Official Journal of ARRL
The national association for AMATEUR RADIO

QST

devoted entirely to

AMATEUR RADIO

September 2000

QST reviews

- MFJ QRP-Cub Transceiver
- Alinco DM-330MV and Diamond GZV4000 power supplies

W5UN's "Mighty Big Antenna"

Build the OCR II receiver

ATV from planes and rockets

The Ross Hull story

$4.99 U.S. $6.99 Can.
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ICOM IC-207H

2M/440MHz Performance at a Single Band Price

ICOM RUGGED
One piece, die cast aluminum chassis makes a large heat sink.

REMOVABLE, REMOTABLE CONTROL HEAD. An optional feature of the '207H lets you separate the control head from the main unit. Only 4.3 inches wide, this little powerhouse is easy to fit on even the most crowded dashboards. Yet, is easy to read.

WORKS ONE BAND AT A TIME. Changing bands is as easy as pressing the large blue band key.

SMALL SIZE, BIG VALUE. ICOM's most affordable mobile dual bander features 50 watts of power (35W UHF), multiple power settings, 182 memory channels, PC programming, and more.

SPECIFICATIONS

Transmit: ..... 2 Meter, 440 MHz (70 CM)
Receive: ..... 118-174 MHz*, 440-450 MHz
Includes Air Band (*guaranteed 144-148 MHz)
Mode: ..... AM (Rx only), FM
Power: ..... 2 Meter: 50W/20W/10W/5W
440 MHz: 35W/20W/10W/5W
Power Supply Requirement: ... 13.8 V DC
Memory Channels: ..... 182 Total,
150 regular, 10 scan edges, 2 call
20 scratch pads
Size (approx): .. 5.5(W) x 1.6(H) x 7.3(D) in.
140(W) x 40(H) x 185.4(D) mm.
Weight (approx): ..... 2 lb, 6 oz /1.17 kg

FEATURES

- **Removable, Remoteable Control Head (optional operation)**
  - Super compact size
  - Big keys, big dials, big bright LCD
  - Optional separation cable required
- **Tone Squelch (CTCSS Encode/ Decode) and Tone Scan Standard**
  - 50 independently programmable tone frequencies for repeater and tone squelch use, respectively
- **Built to Military Specifications (MIL STD) 810 C/D/E shock/vibration**
- **On-Screen Menu "Soft Keys"**
- **Up to 9600 BPS Packet Capable**
- **Fast Scanning**
- **RF Attenuator (Variable)**
- **Auto Repeater Function**
- **Built-in Duplexer**
- **Wireless Mic Operation (optional)**

ONE TOUCH BAND SWITCHING
Easy operation on the go. Work one band at a time.

PACKET CONNECTION PORT
A 6-pin connection point on the back panel is provided for up to 9600 packet operation.

LARGE LCD DISPLAY
Contains "soft keys" menu information, SWR meter, big-sized frequency identification, and more.

50 WATTS
A full 50 watts of output power on 2 meters gives you a commanding on-air presence. 35 watts on 440 MHz.

DTMF MIC
Allows for easy control of most rig functions. Optional wireless mic available.

MIL STD 810 C/D/E VIBRATION

ISO 9002

ISO 9001

PC Ready!

ICOM options required for PC cloning:
CS-207 Cloning Software
OPC-646 Cloning Cable
A third party 6-pin serial cable is required for PC packet connection

WORK THE MAGIC ICOM

The '207H head will fit just about anywhere, whether in a boat, plane, motorcycle, car or truck. Make the IC-207H your next rig! Visit your ICOM dealer today or call our 24-hour free brochure line. 425-450-6088

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Limited Time Offer
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The New Easy to Use IC-718

> ...the IC-718 was very easy to operate with a minimum of "manual" intervention.
> *QST, July 00*

> The ICOM IC-718 offers a nice collection of the more desirable features that are typically absent from transceivers in its price class.
> *QST, July 00*

Whether you're new to HF or just looking for a capable second rig, the IC-718 is for you. It's simple. Buttons for the functions you use the most are prominent and easy to access. Selecting a frequency is as easy as punching in the numbers on the large, well spaced, keypad. And you can quickly tune up or down a band with the auto tuning step feature. It even has a band stacking register to "remember" your last used frequency. It's superior. The '718 features a continually adjustable noise blanker - a feature some high-end rigs don't even have. The IF shift helps reject nearby interference. And with the optional UT-106 installed, you can enhance the superior receiver performance with Digital Signal Processing (DSP). The Auto Notch Filter minimizes noise without compromising receive audio. A full 100 watts (40w AM) of adjustable power keeps you on the air for extended periods. Talk hands-free with the VOX feature. And a built-in keyer for CW enthusiasts. All this and more in a compact, easy to carry little package. Simple. Superior. Piece of cake.

Optional DSP capability. With the optional UT-106 installed, you can enhance the superior receiver performance with Digital Signal Processing (DSP). The IC-718 is the only rig in its price range to offer you the choice!

IC-718 features

- Simple Operation
  - One Touch Band Switching
  - Direct Frequency Input via 10 Button Keypad
  - Auto Tuning Steps (TS). Senses the rate the knob is turned
- Easy to Use Front Panel Controls
- Microphone Compressor
- IF Shift
- 100w of Power (40w on AM)
- Meter Functions (Output Power, ALC, VSWR)
- Built-in Keyer with CW reverse
- VOX
- Large Front Firing Speaker
- Optional FSK Operation
- Adjustable Noise Blanker
- Latest RF & Digital Technology
- Optional DSP with Auto Notch
- Optional Voice Synthesizer

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WORK THE MAGIC
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— Passport to World Band Radio, 1998

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QST

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Technical

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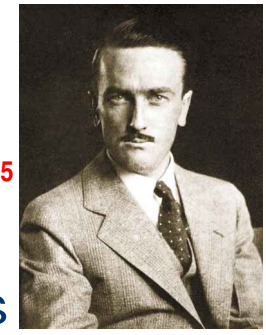

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News and Features

QST (ISSN:0033-4812) is published monthly as its official journal by the American Radio Relay League, 225 Main Street, Newington, CT 06111-1494. ARRL yearly membership dues (including a subscription to *QST*), are $34 worldwide. To compensate for additional postage for mailing outside the US, please remit $47 for Canada and $54 for other countries. Complete membership information is shown on page 5. Periodicals postage paid at Hartford, CT, and at additional mailing offices.

POSTMASTER: Form 3579 requested. Send address changes to:
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QST Workbench

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AIR PHOTO, INC

Our Cover
A view from the air is the only way to capture the true enormity of W5UN's "Mighty Big Antenna." This massive moonbounce array is capable of generating up to 1.5 million watts ERP. You'll find complete details on page 28 of this issue.

Operating

Departments

Membership in the ARRL, including a subscription to *QST*, is available to individuals at the following rates: $34 per year in the US and possessions, $47 Canada, $54 elsewhere, payable in US funds. Age 65 and over, with proof of age, $28 (US only). Licensed radio amateurs age 21 and under may qualify for special rates; write for application. Life membership is also available. Membership and *QST* cannot be separated. Fifty percent of dues is allocated to *QST*, the balance for membership. Sub-scription rate for libraries and institutions: $34 per year postpaid in the US and possessions, $47 Canada, $54 elsewhere. Single copies $5 in the US.

Membership without *QST* is available to the immediate family of a member living at the same address, and to anyone who is legally blind, for $5 per year.

Foreign remittances should be by international postal or express money order or bank draft negotiable in the US and for an equivalent amount in US funds.

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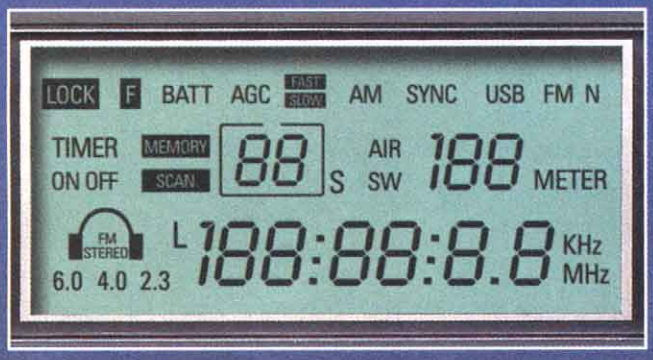
GRUNDIG The Ultimate in



The LCD
Big! Bold! Brightly Illuminated 6" by 3½".
Liquid Crystal Display shows all important data: Frequency, Meter band, Memory position, Time, LSB/USB, Synchronous Detector and more.

The Signal Strength Meter
Elegant in its traditional Analog design, like the gauges in the world's finest sports cars. Large. Well Lit. Easy to read.

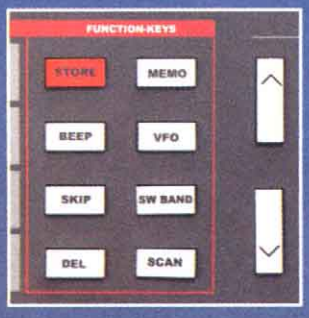
The Frequency Coverage
Longwave, AM and shortwave: continuous 100-30,000 KHz. FM: 87-108 MHz VHF Aircraft Band: 118-137 MHz.

The Tuning Controls
• For the traditionalist: a smooth, precise tuning knob, produces no audio muting during use.

Ultra fine-tuning of 50Hz on LSB/USB, 100Hz in SW, AM and Aircraft Band and 20 KHz in FM.
• For Fixed-step Tuning: Big, responsive Up/Down tuning buttons.
• For direct frequency entry: a responsive, intuitive numeric keypad.

THESE ARE THE SATELLIT 800 MILLENNIUM'S MAJOR FEATURES. FOR A DETAILED SPECIFICATION SHEET, CONTACT GRUNDIG.

Digital Technology



The Operational Controls
Knobs where you want them; Buttons where they make sense. The best combination of traditional and high-tech controls.

The Sound
Legendary Grundig Audio Fidelity with separate bass and treble controls, big sound from its powerful speaker and FM-stereo with the included high quality headphones.

The Technology
Today's latest engineering:
- Dual conversion superheterodyne circuitry.
- PLL synthesized tuner.

The Many Features
- 70 user-programmable memories.
- Two, 24 hour format clocks.
- Two ON/OFF sleep timers.
- Massive, built-in telescopic antenna.
- Connectors for external antennas – SW, AM, FM and VHF Aircraft Band.
- Line-out, headphone and external speaker jacks.

The Power Supply
A multi voltage (110, 220V) AC adapter is included. Also operates on 6 size D batteries. (not included)

Dimensions: 20.5" L × 9" H × 8" W

Weight: 14.50 lbs.

by GRUNDIG

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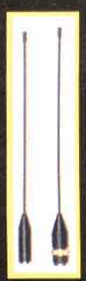
RD-9 Flexible Duck Antenna: The RD-9 is an extremely thin, extremely flexible 7" tall rubber duck that will improve your handheld radio's performance on both Two Meters and 440 MHz. The antenna has either a BNC (protected by a rubber moisture shield) or a SMA connector, and is molded to sit firmly on your radio's connector, preventing excessive wear and tear.



As low as
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PMC-100 Desk Microphone: The new PRYME PMC-100 desk mic features a flexible, metal gooseneck mic for desktop use. It has both momentary and locking Push-To-Talk keys. An audio gain control is included on the microphone for matching the output of the microphone correctly to the radio. Select either FM mode for voice clarity, or SSB mode for that extra punch when needed. Pre-wired mic cable optional.

SPM-300 Series lapel mics: The SPM-300 is a microphone / PTT switch combo which is meant to be worn on the user's collar or lapel. The SPM-300 features heavy duty coiled cable for better durability. The SPM-300 is available with either a clear colored earphone and flesh colored cable for low profile operation or with a black earphone and cable. The earphone is available in either earbud or our patented ear hook design for extra comfort.

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"IT SEEMS TO US..."

Amateur Radio Resources for Learning

One of the finest features of Amateur Radio is that it provides a lifelong framework for learning. This year, the ARRL Board of Directors has committed our organization to two important initiatives to provide improved educational opportunities through Amateur Radio.

The first, the ARRL Certification and Continuing Education Program, was launched at the January meeting of the Board. Targeted at licensees who are seeking challenges beyond those offered within the FCC licensing structure, the program was designed to develop from the bottom up through active member participation. That is exactly what has occurred, as reported by Dan Miller, K3UFG, in last month's *QST*.

I readily admit to being pleasantly surprised at the initial direction in which members decided to take the program: improving emergency communications skills. It is good to know that as a group, we are not overly impressed with ourselves in this field. Amateurs' willingness to assist knows no limits, but skills are another matter. Thanks to the hard work of dedicated volunteers, radio amateurs soon will be able to learn what they need to know to be effective public-service communicators in the new millennium and will receive recognition for what they learn.

Once the pilot project in basic emergency communications is complete, the Certification and Continuing Education Program will move on to address other technical and operating topics. There are many possibilities as to what could be next – the sky is no limit!

The second educational initiative was described vividly to the Board at its July meeting by Vice President Kay Craigie, WT3P. The ARRL Amateur Radio Education Project seeks to help teachers meet national educational standards in such subjects as geography, language arts, mathematics, electronics, and physics by providing them with Amateur Radio resources. Teachers throughout the country have discovered effective ways of employing Amateur Radio to educate their students; the mission of the Education Project is to introduce more teachers to the use of Amateur Radio as a teaching strategy and to put the necessary resources into the hands of those who want to do so.

The success of the Education Project will not be measured solely by the number of young amateur licensees. Vice President Craigie identified a number of other, even more compelling reasons for the ARRL to launch this program. Kids who enjoy a positive experience with Amateur Radio will remember that when they grow up – and we can never have too many friends! American society needs better-educated citizens. American industry needs better-educated employees. Simply put, everybody wins.

The ARRL Board clearly understands that adopting a motion does not make a program. Many different kinds of resources will be required before we can say the Education Project is a reality. Some already exist. For example, we know there are teachers who are interested because they have said so at teachers' conventions. We know there are willing volunteers, both as individuals and in radio clubs, although there will always be room for more. Some publications are ready to be placed on teachers' bookshelves; more will be needed. Radio equipment exists in wide variety, but it's not all designed to withstand the rigors of the classroom or to be placed in young, unskilled hands. Anything put into a school will have to be demonstrated to be unconditionally safe. Teachers' handbooks and sourcebooks, curricula, lesson plans, and exercises suitable for different ages and grades will need to be developed. To make all this happen, professional educators will need to be involved and additional ARRL staff will be required.

This is a big project. In fact, that was the name President Haynie first gave it: The Big Project. It is well beyond the scope of the ARRL's present capabilities. Yet, if we are to go beyond our present limits we have to begin somewhere. So, following President Haynie's leadership and Vice President Craigie's blueprint, that is what the Board has done: to take the single step with which every journey must begin. The next big step is to secure funding from private and corporate sponsors.

As Vice President Craigie summed it up so well, the ARRL believes in the value of Amateur Radio in education. It is time to demonstrate that belief by committing our name and our reputation to fostering increased and improved use of Amateur Radio in the classroom.

It is time because we are about to open an exciting new chapter of Amateur Radio in space, aboard the International Space Station and with the Phase 3D satellite. It is time because the FCC has modernized the amateur licensing requirements. It is time because employers are desperate for workers who understand wireless communications technology. It is time because Amateur Radio needs a higher and more positive profile among young people.

We do not have to wait until the next disaster to serve the public interest.—*David Sumner, K1ZZ*

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If you have a question, try one of these Headquarters departments . . .

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Subject: **Info Request**
In the body of your message enter:

HELP
SEND INDEX
QUIT

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- Our on-line Web magazine, the *ARRLWeb Extra* with colorful news and features you *won't* see in *QST*.
- *QST* Product Review Archive. Get copies of *QST* product reviews from 1980 to the present.
- *QST/QEX* searchable index (find that article you were looking for!)
- Previews of contest results and product reviews. See them here before they appear in *QST!*
- Access to your information in the ARRL membership database. Enter corrections or updates on line!

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BERNIE FULLER, N3EFN
17668 Price Rd, Saegertown, PA 16433
(814-763-1529);
n3efn@arrl.org

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

Central Division

EDMOND A. METZGER, W9PRN
1917 Lindsay Rd, Springfield, IL 62704
(217-546-6870);
w9prn@arrl.org

Vice Director: Howard S. Huntington, K9KM, 25350 N Marilyn Ln, Hawthorn Woods, IL 60047 (847-438-3452);
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
PO Box 1463, Little Rock, AR 72203
(501-988-2527); k5ur@arrl.org

Vice Director: Henry R. Leggette, WD4Q, 7335 Ginger Snap Cove, Memphis, TN 38125-4732
(901-757-0444); wd4q@arrl.org

Great Lakes Division

GEORGE RACE, WB8BGY
3865 Gibbs Rd, Albion, MI 49224
(517-531-4758);
wb8bgy@arrl.org

Vice Director: Gary L. Johnston, KI4LA, 3056 Hergott Dr, Edgewood, KY 41017-3377
(859-341-7477); ki4la@arrl.org

Hudson Division

FRANK FALLON, N2FF*
30 E Williston Ave, East Williston, NY 11596 (516-746-7652);
n2ff@arrl.org

Vice Director: J. P. Kleinhaus, W2XX
PO Box 322, Shrub Oak, NY 10588-0322 (914-528-1604);
w2xx@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
233 N Columbus St, Arlington, VA 22203 (703-243-3743);
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: Marshall Quiat, AG0X PO Box 200878, Denver, CO 80220-0878 (303-331-3456);
ag0x@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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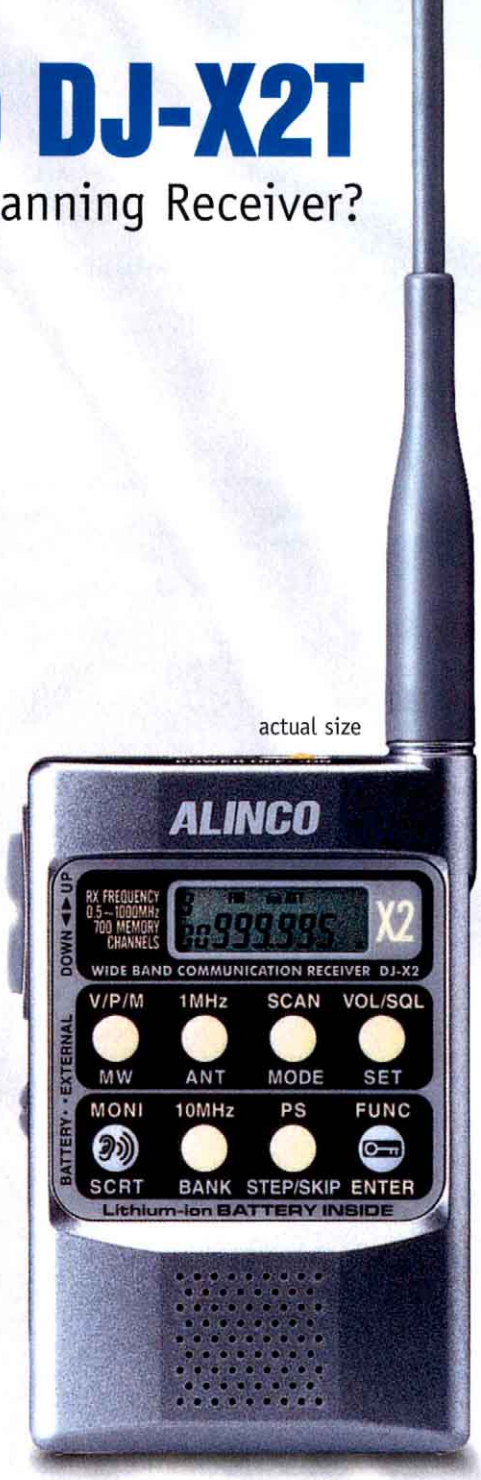

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Delaware — Randall K. Carlson, WB0JJX, 121 Scarborough Park Dr, No 10, Wilmington, DE 19804 (302-655-6179); **wb0jjx@arrl.org**

Eastern Pennsylvania — Allen R. Breiner Sr, W3TI, 212 Race St, Tamaqua, PA 18252 (570-668-3098); **w3ti@arrl.org**

Maryland-DC — William Howard, WB3V, 2304 Snowflake Dr, Odenton, MD 21113 (410-551-6775); **wb3v@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, N0FKU, 8539 Bryant Ave S, Bloomington, MN 55420-2147 (612-888-5953); **n0fku@arrl.org**

North Dakota — Roger "Bill" Kurtti, WC0M, RR1, Box 34, Rock Lake, ND 58365 (701-266-5646); **wc0m@arrl.org**

South Dakota — Roland Cory, W0YMB, 815 2nd Ave W, Mobridge, SD 57601 (605-845-2400); **w0ymb@arrl.org**

Delta Division

Arkansas — Roger Gray, N5QS, PO Box 166, Searcy, AR 72145 (501-729-5489); **n5qs@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 — Bill Uschan, K4MIS, 800 Leawood Dr #27, Frankfort, KY 40601 (502-226-6784); **k4mis@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 — Robert Leiden, KR2L, 19 Willowbrook Rd, Glenville, NY 12302 (518-399-9343); **kr2l@arrl.org**

NYC-Long Island — George Tranos, N2GA, PO Box 296, Bellport, NY 11713, (631-286-7562); **n2ga@arrl.org**

Northern New Jersey — Jeffrey M. Friedman, K3JF, 1 Churchill Dr, Succasunna, NJ 07876-1803 (973-927-8182); **k3jf@arrl.org**

Midwest Division

Iowa — Jim Lasley, N0JL, PO Box 5, Chillicothe, IA 52548 (515-935-4337); **n0jl@arrl.org**

Kansas — Orlan Q. Cook, W0OYH, 12110 West 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 — Joel M. Magid, WU1F, 47 Drumlin Hill Rd, Groton, MA 01450 (978-448-5678); **wu1f@arrl.org**

Maine — William Woodhead, N1KAT, 63 1st Ave, Auburn, ME 04210 (207-782-4862); **n1kat@arrl.org**

New Hampshire — Michael Graham, K7CTW, 50 Joppa Dr, Merrimack, NH 03054 (603-424-6987); **k7ctw@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 (802-482-4280); **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, 2229 Turnagain Parkway, Anchorage, 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, 9832 W Gurdon Ct, Boise, ID 83704-4080 (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 Joaquin Valley — Donald Costello, W7WN, 1900 N Ashby Rd, No. 9, Merced, CA 95348 (209-383-5739); **w7wn@arrl.org**

Santa Clara Valley — Glenn Thomas, WB6W, 502 Walnut Dr, Milpitas, CA 95035-4133 (408-263-9450); **wb6w@arrl.org**

San Francisco — Leonard Gwinn, WA6KLK, 2960 Blackhawk Dr, Willits, CA 95490-9704; **wa6klk@arrl.org**

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 — Lynn Gahagan, AF4CD, 208 Velva Dr, Chesapeake, VA 23325 (757-545-1290); **af4cd@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, 1641 Baywinds Ln, Sarasota, FL 34231-3040; (941-923-1688) **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 (619-475-7333); **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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B-5016-G
$299
Suggested Retail

The MIRAGE B-5016-G gives you 160 Watts of brute power for 50 Watts input on all modes -- FM, SSB, or CW!

Ideal for 20 to 60 Watt 2 Meter mobile or base. *Power Curve* chart shows typical output power.

Hear weak signals -- low noise GaAsFET preamp gives you excellent 0.6 dB noise figure. Select 15 or 20 dB gain.

B-5016-G has legendary ruggedness. *We know of one that has been in constant use since 1979!*

Heavy-duty heatsink spans entire length of cabinet -- prevents overheating. Power transistors protected by MIRAGE's *Therm-O-Guard*™.

Fully protected from high SWR and excessive input power. Has warning LED.

Has smooth adjustable Transmit/Receive switching with remote external keying.

Draws 17-22 Amps at 13.8 VDC. 12x3x5½ in.

RC-1B, $45. Remote Control. On/Off, preamp On/Off, selects SSB/FM. With 18 foot cable.

Power Curve -- typical B-5016-G output power

Watts Out	130	135	140	145	150	155	160	165
Watts In	20	25	30	35	40	45	50	55

More 160 Watt, 2 Meter Amplifiers . . .

B-2516-G, $299. For 10 to 35 Watt mobile or base stations. 160 Watts out for 25 Watts in.

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B-1016-G Great for ICOM IC-706!

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100 Watts for 2 Meter HTs

B-310-G
$199
Suggested Retail
MIRAGE RUGGED!

Power Curve -- typical B-5016-G output power

Watts Out	25	50	75	95	100	100	100	100
Watts In	¼	½	1	2	4	6	7	8

- ***100 Watts out with all handhelds up to 8 Watts***
- ***All modes: FM, SSB, CW***
- ***Great for ICOM IC-706***
- ***15 dB low noise GaAsFET preamp***
- ***Reverse polarity protection***
- ***SWR Protection***
- ***FREE mobile bracket***
- ***Auto T/R Switch***
- ***FREE handheld BNC to B-310-G patch cable***
- ***Ultra-compact 4¾x1¾x7¼ inches, 2½ pounds***
- ***One year MIRAGE warranty***

***Boost** your 2 Meter handheld to 100 Watts!* Ultra-compact all mode B-310-G amp is perfect for all handhelds up to 8 Watts and multimode SSB/CW /FM 2 Meter rigs. *Great for ICOM IC-706!*

35 Watts for 2 Meter HTs

B-34-G
$89.95
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Power Curve -- typical B-5016-G output power

Watts Out	18	30	33	35	35	35	35+
Watts In	1	2	3	4	5	6	8

- ***35 Watts Output on 2 Meters***
- ***All modes: FM, SSB, CW***
- ***18 dB GaAsFET preamp***
- ***Reverse polarity protection***
- ***Includes mobile bracket***
- ***Auto RF sense T/R switch***
- ***Custom heatsink, runs cool***
- ***Works with handhelds up to 8 Watts***
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35 Watts, FM only . . . $69.95

B-34, $69.95. 35 Watts out for 2 Watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

MIRAGE Dual Band 144/440 MHz Amp

BD-35
$159.95
Suggested Retail

Power Curve -- typical B-5016-G output power

Watts Out 2 Meters	30	40	45	45	45	45	45+
Watts Out 440 MHz	16	26	32	35	35	35	35+
Watts In	1	2	3	4	5	6	7

- ***45 Watts on 2 Meters/35 Watts on 440 MHz***
- ***Auto Band Selection***
- ***Auto T/R Switch***
- ***Full Duplex Operation***
- ***5x1¾x5 inches***
- ***FREE mobile bracket***
- ***"On Air" LEDs***
- ***Single Connector for dual band radios and antennas***
- ***Reverse polarity protection***
- ***Works with all FM handhelds to 7 Watts***
- ***One year MIRAGE warranty***

Add this Mirage dual band amp and boost your handheld to a powerful mobile or base -- 45 Watts on 2 Meters or 35 Watts on 440 MHz! Mirage's exclusive *FullDuplexAmp*™ lets you talk on one band and listen on the other band at the same time -- just like a telephone conversation. *(Requires compatible HT).*

6 Meter Amplifier

FCC Type Accepted

The A-1015-G, $389, is the *world's most popular* all mode FM/SSB/CW 6 Meter amplifier. 150 Watts out for 10 in. For 1 to 15 Watt transceivers.

70 cm Amplifiers (420-450 MHz)

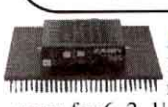
D-3010-N, $365 -- 100 W out/30 in. For 5 to 45 Watt *mobile/base*. **D-1010-N, $395**, 100 W out/10 in. *Dual purpose* -- for handhelds or mobile/base. **D-26-N, $269**, 60 W out/2 in, for *handhelds*.

Amateur TV Amps

Industry standard ATV amps -- **D-1010-ATVN, $414**, 82 Watts PEP out / 10 in. **D-100-ATVN, $414**, 82 Watts PEP out/2 in. (without sync compression).

Remote Control Head for Amps

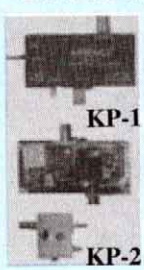
RC-1, $45, remote controls most MIRAGE amps. Check with Mirage for compatibility. Power On/Off. preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). Tiny 1¾x3¾x2½ inches.



Repeater Amps

11 models -- continuous duty all mode FM/SSB/CW repeater amps for 6, 2, 1¼ Meters, 70 cm, 450 MHz, ATV.

Low noise GaAsFET preamps



High gain ultra low noise GaAsFET preamps for receiving weak signals. Selectable gain prevents receiver intermod. 15 to 22 dB gain. Less than 0.8 dB noise figure. Automatic RF switching up to 100 Watts.

Choose *In-Shack* model or *Mast Mount* (includes remote control) model to reduce loss. Rugged die-cast enclosure.

Frequency (MHz)	In Shack $139	Mast Mount $195
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50-54	KP-1/6M	KP-2/6M
144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

1¼ Meter Amps (223-225 MHz)

Choose from 10 models -- 20 to 220 Watts out for 2 to 50 Watts in, $129 to $655.

Commercial Amps ($199 to $395)

FCC Type Accepted

Commercial Amps for 150-174, 450-470 MHz and VHF marine bands, 70-130 Watts out.

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Read SWR directly and Forward/Reverse, Peak/Average power. Remote coupler. 1.8-30, 50-200, 420-450, 1260-1300 MHz band models.

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APRS® (Automatic Packet/Position Reporting System)

- **Position/directional data**
  With an NMEA-0183 compatible GPS receiver you can transmit position data for automatic calculation of distance, current speed and heading. Last 4 digits can be masked for position ambiguity. Manual input of latitude/longitude is also possible.
- **Versatile messaging**
  Transmission of position data can be accompanied by a choice of programmable status text (up to 28 characters), position comments (15 settings), icons and bulletins. For added messaging flexibility, individual alpha messages (up to 64 characters) can also be sent.
- **Station list**
  Store received APRS® data in up to 40 station reports.
- **Grid square locator**
  Position data is displayed on the grid square locator for visible reference.
- **BCON TX interval (0.2/0.5/1/2/3/5/10/20/30 min.)**
- **Packet path selection for Digipeat**
- **Weather station & PHG data reception**
- **Digipeat station and DIGI function capability**
- **Auto Message Reply**
- **Audible APRS® message receive (call sign) notification (requires VS-3)**
- **Waypoint position data output**

FEATURES

◗ Full Dual-band operation: VHF x VHF/VHF x UHF/UHF x UHF ◗ Wide-band receive: 118–524, 800–1300 MHz (excluding cellular blocked + frequencies) ◗ Detached panel (extension cable and panel holder supplied) with extra-large (188 x 54 dots) backlit LCD and multifunction key display (reversible) ◗ Improved key operation announcement with optional VS-3 voice synthesizer ◗ Built-in 1200/9600bps TNC compliant with AX.25 protocol and KISS mode ◗ Simplified packet monitoring ◗ SSTV functions with Fast FM for transmission of images in just 14 secs (approx.) and dual receive for voice and image transmissions (two frequencies simultaneously) ◗ 200 memory channels with 8-character memory name input ◗ Up to 10 programmable memory scan banks ◗ Easy-to-use menu system similar to the TH-D7A ◗ Built-in DCS (Digital Code Squelch) and CTCSS encode and decode ◗ CTCSS tone frequency scan ◗ DCS code scan ◗ 9600bps PC-based packet communications for chat, BBS ◗ DX packet cluster monitoring ◗ Cross-band repeater ◗ Wireless remote controller ◗ 1750Hz tone burst ◗ D-sub 9 pin terminal (for PCs) ◗ GPS input terminal (NMEA-0183) ◗ Visual band scope ◗ Mute function ◗ Memory control program available via Internet access ◗ New backlit microphone with alphanumeric message input.

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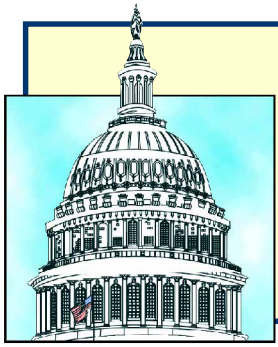

DC Currents

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.

Prospects for Amateur Spectrum Bill Unclear as Adjournment Looms

With just days left until the adjournment of the 106th Congress, prospects for the Amateur Radio Spectrum Protection Act in the House and Senate remain murky, at best. While the House Commerce Committee seems to have wrapped up its work for the year and is very unlikely to take up the bill at this late date, there is still some hope that the bill could move on the Senate side. Prospects were considerably enhanced over the summer with the decision of Senate Telecommunications Subcommittee Chairman Conrad Burns to sign on as a cosponsor.

The ARRL has worked hard to try to move the bill. During the 106th Congress we either visited or attempted to set up appointments with virtually every Representative and Senator. All told, we got to meet with the staff of roughly 300 Representatives and about 60 Senators. As we go to press, 162 members of the House have cosponsored HR.783, and 10 Senators have cosponsored S.2183 (see list on page 16).

Letters from ARRL members to their own members of Congress have contributed greatly to our success in getting cosponsors on these bills. ARRL members who want to ensure that their own Representatives and Senators are cosponsors should examine the list below, organized by state. If you see you Representative or Senator's name, you might wish to write a brief letter of thanks. If the name is not there, you might want to write a letter requesting cosponsorship. But don't wait! Congress is scheduled to adjourn the first week of October. If Congress adjourns without addressing these bills, a substantial number of cosponsors could give reintroduction a boost next session.

A sample letter and links to congressional addresses may be found on the ARRL Web site at **http://www.arrl.org/govrelations/hr783.html**.

Driving While Cellular Stays in the News

♦ Today, at least two dozen state legislatures are considering legislation that would affect the use of cellular telephones and other devices while driving. Bans are also being considered in many municipalities. California, Massachusetts and Florida currently have laws limiting cell phone use in automobiles, but no state has a ban.

The scope of the new bills ranges from simple requirements to report on the accident form if a cellular phone is involved to outright bans on talking on cellular phones while driving. (For additional details, see "DC Currents," March and April 2000). However, some new developments on the horizon might have some effect on the deliberations. For example, The National Highway Traffic Safety Administration is now conducting a series of initiatives to gather more information on the potential safety implications associated with a variety of driver distractions including new technology for in-vehicle phones, fax, E-mail, route guidance, heads-up displays, multimedia entertainment systems, and Internet use. The agency held a public hearing in July, and has set up an Internet forum for further information gathering. In her opening remarks at that hearing, Rosalind G. Miller, Deputy Director of the agency, said, "we are experiencing a dramatic change in driver behavior. Every day, you see more and more drivers using wireless phones. It is hard to ignore that wireless phone use is increasing at an exploding rate. We can expect a similar pattern for other devices. It follows—and it is illogical to suggest otherwise—that increasing distractions increase the risk and lead to unintended consequences.

"If we underestimate this potential risk to highway traffic safety and do not moderate drivers' use of in-vehicle systems, the price may be very steep, indeed."

The Web site can be found at **http://www.driverdistraction.org**.

In other news on the driving-while-cellular front, a Bucks County (Pennsylvania) judge has overturned an ordinance limiting the use of cellular phones while driving in Hilltown Township. The ordinance was enacted after a child was killed by a driver whose attention was distracted by talking on a cellular phone. Judge David Heckler ruled that the ordinance "pre-empted" the state motor vehicle code.

FCC SAYS WIRELESS BUREAU BACKLOG VIRTUALLY ELIMINATED

The FCC's Wireless Bureau says that the bureau has reduced by 99% the paperwork backlog that once plagued the bureau. According to Bureau Chief Thomas Sugrue, quoted in an FCC news release, "the combination of streamlining efforts, improved tracking systems, creative use of technology and plain hard work by staff have enabled us to effectively eliminate our backlog." Sugrue adds that the bureau now has a system in place to prevent backlogs from developing in the future.

The Wireless Bureau's functions include all domestic wireless telecommunications programs and policies, including overseeing Amateur Radio licensing and regulatory functions. At the end of 1998, the bureau had a backlog of pending applications, rulemakings and other administrative items of about 64,000. The FCC's backlog of work at one point became a bone of political contention on Capitol Hill, with high placed lawmakers such as Senator John McCain (R-AZ) demanding that the FCC take action to solve its paperwork problems.

The FCC says that the proliferation of wireless technology results in more than 2 million licenses and 400,000 other applications annually.

Cosponsors for S.2183

Introduced by Senator Michael D. Crapo (R-ID)

Sen. Daniel K. Akaka (D-HI)
Sen. Conrad R. Burns (R-MT)
Sen. Susan M. Collins (R-ME)
Sen. Larry E. Craig (R-ID)
Sen. Rod Grams (R-MN)
Sen. Jesse Helms (R-NC)
Sen. Blanche Lincoln (D-AR)
Sen. Bob Smith (R-NH)
Sen. Olympia J. Snowe (R-ME)
Sen. Ron Wyden (D-OR)

Cosponsors for HR.783

Introduced by Rep. Michael Bilirakis (R-FL-9th)

(Number in parentheses following state name indicates number of congressional districts in that state)

Alabama (7)
Rep. Sonny Callahan (R-1st)
Rep. Bob Riley (R-3rd)
Rep. Robert B. Aderholt (R-4th)
Rep. Robert E. (Bud) Cramer, Jr. (D-5th)

Alaska (1)
(No cosponsors)

Arizona (6)
Rep. Ed Pastor (D-2nd)
Rep. Bob Stump (R-3rd)
Rep. Jim Kolbe (AZ-5th)
Rep. J.D. Hayworth (R-6th)

Arkansas (4)
Rep. Vic Snyder (D-2nd)
Rep. Asa Hutchinson (R-3rd)

California (52)
Rep. John Doolittle (R-4th)
Rep. George Miller (D-7th)
Rep. Barbara Lee (D-9th)
Rep. Fortney Pete Stark (D-13th)
Rep. Tom Campbell (R-15th)
Rep. Sam Farr (D-17th)
Rep. Brad Sherman (D-24th)
Rep. James E. Rogan (R-27th)
Rep. Matthew Martinez (D-31st)
Rep. Grace F. Napolitano (D-34th)
Rep. George E. Brown (D-42nd)
Rep. Ken Calvert (R-43rd)
Rep. Brian Bilbray (R-49th)
Rep. Bob Filner (D-50th)
Rep. Duncan Hunter (R-52nd)

Colorado (6)
Rep. Bob Schaffer (R-4th)

Connecticut (6)
Rep. Sam Gejdenson (D-2nd)
Rep. Christopher Shays (R-4th)
Rep. Nancy L. Johnson (R-6th)

Delaware (1)
(No cosponsors)

Florida (23)
Rep. Karen L. Thurman (D-5th)
Rep. Charles T. Canady (R-12th)
Rep. Porter J. Goss (R-14th)
Rep. Dave Weldon (R-15th)
Rep. Mark Foley R-16th)

Georgia (11)
Rep. Sanford D. Bishop, Jr. (D-2nd)
Rep. Johnny Isakson (R-6th)
Rep. Nathan Deal (R-9th)

Hawaii (2)
Rep. Neil Abercrombie (D-1st)
Rep. Patsy T. Mink (D-2nd)

Idaho (2)
Rep. Michael K. Simpson (R-2nd)

Illinois (20)
Rep. William O. Lipinski (D-3rd)
Rep. Luis V. Gutierrez (D-4th)
Rep. Danny K. Davis (D-7th)
Rep. Jerry Weller (R-11th)
Rep. Jerry F. Costello (D-12th)
Rep. Donald A. Manzullo (R-16th)
Rep. Ray LaHood (R-18th)
Rep. David D. Phelps (D-19th)

Indiana (10)
Rep. Tim Roemer (D-3rd)
Rep. Stephen E. Buyer (R-5th)
Rep. Dan Burton (R-6th)
Rep. Baron P. Hill (D-9th)

Iowa (5)
Rep. James A. Leach (R-1st)
Rep. Leonard Boswell (D-3rd)

Kansas (4)
Rep. Dennis Moore (D-3rd)

Kentucky (6)
Rep. Ed Whitfield (R-1st)
Rep. Anne Northup (R-3rd)
Rep. Kenneth R. Lucas (D-4th)

Louisiana (7)
Rep. Richard H. Baker (R-6th)

Maine (2)
Rep. Thomas H. Allen (D-1st)
Rep. John E. Baldacci (D-2nd)

Maryland (8)
Rep. Wayne T. Gilchrest (R-1st)
Rep. Constance A. Morella (R-8th)
Rep. Roscoe G. Bartlett (R-6th)

Massachusetts (10)
Rep. James P. McGovern (D-3rd)
Rep. John Tierney (D-6th)

Michigan (16)
Rep. Vernon J. Ehlers (R-3rd)
Rep. James A. Barcia (D-5th)
Rep. Debbie Stabenow (D-8th)
Rep. Dale E. Kildee (D-9th)
Rep. David E. Bonior (D-10th)
Rep. John Conyers (D-14th)

Minnesota (8)
Rep. David Minge (DFL-2nd)
Rep. Jim Ramstad (R-3rd)
Rep. Bruce M. Vento (DFL-4th)
Rep. Bill Luther (DFL-6th)
Rep. Collin C. Peterson (DFL-7th)

Mississippi (5)
Rep. Chip Pickering (R-3rd)
Rep. Ronnie Shows (D-4th)

Missouri (9)
Rep. James M. Talent (R-2nd)
Rep. Ike Skelton (R-4th)
Rep. Jo Ann Emerson (R-8th)

Montana (1)
Rep. Rick Hill (R-at large)

Nebraska (3)
Rep. Lee Terry (R-2nd)

Nevada (2)
(No cosponsors)

New Hampshire (2)
(No cosponsors)

New Jersey (13)
Rep. Marge Roukema (R-5th)
Rep. Frank Pallone, Jr. (D-6th)
Rep. Bill Pascrell (D-8th)
Rep. Steven R. Rothman (D-9th)
Rep. Rodney P. Frelinghuysen (R-11th)

New Mexico (3)
Rep. Tom Udall (D-3rd)

New York (31)
Rep. Peter T. King (R-3rd)
Rep. Joseph Crowley (D-7th)
Rep. Major Owens (D-11th)
Rep. Sue Kelly (R-19th)
Rep. Benjamin A. Gilman (R-20th)
Rep. Michael R. McNulty (D-21st)
Rep. Sherwood L. Boehlert (R-23rd)
Rep. John M. McHugh (R-24th)
Rep. James Walsh (R-25th)
Rep. Maurice D. Hinchey (D-26th)
Rep. Louise M. Slaughter (D-28th)
Rep. Amo Houghton (R-31st)

North Carolina (12)
Rep. Bob Etheridge (D-2nd)
Rep. Walter B. Jones, Jr. (R-3rd)
Rep. David E. Price (D-4th)
Rep. Mike McIntyre (D-7th)
Rep. Charles H. Taylor (R-11th)

North Dakota (1)
(No cosponsors)

Ohio (19)
Rep. Tony P. Hall (D-3rd)
Rep. Michael G. Oxley (R-4th)
Rep. Paul Gillmor (R-5th)
Rep. Ted Strickland (D-6th)
Rep. David L. Hobson (R-7th)
Rep. Marcy Kaptur (D-9th)
Rep. Sherrod Brown (D-13th)
Rep. Deborah Pryce (R-15th)
Rep. James A. Traficant, Jr. (D-17th)
Rep. Robert W. Ney (R-18th)
Rep. Steve C. LaTourette (R-19th)

Oklahoma (6)
(No cosponsors)

Oregon (5)
Rep. Greg Walden (R-2nd)
Rep. Earl Blumenauer (D-3rd)
Rep. Peter A. DeFazio (D-4th)

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Rep. Ron Klink (D-4th)
Rep. John E. Peterson (R-5th)
Rep. Tim Holden (D-6th)
Rep. Curt Weldon (R-7th)
Rep. John P. Murtha (D-12th)
Rep. Joseph M. Hoeffel (D-13th)
Rep. William J. Coyne (D-14th)
Rep. Patrick J. Toomey (R-15th)
Rep. Michael F. Doyle (D-18th)

Rhode Island (2)
(No cosponsors)

South Carolina (6)
Rep. Jim DeMint (R-4th)

South Dakota (1)
(No cosponsors)

Tennessee (9)
Rep. William L. Jenkins (R-1st)
Rep. John J. Duncan, Jr. (R-2nd)
Rep. Bob Clement (D-3rd)

Texas (30)
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Rep. Pete Sessions (R-5th)
Rep. Nick Lampson (D-9th)
Rep. William Mac Thornberry (R-13th)
Rep. Charles W. Stenholm (D-17th)
Rep. Larry Combest (R-19th)
Rep. Martin Frost (D-24th)
Rep. Ken Bentsen (D-25th)

Utah (3)
(No cosponsors)

Vermont (1)
Rep. Bernard Sanders (I-At Large)

Virginia (11)
Rep. Owen B. Pickett (D-2nd)
Rep. Norman Sisisky (D-4th)
Rep. Virgil H. Goode, Jr. (D-5th)
Rep. Rick Boucher (D-9th)
Rep. Frank R. Wolf (R-10th)
Rep. Thomas M. Davis (R-11th)
Rep. James P. Moran (D-8th)

Washington (9)
Rep. Richard "Doc" Hastings (R-4th)
Rep. George R. Nethercutt, Jr. (R-5th)
Rep. Norman D. Dicks (D-6th)
Rep. Jennifer Dunn (R-8th)

West Virginia (3)
Rep. Robert E. Wise, Jr. (D-2nd)
Rep. Nick J. Rahall (D-3rd)

Wisconsin (9)
Rep. Ron Kind (D-3rd)

Wyoming (1)
Rep. Barbara Cubin (R-1st)

American Samoa (1)
(No cosponsors)

District of Columbia (1)
(No cosponsors)

Guam (1)
Robert A. Underwood (D-delegate)

Puerto Rico (1)
(No cosponsors)

Virgin Islands (1)
Donna Christian-Christensen
D-delegate)

Media Hits

• The Allentown, PA *Morning Call* reported about the fun had by Schnecksville Elementary School students who used ham radio to make contact with cosmonauts aboard the *Mir* space station. An on-the-scene translator translated their questions (and the answers from space). The students made the contact from their own space station mockup.

• Classroom ham radio activities were also featured in the *Madison County News Democrat*, from Belleville, Illinois. Sixth grade teacher Joyce Wilhelm, N9STL, has been using ham radio to let students contact hams in other states to learn about how others live. Also quoted in the article was Bob Heil, K9EID, who discussed the upcoming Field Day and its role in preparing for emergency communication.

• Darrell Toland, N5REO, explained how East Texas hams help the national Weather Service spot severe weather as part of their activities with the SKYWARN program. The story appeared in the *Longview News-Journal*, of Longview, Texas.

• The *Wilmington Morning Star* of Wilmington, North Carolina, covered all the bases on ham radio with a full page article on the various clubs and Amateur Radio activities going on in the Southeastern part of the state. Among the hams mentioned were Bill Morine, N2COP; John Brier, KG4AKV; Harvey Hutchison, NK0S; Bill Wetherhill, N2WG; Linda Tate, AC4CJ; Bill Murrell, AD4DN and Mark Hudson, N1KFC.

• Some Amherst, Ohio teenagers got onto the police airwaves with stolen radios and said some things they later regretted, including cussing out the police and bragging about smoking pot. They also interfered with a robbery investigation. According to *The Cleveland Plain Dealer*, their illegal broadcast careers were brought to a grinding halt with the assistance of ham operator Todd Dunlap, KC8EDS, who called police and offered to use his skills to track down the teens. They took him up on his offer and the radio brigands were captured.

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HAM-IV, $529.95. *The heavy duty Ham-IV is the most popular rotator in the world!* It is designed for medium size antenna arrays up to 15 square feet wind load area when mounted in-tower, or 7.5 square feet when mast mounted with an optional lower mast bracket. New alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. New low temperature grease permits normal operation down to -30 degrees Fahrenheit. New wire-wound potentiometer gives reliable and precision directional indication, new ferrite beads reduce RF susceptibility, new Cinch plug connector plus 8-pin plug at control box (no screwdriver needed). Dual 98 ball bearing race for load bearing strength. Strong electric locking steel wedge brake prevents wind induced antenna movement. Easy-to-use Control Box has illuminated directional meter with North or South center of rotation scale, separate snap-action brake and rotation switches. Uses low voltage control for safe operation. Accepts masts up to $2^{1}/_{16}$ inches diameter. Rotator size is $13^{1}/_{2}$Hx8D inches.

T-2X, $619.95. *Extra heavy duty Tailtwister antenna rotator!* For large antennas up to 20 square feet wind load when mounted in-tower, or 10 square feet when mast mounted with optional support bracket. Triple 138 ball bearing race, strong electric locking steel wedge brake. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches. Accepts masts up to $2^{1}/_{16}$ inches diameter. Rotator size is $14^{1}/_{16}$Hx$9^{3}/_{16}$D in.

CD-45II, $369.95. *Medium duty antenna rotator.* Handles antenna arrays up to 8.5 square feet windload area when mounted in-tower, or 5 square feet when mast mounted with supplied lower support. Dual 48 ball bearing race, disc brake system. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches with disc brake release. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty lower mast support, Rotator size is $17^{3}/_{8}$Hx8 D inches.

AR-40, $269.95. *Lightweight antenna rotator.* Handles smaller ham antennas and large TV/FM antennas up to 3.0 square feet windload area when mounted in-tower, or 1.5 square feet when mast mounted using the supplied lower support bracket. Dual 12 ball bearing race, disc brake system. Silent, automatic control box -- just dial and touch for desired direction. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty mast support. Rotator size is $17^{3}/_{8}$Hx8D inches.

Call your dealer for your best price!

Rotator Specifications	T2X	HAM-IV	CD-45II	AR-40
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.

HAM IV

$529.95
Suggested Retail

T-2X

$619.95
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CD-45II

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AR-40

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Everyone's Talking About PEGASUS

Whether you're listening on the bands or reading the mail here at TEN-TEC, the message is the same - PEGASUS is the most intriguing new development in amateur radio. Combining the power of your own PC with cutting edge IF-DSP, TEN-TEC is the first to offer this HF innovation at such an affordable price. Take a look at what owners have to say:

"Love this radio...all reports great...."
- Brad Mackay, WE4DX

"Outperforming a recent HF transceiver from a competitor that costs three times as much."
- Dave Garner, WA4YRK

"This is an impressive product."
- Ted Mackinnon, NW8W

"Well designed and operator friendly."
- Richard Maxwell, K3BL

"It is a wonderful radio."
- Norm Creller, W8MPM

"The receiver is quiet with beautiful receive audio."
- Jim Cox, K4JAF

"It took less than 10 minutes to have my first QSO."
- Paul Christensen, W9AC

"Consider me delighted!"
- Karl Heimbach, W5QJ

"It's nice to have a large number of filters to choose from."
- Mark Aaker, K6UFO

"Congratulations on an outstanding accomplishment in quality and price."
- Harvey Solomon, KQ0A

"This is a winner!"
- Charles Scheid, W3OHV

"Reports on the air have been nothing short of fabulous."
- George Shapow, NY2O

Anyone running Windows 3.1, 95/98®, will have PEGASUS operational in minutes as there is no hardware to install inside your PC. Control any transceiver function with your mouse or PC keyboard. For armchair operation, add optional Remote Encoder Keypad, Model 302. Test drive the PEGASUS before you buy - download the actual software from our website (www.tentec.com).

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Monday - Friday 9:00 - 5:30 EST

* Model 550 - $895 plus $15 S/H in 48 states
* Model 302 - $139 (no added S/H if ordered with PEGASUS)
- We accept VISA, Mastercard, and Discover
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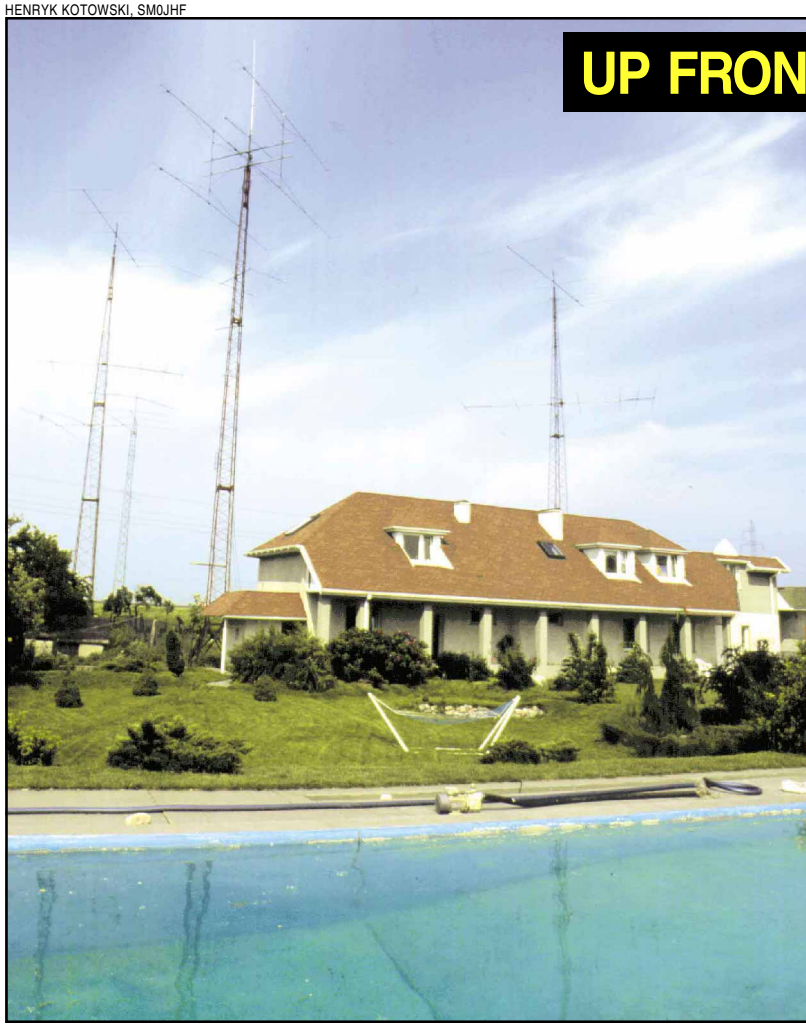


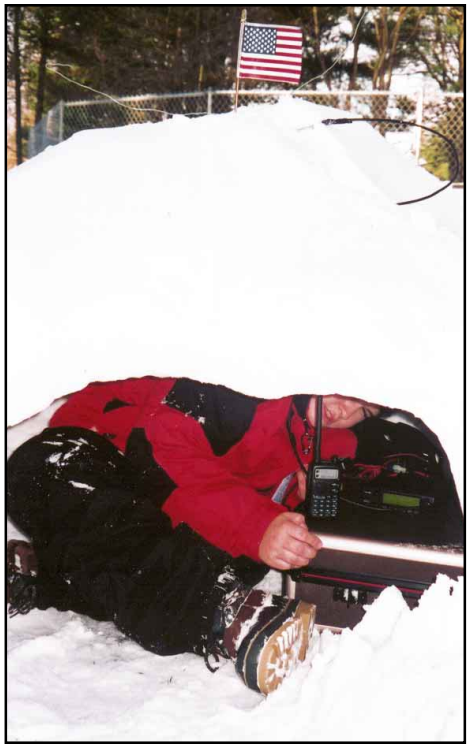
Posh Poland! This is the home of Kazimierz Drzewiecki, SP2FAX, in Bydgoszcz. Whenever the bands are dead, you can always retire to the swimming pool.

A new addition to W1AW—with "shipping" direct from Japan. ICOM President Tokuzo Inoue, JA3FA (right), donated a new IC-756PRO HF+6 Meter transceiver to Maxim Memorial Station W1AW. Inoue and a small delegation from ICOM delivered the unit in person June 23. The IC-756PRO—an updated fully-DSP design of the popular IC-756—will be installed in one of the visitor operating suites at W1AW. Accompanying Inoue to Newington were ICOM America President Hiro Nakaoka, JK3UZC, and ICOM America District Sales Manager John Dunker, W9UR. Accepting the donation on behalf of the ARRL was Executive Vice President David Sumner, K1ZZ (left).

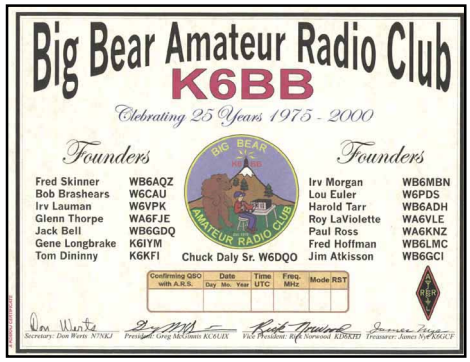
On Kingman Reef, this is as good as it gets! When Chuck, N4BQW, briefly visited the reef a couple of months ago, he set up this portable operating position (including a mast to support a 20-meter dipole). A large-scale DXpedition will be journeying to Kingman next month. You'll find the details in "How's DX?" in this issue.

Calling All Holiday Photos!

Even though most of us are still sweltering in the summer heat, at *QST* our thoughts are already on our December issue. We're looking for a few good photos that capture the spirit of Amateur Radio during the Holiday Season. The best photographs will appear in the December *QST* "Up Front." Send your prints or slides (no digital images, please!) by September 15 to: Up Front, ARRL, 225 Main St, Newington, CT 06111. All photos become the property of the ARRL and will not be returned.



Zach Jackowski, KC2FNB, of Boonton, New Jersey doesn't let a little snow get in the way of his Amateur Radio activities. When he needs a place to operate outdoors in the winter chill, Zach digs an igloo!



Special-event QSLs and certificates are commonplace, but occasionally you run into one that really stands out. If you happen to work the Big Bear Amateur Radio Club this month during their K6BB special-event operation (September 16 and 17) from Big Bear Lake, California you'll be eligible for this snappy 25th anniversary certificate. The certificate was designed by KD6KHJ. See "Special Events" in this issue.

How many radios can you fit in a van? Jim Romelfanger, K9ZZ, passed along these photos of the new Milwaukee County ARES communications van. It is equipped with radios for government, police, CB, marine, fire and, of course Amateur Radio. The ham gear includes several computers for packet and APRS and operating positions for voice and slow/fast scan ATV. The inside front of the van (above) resembles the flight deck of a Boeing 767. (That's Bob Goldstein, K9KJT, with the microphone. He also took the photographs.)

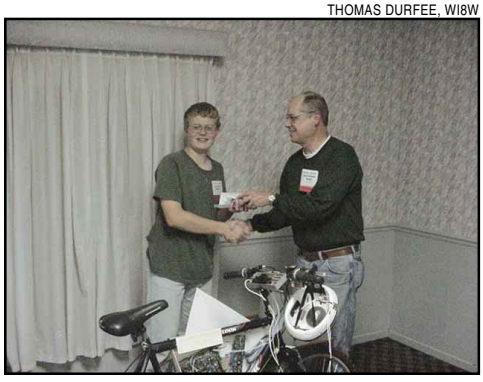
It must be a desperate plea for Yukon contacts during Sweepstakes, right? Wrong. The initials of the person who owns this tag are "C.Q." and she just happens to have a particular affinity for the Yukon. According to Herb, AK1V, the owner had no idea that her license tag was an eye catcher for hams!

JOHN BARR, W6JTB

Now repeat after me . . . No, this isn't a Wouff Hong initiation. Alan Corlin, AA6DW, is being sworn in as a member of the City Council of Culver City, California. Many other amateurs were present at the ceremony, including KD6AAA, W6JTB, KC6ZRI, KE6VIS, KF6UAL, KF6UAM, KE6ZHM, KM6GN, KC6GDQ, KC6GDR, KE6RPV, K6WAS, KF6SBP, K6FCC and KA6MSL.

Take these, brother. May they serve you well. At the 2000 Dayton Hamvention, Doug Hendricks, KI6DS (center), editor of the Northern California QRP Club's quarterly newsletter, presented David Sumner, K1ZZ (right), with a handful of the club's latest QRP kits: the SMK-1 40-meter QRP transceiver; a Fort Smith QRP Group CW keyer and paddle; and the NorCal "BLT" antenna tuner. The SMK-1, designed by Dave Fifield, AD6A, is based on the Tuna Tin 2 transmitter and the MRX40 receiver and uses mostly surface mount components. Charlie Lofgren, W6JJZ, designed the balanced line tuner. The TiCK-based electronic keyer/paddle is a club project of the Fort Smith QRP Group in Fort Smith, Arkansas. NorCal set K1ZZ up with one of their earlier kits—the NorCal 20 QRP transceiver—back in the spring of 1999. He had a great time assembling that one and has had a blast using it on the air. The fellow on the left is Gary Diana, N2JGU, of Embedded Research, manufacturer of the TiCK keyer chips.

THOMAS DURFEE, WI8W



QRP bicycle mobile. Andy Meng, KC8KFI (left), won an antenna tuner for his clever QRP bicycle station built around an Elecraft K2 transceiver. Andy received the tuner from Jim Stafford, W4QO, president of QRP ARCI, at the 2000 Four Days in May activities that took place in conjunction with the Dayton Hamvention.

When listening to the radio could cost you your life. John Swartz, WA9AQN, sent along these remarkable photos of a World War II-vintage clandestine shortwave receiver. The three-tube radio was owned by the parents of Anja Lodge, now living in St Louis, and was built by Piet Vennema who worked in Eindhoven, Holland. During the Nazi occupation, Anja's parents used it to listen to news from the BBC. The receiver fit neatly into a hinged tobacco tin with accessories in a companion tin. As John poignantly states, "We make QRP transceivers in tuna tins for fun. Can you imagine risking death to build a concealable receiver like this?"

MOBILE DX MASTER

Since its introduction over a year ago, Yaesu's FT-100 HF/VHF/UHF Transceiver has been widely acclaimed for its outstanding performance and flexibility. Now the FT-100D builds on this success story, adding the convenience of factory-installed modules for today's Ham on the go!

FT-100D HIGHLIGHTS

The FT-100D is a high-performance, ultra-compact transceiver operating on the 160-10 meter HF bands, plus the 50, 144, and 430 MHz VHF/UHF bands. Known for its outstanding receiver performance, the FT-100D's easy-to-access DSP system is the cornerstone of the outstanding receiver capability. Providing Noise Reduction, Auto-Notch, and Narrow-Bandwidth Filter selection, the DSP system also includes a Microphone Equalizer for the transmit side.

The new and enlarged speaker of the FT-100D (ϕ66 mm) provides spectacularly clean audio output, to help you dig out those weak signals.

Whether at home or away, the fantastic new FT-100D is The Choice of the World's Top DX'ers. Step up to the FT-100D, and enjoy the thrill of the sunspot peak in style!

MICRO MOBILE

FT-100D

Ultra-Compact HF/VHF/UHF Transceiver

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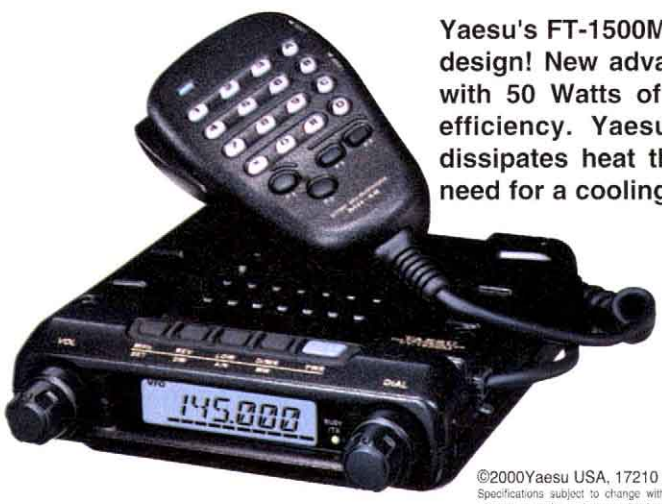
Actual Size



Yaesu's FT-1500M represents a technological breakthrough in radio transceiver design! New advances in power amplifier technology combine to provide you with 50 Watts of clean transmit power with enhanced current consumption efficiency. Yaesu's patent pending aluminum die-cast shell construction dissipates heat throughout the entire transceiver chassis and eliminates the need for a cooling fan. This allows the FT-1500 to fit in an incredibly small case size: less than 5 inches square X 1.4 inches high and offer superior operating specifications as well!

FT-1500M

50 W 2-m FM Mobile Transceiver

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We read every letter received, but we can only publish a few each month. We reserve the right to edit your letter for clarity, and to fit the available page space. Of course, the publishers of *QST* assume no responsibility for statements made by correspondents.

UPGRADE THE OLD GENERALS

♦ I read with interest the letter by W0NYA in June 2000 *QST* "Correspondence" ("Righting An Old Wrong"). I could not agree more with Bob. Since it has been decided to "grandfather in" the Technician hams who were licensed prior to March 21, 1987 to General class, it seems to me that it is only fair to "grandfather in" to Amateur Extra all of us who were Generals prior to the Incentive Licensing program.

I personally thought then, and think now, that Incentive Licensing was a bunch of bunkum. One of the reasons that I was off the air for 30 years was Incentive Licensing. I thought it was grossly unfair to reduce my full privileges, so I found other things to do with my life than ham radio. When you compare testing in 1953, when I was licensed, to testing as it exists today, it's clear that the Generals of my day took tests that were equal to the Amateur Extra exams of today.

Yes, I think it is high time to "Right An Old Wrong" here. Can we expect the ARRL to move forward on this?—*Bill Beers, K6ERQ, Ferndale, California*

♦ W0NYA comments in "Righting an Old Wrong" are on target. I was licensed as a General in 1956 as W1GBZ. I grudgingly accepted the changes as Incentive Licensing was introduced. I simply continued to enjoy CW. Today my proficiency is ARRL certified at 25 WPM although I comprehend at 30 WPM—thanks to W1AW.

When the current restructuring discussion began, I wrote to the FCC and suggested that we pre-Incentive Licensing Generals be grandfathered back to the spectrum that we lost in the '60s.

Now I sense that there are others who feel as I do: changed and shortchanged. Maybe we do indeed have an opportunity to right an old wrong.—*Larry Robbins, W3CEI, Middletown, Pennsylvania*

LIVE HF DIGITAL VS. UNATTENDED?

♦ As an active ham on digital, SSB, and CW I want to express my full agreement with the opinions expressed in the letter by G3PLX in June *QST* regarding live vs. unattended HF digital activity. Something really needs to be done!—*Ron Finger, W7ZT, Corona de Tucson, Arizona*

♦ Peter Martinez, G3PLX, writes in "HF Digital: Live vs. Unattended" in the June *QST* "Correspondence," advocating further, stronger subband-by-mode Balkanization of our (US) HF bands in the name of "protecting" live keyboard-to-keyboard QSOs (like PSK31) from automatically-controlled ("unattended") operations (such as electronic mailboxes, presumably), where one end of the link is an unattended machine (but where that machine only responds to calls, rather than initiating them).

While Peter is to be highly commended for his contribution to the amateur community through his efforts in developing PSK31 (which is a really neat mode), I think that he is misguided in his suggestion that such "protection" be codified into governmental rules and regulations for a number of reasons:

Live keyboard-to-keyboard operators have the ability to freely choose an operating frequency and to move, if necessary, to avoid occasional, unintentional interference which may crop up unexpectedly from time to time (as can happen with any QSO).

The "unattended" operations' nature (electronic mailbox, etc.) more or less requires that the unattended station remain on a known, fixed frequency in order for other stations to use its services. (Though more advanced techniques allow such unattended stations to scan for calls addressed to them, the use of such techniques can create unacceptable side effects, such as delays and the waste of a lot of transmission time [bandwidth] calling such a device on a clear frequency and waiting for it to "find" the caller and respond.)

Since the unattended stations Peter refers to, as he acknowledges, do not initiate but only respond to calls, it seems that the burden of avoiding interference to any ongoing keyboard-to-keyboard QSO should fall on the human operator who wishes to use the services of the unattended station. (Though unattended stations could be programmed to recognize on-frequency activity not addressed to them and to refuse to respond to calls under such conditions.)

Any restrictive regulation that is not absolutely necessary should not exist. Regulations, which set aside "protected enclaves" for various modes of operation only serve two functions in the long run: they cause technology to stagnate at the level of what is permitted in those enclaves, and they reduce our ability to use our spectrum flexibly and efficiently. Both of these outcomes are very bad for the Amateur Radio Service, both in the short term and, particularly, in the long term.

If a real problem exists, we should seek technical solution, not enact more unnecessary restrictive regulations. We are supposed to "advance the state of the radio art," right? I don't recall anything in Part 97.1 that says we should "strive to enact as many unnecessary, convoluted, restrictive regulations as possible."

Starting a QSO on top of an ongoing one is clearly an unacceptable operating practice which is rude at the least, and if done intentionally and repetitively without regard to others' rights becomes intentional interference which should be subject to enforcement action. We should seek enforcement of the existing rules against the human operators intentionally causing such interference by beginning QSOs with automated stations "on top of" pre-existing live QSOs in cases where such interference is persistent and repetitive.

To blame the unattended station for the transgressions of a live operator (who in some sense, if not in fact, controls the unattended station's actions) places the blame on the wrong party. The "problem" to which Peter refers is a behavioral problem on the part of a few operators, which devolves into an enforcement problem. It is not the fault of the unattended station when someone calls it on top of an existing live QSO; it is the fault of the LID on the other end who ignores the live QSO and calls the automated station without regard for the live QSO. What we need in these cases is enforcement of existing rules against intentional interference, not new rules that unnecessarily limit freedom of operation.— *Carl R. Stevenson, WA6VSE, Emmaus, Pennsylvania*

SAY "NO" TO ULS

♦ Several issues ago a gentleman explained he wasn't planning to register with the Universal Licensing System (ULS) because of the requirement to turn over your Social Security Number to the FCC in exchange for the "privilege" of updating your records electronically. In this time of identity theft and government malfeasance in keeping private records private, I understand and agree with him completely. There is no reason the FCC needs this information. The baloney that it's being used to track down "deadbeat dads" is just a smoke screen. Hackers are breaking into computers left and right these days. Will the FCC guarantee that hackers won't break into their systems and steal our identity information? I doubt it.

The fact is that many hams are not signing up for the ULS like good little big-government sheep. I opine that the lack of registration is due to this onerous requirement. (Yes, I know the government already has your Social Security Number, but why make it easier

for them to create that all-encompassing database by giving them another unique record?) The Social Security system was implemented with the promise that the SSN would *never* become a national ID number. We have seen how well governments keep promises.

Now, we see the FCC trying to spin their ULS miscalculation by issuing a not-so-subtle you-had-better-register-or-your-license-record-might-get-lost-or-reassigned statement…a friendly suggestion, not a threat, mind you. What shall we see next? The "loss" of several licenses and the subsequent punishment of these licensees for "operating without a license" as an example of what might happen if you don't register? Or should I just expect Janet Reno's folks to be busting down my door should I fail to "register" my radio license "with the proper authorities"?—*Michael Weaver, KD7DDG, Glendale, Arizona*

A TALE OF "TEST DAY JITTERS"

♦ We've all heard of the "test day jitters" and what they can do to candidates trying to pass their FCC examination for a license. It seems that the worst case involves the code portion of the exam.

How many of us can remember the hours of diligent practice put forth learning Morse code in preparation for the big day, only to find that we just couldn't function efficiently knowing that we were under the gun during the actual test session?

This was the problem that plagued one hopeful code candidate at a Clinton (Iowa) Amateur Radio Club ARRL VE test session. Candidate Randy Swemline, KB9KUZ, had previously tested over 12 times at various locations, in an attempt to gain his 5-WPM code credit. After watching Randy fail his initial CW exam, I sensed his "test fright" and secretly conferred with fellow team members KE0FT, KF9TL, K0RLM, WJ9D and KB9SJI, suggesting that we try a psychological "trick."

Under the guise of pretending to check a new version of a code test tape recently received, the team was asked to listen to, and copy, the code session. Randy was invited to do so as well. When the tape was complete, everyone was asked to exchange copy sheets and check for correct copy. Upon being checked by all VEs present, we disclosed to Randy that he had just received—and passed!—his code exam. The test-day jitters had finally been overcome!

Since all testing regulations had been carefully followed and monitored by all accredited VEs present, KB9KUZ went home with a CSCE for his 5-WPM Morse code exam. He is now reportedly hard at work studying for the General written exam.

"Thank you" to my fellow VEs who went the extra mile!—*Roger Gorzney, KD0WY, ARRL VE Team Liaison, Clinton Amateur Radio Club, Clinton, Iowa*

TOROID-A-PHOBIA

♦ In two different articles in June 2000 *QST* (page 33 and page 74), toroids are described in language that implies: (1) they are difficult to wind and (2) elimination of toroids in a project is an indicator of design expertise.

While it is true that winding the correct number of turns, stripping the wire, and keeping track of windings in multifilar toroids is a more difficult task than bending the leads of a resistor and plugging it into a board, winding a multifilar toroid is a basic skill that may be easily acquired by anyone with normal eyesight and a little dexterity. Much of the joy of Amateur Radio comes from acquiring new skills: conversing in CW, handling traffic in a crisis, and learning advanced construction techniques. I would be shocked to read about "those annoying 20-WPM CW operators in the Amateur Extra subbands" or "that annoying emergency traffic after the earthquake" in *QST*, but it has become routine for *QST* editors and authors to disparage construction skills that they have not yet mastered.

A skillful designer may eliminate toroids from a beginner project. However, eliminating toroids because the designer doesn't like them is not good design. The multifilar toroid transformer is a high-performance, well-behaved component. It is widely used in radio circuitry where performance is more important than cost or ease of assembly. World-class professional radio designers like Wes Hayward, W7ZOI, routinely exploit the benefits of multifilar toroids in *QST* projects, and the younger generation learns the basic skills by studying, reproducing, and improving those circuits. In an age when many EE professors have never actually built anything that worked, an engineering college graduate who has built a "Progressive Receiver" is far more valuable and employable than one who has only stuffed parts on a silk-screened board with no wires, bolted it into a pre-drilled box, and connected the antenna.

QST readers are a diverse lot, and some have an unreasonable fear of learning new skills. One of the functions of *QST* is to inspire readers to overcome that fear and explore new territory. For the first few projects, a large, silk-screened PC board with easily handled components is appropriate. By the third or fourth project, winding a few toroids is a good skill to acquire. Within a year or two, a beginner can progress to the point where duplicating a Wes Hayward circuit without a PC board is routine. The satisfaction of learning new radio construction skills, building a rig, and then using it on the air is as old as the radio art. Let's keep the tradition alive in *QST* and use language that encourages readers to progress beyond the beginner level in radio construction.—*Rick Campbell, KK7B, Portland, Oregon*

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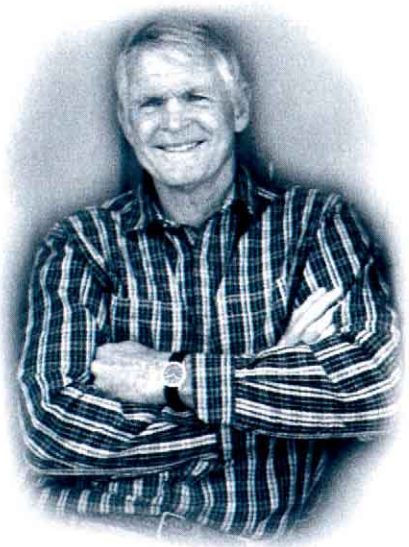

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Your annual premium is just $1.50 per $100 of replacement cost value (minimum premium is just $20) plus a $7 administration fee. If your equipment is worth $4,400 . . . your premium is only $66 (plus the $7 administration fee) for a full year of protection.

The program's deductible is just $50 for each loss. To assist you even further, the deductible for the repair of damaged equipment is only $25.

Loss or damage to radio towers, antennas or rotators is not covered under the equipment plan. ARRL has added a **separate** Tower, Rotor & Antenna coverage Plan. If you would like more information, please call Seabury & Smith, ARRL's Plan Administrator, toll free: 1-800-503-9230.

Exclusions

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ARRL Ham Radio Equipment Insurance Program Official Application

ARRL-Q
A 900

Please type or print

1. Name of Applicant _____ Daytime Telephone ( ) _____
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3. Other locations where equipment is kept: _____
   _____
4. Date of Birth _____
5. QST Control No. (from QST label) _____
6. **SCHEDULE OF EQUIPMENT**

   Use this listing to describe all radio equipment in your possession (except radio towers, antennas and rotators, which are not covered).

DESCRIPTION (including Manufacturer's Name, Model and Serial Number or other Identification)	**Replacement Cost** (Value at today's prices)
_____	$ _____
_____	$ _____
_____	$ _____
_____	$ _____
_____	$ _____
_____	$ _____

(If additional space is necessary, please attach a separate sheet.)

7. To figure your premium, complete the following:

Total Amount of Replacement Insurance	$ _____
Total Amount of Miscellaneous Items (valued under $50.00 each)	$ _____
Total Amount of Insurance	$ _____
Annual Premium (based on the rate of $1.50 per $100 of insurance. Minimum premium $20.00)	$ _____
Add Annual Administration Charge	$ 7.00
Total Amount Enclosed	$ _____

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Date _____ **Signature X** _____

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By David Blaschke, W5UN

MBA
The Mighty Big Antenna

Everything really *is* bigger in Texas—including antennas!

"What the heck is an MBA?"

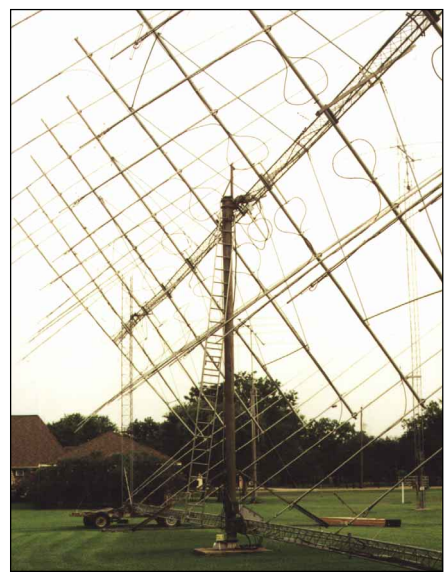
It's not my college degree that I am referring to, but rather the Mighty Big Antenna array that I constructed here at the W5UN homestead back in 1985 for the purpose of doing some serious 2-meter Amateur Radio EME (moonbounce) operating. Yes, I'm talking about the monstrous antenna system shown on the cover of this issue.

The MBA was first introduced to the world in an article that was carried in the January 1989 issue of *QST*, four years after it was constructed. In the 16 years that have passed since I first built the MBA, many exciting and interesting things have occurred here at W5UN on 2 meters. The astounding thing to me, though, is the fact that the antenna array is still standing and going strong after all this time. Of course, there have been several close calls from hurricanes that have, fortunately, passed this location by thus far.

The Price Tag

One of the first questions I am always asked by visitors is, "How much did it cost?" My answer is that it cost a whole lot less than if the government had built it! But seriously, it was not all that expensive, considering its size and complexity. I scavenged most of the materials (except for the Yagi antennas themselves) from local junk and scrap metal yards, where I literally paid pennies on the dollar for most of the items I needed. The tower sections comprising the main boom came from a tower that I spotted a few miles up the road that had nothing on it. I stopped to ask the owner what he wanted for it, and he told me, "You take it down, it's yours." So some luck was involved, too. The coaxial cable used to interconnect and phase all the individual Yagis is aluminum-jacketed 75-Ω cable television hard line (CATV) that I got without cost from a local cable company. They were throwing away spools of cable with less than 100 feet left on them during a cable installation project.

The only things I purchased new were the Yagi antennas, the 12 40-foot lengths of 3-inch aluminum irrigation tubing, coax cable connectors, standard bolts, nuts and U bolts. Counting everything, I estimate that I spent less than $10,000 by the time I finished the MBA. Now that may sound like a substantial sum of money, but it was really quite cheap considering the 16 years of pleasure (and exercise) I have received from using and maintaining the array. I also became a pretty fair welder in the process.



The MBA is so large, it is impossible to capture the entire array in a single ground photo.

The author settles in for another evening of moonbouncing at W5UN.

The Nuts and Bolts

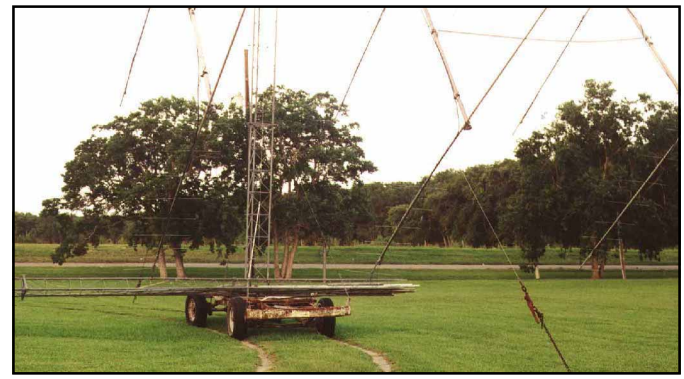
Let me tell you a little about MBA's performance and what it may mean for you. The array is capable of boosting power by 30 dB (referenced to a simple dipole antenna). In other words, with 1500 W delivered to the array, the effective radiated power is nearly 1.5 *million* watts. The beam is sharply focused, with a 3-dB beamwidth of $1^{3}/_{4}$ degrees in the E plane and about 6 degrees in the H plane.

Mechanically speaking, the boom, made from Rohn-25 tower sections, is 155 feet long. A stripped-down Ford pickup chassis serves as the MBA "rotator." I rotate the array around a 358-foot track by driving the Ford's rear differential with a $^{1}/_{3}$ horsepower dc gear motor. (I paved the wheel paths with concrete after the Ford got stuck in the mud a few times.) It takes about 15 minutes to rotate the array completely around the track. Elevation aiming is handled by a winch and cable system that controls up and down movement. The main boom is mounted on hinge plates attached to the three mounting masts, allowing full 0 to 90° aiming capability.

The way my property is situated, I have a clear view to the eastern horizon on moonrise and a nearly clear view to the west on moonset. There are woods to my north, but they present no problem, as I rarely aim the antenna in that direction. I have occasionally made long-distance (over 1000 miles) scatter QSOs with stations to the north, but terrestrial operation with MBA is infrequent. Occasionally, someone will request a meteor scatter schedule during the major meteor showers, but I have found MBA to be a poor performer for that mode, perhaps because of its very narrow beamwidth. If only I could aim the array at the meteor burn, I'm sure results would be impressive, but I haven't found a computer program to predict that yet.

When EME operation is underway here at W5UN, things are highly automated. Three computers do most of the work. One

The 1947 Ford pickup chassis and 1/3 horsepower dc motor that rotates the MBA.



Here you can clearly see the concrete tracks as well as the cable tie-down that secures the MBA when it is not in use.

computer handles antenna-aiming chores. A second computer monitor displays a 2-kHz wide "waterfall" spectrogram[1] of the audio bandpass that I happen to be tuned to. The third sends the CW, handles sequence timing, and transmit/receive. It also handles my logging chores. All of this automation frees me to concentrate on the important things, like digging call signs and reports out of the noise.[2]

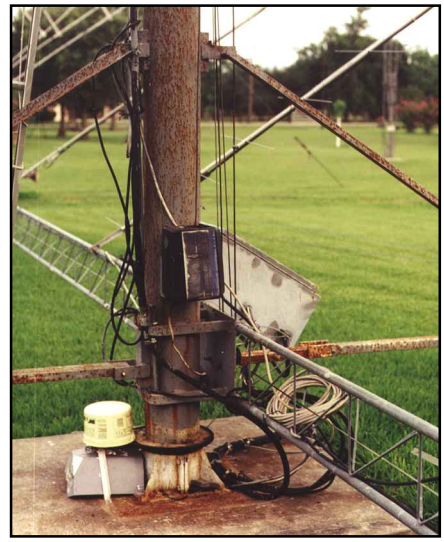
The Possibilities

Many modestly equipped stations have been worked via EME since 1985; among the smallest was ZD8MB, who was running less than 25 W to a single short Yagi antenna. This happened during an ARRL EME contest. You don't normally expect a telephone call from a ham on Ascension Island requesting a schedule, but that is exactly how it happened after he heard me calling CQ.

Another modestly equipped station that I worked was CO2KK. Arnie called me from Havana, Cuba after our QSO and invited me to be an interview guest on Radio Havana, where he hosts a radio program about Amateur Radio.

Working stations running 50 to 100 W to well-designed single Yagi antennas (those with boom length of three or more wavelengths) has become almost routine, but never boring. I have heard my own echoes more than once while transmitting with one watt. Hearing and working modestly equipped stations requires that conditions be at their very best, with the Moon near perigee and minimal sky noise in the Moon's direction.

What all of this can mean for you is that if you are operational on 2 meters, and your station is modestly equipped as described above, you have an excellent chance of hearing W5UN's echo as it reflects from the Moon's surface. To hear me, you must aim your antenna toward the Moon and tune to the frequency where I normally operate on two meters.[3] If you can copy W5UN, then you can also reasonably expect that W5UN will detect your signal and hear you if you are delivering 100 W or more to your antenna when you transmit. Of course, most moonbounce operating is done using CW. SSB is uncommon and FM is never used because it is poorly suited for weak signal work. If you cannot aim your antenna at the Moon when it is overhead, then you will have to wait until the Moon is either rising or setting. You will have about one hour's worth of "Moon view" during each of these times without elevating the angle of your antenna.



The MBA elevation winch and azimuth position transducer (under the ice cream bucket).

EME transmitting and receiving times are based on using one- or two-minute sequences. I normally transmit during the even minutes, and listen during the odd minutes. Keep that in mind if you are going to make an attempt to contact me. The CW speed will be 20 WPM, which is the speed I find best for getting information exchanged when making QSOs.[4]

You have an excellent chance to work the MBA and many other moonbounce stations in October and November during the 2000 ARRL International EME Competition. You'll find complete rules elsewhere in this issue.

MBA Accomplishments

Some very interesting things have occurred here as a result of having the large antenna array. In October 1990, I was able to assist AMSAT personnel in rescuing the DOVE-OSCAR 17 satellite. Using the MBA, we were able to send a signal strong enough to unlock Dove's 2-meter receiver from being swamped by the transmitter signal. AMSAT presented me with a beautiful plaque to commemorate the occasion, which I still proudly display here in the shack.

Then, of course, there was the accomplishment of working enough different countries to win the first DXCC on 2 meters, a feat thought impossible only a few years earlier. My wife and I personally flew to ARRL Headquarters in January 1991 to hand deliver the coveted QSLs. I said at the time, "After all the work it took, I want to be on the plane carrying these cards if it goes down." The current 2-meter DXCC country total at W5UN stands at 161.

I cannot fully express how much enjoyment I have received, and how many friends I have made in these sixteen years since the MBA was put into service. Perhaps you will be one of the future contacts with W5UN. If so, you will be placed in good company among the more than 10,000 2-meter EME QSOs, with nearly 2400 different stations that are already in the 2-meter log here.

You can contact the author at 9102 Kings Dr, Manvel, TX 77578; **w5un@wt.net**.

Notes

[1]The spectrogram waterfall display is provided by AF9Y's *FFTDSP* software. You can find out more about it on the Web at: **http://www.webcom.com/af9y/radio10.htm**.

[2]My software, *Skymoon* and *Cwkey5*, are shown on the W5UN Web site at: **http://web.wt.net/~w5un**.

[3]W5UN can be found on 144.041 MHz when on the air. A good time to listen is during EME contests.

[4]Full operating procedures are explained in detail on W5UN's Web site (see above).

By Bill Wageman, K5MAT

Grid Chasing: Fixed or Mobile?

Whether you're chasing VUCC grids from the comfort of your home shack, or handing out grids from the most forlorn peak in the Rockies—beware. Playing the grid game from any angle is highly addictive and perpetually rewarding. Now that you've been warned, let's get started!

When the ARRL instituted the VUCC program I thought it was a silly approach to an operating award. It's plenty easy to achieve on 6 meters, and here in the Rocky Mountain area—where tropo is essentially nonexistent—it's nearly impossible on any of the higher bands. So, I avoided getting involved in such a frustrating project. I initially saw the whole thing as a waste of time and an essentially futile pursuit. After all, I had WAC and CW WAS on 6 meters, with a few states and two countries on 2 meters. I really didn't need another world to conquer.

Forget grids, I thought—they're so artificial. And besides, there are plenty of other fun ham radio pursuits.

I actually did forget about grids until a few weeks later when a friend mentioned that he was going to try to help Fred, W5FF, by working him from DM71 on 6 meters. My friend wanted to try a contact with me, too, on 2 meters. Because I lived near the northern boundary of DM65, a 300-mile contact seemed almost impossible. Steve, KB5GY, traveling to the boondocks in West Texas, could run only 25 W to a small beam. He would also have to carry a car battery up a long hill to see in my direction. He wanted the exercise, though, so I said I'd give it a try.

Fred, W5FF, has a *big* 2-meter station and I was sure he would be able to work Steve. He graciously offered to relay between us if we had any difficulties. Steve would call Fred, and Fred would alert me to listen down in the noise. At the appointed time I was listening on 144.2 MHz and, sure enough, I suddenly copied KB5GY calling W5FF on CW. I wasn't born yesterday, so I answered Steve right away and we completed our exchange before Fred even got to his operating position.

Bob, N5EPA, braves the arid environment of grid square DM38.

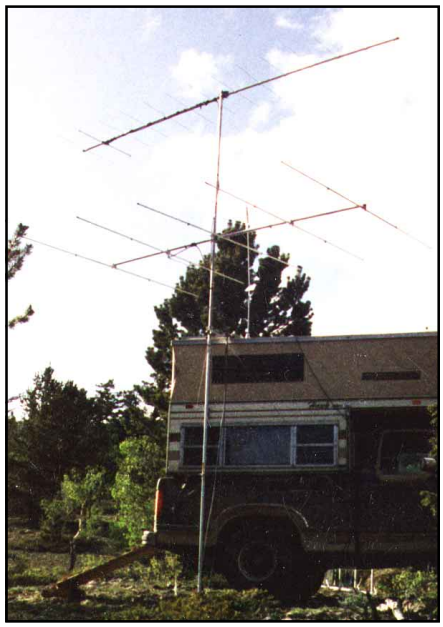
That did it! My snooty attitude toward grid hunting went out the window in a rush of adrenalin. I've been hunting grids ever since!

The Lay of the Land

There are 22 grids that are wholly or partially in New Mexico, but many of them hardly have any residents, let alone hams (particularly hams equipped for 2-meter narrowband operation). That said, those 22 grids would still be a great start toward the VUCC 100 if only Steve could be convinced to travel to them with his rig. But he'd hardly want to spend hours of driving and many bucks for gasoline only to put up with what would probably include many failed schedules. Or did he feel the same adrenalin rush that I had? Could it possibly be even more fun to work *from* a rare grid instead of working it *from home*?

I think the person handing out the grids is actually having the most fun, at least part of the time. Flat tires, lightning storms, high winds and equipment problems cause minor inconveniences, but the payback is worth the process. I was the only guy who worked Steve (besides Fred) on that first trip, but better planning would have probably netted much better results.

When Steve set out that day there was precious little activity on 6- or 2-meter SSB in New Mexico. But for most of his later trips (to grids that Fred wanted on 6 meters), the summer sporadic-E season frequently allowed for HF-style pileups with ops who didn't even know why Steve was



Grid DN50 offered a pleasant mountain campsite for N5EPA.

Steve, KG5BY, sets up in West Texas.

"gridexpeditioning" in the first place.

I naturally wanted his grids on 2 meters. Thankfully, Steve was content to run around for only one or two people on 144 MHz. He was my only contact in seven grids, but we did have numerous other contacts as he traveled around. Lee, K5FF, also provided a few grids.

Although he's now rejuvenated, Steve eventually wore out. I wondered who else could be coerced—I mean convinced—that handing out grids might be a lot of fun? A co-worker, Tom, N5ACP, became interested, and because he also loved to drive and camp, he finally convinced himself that handing out grids as part of the overall process would also be fun.

Tom was my only contact in nine grids on 144 MHz, and before he left the state he generously provided four grids on 432 MHz. I have also been fortunate to work half-a-dozen or so ops who went expeditioning for others (they somehow managed to hear me). They were helpful in my quest for VUCC on 144 MHz.

When Tom left to work the great tropo in southwestern Ohio (a new job had nothing to do with it) I again needed help with my grid totals. About that time, along came Bob, N5EPA, who loved to go four-wheeling and camping in the mountains. He started packing some radio gear I graciously lent him (I'm no fool). Again, like KB5GY, 6-meter openings were his bread and butter. The ops on 144 MHz consisted mostly of me, but Bob expeditioned diligently for several summers, giving me my only contacts in nine more grids on 2 meters. It's a real tribute to Bob's operating ability that we had complete contacts over those long paths from every single grid we tried.

Inside Information

What sort of information did these fellows have that proved useful? Their mentors were Hub, W5FAG (SK), and Fred, W5FF—both pioneers on V/UHF in New Mexico. They knew that it was more effective to be on the downhill side looking toward the target than it was to be on top of the hill or mountain, and they were only mildly surprised when we encountered some interesting anomalies.

At one point we could ragchew on 432 MHz with 10 W but couldn't even make contact on 2 meters with 100 W. During another strange-but-true experience we could chat on SSB when one op was mobile in a deep canyon, but we couldn't make contact through an FM repeater that was 10,000 feet up between our respective locations!

Two of the rovers had no HF capability when mobile, but carefully timed schedules eliminated the need for coordination. The bottom line is to give it the old college try—there's nothing to be lost by trying.

I owe a great debt of gratitude to all of the hams who helped me with my quest. What was their motivation? What's the motivation for working grids at all? Are we all crazy? Or is VUCC a real challenge?

I decided a couple of years ago that I wanted to join that group of guys who journeyed forth to give grids to others and see for myself why they did it. Bob, N5XZM, and I cooked up a mini-expedition to get the ball rolling. We'd provide grids and states to Dick, K5RHR.

Bob has a nice RV with a comfortable operating position. With his FT-736R, a borrowed 19-element beam for 222 MHz and his own 432-MHz beam, we worked Dick from several new grids. We were especially pleased to give him Oklahoma on 222 and 432, and Kansas on 222.

Our first stop was near a microwave tower, and the only decent parking and antenna-erecting site was immediately adjacent (and partly "through") the tower. The wind was fierce, the dust was blowing and poor Bob had to hold that inch-and-a-half mast (with a 24-foot antenna perched at the top) so it pointed in the right direction.

We had a variety of mechanical problems in the next grid, but a helpful rancher stopped by and gave us some assistance. Our stop in the Oklahoma panhandle was straightforward, and by that time we had other ops looking for us. At least two of them heard us, but they had troubles with their transmitters, so the only station we worked belonged to K5RHR. The distance of about 260 miles was easily covered with high-gain antennas and 100 W (or so) on both bands.

Then came southwestern Kansas, which sported lightning storms and high winds. We'd been in touch with Dick on the MegaLink, a system of linked repeaters that covers most of northern and eastern New Mexico, but we were just too far away to let Dick know that we wouldn't be on at the appointed time. The storm finally passed about three hours later, but the chances of catching Dick seemed quite small. A QSO attempt using rapid meteor-scatter calls seemed worthwhile, and just before Dick had to leave home we broke his squelch on 222 MHz and the contact was logged.

It's Fun

Grid hunting can be a ball, whether you're the hunter or the hunted. Gridexpeditions are generally much less expensive than HF DXpeditions, and you're still the guy or gal that everyone is trying to work. N5ACP maintains that he always enjoyed handing out the grids much more than he did working them from home. Why not join the grid-hunter ranks on SSB and/or CW? And if traveling the back roads for your fellow amateurs sounds interesting, by all means, give it a try! You have the perfect opportunity coming up this month, September 9-11, during the ARRL September VHF QSO Party. See the rules in your August *QST*.

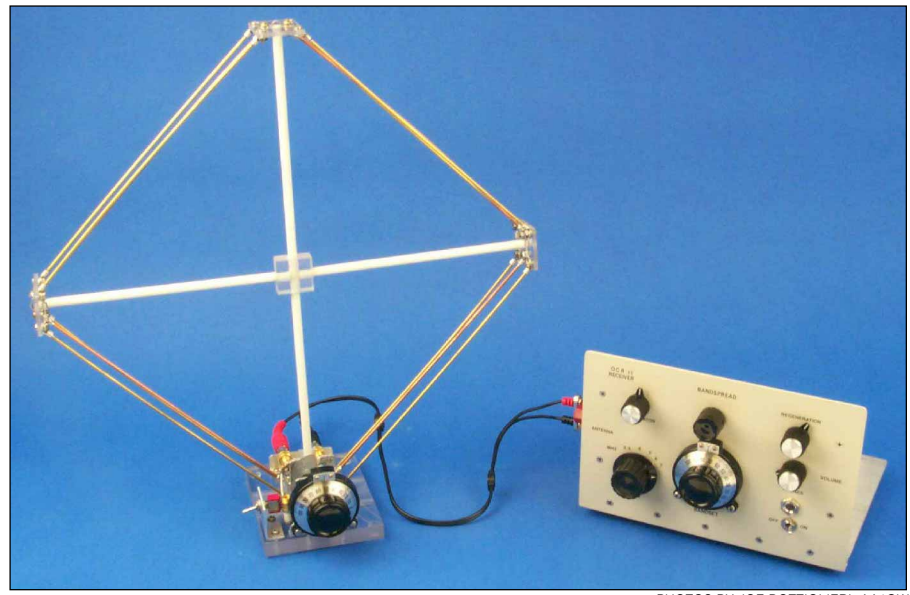
You can contact the author at 7309 Avenida La Costa NE, Albuquerque, NM 87109-3900; **Oldham73@aol.com**.

By Dan Wissell, N1BYT

The OCR II Receiver

Here's the radio a number of readers have been asking for: A simple, all-mode shortwave receiver based on the combination of the popular SLR and OCR receiver designs.

Since the introduction of the SLR (shielded loop receiver)[1] and OCR (optically coupled regenerative)[2] receiver designs in *QST*, I have been gratified by the overwhelmingly positive response from builders of these receivers. Many builders have asked the same question: "How can I convert the receiver to cover a wider frequency range?" Independently converting the SLR or the OCR to cover a broader frequency range poses design challenges. Being a simple D-C design, it's easy to make the SLR cover a broader frequency range, but this receiver is not suitable for good AM shortwave reception. On the other hand, the OCR is by design an all-mode receiver, but it's quite difficult to make it cover a broader frequency range. To answer the question, I combined the SLR and OCR designs to produce an all-mode multiband (ie, 3.5 to 8.5 MHz) shortwave receiver that I'll describe here.



PHOTOS BY JOE BOTTIGLIERI, AA1GW

The challenge I faced was designing a receiver that retains the qualities of both earlier unique designs. For the SLR, these qualities include its sensitivity and ability to use a small loop antenna to reduce local noise pickup. The OCR offers the extraordinary performance of the optically isolated regenerative detector, providing all-mode operation. The receiver presented here answers the design challenge, yet contains about the same number of components as used in either *one* of the other receivers. Because I've provided a means of using simple random-wire antennas *and* a tuned-loop antenna, I've dubbed this receiver the OCR II. A PC board and kit of parts are available to speed construction.[3] I encourage you to review the previous two *QST* articles to gain a greater insight into the evolution of this design (see Notes 1 and 2).

The Receiver Circuit

Overview

Refer to Figure 1. The OCR II is basically a single-conversion receiver with a 455-kHz IF. An incoming 3.5- to 8.5-MHz signal is converted to the IF, amplified and presented to the detector, which is an OCR operating at a fixed frequency of 455 kHz. An audio preamplifier and a headphone amplifier follow the OCR. This approach is similar to that employed by simple receiver designs of the 1950s and 1960s that use oscillating (regenerative) detectors at a fixed IF. There is, however, no comparison between the performance of those earlier detectors and the better OCR!

Description

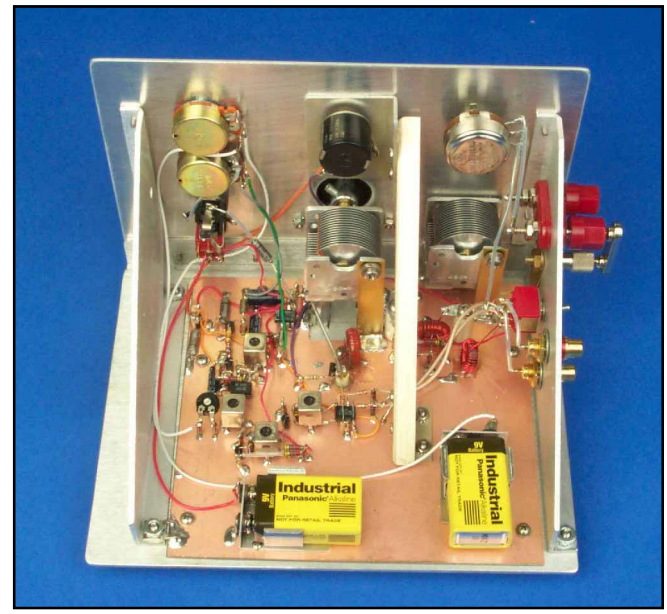
As in the SLR design, the receiver's converter employs an SA602 mixer, U1. L1 and **BANDSET** capacitor C9 control U1's internal oscillator frequency. Tuning diode D1 provides bandspread. The oscillator tunes between about 3 and 8 MHz. This provides coverage of about 3.5 to 8.5 MHz without the need for a band switch. This tuning range includes 80 and 40 meters and a number of popular shortwave bands. It's possible to operate the mixer at higher frequencies, but more-complicated oscillator circuits are needed to achieve the required frequency stability. A preselector consisting of Q1 and related components precedes the converter. The preselector allows the use of simple wire antennas. T1 and C1 form a tuned circuit providing receiver front-end selectivity that helps minimize images. R2 at the gate of Q1 reduces the T1/C1 tuned-circuit Q and sufficiently broadens the tuning so that a vernier drive is not required with C1.

The incoming-signal level can be attenuated by R1, a 1-kΩ potentiometer. Providing attenuation control is important with the SA602 mixer. Overloading the mixer creates many unwanted mixing products that produce considerable audio hash. The loop antenna used in the original SLR makes it very difficult to overload the mixer. That's one of the reasons the apparent sensitivity and selectivity of the SLR receiver design are so good.

Broadband transformer T2 converts the single-ended low-impedance output of Q1 into a fairly well balanced 3-kΩ input impedance required by the mixer. As I found with the SLR receiver, the SA602 works

[1]Notes appear on page 37.

A front-panel view of the OCR II.



To a builder's eye, the inside of the OCR II is as attractive as the outside.

considerably better when used with balanced inputs and outputs. I found this to be true even though I expended considerable effort trying to provide proper single-ended terminations. Note that the preselector is essentially an impedance-matching buffer and provides no gain, thus it has little chance of oscillating.

As with the original SLR, the preselector circuit can be removed from the signal path and a tuned loop antenna used in its place. When a loop antenna is used, connections to the mixer are made via C4 and C5. In general, I find that there is little difference in receiver performance with the loop antenna or the combination of the preselector and a modest wire antenna. However, by properly positioning the loop antenna, you can null local noise sources and strong broadcast stations—the wire antenna alone cannot accomplish this feat.

U1's output is terminated in the primary of T3, a 455-kHz IF transformer. (I use these IF transformers wherever possible because they're inexpensive and allow a good range of impedance-matching flexibility.) T3's secondary is terminated by R7. This presents an approximate 3-kΩ termination impedance to U1. Q2 and T4 form a tuned 455-kHz amplifier. Q3 is used as an impedance-matching stage between T4 and T5. This is necessary because the secondary of T5 is terminated in a relatively low (and variable) impedance of regeneration controls R13 and R14. If not for the buffering action of Q3, this would impact the IF amplifier and could result in unwanted oscillations.

The 455-kHz energy is coupled to linear optocoupler U2 via the secondary of T5. An Agilent (formerly Hewlett-Packard) HCPL4562 linear optocoupler is the heart of the OCR. Although its operation is fully described in the original OCR article, a brief explanation of how it works is worth mentioning here. The 455-kHz RF energy is coupled to the cathode of U2's LED via T5. This energy modulates the current flowing through the LED. Photons from the LED provide the base current for the optocoupler transistor. The transistor in U2 is configured as a 455-kHz Colpitts oscillator using L2 and associated components. The current flowing through the LED controls the circuit oscillation creating an ideal regenerative oscillator. The magic in this design is that by virtue of the LED, both the RF energy and the regeneration control are *totally isolated* from the sensitive areas of the oscillator, such as the tank circuit. This technique delivers a very well behaved regenerative detector with none of the infamous regenerative detector problems. An infinite impedance detector (Q4) recovers the audio, as opposed to a transformer and RF-choke scheme often employed with regenerative circuits.

The detected audio is band-pass filtered by C22, C25, C28 and R20 and R22. These components along with Q5 form the audio preamplifier. A ubiquitous LM386 (U4) is used as the headphone or loudspeaker amplifier.

Regulated voltage is supplied by U3, an LM78L05 three-terminal regulator. The regulated voltage is used at U1, U2 and tuning diode D1.

Construction Details

One of the more difficult tasks in designing a project such as the OCR II is component selection. When building a single unit, one-off parts, such as those found at flea markets or in junk boxes, are okay to use. But when developing a design to be copied, every effort must be made to use readily available parts. This, in turn, often forces design decisions that may appear arbitrary. An example of this process is the trade-off required when deciding how to implement the tuning in the OCR II. Some of the various options included a band switch, pluggable coils or an external VFO. Each choice has its own set of complications including part availability and cost. For this project, I decided to use common 365-pF air-dielectric variable capacitors to eliminate more complex band-switching circuits that require good-quality switches. Because such switches cost about the same as the capacitor, I used the latter. A vernier dial is used with the **BANDSET** capacitor. Besides making the tuning easier, it provides a calibration scale.

For the **TUNING** control, however, I decided in favor of a low-cost tuning diode and 10-turn potentiometer. Both of these decisions are based upon the availability of reasonably priced components from at least one reliable source.[4] In general, I have taken a minimum-component design approach, consistent with the desired receiver performance. No components can be eliminated and still retain good circuit performance. The bulk of the parts are available from standard suppliers. The HCPL-4562 (U1) is stocked by Newark Electronics.

The frequency-dependent portion of the U1 oscillator design can be scaled for other frequencies of interest in the lower HF region. However, for operation above about 10 MHz, consider using an external, well-shielded VFO for improved stability.

Instead of the PC board, you may use any of the standard construction techniques such as point-to-point wiring on a copper-

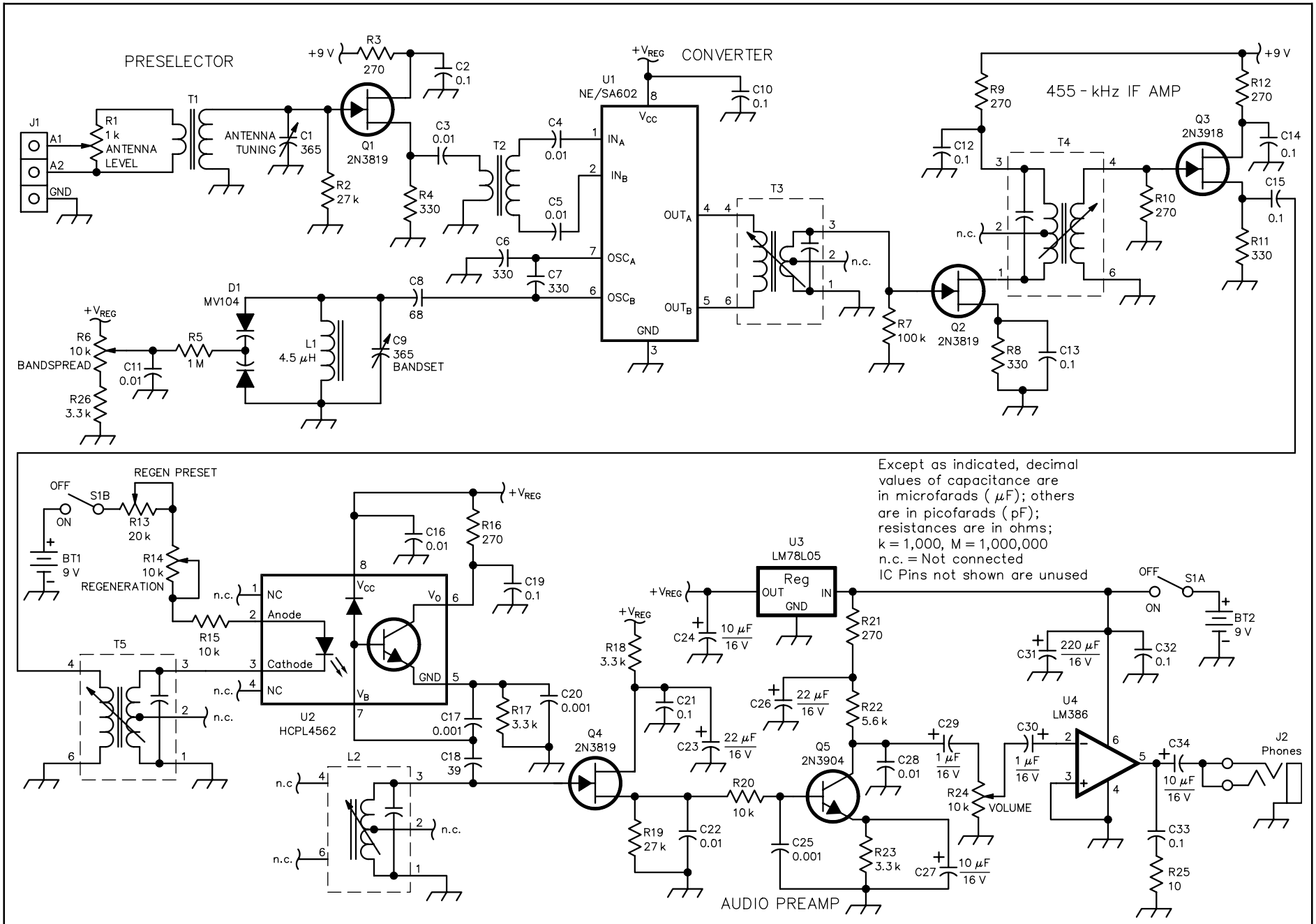
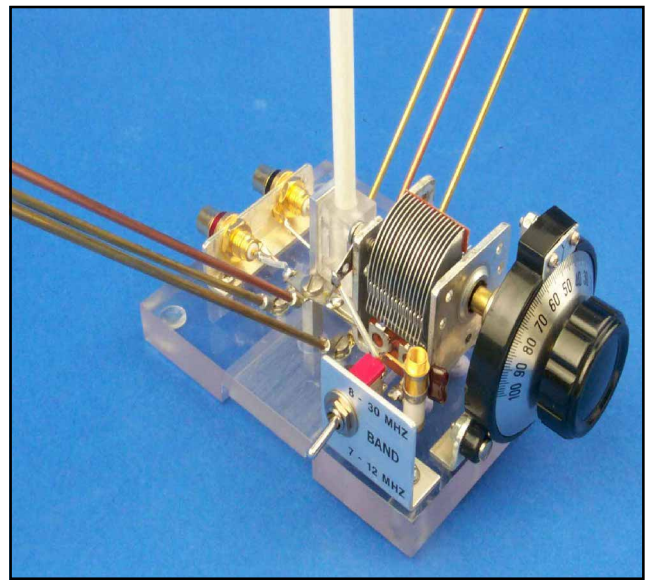

PRESELECTOR
CONVERTER
455 - kHz IF AMP
REGEN PRESET
AUDIO PREAMP
Except as indicated, decimal values of capacitance are in microfarads (μF); others are in picofarads (pF); resistances are in ohms; k = 1,000, M = 1,000,000
n.c. = Not connected
IC Pins not shown are unused
+9 V
+VREG
J1
A1
A2
GND
R1 1 k ANTENNA LEVEL
T1
ANTENNA TUNING
C1 365
R2 27 k
R3 270
C2 0.1
Q1 2N3819
C3 0.01
R4 330
T2
C4 0.01
C5 0.01
U1 NE/SA602
VCC
INA
INB
OUTA
OUTB
OSCA
OSCB
GND
C10 0.1
C6 330
C7 330
C8 68
D1 MV104
L1 4.5 μH
C9 365 BANDSET
R5 1 M
C11 0.01
R6 10 k BANDSPREAD
R26 3.3 k
T3
R7 100 k
Q2 2N3819
R8 330
C13 0.1
R9 270
C12 0.1
T4
R10 270
Q3 2N3918
R12 270
C14 0.1
C15 0.1
R11 330
OFF
S1B
ON
BT1 9 V
R13 20 k
R14 10 k REGENERATION
R15 10 k
T5
U2 HCPL4562
NC
Anode
Cathode
C16 0.01
R16 270
C19 0.1
C17 0.001
C18 39
R17 3.3 k
C20 0.001
L2
Q4 2N3819
U3 LM78L05
Reg
OUT
IN
GND
C24 10 μF 16 V
R18 3.3 k
C21 0.1
C23 22 μF 16 V
C26 22 μF 16 V
R21 270
R22 5.6 k
C28 0.01
C29 1 μF 16 V
Q5 2N3904
R20 10 k
R19 27 k
C22 0.01
C25 0.001
R23 3.3 k
C27 10 μF 16 V
R24 10 k VOLUME
C30 1 μF 16 V
U4 LM386
C34 10 μF 16 V
J2 Phones
C31 220 μF 16 V
C32 0.1
OFF
S1A
ON
BT2 9 V
C33 0.1
R25 10

Figure 1

Figure 1—Schematic of the OCR II circuit. Unless otherwise specified, resistors are 1/4-W, 5%-tolerance carbon-composition or metal-film units. RS part numbers in parentheses are RadioShack. Other suppliers include Digi-Key Corp, 701 Brooks Ave S, Thief River Falls, MN 56701-0677; tel 800-344-4539, 218-681-6674, fax 218-681-3380; http://www.digikey.com and Newark Electronics, 4801 N Ravenswood Ave, Chicago, IL 06040-4496; tel 800-463-9275, 312-784-5100, fax 312-907-5217; http://www.newark.com. Also, see Notes 3 and 4. Equivalent parts can be substituted; n.c. indicates no connection.

BT1—9 V
BT2—9 to 12 V; see text.
C1, C9—365 pF air-dielectric variable
C6, C7—330 pF, 5% NP0; see text.
C8—68 pF, 5% NP0; see text.
C24, C27, C34—10 µF, 16 V electrolytic
C23, C26—22 µF, 16 V electrolytic
C29, C30—1 µF, 16 V electrolytic
C31—220 µF, 16 V electrolytic
D1—MV104 varactor
J1—Spring-action terminal strip (RS 274-315)
J2—Three-conductor phone jack (RS 274-249)
L1—Approx. 4.5 µH, 28 turns #24 enameled wire on a T-68-2 core
L2—0.64 mH variable coil Toko RMC-2A6597HM (Digi-Key TK1302)
Q1-Q4—2N3819, MPF102 (RS 276-2035)
Q5—2N3904, 2N2222
R1—1-kΩ, linear-taper pot (RS 271-1715)
R6—10-kΩ, linear-taper, 10-turn panel-mount pot; see text.
R13—20-kΩ, linear-taper, PC-board mount pot; see text.
R14—5-kΩ, linear-taper, panel-mount pot; see text.
R24—10-kΩ audio-taper pot (RS 271-1721)
S1—DPDT (RS 275-614)
T1—Pri: 2 turns #26 enameled wire; sec: 35 turns #26 enameled wire on T-68-2 core
T2—Pri: 10 turns #26 enameled wire; sec: 25 turns #26 enameled wire on T-50-43 core
T3, T4, T5—0.64 mH variable coil, Toko RMC-502182NO (Digi-Key TK1305)
U1—NE/SA602 double-balanced mixer and oscillator
U2—HCPL4562 optoisolator (Newark #HPCL-4562)
U3—LM78L05 5 V, 100 mA positive voltage regulator
U4—LM386-4 audio amplifier
Misc: PC board (see Note 3); two-inch diameter vernier dial, 1/4-inch shaft (Philmore #S50); 9-V battery snap connectors (RS 270-234); 9-V battery holders (RS 270-326); enclosure; hardware



The OCR II can be built to use either wire antennas or tuned loop antennas. You can add the ability to use either antenna by adding a DPDT switch to select the preselector circuit (used with the random-length wire) or the loop antenna.

clad perfboard, or "ugly" ("dead-bug") construction on a bare copper PC board. The only critical area is the SA602 oscillator circuit. NP0 (C0G) capacitors are used here to enhance frequency stability. Use short, direct leads in this area. Make the circuit as mechanically robust as possible to help ensure stability. The hardware used for antenna connector J1 and switch S1 may be whatever you prefer. You can fashion an enclosure from PC board, aluminum or use a manufactured enclosure. A fully closed case is not required for good operation. Several prototype OCR receivers built as open-frame units perform very well over reasonably constant temperature ranges.

One of the more useful and interesting features of the OCR design is the **REGENERATION** control. This not only controls the amount of detector oscillation, but also controls the detector Q, which sets its bandwidth. With careful adjustment, bandwidths of a few tens of Hertz are achievable just before the detector starts to oscillate. To take advantage of this control, the pot used for regeneration control must have a fairly good resolution. Although a multiturn pot could be used here, I took a more cost-effective approach. A board-mounted 20-kΩ pot (R13) is used to preset R14, a 5-kΩ front-panel-mounted pot, for regeneration control. R13 is adjusted so that regeneration starts with R14 at about 75% of its maximum range. Used this way, R14 gives very good control over the regeneration. This scheme works well because the oscillator frequency is fixed, and the regeneration point is quite constant. Because the total current used by the LED in U2 is only about 400 µA, the change in battery voltage related to battery aging is very slow and therefore, only infrequent R13 readjustment is required.

Checkout and Operation

When you finish circuit assembly, carefully check your work for wiring errors and cold or missing solder joints. Verify that the components have been installed correctly before applying power. Note that BT1, used for the regeneration circuit, should be a 9-V battery. This reduces noise in the detector. BT2 may be a 9-V battery for headphone operation or a 12-V battery for loudspeaker operation.

Once all has been checked, plug your headphones into J2 (phones with an impedance of 16 Ω or greater give the best results) and apply power to the receiver. The headphones used should be of good quality. With the **VOLUME** control (R24) set at about midrange, advance the **REGENERATION** control (R14) to about 75% of its range. Adjust the **REGEN PRESET** potentiometer R13 until you hear a gentle but distinct increase in background noise. This indicates that U2 is oscillating and all is well with the OCR detector circuit.

Set the detector frequency by listening for the 455-kHz signal from U2 in a general-coverage receiver. Adjust L2 to set the operating frequency of U2. Alternatively, a frequency counter can be used to set the frequency. (Many inexpensive digital multimeters now have frequency counters usable to 10-MHz.) To measure the frequency of U2, connect the frequency counter to pin 5 of U2. Although the signal level is lower at pin 5 than at L2, measuring at this point avoids incorrect readings caused by the probe loading the tank circuit. (Similarly, the converter-oscillator frequency can be measured at pin 7 of U1; this is discussed later.) As the detector frequency is adjusted, the regeneration controls may have to be retouched to keep U2 oscillating. It is not critical that U2's oscillator frequency be set to *exactly* 455 kHz because there are no narrow filters used in the receiver. It is only necessary that all the IF transformers be within adjustment range of each other.

Verify that the mixer oscillator is operating over the correct range by listening for

its signal in a general-coverage receiver or using a frequency counter. The converter-oscillator frequency can be adjusted by adding a turn to, or removing a turn from L1. Remember to subtract the IF from the mixer-oscillator frequency. For example, the required mixer-oscillator frequency for receiving a 3.5-MHz signal is 3.045 MHz. Once this is done, connect a 15- or 20-foot-long wire test antenna to terminal **A1** on connector J1. Connect J1 terminal **A2** to the **GND** terminal. If an earth ground is available, connect it to the **GND** terminal also. With the detector oscillating, use the **BANDSET** control to find a signal. Peak the signal with the **ANTENNA TUNING** capacitor, C1. Next adjust the tuning slugs in T3, T4 and T5 for maximum signal strength. There is little interaction between these adjustments. The tuning of T5 is very broad, and an obvious peak is hard to discern. I generally place the tuning slug at the midpoint of its adjustment range. Finally, verify that the **ANTENNA LEVEL** control works and that the **BANDSPREAD** tuning is functional. That's it for tune up!

Using the OCR II

If this is the first regenerative receiver to which you've been exposed, tuning the OCR II will take some practice. The most sensitive operating regions of the detector for AM-signal reception is the area just *before* oscillation and for CW, just *at* oscillation. For SSB reception, the best operating point is found with just a bit more regeneration than that required for CW reception. After using the **REGENERATION** control for a short time, you'll get the feel of the receiver. The interaction between the **REGENERATION** control setting and the gain and selectivity of the detector will become quickly apparent. You may find yourself digging out CW and SSB signals from beneath the AM stations in the 40-meter band—signals you could never hear on other simple receivers! Those who have tried other regenerative receivers will notice that there is virtually no interaction between the received signal strength and the regeneration setting required. And, since the detector is at a fixed frequency, the regeneration level can be maintained over the entire tuning range of the receiver. This is a radio that is great fun to use because you have virtually total control of the receiver performance.

On 80 meters, the **BANDSPREAD** is fairly limited, covering only about 20 kHz or so. I use the **BANDSET** to tune the band and the **BANDSPREAD** as a "fine tuning" control. About 25% of the total tuning range is used to cover 3.5 to 4 MHz, so using it as a "main tuning" control works well with the vernier dial. At 40 meters, the **BANDSPREAD** covers the entire band. When tuning the 40-meter band, insure that the preselector is tuned to 7 MHz. It will also peak up at the image frequency around 6 MHz. This adds even more QRM to the band!

When the conditions are good, use the antenna **LEVEL CONTROL** to reduce the signal level. I have found that if the input signal from the antenna can not be reduced to the level that no signal can be heard on the receiver, the antenna is too big and can overload the converter section when the **LEVEL CONTROL** is set at its minimum.

To receive AM stations, I use the following procedure: Set the regeneration as for CW reception and "zero beat" the AM station. Next, reduce the regeneration just to the point where the oscillation stops. Keeping the regeneration level as high as possible allows the maximum detector sensitivity and provides the tightest audio passband. Depending on the strength of the station and the QRM present, the regeneration level can be reduced. This improves the fidelity of the signal because of the increased detector bandwidth. This technique is possible on the OCR II for two reasons. First, there is virtually no interaction between the received frequency and the regeneration control. Additionally, there is no frequency "pulling" by strong stations. Therefore, a weak station next to a strong station can be easily received.

The measured CW receiver sensitivity is less than 1 µV (by my ear) when driven by a laboratory-grade 50-Ω signal generator. The AM sensitivity is a little more difficult to measure since it depends upon the amount of regeneration being used, but it's about 2 or 3 µV.

Antennas

As mentioned earlier, the OCR II can be built to use a wire antenna or a tuned loop. For versatility, you can add a switch to choose the preselector circuit for the wire antenna or the loop antenna. I did this on a prototype with very good results.

The preselector has two antenna terminals (**A1** and **A2**) and a chassis ground terminal (**GND**). This allows maximum flexibility when using simple wire antennas. For the simplest random-length wire antennas, connect the antenna to terminal **A1**. Connect terminal **A2** to the **GND** terminal. If an earth ground is available, always connect it to the **GND** terminal as well. An antenna length of 20 or 25 feet will give good results. I've found that when an earth ground is available, a simple wire antenna just a few feet long works very well.

If you use a balanced antenna, connect one antenna leg to terminal **A1**, the other to terminal **A2**. Again, if an earth ground is available, connect it to the **GND** terminal. Don't be afraid to experiment with the antenna connections to find the best combination for your antenna. Remember: Overloading the OCR II mixer degrades overall receiver performance. Use the **ANTENNA LEVEL** control to reduce overloading when using large antennas or when very strong shortwave stations are encountered. The **ANTENNA LEVEL** control in conjunction with the **REGENERATION** control make a powerful combination to improve shortwave listening.

Using a tuned loop provides the receiver with front-end selectivity. (Loop-antenna designs are presented in the SLR article; see Note 1.) Generally, the loop should be designed for the lowest operating frequency. For 3.5 MHz, a square loop about 18 inches on a side is a good minimum size. A shielded or unshielded design can be used. My rule of thumb for calculating the inductance of a small wire loop is to estimate the inductance at 26 nH per inch. Thus, the small loop of 18 inches per side will have an inductance of about 1.87 µH. To tune this loop to 3.5 MHz, a capacitance of about 1100 pF is required. At 8.5 MHz, you'll need 187 pF. A combination of fixed-value and variable capacitors can be used to tune a loop over this frequency range. (Here's a good application for that triple-section, 365-pF-per-section variable capacitor you've been saving because it's "too good to throw out!") Of course, the loop can be made a bit larger or a multiturn loop can be used to reduce the capacitance required to tune the loop antenna.

A shielded loop antenna is shown with the OCR II in the title photo. An earlier version of this loop appeared on the cover of *QST* for October 1997. That loop was constructed of 22-gauge wire as described in the SLR article. However, that antenna and the receiver were borrowed so often that replacing the wire loops became a weekly task! I rebuilt the loop using $^3/_{32}$-inch-diameter tubing sold at model and hardware stores. Copper tubing is used for the active portion of the loop, with lower-cost brass tubing used for the shield loops. This material is sold in 12-inch lengths, solders easily and is quite rigid. The loop made with loops of tubing has proven to be very durable.

This particular loop is small, only nine inches on a side; therefore it is used on frequencies above 6.5 MHz. The loop inductance is approximately 0.95 µH and a capacitance of about 550 pF is required to resonate it at 7 MHz. Tuning the loop is accomplished with a 365-pF air-dielectric variable capacitor in parallel with a fixed-value capacitance of 220 pF. The fixed-value capacitor can be switched in and out, providing two tuning ranges. The lower range covers 7 to 12 MHz, while the upper range covers 8 to 30 MHz. The loop is connected to the receiver using short lengths of low-cost audio cable and standard phono connectors.

Summary

The OCR II receiver is a simple, all-mode multiband receiver. It retains the best features of its predecessors, the SLR and OCR receivers. With sensitivity equal to that of the SLR and the good selectivity provided by the OCR regenerative detector, the OCR II offers performance greater than the sum of its parts. I have enjoyed designing this radio, and have had great fun operating it. I thank those builders of the SLR and OCR receivers who have sent me mail and inspired the design. I hope others are inspired to try their hand at "homebrewing" this and other projects.

Notes

[1]Daniel Wissell, N1BYT, "The 40M SLR—a Shielded-Loop Receiver," *QST*, Oct 1997, pp 33-38.

[2]Daniel Wissell, N1BYT, "The OCR Receiver," *QST*, Jun 1998, pp 35-38.

[3]Jade Products, Inc,, PO Box 368, East Hampstead, NH 03826-0368; tel 800-523-3776, fax 603-329-4499; **jadepro@jadeprod.com**; **http://www.jadeprod.com/**. Jade also offers components used in this project.

[4]Additional parts sources include: Dan's Small Parts and Kits, Box 3634, Missoula, MT 59806-3634; tel and fax: 406-258-2782; **http://www.fix.net/dans.html**, for variable capacitors and multiturn potentiometers; The Xtal Set Society, PO Box 3026, St. Louis, MO 63130; tel 800-927-1771; **xtalset@midnightscience.com**; **http://www.midnightscience.com/crystal.html**) is one source of 365-pF air-dielectric variable capacitors.

Dan Wissell, N1BYT, was first licensed as WN2WGE and upgraded to Extra in 1984 as N1BYT. He's been with Compaq Computer Corporation (formerly Digital Equipment Corporation) for 20 years. He is currently a Principal Member of the technical staff, designing RF and analog systems. You can contact Dan at 7 Notre Dame Rd, Acton, MA 01720; **n1byt@arrl.net**.

NEW BOOKS

THIS WAS RADIO

By Ronald Lackmann
First edition. Copyright 2000 by Great American Audio Corporation, 33 Portman Rd, New Rochelle, NY 10801; tel 914-576-7660. Hardcover, 14 3/8 × 11 3/8 inches, 72 pages plus two audio CD-ROMs. $39.95. Available at Barnes & Noble, Borders, and other book retailers.

Reviewed by Steve Ford, WB8IMY
QST *Managing Editor*

◊ *This Was Radio* is saddled with the difficult task of distilling the golden age of broadcast radio into a single multimedia (print and audio) presentation. To a great degree it succeeds, with a few notable shortcomings.

The book itself is a handsome large-format "coffee table" tome packed with crisp black and white photography. Tracing the history of broadcast radio from its roots, for example, we see Frank Nullen in the studio of KDKA in 1922. Along the bottom of the opening pages is a time line that begins with Marconi in 1895. (Curiously, author Ronald Lackmann credits Ambrose Fleming with the invention of the vacuum tube in 1907, yet fails to mention the contributions of Lee DeForest.)

This Was Radio moves forward at a rapid clip with Lackmann's writing style exuding a contagious enthusiasm for his subject. In addition to the well-composed narrative you're treated to more fascinating photography. The collection ranges from rare studio shots to promotional images including photos of Bob Hope, Fanny Brice (as Baby Snooks), Abbott and Costello, Judy Canova, Jimmy Durante, Orson Wells, New York City mayor Fiorello LaGuardia (reading the Sunday comics during a newspaper strike) and much more.

Two audio CDs are embedded in the inside front cover. These contain superbly recorded excerpts from poignant moments in history such as the attack on Pearl Harbor and the crash of the Hindenburg zeppelin ("Oh the humanity!"). Best of all, entire episodes of well-known radio programs are available. Thrillers such as *Lights Out* and *The Inner Sanctum* still retain their ability to scare—more than 50 years after they were broadcast. Groucho Marks and Jack Benny are as amusing as ever. You'll even hear excerpts of speeches by Franklin Roosevelt, Harry Truman, Winston Churchill and flamboyant Louisiana senator Huey Long.

This Was Radio vividly encapsulates broadcast history, but does so from a point of view that is selectively nostalgic. For example, *Amos and Andy* is included in the book (and on the audio CD) because it was the first radio situation comedy. Lackmann, however, fails to discuss how *Amos and Andy* reflected the racism of its time. The fact that *Amos and Andy* stars Freeman Gosden and Charles Correll were actually white actors is only mentioned in passing. A photograph of the duo in black-face makeup appears without comment. (You'd have to be devoid of cultural or political sensitivity not to cringe while listening to their shows today.)

In another well-intentioned desire to sugarcoat the golden age of radio, Lackmann totally ignores Father Charles E. Coughlin, the "Radio Priest". His broadcasts attracted an audience of 30 million at the height of his popularity in the 1930s. Father Coughlin's angry messages often promoted fascist political ideology and offered the American public a strong dose of anti-Semitism. It is a portion of broadcast history that no doubt many would prefer to forget, but if *This Was Radio* intends to honestly portray the era, Father Coughlin should be included.

Finally, a photograph of Tokyo Rose teased me with the possibility that I would hear at least an excerpt of one of her infamous World War II propaganda broadcasts. Alas, she is missing from the CDs (as is Axis Sally). Once again, Tokyo Rose and Axis Sally had important, if dubious, roles in broadcast history. Their absence is puzzling.

Sweetened nostalgia aside, *This Was Radio* is a fine effort and certainly worth the $39.95 price tag. The CDs alone justify the cost. If you want a more thorough, candid look at broadcast history, however, I'm afraid you'll have to search elsewhere.

Next New Book

NEW PRODUCTS

NEW SEMICONDUCTOR REPLACEMENT GUIDE FROM PHILLIPS ECG

◊ The 19th edition of the *ECG Semiconductor Master Replacement Guide* (ECG212U) provides approximately 306,000 crosses for US, European and Asian semiconductors. The new guide lists 6,000 additional cross-references and 81 new devices.

Expanded selector guides are also included, simplifying the process of determining the best ECG replacement type for components that are not crossed.

The ECG *Instant Cross* program (ET-2604W2.2)—a semiconductor and relay cross reference on diskette—is now also available in both *DOS* and *Windows* versions

To find out more about these products or to locate an ECG distributor in your area, call 800-526-9354 or visit their Web site at **http://www.ecgproducts.com/**. Phillips ECG, 1001 Snapps Ferry Rd, Greenville, TN 37744; tel 423-636-5688; fax 423-636-5809.

Next New Product

By Dick Goodman, WA3USG

The Monster Loop

High-performance LF receiving loops are frequently small enough to sit comfortably on your desktop. But if you believe that size matters, here's a loop antenna that is physically commensurate with its performance—big, big, big!

Since I've become involved with low-frequency (LF) experimenting I've spent a disproportionate amount of my time in the shack with 136.745-kHz AMRAD beacons droning in the background. As I type this, my wife and daughter are upstairs napping on this lazy Saturday afternoon, and I'm wide awake and looking forward to spending the night checking out the action on LF. My family thinks I'm crazy! After a full day of working in the yard I feel even more ambitious. Just yesterday I completed my "Monster Loop," which is now bracketed to the side of my house.

At 6:18 PM I can easily copy both AMRAD beacons from a distance of more than 200 miles. Throughout the day, taking breaks from my yard work, I periodically poked my head into the shack to check on the strength of the beacons. At about 1 PM, the S-meter on my Ten Tec RX-320 showed RF from WA2XTF/6 and /12. The audio from both was strong enough to pump the receiver's AGC. I switched to the 160-meter sloper, which also works pretty well as an LF receiving antenna. The beacons were both readable on the sloper, but they were nowhere near as strong as on the loop.

At the suggestion of my friend Bob Riese, K3DJC, I've built several loops. The first, a 20-foot shielded loop for 160 meters, didn't work too well, although Bob's version seemed to work just fine.

As a follow-up I tried building a multiturn loop with a 20-foot circumference. I wound about 16 turns of No. 22 wire on the same PVC form that once held the 160-meter shielded loop. I also mounted nine capacitors in a weatherproof box so I could switch one or more of them across the loop with remote-controlled relays, thus changing the antenna's resonant frequency. The loop worked reasonably well from about 100 to 380 kHz, but my160-meter sloper still outperformed it. Not good.

It was time to pull out all the stops and give loop antennas a final chance to perform. How big could I make a loop that I could still turn with a small Radio Shack TV rotator? I started with plans for a loop that was 15 feet from corner to corner (more than 42 feet in circumference). I built the PVC frame and tried to stand it up—wrong! It was way too big and too unstable to rotate. I decided to chop 18 inches from each of the PVC pipes that made up the frame. This produced a more reasonable 12-foot loop (34 feet in circumference).

Taking Bob's advice, I made the loop from No. 14 stranded, insulated wire. I also spaced each of the 10 turns one inch apart to maximize the antenna Q. I used the same relay-switched capacitor scheme but added varactor tuning diodes that worked in conjunction with the switchable capacitors. This lets me remotely tune the loop to resonance anywhere from 90 to 450 kHz.

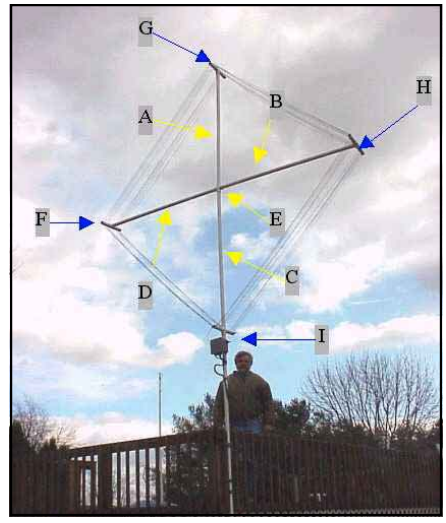


Figure 1—Assembling the loop frame. Cut four pieces of PVC pipe to a length of 5 feet 6 inches (A, B, C and D). These will be inserted into the center-mounted PVC cross fitting (E). Three-way PVC T fittings will be installed at locations F, G and H. The last PVC cross fitting will be attached at location I.

I managed to get the whole thing up on my roof and discovered that, yes, it could be turned with a small rotator as long as I mounted the rotator at the bottom of the mast.

How does it work? Let's just say that "I've gone loopie for loops!"

I was thinking about calling this project "The Lowes Loop" because virtually everything can be procured at your local Lowes (building supply) store. Here's your shopping list:

- Five (5) sections of 10-foot, 1 1/4-inch schedule 40 PVC pipe
- Two (2) 1 1/4-inch four-way PVC cross fittings (join four pipes)
- Three (3) 1 1/4-inch PVC "T" fittings (join 3 pipes)
- One (1) 500-foot roll of no. 14 stranded, insulated wire
- One (1) bottle of PVC glue
- Five (5) 4-inch TV mast-mount standoff insulators
- One (1) 10-foot section of TV mast
- One (1) 5-foot section of TV mast

Building the Frame

As shown in Figure 1, cut four pieces of PVC pipe to a length of 5 feet 6 inches (**A**, **B**, **C** and **D**). These will be inserted into the center-mounted PVC cross fitting (**E**). Three-way PVC **T** fittings will be installed at locations **F**, **G**, and **H**. The last PVC cross fitting will be attached at location I. From this point, the loop mast and support assembly will be attached.

Now that you understand the configuration of the frame, take the remaining PVC pipe and cut eight sections, each eight inches long. See Figure 2. Measure a half-inch from one end and drill a hole large enough to pass the no. 14 wire. Drill five more holes, each one-inch apart.

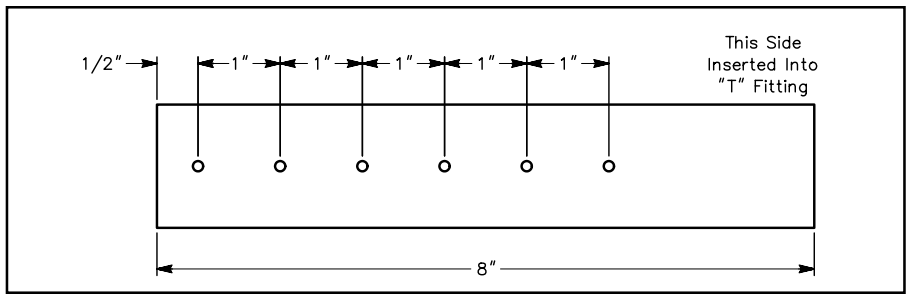


Figure 2—This short PVC pipe is what will actually support your loop wires. Two of these will go into each of the three T fittings on the ends of each pipe. Two more will go into the cross fitting at location I in Figure 1. Measure a half-inch from one end and drill a hole all the way through the pipe that is large enough to pass the No. 14 wire. Drill five more holes through the pipe, each one-inch apart.

Assembling the Loop

Take the eight pieces of drilled PVC pipe and insert them into their appropriate places in the three **T** fittings on the sides, top and in the single cross fitting on the bottom. The holes in the top and bottom (**G** and **I**) pieces should be parallel to the ground. The holes in the side pieces (**F** and **H**) should be perpendicular to the ground.

Place the entire frame on its back (or front) and start stringing the no. 14 wire. It took me about 45 minutes to lace all 10 turns. I started with about 100 feet of wire stretched out on the ground. I threaded it through the holes, keeping everything tight. When I ran out of wire, I soldered another 100-foot piece to the end of the first and continued. When you're finished, you will have 10 turns of wire in place and the framework will be much stiffer then it was before the wire was added.

Cut a piece of PVC pipe 18 to 22 inches long. Insert it into the bottom of the cross fitting. This is where you will fasten the relay box. Insert the five-foot section of mast into this section from the bottom. Leave about nine inches of mast protruding. This will join with an additional 10-foot mast section later in the assembly.

Drill two holes all the way through the PVC pipe, through the mast inside, and out the other side of the pipe. Note the distance between these two holes. You will fasten the capacitor box to this point by running two bolts through the capacitor box, the pipe, and to nuts on the other side. This will also keep the mast from turning.

Now measure how far up into the loop frame the mast goes. About an inch from the upper end, drill a hole through PVC pipe **C** (see Figure 1), the mast inside, and the other side of the pipe. Insert a bolt and fasten tightly with a nut. The mast is now an integral part of the loop structure and offers substantial support.

Turning this mast turns the loop. I used PVC pipe cement to glue the T fittings in place. I also glued the eight-inch PVC pieces in place. I did not glue the PVC pipes where they attached to the cross fitting at location **E** in Figure 1. I did, however, drill small holes where the pipe entered this cross fitting and used self-tapping screws into the fitting to hold the pipes in place.

The Capacitor Box and Control Unit

The capacitor box makes this loop functional. With it you can tune the loop to resonance anywhere between 90 and 450 kHz. And there's no reason you can't modify the circuit to suit your needs. The schematic for the box is shown in Figure 3.

I used a couple of runs of four-conductor rotator cable between my control unit in the shack to the capacitor box. I used five conductors to apply 28 V dc to each relay coil (not shown). Using this method, any number of capacitors (or no extra capacitors) may be switched across the loop. In addition to the switched "bulk" capacitors, three MVAM109 varactor diodes are also connected across the loop in parallel. I used another conductor from the control cable to route tuning voltage from the shack-mounted control box to the varactor diodes in the capacitor box.

The 1:1 toroidal balun is a Palomar FT-50-43 wound with 15 trifilar turns of No. 30 wire wrapping wire I obtained from RadioShack. Use three colors to make it easy to tell which wire goes where. It's an

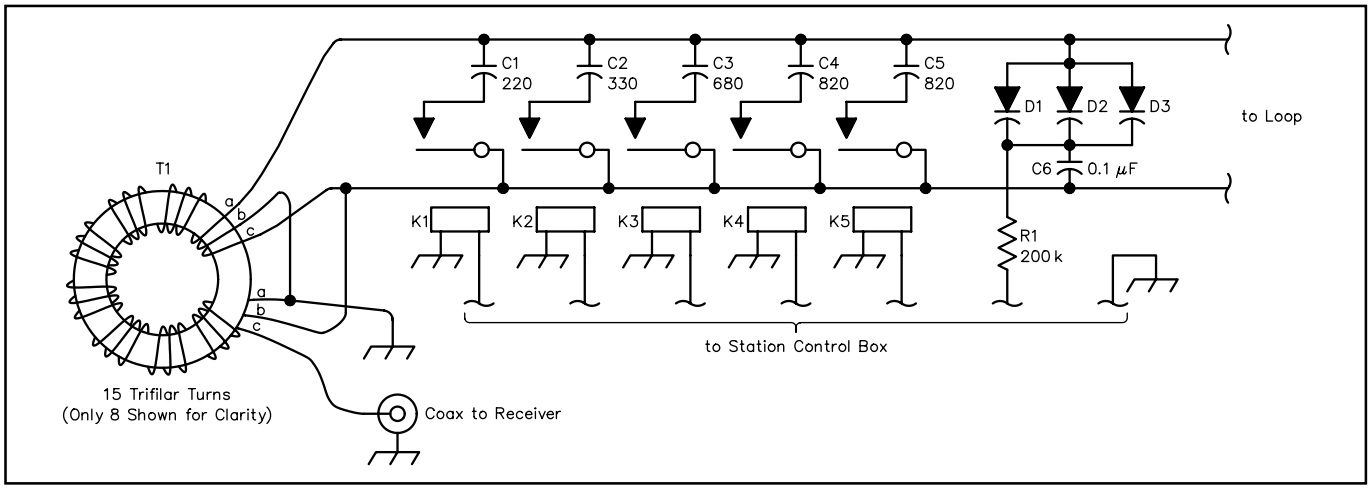


Figure 3—The schematic diagram of the "capacitor box." This circuit must be mounted in a weatherproof enclosure at the base of the loop.

K1-K5—SPST relays, 24-V dc coils
D1-D3—MVAM 109 varactor diodes (Dan's Small Parts, tel 406-258-2782; http://www.fix.net/dans.html)
C1—220-pF 50 V mica capacitor
C2—330-pF 50 V mica capacitor
C3—680-pF 50 V mica capacitor
C4-C5—820-pF 50 V mica capacitors
C6—0.1 µF ceramic disc capacitor
T1—1:1 toroidal balun. Palomar FT-50-43 wound with 15 trifilar turns of no. 30 insulated wire (Palomar, tel 760-747-3343; http://www.Palomar-Engineers.com)
R1—200 kΩ, 1/4-W resistor
One roll no. 30 wire wrapping wire (red)
One roll no. 30 wire wrapping wire (white)
One roll no. 30 wire wrapping wire (blue)
One chassis-mount SO-239 coax connector
Two 10-pin terminal strips
One five-pin terminal strip

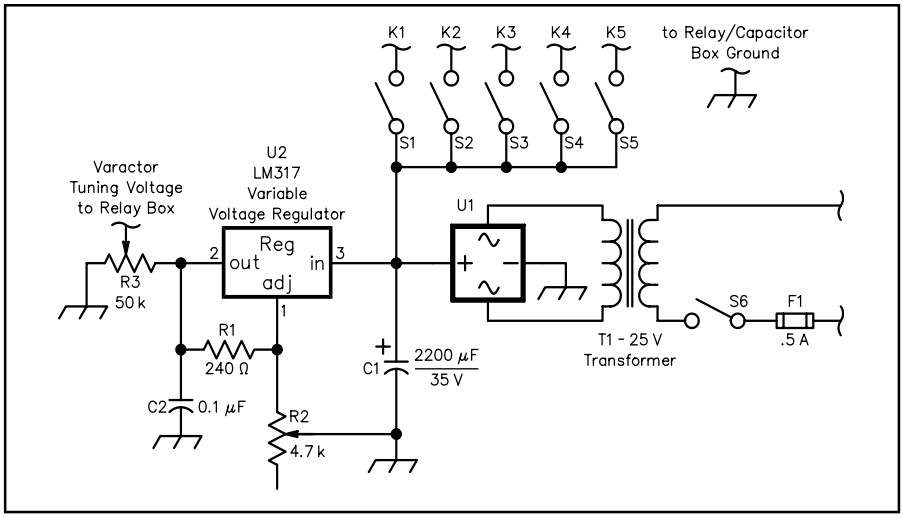


Figure 4—Schematic diagram of the control unit. All parts are available from RadioShack unless otherwise indicated. Layout is not critical. Simply mount the five "capacitor switches" on the front of the enclosure along with the tuning potentiometer (R3). By using various combinations of switches and tuning, you can tweak the loop for maximum received signal strength from the comfort of your shack.

C1—2200μF, 35-V electrolytic capacitor (272-1020)
C2—0.1μF ceramic disk capacitor (272-135)
F1—0.5A, 120 V fuse
R1—240 Ω resistor
R2—4.7 kΩ trimmer potentiometer (271-281)
R3—50 kΩ potentiometer, linear taper (271-1716)
S1-S5—SPST toggle switches (275-624)
S6—SPST switch (275-603)
T1—120/25.2-Vac transformer (273-1366)
U1—Bridge rectifier, 4A, 100 PIV (276-1171)
U2—LM317T adjustable voltage regulator (276-1778)

elegant way to match and interconnect the loop to the coax, and it works perfectly. I ran about 60 feet of RG-58 coax from the SO-239 connector on the capacitor box to the shack-mounted preamp.

The control unit is equally simple (see Figure 4). Because the relays had 24-V coils, I used a RadioShack 24-V transformer and a full-wave bridge for the relay power supply. This pulled in the relays just fine.

For the varactor tuning voltage, I regulated the raw output of the relay supply with an LM-317 three-pin voltage regulator. I set the regulated voltage to 20 V dc and used a 50-kΩ potentiometer to provide 0 to 20 V to the diodes. One side of the potentiometer is connected to ground while the other connects to the 20-V regulated output. A wire from the wiper arm connects to the 200-kΩ resistor that feeds the tuning diodes. A set of five SPST toggle switches activate the relays to select the various capacitor combinations.

To the Roof!

A lot of Old-Timers say loops don't have to be mounted high, but I wanted to get this particular loop as high as possible. *Remember that this is a large, unwieldy antenna.* I first tried to hoist it to the roof myself, with *almost disastrous results*.

Get help erecting this antenna!

If the loop tilts more than 30°, one person probably can't handle it. It's also somewhat heavy and has noticeable wind resistance.

I hoped to be able to rotate the antenna with a small RadioShack rotator, but the sheer size of the loop made it impossible to mount the rotator near the antenna, so I mounted it at the bottom of the antenna mast support assembly.

I took the completed loop assembly, with a five-foot mast sticking out of the bottom, and carefully laid it down on the ground and attached a 10-foot section of mast to the existing five-footer. I slid a nine-foot section of $1^{1}/_{4}$-inch schedule 40 PVC over the 10-foot mast section, making sure that the PVC pipe was fully contacting the pipe from the completed loop assembly.

Next, I drilled a small hole through the PVC pipe and internal mast about two feet from the bottom of the entire assembly. I ran a small bolt through this hole and fastened it with a nut. Now the PVC pipe couldn't slip off. The whole assembly can be carefully raised by *at least two people* and bracketed to the side of a structure using four TV mast brackets. Make sure the mast brackets are securely anchored to the side of the structure. Once the assembly is bracketed in place, the bolt you installed should be removed, allowing the loop to be rotated from the bottom.

How Does it Work?

I had my doubts about loops before I built this one. The others were poor performers and I had to tweak them incessantly to achieve only marginal performance. After all the adjustments, my short 160-meter sloper would always outperform the loops.

When I finished the Monster Loop, I temporarily strapped it to the deck of our pool (which drew an interesting stare from my wife). I promised her it was only temporary and proceeded to connect the control wires and coax. Back in the shack, I powered up the RX-320, which was tuned to the AMRAD LF beacon frequency on 136.745 kHz. The receiver came to life and DCU (a commercial data station somewhere in Nova Scotia) blared from the speaker!

The Canadian signal was quite strong. I switched to the 160-meter sloper. Yes! The signal was there, but nowhere near as strong as the loop. I flipped the switch on the control box that inserted a 1640-pF capacitor across the loop. The signal from DCU increased markedly. With that particular capacitor in parallel with the loop, the Varactor diodes allowed me to tune the loop to resonance.

Later that day, WA2XTF/6 and /12 moved my S-meter for the first time! And every time I compared the loop to the sloper, the loop won hands down. By rotating the loop I could effectively eliminate about 80% of the line noise that was giving me trouble. The big loop has an incredibly deep null. Being able to null unwanted noise sometimes makes the difference between hearing a signal well and not hearing it at all.

I experimented with the loop's switchable capacitors and found that the loop can be made to resonate anywhere from slightly below 90 kHz to just above 450 kHz.

Remote tuning diodes are the only way to go. The resonance peaks are quite sharp, and you have to retune every couple of kHz, but the incredible performance makes it all worthwhile.

If you build a version of this loop for yourself, please remember to be careful during installation. Although it performs well, it's awkward to install. I also have my finger crossed as to its survivability. We've had a few strong winds since I've installed the "Monster." It swayed back and forth, but no harm was done.

Last but not least—building this big loop was a lot of fun. It had been a while since I'd brought back a load of hardware and turned it into something useful *and* attractive.

You can contact the author at 199 Maple Ave, Mechanicsburg, PA 17055; **wa3usg@compuserve.com**.

By Steve Cerwin, WA5FRF

Amateur Television from Model Planes and Rockets

Install an ATV camera and transmitter in a model airplane or rocket and you'll see the world from a very different perspective!

Since I began flying radio controlled airplanes in 1980, I had wanted to include cameras and television equipment as payloads. Although I enjoyed early success with 35-mm photography, the television gear of that era was too bulky and expensive for my plane and pocketbook. Within the last five or so years, however, miniature TV cameras have become astonishingly small, lightweight, affordable and require only minimal power. And RF transmitter boards share similar characteristics. The availability of suitable components and the added attraction of contributing to an advanced middle school program brought my dream to reality nearly 20 years later.

Figure 1—The author with an ATV-equipped *Ugly Stick*.

An ATV frame capture from the *Butterfly*.

The Krueger School of Applied Technology (K-SAT) at Krueger Middle School in San Antonio, Texas, has a truly enlightened magnet program for sixth, seventh and eighth graders. Headed by Calvin Best, the program adds a heavy science and aerospace spin to all academic subjects. In addition to their normal classes, the students design and build model rockets and planes and are involved with the supervised flying of high-altitude rockets and radio-controlled model airplanes. The students also prepare for and obtain their ham licenses as part of the curriculum. My friend, Charles Thomas, WA3PAY, and I build and fly ATV-equipped RC airplanes for our own enjoyment, but derive as much or more satisfaction from sharing our experiences with the students. Charles and I serve as mentors for the K-SAT program.

Another K-SAT mentor, Bob Morris, is a retiree from the United States Geological Survey (USGS). Thanks to his efforts, we were invited to fly an airborne ATV system equipped with a GPS position overlay to survey the Texas flood plain areas affected by the October 1998 floods. This was done on a demonstration/volunteer basis in much the same way hams provide the National Weather Service with rainfall data. Using the camera-equipped planes we were able to fly over and videotape otherwise inaccessible creeks and riverbeds. The USGS used this data to assess water flow resistance and flood potential in times of high rain. The radio-controlled "camera planes" offered a low-cost and low-risk alternative to manned flight. The experiment turned out to be a highly successful and satisfying adventure.

Described below are some of the projects we have undertaken and shared with the school.

Airplane Platforms

The first (and the most versatile to date) airborne ATV transmitter was built as a completely self-contained unit that could be attached over the wing of any suitable model airplane with rubber bands. The original package contained a single forward-looking CCD camera, an 80-mW transmitter, a 12-V NiCd battery pack and an integral monopole antenna. The package measured 4 × 6 × 1.25 inches and weighed about 1.25 pounds. The inside of the plastic chassis was lined with copper foil tape to provide a lightweight shield for the electronics and a ground plane for the antenna. Subsequent revisions have included connections for a second, down-looking camera, a switch to select the look angle by remote control, and optical filters to improve the video quality. A photograph of the transmitter mounted atop a .40-sized *Ugly Stick* is shown in Figure 1.

The *Butterfly* motor glider has proven to be the most stable platform flown to date. The Butterfly sports a 99-inch wingspan and nearly 1000 square inches of wing area. It has been fitted with a .32-size engine to develop enough power to get the 1.25-pound camera package airborne with a short takeoff roll on a grass runway. The large size and inherent stability of this airframe makes it very easy for an experienced pilot to fly visually (looking at the airplane) or as a remotely piloted vehicle (RPV, looking at the video). As an RPV, the plane flies very much like a computerized flight simulator. In fact, when flying in this mode it's possible to inadvertently fly the plane out of range unless a safety pilot is present to tell the operator when to turn back toward the control transmitter. The frequencies and

relative power levels of the control signal and ATV transmitter are calibrated to allow the ATV link to fail before the radio control link goes down. The rule of thumb is, if the picture starts getting fuzzy, it's time to head back!

With a smaller and fully symmetric shoulder wing, the *Ugly Stick* is fully aerobatic. The video from doing loops, rolls and spins is truly spectacular! It's like actually being in the plane, except you get to keep your lunch. The extra weight and drag from the ATV package, however, leads to longer takeoff rolls and screaming-hot landings. The camera package represents a larger fractional increase in weight for this airplane and maintaining sufficient airspeed is critical with the high wing loading. But even though it glides somewhat like a streamlined brick, it handles pretty well once you get used to the "heaviness" of the stick.

The *TH-60* has enough wing area (875 square inches) and power to easily carry the ATV package without strain. This airframe also provides superior wind penetration and crosswind landing characteristics as compared to the motor glider. Increasing the wing incidence one degree over stock and outfitting the airplane with fully functional flaps dramatically improved flight characteristics at minimum controllable airspeed and helped to slow the landings to more normal speeds. I've recently installed a second-generation ATV transmitter inside the TH-60 fuselage. Although the weight is still about the same, getting rid of the extra drag of the exterior ATV package yielded significant handling improvements. The forward-looking camera is mounted in a small box attached to the windshield and the down-looking camera looks through a hole in the bottom of the fuselage. As before, the look angle can be selected in flight. Microscope slides serve as windscreens to keep bugs and fuel spray off the camera optics. A future project will explore the use of a two-axis gyro to help stabilize flight in gusty winds.

Rocket Platforms

While the students at K-SAT build their three-foot-tall rockets, the adult kids build theirs. The big kids' "heavy lifters" stand 11 feet tall and carry an ATV transmitter with video overlays that display GPS position, speed, heading and altitude. Constructed under the expert guidance of Bill Wagner, these rockets require FAA coordination and need *lots* of empty land around them to fly. After months of rain delays, we finally got a chance to fly one of the big rockets in May 1999 at a 22,000-acre cattle ranch in southern Texas belonging to Rik Hoffman, K5SBU. The rocket carried a side-looking color camera and a 1.5-W ATV transmitter. After the pre-filed clearance was obtained from Houston center via cell phone, we started a quick countdown and hit the switch. The rocket leaped into the air atop a mountain of fire and roared away with Doppler-shifted thunder, ever decreasing in pitch as the rocket accelerated to 401 MPH. During its seven-second burn, the rocket consumed $360 of solid fuel at a rate of slightly more than $50 per second. The rocket then coasted straight up for another 23 seconds, reaching an altitude of 7000 feet.

Figure 2—*Big Yeller* takes to the skies with GPS and ATV payloads.

The Hondo airport as seen from the TH-60.

Figure 3—Looking down the rocket fuselage at Hondo airport.

The ATV system worked flawlessly, providing spectacular video for the entire flight. The view was particularly impressive as the rocket approached, penetrated and ascended above a thin cloud deck at 3500 feet. As the rocket passed apogee and began to descend, the computerized altimeters sensed the increase in barometric pressure and deployed the parachutes. Five minutes later the rocket landed in a mesquite tree just over a mile from the launch pad. After touchdown, the ATV signal was still coming through, showing an excellent view of the thick underbrush and reporting its landing coordinates on the GPS data overlay. We punched the coordinates into a hand-held GPS unit and went right to the landing site. A photograph of the launch is shown in Figure 2.

A second rocket with its own ATV payoad was constructed, this time with a down-looking black-and-white camera. Both rockets were launched on December 4, 1999. You can see a view from one of the rockets in Figure 3.

Cameras and Optics

Small CCD cameras are still evolving. Our first ATV transmitter used a single board black-and-white camera with a pinhole lens and required 9-V dc at 100 mA. Our first color camera ran on 10.5 V, had three PC boards and required 300 mA. Our present camera is a much smaller single-board color model that requires 10 V at 100 mA. A series string of 1N4001 rectifier diodes is used to drop the 12-V ATV transmitter battery voltage to about 10 V dc. The cameras were obtained from Supercircuits (see the Equipment Suppliers sidebar) in Austin, Texas.

Cameras are available with pinhole or multielement lenses. Both give a 70 to 90° field of view, with the wider view preferred for airborne operations. The multielement lenses have less barrel distortion than the pinhole versions, but are physically larger. The apparent curvature of the earth evident in some of the aerial views isn't real—it's caused by the barrel distortion of the camera lens.

The picture quality obtainable from outdoor operations can be improved by adding filters in front of the camera lens. Most CCD cameras are set up for low-light performance and suffer from overexposure in bright sunshine. The symptoms can include blank-out or streaking if the sun comes into the field of view, sluggish AGC response and excessive contrast, causing loss of ground detail below a bright sky. This can be fixed by adding a neutral-density filter to the front of the lens. Values

between ND 0.5 and ND 1.5 work well. The wing-mounted ATV package was modified to include a 37-mm screw-in adapter to accept one or more photographic filters. Infrared and ultraviolet (haze) filters can improve color balance.

Another parameter affected by light level is shutter speed, the primary exposure control of a CCD camera. Without neutral-density filters, the shutter speeds can be faster than a ten-thousandth of a second. This is fast enough to stop the prop of a 12,000-RPM engine if the camera is looking through the prop arc. The resulting stroboscopic effect is fascinating to some and downright annoying to others. Adding the neutral-density filter starves the camera for light and it responds by slowing its shutter speed. This causes the prop to blur or even disappear if the prop is dark in color, giving a more pleasing frontal view. The present external ATV package uses one or two neutral-density filters screwed onto the chassis ahead of the camera lens.

Frequency Selection

Several factors influence the choice of operating frequency for the ATV transmitter. These include range, efficiency and receiver complexity. ATV frequency bands include 70 cm, 33 cm and 24 cm, and 2.4 GHz and above. It takes four times as much power to get the same signal at 900 MHz as it does at 450 MHz. Transmitters are also more efficient at 450 MHz, meaning smaller and less massive batteries can be used on the already overburdened RC aircraft. Also, it just happens that cable TV channels 58 through 60 fall completely within the 70-cm band (427.25, 433.25 and 439.25 MHz, respectively). This means that a cable-ready TV or VCR can be used as a receiver without any additional electronics. Transmitter suppliers are well aware of this fact and offer transmitter boards already tuned to these frequencies. These factors make 70 cm our hands-down favorite for airborne ATV activities.

Interference to and from other amateur services (FM repeaters and satellite operations) isn't really an issue because the airborne packages typically use only 80 to 200 mW and are flown for short durations from (necessarily) remote locations. Maximum range, even with a beam for a receiving antenna, is only a few miles.

Antennas

Our antennas are designed to maximize range and minimize interference between co-located functions. In the airplanes, this is the ATV transmitter and the flight pack receiver. In the rocket, it is the ATV transmitter and the GPS receiver. An additional goal is to provide uniform coverage with minimal dropouts in the coverage pattern.

The view from the K-SAT rocket at 7000 feet.

Figure 4—The circularly-polarized ATV antenna on the rocket payload bulkhead.

The best airplane ATV antennas have been simple vertical ground-planes or vertical dipoles. For short-range flights the receive antenna was a simple quarter-wavelength vertical mounted on my car with a mag-mount. For longer-range airplane flights and for rocket flights, a 10-element beam (a KLM 440-10x) was connected to the receiver. The airplane's flight pack receiver uses a standard trailing-wire antenna supplied by the manufacturer. The control receiver and antenna are configured for horizontal polarization and are mounted as far away from the ATV antenna as possible.

The rocket payload contains two antennas: one for the ATV transmitter and one for the GPS receiver. The 70-cm ATV antenna is a circularly polarized turnstile mounted on the wooden bulkhead separating the payload section from the booster. A photograph of the antenna is shown in Figure 4. When worked against a horizontally polarized beam on the ground, good signals—without dropouts—were obtained from the spinning rocket (as it ascended overhead and as it drifted upside down to the landing site a mile from the launch site).

The GPS antenna was glued to the outside of the rocket. A folded dipole design was selected for simplicity, conformal mounting and frequency selectivity. The folded dipole was placed on the rocket as far away from the ATV antenna as possible. Tuned for 1570 MHz and fed with a half-wave coaxial balun, it provided good rejection of the 427-MHz ATV signal. The antenna was capacitively coupled to the coaxial feed line to keep from shorting out the preamplifier bias voltage placed on the coax by the GPS receiver. Excellent GPS coverage was obtained during the flight.

If the ATV transmitter is connected to the antenna with a coaxial feed line, a balun will prevent the feed line from becoming a part of the antenna. This will eliminate feed line radiation (which can distort the radiation pattern), keep the ATV RF away from sensitive onboard receivers and facilitate tuning the antenna. Choke, ferrite bead, sleeve and current transformers are good balun candidates. I've had excellent results with a simple choke balun formed by coiling the RG-174 feed line at the antenna feed point. This eliminates unwanted feed line radiation and decouples the feed line from the antenna, significantly improving the SWR.

Operational Considerations

One safety issue that must be addressed for safe RC aircraft operation is eliminating interference from the ATV transmitter to the flight-control receiver. Both use a 60-Hz frame rate, and ATV signals can cause serious interference to the flight pack receiver and subsequent loss of aircraft control. Although the control frequency is at 72 MHz (or at 6 meters for hams), receiver "desensing" can occur if the ATV signal enters the receiver through the antenna, servo or battery leads. I took several steps to eliminate this problem. First, the TV camera and the ATV transmitter were mounted in a shielded enclosure. Copper foil tape makes an excellent lightweight shield when applied to plastic and balsa enclosures. The antennas for the ATV transmitter and flight pack receiver were placed as far apart as possible and cross-polarized (ATV vertical and flight pack horizontal). A balun was used in the ATV antenna coax to eliminate unwanted feed-line radiation. To eliminate conducted interference, separate batteries were used for the flight pack and the ATV package, and the direct connection between the flight receiver and the ATV package was decoupled by inserting a 1-k ohm resistor in series with the signal and the ground wire.

With the ATV package mounted atop the TH-60, I couldn't eliminate all of the interference until I decoupled the leads from the aileron servos by winding them around a ferrite toroid. Ferrite beads and toroids can be effective only if they are suitable for use at 450 MHz. Most are not, and the manufacturer's data sheets should be consulted when selecting the correct ferrite cores for various frequencies.

The elegant Butterfly with its ATV package attached.

The ATV-equipped Tower TH60 ready for takeoff.

The KSAT rocket and launch team.

Equipment Suppliers

Supercircuits
One Supercircuits Plaza
Leander, TX 78261
800-335-9777
http://www.supercircuits.com
(cameras and transmitters)

Edmund Industrial Optics
101 East Gloucester Pike
Barrington, NJ 08007
800-363-1992
http://www.edmundoptics.com
(cameras and optics)

PC Electronics
2522 Paxson Ln
Arcadia, CA 91007
http://www.hamtv.com
(transmitters, GPS overlay boards and cameras)

Tower Hobbies
PO Box 9078
Champaign, IL 61826
http://www.towerhobbies.com
(model aircraft and supplies)

These steps were sufficient to guarantee no loss in control range for my RC aircraft. More stubborn cases may require shielding the receiver, decoupling each servo lead with feed-through capacitors or chokes where the lead enters the shielded receiver compartment and inserting a low-pass filter in series with the antenna lead. Before flying with ATV gear, carefully "range test" the system on the ground with the engine turned off. A typical test involves removing or collapsing the transmit antenna and backing away from the aircraft while observing the control surfaces. Tests should be performed with the ATV transmitter *on* and *off* to make sure that the maximum control range has not been compromised.

We installed the ATV gear only on aircraft that had already been proven flightworthy. After installation, the center of gravity was carefully checked to ensure that the additional gear was at the correct location as indicated on the airplane plans. The greater wing loading caused longer takeoff and landing rolls, higher stall speeds, sluggish climb performance and a degraded glide ratio. Rudder trim became very important and it was necessary to add more rudder for coordinated turns. The TH-60 flew best when the control transmitter was set up to automatically mix rudder deflection with the ailerons.

If the camera is mounted behind the engine, fuel spray can become a problem. A microscope slide or neutral-density filter makes an excellent windscreen to protect the camera lens, but it can become fogged in only a few minutes if the fuel spray is excessive. Exhaust is the main culprit, and the muffler should be positioned on the opposite side of the airplane from the camera. To keep fuel spray off the microscope slide window on the bottom of the TH-60's fuselage, I had to install a triangular baffle ahead of the window. Significant fuel spray can also come from the carburetor. This can be reduced by installing an air filter. Engines that use crankshaft bushings instead of sealed bearings spray fuel from the front of the engine. Cowling the engine or using a ball bearing engine will fix this problem.

We discovered that the computerized altimeters used to deploy the parachutes on the rockets were susceptible to interference from the 2-meter hand-helds we used to coordinate launch activities. Chute-deployment failure and pre-launch chute deployment were problems before we caught on to what was going on. We lost our first two ATV rockets to this problem, even though both rockets contained redundant altimeters. Fortunately, the rockets came down in the (planned) remote area, and the crash was a non-event. The rockets and all onboard equipment were a total (and spectacular) loss. In the future, the altimeters will be shielded and all connecting wires will be shielded and decoupled with bypass capacitors and ferrite chokes. All hand-helds will be kept at least 50 feet from the launch site. Careful checks will be made to ensure that the 70-cm ATV transmitter can't cause similar problems. Additionally, we will be installing simple backup timers to deploy the chutes if the altimeters are unable to function for any reason.

Precautions

I don't want this to sound too much like "don't try this at home," but in reality, flying model aircraft and rockets can be dangerous and should be undertaken only by qualified individuals. Both possess sufficient speed and energy to cause injury, death or extensive property damage. Model airplane engines and propellers can cause serious hand injuries. Flying RC aircraft is a difficult skill that is within the reach of most individuals, but may take years to master. Launching model rockets that weigh more than 1500 grams or carry more than 125 grams of propellant is subject to FAA regulation. Additional restrictions apply: See FAR Part 101 of the Code of Federal Regulations for more detail. Rocket components and chemicals for larger motors are available only to individuals certified by Tripoli Rocket Association or The National Rocket Association.

This article is meant to share experiences and prompt a discussion of the technical issues involving airborne ATV experimentation. It should not be construed as a "how-to" cookbook. This activity involves risks, and individuals participating in this activity do so at their own risk.

You can contact the author at 10227 Mt Crosby Dr, San Antonio, TX 78251; scerwin@swri.org.

By Eric Jamieson, VK5LP

The Ross Hull Story

One of the greatest VHF/UHF radio pioneers of the 20th century was an Australian-born amateur.

Ross Hull is best known for his pioneering work in the field of development of the VHF and UHF spectrum, in particular equipment for the 56 MHz amateur band and later for the 112 and 224 MHz amateur bands. These were the bands offered to the amateurs during the period between World War I and World War II. Initially they were shunned by the professionals due to their perceived "line-of-sight" limitations.

While much of Ross's developmental work took place in the US, he was an Australian, born in Melbourne in 1902. Although he was trained to be an architect, early in his life he developed a great interest for radio, Amateur Radio in particular. By 1922, he had progressed to become one of Australia's best achieving amateurs, being the first to receive signals from amateurs in the US.

He firmly believed in the Wireless Institute of Australia and became its Federal Vice-President in 1924. Later he was appointed Secretary.

In 1925, the Victorian Division of the WIA formed a committee to undertake tests to establish contacts with ARRL stations in the US. The committee consisted of Howard Kingsley-Love, 3BM; Ross A. Hull, 3JU; W.F.M. Howden, 3BQ; E. K. Cox, 3BD and C. Philpott. The VK prefix was to be added to their call signs later.[1]

On 25 July 1925, Australia was visited by the US Naval Fleet at Melbourne. The vessels included the flagship *Seattle* with station NRRL aboard manned by Lt. Fred H. Schnell, USNRF, and 1MO-1XW was greeted as the first ARRL contact by Ross A. Hull, A3JU and H. Kingsley-Love, A3BM, and others. The latter was editor and the former associate editor of *Experimental Radio and Broadcast News.*

[1]Notes appear on page 47.

The US Recognizes his Value

As the result of meeting Fred Schnell, Ross was determined to see America. In 1926, in his capacity as Secretary of the WIA, he visited the United States to study American radio activity with an emphasis on Amateur Radio. The ARRL was quick to recognize his potential and appointed him to a junior position in the editorial department, the technical information service. He extended his stay in the US and was eventually appointed to the position of assistant technical editor of *QST.*[2]

When, in 1928, the Board of Directors authorized a special technical development program at ARRL HQ to devise new apparatus and methods (to meet the trying conditions that would confront amateur radio in 1929 when the Washington Convention took effect), Hull was the logical man to head the program. The brilliant success of that program is well known to every old time amateur. Much new gear of Hull's devising was introduced and it is not going too far to say that his studies over that period revolutionized the techniques of that day.

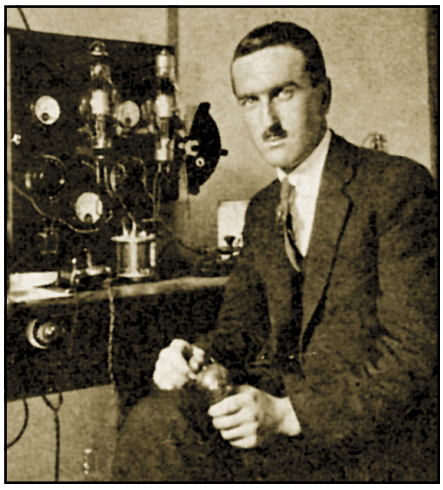
He popularized "band-spread" for amateur receivers and was responsible for the first serious use of the *superheterodyne* in amateur circles as the logical receiver for phone stations. He produced the first practical apparatus employing the high-C circuit for self-excited oscillators, made the first presentations in Amateur Radio of 100%-modulation and the use of linear RF amplifiers and first introduced the signal monitor. This technical-development program was the beginning of real development work in the ARRL Headquarters laboratory, thereafter carried on almost entirely under his direction.

Ross had a flair for building unorthodox equipment. He popularized the practice of putting tubes upside down or at unusual angles to shorten leads and was largely responsible for the abandonment of bread-board construction in favor of bent metal chassis. The apparatus he built, although often put together under the stress of time, was beautifully constructed, mechanically rigid and with losses minimized to work at the greatest efficiency, whatever its purpose. He set the pace in apparatus design for many years.

He returned to Australia in 1929 and became the technical editor of *Wireless Weekly,* which was edited by his brother, A. Galbraith Hull. *Wireless Weekly* was the forerunner of today's *Electronics Australia.*

Ross Joins the Staff of *QST*

He had been well and truly bitten by the American bug, so he returned to the US and in January 1931 he joined Kenneth B. Warner, W1EH, (Secretary of the ARRL, Editor-in-Chief and Business Manager of *QST)* as Associate Editor of *QST,* a position from which he became the mainspring of the *QST* editorial staff. Ross Hull had the ability to organize and direct; he could keep his eye on the ball and inspire others to do the same. At the same time he worked like three ordinary men in the laboratory himself. Here he developed new equipment for use by W1AL, the ARRL's own experimen-



Ross Hull, 3JU, at his station in Melbourne, Australia circa 1924.

tal station. Much of the equipment was designed to work in the UHF spectrum, which in those days was considered that portion above 30 MHz, with particular emphasis on the 56-60 MHz (five meters) amateur band.[3]

Typical five-meter equipment of the day consisted of a modulated oscillator using a single tube that was quite unstable and could produce almost as much FM as AM as it drifted across the band. Hull recognized the shortcomings of this form of transmitter and the accompanying super-regenerative receiver that radiated spurious signals to interfere with others on the band or surrounding services. He worked to improve frequency stability and reduce operating bandwidths. If transmitters could be made more stable, then receiver bandwidths could be reduced. The benefits would be less interference and a better chance to hear distant stations. Thus came his design for separate oscillator and amplifier stages to reduce frequency pulling and FM and designed receivers with improved selectivity.[4]

Improvements for 5 Meters

The first step in this direction was when for that band he pioneered relatively simple apparatus using ordinary receiving tubes. That they worked so well was testimony to his skills in achieving efficiencies never intended for such devices.[5] The transmitter follows the principle of separate oscillator and amplifier, the receiver had a tuned RF stage ahead of the super-regenerative detector. This was quite a step forward in the design of equipment, simple as it remained. By now his efforts in this direction showed amateurs the great enjoyment which could be had from five-meter contacts.

In the early 1930s, the average five-meter station was capable of working about 15 miles. But in August 1934, Ross amazed his colleagues at *QST* by announcing that he had worked from Hartford to Boston, a distance of 100 miles. His secret was the antenna. At the time, everyone used vertical antennas, but Ross put up a beam. It was a simple antenna by today's standards—four quarter-wavelength radiators fed in phase with four reflectors—but it made a startling difference in station performance.[6] The word spread and before long the distance records were tumbling.

Then Ross made a big discovery. He had observed that signal strengths varied over time; a signal could be strong today and gone tomorrow—or it could be present in the morning but absent in the afternoon. To find the answer he turned his attention to a detailed study of VHF propagation.

Propagation Studies

He did a long-term piece of original research work of great value in recording received UHF signals and correlating their transmission with weather observations, establishing for the first time the true cause for the bending of these waves in the lower atmosphere. Hull, by means of high gain antennas, was regularly communicating on five meters over distances in excess of a hundred miles when others were still laboring to exceed fifteen miles—except on the occasions when they talked to Hull.[2, 11]

Over a period of several years he made regular recordings of distant UHF signals, accumulating a vast quantity of data that required prodigious labor to correlate and analyze. He delivered several scientific papers on this work before technical societies.

For this work, in March 1935, he built the equivalent of a chart recorder.[7, 11] He fed the output of a receiver to a meter, and focussed the image of the meter needle through a slit on to a strip of photographic film. The film was drawn slowly past the slit by a gramophone motor. This enabled him to correlate signal strength with other data, and it became clear that signal variations were associated with changes in atmospheric pressure and moisture. This led to the discovery that VHF signals are refracted in the lower atmosphere, in much the same way as light rays.

Record Distances Increased

This was a major scientific discovery, on a par with the discovery of ionospheric reflection on HF frequencies. Ross Hull made this discovery with no scientific training, using homemade equipment![11]

Ross published his findings in *QST* [8,9] and they led to a flurry of experimental activity and another dramatic increase in VHF record distances. Within a short time, five-meter contacts were being made half way across the country—a far cry from just a couple of years before when even the most die-hard experimenters thought that VHF would never be useful for anything other than chatting across town.

Ross applied the same techniques of stable oscillators and beam antennas to the 112 and 224 MHz bands. As early as 1934

An enthusiastic skier of considerable ability, Hull made frequent weekend pilgrimages to the hills of upper New England. This photo was taken in New Hampshire in 1937.

he had succeeded in working over 75 miles on 224 MHz.[10] As more amateurs adopted his techniques, it was not long before the 112 and 224 MHz bands started to deliver DX on a regular basis.[11]

Ross was also the editor of *The Radio Amateur's Handbook*. He joined communications manager Handy in the rewriting of the fourth edition. Shortly, of course, it became a family affair—the product of the entire staff—and all successive editions were under his editorship.

The Tragic End of a Life

(The following was part of the obituary to Ross Hull written by Kenneth B. Warner, W1EH, for "It Seems to Us" in the November 1938 QST.*)*

"Ross Hull was also greatly interested in television, particularly in the ultimate opportunities for its employment in amateur radio. He had an elaborate experimental setup of his own devising at his home on a Connecticut hilltop, a thousand feet above sea level. With his remarkable ability to scoop up UHF signals, he was succeeding, in his last few weeks, in receiving the NBC experimental transmissions from New York, a hundred miles distant, about as well as they were received in New York City, much to the amazement of the NBC engineers.

"He had, in fact, built an experimental amateur television transmitter in the ARRL laboratory which was sufficiently promising to indicate that amateurs may soon expect low cost two-way television communication without the need for precise standardization on number of lines and so on.

"It was the power supply for his television

receiver which caused his death. This receiver required a 6,000-volt plate supply for its large Kinescope. While only a few milliamperes were required, small transformers had caused trouble through surface leakage and he had replaced them by a husky 1.5 kW, 4,400-volt pole transformer. The power supply was on a shelf under the table, and the mains outlet was on the wall behind and immediately above this apparatus. It was a dangerous setup. While wearing phones connected to the converter and receiver, and grounded on one side, he reached over the power supply to plug into the 120-volt mains. Upon withdrawing his hand he came in contact with the high-tension lead to the rectifier plate, pulled it off, and fell so that the 4,400-volt lead was contacting his body, the phones providing the ground.

"He had as a dinner guest that evening a doctor who was an X-ray expert and familiar with high voltages. Sensing trouble from the next room within thirty seconds after Hull plugged in the power supply, the doctor ran to his aid, dragged him clear and applied artificial respiration. Two other doctors arrived in a short time, adrenaline was administered, a pulmotor was quickly got, and every effort was promptly made by experts. But to no avail: death had been instantaneous on 13 September 1938.

"There is an awful lesson in Ross Hull's tragic end. He did not need to die. **If** the small transformer had still been in use instead of the brute with a powerhouse behind it…**if** the power supply had been covered…**if** the plug had been somewhere else…**if** the line had been lightly fused…**if** he had not had on the headphones.

"Hull was himself the author of the warning against high voltages which appears in the *ARRL Handbook.* But skillful experimenters are too often contemptuous of the dangers in which they work. Far too many amateur transmitters are potential lethal machines. When death comes to as clever and versatile experimenter as Ross Hull, it must be a painful object lesson to the rest of us.

"Of the most endearing personal qualities, Ross Hull leaves aching hearts in all who knew him. He was a grand guy. He will live forever in the thoughts of his friends."

His Other Interests

The story of Ross Hull does not end there. He had many other fine qualities and these should be mentioned. More from November 1938 *QST's,* "It Seems to Us":

"The electrocution of Ross Hull tragically closed the life of the man whom we consider the most brilliant and ingenious and indefatigable amateur we have ever known. Possessed of a restless, inquiring mind, a determination to out-do all others in everything he attempted, and never satisfied with the accomplishments either of himself or of others, Ross Hull poured unbelievable numbers of hours and an astonishing enthusiasm into numberless projects, both in and out of amateur radio.

Hull (right) and his model soaring plane at the Elmira soaring meet in the summer of 1938. The plane is a gull-wing with a 16-foot span. It had been equipped with radio control by Hull and Bourne, W1ANA, the latter acting as control operator in flight.

"Most of our readers know him as a radio amateur who left a deep impress upon our field but, although amateur radio was his greatest love, he was proficient in many fields. He was a brilliant pianist, with a great love of music, and played for hours every day. He was an artist of considerable ability in oils, watercolors and crayon. He was an expert amateur photographer, both as a pictorialist and in scientific work, and many of *QST's* cover illustrations have been his work. He was interested in astronomy and had built several reflecting telescopes.

"Model aircraft was one of his passions from childhood. The last several years, he and W1ANA had been building model soaring planes of considerable span, large enough to carry radio apparatus for control in flight. With it all, Hull found time to read everything and the time to play; skiing in the winter, golf in the summer. With his radio gear, his piano, his cameras and his workshop he lived the life of the ideal amateur at his cottage in the Connecticut countryside. He was unmarried."

The Need for Safety Measures

Just prior to his death, in an ironic twist of fate, Ross Hull responded to a letter on safety measures written by Howard Chinn of the engineering department of the Columbia Broadcasting System, in the following manner:

Dear Howard:

Of course, you are quite right about the insane fashion in which amateurs operate high-voltage equipment and about the equally stupid fashion in which we even go to the trouble of providing photographic illustrations of just how to do it. I would explain (not that it helps any) that the W1AW transmitters were, when the photograph was taken, still in the laboratory undergoing final checking. Since then, the transmitters have been fitted with elaborate "dust covers" and illuminated signs. There will also be much more space between the back of the transmitters and the wall and I understand appropriate cushions are to be placed along the wall and behind each of the units.

Seriously, Howard, we should take some steps to keep amateurs impressed with the dangers involved and possibly insist on some protective devices, and I think we shall come to that. We have of course run quite a lot of material on the general subject—including a problem contest for ideas on the subject—but we should do more. Aren't you impressed though, with the better performance in the amateur world than in the professional world, particularly when one thinks of the relationship between the high-voltage-hours involved in the ham game? The most important problem is that amateurs seem to insist on the right to tune their transmitters with a lead pencil. They will not use a complete enclosure with interlock. And any of the other "safety" devices are probably worse than nothing.

How about writing a story for *QST* on ways and means?

Sincerely yours, Ross A. Hull, Editor, *QST.*

Conclusion

Had Ross lived a normal life span one wonders to what extent the amateur radio movement would have benefited from his brilliant mind. Certainly VHF, UHF, SHF and microwaves would have been high on his list. Improvements in these areas coupled with better antennas had to lead to ever increasing distances for contacts.

It was a sad day for the wireless/radio/electronics industry when such a great man had his life cut short doing what he loved—Amateur Radio.

Eric Jamieson, VK5LP, was a VHF columnist for Amateur Radio *for 30 years. See "The World Above 50 MHz" in the December 1999* QST. *This article was originally published in the December 1999 issue of* Amateur Radio*, the journal of the Wireless Institute of Australia.*

Notes

[1] *WIA Book Volume 1.*
[2] "It Seems to Us," *QST*, November 1938.
[3] "Firing Up on the Newly Opened Ultra-High Frequencies," *QST,* September 1934.
[4] "New Equipment for the 56 Mc Station," *QST,* August 1934.
[5] "A New Receiving System for the Ultra-High Frequencies," *QST,* November and December 1935.
[6] "Extending the Range of Ultra High Frequency Amateur Stations," *QST,* October 1934.
[7] "A Simple Photographic Recorder for the Experimenter," *QST,* March 1935.
[8] "Air-Mass Conditions and the Bending of Ultra High Frequency Waves," *QST,* June 1935.
[9] "Air Wave Bending of Ultra High Frequency Waves," *QST,* May 1937.
[10] "Progress on the Ultra High Frequencies," *QST,* January 1935.
[11] "Ross A. Hull VHF Pioneer," *Amateur Radio,* January 1998.

By Jean Wolfgang, WB3IOS

Jamboree On The Air 2000

You may be sweltering now, but October is closer than you think. This is the time to prepare for Jamboree On The Air 2000, better known as *JOTA!*

Hams all over the world have been reserving the third weekend of October every year to participate with Girl Scouts and Boy Scouts in JOTA. This year JOTA begins October 21 at 0001 local time and ends October 22 at 2359 local time, though some activity continues over from Friday to Monday to take advantage of DX time differences. JOTA is *not* a contest; it is an opportunity for Scouts to communicate with each other and experience Amateur Radio.

You don't have to be a Scout to participate. Why not invite Scouts and Scout units to your station? You can obtain contact information about the Scout councils in your area on the Web at: **http://www.bsa.scouting.org/councils/index.html**. You can also find local councils in the phone book under "Boy Scouts of America" or "Girl Scouts of America." How about volunteering to set up a station at a district or council camporee, Scout show or other event? Contact the nearest local council for more information. If nothing else, just get on the air and call "CQ Jamboree," or respond to such calls.

The Radio Merit Badge

The Scouting program provides several applications for ham radio. The radio merit badge is just one of them. Although this badge includes commercial radio, there is a strong emphasis on Amateur Radio. For some scouts, that's all they need.

The ARRL Atlantic division director Bernie Fuller, N3EFN, is a perfect example. As a young Scout in 1947, he earned his radio merit badge. I asked Bernie if he needed to know Morse code. "Not only did I have to learn the Morse code, but was examined by the merit badge committee leader who was a Merchant Service shipboard radio operator. Learning the code was a plus for me. It led to the CW operator course when I entered the Army during the Korean War ... I spent a large part of my early service even before going to CW school teaching the code to others. (The CW course later was a real piece of cake for me)."

For the next 36 years, his life was filled with an Army career, a wife, and family. The ham radio bug resurfaced in 1983 and Bernie finally earned an Amateur Radio license. Today he takes special interest in sharing ham radio with young people.

Not Just for Boys

JOTA is for Boy Scouts and Girl Scouts. You will notice both of these stories come from Boy Scouts. Unfortunately, I have very little information on JOTA and Girl Scouts. Each year I receive many JOTA pictures and surveys from the Boy Scout population. The participation numbers grow rapidly. On the other hand, in 1998, I received only two surveys that included Girl Scouts. Last year I received about five. I am hoping you will work with me to make JOTA an annual event in the Girl Scout program.

For more information about JOTA on the Web, see **http://www.arrl.org/ead/#scout**,or e-mail **jota@arrl.org**.

Suggested Scout Frequencies

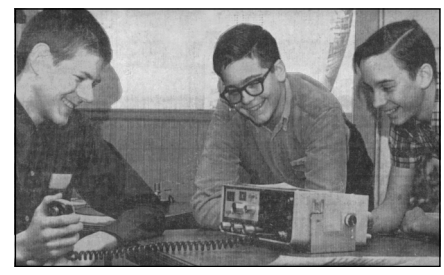
Band (meters)	*Phone (MHz)*	*CW (MHz)*
80	3.740 & 3.940	3.590
40	7.270	7.030
20	14.290	14.070
17	18.140	18.080
15	21.360	21.140
12	24.960	24.910
10	28.390	28.190

A Lasting Legacy from Humble Beginnings

During the first JOTA in 1958, 13 countries and fewer than ten stations participated. As the years passed, JOTA became more popular with both hams and scouters. In 1999, the World Scouting Bureau reported 110 countries and about 270,000 participants!

Have you participated in JOTA in the past? If you have you may be wondering if the time you spent with Scouts ever produced ham operators. You may never know, but here are a few people who owe their Amateur Radio enthusiasm to hams who found the time to participate in JOTA and/or the Scouting radio merit badge. Larry Wolfgang, WR1B, relates this story:

"I was 16 and a Novice (WN3JQM) for less than a year. Two other Scouts from Troop 180 in Gordon, Pennsylvania were also new Novices: Garry, WN3JQL and Terry, WN3JQK. Assistant Scoutmaster Jack, W3AMD, had turned us on to ham radio a few years earlier. He passed away before we earned those licenses, so in many ways, we were on our own.



JOTA in the "good old days"—1968. The enthusiastic boy in the center is Larry Wolfgang, WN3JQM, who would later become WR1B and a Senior Assistant Technical Editor at ARRL Headquarters.

"The excitement ran high as we made our plans for JOTA 1968. We set up an old canvas wall tent salvaged from summer camp to use as an operating shelter. There are no floors in those Scout tents, so the feed line from my 80/40-meter dipole snaked in under the sidewall, along with an extension cord from the house for ac power. We used my Knight-Kit T-60 transmitter (crystal controlled, of course) and Terry's Hammarlund receiver. My parents' large canvas "cabin" tent would serve as the sleeping quarters a few yards away. With the help of three other interested Scouts, we would operate as teams throughout the night, with each team taking a two-hour shift on the radio and a four-hour rest period.

"I don't remember how many contacts we made or how far we reached. I do remember that we had a sense of excitement and anticipation followed by some disappointment. There was still a great sense of accomplishment, though. I've operated JOTA stations many times since then, and really enjoy sharing my hobby with Cubs, Scouts and Leaders at every opportunity."

By Steve Ewald, WV1X

On Your Mark...Get "SET"... Go!

The ARRL Simulated Emergency Test is October 7-8.

"On your mark... get set.... go!" Picture yourself in a race After hearing this command barked over a megaphone, you're off and running toward the finish line. In order to excel in the race, you would have to prepare in advance and exercise regularly. Right?

This same concept applies to preparing for emergencies, and the annual ARRL Simulated Emergency Test (SET) is an important event for you to practice your operating skills and learn proper procedures for emergency communications. The ARRL Field Organization leaders in your section and area will be organizing scenarios and holding special net sessions for this test. The main SET weekend is October 7-8, 2000.

What's Going On?

You're encouraged to get involved in SET this year. Need help in finding out what's going on in your area? You may wish to check with your ARRL Section Manager (see page 12 of *QST*). In addition, the ARRL Web Page, **http://www.arrl.org/field/org/smlist.html**, will lead you to a listing or additional links to the ARRL Field Organization leaders in your vicinity.

Although October 7-8 is the main SET weekend, ARRL Emergency Coordinators, Net Managers and other leaders may choose to conduct their simulated emergencies anytime between September 1 and November 30 to allow for maximum participation or effective coordination with community state-level served agencies with whom radio amateurs work.

If you're an ARRL Field Organization official involved in the planning of the SET, visit the ARRL Web Page on Amateur Radio Public Service. The "News and Views" area, **http://www.arrl.org/field/pubservice.html#nandv**, has a link to the 2000 SET Guidelines, and you may download the SET reporting forms that are in Adobe PDF format.

To gain a little background on what a simulated emergency test is all about, here are the details of an exercise held on June 15. Members of the Sarasota Emergency Radio Club (SERC), in the ARRL West Central Florida Section, participated in a drill held by Southwest Florida Regional Natural Gas/Chemical. Thanks to Ron Wetjen, WD4AHZ, ARRL Emergency Coordinator, Sarasota County, for the following report.

ROBERT LUNSFORD, KB8UEY

The Warren County communications van helped members of the Dayton Amateur Radio Association and the Warren County RACES/ARES provide public service communications for the Caesar Creek Triathlon near Waynesville, Ohio, in July. Public service events are an excellent way to practice emergency operations.

SARASOTA SCENARIO

By Ron Wetjen, WD4AHZ

This exercise was to test the preparedness of various organizations, and to deal with a hazardous materials incident. What made this exercise very realistic was that none of the responding units were aware this was an exercise. They believed they were responding to a real incident.

June 14: Preparation

At 10:00 AM, Ed Gansen, K8DSS, Andy Murray, KG4DVD, and Ron Wetjen, WD4AHZ, met up with Captain Darren Miller, from the North Port Fire Department, at the North Port Fire Station on Sumter Blvd. Captain Miller transported the Region 6 MAC (The Florida Fire Chiefs' Association's Mutual Aid Communications) Unit, to a location several miles away. This location would be used as the "command post" for Thursday's event. Ed, Andy and Ron did a partial deployment of the MAC Unit Tower to a height of about 50 feet. In addition to the usual Division of Forestry VHF antenna, a second VHF was installed. This antenna would be used to do some testing of possible Amateur Radio gear that may be used with the MAC Units in the future. We secured the MAC unit around 12:30 PM and returned to Sarasota.

June 15: The Test

At 7:00 AM, Ed, Andy, Ron and Ken, K4AKL, arrived at the MAC Unit and completed the setup of the MAC Unit. At 8:15, Ed, Ken and Ron, arrived at Toledo Blade Elementary School while Andy remained at the command post. At the school, we attended a briefing on the exercise and issued the VHF handhelds from the MAC Unit radio cache. These radios would be used by the planners and observers of the event, and be used to coordinate activities "behind the scenes." The MAC Unit "alpha" repeater (DOF VHF frequency) would be used for these communications.

After the briefing ended, everyone moved to the "accident" scene, on the corner of Toledo Blade and Price Boulevards. Two old vehicles were "crashed" at the scene. A gas line was run into the engine compartment of one of the vehicles and ignited. Eight or nine "victims" were positioned.

When everything was ready, a call was placed to 911, reporting the "accident." We monitored the dispatch frequency as the call went out, and the first units were dispatched. Once the first units arrived, they discovered this was only an exercise, but they proceeded as if it were the real thing. They called for additional resources including fire units, emergency medical services, police (for traffic control) and the "Bayflight" helicopter to transport the seriously "injured" to the hospital.

When crews from the gas company arrived, they located and turned off the gas that was fueling the fire. After about 1 1/2 hours, the exercise wrapped up. We reported back to Toledo Blade Elementary School as the radios we issued earlier were returned.

Lunch was served for the participants, and a critique was held with several of the agencies and observers contributing their input. In all, 17 agencies took part in this simulated emergency test.

By Lew Malchick, N2RQ

School Club Roundup, 2000

More than 900 student operators can't be wrong!

In 2000, the 14th School Club Roundup (SCR) continued as one of the most enjoyable operations of the school year. It was a banner year for publicity. At least two schools got local TV news coverage and many sent in newspaper clippings. KC0CRP (St. Patrick's Catholic Middle School) was on KCRG TV in Cedar Rapids, Iowa and KC2AIF (Pioneer High School) was on the Channel 4 News in Buffalo, New York.

Our perennial SCR leader, KC7KFF, at Carl Hayden Community High School Amateur Radio Club in Phoenix, Arizona, and its advisor, Allen Cameron, N7UJJ, have spawned an offshoot at Arizona State University. W7ASU, whose operators include several alumni from KC7KFF, came in first with a score that was more than double last year's college/university class leader. In fact, five of the eight entry classes reporting this year had repeat leaders. Four of them, KC7KFF, ON4HTI, W5RRR and N2IZM have led their categories for at least three consecutive years. WB2JKJ also returned to lead the middle/intermediate/JHS group, a position familiar to Joe and his "crew." W3NCS, sporting a new call sign for the North Clarion School, almost doubled their 1999 score after nearly tripling the previous year to gain the top spot in the elementary school class.

The Western Carolina ARS, W4MOE, took their show on the road, operating at two community high schools. The four operators reported students and teachers had a positive Amateur Radio experience.

Nearly all comments indicate students had an exciting and interesting experience in SCR 2000. There were many reports describing the special excitement of contacting W5RRR at the Johnson Space Center and K3FBI at the Federal Bureau of Investigation. Contacts were also made from W1AW by volunteer ARRL staff and ham friends.

Kindergartner Emily Rice calls CQ at WA4UCI, the East Tennessee State University Amateur Radio Club station in Johnson City, Tennessee.

Tamar Rice, KG4CWK, and brother Huck Rice, KG4BCV, operating from WA4UCI.

The majority of people reported hearing more schools, and making more contacts. This may be due to improved propagation conditions, or it may indicate that more stations are operating on or near the specified SCR frequencies. As a result, scores in the elementary, middle/intermediate/JHS and college/university categories rose substantially. The number of young third-party operators is difficult to gauge since some teachers list only licensed operators, while others listed each student as an operator. In spite of receiving fewer logs, there were about 900 operators reported this year!

We invite anyone interested in obtaining more information about the School Club Roundup to subscribe to our e-mail reflector. You can subscribe at: **http://www.egroups.com/group/SCR-L**, or by sending an e-mail message to: **SCR-L-subscribe@egroups.com**. You can also receive information by postal mail. Just send a return address label and two units of First Class postage to: Lew Malchick, N2RQ, c/o Brooklyn Technical High School, 29 Fort Greene Place, Brooklyn, NY 11217. You can e-mail me with any questions at: **caarnycs@juno.com**.

The 15th SCR will take place **February 12-16, 2001**. Hope to hear your school on the air!

SOAPBOX

"Our students had Friday the 18th as a scheduled vacation day, but after the first couple of days, we had numerous requests by students who wanted to come in on Friday to operate. Unfortunately, a snowstorm cut our operations short. Highlight of the week was having CO2HQ come back to a 7th grade girl who had been calling CQ."—*Don Kirchner, KD0L*

"The School Club Roundup is, by far, the most enjoyable activity for school based radio clubs, especially at the elementary level. We have tried to participate in some of the weekend contests, but those are too fast-paced and intimidating for young students getting their feet wet. It's great to see more and more schools participating. We'd like to thank all the wonderful hams that looked for the school clubs during the week and took the time to visit with the students. Thanks for making February the highlight of our radio club's year."—*Bruce, K3LTM, advisor, CVSARC*

"We always hear and write about how the SCR gets our grade school students excited about Amateur Radio. The students at W2KGY show that it is not limited to the very young. This was an excellent opportunity for cadet hams and non-licensed cadets alike to get on the air and participate in Amateur Radio. Consequently, several cadets have expressed an interest in obtaining their radio license. Please continue to sponsor this great event. We look forward to participating again next year."—*Michael R. Adams, KC7GCQ, Assistant Cadet-in-Charge, USMA, West Point, New York*

2000 School Club Roundup Scores

Call sign	Score	Rank	QSOs	States	Countries	Clubs	Schools	Hours	Operators	Club Name	School
Elementary Schools											
W3NCS	76270	1	262	47	29	7	40	24	11	N Clarion School ARC	
KB9TYU	25300	2	115	48	1	3	33	9	9	Franke Park School ARC	
N1IFP	11766	3	74	29	9	3	23	10	21	Bean Elementary School ARC	
KB3BRT	11725	4	67	22	22	3	25	18	11	Cowanesque Valley School ARC	Westfield Area Elementary
KE6EUA	8056	5	76	38	0	4	12	12	26		Ohlone School
KB2VAP	5875	6	47	25	3	1	19	12	19		Shaker Rd Elementary School
KB2RMS	3430	7	46	21	5	2	8	10	13		Chapin School
KC8HZZ	2352	8	24	16	0	1	16	8	29	Ardis All Stars	Ardis Elementary
K2KID	1320	9	39	7	11	6	0	9	1		Friends Home School
KC2AXZ	1020	10	17	14	2	2	8	6	9		Kernan Elementary School
KD7FRL	440	11	20	11	1	0	2	1	17	Morgan School Radio Club	
K6LSR	340	12	10	10	0	2	4	1	3	Nichols Elementary School ARC	
Middle/Intermediate/Junior High School											
WB2JKJ	160460	1	565	50	50	7	34	24	1	Radio Club of JHS 22	
K7BZN	97042	2	401	45	9	9	34	24	12		Sacajawea Middle School
AD8B	73168	3	272	45	12	6	40	24	46	Zion ARC	Zion Lutheran Middle School
KC0CXB	66830	4	326	39	8	4	30	24	37	Mt Garfield Middle School ARC	
W4JMS	62040	5	218	38	1	4	47	21	15	Jonesborough Middle School ARC	
KC0CRP	40260	6	163	30	17	6	37	22	38		St Patricks Catholic Middle School
KR9L	34404	7	172	37	15	3	26	12	7	Liberty Radio Explorers	Liberty Community Unit #2
W0JV	19947	8	107	36	3	7	26	22	33	Iowa City Amateur Radio Club	Northwest Junior High
K7WMS	18368	9	112	32	1	3	25	16	15	Washington Middle School ARC	
KC7VWW	16936	10	144	36	18	1	12	13	56	Klamath County Schools ARC	Henley Middle School
N7XP	15996	11	124	34	2	4	17	10	4	Pacific Crest Amateur Radio Club	Pacific Crest Community School
NW7US	8010	12	90	24	4	3	11	16	11		Brinnon School
KB1BZQ	5246	13	43	18	3	3	19	10	8	Plumfield School ARC	
K5ARK	5226	14	67	32	1	0	9	6	5	Dunbar International Magnet ARC	
KC2AHK	3976	15	71	15	26	0	3	12	150	Stafford Intermediate School ARC	
KC8KOH	2405	16	34	15	0	0	10	8	5	Ritchie Co Middle/High School ARC	
High School											
KC7KFF	286944	1	854	47	44	10	45	24	10	Carl Hayden Community HS ARC	
K5KHS	220520	2	740	49	43	3	40	24	8	Kingwood High School Amateur Radio Club	
W1SJA	108378	3	482	44	29	5	28	23	6	St Johnsbury Academy Wireless Club	
K1BBS	103740	4	308	30	42	8	37	24	17	Burr and Burton ARC	Burr and Burton Seminary
KF6WMH	88555	5	445	47	9	4	27	21	19	Paso Robles High School ARC	
W2ZFB	57190	6	215	42	4	5	42	21	19	Lewis County HS ARC	
KB3BKW	54080	7	208	37	13	5	40	14	8	Belle Vernon HS ARC	
W5CHS	40348	8	152	39	3	5	42	11	7	Catholic HS ARC	
KC0ENB	17520	9	120	37	6	4	19	16	4	Russell High School Radio Club	
KO0Z	15520	10	97	32	12	18	16	20	6	Francis Howell North HS ARC	
W3HL	14378	11	79	24	4	2	30	10	35	Isaiah 40 Home Schoolers	Colonial Baptist Church
KC1XG	11250	12	89	26	8	3	17	18	8	Triton Regional School ARC	
WD5IAD	11200	13	64	30	1	2	28	7	7	St Stanislaus High School ARC	
W2CXN	9744	14	56	24	8	1	28	10	7	Brooklyn Technical High School ARC&Soc.	
N2WG	8050	15	50	25	2	2	26	10	16		Pender High School
KC2AIF	6667	16	59	23	3	1	17	10	23	Pioneer HS Radio Club	
W7W	4556	17	67	28	1	2	7	13	1		Franklin Pierce High School
W8SWD	4522	18	38	23	1	0	19	7	3	Milford High Communications Club	
KB3BLD	3686	19	38	13	12	1	14	11	5	WCTC Radio Pioneers	Worcester Career & Tech Ctr
WD4OHD	2712	20	24	19	0	2	18	3	1	Baylor School Amateur Radio Club	
KC2FTK	1554	21	21	12	3	2	11	9	3		Immaculate Heart Academy
KC2AXX	1026	22	18	10	3	2	8	10	7	AMAR	Sct Boces Tech Ctr
W9DHS	871	23	13	12	0	0	11	4	2	Dixon High School Radio Club	
DX High School											
VE7HSS	10541	1	83	32	4	3	17	18	11		Eric Hamber High School Canada
College/ University											
W7ASU	255465	1	777	47	40	9	42	24	6	Amateur Radio Society at Arizona State University	
W2KGY	129082	2	554	48	41	2	28	20	9	USMA at West Point Cadet Amateur Radio Club	US Military Academy at West Point
WA4UCI	81090	3	253	44	10	7	50	17	2	University School of East Tennessee State University	
W5ASU	39520	4	160	40	2	10	37	12	9	W5ASU— ASTI ARC	Arkansas State Univ
W9NIU	29824	5	127	35	12	3	36	15	5	NIU College Of Engineering Radio Club	Northern Illinois University
AG0EU	1512	6	24	16	1	3	8	3	2	Jack Blizzard ARC	Evangel University
DX College/ University											
ON4HTI	17640	1	168	10	46	12	5	21	2	Starcom	Higher Technical Institute, KHBO Belgium
Club											
W5RRR	110124	1	483	37	21	15	28	12	2	Johnson Space Center Amateur Radio Club	
K3FBI	57165	2	185	41	17	3	49	14	3	Federal Bureau Of Investigation ARA	
W4MOE	2709	3	43	18	3	1	8	11	4	Western Carolina ARS	Enka HS and North Buncombe HS
Individual											
N2IZM	6804	1	36	20	1	4	32	20	1		
KB3AGZ	6392	2	34	21	0	1	33	9	1		
W8UY	1683	3	17	14	0	0	17	11	1		
KA2NRR	224	4	7	5	0	1	5	6	1		
N2TDT	65	5	13	3	0	1	0	2	1		

NEW PRODUCTS

GOLD PLATED SOLDERING IRON TIPS

◊ M.M. Newman Corp now offers gold plated soldering iron tips for use with their Antex precision miniature soldering irons.

Available in chisel, spade and needle point styles, the Antex gold plated soldering iron tips are constructed from a proprietary copper alloy that maximizes strength and heat conductivity. The gold plating assures easy wetting. The tips slide directly onto the 0.135-inch heating element found on Antex precision miniature irons.

The tips are ideal for use with the Antex Model G/3U. This 6$^{1}/_{2}$-inch long iron is UL listed and is designed for rapid initial heat up and fast recovery time.

The list price for the soldering tips is $6.76 each. The Antex Model G/3U precision miniature soldering iron lists for $23.79. For additional information contact M. M. Newman Corp, 24 Tioga Way, Marblehead, MA 01945; tel 718-631-7100; fax 718 -631-8887; **mmn@mmnewman.com**; **http://www.mmnewman.com**.

Next New Product

By Dave Patton, NT1N

ARRL Board Thinks Big for the New Millennium

The ARRL Board of Directors met for the second session of 2000 in Hartford, Connecticut. This meeting will go down in history as having jump-started the ARRL into the new millennium.

It was Jim Haynie's first meeting in the big chair at the center of the head table. Claiming to be a little nervous but never outwardly revealing such, the new ARRL president called the 2000 Second Meeting of the ARRL Board of Directors to order. Not quite sure what to expect, the gathering quickly fell silent and started to take stock of their new president, and other new officers, and of the League's future in the millennium to come.

And then Mr Haynie spoke, the big Texas drawl lingering on all the right syllables, projecting the no-nonsense attitude

1999 Awards

The ARRL is proud to have two clubs sponsoring awards this year. The Lake County Amateur Radio Club of Crown Point, Indiana cosponsored the 1999 ARRL Herb S. Brier Instructor of the Year award. The Lambda Amateur Radio Club, a national club headquartered in Philadelphia, Pennsylvania, is cosponsor of the 1999 ARRL Professional Educator of the Year award. There were no nominees for the 1999 ARRL Professional Instructor of the Year award.

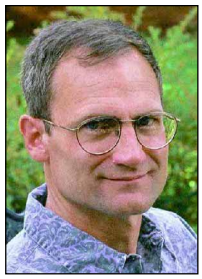
Philip J. McGan Memorial Silver Antenna Award—Diane Ortiz, K2DO

As both an ARRL Public Information Coordinator and Public Information Officer, Diane Ortiz, K2DO, has put in several years on the public relations front, making a difference in the New York City/Long Island section and beyond. Diane has achieved outstanding success in telling the Amateur Radio story to newspaper, TV and radio reporters, hosting a cable television program about Amateur Radio and providing guidance for other public information volunteers in her area. Diane's public relations talents reach beyond the scope of media relations to include working with young people and promoting the benefits of Amateur Radio to local officials. "This public relations self-starter has made the greater New York City/Long Island area friendly turf for the radio amateur," says nominator Norman Wesler, K2YEW. As a licensed ham for more than 25 years, Diane also enjoys contesting and keeps a keen eye on the world of Amateur Radio through her affiliations with more than 20 local, national and international ham radio organizations.

ARRL Doug DeMaw, W1FB, Technical Excellence Award—Rick Campbell, KK7B

Rick Campbell's "A Binaural I-Q Receiver" in the March 1999 *QST* was one of the most popular construction projects of the year. The imaginative design of this selective HF receiver creates a three-dimensional auditory effect where signals seem to "float" between one's headphones, depending on how the receiver is tuned.

Rick became a ham while in junior high school, passing his Novice and General class exams. He soon migrated from a Heathkit HF station to surplus and homebrew gear on VHF. Over the following decade Rick assembled a weak signal station for all bands from 50 MHz to 5.7 GHz. Student budget constraints forced him to redesign published circuitry to use available surplus parts. With a permanent job and family he shifted his efforts to developing thoroughly-engineered radio hardware that could be reproduced by serious amateurs, and publishing these designs in VHF and microwave conference proceedings and *QST*. His no-tune transverters are common on the microwave bands, and his R2 family of receivers and exciters are popular with high-performance radiophiles. Recently he has been pushing the radio art in new directions. In his creative work, Rick enjoys defying established conventions—including those he helped create.



Rick served as a US Navy Radioman, earned a BS in Physics from Seattle Pacific University, worked in Solid State Physics for four years at Bell Labs in Murray Hill NJ, earned MSEE and PhD degrees at the University of Washington, and was a faculty member at Michigan Technological University from 1983 through 1996. For the past four years he has worked at TriQuint Semiconductor, designing integrated circuits for wireless applications. Rick spends most of his nonprofessional time as a father, and divides what is left between windsurfing and playing various musical instruments.

1999 ARRL Herb S. Brier Instructor of the Year Award—Allen Wolff, KC7O

Allen Wolff, KC7O, lives in Sierra Madre, California and enjoys Field Day, mobile VHF, UHF and HF. He has been teaching ham radio for 14 years and obtains free membership in the Pasadena Radio Club for each of his students. According to a former student and now club member, Allen has brought approximately 450 members in to the club since 1986. Some of Allen's

that rewarded him with the Big Seat, at the Big Table, of the Biggest Amateur Association on this Big Planet. We heard how he had coped with back surgery just a few weeks after taking office. We heard of heroic efforts by our fellow amateurs to help a family of hams who had been attacked by pirates on their boat off the coast of Honduras, and we heard of television interviews and positive publicity that have erased years of our being low-profile and have righted wrong ideas about Amateur Radio among the public. Mr Haynie told us of hundreds of hours spent in meetings and conversations with people ranging from Cub Scouts to Senators, from truck drivers to officers of the Iraqi Association for Radio Amateurs. We learned about a new League president who calls members on the telephone to get to the root of problems and concerns. And finally, we learned of Big Projects that simply put "would only happen with a visionary and courageous Board of Directors—in a new millennium." Then we heard a joke about armadillos, and the ice was broken. We were on our way.

Committee Reports Available

Copies of the reports of the Standing Committees of the Board, Ad Hoc Committees, and Advisory Committees are available on the ARRL Web site, and are also available in hard copy form to members for the cost of reproduction and mailing. Here's a list of these reports, as presented at the 2000 Second Meeting, with the number of pages and cost of each. Please order by document number and include your remittance with your order. Send orders to Secretary, ARRL.

Committee	*Doc. #*	*Pages*	*Cost ($)*
Membership Services	16	5	1
Volunteer Resources	17	8	1
Admin and Finance	18	4	1
Enforcement	21	1	1
SAREX/ARISS	22	2	1
RFI	24	4	1
RF Safety	25	3	1
Public Relations	26	1	1
Historical	27	5	1
Ad Hoc Antenna Case	28	4	1
Industry Advisory	29	1	1
Pres. Roundtable	30	2	1
CAC	31	2	1
DXAC	32	4	1

The Team Goes to Work

Simply put, the atmosphere at this Board meeting was nothing short of infectious exhilaration. Board members brought forth topics of need and solutions of elegance. Responding to news of an impending battle for 40 meters as explained by our new International Affairs Vice President Rod Stafford, W6ROD, the assembled leaders quickly agreed on a battle plan and started gathering forces behind Executive Vice President David Sumner, an expert on 7 MHz issues. The subject of realigning 40 meters to get back to an exclusive worldwide allocation of 300 kHz at 7 MHz is now on the agenda for WRC-2003. Success will require an all-out effort by the ARRL, the IARU and the rest of the world's Amateur Radio societies. (See Minutes 14 and 58).

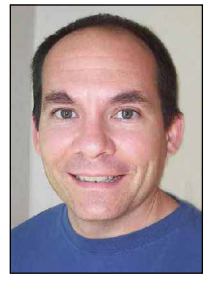
Riley's Pep Talk

The mood for the meeting was likely set the night before. On Thursday night,

former students are now the club officers.

Allen teaches with enthusiasm and uses encouragement and humor to keep the students' attention. Allen uses everything from comics to slides and videos to help students remember the answers as well as the explanations. He is a resourceful teacher who is continually looking for new and exciting ways to inspire both young and old.

1999 ARRL Professional Educator of the Year Award—Dan Calzaretta, NX9C



Dan Calzaretta, NX9C, is from Portland, Oregon. He has been teaching ham radio for 20 years. In 1992, he joined the staff at the Pacific Crest Community School and added Amateur Radio to the curriculum. Last year, NX9C submitted a grant request titled "Amateur Radio: Emergency Communication, Community Service and the Classroom." It used Amateur Radio as the main component but also included social studies, science and geography. In May, he received a grant for almost $6000. This grant enabled him to purchase equipment for the Pacific Crest Amateur Radio Club, N7XP, and he was able to implement his educational concept.

Dan encourages field trips and activities that the students will never forget. He uses a Slinky to study the relationship between frequency and wavelength, and fruit or vegetables to study voltage. His students describe him as an effective teacher in a classroom or one-on-one; fun to be around.

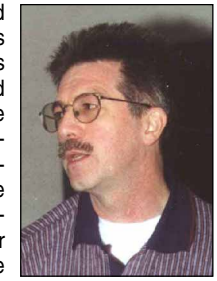
1999 ARRL Hiram Percy Maxim Memorial Award—Brian Mileshosky, N5ZGT

This award honors outstanding achievement among amateurs under 21 years of age. Brian Mileshosky, N5ZGT, is from Albuquerque, New Mexico. He was first licensed at the age of 12. Brian is constantly promoting ham radio to young people. He is active in Venture Crew 296, which is an Amateur Radio search and rescue youth group. Brian has participated in many Scouting Jamboree-On-The-Air activities including demonstrations and radio merit badge classes.

Brian is an active ARRL Official Observer and a member of the Board of Directors of the Upper Rio FM Society, Inc, a Volunteer Examiner, and a member of both the Bernalillo County and the Sandoval County ARES. Brian's leadership qualities are also demonstrated by his ability to run the statewide weekly "Swap Net."

In September, Brian will begin his senior year at the University of New Mexico where he is pursuing a degree in electrical engineering.

1999 ARRL Technical Innovation Award—Terry Fox, WB4JFI



The first ARRL Technical Innovation Award was given to Terry Fox, WB4JFI. This award is intended for amateurs who make contributions to the state of the radio art. Terry has a record of achievement that spans decades. In the 1970s, he and Bruce Brown, WA9GVK, installed one of the first amateur fast-scan television repeaters in Alexandria, Virginia. In the 1980s, he was a major contributor to the development of the AX.25 amateur link-layer packet protocol. A more recent project is the design and construction of a direct-frequency synthesizer for amateur use. He has also held various positions in the Amateur Radio Research and Development Corporation, including the office of President.

1999 ARRL Microwave Development Award—Al Ward, W5LUA

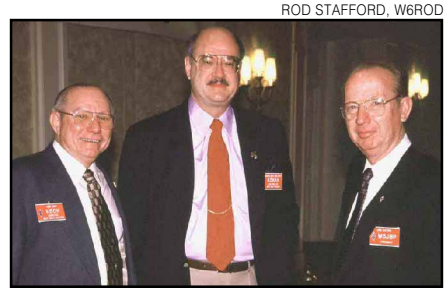
The ARRL Microwave Development Award is given to the amateur individual or group for contributions to the state of the art in the microwave frequency range. The award this year was given to Al Ward, W5LUA. Al has been a strong supporter of the Microwave Update Conferences since their inception—hosting four of them over the years. He has contributed as an author and speaker at every conference, presenting information on circuit design, antennas and propagation. Over the years, he has published and presented designs and projects on preamplifiers, feedhorns, transverters and power amplifiers, to name just a few. Al's current project is rather ambitious; he is working on accomplishing the first 24-GHz EME contact. He is also designing new circuits for 24, 47 and 75 GHz.

Summary of Major Board Actions

Minute	*Purpose*	*Disposition*
Organizational		
11	Creation of the ARRL Amateur Radio Education Project	Adopted
30	Creation of Ad Hoc Committee on National Conventions	Adopted
31	Bylaw 41	Amended
34	Ad Hoc Antenna Case Assistance Committee Recommendations	Adopted
36	Enterprise software system	Adopted
37	@arrl.net improvement	Adopted
38	*QST* printed in full color	Adopted
39	*QST* to be published with a minimum of 176 Pages	Adopted
42	ARRL Task Force for the Development of Digital Voice	Adopted
43	Memorandum of Understanding with REACT	Adopted
55	Expand relationship with BSA/GSA	Adopted
58	7 MHz goal for WRC-2003	Adopted
59	ARRL School Science Fair	to VRC
62	Petition for Spread Spectrum at 219-220 and 222-225 MHz	Adopted
63	Memorandum of Understanding with Soc. of Broadcast Eng.	Adopted
Awards and Recognition		
23	Rick Campbell, KK7B, DeMaw Technical Excellence Award	Awarded
24	Dan Calzaretta, NX9C, Professional Educator of the Year Award	Awarded
25	Allen Wolff, KC7O, Herb S. Brier Instructor of the Year Award	Awarded
26	Brian P. Mileshosky, N5ZGT, Maxim Memorial Award	Awarded
27	Al Ward, W5LUA, ARRL Microwave Development Award	Awarded
28	Terry Fox, WB4JFI, ARRL Technical Innovation Award	Awarded
29	Diane Ortiz, K2DO, McGan Silver Antenna Award	Awarded
41	WD5EEV and WD5EEU recognized for work with NASA	Adopted
57	Recognition of ARRL VEs and VEC	Adopted
60	Jack Landis, W0PRF, ARRL National Certificate of Merit	Awarded
61	Forrest Bartlett, W6OWP, ARRL National Certificate of Merit	Awarded

the Board met in an informal session with a special guest of honor—Riley Hollingsworth, K4ZDH, from the FCC's Enforcement Bureau. Quickly becoming today's most famous amateur, Riley inspired the attendees with his wisdom and his obvious enthusiasm for cleaning up the amateur bands and for ridding our bands of unwelcome—and illegal—intruders. Reminding us that it was indeed the ARRL that brought the FCC back into the amateur regulations enforcement game, Riley urged this group of leaders to stay focused on our priorities and to continue to promote our service to our representatives in Washington.

ROD STAFFORD, W6ROD



President Haynie poses with the new representatives from the West Gulf Division, Vice Director David Woolweaver, K5RAV (middle), and Director Coy Day, N5OK (left).

Member Service and the Future Member: They Go Together

Then the Board grappled with some actions needed to move the League squarely into this new millennium. The Board listened to a persuasive and solidly documented presentation by Walt Stinson, W0CP, chairman of the Administration and Finance Committee, on what had to be done to make the ARRL a future-oriented organization. Walt outlined the structure and mechanics behind a new enterprise software system that would make sweeping changes and improvements to the way this organization handles e-commerce, membership information, accounting processes, and other functions. The new systems would also lay the groundwork for new and improved services like electronic QSLing, Web access for members to their DXCC records, nearly real time updating of DXCC listings, expanded and more detailed contest results, and other possibilities. Walt also showed the Board how we can make further improvements to *QST*, which is undeniably the most important and highly visible benefit for most members. And he also detailed how the astounding success of e-mail forwarding via arrl.net addresses requires us to revamp the system and make it more reliable and secure for our loyal members.

And when it was all done and the votes were cast, the Board was unanimously in favor of:

• A completely new system of integrated software solutions for Headquarters that includes true e-commerce capability, modern membership information databases, swift and agile accounting packages, and a completely integrated DXCC management system that will allow DXCC records and other information to be completely and automatically transportable to the Web site—something that is not available now. (See Minute 36).

• A new *QST* that makes much more use of color throughout the entire issue, and carries even more articles and columns of wide interest in its now-minimum 176 pages. The Board realizes that *QST* is the best of the tangible benefits that comes with League membership and they want to make it even better. (See Minutes 38, 39).

• A more reliable "callsign@arrl.net" e-mail forwarding service. Everyone using the service can rest assured that better hardware and Internet connectivity and redundant servers will ensure increased reliability and security. There have been some problems during the last year, and we recognize that our members are loyally sticking with this program and proud of their organization. And now the great features of a permanent, lifetime e-mail address at arrl.net have just gotten better. (See Minute 37).

But wait! There's more! Vice President Kay Craigie, WT3P, outlined an ambitious and groundbreaking plan for implementing The Big Project. Also known as the ARRL Amateur Radio Education Project, it's a long-term program promoting the application of Amateur Radio in American primary and secondary education. The goal is to create comprehensive resources to be provided to educators to encourage and support use of Amateur Radio as an effective teaching strategy in such subjects as geography, language arts, mathematics, electronics and physics. (See Minutes 10 and 11).

ARRL General Counsel, Chris Imlay, W3KD, along with Directors Jay Bellows, K0QB, and Frank Fallon, N2FF, reiterated throughout the meeting that there are going to be more and more antenna cases reaching the courts of America. Director Bellows, also an attorney "in real life" led the Ad Hoc Antenna Case Assistance Committee to the recommendation of several ways to help the fight against unreasonable antenna restrictions. The Board unanimously approved the following measures: (1) A four-member Voluntary Panel of Experts to evaluate requests for supplemental funding of antenna cases; (2) ARRL funding of federal appeals, with a cap of $10,000, may be made available in those rare and infrequent cases in which there is a significant issue of law of benefit to the wider Amateur Radio community, substantial merit on the facts of the case as presented at the administrative and trial levels, a likelihood of success on appeal, and substantial financial participation at the appellate level by the Amateur or the local Amateur community; and (3) Improved legal and engineering resources to be available to amateurs and their counsel from the ARRL. (See Minute 33).

MOVED & SECONDED

2000 SECOND MEETING OF THE ARRL BOARD OF DIRECTORS JULY 21-22, 2000

Summary Agenda
1. Roll Call
2. Moment of Silence
3. Consideration of the Agenda for the meeting
4. Approval of the Minutes of the 2000 Annual Meeting
5. Reports by the Officers
6. Reports on Legislative and Technical Regulatory Affairs
7. Receive Reports and Consider Recommendations of the Committees
8. Directors' motions

1. Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in annual session at the Hilton Hartford Hotel in Hartford, Connecticut on Friday, July 21, and Saturday, July 22, 2000. The meeting was called to order at 8:36 AM EDT, July 21, with President Jim Haynie, W5JBP, in the Chair and the following Directors present: Bernie Fuller, N3EFN, Atlantic Division; Edmond A. Metzger, W9PRN, Central Division; Jay Bellows, K0QB, Dakota Division; Rick Roderick, K5UR, Delta Division; George Race, WB8BGY, Great Lakes Division; Frank Fallon, N2FF, Hudson Division; Wade Walstrom, W0EJ, Midwest Division; Tom Frenaye, K1KI, New England Division; Greg Milnes, W7OZ, Northwestern Division; James Maxwell, W6CF, Pacific Division; Dennis Bodson, W4PWF, Roanoke Division; Walt Stinson, W0CP, Rocky Mountain Division; Frank M. Butler, W4RH, Southeastern Division; Fried Heyn, WA6WZO, Southwestern Division; and Coy Day, N5OK, West Gulf Division.

Also present without vote were Joel M. Harrison, W5ZN, First Vice President; Kay C. Craigie, WT3P, Vice President; John Kanode, N4MM, Vice President; Rodney J. Stafford, W6ROD, International Affairs Vice President; and David Sumner, K1ZZ, Executive Vice President and Secretary. Chief Financial Officer Barry J. Shelley, N1VXY, was present in his capacity as an officer of the Corporation.

Also in attendance at the invitation of the Board as observers were the following Vice Directors: William Edgar, N3LLR, Atlantic Division; Howard Huntington, K9KM, Central Division; Twila Greenheck, N0JPH, Dakota Division; Henry Leggette, WD4Q, Delta Division; Gary Johnston, KI4LA, Great Lakes Division; J.P. Kleinhaus, W2XX, Hudson Division; Bruce Frahm, K0BJ, Midwest Division; Mike Raisbeck, K1TWF, New England Division; James Fenstermaker, K9JF, Northwestern Division; Robert Vallio, W6RGG, Pacific Division; Les Shattuck, K4NK, Roanoke Division; Evelyn Gauzens, W4WYR, Southeastern Division; Art Goddard, W6XD, Southwestern Division; and David Woolweaver, K5RAV, West Gulf Division. Also present were General Counsel Christopher D. Imlay, W3KD; Publications Manager Mark Wilson, K1RO; Membership Services Manager Wayne Mills, N7NG; Field and Educational Services Manager Rosalie White, K1STO; Technical Relations Manager Paul Rinaldo, W4RI; Legislative and Public Affairs Manager Steve Mansfield, N1MZA; and Special Assistant to the Executive Vice President David Patton, NT1N. Present as guests of the Board were Radio Amateurs of Canada (RAC) Vice President Ken Pulfer, VE3PU, Director Emeritus Tod Olson, K0TO, and John Chwat and Derek Riker of Chwat and Company. Apologies for inability to attend were received from Treasurer James McCobb, W1LLU, and Vice Director Marshall Quiat, AG0X, Rocky Mountain Division.

2. The assembly observed a moment of silence in recollection of Radio Amateurs who have passed away since the previous Board meeting, especially Max Gavin, W5ODF; Art Ideker, W5CAM; Corval Lile, N0BBJ; Louis Varney, G5RV; and George 'Dewey' Wilson, W7HF.

3. On motion of Mr. Heyn, seconded by Mr. Metzger, the Minutes of the 2000 Annual Meeting were ADOPTED.

4. On motion of Mr. Race, seconded by Mr. Milnes, the agenda of the meeting was ADOPTED as presented.

5. Mr. Pulfer conveyed the greetings of the Radio Amateurs of Canada, Inc., and thanked the Board for its continuing cooperation. He added that the working relationship between RAC and ARRL is always good and views are shared on most issues.

6. Mr. Metzger conveyed the greetings of the ARRL Foundation. He reported that the Foundation's assets remained above the $2 million mark and noted that $37,000 in scholarships was distributed last year.

7. At this point, President Haynie and Executive Vice President Sumner presented 50-Year Membership plaques and pins to Mr. Butler and Mr. Metzger. (Applause.) Mr. Sumner also presented a certificate from the Union of Radio Amateurs of Russia to Vice President Kanode rewarding him for his participation in the MIR Contest. (Applause.)

8. The officers reported on their activities during the first half of 2000. President Haynie began his report with comments regarding his and staff's efforts to expand and improve the League's relationship with the FCC. He continued with remarks about the tremendous year so far with regard to positive publicity for Amateur Radio—especially those stories associated with the van Tuijls' tragic episode with pirates off the coast of Honduras. Other topics covered by President Haynie included the effects of restructuring, progress on "The Big Project," and the ARRL's participation in the upcoming WRC 2003 where the misalignment of the 7 MHz band will be given attention.

9. First Vice President Harrison supplemented his written report with comments about restructuring, events at the international Ham Radio hamfest in Friedrichshafen, Germany and the Phase 3D satellite launch.

10. Vice President Craigie delivered an in-depth presentation regarding "The ARRL Education Project" aka "The Big Project," which will harness the country's known uses of Amateur Radio in the classroom and refine, expand, and promote such use in far greater numbers. This initiative will seek funding from private and corporate sponsors—especially from those organizations that value an Amateur Radio background in their potential employees. At this point, Vice President Craigie yielded the floor to Mr. Bodson.

11. On motion of Mr. Bodson, seconded by Mr, Frenaye, it was unanimously VOTED that the ARRL shall create a long-term program promoting the application of Amateur Radio in American primary and secondary education. The program will be called the Amateur Radio Education Project. The project will create comprehensive resources to be provided to educators for the incorporation of Amateur Radio as an effective teaching strategy in such subjects as geography, language arts, mathematics, electronics, and physics. The Board was in recess from 10:00 AM until 10:25 AM.

12. President Haynie introduced three new Directors, each of whom then introduced his new Vice Director: Bernie Fuller, N3EFN, of the Atlantic Division, and his Vice Director Bill Edgar, N3LLR; Dennis Bodson, W4PWF, of the Roanoke Division and his Vice Director Les Shattuck, K4NK; and Coy Day, N5OK, of the West Gulf Division and his Vice Director David Woolweaver, K5RAV. He also recognized the attendance of Director Emeritus Olson, K0TO.

13. Vice President Kanode supplemented his written report with comments about the improvement of the physical appearance of headquarters, and the progress made in the Membership Services Committee.

14. International Affairs Vice President Stafford supplemented his extensive written report with a presentation about the "harmonization" of the 7 MHz band. The 7 MHz misalignment issue is now on the agenda for the World Radiocommunication Conference in 2003 and it is imperative that the ARRL do the utmost to achieve a 300 kHz exclusive assignment for Amateur Radio around 7 MHz. The Board was in recess for lunch at 12:02 PM until 1:07 PM reconvening with all persons hereinbefore mentioned and Don Durand, ARRL's Information Services Manager.

15. In the absence of Treasurer McCobb, Chief Financial Officer Shelley relayed information regarding ARRL's investment portfolio. Investments are valued at approximately $15 million.

16. Chief Financial Officer Shelley discussed ARRL's financial condition and the positive effects of restructuring, the net result being that ARRL is approximately $330,000 ahead of budget projections for the first six months of the year. He continued with discussion of plans to replace three outdated software packages. Mr. Durand described the proposed changes and answered questions.

17. Executive Vice President Sumner referred to his extensive written report on the activities within HQ. He also touched on the after effects of restructuring and the excellent work of volunteers and staff with the design and implementation of the first stages of the ARRL Certification—Continuing Education Program. Mr. Durand left the meeting at 3:00 PM.

18. General Counsel Imlay's report covered many issues and centered on the 2400 –2450 MHz band. He yielded the floor to Vice Director Goddard who discussed how the Los Angeles Office of Public Safety is attempting to gain sanctioned use of this band for its helicopter-based video transmissions. Mr. Imlay also discussed the dynamics surrounding ARRL's petition for reconsideration for strengthening of PRB-1. The Board was in recess from 2:47 PM until 3:07 PM.

19. Mr. Mansfield, Manager of Legislative and Public Affairs, supplemented his written report with introductions of John Chwat and Derek Riker of Chwat and Company of Alexandria, VA. Chwat and Company has been working with Mr. Mansfield "on The Hill" and has been of tremendous assistance to ARRL's advocacy work in Washington. Mr. Mansfield reported that time is running out for adoption of the Amateur Radio Spectrum Protection Act in this Congress.

20. Mr. Rinaldo, ARRL's Technical Relations

Manager, delivered his report on the numerous activities of his office including work for the IARU, WRC-2000, Americas TELECOM 2000 and several ITU Study Groups.

21. Mr. Roderick, as Chairman, presented the written report of the Membership Services Committee. Major issues addressed by the Committee included the 15 meter DXCC rollout and the progress of the DXCC 2000 program and the DXCC Challenge Award. The 12 and 17 meter DXCCs will be added in January 2001 thus rounding out the program. Mr. Roderick yielded the floor to Mr. Patton for an update on the electronic QSLing Project. The EQSL project will proceed with written specifications for an automated system incorporating extensive electronic security measures. The Committee also discussed the progress of the DXCC Card Checking Program and will re-evaluate at the next Board meeting. The MSC will be developing a set of goals and criteria to send to the Contest Advisory Committee for a study of the Club Contesting program. The Membership Services Manager was tasked with studying the possibilities for managing a QRP DXCC.

22. Mr. Race, as Chairman, presented the extensive written report of the Volunteer Resources Committee, and reviewed committee work on the National Convention concept, Club 2000 Achievement Award Program issues, and the success of the Dayton Hamvention/ARRL National Convention.

23. On motion of Mr. Milnes, seconded by Mr. Bodson, it was unanimously VOTED that the ARRL Board of Directors selects Rick Campbell, KK7B, of Portland, Oregon, as the recipient of the 1999 Doug DeMaw, W1FB, Technical Excellence Award for his article, "A Binaural I-Q Receiver," which appeared in the March, 1999 issue of *QST*. (Applause.)

24. On motion of Mr. Milnes, seconded by Mr. Maxwell, it was unanimously VOTED that the ARRL Board of Directors selects Dan Calzaretta, NX9C, of Portland, Oregon, as recipient of the 1999 ARRL Professional Educator of the Year Award. (Applause.)

25. On motion of Mr.Heyn, seconded by Mr. Bodson, it was unanimously VOTED that the ARRL Board of Directors selects Allen Wolff, KC7O, of Sierra Madre, California, as the recipient of the 1999 Herb S. Brier Instructor of the Year Award. (Applause.)

26. On motion of Mr. Stinson, seconded by Mr. Fallon, it was unanimously VOTED that the ARRL Board of Directors confers upon Brian P. Mileshosky, N5ZGT, of Albuquerque, New Mexico, the 2000 Hiram Percy Maxim Award. (Applause.)

27. On motion of Mr. Day, seconded by Mr. Roderick, it was unanimously VOTED that the ARRL Board of Directors selects Al Ward, W5LUA, of Allen, Texas, as the recipient of the ARRL Microwave Development Award. (Applause.)

28. On motion of Mr. Bodson, seconded by Mr. Heyn, it was unanimously VOTED that the ARRL Board of Directors selects Terry Fox, WB4JFI, of Falls Church, Virginia, as the recipient of the ARRL Technical Innovation Award. (Applause.)

29. On motion of Mr. Fallon, seconded by Mr. Maxwell, it was unanimously VOTED that the ARRL Board of Directors confers upon Diane Ortiz, K2DO, the 2000 Philip J. McGan Memorial Silver Antenna Award. (Applause.)

30. On motion of Mr. Race, seconded by Mr. Stinson, it was unanimously VOTED that an Ad Hoc Committee on National Conventions shall be appointed by the President. The task of this committee shall be to articulate the purposes and goals for holding ARRL National Conventions and to identify appropriate ways to measure the success of National Conventions. The committee will submit its report to the Board at the Annual Meeting in January, 2001.

31. It was moved by Mr. Race, seconded by Mr. Bodson, that By-Law 41 be amended by adding the following language to the list of volunteer programs on which the Volunteer Resources Committee makes recommendations: "The Volunteer Consulting Engineer Program," and "Educational Initiatives." A roll call vote being required, the question was decided in the affirmative with all Directors voting aye.

32. Mr. Butler, as Chairman, presented the report of the Election Committee with the emphasis being on the upcoming fall elections.

33. President Haynie presented the report of the Executive Committee and yielded the floor to Mr. Bellows who reported on the activities and recommendations of the Ad Hoc Antenna Case Assistance Committee. The Ad Hoc Antenna Case Assistance Committee recommended the creation of a four-member Voluntary Panel of Experts to evaluate requests for supplemental funding of antenna cases. ARRL funding of federal appeals, with a cap of $10,000, would be available in those rare and infrequent cases in which there was significant issue of law of benefit to the wider Amateur community, substantial merit on the facts of the case as presented at the administrative and trial levels, a likelihood of success on appeal, and substantial financial participation at the appellate level by the Amateur or the local Amateur community. A memorandum of understanding between the Amateur, the Amateur's counsel and the Panel would be required, setting forth the issues to be addressed on appeal and the legal theories to be advanced. Funding would be provided only on the unanimous decision of the Panel and would come from contributions to the Legal Research and Resource Fund. The report also made specific recommendations for improved legal and engineering resources to be available to Amateurs and their counsel from the ARRL.

34. On motion of Mr. Fallon, seconded by Mr. Bellows, it was unanimously VOTED that the Board of Directors adopts the recommendations of the Executive Committee regarding the report of the Ad Hoc Antenna Case Assistance Committee. (Minute 33.)

35. Mr. Harrison, as Chairman, presented the report of the Enforcement Task Force and described the committee's meeting with Mr. Hollingsworth of the FCC regarding pending Amateur Auxiliary cases and pending enforcement actions. The Board was in recess from 5:25 PM July 21 until 8:34 AM July 22, reconvening with all persons hereinbefore mentioned except Mr. Durand.

36. Mr. Stinson, as Chairman, presented an extensive report on the activities of the Administration and Finance Committee. The first topic covered was the information technology upgrade recommended by staff based upon the Board's request that the ARRL continue to invest in web-based delivery of member services, including products and information. The ARRL presently relies on three primary software products (that are written in an outdated and unsupported database program—FoxPro 2.6) to manage its operations in accounting, membership records, and DXCC. In view of the ARRL's strategic objectives, the committee recommends that a new system be developed that integrates the Web, DXCC, membership management, and accounting by utilizing up-to-date, mainstream technologies and applications and relying on strong technology partners for help with implementation and ongoing support (the Enterprise Software Proposal). On Motion of Mr. Stinson, seconded by Mr. Roderick, it was unanimously VOTED that the following resolution is adopted.

WHEREAS, the current enterprise business software systems are outdated, inflexible, inefficient, and difficult to support, and

WHEREAS, the current systems are unsuited to e-commerce and web-based transactions,

THEREFORE, BE IT RESOLVED, that the IS Department is authorized to invest up to one million and twenty five thousand dollars in a new hardware and software system in accordance with the specific proposals approved by the A&F Committee.

37. Mr. Stinson, as Chairman, continued with his report on behalf of the Administration and Finance Committee by discussing problems with the arrl.net e-mail forwarding service, which is much more popular than anticipated. With over 35,000 loyal members using the service the committee recommended the addition of professional, offsite hosting services to guarantee a high level of reliability and security for our members who are using @arrl.net as their primary e-mail address. On motion of Mr. Stinson, seconded by Mr. Heyn, it was unanimously VOTED that the following resolution is adopted:

WHEREAS, the arrl.net service has grown to over 35,000 users; and

WHEREAS, it is imperative that the service maintain a high degree of reliability;

THEREFORE, BE IT RESOLVED, that the Chief Financial Officer is authorized to spend up to $17,000 for additional hardware and up to $2125 per month for additional fees and services for arrl.net.

The Board was in recess from 9:55 AM until 10:06 AM.

38. Mr. Stinson continued his report with a detailed analysis of the ARRL's main membership benefit—*QST*. Recent advances in printing technology have reduced the cost spread between a black and white page and a color page to the point that the committee recommends making *QST* a full-color publication. Additionally the committee recommends increasing the size of *QST* to minimum of 176 pages per issue. On motion of Mr. Stinson, seconded by Mr. Maxwell, it was unanimously VOTED that the following resolution is adopted:

WHEREAS, *QST* is a major benefit of League membership; and

WHEREAS, the use of color substantially improves the content, graphic design and interest in a magazine; and

WHEREAS, the cost of producing a full color magazine has become more affordable;

THEREFORE BE IT RESOLVED that the Publications Manager is directed to print *QST* in full color.

39. On motion of Mr. Stinson, seconded by Mr. Butler, it was unanimously VOTED that the Publications Manager is directed to publish *QST* with a minimum of 176 pages per issue.

40. Mr. Stinson finished his discussion of the Administration and Finance Committee's activities with a progress report regarding the possibilities for the hiring of a Development Director and staff.

41. Mr. Harrison, as Board Liaison, supplemented the written report of the SAREX Working Group. Projections for Amateur Radio on the International Space Station (ARISS) are that there will be Amateur activity on 2 meters and 70 centimeters in October when the first (Expedition 1) crew will be settling in. On motion of Mr. Walstrom, seconded by Mr. Fallon, it was unanimously VOTED to extend the ARRL Board's sincere appreciation and thanks to John and Karen Nickel, WD5EEV and WD5EEU, for their work with NASA at the Johnson Space Center in support of the SAREX/ARISS Working Group's

efforts to place Amateur Radio on the International Space Station.

42. Mr. Harrison, as Chairman, presented the report of the Technology Task Force. Based on input from the Technology Working Group, the Task Force recommends the ARRL proceed to spearhead the development of digital voice for the Amateur Service. On motion of Mr. Frenaye, seconded by Mr. Maxwell, it was unanimously VOTED that the ARRL proceed with the development of digital voice for the Amateur Service. The President shall appoint a group of individuals knowledgeable in the field of digital voice from the international Amateur community and industry. The group shall report to the Technology Task Force and shall submit an initial report at the 2001 Annual Meeting.

43. Mr. Huntington, as Board Liaison, supplemented the extensive report of the RF Safety Committee with news of ARRL assistance to an ongoing study being performed by Dr. Kenneth Cantor of the National Cancer Institute.

44. Mr. Kleinhaus, as Board Liaison, reported on the activities of the Public Relations Committee. There were many significant exposures of Amateur Radio to the public led by the van Tuijl pirate shooting off the coast of Honduras, the big screen movie *Frequency*, and ARRL's Kid's Day and Field Day.

45. Mr. Frenaye, as Chairman, supplemented the report of the Historical Committee with an informative discussion of the mechanics of identifying, cataloguing, storing, and displaying archival material that is located at Headquarters and in fact throughout the country. The Fund for the Preservation of Amateur Radio Artifacts (established by the ARRL Board in 1986) has a balance of approximately $90,000.

46. Mr. Bellows presented the written report of the Ad Hoc Antenna Case Assistance Committee, whose recommendations were endorsed by the Executive Committee and adopted by the ARRL Board earlier in this meeting.

47. Mr. Stinson, as Chairman, summarized the activities of the ARRL Industry Advisory Council. The highlights of the report included the committee's proposal of four radio-related items to be standardized amongst manufacturers (DC power connector, base station microphone connector, sound card interface, and serial port interface), the "best ever" sales report from the Dayton Hamvention/ARRL National Convention 2000, and a Ham Radio promotion brochure recommended for inclusion in Family Radio Service equipment packaging.

48. Mr. Fuller, as Board Liaison, presented the report of the President's Roundtable. The President's Roundtable has met three times with two primary missions: (1) advise the ARRL President of the availability of significant endowment funds, and (2) provide entrée to the inner circles of the constituencies they represent for the purpose of maintaining the ARRL as the preeminent voice of Amateur Radio. Recent results of the Roundtable include the commitment of MFJ Products to include ARRL brochures with its products—more such cooperation with manufacturers and retailers is expected.

49. Mr. Frenaye, as Board Liaison, presented the report of the Contest Advisory Committee, which considered one Sweepstakes item presented to it and is recommending no changes.

50. Mr. Walstrom, as Board Liaison, presented the report of the DX Advisory Committee, and noted the addition of two new entities to the DXCC List: East Timor (4W), and the Chesterfield Islands of New Caledonia (FK/C). A new DXAC Chairman will be appointed soon to replace Wayne Mills, N7NG, who joined ARRL staff as the Membership Services Manager.

51. Mr. Sumner, on behalf of Joe Moell, K0OV, ARRL ARDF Coordinator, presented a report on the activities involving Amateur Radio Direction Finding. The ARRL provided funding to help defray the costs of the ARRL's team to travel to Nanjing, China to compete in the 10th ARDF World Championships. The ARRL Team Leader will be Dale Hunt, WB6BYU. The Board was in recess for lunch from 12:03 PM until 12:53 PM at which time Mr. Chwat and Mr. Riker left the meeting, and ARRL Lab Supervisor Ed Hare, W1RFI, joined the meeting.

52. Mr. Bodson, as Chairman, made a detailed presentation on the activities of the RFI Task Group that included extensive work on the Pacific Gas and Electric noise problems, and the AT&T/Phonex wireless modem jack problems (interference at 3.53 MHz). AT&T management has been responsive and has helped to eliminate over 26,000 of the 56,000 wireless modem jacks that operated at 3.53 MHz and were installed across the country. RFI threats to Amateur Radio are on the increase and Part 15 devices are leading the way causing the ARRL to begin a comprehensive Part 15 information page on its web site.

53. Mr. Shattuck, as past President of QRP Amateur Radio Club International (QRP ARCI), presented QRP ARCI's "Special Recognition Award" and QRP ARCI's "The President's Award" to Mr. Hare to recognize his work with and for QRP and for his work in reviving "The Tuna Tin 2" for publication in *QST*. (Applause.)

54. At this time, President Haynie presented ARRL Vice Director pins to the three new Vice Directors: Mr. Edgar, Mr. Shattuck, and Dr. Woolweaver. (Applause.) Mr. Hare left the meeting.

55. The Board next moved to consider Directors' motions. On motion of Mr. Fuller, seconded by Mr. Butler, it was unanimously VOTED that the ARRL will expand its relationship with the Boy Scouts of America and the Girl Scouts of America reaffirming the League's commitment to the youth of America.

56. On motion of Mr. Fuller, seconded by Mr. Metzger, it was unanimously VOTED that the Board of Directors authorizes the President to execute, on behalf of the ARRL, a memorandum of understanding with REACT International, Inc. in the form previously circulated to the board.

57. On motion of Mr. Bellows, seconded by Mr. Frenaye, it was unanimously VOTED that the following resolution is adopted:

WHEREAS, the ARRL VEs and the ARRL VEC have administered and processed Amateur Radio license examinations to more than 30,000 applicants between April 15 and June 23, 2000; and

WHEREAS, in the first 6 months of 2000 the ARRL VEs and the ARRL VEC have served more than 3 times as many applicants as during the same period a year ago; and

WHEREAS, the effort, enthusiasm and dedication of ARRL VEs and the ARRL VEC has been instrumental in the success of the implementation of Amateur license restructuring;

NOW THEREFORE, the ARRL Board of Directors extends its sincere appreciation and thanks to ARRL VEs and ARRL VEC for their efforts above and beyond the call of duty.

58. On motion of Mr. Roderick, seconded by Mr. Fallon, it was unanimously VOTED that the following resolution is adopted.

WHEREAS, the misalignment of the worldwide 7-MHz (40 meter) Amateur band has been a longstanding problem since 1938;

WHEREAS, previous attempts to realign the Amateur and broadcasting bands have been unsuccessful for various reasons;

WHEREAS, WRC-2000 has recommended that 7 MHz realignment be placed on the WRC-2003 agenda;

WHEREAS, the realignment of the band is of great importance to Amateurs in the United States and globally;

NOW THEREFORE RESOLVED, that the League hereby reaffirms the goal of attaining 300 kHz at 7 MHz worldwide, Amateur exclusive, and instructs the Executive Vice President to pursue the above objective and to take all steps reasonably necessary and appropriate to achieve the objective.

FURTHER RESOLVED, the International Affairs Vice President is tasked with working with sister societies and the International Amateur Radio Union in order to achieve the above stated objective.

59. On motion of Mr. Fallon, seconded by Mr. Race, it was unanimously VOTED that the Volunteer Resources Committee is tasked to study a proposal to conduct a nationwide ARRL School Science Fair project.

60. On motion of Mr. Walstrom, seconded by Mr. Heyn, it was unanimously VOTED that the following resolution is adopted.

WHEREAS, Jack Landis, W0PRF, of Des Moines, Iowa, has contributed to the health and growth of Amateur Radio in the Midwest for more than 50 years, and

WHEREAS, during that time he has mentored more than 500 Radio Amateurs who benefited from his personal involvement,

THEREFORE BE IT RESOLVED by the Board of Directors in meeting assembled, July 22, 2000, that the ARRL National Certificate of Merit is hereby awarded to Jack Landis, W0PRF, in recognition of his lifetime of service to others through Amateur Radio.

61. On motion of Mr. Maxwell, seconded by Mr. Heyn, it was unanimously VOTED that the following resolution is adopted.

WHEREAS, Forrest Bartlett, W6OWP, has provided regular on-the-air code practice and ARRL code proficiency qualifying runs for over 50 years, and

WHEREAS, innumerable persons learned Morse code, sharpened their Morse skills and qualified for their Amateur licenses as a direct result of his efforts, and

WHEREAS, he has recently retired from his volunteer position, and

WHEREAS, he exemplifies the very best in Amateur Radio volunteerism,

NOW, THEREFORE BE IT RESOLVED, that the ARRL Board of Directors congratulates Mr. Bartlett on his retirement, and

BE IT FURTHER RESOLVED, that the ARRL Board of Directors confers the National Certificate of Merit to Forrest Bartlett, W6OWP.

62. On motion of Mr. Bodson, seconded by Mr. Race, it was VOTED that the following resolution is adopted.

WHEREAS, the ARRL petitioned (RM-8737) the FCC to make greater use of spread spectrum (SS) technologies, and

WHEREAS, the FCC, in response to the ARRL petition, adopted a Report and Order (WT 97-12) that removed the restrictions in the Amateur Radio Service that limit the SS emission types (e.g., spreading codes) that Amateurs may transmit, and

WHEREAS, the FCC believes that the changes identified in the Report and Order will allow Amateur Radio Service licensees to experiment with additional SS emission types, allow Amateur Radio operators to develop innovations and improvements to communications products and develop new communications technologies, facilitate the ability of the Amateur Radio Service to contribute to the development of SS communications by allowing Amateur stations to transmit and experiment with SS technologies currently used in consumer and commercial prod-

ucts, and promote more efficient use of spectrum allocated to the Amateur Radio Service,

RESOLVED, that the ARRL Board directs the Executive Vice President and the General Counsel to file a petition at the appropriate time with the FCC to permit Spread Spectrum emissions in the 219-220 MHz and 222-225 MHz band.

63. On motion of Mr. Day, seconded by Mr. Butler, it was unanimously VOTED that the Board of Directors authorizes the President to execute on behalf of the ARRL, a Memorandum of Understanding between the ARRL and the Society of Broadcast Engineers, Inc. that was dated April 5, 2000.

64. Those present were invited to make informal closing comments.

65. On motion of Mr. Heyn, seconded by the entire assembly, it was unanimously VOTED to thank Lisa Kustosik and staff for their support of the meeting.

66. There being no further business, the meeting was adjourned at 2:44 PM. (Time in session as a Board: 12 hours, 8 minutes; direct authorizations, $1,042,000)

Respectfully submitted,

David Sumner, K1ZZ
Secretary

MINUTES OF EXECUTIVE COMMITTEE NUMBER 464 HARTFORD, CONNECTICUT JULY 20, 2000

Agenda

1. *Approval of minutes of April 1, 2000, Executive Committee meeting*
2. *Consideration of report of Ad Hoc Antenna Case Assistance Committee with a view to formulating a recommendation to the Board*
3. *Affiliation of clubs*
4. *Approval of conventions*
5. *Recognition of Life Members*
6. *Date and place of next EC meeting*
7. *Other business*

The Executive Committee of the American Radio Relay League, Inc., met at 9:57 PM Thursday, July 20, 2000, at the Hilton Hartford Hotel, Hartford, Connecticut. 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 Directors Jay Bellows, K0QB, and Dennis Bodson, W4PWF, Vice Director Robert Vallio, W6RGG, Vice President John Kanode, N4MM, and General Counsel Christopher D. Imlay, W3KD.

1. On motion of Mr. Heyn, the minutes of the April 1, 2000, Executive Committee meeting were approved as printed in *QST*.

2. Mr. Bellows presented the report of the Ad Hoc Antenna Case Assistance Committee on behalf of Mr. Fallon, Mr. Imlay, and himself. The committee was appointed in December 1999 to review the means by which the League responds to and assists in antenna cases involving radio amateurs throughout the United States. A preliminary report was presented to the ARRL Board at Minute 55 of its 2000 Annual Meeting in January. Mr. Bellows noted that the report now being presented recommended the creation of a four-member Voluntary Panel of Experts to evaluate requests for supplemental funding of antenna cases. ARRL funding of federal appeals, with a cap of $10,000, would be available in those rare and infrequent cases in which there was a significant issue of law of benefit to the wider amateur community, substantial merit on the facts of the case as presented at the administrative and trial levels, a likelihood of success on appeal, and substantial financial participation at the appellate level by the amateur or the local amateur community. A memorandum of understanding between the amateur, the amateur's counsel and the Panel would be required, setting forth the issues to be addressed on appeal and the legal theories to be advanced. Funding would be provided only on the unanimous decision of the Panel and would come from contributions to the Legal Research and Resource Fund. The report also made specific recommendations for improved legal and engineering resources to be available to amateurs and their counsel from the ARRL.

After discussion, on motion of Mr. Fallon, it was unanimously voted that the Executive Committee recommends acceptance and implementation of the committee's recommendations by the Board, with the policy thus adopted to supersede Standing Order 101. Mr. Bellows left the meeting at 10:50 P.M.

3. On motion of Mr. Heyn, the following clubs were declared affiliated or their earlier affiliation by mail vote was ratified:

Category 1

Clinton County Amateur Radio Association, St. John's, MI; Flagler-Palm Coast Amateur Radio Club, Palm Coast, FL; Gloucester City Amateur Radio Club, Gloucester City, NJ; Great Lakes Amateur Radio Club, Laingsburg, MI; Guilford Amateur Society, Greensboro, NC; Koolau Amateur Radio Club, Kailua, HI; Monadnock Amateur Radio Club, Jaffrey, NH; Motorola Amateur Radio Club, Hoffman Estates, IL; New Orleans Amateur Radio Emergency Service, Metairie, LA; Nortel Networks Amateur Radio Club, McKinney, TX; Octogenarian Amateur Radio Club, Port St. Lucie, FL; Olive Branch Amateur Radio Club, Olive Branch, MS; Palm Beach Repeater Association, Lake Worth, FL; Peekskill/Cortlandt Amateur Radio Association, Crompond, NY; Peninsula Electronic Amateur Radio Society, Hampton, VA; Rockwall Amateur Radio Club, Rockwall, TX; Saltgrass Link System, Clute, TX; South East Texas Amateur Radio Club, Tomball, TX; Southern CA Japanese Ham Club, El Toro, CA; Spider Amateur Radio Club, San Diego, CA; Thunderbolt Amateur Radio Association, Pueblo, CO; Town of Babylon Amateur Radio Emergency Services, West Babylon, NY; Tuscarrora Amateur Radio Association, Mifflintown, PA; Utah Hamfest, Inc., Layton, UT; Westside Hamsters Amateur Radio Club, Laurie, MO; Young Amateur Radio Operators Club, Seekonk, MA

Category 2

Hawaii DX Association, Keauu, HI; Hawaii QRP Club, Hilo, HI; SOJOURNERS, Macdoel, CA

Category 3

Petrova School Amateur Radio Club, Saranac Lake, NY

The ARRL now has the following numbers of active affiliated clubs: Category 1, 1894; Category 2, 24; Category 3, 143; Category 4, 16; Total, 2077.

4. On motion of Mr. Butler, the holding of the following ARRL conventions was approved or their earlier approval by mail vote was ratified:

2000

Alabama State, Aug 19-20, Huntsville, AL; Missouri State, Aug 26, Columbia, MO; New Mexico State, Aug 26-27, Rio Rancho, NM; Alaska State, Sept 16-17, Anchorage, AK; North Texas Section, Oct 14, Denton, TX; Pacific Division, Oct 20-22, Concord, CA

2001

Virginia Section, Jan 21, Richmond, VA; Florida State, Feb 3-4, Miami, FL; Northern Florida Section, Feb 9-11, Orlando, FL; Texas State, March 17-18, Midland, TX; West Texas Section, May 5-6, Abilene, TX; Atlantic Division, June 1-3, Rochester (Henrietta), NY; Eastern Pennsylvania Section, June 9, Bloomsburg, PA; Western New York Section, Aug 12, Cheektowaga, NY

5. On motion of Mr. Frenaye, 77 newly elected life members were recognized and the Secretary was instructed to list their names in *QST*.

6. The next meeting of the Executive Committee was tentatively scheduled for the vicinity of Dallas, Texas, November 4, 2000.

7. Mr. Heyn requested a status report on the quarterly report of IARU expenses. Mr. Haynie reported that the document was in his possession and would be distributed to the Board shortly.

Mr. Haynie also reported that he would circulate a document to the Executive Committee suggesting improvements to the Bylaws for review prior to the next meeting.

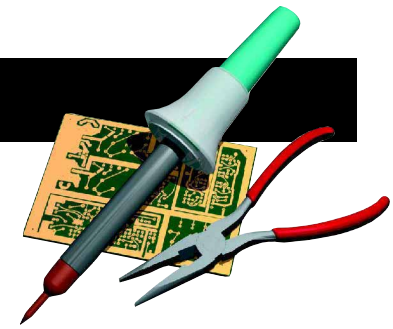
There being no further business, the meeting was adjourned at 11:03 PM.

Respectfully submitted,

David Sumner, K1ZZ
Secretary

LIFE MEMBERS ELECTED JULY 20, 2000

Jeffery L. Alexander, N4MSE; Bernie Berger, NY4Z; Randall G. Berger, WA0D; Michael K. Boyea, KE4KMG; Ellwood E. Brem, K3YV; Michael K. Brewer, AE4MA; Christopher J. Burkey, WD8EEQ; Michael H. Burkhardt, W8MHB; Kenneth O. Carey, KN6CK; Juergen Carow, DF3OL; Gary L. Chadwick, AB2IJ; William C. Chapman, N3WCM; Manfred F. Chiu, KJ6O; Lewis C. Cook, KD5HXQ; David Coursey, N5FDL; Michael S. Davis, W4QEK; Bradford L. Denison, W1NT; Clark D. Dowding, N7TDT; John R. Downey, KI5KW; Karl F. Eckerle, K8FE; Alan M. Ehrlich, WA2GDQ; Michael Ethridge, KF6QXN; Debra J. Fligor, N9DN; Sharon L. Gaisler, N3SG; Jeffrey N. Galin, W1LOP; Edward Gallegos, XE2JEG; Travis L. Graham, AA9NV ; William L. Grover, N3EYF; Catherine L. Gugler, K0KTG; Wayne L. Harrah, KE0MS; Joseph L. Harrington, KB3BZY; Gordon R. Harris, W7ROB; Carl B. Hayes, NN5I; Robert C. Hill, N8WFL; Robert E. Hootkins, KD5JQA; Robert Hootkins, KD5JQC; Bro R. Justin Huber, AA8FY; Kevin M. Imel, KF7CN; Benuel J. Kelsall, WA3RLT; Sarah Kelsall, KB3BBR; Jeffrey J. Knierim, N8GAK; Joel G. Knoblock, W3RFC; Satoshi Kouya, JQ1OCR; Joseph M. Lauben, KB7AVT; Glenn E. Lowery, K2FF; Peter B. Macchiaroli, KB3ERE; Charles L. Mc Allister, N8VIZ; Kipling L. Mc Vay, WD4SJW; Peter T. Mendoza, KD6QZH; Bruce A. Merrill, W8WQ; Frank M. Mroz, WA1CHE; Roderick J. Murray, K1ROD; Mark G. Nosek, KB8MCK; Isao Numaguchi, JH1ROJ; Owen O' Neill, N2IWN; Robert Oler, WB5MZO; Norma B. Robison, KF4JDF; Tim Rodgers, KA8PWQ; Kevin J. Rowett, N6RCE; Ferdi Rueesch, HB9SPC; Ramon Santoyo, KG6BXE; Barbara A. Schultz, KB6TPT; Theodore D. Schultz, N6RPG; Thomas G. Scott, KF4I; Daniel A. Scull, KD4VAV; Eric E. Sifford, KF4MIS; Mark Simcik, WA1VVB; Patricia A. Stafford, N1PAT; Arnold J. Stenborg, KB1CKJ; Michael H. Sullivan, KB0THC; Mario Tachibana, W2CV; Sarah E. Thomas, KE6AKX; Stanley L. Vandiver, W4SV; George J. Vargo, K7CHP; Paul A. White, N8WJG; Blane M. Wilson, K3LYE; and Megan M. Wolf, WB8IKO. QST



The Doctor is IN

Q Roger Brackney, K6ZTK, asks, "What is the meaning of 'DIN', the infamous multi-pin plug?"

A DIN is an acronym for Deutsche IndustriNorm, the standards-setting organization for Germany. A DIN connector (see Figure 1) is a connector that conforms to one of the many standards defined by DIN. There are many types of DIN connectors in addition to the familiar multi-pin circular types.

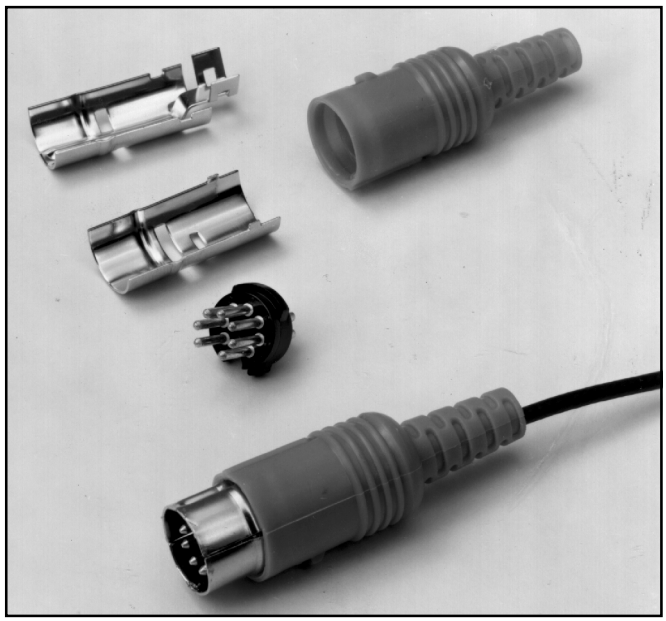


Figure 1—The ubiquitous DIN connector

Q Arnold, AA3HO, asks, "I have a problem when I transmit on HF. When my wife is on the Web my transmissions apparently garble the incoming and outgoing data, preventing her from reaching her desired sites. The computer does *not* lock up, and the dial-up connection isn't lost. What tips can you give me to locate and fix the problem?"

A There is a whole chapter in the *ARRL RFI Book* (http://www.arrl.org/catalog/6834/) on computers—I can't reproduce it all for you here. It covers interference both ways—to and from computers.

Here is a plan of action. The book points out that many of the same fixes for RFI *to* computers are those for RFI *from* computers. These may be found in an article on the TIS Web site: http://www.arrl.org/tis/. Click on RFI/EMI in the menu, then choose "Computer Interference." Try those fixes.

Also, from personal experience, make sure *everything* is grounded. All of your ham equipment should be grounded together. Ground your computer; a strap made from discarded coax cable shield running from a screw on the computer's metal case to ground works nicely. A good ground point for the computer is the little screw on the cover plate of your wall power socket. Test this by shutting off the circuit breaker to that plug and use an ohmmeter between the screw and the ground wire hole. At the very least, make sure your PC is attached to your *station* ground.

Incidentally, the problem may not be the computer at all and may be your external modem, if that's what you use. Use the same techniques on it if possible.

Finally, make sure you have no RF coming back into the shack from the antenna. If, per chance, you are using an end fed random or long wire antenna, you may have to try another type. For balanced antennas, such as dipoles, consider adding a 1:1 balun at the feed point.

Q Paul Brenner, W6RLF, asks, "I have a question concerning the MFJ Artificial Ground. I'm using a 100-foot long-wire antenna fed with an MFJ tuner. I have about 5 feet of tinned copper braid going to a six-foot copper rod ground just under the window where the tuner is located. The performance of the long wire on 40 meters seems just so-so, although it's a decent length (3/4 wavelength) on 40. If I add the MFJ Artificial Ground to improve my RF grounding, will that help the performance of my antenna system?"

A It would seem unlikely to be of much help. The MFJ Artificial Ground (see Figure 2) does a fine job taming RF in the shack. It is also an excellent "counterpoise tuner" for hams who are using end-fed wire antennas in apartment situations without a short access path to an outdoor ground or radial system, but this isn't your problem.

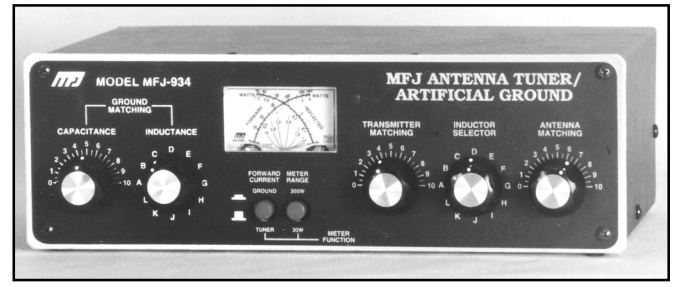


Figure 2—The MFJ-934 Artificial Ground

Have you considered improving your antenna system? At 3/4 wavelength on 40 meters, it is technically not a long wire but a random wire ("… the power gain of a long-wire antenna as compared to a half-wave dipole is not considerable until the antenna is really long [its length measured in wavelengths]"—*ARRL Antenna Book, 18th edition*). Try adding as much wire as possible to your antenna; it can run in just about any direction. Get your antenna as high in the air as possible. In addition, attach some 33-foot radial wires to your ground rod. Begin with 4 or 5 wires, either lying on top of the soil or buried underneath. My guess is that you'll see an improvement in your antenna performance.

Q Dennis, AA0A, asks, "I'm attempting to run PSK31 with the *DigiPan* software, but I can't seem to get the waterfall display to function properly. I know that audio is getting to the sound card from my transceiver (I can even record the audio using *Windows Sound Recorder*). Any ideas?"

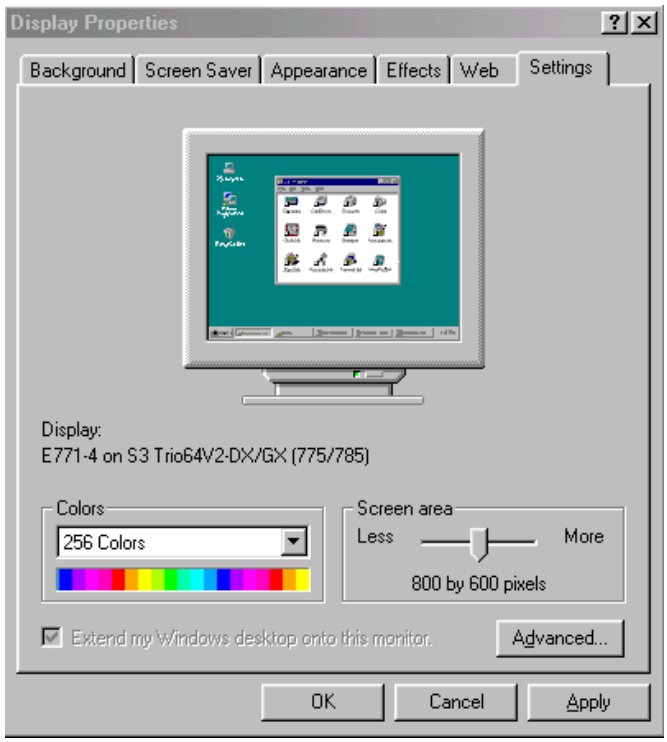


Figure 3—To change your display color settings in *Windows*, you need to access the DISPLAY window in CONTROL PANEL.

A This sounds like a display problem of some sort. Are you using the 256-color display mode? Check your *Windows* display properties under SETTINGS—CONTROL PANEL—DISPLAY. Make sure the SETTINGS are either 256-color or "High Color." See Figure 3.

Update: Success! I was running under the lowest color mode—16 colors. I changed the display setting to 256 colors and everything is working!—*AA0A*

Q Michael, KD5BBC, asks, "I live in a second-floor apartment, so attaching a ground wire to a ground rod is out of the question. Since I can't connect to a ground rod, should I still connect the grounds of all of my equipment together? I don't seem to have a problem with RF feedback in the shack, and transmitting on 40 through 10 meters with 100 W doesn't seem to affect either my computer on the other side of the room or my TV in the next room. I have what appears to be an active ground on the 3-plug electrical line (according to the tester I bought at RadioShack). Should I try to ground to that, or would that also be asking for problems?"

A Yes, absolutely connect all the equipment in the shack together and then to the ground on the wall socket. A good way to accomplish this is to check that the screw holding the cover in place is grounded. You can do this by first turning off the circuit breaker to the plug and measuring between the screw and the ground plug with an ohmmeter. Then strip the braid off some old coax to make a nice flexible ground strap between your station and the screw. That takes care of the safety ground. You'll still need an RF ground, which often takes the form of a counterpoise wire. See my answer to W6RLF earlier in this column.

Also, check out "Antennas and Grounds for Apartments" on the TIS Web page at: **http://www.arrl.org/tis/** under **Antennas/Grounding**.

Q Howard, KK7KL, asks, "Can you tell me how one figures the spacing for the matching section of a J antenna? Is there a rule of thumb? Any assistance you could pass along would be greatly appreciated."

A The **J** pole is an interesting antenna. It is essentially an endfed half-wavelength antenna, and the transmission line is used as a transmission-line transformer to transform the high feedpoint impedance to 50 Ω for your radio. The relationship between all of the elements is complex. The high impedance of the end-fed radiator is determined by its length and diameter and, to a smaller degree, the presence of nearby dielectric insulators.

The impedance of the matching section is determined by its conductor diameter and spacing. This is not very critical in most **J** pole designs. The transmission line transformer is usually cut to a quarter wavelength, shorted at one end. It is then tapped at the point that corresponds to an impedance of 50 Ω. Minor variations in the length of the radiating element and the transmission-line transformer can be compensated for by either changing the length of one or both elements slightly, or by changing the tap point on the transformer.

Most **J** poles are either designed by trial and error, or by modeling them on a computer. You can start with the half-quarter-wavelength dimensions (don't forget the approximately 0.97 velocity factor on the transmission line section), then adjust the tap point and length of the radiating element. If you have access to an impedance bridge, such as the MFJ-259B or Autek VHF Analyst, you can adjust the tap position for 50 Ω resistive and the length of the radiating element to get the reactance down to zero.

Of course, there is nothing magical about the half-/quarter-wavelength combination. I recently modeled a **J** pole whose dimensions are much shorter than the norm, and it, too, gives 50 Ω at the feed point.

Q Les, W2QHS, asks, "Recently I tuned through some PACTOR signals, but all I could copy were call signs being sent repeatedly. Were these stations attempting to link to BBSs? Is it possible to have just a casual conversation with a PACTOR station?"

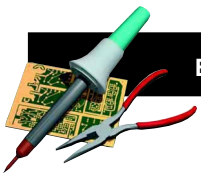
A The PACTOR signals you've seen are indeed stations attempting to establish connections, often to automated BBSs or Internet e-mail gateways that are part of the Winlink2000 network. Winlink2000 in particular has become popular among sailing enthusiasts and others who wish to exchange e-mail from remote locations. It is certainly possible to enjoy casual keyboard-to-keyboard PACTOR QSOs, but these tend to be the exception rather than the rule.

For "live" HF digital conversations, most amateurs have chosen PSK31 or RTTY. You should be able to find someone to chat with on either mode on 20 meters between 14.070 and 14.099 MHz at just about any time. PSK31 predominates between 14.070 and 14.073 MHz, but in recent months activity has expanded to 15 meters (21.070 MHz) and 10 meters (28.120 MHz).

Q Steve, N6PHX, asks, "What are the rules governing the use of a ham transceiver outside the amateur bands? Can one use an amateur transceiver on CB, for example?"

A You can only use radios that have been FCC certified for use in the service for which they are intended. That makes it illegal to use a ham transceiver on CB, for example, because a ham rig is not FCC certified for use as a CB radio.

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; http://www.arrl.org/tis/. QST



By Charles Kitchin, N1TEV

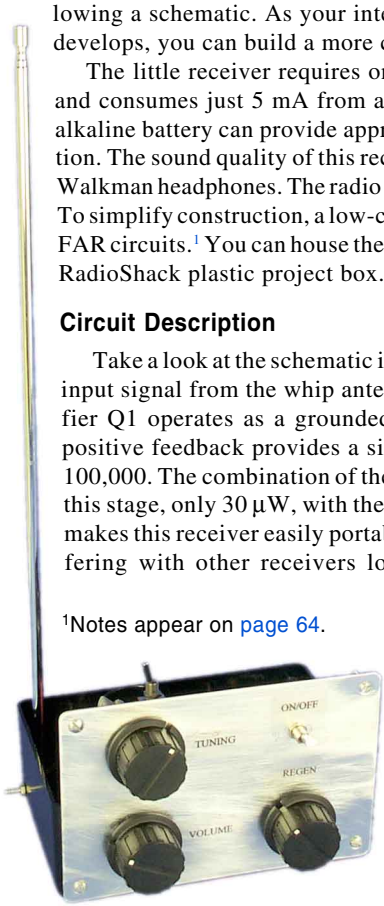
A Simple Regen Radio for Beginners

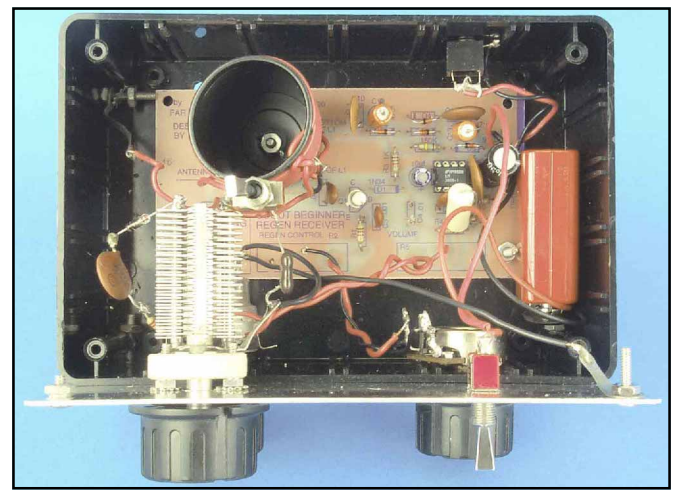
Need a simple, fun project—possibly for a Scout Radio Merit Badge? This project is a great way to introduce kids of any age to electronics and shortwave listening.

Here's a low cost, simple-to-build, portable shortwave receiver. Its design is noncritical and the receiver is easy to get going. With it, you can receive dozens of international shortwave broadcast stations at night—even indoors—using a 39-inch whip antenna. This little radio is perfect for discovering ham-band QSOs, news, music and all the other things the shortwave bands have to offer.

Although this little receiver is quite sensitive, it naturally won't match the performance of a commercial HF rig, and if you've not used a regen before, you'll have to practice tuning the radio—but that's part of the adventure. Most of today's experienced "homebrewers" got their start by building simple, fun circuits just like this one. You'll gain experience in winding a coil and following a schematic. As your interest in radio communication develops, you can build a more complex receiver later.

The little receiver requires only a single hand-wound coil and consumes just 5 mA from a 9-V battery. At that rate, an alkaline battery can provide approximately 40 hours of operation. The sound quality of this receiver is excellent when using Walkman headphones. The radio can also drive a small speaker. To simplify construction, a low-cost PC board is available from FAR circuits.[1] You can house the receiver in a readily available RadioShack plastic project box.





In this version of the receiver, a prototype PC board is used; it is not directly representative of the currently produced board, although they are similar. In this view of the receiver, the antenna has been removed. The TUNING capacitor is at the left. Immediately behind the capacitor is the coil, L1. Attached between the TUNING capacitor and the VOLUME control pot immediately beneath you can see D1, C4 and R4 as discussed in the text.

Circuit Description

Take a look at the schematic in Figure 1. L1 and C1 tune the input signal from the whip antenna. Regenerative RF amplifier Q1 operates as a grounded-base Hartley oscillator. Its positive feedback provides a signal amplification of around 100,000. The combination of the very low operating power of this stage, only 30 µW, with the use of a simple whip antenna makes this receiver easily portable and prevents it from interfering with other receivers located nearby. Regenerative receivers are, after all, oscillators. R2 controls the amount of positive feedback (regeneration).

D1 and C4 comprise a floating detector that provides high sensitivity with little loading of Q1. The relatively low back-resistance of the 1N34 germanium diode (don't use a silicon diode here!) provides the necessary dc return path for the detector.

VOLUME control R5 sets the level of detected audio driving U1, an LM386 audio amplifier. C5 provides low-pass filtering that keeps RF out of the audio amplifier. R4 isolates the low-pass filter from the detector circuit when the volume control is at the top of its range. The bottom of the **VOLUME** control, R5, and pin 3 of the LM386 float above ground so that both inputs of the IC are ac coupled. This allows the use of a 100-kΩ **VOLUME** control; this high resistance value prevents excessive loading of the detector. D5 protects the receiver from an incorrectly connected battery.

L1 is wound on a standard 35-mm plastic film can or a 1-inch-diameter pill bottle. C1 can be any air-dielectric variable capacitor with a maximum capacitance of 100 to 365 pF. Total frequency coverage varies with the capacitance value used, but any capacitor in that range should cover the 40-meter ham band and several international broadcast bands. If you use a capacitor with a large capacitance range (such as 10 to 365 pF), you'll find that selectiv-

[1]Notes appear on page 64.

ity suffers. That is, it's more difficult to tune in an individual station because there are more stations within the tuning range than when using a capacitor with a smaller capacitance range (such as 10 to 150 pF). Therefore, an optional fine-tuning control (see the inset of Figure 1) is recommended when using tuning capacitors with a wide capacitance range.

Building the Receiver

Finding the Parts

Air-dielectric variable capacitors can be purchased from several suppliers.[2] You can also find them at ham flea markets or salvage one from a discarded AM radio. All the other components are available from RadioShack and Digi-Key. PC boards are available from FAR Circuits (see Note 1).

Winding the Coil

Some would-be builders are intimidated by the idea of winding a coil. Actually it's quite easy to do. Sometimes, having a second set of hands helps. For the coil winding, use 22-gauge solid-conductor insulated hook-up wire. Before you start winding the coil,

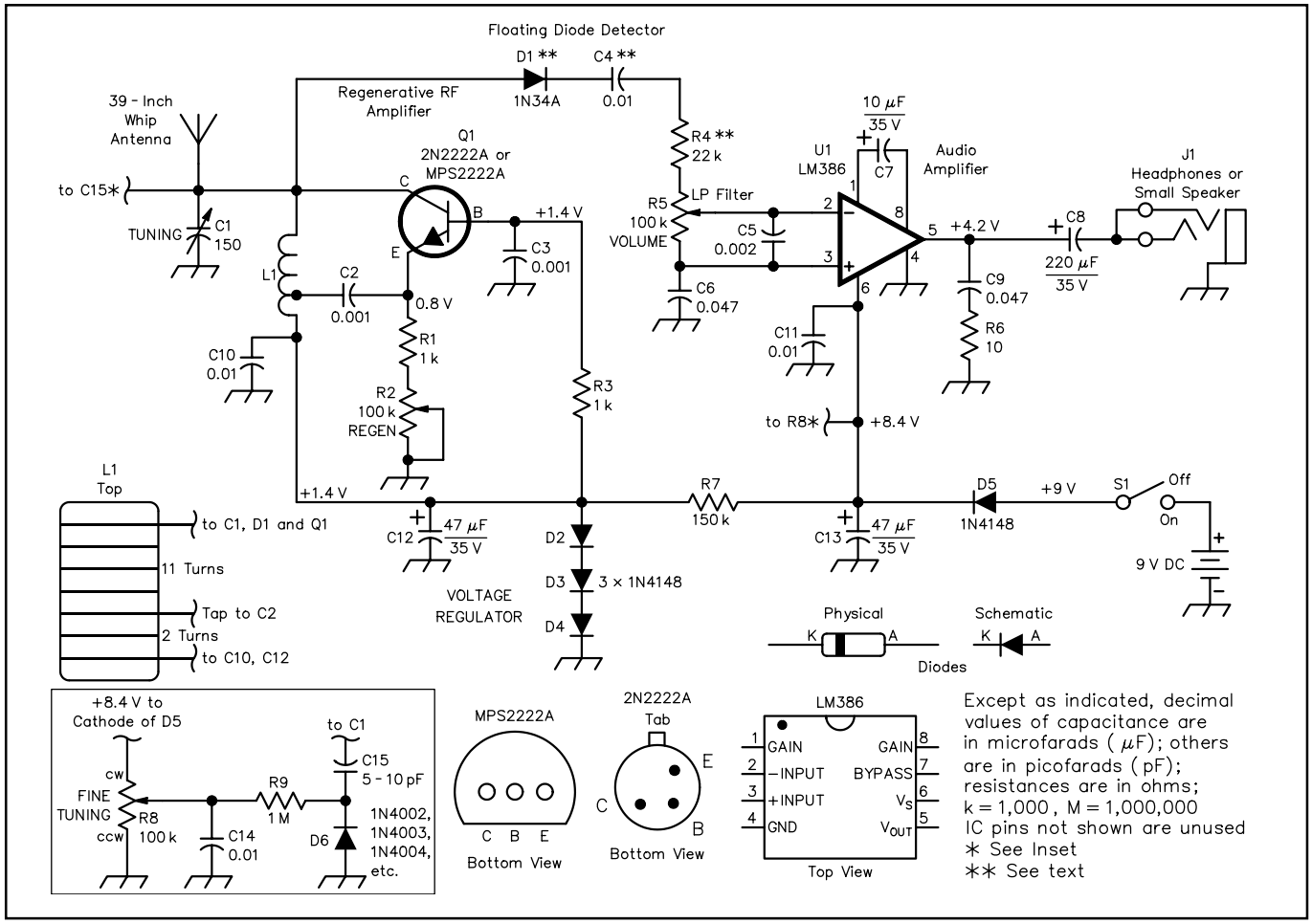
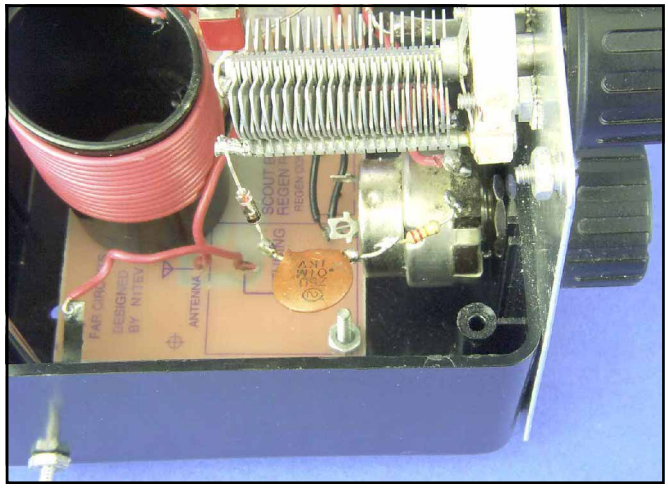


Figure 1—Schematic of the simple regen receiver. Unless otherwise specified, resistors are 1/4-W, 5%-tolerance carbon-composition or metal-film units. Part numbers in parentheses are RadioShack. Equivalent parts can be substituted; n.c. indicates no connection.

C1—150 to 350 pF (maximum value) air-dielectric variable capacitor; see text.
C2, C3—0.001 µF, 50 V (or more) disc ceramic (RS 272-126)
C4, C10, C11, C14—0.01 µF, 50 V (or more) disc ceramic (RS 272-131)
C5—0.002 µF, 50 V (or more) disc ceramic (use two RS 272-126 connected in parallel).
C6, C9—0.047 µF, 50 V disc ceramic (RS 272-134)
C7—10 µF, 35 V electrolytic (RS 272-1025)
C8—220 µF, 35 V electrolytic (RS 272-1017)
C12, C13—47 µF, 35 V electrolytic (RS 272-1027)
C15—5 to 10 pF, 50 V (or more) mica (RS 272-120)
D1—1N34A *germanium* diode (RS 276-1123); don't use a silicon diode here.
D2-D5—1N4148 or any similar silicon diode (RS 276-1122)
D6—1N4003 silicon diode (RS 276-1102)
J1—2 1/8-inch, three-circuit jack (RS 274-246)
L1—See text.
Q1—2N2222A NPN transistor (RSU11328507) or MPS2222A (RS 276-2009)
R1, R3—1 kΩ (RS 271-1321)
R2, R5—100 kΩ potentiometer, linear taper (RS 272-092)
R4—22 kΩ (RS 271-1339)
R6—10 Ω (RS 271-1301)
R7—150 kΩ (RSU11345287) or use series-connected 100 kΩ (RS 271-1347) and 47 kΩ (RS 271-1342) resistors.
R8—100 kΩ audio-taper pot (RS 271-1722); connect so that clockwise rotation increases the voltage at the junction of the pot arm, R9 and C14.
R9—1 MΩ (RS 271-1356)
S1—SPST miniature toggle (RS 275-612)
U1—LM386N-1 audio amplifier (RS 276-1731)
Misc: PC board (see Note 1); 39-inch whip antenna (RS 270-1403); 8-pin DIP socket for U1 (RS 276-1995A); 9-V battery clip (RS 270-325); three knobs (RS 274-402A); project box (RS 270-1806); #6-32 screws and nuts, rubber feet; 9-V battery, Radio Shack 22-gauge solid hook-up wire. Note: RSU items in the RadioShack catalog need to be ordered (delivery in approximately 7 to 10 business days).



This close-up shows the interconnection of series-connected D1, C4 and R4 between the TUNING capacitor and VOLUME control.

drill a mounting hole in the bottom of the film can or pill bottle. Then, drill two small holes in the side of the coil form, near the top, where the winding starts. (By winding from the top of the coil form to the bottom, the winding bottom is kept well above the PC board, preventing any circuit loading that could decrease the receiver's selectivity.) Feed one end of the coil wire through the first hole to the inside of the form, then out through the second. Tie a knot at the point in the wire where it enters the form—this keeps the wire in place and prevents it from loosening later on. Be sure to leave a two to three inch length of wire at each end of the coil so you can make connections to the PC board.

You can wind the coil in either direction, clockwise or counterclockwise. Tightly wind the wire onto the form, counting the turns as you go. Keep the turns close together and don't let the wire loosen as you wind; this takes a little practice.

To make the coil tap, wind 11 turns on the coil form. While holding the wire with your thumb and index finger, mark the tap point and remove the insulation at that point. Solder a two to three-inch piece of wire to the tap. Continue winding turns until the coil is finished (13 turns total). Keep the free end of the wire in place using a piece of tape and drill two more holes in the coil form where the winding ends. Feed the wire end in and out of the coil as before and tie a knot at the end to hold the winding in place. When the coil is finished, remove the tape then carefully solder the three wires from the coil (bottom, tap and top) to their points on the PC board keeping the wire lengths as short as possible.

For best performance, the floating detector must be wired using short, direct connections. Therefore, these components are not mounted on the PC board. Mount the **VOLUME** control, R5, close to the **TUNING** capacitor, C1. Connect D1, C4 and R4 in series between the hot side of C1 (the stator) and the top of the **VOLUME** control.

Options

Fine-Tuning Control

You can add a fine-tuning control to the receiver using the circuit shown in the inset of Figure 1. D6 functions as a poor man's Varactor (voltage-variable capacitor). As the voltage from **FINE-TUNING** control R8 is increased, the diode is reverse biased and its capacitance decreases. This fine-tuning control is cheap and easy to add, but its added capacitance somewhat reduces the maximum frequency range of the receiver. You can compensate for this by removing turns from L1 if necessary.

Two-Band Option

If you'd like a two-band receiver with noncritical tuning, use a 150-pF capacitor for C1 and install a miniature toggle switch with very short leads to add an additional 250-pF fixed-value mica capacitor in parallel with C1. With the capacitor in the circuit, the receiver will then tune the 80-meter band.

Packaging the Radio

The recommended RadioShack project box includes metal and plastic tops. Use the metal top as a large front panel by mounting it to one side of the box using two small screws and nuts through two of the four predrilled holes. Then drill the control mounting holes and mount the three controls and the **ON/OFF** switch on the metal panel. The radio is easier to operate if you mount the **TUNING** capacitor and the regeneration (**REGEN**) control on opposite sides of the front panel. The **VOLUME** and **REGEN** controls are best mounted near the bottom of the front panel to keep their connecting wires to the PC board as short as possible. You can use the RadioShack hook-up wire for the **VOLUME** and **REGEN** control connections if you twist the wires closely together and keep their lengths very short. Otherwise, use shielded wires for these connections. You can mount the **ON/OFF** switch last, in any convenient location. Use one of the two remaining holes in the metal front panel to attach a wire connecting the panel to the PC board ground. Attach the PC board and the coil to the bottom of the project box using small screws. Mount the headphone jack on the box rear, close to the PC board and the LM386. Attach the RadioShack 39-inch whip antenna to one of the back corners of the box using a small screw and nut.

If you use the RadioShack jack specified for J1 (RS 274-276), connect together pins 2 and 5 and attach that common lead to C8. Ground pin 1 of the jack. If you intend to use a small speaker, connect it between pins 1 and 3. Then, when headphones are plugged in, the speaker will be disconnected automatically.

Testing and Operating the Receiver

Set the **VOLUME** and **REGEN** controls to midrange, plug in the headphones, extend the whip antenna, attach the battery and turn on the receiver. You can check to ensure that the audio stage is functioning by placing a finger on the center lug (wiper) of the **VOLUME** control and listen for a buzz. If the audio stage is working, adjust the **REGEN** control until the set produces a sound, indicating that Q1 is oscillating. If Q1 is not oscillating, carefully check the wiring and measure the voltages labeled on the schematic using a high-impedance DVM or multimeter. Common problems are Q1 being wired backwards (emitter and collector connections reversed) and the wires from coil L1 connected to the wrong places on the PC board.

Use two hands when operating the receiver: one for tuning, the other for controlling regeneration. For international broadcast stations or AM phone operation on 40 meters, carefully adjust the **REGEN** control so that Q1 is just below oscillation. For CW and SSB, increase the **REGEN** level so that the set *just* oscillates providing the required local oscillation for these modes. This receiver picks up lots of stations with just its whip antenna, although using a ground connection will greatly reduce any hand-capacitance effects. To pull in more stations during daylight hours, a 10 to 15-foot (or longer) length of insulated hook-up wire can be used as an external antenna. Simply wrap the end of this wire a couple of times around the whip antenna.

If you operate this receiver close to another radio, the regen's 30-µW oscillator might interfere with it. Those who are interested

in building a higher-performance regen receiver for serious CW and SSB reception should read my article "High Performance Regenerative Receiver Design."[3] You can also see the project at **http://www.chelmsford.com/bars/regenproj.htm**.

Notes

[1]A PC board for this radio is available from FAR Circuits, 18N640 Field Ct, Dundee, IL 60118-9269, tel 847-836-9148 (voice and fax). Price: $5 each plus $1.50 shipping for up to three boards. FAR Circuits offers a group discount rate of 10% for orders of 10 or more boards. Visa and MasterCard accepted with a $3 service charge; **farcir@ais.net**; **http://www.cl.ais.net/farcir/**.

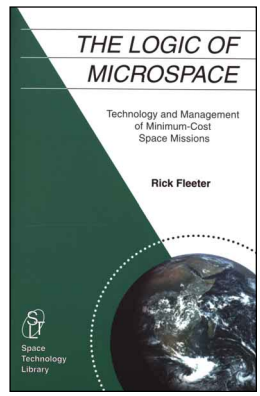
[2]Suppliers include, but are not limited to: Antique Electronics Supply, 7221 S Maple Ave, Tempe, AZ 85283; tel 480-820-5411, fax 800-706-6789, 480-820-4643; **info@tubesandmore.com**; **http://www.tubesandmore.com**; Digi-Key Corp, 701 Brooks Ave S, Thief River Falls, MN 56701-0677; tel 800-344-4539, 218-681-6674, fax 218-681-3380; **http://www.digikey.com**; Fair Radio Sales Co, Inc, 1016 East Eureka St, PO Box 1105, Lima, OH 45804; tel 419-227-6573, 419-223-2196; fax 419-227-1313; e-mail **fairadio@wcoil.com**; **http://www.fairradio.com/**; Ocean State Electronics, PO Box 1458, 6 Industrial Dr, Westerly, RI 02891; tel 800-866-6626, 401-596-3080, fax 401-596-3590; RadioShack—see your local distributor. RadioShack.com L. P., 300 West Third Street, Suite 1400, Fort Worth, TX 76102; **http://www.radioshack.com/**; The Electronic Goldmine, PO Box 5408, Scottsdale, AZ; 85261; tel 800-445-0697; fax 480-661-8259; e-mail **goldmine-elec@goldmine-elec.com**; **http://www.goldmine-elec.com**.

[3]Charles Kitchin, N1TEV, "High Performance Regenerative Receiver Design," *QEX*, Nov/Dec 1998, pp 24-36. See also Charles Kitchin, N1TEV, "Regenerative Receivers: Past And Present," *Communications Quarterly*, Fall 1995, pp 7-26.

26 Crystal St
Billerica, MA 01821
charles.kitchin@analog.com

NEW BOOKS

THE LOGIC OF MICROSPACE



By Rick Fleeter, K8VK

Published jointly by Kluwer Academic Publishers and Microcosm Press. Available from Microcosm Press, 401 Coral Circle, El Segundo, CA 90245-4622; tel 310-726-4100; **http://www.smad.com**. *6×9 inches, 477 pages. Softcover. ISBN 1-881883-11-6. $29.95.*

Reviewed by Steve Ford, WB8IMY
QST *Managing Editor*

◊ The *Logic of Microspace* has nothing to do with Amateur Radio—and everything to do with Amateur Radio. Hams pioneered the concept of microsatellites—compact spacecraft designed to be deployed at minimal cost while offering flexible functionality. The results are orbiting overhead as you read these words. Several of the first Amateur Radio microsats launched almost 10 years ago are still very much alive and well.

Microsats have since moved into the commercial sphere with corporations, governments and even NASA embracing the concept. In fact, author Rick Fleeter, K8VK, is president and CEO of AeroAstro, a company that designs and builds microsats.

But we still haven't addressed the question of why you should be interested in reading *The Logic of Microspace*. There are two reasons: (1) To gain an education in the fascinating world of space technology in general and microsats in particular and, (2) because this book is a pure delight.

Rick Fleeter is one of those rare individuals who can not only explain technical topics to any audience, he can do so with highly effective humor. This gifted combination of talent makes *The Logic of Microspace* one of the most unusual science and technology books you'll ever read.

Like his previous work, *Micro Space Craft*, *The Logic of Microspace* is the kind of title that seems deliberately designed to hide the true content of the book. If you saw *The Logic of Microspace* sitting on a bookstore shelf, chances are you'd stroll right by without giving it much more than a glance. (Oh, another one of those boring academic snoozers!)

You couldn't be more wrong.

In *The Logic of Microspace* Fleeter takes complex topics such as rocket propulsion and orbital mechanics and explains them clearly, without patronizing. *The Logic of Microspace* eschews the stuffy traditions of academic and technical writing. (There isn't a "hitherto" or a "thus" to be found.) Instead, *The Logic of Microspace* is totally conversational and often downright hilarious. Fleeter's writing style is filled with contemporary references to pop culture (rock n' roll in particular). Imagine a technical book written by a tag team of Carl Sagan, P. J. O'Rourke and Hunter Thompson and you'll have a pretty good idea of what to expect with *The Logic of Microspace*.

A glance at some of the chapter sections will give you a sense of the "atmosphere:"

- Weather, Ecology And Another Proof of the Existence of God
- How Mother Nature is Cruel to Eight-Year-Olds
- A War Waged for the Sake of the Clueless (my personal favorite)

The Logic of Microspace is really three books in one. The first is a treatise on space technology and physics. The second is a fascinating examination of the politics, planning and psychology that underlies much of the work involved in aerospace projects. The third is the biggest surprise of all—a work of science fiction. The 94-page novella is titled "A Wrinkle in Microspace" and it is as compelling as anything you'll find on the fiction shelf of your local library.

Although it may not be obvious, Amateur Radio illuminates every page of *The Logic of Microspace*. Insatible technical and scientific curiosity is what drove Rick Fleeter to become a ham in the first place. That same muse guided him later to a career in aerospace. *The Logic of Microspace* is, in many ways, a testimonial to the fundamental "spirit" that brings us all to this hobby—and carries some of us, such as Rick Fleeter, much farther. QST

NEW PRODUCTS

CAPANALYZER 88A IN-CIRCUIT CAPACITOR TESTER

◊ The CapAnalyzer 88A allows testing of electrolytic and tantalum capacitors in-circuit by measuring the equivalent series resistance (*ESR*) and the dc resistance (*DCR*)—eliminating the need to desolder the component from the pc board.

The test instrument discharges the capacitor, checks it for low DCR, reads out the high-frequency ESR and allows you to quickly compare those readings with the industry standard values conveniently provided on a three-color chart on the front panel.

There's also a *QuickESR* mode to speed ESR-only testing and a 1- to 5-beep tone alert system that allows you to know the approximate ESR reading without having to avert your attention from the device under test.

The included tweezer-type probe allows easy one-handed testing of both normal and surface-mounted capacitors and uses coaxial cable instead of separate test-probe wires, insuring stable readings even on small capacitors.

The CapAnalyzer 88A is battery powered—an optional ac adapter is also available.

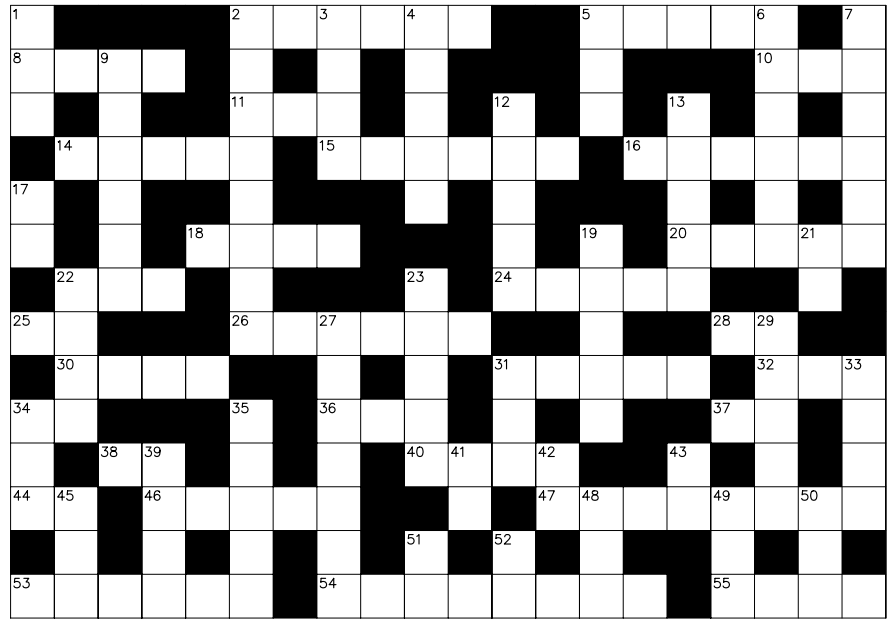
For more information, visit your favorite electronics distributor or contact Electronic Design Specialists, Inc, 4647 Appalachian St, Boca Raton, FL 33428; tel/fax 561-487-6103; **info@eds-inc.com**; **http://www.edsinc.com/**. QST

Next New Product

By H. Ward Silver, N0AX

Test Your Knowledge!

Tools! Tools for building, fixing, losing, and finding. This month's puzzle is about the world of tools—and the people who love them.

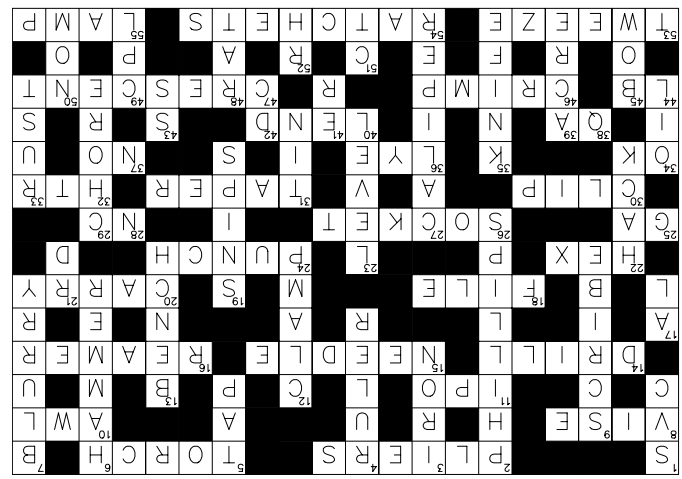


Across

2. Used to grip things
5. Hot item
8. Jaws to hold, not to bite
10. Hole poker
11. Initial public investment in your invention
14. Rotates a bit
15. Style of a nose
16. Makes a hole bigger
18. Scrapes metal edges smooth
20. To lift and move an object
22. Six-sided key
24. Start a hole with a center…
25. Gauge (abbreviation)
26. Fits a nut
28. Numerically controlled (abbreviation)
30. To cut off the end
31. Gradual reduction in diameter
32. Heater (abbreviation)
34. Everything alright
36. Caustic chemical
37. Normally Open (abbreviation)
38. Quality Assurance (abbreviation)
40. Do not do this to your tools
44. Pound (abbreviation)
46. Tool does this to hold a terminal on a wire
47. Type of adjustable wrench
53. What a tweezer does
54. Only turns one way
55. Puts light on the work

Down

1. Service (abbreviation)
2. Type of screwdriver
3. Used to solder
4. Measures distance
5. Puts threads in a hole
6. Used to hit things
7. If you get a metal chip in your eye, your vision will become…
9. Draw a line on metal
12. Holds firmly
13. Where the work is done
17. Aluminum (abbreviation)
19. Cut tin with these
21. Round (abbreviation)
22. Saw used on metal
23. Both sides at equal heights
27. Measures precise widths and lengths
29. Cleanup is a…
31. Coat with solder
33. Wet tools do this
34. Lubricant
35. Used for cutting



39. Unit of area
41. Where you will go if you're not careful around tools (abbreviation)
42. Battery power
43. Stainless steel (abbreviation)
45. Saw kept under tension
48. Type of a file tail
49. Couple (abbreviation)
50. Nominal (abbreviation)
51. Count (abbreviation)
52. Right-hand (abbreviation)

22916 107th Ave SW
Vashon, WA 98070

EZNEC 3.0 for *Windows*

By Michael Tracy, KC1SX, ARRL Laboratory Engineer

Lots of hams like to "fiddle" with antennas, and antenna modeling software can make the task easier and more fun.

Until recently, most antenna modeling software for the PC was *DOS*-based. While *DOS* software can run under *Windows 95* and *98*, these older programs can present a bit of a challenge to folks who got started on *Windows 95/98* systems. Also, *DOS* software runs in a single window only, missing out on one of the real advantages of the *Windows* environment.

Getting Started

Those who already have one of W7EL's *DOS* programs will have a short learning curve on *EZNEC 3.0*. For new users, the help information includes an excellent "walk-though" type tutorial that covers basic operation and advanced features, some practical examples and a demonstration of features particular to this new *Windows* version.

The first major change in *3.0* is the on-line manual in the help system. I initially thought that I'd want to print out the parts I needed to refer to, but since the help is very well organized, and the window can be left open for handy reference, I found that I didn't miss "the book" all that much.

What *DOS* users will notice immediately is the change in appearance of the main window. Instead of two-letter command keys, there are 10 "action buttons" on the extreme left and 14 "selection" buttons along the left edge of the antenna information portion (the selection button can change as needed, much like "soft key" menus in certain transceivers).

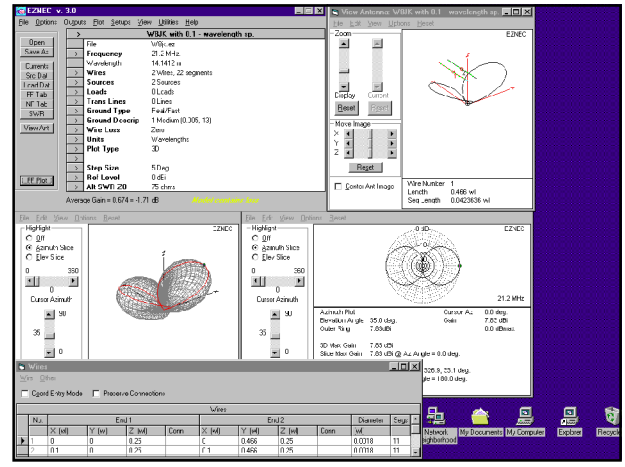
Wires, Wires

The antenna configuration is edited by edited by clicking on the **WIRES** selection button. The wires window looks somewhat like a simple database table. Each row defines a wire, with columns for end coordinates, end connection points (if any), wire diameter and the number of "segments" (the number of chunks to split the wire into for analysis). One of the special new features is included here. If you position the mouse cursor over one of the coordinate columns and click the right mouse button, you'll see a pop-up menu that lets you change the coordinate (relative), change the length (relative or absolute), rotate the end (in azimuth or elevation) or connect that end to the end of another wire.

A word about wires. If you haven't used antenna modeling software before, you might be thinking that you can only model wire antennas—not so! The term "wire" here only refers to the representation of the antenna as multiple straight conductors. You can set the wire diameter to several inches if you like and aluminum conductors can be modeled as well. The program includes a "wire loss" selection button that lets you choose aluminum, copper, tin and zinc (useful for galvanized steel). You can also choose "zero" if you can neglect wire loss in your model and you can also define the loss if you know the resistivity and relative permeability of your material of choice.

Other helpful windows version features involve the "View Antenna" window (activated by an action button on the main screen). If you have this window open at the same time as the wires window, and you make a change to a wire, you will get an immediate update on what the changed antenna looks like. This is especially handy when you are rotating wire ends and accidentally go the wrong way!

If you have diagonal wires that you need to check the length of, just position the mouse cursor near the wire and hold the right mouse button down—you'll see a small text box showing the wire number, wire length and segment length.



You can also alter your perspective of the antenna in this window. Zoom in (or out), slew in all three axes and rotate the graphic. Moving around like this makes checking complex designs (like a 5-element quad) a snap!

Frequency can be changed via one of the action buttons and you also have the option of automatically re-scaling the antenna dimensions by the amount of the frequency change. You can use this feature to modify the model for another band or simply shift the size slightly for a better SWR.

Pattern Potting

Of course, the pattern plot is what we're most interested in, right? Well, *EZNEC 3.0* shines here, too. Like the *DOS* version, you can plot azimuth or elevation patterns in "2D," or plot the complete pattern in three dimensions as a wire frame structure. If you have 800 × 600 screen resolution or better, you can view both the plots and the antenna window all at the same time. The 2D pattern also shows up on the view antenna window so you can see where the major lobes are relative to your wires.

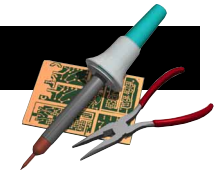
More Features

The SWR action button tells you the SWR (relative to the Z0 chosen) of the model, giving you a graph over a frequency range (you choose frequency limits and step).

The **Src Dat** action button computes the electrical characteristics at the antenna Source (feed point), including impedance in rectangular form (ie, "47 -*j*5.6") and SWR at the design frequency. **Load Dat** performs a similar function for antenna loads (if any). **FF Plot** is the button that creates the far field pattern. **FF Tab** produces a tabular output of the pattern instead of a graph. **NF Tab** does the same for the near field, which can help you evaluate the RF safety of the antenna if you know how to interpret the data and set up the model. The Currents action button gives a table of the current magnitude and phase in each of wire segments.

Although the program is easy to get started with, it takes some "tinkering" to discover the nuances of all its features. But for those who love experimenting with antennas, it's a lot of fun and eye-opening, too.

Manufacturer: Roy Lewallen, W7EL, PO Box 6658, Beaverton, OR 97007; tel 503-646-2885; fax 503-671-9046; **w7el@eznec.com**; **http://eznec.com**. *Web site download: $89. CD-ROM $99 (plus $3 outside the US and Canada).*



The ARRL Outgoing QSL Service

Note: The ARRL QSL Service should not be used to exchange QSL cards within the 48 contiguous states.

How To Use The ARRL Outgoing QSL Service

(1) Presort your DX QSLs alphabetically by parent call-sign prefix (AP, C6, CE, DL, ES, EZ, F, G, JA, LY, PY, UN, YL, 5N, 9Y and so on). Note that some countries have a parent prefix and use additional prefixes, ie, CE (parent prefix) = XQ, 3G and so on. When sorting countries that have multiple prefixes, keep that country's prefixes grouped together in your alphabetical stack. Addresses are not required. *Do not* separate the country prefixes by use of paper clips, rubber bands, slips of paper or envelopes.

(2) Enclose proof of current ARRL membership. This can be in the form of a photocopy of the white address label from your current copy of *QST*. You can also write on a slip of paper the information from the label, and use that as proof of membership. A copy of your current membership card is also acceptable.

(3) Members (including foreign, QSL Managers, or managers for DXpeditions) should enclose payment of $6 per pound of cards or portion thereof—approximately 150 cards weigh one pound. A package of only 10 cards or fewer sent in a *single* shipment costs only $1. Eleven to 20 is $2. Twenty-one to 30 is $3. Please pay by check (or money order) and write your call sign on the check. Send "green stamps" (cash) at your own risk. *Do not* send postage stamps or IRCs. (*DXCC credit cannot be used towards the QSL Service fee.*)

(4) Include only the cards, proof of membership, and fee in the package. Wrap the package securely and address it to the ARRL Outgoing QSL Service, 225 Main St, Newington, CT 06111.

(5) Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership" on the primary member's proof of membership.

(6) Visually impaired members who do not receive *QST* need only include the appropriate fee along with a note indicating the cards are from a blind member.

(7) ARRL affiliated-club stations may use the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that affiliation is current. In addition to sending club station QSLs through this service, affiliated clubs may also "pool" their members' individual QSL cards to effect an even greater savings. Each club member using this service must also be a League member. Cards should be sorted "en masse" by prefix, and proof of membership enclosed for each ARRL member.

Recommended QSL Card Dimensions

The efficient operation of the worldwide system of QSL Bureau requires that cards be easy to handle and sort. Cards of unusual dimensions, either much larger or much smaller than normal, slow the work of the Bureaus, most of which is done by unpaid volunteers. A review of the cards received by the ARRL Outgoing QSL Service indicates that most fall in the following range: Height = $2^3/_4$ to $4^1/_4$ inches (70 to 110 mm), Width = $4^3/_4$ to $6^1/_4$ inches (120 to 160 mm). Cards in this range can be easily sorted, stacked and packaged. Cards outside this range create problems; in particular, the larger cards often cannot be handled without folding or otherwise damaging them. In the interest of efficient operation of the worldwide QSL Bureau system, it is recommended that cards entering the system be limited to the range of dimensions given. (Note: IARU Region 2 has suggested the following dimensions as optimum: Height $3^1/_2$ inches [90 mm], Width $5^1/_2$ inches [140 mm].)

Countries Not Served By The Outgoing QSL Service

Approximately 260 DXCC countries are served by the ARRL Outgoing QSL Service, as detailed in the ARRL DXCC Countries List. This includes nearly every active country. As noted previously, cards are forwarded from the ARRL Outgoing Service to a counterpart Bureau in each of these countries. In some cases, there is no Incoming Bureau in a particular country and cards therefore cannot be forwarded. However, QSL cards can be forwarded to a QSL manager, eg, ZB2FX via (G3RFX). The ARRL Outgoing Service cannot forward cards to the following countries:

A5	Bhutan	TY	Benin
A6	United Arab Emirates	V6	Micronesia
D2	Angola	VP2M	Montserrat
J5	Guinea-Bissau	XU	Kampuchea
KH0	Mariana Is.	XW	Laos
KH1	Baker and Howland Is.	XZ (1Z)	Myanmar (Burma)
KH4	Midway I.	YA	Afghanistan
KH5	Palmyra and Jarvis Is.	ZD9	Tristan da Cunha
KH7K	Kure I.	3C0	Pagalu I.
KH8	American Samoa	3C	Equatorial Guinea
KH9	Wake I.	3W, XV	Vietnam
KP1	Navassa I.	3X	Guinea
KP5	Desecheo I.	5A	Libya
P5	North Korea	5R	Madagascar
S7	Seychelles	5T	Mauritania
T2	Tuvalu	5U	Niger
T3	Kiribati	7O, 4W	Yemen
T5	Somalia	7Q	Malawi
T8	Palau	8Q	Maldives
TJ	Cameroon	9N	Nepal
TL	Central African Republic	9U	Burundi
TN	Congo	9X	Rwanda
TT	Chad		

Countries that currently restrict the forwarding of QSL cards to anyone other than members of that country's national society include the following:

Egypt	Germany
Monaco	Poland
France	Japan
Morocco	Portugal

Additional information:

- We no longer hold cards for countries with no Incoming Bureau. Only cards indicating a QSL manager for a station in these particular countries will be forwarded.
- When sending cards to *Foreign QSL Managers*, make sure to sort these cards using the Manager's call sign, rather than the station's call sign.
- SWL cards can be forwarded through the QSL Service.
- The Outgoing QSL Service **cannot** forward stamps, IRCs or "green stamps" (cash) to the foreign QSL bureaus.

Please direct any questions or comments to the ARRL Outgoing QSL Service, 225 Main St, Newington, CT 06111-1494. Inquires via e-mail may be sent to: **buro@arrl.org**.

HINTS & KINKS

DOX CONTROL FOR A YAESU FT-847

◊ I enjoy operating PSK31 with my FT-847, but I need the two serial ports on my PC for a packet modem and computer-control of the receiver, so I don't have a spare RTS or DTR line to key the transmitter, as is common with most PSK31 interfaces. The FT-847 does not have VOX, but it does have a data AFSK port that can be used to key the transmitter by pulling the transmit line low with a 22 kΩ (or lesser value) resistor. Keying the data port also disables the mike, an ideal situation for simple data-mode operations. To interface the PC to transceiver, I designed the *DOX* (data-operated transmit control, similar to VOX—*Ed.*), a minimum-component-count interface that keys the transmitter from the AFSK signal produced by the PC audio card. Although I have tried the interface only for PSK31, it should also work with other modes that use sound-card AFSK modulation.

Audio from one PC speaker output is stepped up by a reverse-connected speaker output transformer (T2, RS #273-1380) to approximately 30 V (P-P) and peak rectified by D1, D3, C2 and C3. The rectified positive voltage is applied to the gate of a 2N7000 MOSFET (Q1), which then appears as a low resistance to ground. The peak detection is very effective because the FET gate impedance is nearly an open circuit. Peak detection with a long discharge time constant is required because PSK31 data goes through a null with each phase reversal. The discharge time constant (C3-R5, approximately 0.1 second) is long enough to smooth ripple in the rectified voltage. The Zener diode (D2) provides protection for the 2N7000 gate in the event the input voltage is too high; as a bonus, the LED (DS1) in series with the Zener indicates that data is detected and the transmitter is keyed.

The combination of R1 and R2 reduces the 30-V audio to the approximately 30 mV (P-P) required by the transceiver data input. To adjust the transmit level, I connect the transmitter to a dummy load, set the PC software to the transmit mode and adjust the PC sound card software sliders so that the LED just lights. Then, adjust R2 so that the ALC meter barely indicates.

All component values are relatively noncritical. Diodes D1 and D3 may be any small-signal silicon diodes. Zener D2 may be any 18-24 V, 500 mW device. The LED may be omitted if desired. The time constant (C3-R5) may be varied; the values I use do not produce any relay chattering in the FT-847. This interface has no hysteresis (snap action)—as would be required in a VOX circuit—because the input data signal has constant amplitude while transmitting.

On the receive side, the center-tap of a 1:1 transformer (RS #273-1374) provides a 2:1 voltage step-up to the sound-card line input. This interface was constructed in a small metal enclosure and only the transceiver side of the circuit is grounded to the case. *The leads on the PC side are shielded and the shields grounded to the case only at the PC*; this is important to prevent any possibility of line-frequency hum being introduced into the low-level signals. I constructed the cables by cutting a shielded stereo patch cord (RS #42-2387) in half.—*David Smoler, AD6KI, 19982 Charters Ct, Saratoga, CA 95070-4458;* **ad6ki@earthlink.net**

SWEEP-TUBE REPLACEMENTS

◊ Here are a few thoughts regarding "A New Life for your FT-101," (May 1999, pp 68-69). I've done a fair amount of thinking and research about ways to solve the problem of the once common-and-cheap, but now scarce-and-expensive sweep tubes in HF transceivers and linear amplifiers. There are two categories of sweep tubes: small (about 18 W dissipation and 1.25 A heaters), and large (30+ W dissipation and 2.5 A heaters). The former include the 6DQ6B/6LQ6, 6JB6 and such (used in Drake equipment) and the latter 6JE6/6LQ6, 6JS6, 6KD6 and so on. Except for their bases, the 6146, 6146A (20 W CCS dissipation) or the 6146B (27 W CCS dissipation) match up closely to the smaller sweep tubes. The higher dissipation of the 6146B would be an obvious bonus. I would only use new-old-stock (NOS) 6146Bs; according to RF Parts, the current Chinese-made 6146Bs must be derated to 75% of published specifications.

For the larger sweep tubes, the current Svetlana EL-509/6KG6 is—

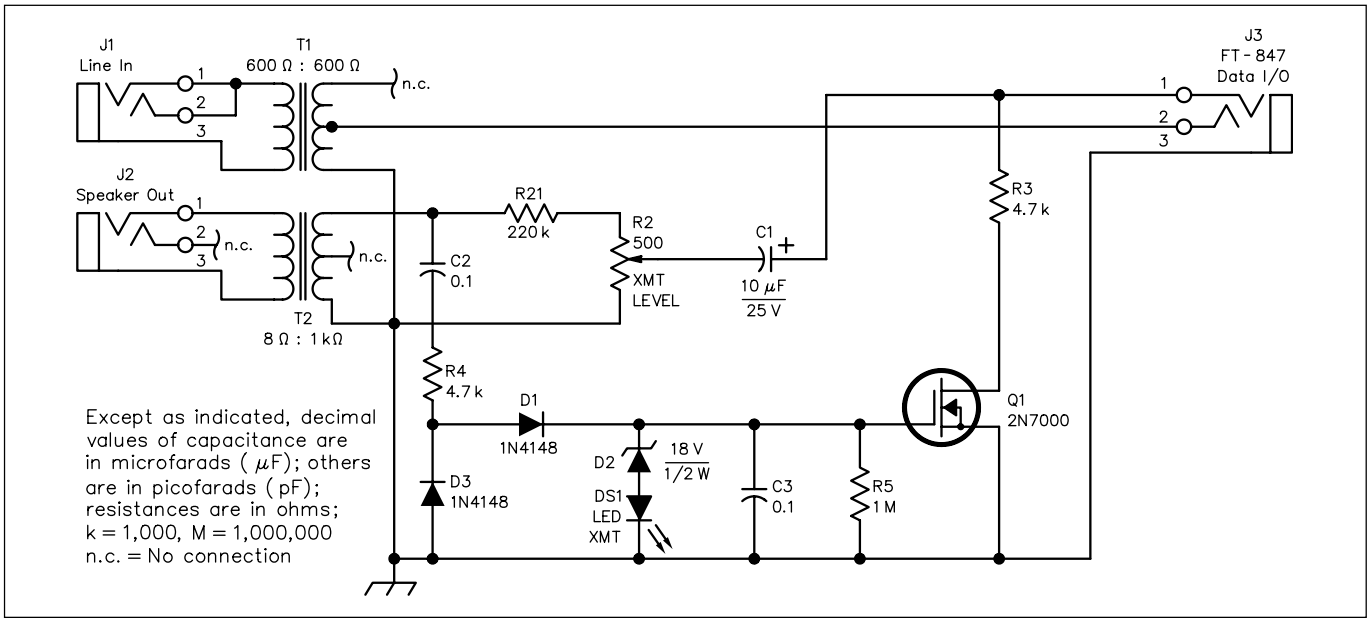


Fig 1—Schematic of AD6KI's DOX interface.

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor

except for its base—a close match in heater current, dissipation and interelectrode capacitances. According to Svetlana, it has a hard glass envelope, many other features of a transmitting tube and is usable at full ratings to 30 MHz. Svetlana Technical Bulletin 32 gives detailed instructions for conversion from 6KD6s to EL-509/6KG6s. "Evaluating the Svetlana EL/509/6KG6 Tube" (*Electric Radio,* Mar 1999; Svetlana Technical Bulletin 49) gives results of test-jig comparisons of an EL/509/6KG6 with a 6146B. (See References and **http://www.svetlana.com/docs/TechBulletins/** for these articles.—*Ed.*)

I own two sweep-tube SSB rigs, a Drake T4XB and an EICO 753. There are many Drake rigs out there, and the conversion would also apply to TR-series transceivers, which use three 6JB6 tubes. Unfortunately, I don't own any rigs that use the large sweep tubes. There are probably many sweep-tube SSB rigs and linears out of service due only to the cost and availability of the tubes.

Here are a few additional thoughts: The Chinese-made 6146B tubes, marketed under the Penta (and possibly other) brand names by several vendors, are priced substantially lower than NOS 6146Bs. Assuming the recommended 75% derating factor, their effective dissipation (27 W × 0.75 = 20.25 W) is still sufficient to directly replace American-made 6146 and 6146A (but not the "B") tubes and the smaller sweep tubes, with accommodation of the base differences. In addition to base changes, differences in interelectrode capacitances may require changes in tank and neutralization circuits.

You can expect reasonably close tube-to-tube uniformity between different Svetlana EL-509 tubes or among American-made 6146A/B/W-series tubes from the same manufacturer and with similar date codes. This may not be true for Chinese 6146B tubes.

Although the 6146W is a rugged variant of the 6146A, some vendors have claimed that their 6146W tubes were selected out of regular production runs of 6146B tubes. This may have been true of late-production tubes, but experimental evidence would be needed to confirm or deny this claim. If true, this suggests that sometime after the introduction of the 6146B (circa 1963) production was consolidated into one tube that had the increased dissipation and 1.125 A dark heater of the "B" variant as well as the "W" variant's ability to meet military specifications for vibration and shock. Such a tube could conceivably have been labeled as A, B or W.—*Bill Tipton, K5JRI, 1332 Pinewood Rd, Jacksonville Beach, FL 32250-2941*

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G. Badger, B. Alper, and E. Barbour, *Technical Bulletin, 32* (Huntsville, Alabama: Svetlana Electron Devices, 1997) "Save your Dentron GLA-1000 with the Svetlana EL-509."

Receiving Tube Manual (Harrison, New Jersey: RCA Corporation, 1973).

RCA-6146B/8298A Beam Power Tube (Lancaster, Pennsylvania: Radio Corporation of America, 1963).

Svetlana Technical Data: EL-509 Beam Tetrode (Huntsville: Svetlana Electronic Devices, 1997).

R. D. Straw, N6BV, Ed. *The ARRL Handbook* (Newington: ARRL, 1999) Order No 1832, $32. ARRL publications are available from your local ARRL dealer or directly from the ARRL. See the ARRL Bookcase elsewhere in this issue or check out the full ARRL publications line at **http://www.arrl.org/catalog**. See the Chapter 24 data tables for "Tetrode and Pentode Transmitting Tubes" and "TV Deflection Tubes."

DECAL LABELS MADE EASY

◊ Labeling home-built equipment has always been a challenge for me. Until now, all of the labels on my equipment *looked* homemade. Here's a technique I've found to remedy that situation.

1. Typewrite or print the labels on paper.
2. Photocopy the labels onto a transparency.
3. Trim the labels from the transparency.
4. Glue the labels to the equipment panel. (Be careful not to smear the letters)
5. Coat the panel and labels with clear spray varnish.

The finished panel has proper letter alignment and spacing, as if professionally printed.—*John Bandy, W0UT, 2810 Euclid, Wichita, KS 67217-1927;* **john.bandy@twsubbs.twsu.edu**

◊ There are more options. Some computer applications can print a mirror image of a document. By doing so, you can print a reversed image onto acetate or photocopy one from paper onto acetate. This places the printing on the rear of the plastic sheet to protect the printing and present a nice, finished appearance.

With a little planning, one could properly position all labels for a panel on a sheet of paper or acetate so that a single smooth plastic sheet would cover the whole panel. To add some color, use a sheet of colored paper or contact paper behind the plastic and affix the whole assembly to the project.

At a local model train show last spring, I saw blank decal paper for sale. It's available from Walthers (**www.walthers.com**) and other suppliers at hobby shops. According to the rec.models.scale FAQ, part 13 (**http://www.1250fleets.com/FAQ/rmsfaq.13.htm**), modelers have had a little trouble using ink-jet printers directly on the decal paper, but they've had good results with laser printers and copying onto decal paper at local photocopy shops.—*Bob Schetgen, KU7G*

STARTING SCREWS IN TIGHT PLACES

◊ Often I need to replace a screw that is in between components and not readily accessible. I have a straight-blade screwdriver with a retaining device that works well, but nothing similar to that for use with Phillips screws. Sometimes it is necessary to place a lock washer with the screw, as well.

By securing the screw (and lock washer, if needed) to the end of the screwdriver with a small piece of adhesive tape, it's easy to start the screw on the first try. The tape gives a little, which makes a slight misalignment unimportant. After driving the screw, the tape breaks and comes away with the screwdriver. The same trick works with slotted screws and nuts on panels and in nutdrivers.—*Hugh Inness-Brown, WZ1B, 5351 State Hwy 37, Ogdensburg, NY 13669*

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 **rschetgen@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

BATTERY PACKS

◊ Maha Communications now offers two new external battery power packs.

Primarily intended for use with digital cameras, the 7.2-V/1400 mAh MH-DPB140LI lithium ion pack and the 6-V/1800-mAh MH-DPB180M nickel metal hydride pack should also be attractive choices for other portable electronics applications.

Both versions feature compact dimensions and lightweight construction. A carry case with a belt clip, a cigarette lighter cord, a wall transformer charger and a "universal" power cable is provided. The cable includes three plug adapters that fit the power connectors found on several of the current digital cameras.

A built-in four-stage indicator makes it easy to keep track of the charge state. Charging time for the lithium ion pack is approximately 3 hours; for the nickel metal hydride pack, about 4 hours.

The suggested retail price for the MH-DPB140LI lithium ion pack is $69.95. The MH-DPB180M nickel medal hydride pack is $59.95. For additional information visit your favorite Maha products dealer or contact Maha Communications, 545-C W Lambert Rd, Brea, CA 92821; tel 800-376-9992 or 714-990-4557, fax 714-990-1325; **sales@mahacomm.com**; **http://www.mahacomm.com**. QST

Next New Product

ARRL Says Amateur Service is "Fertile Testing Ground" for SDR Technology

The ARRL says that Amateur Radio "is a fertile testing ground" for software defined radio technology and that SDR would be especially valuable to facilitate disaster communications. The League commented in June in response to FCC *Notice of Inquiry* ET Docket No. 00-47 on SDR technology, released in March.

The League said its understanding of SDRs is that they are "in essence, digital computers connected to an antenna, controlled by software." True SDR functions, other than baseband DSP, are yet to be incorporated into commercial or even into sophisticated homemade amateur equipment, the ARRL noted.

The League said that because of its flexibility, utilization of multiple modes, and shared allocations, the Amateur Service provides the proper environment to develop, test and deploy SDR technology. Amateur Radio is not constrained by limitations imposed on other services and "serves as a reasonable paradigm for a regulatory structure that might be adapted to other services," the ARRL told the FCC. The League said it intends to give a "high profile" to SDR developments in the Amateur Service through its technical/experimental publication, *QEX*.

The ARRL said that SDR affords a level of flexibility and interoperability that could enhance Amateur Radio's performance in emergency communications and disaster relief efforts with respect to served agencies. "Amateur SDR equipment could be rapidly reprogrammed to be interoperable with that of served agencies such as the Red Cross, the Salvation Army, local civil defense offices, state OES offices, and public safety agencies," the League said. The result would be "an even more immediate and adaptable source of restored communications for disaster relief coordination" than previously available.

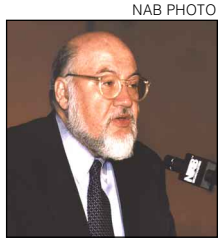
The ARRL told the FCC that SDRs would obviate the need for differing transmission standards in the future. SDRs could shift transmission standards automatically to overcome common communication roadblocks such as noise levels, propagation characteristics, QRM, and other factors.

The League cautioned the FCC against imposing equipment authorization requirements on SDR hardware or software designed for amateur use that could inhibit experimentation.

A copy of the League's comment in response to FCC *Notice of Inquiry* ET Docket No. 00-47 is available at **http://www.arrl.org/fcc/arrldocs/et-0047.pdf**.

FCC'S HATFIELD ADVISES HAMS TO "WALK THE WALK"

NAB PHOTO



The FCC's Dale Hatfield, W0IFO, predicts a bright future for Amateur Radio. But the Office of Engineering and Technology chief says that amateurs "will be under a certain amount of pressure" to justify their free use of the radio spectrum. As a result, he said, it will be more important than ever that hams actually fulfill their service, good will and educational roles—not just talk about them.

Hatfield offered his observations as keynote speaker for AMRAD's 25th anniversary dinner June 17 in Virginia. In a talk entitled "The Role of Amateur Radio in the Future," Hatfield told the gathering that there simply is not enough spectrum for all to share, and "the key issue for the amateur service is maintaining access to an adequate amount of spectrum." Hatfield said that while he was not suggesting any immediate threat, rapidly growing demand for spectrum in an era of higher-stakes spectrum auctions means hams will have to do a better job of justifying their current allocations.

Hatfield said hams should actually engage in experimentation to advance the state of the art, provide communication and train operators for emergencies, encourage international cooperation and good will, and offer an important technical educational outlet. "Or, to use a bit of slang, it seems to me that it will be even more important for all segments of the amateur community to 'walk the walk' not just 'talk the talk'," he said.

Hatfield encouraged his audience to explore advanced techniques that conserve spectrum, especially digital techniques. As the rest of the telecommunications world transitions to digital techniques, Hatfield said, "the amateur service will look antiquated if it is not making progress in that direction as well."

Hatfield also said software defined radios could facilitate "a new era of amateur experimentation" and, in many ways, represent "a final merger" of radio communications and computers.

The text of Hatfield's prepared remarks is available on the FCC Web site at **http://www.fcc.gov/Speeches/misc/dnh061700.html**.

WRTC CHAMPS K1TO, N5TJ DO IT AGAIN IN SLOVENIA

World-champion contesters Dan Street, K1TO, and Jeff Steinman, N5TJ (ex-KR0Y), retained their title at the World Radiosport Team Championship 2000 competition held in Slovenia in early July. Street and Steinman topped the field of 53 WRTC-2000 two-operator teams from around the world in off- and on-the-air operating events designed to test their contesting skills. Using the call sign S584M, the K1TO-N5TJ combo racked up 965.31 points of out a possible 1000.

During the 20-hour on-air event, concurrent with the IARU HF World Championship Contest held over the July 8-9 weekend, K1TO and N5TJ managed to put 2234 contacts into the log and collected 364 multipliers (under WRTC rules, multipliers were counted separately on phone and CW).

The winning team also scooped the pileup tapes competition held earlier. Street and Steinman topped all competitors at the last WRTC, held in 1996 in the San Francisco Bay area.

Finishing in second place with 910.86 points was the Russian team of Igor Booklan, RA3AUU, and Andrei Karpov, RV1AW, operating as S587N. Coming in at number three with 867.15 points was the US wildcard team of Doug Grant, K1DG, and *CQ* magazine contest editor John Dorr, K1AR. Grant and Dorr operated as S582A.

In the final results, only one other US team made the top 10. The S519I team of Bob Shohet, KQ2M, and Dan Handa, W7WA, finished at number 9.

The WRTC-2000 top 10 finishers represented world-class contesters from seven countries, including three from the US and two bi-national teams—UT4UZ from Ukraine and RW1AC from Russia, who operated as S523W, and DL6RAI from Germany and OE2VEL, from Austria, who operated as S533G.

During this third WRTC, the teams competed using modest stations running 100 W on CW and SSB, plus equivalent antennas—three-element triband Yagis for 10, 15, and 20 meters, and Windoms for 80 and 40 meters, both mounted about 40 feet above

Rick Lindquist, N1RL ♦ Senior News Editor

ARRL PHOTO

We are the champions! **WRTC-2000 winners Dan Street, K1TO (left), and Jeff Steinman, N5TJ.**

ground. All stations were on hilltops or mountains.

Sponsoring WRTC-2000 was the Slovenia Contest Club. Serving as the chief referee at this year's event was the ARRL's Executive Vice President David Sumner, K1ZZ.

A listing of the WRTC-2000 teams and scores is available at **http://wrtc2000.bit.si**, and accounts posted by several participants and observers are on the *NCJ* Web site at **http://www.ncjweb.com**.

FLORIDA TOWER RULING DISAPPOINTS LEAGUE

The ARRL has expressed its disappointment at a US Appeals Court ruling in a four-year-old Florida Amateur Radio tower case. The US Court of Appeals for the Eleventh Circuit on May 31 affirmed a lower-court ruling against Lenard Persin, WB4HZQ, in his efforts to erect an 80-foot repeater and HF remote base tower in his side yard in Seminole County.

"We are disappointed with the Court's ruling, which runs contrary to the clear and unambiguous meaning of the FCC's PRB-1 preemption decision," said ARRL Executive Vice President David Sumner, K1ZZ. The Eleventh Circuit ruling was doubly troubling because the ARRL had agreed to fund Persin's appeal in the case. The League is in the process of fine tuning its approach to how it handles future antenna cases (see "ARRL Board Thinks Big for the New Millennium" elsewhere in this issue).

In a six-page, unpublished decision, the Eleventh Circuit decided that the US District Court had not erred by applying "a balancing test rather than the reasonable accommodation test required by PRB-1."

Sumner said that by letting stand the US District Court's reliance on the "balancing of interests" approach, the Appeals Court took a regulatory direction that the FCC has expressly labeled "not appropriate." He called it "incomprehensible" that the Eleventh Circuit Court of Appeals could have failed to follow the lead of the Eighth Circuit, which reaffirmed the "reasonable accommodation" and "minimum necessary regulation" principles of PRB-1 in a landmark 1994 case.

Seminole County's ordinance restricts Amateur Radio towers to 35 feet without a special exception. The lower court agreed with Seminole County that Persin's request for a taller structure would be detrimental to the character and not consistent with the development trends of his neighborhood.

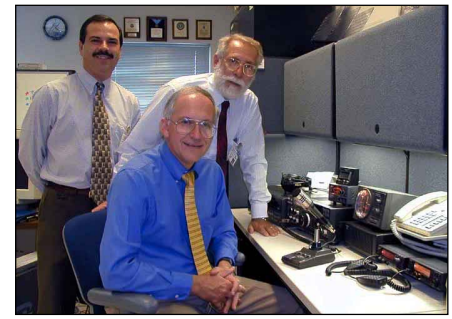
Persin says he believes the decision dealt "a fatal blow" to PRB-1 and that other jurisdictions will copy Seminole County's approach. The county's ordinance, Persin says, "was particularly designed to thwart PRB-1."

Sumner and ARRL General Counsel Chris Imlay, W3KD, note, however, that, the unpublished Eleventh Circuit opinion will not serve as a precedent in future cases. Sumner says that, under PRB-1, municipalities continue to have "an absolute obligation" to reasonably accommodate Amateur Radio.

Persin has been granted permission by

Two Decades of W4EHW Hurricane Support

National Hurricane Center Assistant Amateur Radio Coordinator Julio Ripoll, WD4JR, says this hurricane season marks 20 years of activity for the operators at the National Hurricane Center's W4EHW. Formal Amateur Radio activity at the National Hurricane Center was initiated by Andy Clark, W4IYT (now a Silent Key), and NHC Director Neil Frank in 1980. At the time, Ripoll—then a college student—used to carry in his own transceiver to the Center or borrow one from his college club station. During the station's first hurricane season, about five volunteers sometimes operated up to 12 hours per shift. The first ham radio operation at the NHC was Hurricane Allen. The station spent some 120 hours on the air, filled 20 log pages and sent more than 90 radiograms. Ripoll served as Amateur Radio Coordinator from 1980 until 1986. Today, Ripoll says, more than 30 operators at W4EHW provide hurricane weather communication for the Caribbean, the Gulf Coast and the Atlantic coastal states as well as emergency communications for the Center and local agencies. W4EHW works in conjunction with the Hurricane Watch Net, which activates on 14.325 MHz whenever a hurricane is within 300 miles of landfall in the western Atlantic, the Caribbean or the eastern Pacific. The station is sponsored by the Dade County Amateur Radio Public Service Corps and assembled from donated equipment. W4EHW's informative Web site is at **http://www.fiu.edu/orgs/w4ehw**.



National Hurricane Center Director Max Mayfield, sits at the W4EHW station. Standing are NHC Amateur Radio Coordinator John McHugh, KU4GY (right), and Assistant Coordinator Julio Ripoll, WD4JR (left).

NOTABLE SILENT KEYS

DAVID BOND, W9MG

LOUIS VARNEY, G5RV, SK

R. Louis Varney, G5RV, who invented the world-famous G5RV antenna, died June 28, at his home in West Sussex, England. He was 89 and had been reported in failing health earlier this year. The G5RV multiband wire antenna for HF—typically 102 feet on the flattop section—is among the most popular of all antenna designs. Varney first described the G5RV during the late 1950s in the *RSGB Bulletin*. While models fed with coaxial cable have proliferated, Varney's personal recommendation was to use a balanced feed line and a matching network for bands other than 20 meters. (The G5RV dipole is discussed in Chapter 7 of *The ARRL Antenna Book*.) Varney had a full-size and a double-size G5RV, both fed with open-wire feeders, at his own station.

Varney was an RSGB member for 74 years, and he served as life president of the Mid-Sussex Amateur Radio Society. His wife Nelida is among his survivors. Services were July 4.—*thanks to Bob D'Imperio, N4XAT, and RSGB*

JIM GRAY, W1XU, SK

73 magazine propagation editor Jim Gray, W1XU, of Payson, Arizona, died June 30. He was 73. Gray had recently been reported ill. He took over as propagation editor of *73* in 1984 following the death of John Nelson. "His powerful curiosity, pervasive optimism, and gentle spirit made him a remarkable man for others to know," said friend and onetime *73* colleague Larry Ledlow, N1TX, in a posting to the AMSAT reflector. Gray's wife, Peggy, is among his survivors.

Seminole County to erect a 35-foot tower on his property.

ARRL ASKS FOR PRIMARY STATUS AT 2400-2402 MHZ

The ARRL has asked the FCC to elevate the domestic status of Amateur and Amateur-Satellite services from secondary to primary in the band 2400 to 2402 MHz. The League filed a *Petition for Rule Making* with the FCC on July 17.

Amateurs already are primary at 2390 to 2400 and from 2402 to 2417 MHz. The ARRL says it's necessary to secure the intervening spectrum slice "to provide some assurances of future occupancy of the band segments for the next generation of amateur satellites," including Phase 3D.

"It is urgent to protect the 2400-2402 MHz band due to the extensive reliance by the Amateur-Satellite Service on the future development of satellite uplinks and downlinks in that segment in particular," the League said.

Hams have shared their other 2.4 GHz spectrum on a secondary basis with government users. In the July petition, the League said it wants an allocation that's not subject to reallocation or use by "an incompatible sharing partner." The City of Los Angeles recently was granted an experimental license to operate a TV downlink system in the 2402-2448 MHz band. The ARRL has protested that grant as well as a similar application from Los Angeles County.

MUSEUM SEEKS DONATIONS FOR GOLDWATER HAM EXHIBIT

The Arizona Historical Society Museum is seeking donations to reconstruct the well-known Amateur Radio station of the late Sen Barry Goldwater, K7UGA. Goldwater's amateur equipment, memorabilia and furnishings were donated last year to the Society's museum in Papago Park in Tempe.

Director Reba Wells Grandrud said the museum will need $77,000 to set up a "high-quality exhibit" of the massive station console and equipment "as the late Senator used it." The museum's display designers likely will use digital photographic techniques to replicate the interior of the original room as well as the desert views seen from the windows, "to make it feel like you're walking into Barry Goldwater's ham shack," she said.

It's not likely the Goldwater museum station will be operational, but Grandrud said the museum might "simulate" an operating setup for the sake of visitors. Grandrud said the museum will be putting the exhibit together between now and February.

The K7UGA station equipment and console were removed in May from the Goldwater home in Paradise Valley, Arizona, which has been sold. Before it was dismantled, museum personnel photographed and inventoried the setup.

Goldwater died two years ago. During the Vietnam War, his station and massive antenna system were used to complete thousands of phone patch messages for troops. The K7UGA antennas since have been sold to private buyers and will not be a part of the museum exhibit.

Donations in support of the Goldwater station exhibit are welcome to Reba Wells Grandrud, Arizona Historical Society Museum at Papago Park, 1300 N College Ave, Tempe, AZ 85281.

HAM TRACKS TAUNTING TEENS

According to news accounts, a group of Ohio teenagers have a local ham to thank for helping to land them in juvenile detention. Authorities report the youths used a pilfered police radio to taunt police over the air June 17, then bragged that they'd never be caught.

With help from a local amateur, however, police in Amherst and Vermillion, Ohio, tracked down the young miscreants. The towns share a public safety communications network.

Authorities report that one of the youths—all between 14 and 16 years old—had stolen three handhelds from the public works department, where he had a summer job. Using two of the radios, the teens reportedly badgered police over the air with obscenities and threats, at times calling the officers by name. The cops tried to enlist the aid of the FCC's Detroit field office, but Commission personnel reportedly said they couldn't get direction-finding gear out there until the next day.

Enter Todd Dunlap, KC8EDS, of Amherst, who was able to track the signals to a basement recreation room in his own neighborhood, a police spokesperson said. Within a few minutes, police were knocking on the door of the house where, according to news reports, authorities found the youths and two of the stolen radios. They later recovered the third at the home of the teenager who had allegedly stolen it.—*from news reports*

In Brief

• Ariane 5 schedule delay could affect Phase 3D launch: In late July, Phase 3D project officials were attempting to determine the impact of an Ariane 5 launch delay. Arianespace postponed the July 25 launch of Flight 130 (Ariane Flight 506) while it looks into an "anomaly" uncovered during testing. Phase 3D—the next-generation Amateur Radio satellite—tentatively had been scheduled to launch aboard Flight 132 (Ariane Flight 507), the next Ariane 5 flight in line after 130. "We don't know. We're asking the question right now," said AMSAT-NA President Keith Baker, KB1SF, when asked about a possible schedule impact on P3D. As of press time, there was no official word yet as to whether the Flight 130 delay would affect Phase 3D's launch schedule. Flight 132 had been set for mid-September at the earliest and possibly as late as the end of October. The Phase 3D satellite is at the European Spaceport in French Guiana awaiting the start of launch preparations. A launch contract accepting Phase 3D as a payload for the first suitable Ariane 5 launch vehicle was signed last October.

• Youngsters hailed in radio rescue: Two young Oregon brothers are being credited with quick thinking after they intercepted a plea for help transmitted via a Family Radio Service UHF transceiver by some injured mountaineers more than 80 miles away. Fletcher and Parker Wold, ages 7 and 5 respectively, of McMinnville, heard the call for help put out by climbers Iain Morris, 23, and Jim Clark, 38. Morris and Clark had been caught in a rock slide on Mount Hood June 20, and Morris was seriously injured. The brothers immediately alerted their dad, Mike Wold, who contacted authorities, triggering a full-scale mountain rescue. Mike Wold says he gave the boys the hand-held transceivers to use when playing in the woods, so he could keep in touch with them. The hikers had tried their more-powerful VHF transceiver before giving up and using the FRS set they used to keep in touch with one another along the trail. In a related story, REACT International is suggesting adoption of FRS channel 1 (462.5625 MHz) with the CTCSS tone disabled as a national call channel. REACT says it came up with the idea after lost hikers in Southern California spent 40 minutes calling on 14 different FRS channels using 38 different tones. In that case, an 11-year-old boy, Kristofer Moore, heard the distress call on his FRS H-T while camping with his family.—*thanks to Cindy Wall, KA7ITT; REACT*

• Louisiana club donates to "Defense" fund: During the Louisiana Section Convention at the Baton Rouge Hamfest, the Acadiana Amateur Radio Association of Lafayette, Louisiana, presented a check for $2000 to the Fund for the Defense of Amateur Radio Frequencies. In making the donation, members of the club expressed their belief that the defense of amateur frequencies "is the most important issue facing Amateur Radio today."—*Al Oubre, K5DPG*

(L-R) Acadiana ARA President Ward Tilly, NG5T, Honorary Vice President Eddie Miller, W5EXI, and ARRL Delta Division Director Rick Roderick, K5UR.

FCC SAYS "NO" TO SSB, DIGITAL MODES IN VHF CW SUBBANDS

The FCC has turned down a request asking it to change the amateur rules to permit SSB and digital modes in the 6 and 2-meter CW-only subbands. The petition, filed last August by the California Six Meter Club, was assigned rulemaking number RM-9806.

The CSMC said it requested the additional emission types because its survey of weak-signal operations by its members and others using CW on those bands indicated that the segments are hardly used. The club said most DX and weak signal work takes place on frequencies above the CW subbands.

The FCC said it received one comment, which opposed the petition.

In denying the request, the FCC said it did not believe the requested revisions "are necessary or have support" within the amateur community. The FCC said the petition's premise that the segments 50.0 to 50.1 MHz and 144.0 to 144.1 MHz appear "virtually unused" was contradicted by an earlier petition filed by the Central States VHF Society. The CSVHFS had asked for additional spectrum to protect so-called weak signal operations from other, wideband modes and asked for additional spectrum for weak-signal work. The FCC dismissed the CSVHFS petition last November.

The FCC concluded that authorizing additional emission types in the 6-meter and 2-meter CW subbands "could have an adverse impact on the operating activities of other licensees." Additionally, the FCC said other emission types were "adequately accommodated" under present rules.

HOLLINGSWORTH: "LOT OF WORK TO BE DONE"

FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth says he expects to continue his amateur enforcement effort at the current pace despite fewer complaints in recent months. "There's a lot of work to be done," he said July 20 during a visit to ARRL Headquarters.

At the same time, Hollingsworth said, amateurs wielding their newly minted HF privileges as a result of restructuring have generated no enforcement problems whatsoever. "In fact, had I not known about the restructuring, I wouldn't know it from an enforcement standpoint," he said. "I've noticed no difference." Hollingsworth encouraged veteran operators to bring newcomers to the HF bands "into the fold" and teach them to be proficient, compliant operators.

ARRL PHOTO

Riley Hollingsworth (left) chats with ARRL President Jim Haynie, W5JBP, prior to the ARRL Board of Directors meeting in Hartford, Connecticut.

Hollingsworth noted that while the pace of amateur complaints continues to slow, the Amateur Service still is not where it should be from a compliance standpoint. "Today, the equipment seems to be better than a lot of the operators," he said.

The trend toward fewer overall complaints, he said, will provide the FCC with an opportunity to concentrate on the more complicated cases, including unlicensed operation. "We can't tolerate unlicensed operation," he said. "The whole allocation system breaks down if you tolerate unlicensed operation."

Hollingsworth also said the federal government has ramped up its efforts to collect fines in those cases where they've been levied on violators. In the meantime, he said he plans to continue to curry voluntary amateur compliance, without fines or license revocations. "The main goal is not to take licenses. The main goal is compliance," he said.

FCC LAUNCHES CORES

The FCC has begun implementing the Commission Registration System, to be known as CORES. While the action has few immediate implications for Amateur Radio licensees, CORES registration eventually will replace Universal Licensing System, or ULS, registration.

Described as an agency-wide registration system for anyone filing applications with or making payments to the FCC, CORES will assign a unique 10-digit FCC Registration Number, or FRN, to all registrants. The FCC says use of the FRN will allow it to more rapidly verify fee payment.

The on-line filing system and further information on CORES is available by visiting the FCC Web site, **http://www.fcc.gov** and clicking on the CORES registration link.

For the time being, using an FRN is voluntary, although the Commission says it will consider making it mandatory in the future for anyone doing business with the FCC. The FCC says it will modify its licensing and filing systems—including ULS—over the next several months to accept and use the FRN.

The FCC's Steve Linn has confirmed that while CORES registration will supplant ULS registration, the ULS itself will remain the licensing database system for Wireless Telecommunications Bureau licensees, including amateurs. Amateurs who registered in the ULS prior to June 22 automatically have been registered in CORES and will receive an FCC Registration Number in the mail.

Amateur Enforcement News

• **FCC reduces fine for former amateur:** The FCC has substantially reduced a $17,000 fine that it proposed to levy on a former Houston, Texas, amateur. On July 12, the Commission issued a *Forfeiture Order* telling Leonard D. Martin, formerly KC5WHN, that he should pay $4000 for repeated unlicensed operation and for failing to allow the FCC to inspect his radio equipment. Martin racked up a two-year history of alleged unlicensed transmissions on 27 MHz. He turned in his Technician license last summer. Martin did not deny the violations but said he couldn't pay the $17,000 fine and submitted copies of tax returns as proof. The FCC ultimately determined that a $4000 fine was justified in light of the serious nature of the willful and repeated violations and his ability to pay.

• **FCC questions W5YI-VEC over code test complaint:** Citing past complaints about W5YI-VEC test sessions, the FCC has written Fred Maia, W5YI, with yet another. But Maia contends it's much ado about nothing. The FCC letter to W5YI-VEC June 28 included a complaint from Technician licensee Simon Clowes, KD7IEB, of Baker City, Oregon. Clowes protested to the FCC about a Morse Code exam administered at an April 20, 2000, test session by W5YI VE Elwood Fennimore, N7BZ. Clowes asserted that numerals were not counted as two characters as required by the rules, that the tape was noisy, that other VEs were discussing the text of the tape before the grading was completed, and that the tape speed was erratic. He says he believes he copied just enough characters to have passed. Clowes further complained that Fennimore and the W5YI-VEC did not respond adequately to his complaints. According to an account provided by Fennimore, Clowes, who holds an Unrestricted Australian license, sat twice for the code test but was able to copy very little and left with his code test answer sheet in hand. FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth gave Maia 20 days to "fully address" Clowes' complaint. QST

MFJ-9340K QRP-Cub Transceiver Kit

Reviewed by Rich Arland, K7SZ
QST *Contributing Editor*

If you have a passion for low power communications (QRP), you are probably already aware of the tremendous selection of kits that are available to those participating in this facet of the ham radio hobby. QRP transceivers, transmitters and accessory kits abound. The QRPer is faced with a staggering array of choices regarding what to buy and from whom.

A long-time supplier of Amateur Radio products, MFJ Enterprises, has thrown their hat into the QRP kit ring with the introduction of their "Cub" CW QRP transceivers. (Factory wired and tested versions are also available.)

I have owned a variety of MFJ gear since 1973. I toured their factory in 1974 (at the time it was in a mobile home on lot #1, Luxury Mobile Homes, on Highway 25, just outside of Mississippi State College) and, in an article for Ade Weiss' *The Milliwatt—The National Journal of QRPp* (the December 1974 issue), I predicted that we would see big things in the future from MFJ. If the usual array of full-page ads in each issue of *QST* over the last several years serve as any indication, I think you'll agree that my prediction was correct. Without a doubt, MFJ Enterprises is a major player.

The Cub

The MFJ QRP-Cub was designed by QRP-ARCI Hall-of-Famer Rick Littlefield, K1BQT, and is a quasi-radical departure from the majority of QRP transceiver kits currently available. Like many of the alternatives, it is a monoband CW rig (available for 80, 40, 30, 20, 17 and 15 meters) with a superhet receiver and crystal filtering, but this is where the similarities end. Unlike the "through-hole" component kits that we've come to know and love, the Cub also employs lots of surface mount (SMT) components.

If you have yet to work with surface mount parts and are wondering if you have the necessary level of dexterity and acuity of vision to install them, relax… the precision automated equipment on MFJ's factory production line has already installed those components for you. All that is left for the Cub kit builder is to solder in the remaining conventional through-hole components—a few capacitors, some connectors, trimmer caps, inductors and variable resistors—wind and install a couple of toroidal inductors, align the rig and assemble the enclosure. Pretty simple, eh?

Bottom Line

Employing a combination of space-saving factory installed surface mount components and user-installed though-hole components, the tiny Cub represents a whole new concept in kit construction.

Assembly

For me, the choice of which band version to build was easy—40 meters. Forty is my all-time favorite QRP band—you can usually scare up a contact any time of the day or night.

Having built many kits (including some using SMT devices, incidentally), I wouldn't think that the beginning builder would find the Cub kit to be at all intimidating—especially since all of the SMT components are already installed!

I began the construction process with a quick inventory of the parts (*always* inventory a kit before you begin putting it together… believe me, it can save you valuable time and lots of hair pulling later) and was soon blissfully engaged in stuffing leaded components into the board.

This was the first MFJ kit I've built, so I paid particular attention to the instruction manual. One missing "builder comfort" that I would have appreciated having is parts placement and tune up control location diagrams on separate foldout or tear-out sheets. This would eliminate the need to flip back and forth between manual pages as building and alignment progresses.

Overall, I found that the instructions were clear and, with the exception of one BIG faux paux on my part, the rig went together relatively uneventfully.

A few words about solder for the benefit of first time kit builders—and perhaps even a few of the old pros. For as long as I can remember I have used Kester 60/40 rosin core solder for all of my electronic kit building and associated projects. This all changed when I purchased my Elecraft K2 kit a few months ago.

Figure 1—MFJ-9340K QRP-Cub transceiver kit includes a 3 1/4 × 3 1/4-inch PC-board with pre-mounted surface mount components, three bags of user-installed parts and a complete enclosure package.

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

Table 1
MFJ-9340K QRP-Cub Transceiver

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: Receive and transmit, any 60 kHz portion of the 40-meter band.	As specified.
Power requirement: Not specified.	Receive, 41 mA; transmit, 270 mA. Tested at 13.8 V.
Modes of operation: CW.	As specified.
Receiver	*Receiver Dynamic Testing*
CW sensitivity: <0.3 μV.	Noise floor (MDS): –132 dBm.
Blocking dynamic range: Not specified.	Blocking dynamic range: 101 dB.
Two-tone, third-order IMD dynamic range: Not specified.	76 dB.
Third-order intercept: Not specified.	–18 dBm.
Receiver audio output: Not specified.	437 mW at 10% THD into 8 Ω.
IF/audio response: 750 Hz.	Range at –6 dB points, (bandwidth): CW: 300-900 Hz (600 Hz) (user adjustable).
Spurious and image rejection: Not specified.	First IF rejection, 90 dB; image rejection, 81 dB.
Transmitter	*Transmitter Dynamic Testing*
Power output: 2.2 W typical.	1.9 W.
Spurious-signal and harmonic suppression: Not specified.	–43 dB. Meets FCC requirements for spectral purity.

Size (hwd): 2.0×3.63×3.75 inches; weight, 8.2 ounces.

Note: Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.

Third-order intercept point was determined using noise floor reference.

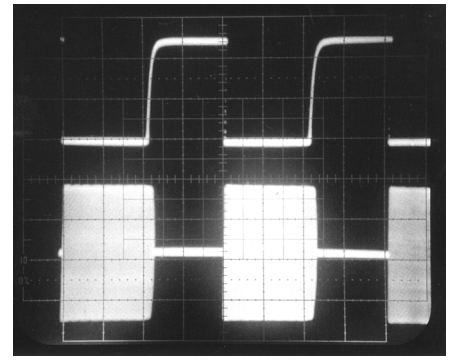


Figure 2—Keying waveform for the MFJ-9340 QRP-Cub showing the first two dits. The equivalent keying speed is 60 WPM. Horizontal divisions are 10 ms. The upper trace is the actual key closure; the lower trace is the RF envelope. The transmitter is being operated at 2 W output at 7.020 MHz. The rise time is quite fast and may generate some key clicks.

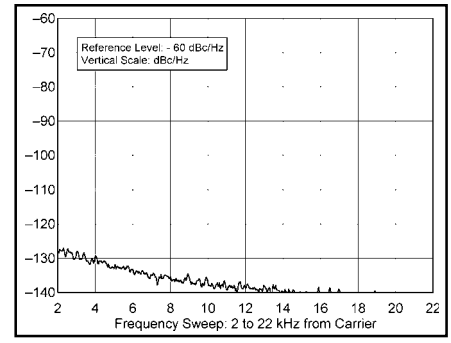


Figure 3—Spectral display of the MFJ-9340 QRP-Cub transmitter output during composite-noise testing. The carrier, off the left edge of the plot, is now shown. This plot shows the composite transmitted noise 2 to 22 kHz from the carrier. The transmitter is being operated at 2 W PEP at 7.020 MHz.

Elecraft strongly recommends that the K2 builder use 2% silver solder to assemble the rig. I bought one roll of Kester 24-7150-8800 "no-clean" 2% silver solder and will *never* go back to 60/40.

This solder leaves virtually no flux on the PC board, eliminating the need to scrub the surface of the finished board to remove any residue. The soldering on the board even looks much more professional and the chance of producing a high impedance path due to excessive flux is nonexistent. Needless to say, the Cub got the silver solder treatment.

My one construction error is directly related to "operator headspace." When I reached the step where the on/off switch is mounted to the circuit board, I ran into trouble. The pins of the PC-board mounted switch were too large to fit into the holes provided in the board. Without giving it a second thought, I chucked the #64 bit into the Dremel MotoTool and enlarged the holes. The switch fit just fine then, but when it was time for initial testing, I couldn't power the rig on!

Needless to say, I immediately suspected that the problem was related to the switch. Closer inspection revealed that the holes were initially plated-through and that, by drilling them out, I had removed the plating that provided a path between traces on the top and bottom of the board! Naturally, I attempted to solder the switch pins to the topside pads by slipping the soldering iron tip into the small space between the top of the board and the underside of the switch. This resulted in utter destruction of the switch (I absolutely love it when a plan comes together!).

A quick call to MFJ, and a replacement switch was on the way. I ended up permanently bridging the damaged solder pads together and mounted the new switch in place. The switch is now purely cosmetic, but it does fill the hole in the front panel nicely!

What's the lesson here? If you run into a snag during any project, take some time to think through your course of action. Had I done this (or contacted MFJ's tech support personnel for suggestions), I might have filed down the switch's pins to fit the PC board holes instead of drilling out the holes to accommodate the switch pins (and destroying the through-hole plating in the process).

I discussed this unfortunate experience with the folks at MFJ. They told me that they were aware of the problem—it only occurred with a handful of kits—and have corrected it. Edsel Murphy lives, what can I say?

It took me about six hours to complete the transceiver, including alignment. The tuning range I measured on my frequency counter was about 60 kHz. I set up mine to cover from 7.000 to 7.060, but the Cub is capable of tuning any 60 kHz portion of the 40-meter band. The alignment instructions are very good, as is the explanation of how to set up the zero beat on the BFO.

The front panel arrangement is the epitome of simplicity. The only controls are the power pushbutton, the volume control and the main tuning knob. There's no built-in speaker—a 3.5 mm **PHONES** jack is provided.

Rear panel connection points include a 3.5 mm key jack, a coaxial-style dc power socket and a phono jack antenna connector. A punch-out in the panel for a BNC antenna connector is provided for those that might prefer to install that type.

The manual includes a brief troubleshooting section along with IC and transistor voltage charts to help cure any maladies. Our Cub went together without any major problems (other than the switch) and the alignment was performed without difficulty.

Catch a Wave

I wired the Cub to my power supply, plugged in my key and headphones, connected my 40-meter extended double Zepp

through an antenna tuner, and was rewarded with a rush of signals. I tuned around a bit and found a station calling CQ and gave him a quick call. He came back with a 579 report—not bad considering I was transmitting with just 2 W of RF power!

I am suitably impressed with the MFJ Cub—the more I operate it the more I like it. It's important to keep in mind that the Cub was never intended to be a "contest" radio—it's designed to be a simple, relatively inexpensive transceiver for casual QRP operating.

Since the Cub uses only a 3-pole IF crystal filter, there is some filter "blow by," and during evening operation I also noticed that, at least here in the northeast, the 40-meter version is prone to shortwave broadcast overload. CW break-in is semi-QSK.

One operating characteristic that takes a little getting use to is that the main tuning dials on the 40- and 80-meter Cubs work backwards! You turn the tuning knob clockwise to move down in frequency.

Overall, the performance ain't bad.

Room to Grow

Now that I've completed the kit and verified that it's working properly, in typical QRPer fashion, I'm already considering how I'd customize it. I'd build in a PIC-based memory keyer (such as the TiCK or K1EL variety) and maybe add an audio frequency enunciator like the Small Wonder Labs FREQ-Mite. There's plenty of room inside the case.

The manual lists several power amplifier transistors that can be substituted for the stock 2N5109 that comes with the kit. I had a 2N3553 on hand and have already tried installing that device in place of the normal PA with good results.

I also performed one other modification—I've replaced the main tuning knob with a knob of much larger diameter. This greatly enhances the ease of tuning.

The Scouting Report

The Cub is geared for the backpacker, hiker or QRPer on the go. The rig can be powered by a battery pack made from a handful of AA cells or, if space and weight isn't a major consideration, a gel cell. A collection of two or three Cubs covering a variety of bands could be the start of a great little portable station for camping, business trips or vacations.

The construction of the Cub is pretty easy. It seems to me to be an excellent choice for a first time kit builder. If you are not interested in spending a few enjoyable hours at the bench, you can order the unit factory assembled.

The performance is decent—especially when you consider the simplicity of the design, the price and the intended market. Those who haven't experienced QRP operation yet will be surprised with how well they can do using just a couple of watts and a simple antenna.

Manufacturer: MFJ Enterprises, PO Box 494, Mississippi State, MS 39762; 800-647-1800, fax 662-323-6551, **http://www.mfjenterprises.com/**.

Manufacturer's suggested list price: $99.95 (kit); $149.95 (wired and tested).

Switching Power Supplies Revisited

Reviewed by Joe Bottiglieri, AA1GW

A comparison product review covering the Astron SS-30M, the ICOM PS-85, the Kenwood PS-40, the MFJ-4225MV, the Samlex SEC 1223 and the Yaesu FP-1023 switching power supplies appeared in the January 2000 issue of *QST*.

Since then, two additional manufacturers have added switching supplies to their product lines. This time around we'll put Alinco's DM-330MV and Diamond's GZV4000 through their paces. Please have a look back at the earlier review to get a complete picture of how these new contenders stack up against their predecessors.

We had hoped to take this opportunity to check out an updated version of ICOM's PS-85. The example of that supply that we evaluated in the previous review exhibited some disappointing performance. At that time, communications with ICOM America indicated that an improved version would be available by the time that the January 2000 issue of *QST* had hit the streets. Unfortunately, due to engineering delays (and contrary to what I reported in the text of that review), a redesigned PS-85 has not yet become available.

A Transformation

Perhaps the most noticeable advantages of switching supplies over their more conventional transformer-based cousins are reductions in size and weight. This makes them especially attractive choices for portable applications, such as for travel or for use in the field. If the trends that we are seeing in the power supplies of consumer electronics products are any indication however, switching supplies will be finding their way into more and more ham shacks—weight and size considerations may soon give way to the forces of simple economics.

While early "switcher" designs proved too electrically noisy for use with our sensitive receivers, the results of our January review prove that most of the currently available "communications grade" switching power supplies are sufficiently quiet for the vast majority of Amateur Radio use.

The Tests

We subjected the Diamond and Alinco supplies to the same battery of tests that we used for the previous evaluations. These include measurements of the dc output voltage at loads of 1.1 and 21 A, the minimum ac input voltage required for the supply to retain proper dc regulation and the amount of dc ripple present on the output.

We also put them through the same dynamic test—the supply is connected to a test fixture that rapidly alternates the load between approximately 1.1 and 21 A and the resulting variation in the output voltage is recorded.

The final—and perhaps the most revealing—lab test involves ac coupling the supply to a spectrum analyzer, connecting a load of approximately 20 A, and generating a spectral plot of the frequencies between 1.5 and 100 MHz.

As before, the supplies were field tested by substituting them for the existing dc power supplies in a variety of station configurations.

The Alinco DM-330MV

The DM-330MV is one of the smallest of the switching power supplies that we've looked at so far, but—paradoxically—it is

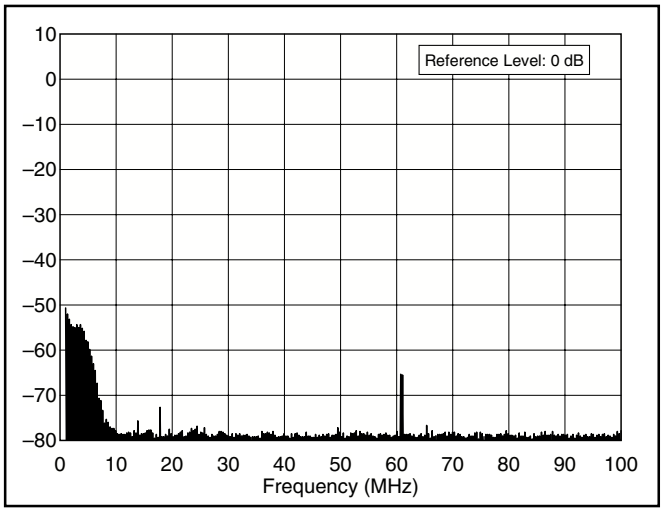


Figure 5—A spectral plot of the output of the Alinco DM-330MV under load. This supply exhibited low levels of broadband noise. The peaks that do appear lie primarily below approximately 7 MHz.

also the most feature-packed.

The entire top cover is a finned anodized aluminum heat sink. The enclosure is finished in dark bronze and the controls and connections are labeled with gold lettering.

The front panel includes a large backlit voltage/current meter, a 10-A cigarette lighter-style dc socket and two pairs of 5-A push-in terminals. Rocker switches are provided for power on/off and for selecting either voltage or current metering.

There is also a set of dual concentric rotary controls. The outer ring controls the output voltage, which is variable from approximately 5 to 15 V. A detent in the midway point of this control's rotation corresponds to 13.8 V out. The inner knob is a "noise offset" control—more on this later.

Large widely-spaced binding posts, for supplying loads that draw up to 32 A, are provided on the back panel. The ac power cord is not removable and 220 V operation is not supported (the manual lists a different model for 220 V ac applications).

The back panel also includes a small cooling fan, a fuse for ac line protection, a station ground attachment point, a **PRESET** switch, a recessed **PRESET ADJUST** potentiometer and a 3.5 mm **REMOTE CONTROL** jack.

The "preset" feature allows you to lock the supply's output at a specific dc voltage (the factory default setting is 13.8 V). When the preset slide switch is in the on position, the voltage adjustment control on the front panel is disabled.

This feature is handy when using the supply to power the typical transceiver. It eliminates the possibility of accidentally varying the dc voltage with the front panel control to a level that is outside of the radio's specified voltage range. The screwdriver adjustable **PRESET ADJUST** control allows you to change this fixed voltage to any value between 5 and 15 V dc.

The **REMOTE CONTROL** jack can be used to connect an external control for the supply's output voltage. A simple schematic for constructing the remote control head, which consists of a variable resistor and two fixed resistors, is described in the documentation. When a plug is inserted into the jack, the remote feature is automatically enabled and the preset feature and the front panel **VOLTAGE ADJUST** control are disabled.

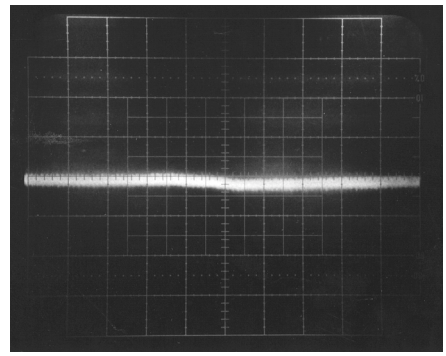


Figure 4—An oscilloscope trace of the dc output of the Alinco DM-330MV while operating under a 20 A load. The vertical scale is 5 mV/div and the horizontal scale is 5 mS/div. The level of dc ripple is very low, approximately 1 mV p-p, and there are no discernable spikes.

Table 2
Alinco DM-330MV
serial number M0000797

Manufacturer's specifications

Power requirement: 120 V ac.
Output voltage: 5.0-15.0 V dc.
Output current (continuous): 30 A.
Size (hwd): 2.64×6.9×6.5 inches; weight, 4.4 pounds.

Lab Measurements

Output voltage, no load: 13.47 V dc.
Output voltage, 21 A load: 13.15 V dc.
Low line drop out voltage: 75 V ac.
Dc variation during dynamic testing: ≈40 mV.

A particularly interesting—but somewhat illusive—feature is the "noise offset" system. If you encounter a situation where pulse noise generated by the supply is causing interference to a specific frequency of interest, you can use the front panel **NOISE OFFSET** control to "move" the interference. Unfortunately (or perhaps *fortunately*?), we were unable to locate any supply-generated interference in the receivers in the course of field testing to use to investigate this system's effectiveness—a testament to the spectral "cleanliness" of the DM-330MV's output (see Figure 5).

Automatic protection circuits, for short circuit, over-current and over-temperature, are included.

The 5 to 15 V dc voltage output range and the nice selection and sensible location of dc connection points make this unit a particularly good choice for someone looking for more than just a dedicated transceiver supply. The DM-330MV is well equipped to pull double-duty as a test bench supply. The only power supply in our previous review that offered a front panel control to vary the dc output was the MFJ-4225MV—and that was limited to between 9 and 15 V dc. (Read on though, the Diamond supply features variable dc output as well.)

The high current (32 A maximum) terminals are located on the back panel—and this is the intended connection point for 50 to 100 W+ transceiver power cords. This leaves the front panel 5 A push-in terminals and the cigarette lighter socket readily available for test bench or accessory applications.

If you have a temporary requirement for a dc voltage other than 13.8 V—for testing a homebrew circuit for example—simply disconnect (or shut off) the station transceiver, set the dc voltage to the desired level, connect the device and you are good-to-go.

The cigarette lighter socket allows you

to use lighter plug equipped vehicle power cords that you may already own for H-Ts and mobile accessories to conveniently power these devices in the home station.

The DM-330MV is a very quiet supply, both electrically and acoustically. The tiny cooling fan is temperature controlled—but even when running it's virtually silent.

When the '330MV was substituted for conventional transformer-based supplies, no increase in broadband noise or spurious signals within the tuning range of the connected HF transceivers, or changes in the transmitted signal, were observed.

The unit does get very warm during relatively high current operation. Thirty minutes of continuously supplying 13.8 V to a 21 A load (this approximates the power requirement of a 100 W-class transceiver transmitting at full output for 30 minutes straight at 100% duty cycle) brought the temperature of the top cover/heatsink to the "untouchable" level. While the supply did throw off a considerable amount of heat, it did not get hot enough for the over-temperature protection circuitry to kick in. With a rated continuous-duty current rating of 30 A—we probably didn't even come close. A yellow label on the enclosure warns of the potential for high surface temperatures. Believe it.

The documentation packed with the DM-330MV is a single folded 20×14½-inch sheet—English instructions are on one side, Japanese are on the other. It includes specifications, identification of controls and connection points, construction details for the remote control and an extensive collection of "Danger," "Caution" and "Warning" notices. No schematic diagram is provided.

The Alinco DM-330MV is small and light enough for easy portability in the field, yet it also offers multiple connection point alternatives, high current producing capabilities and impressive dc output voltage control flexibility. These attributes make it a great choice for fixed station, portable and test bench applications as well.

Manufacturer: USA Alinco Branch, 438 Amapola Ave, Torrance, CA 90501; 310-618-8616; fax 310-618-8758; **http://www.alinco.com**.

Manufacturer's suggested retail price, $219.95. Typical current street price, $180.

The Diamond GZV4000

The GZV4000 is taller, wider and deeper than the other switching supplies that we've considered so far and, at 40 A, it also carries the largest continuous current rating of the switching supplies that we've tested.

Its grand dimensions and stylish dark gray molded plastic front panel give it a look that nicely compliments the enclosures of several current amateur HF transceivers.

Through the years, many of the individual radio manufacturers have offered "matching" power supplies, "matching" external speakers—and additional accessories as well—that exhibit design elements and colors that blend perfectly with their own line of HF transceivers. Although same-brand "matching" accessories usually cost considerably more than suitable aftermarket alternatives—amateurs of means will often pay the premium to achieve that three-foot wide, perfectly integrated, station appearance.

While the style and color of the GZV4000 is not an *exact* match for any of the current radios, it has a generic look that is more than attractive enough to earn it a place of honor next to the main transceiver even in the most aesthetically fastidious ham's operating position.

The front panel has a rocker style **POWER** switch, LED **AC POWER** and **OVERLOAD** indicators, a voltage control knob, a large backlit voltage/current meter, a slide switch to select the meter function and a front-firing built-in speaker. A flip-down door centered on the lower edge of the front panel conceals a cigarette lighter socket that can supply up to 10 A and a set of snap-in terminals rated for up to 6 A.

The dc output voltage can be varied between 5 and 15 V dc. A detent in the midpoint of the travel of the **VOLTAGE** control corresponds to 13.8 V.

The rear panel includes a pair of large widely-spaced binding posts for connecting high current loads, a 3.5 mm jack that delivers external audio to the built-in speaker, a fuse for ac line protection, a station ground connection point and a per-

Table 3
Diamond GZV4000
serial number 00400788

Manufacturer's specifications

Power requirement: 120 V ac.
Output voltage: 5.0-15.0 V dc.
Output current (continuous): 40 A.
Size (hwd): 4.3×8.3×11.8 inches; weight, 6.6 pounds.

Lab Measurements

Output voltage, no load: 13.77 V dc.
Output voltage, 21 A load: 13.70 V dc.
Low line drop out voltage: 84 V ac.
Dc variation during dynamic testing: ≈50 mV.

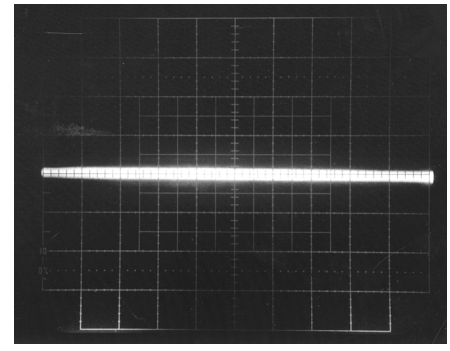


Figure 6—An oscilloscope trace of the dc output of the Diamond GZV4000 while operating under a 20 A load. The vertical scale is 5 mV/div and the horizontal scale is 5 mS/div. The level of dc ripple is very low, approximately 1 mV p-p, and there are no discernable spikes.

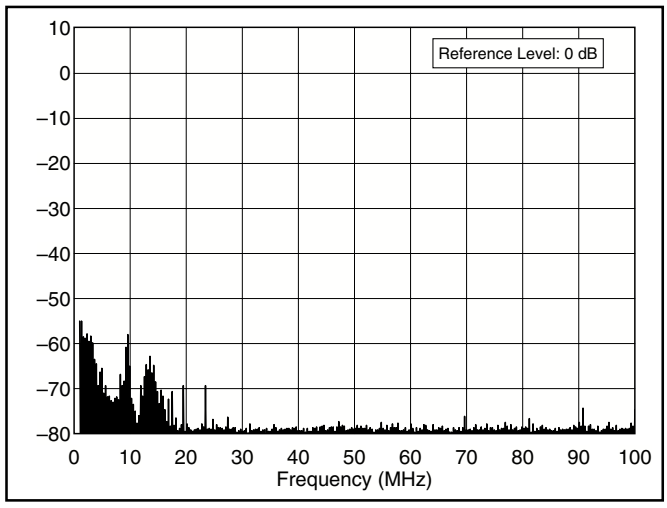


Figure 7—A spectral plot of the output of the Diamond GZV4000 under load. This supply exhibited moderate levels of broadband noise within some portions of the US amateur bands, primarily below 4 MHz and near 14 MHz.

manently affixed 120 V ac power cord. Provisions for operating this supply from a 220 V ac source are not included, but the documentation does seem to indicate that a separate 220 V model is manufactured. Automatic protection circuitry—for overload and excessive temperature—is included.

The *Instruction Manual* that comes packed with the supply consists of a single folded 8¼ × 11¾-inch sheet with a list of features; a specifications table; connection and control descriptions; installation and operating instructions; and a handful of safety precautions. A schematic diagram is not included.

As is the case with the MFJ-4225MV that we looked at back in January and the Alinco DM-330MV, the GZV4000's variable voltage capability and front-panel lighter socket and terminals make it a good choice if you occasionally need a dc supply for test bench applications. The flip-down access door and rear panel mounted high current connection points help it retain its good looks during typical station supply use.

The large temperature-controlled cooling fan, mounted in the rear panel of the enclosure, runs continuously when the power is on. The fan speed increases if the temperature exceeds a preset level. The amount of fan noise under typical conditions is low to moderate—about equivalent to that of the typical desktop PC's supply fan.

The inclusion of a built in speaker was a pleasant surprise. While the speaker itself is smaller than most that are provided within the enclosures of the current HF transceivers, the sound quality is pretty good. Its front firing design directs receiver audio towards the operating position better than the usual top-cover mounted speakers, but it is no competition for the audio quality improvement that results from the larger magnets and cones found in most "matching" and aftermarket external speakers.

The GZV4000 was substituted for the conventional transformer-based supplies in several typical HF station configurations. No noticeable increase in broadband noise or spurious signals within the tuning range of the connected transceivers, or changes in the quality of the transmitted signals, were observed.

The supply was used to power a load that is roughly equivalent to that of a 100 W HF transceiver operating at 100% transmit duty cycle (21 A at 13.8 V dc) for 30 minutes. The case temperature of the supply increased only slightly. The large fan and generously vented enclosure, and the fact that the supply was only running at approximately half of its current capacity, may give it a bit of an unfair advantage in this particular exercise. Let's bear in mind, however, that for our typical purposes—supplying dc power for a 100 W HF transceiver—this test probably adequately approximates real-world amateur station applications.

If you are enamored by the look of a matching power supply, but are also interested in such niceties as front panel metering, higher current supplying capabilities, conveniently located low- to mid-current connection points and variable dc output for test bench applications (…and perhaps wouldn't mind saving a bit of cash in the bargain), be sure to check out the Diamond GZV4000.

Manufacturer: Diamond Antenna division, Dai-ichi Denpa Kogyo Co, Ltd.

Manufacturer's US representative: RF Parts, 435 S Pacific St, San Marcos, CA 92069; 800-737-2787; fax 888-744-1943; **rfp@rfparts.com**; **http://www.rfparts.com/diamond**.

Suggested list price, $229.95. Typical current street price, $190.

A Few Observations

Looking over the Lab data presented in Tables 2 and 3; the oscilloscope traces of the dc outputs in Figures 4 and 6; and the spectrum analyzer plots in Figures 5 and 7, and comparing these with the corresponding data that we published in the previous switching supply review, reveals that this review's subjects perform very well.

The oscilloscope traces, unlike some of those in the earlier review, are virtually flat. No evidence of high frequency spikes was seen on the outputs of either supply.

The spectral plots of the supplies operating under a 20 A load (simulating a transmit condition), while perhaps not quite as clean in some of the lower frequency ranges as those of the Astron or MFJ supplies that we investigated in January, still indicate better than average performance.

During field testing, neither of these supplies generated any perceivable interference in any of the station receivers. Transmit quality was also unchanged when these switching supplies were substituted for conventional supplies.

As we stated in the previous review, there are a few instances where the level of broadband RF noise generated by a switching supply under load could create interference problems. Multi-radio operations where several transceivers are set up in close proximity, contest stations where a second receiver is sharing the same supply with a transceiver or "mode A" full duplex satellite operation are some possible examples.

For most casual fixed station, portable and test bench applications though, nearly any of the switching power supplies that we've looked at so far should provide very acceptable performance. QST

FEEDBACK

◊ Please refer to "Verticals, Ground Systems and Some History," *QST*, Jul 2000, pp 38-44. In the Appendix on page 42, there is an error in the first part of Equation 2. It should read:

$$\frac{I_e}{I_w} = j\left(\frac{3.6\times10^4\,\sigma\pi^4\,r_1^2}{f^{MHz}n^2}\right)\left[\log\left(\frac{3\times10^4\,\pi r_1}{f_{MHz}nr_2}\right)-0.5\right] = j\left|\frac{I_e}{I_w}\right|$$

Also, I've supplied a replacement Excel file contained in *SEVERNS.ZIP* available for downloading at **http://www.arrl.org/files/qst-binaries/**. The original Excel file uses units that don't quite match those in the article's Appendix equations.—*tnx Rudy Severns, N6LF*

◊ There are three notable errors in the August 2000 *QST*. At the end of "Short Takes," page 63, the telephone number for Atomic Time is shown incorrectly. The correct number is: 800-985-8463. In "Up Front," page 20, the Web address for the WX2NJ "boom box" is incorrect. It should be: **http://members.aol.com/wx2nj/aresbox.html**. Finally, the "Stray" on page 85 lists an incorrect Web address for the Amateur Radio Lighthouse Society. The correct address is: **http://www.waterw.com/~weeidner/arls.htm**. QST

The Trials and Rewards of Disaster Response

When a disaster strikes, numerous volunteers—including Amateur Radio operators—are called to respond. Depending upon the magnitude of the disaster or emergency, disaster-relief volunteers may need to sacrifice themselves and spend time away from home, their families and their jobs to perform in the field. Any number of emergency responders would be able to describe the trials involved in service on one hand. On the other hand, they could tell about the personal rewards that can be gained through these kinds of experiences.

As just one example, "Public Service" is pleased to share the story of Bob DeVarney, WE1U, of Milton, Vermont. Bob, who has served as ARRL Vermont Section Manager, accepted a disaster-relief assignment with the American Red Cross to work in North Carolina following Hurricane Floyd last year (September 1999).

While recollecting his thoughts, Bob referred to back issues of the Northern Vermont American Red Cross Chapter newsletter that is edited by Ralph Stetson, KD1R. The Web-based newsletter published his news reports from the field. Some of the following comments by Bob first appeared in this newsletter. Our thanks to Bob, WE1U, and the Northern Vermont Chapter of Burlington for use of this material.

Additional quotes are from Bob's introduction to a proposal that he has written on behalf of his employer, Verizon Wireless, to establish a disaster-leave policy. This project is still a "work in progress." We hope this month's column will encourage you to consider the possibility of a disaster-leave policy at your place of employment and to gain some insight from someone who has had first-hand experience.—*Steve Ewald, WV1X, ARRL Public Service Specialist*

NOTES FROM NORTH CAROLINA

By Bob DeVarney, WE1U

I was assigned to the Hurricane Floyd relief effort in North Carolina. This was something I had long wanted to do, but never had the vacation time available, or was unable to make my schedule fit. I can truly say that I enjoyed my time in North Carolina, and it was a life-changing experience. I went out for the communications function, and as such was part of a support team responsible for ensuring communication by telephone, fax, radio, and cellular telephone, to name a few. I was based at the relief effort headquarters in Smithfield, North Carolina. I am told that the officer who started the job set a new "best" by having working telephones in headquarters the same day that they opened. Oh, and did I mention that there were 75 telephone lines?

Our team installed telephone lines, faxes, and base radio units in shelters, service centers, and mobile kitchens. We also installed and maintained mobile radios in everything from cars to tractor-trailer trucks. We also programmed 130 hand-held radios, and installed a UHF repeater system.

At one mobile kitchen, run by the Southern Baptist Convention, I had the opportunity to look around a bit and ask some questions. These kitchens are usually set up in tents in parking lots, as they can best lay out the "flow" of the kitchen without walls to

Bob DeVarney, WE1U, is in the driver's seat of the American National Red Cross "Hummer." This vehicle, also known to the United States military as a HMMV, is packed with communications gear.

A Disaster Leave Policy for Verizon Wireless

(A draft proposal by Bob DeVarney, WE1U)

1. Verizon Wireless employees may be granted leave with pay for not more than 21 working days in a 12-month period to participate in disaster relief services within and without the home state of the employee.

Leave may be granted as long as the following conditions have been met:

a. The employee is a certified disaster volunteer of a nationally accepted disaster-relief agency (ie American Red Cross, Salvation Army).

b. The service of the employee is specifically requested by said agency.

2. During the period of absence, there will be no loss of seniority, pay, vacation time, compensatory time, or sick time. Compensation shall be at the regular rate of pay for regular work hours during which the employee is absent from work.

3. During the period of absence, the relief agency shall be held responsible for the health and safety of the employee (ie no worker's comp claims against the company if the employee is injured while on leave).

4. The transportation to and from the assignment shall be the responsibility of the relief agency.

5. The leave shall only be granted after a disaster has been officially declared by the President of the United States, or a State of Disaster has been officially declared by the Governor of the affected state.

6. Requests for assistance must have been made by public officials at the scene of the disaster. Employees must provide to their managers written requests to participate in disaster relief efforts prior to providing relief pursuant to this policy.

7. The service(s) provided by the employee must be related to a specialized skill or training that the employee possesses.

8. Leave granted to employees pursuant to this policy shall be at the discretion of the manager or director of the appropriate department/region. Said leave will only be granted as the needs of the company permit.

(In other words, no leaving the state when you have work here to do first.)

9. A written request shall be on file with the HR department stating the employee's desire to participate in the Disaster Leave Policy beforehand. (In other words, no deciding out of the blue you want to go out and play…no surprises.)

During research for this proposed document, Bob DeVarney discovered that companies with a disaster-relief policy would receive tax benefits in giving employees disaster leave as well as receive public relations benefits. While Bob was in North Carolina, for example, he saw the Red Cross public relations staff write press releases, and one of his co-workers was interviewed by a TV-network affiliated station on behalf of the co-worker's hometown TV station in California.

Rosalie White, K1STO ♦ Field & Educational Services

impede them. After peering into one of six pots of chili the size of large garbage barrels, I casually asked one of the kitchen staff how many meals they served daily. Without batting an eyelash, the woman replied, "We served around 6,000 yesterday, and hope to get up to 10,000 by the end of the week." I thought we were doing well when my wife and I serve coffee hour at church for 60!

I have been a Red Cross volunteer for some 8 years, but this was my first out of state response. There are two levels of volunteer within the Red Cross, a Local Disaster Volunteer (LDV), and a Disaster Services Human Resources (DSHR) volunteer. As you might gather from the names, an LDV is typically used for local, in-state disasters. I have been involved with the Northern Vermont ice storm of 1998, as well as the Johnson floods of 1995. I have also participated in several other local disasters, and was part of our local jump teams that responded to local house fires, and other disasters, small and large. In September, I signed on as a DSHR volunteer. DSHR volunteers can and usually are called for larger, national-level disasters, and may be sent anywhere the American Red Cross operates (basically anywhere within the US and its possessions), While I was in North Carolina, I met volunteers from 46 US states, and 5 US possessions, including Guam.

To say that my time spent on assignment was a terrific life experience would be a gross understatement. Besides getting real, job-related experience (running phone lines, etc), I also got a real opportunity to do something worthwhile and good. The sense of gratification I got from what I did cannot be explained to someone who has not "been there" or "done that." I was continually amazed at the spirit of the people of North Carolina, who despite having lost their homes or livelihoods, still managed to have a smile or a kind word of thanks for a Yankee from Vermont. I also carry home with me some wonderful friendships that I made while on assignment.

The Long and Short of It

By Dennis Rybicke, K9LGU, Section Traffic Manager, Wisconsin

When William Shakespeare's Polonius said, "Brevity is the soul of wit," it was ironically part of a long speech, but the point is well taken. We admire the person who can pound a nail or complete a round of golf with the fewest strokes. And in traffic nets, such efficiency is treasured as well.

Here are a few operating techniques that can make nets and traffic handling faster and easier. (1) When you check in to a phone net, give the net control station's call; listen; then give your call. (2) Use standard phonetics to spell out uncommon words only when conditions warrant. (3) Write your own formal messages in the fewest words; use the ARRL Numbered Radiograms. (4) If a net control asks for informal comments, be succinct. Notes help. Leave the listeners with one good thought.

Being pithy (no, I don't lisp) in what you transmit doesn't mean you have to be less friendly or cordial in your operation. There are times to be relaxed and times to concentrate on efficiency. A good operator should know when. Err, and an STM should know when to be brief too. 73.

Field Organization Reports

Public Service Honor Roll
June 2000

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

949
NM1K
611
K9JPS
430
W9RCW
305
K5NHJ
296
KJ3E
287
N5JZ
236
KB5WEE
219
KA2ZNZ
W7TVA
215
WB5ZED
K7BDU
213
K4FQU
212
WD8V
W6DOB
204
KK3F

203
WA9VND
201
KB2RTZ
198
N5IKN
194
N2LTC
192
W4ZJY
190
KB8ZYY
189
N2YJZ
187
KC2EOT
185
N2OPJ
KA4FZI
NN7H
182
K2UL
180
AD4DO
KF4NFP
175
K8GA

174
K9FHI
N2CCN
171
N2JBA
N2RPI
170
W6IVV
169
WA1JVV
W2EAG
168
W4CAC
KA2GJV
K6YR
164
KA5KLU
162
KJ4N
160
K4IWW
N8IO
WA5I
159
W2RJL
KB2VVB
158
KC2DAA

W6QZ
157
K4YVX
KC2AHS
155
W5ZX
N5NAV
154
N8FPN
WN0Y
152
WB2UVB
151
N8JGS
150
WB4GM
N7YSS
K4RBR
WA3HJC
149
W2MTA
KB2VRO
KD4GR
148
W3YVQ
W2AKT
N1LKJ

147
KC5OZT
KC4ZHF
K4SCL
146
KI4YV
KE4JHJ
WO0A
145
N3WK
144
WA2YBM
WB2ZCM
143
W3CB
142
WA4DOX
WB2GTG
W9YCV
N9BDL
WA1FNM
141
KB2KLH
KT4PM
140
NC4ML
WX8Y
KE0K
K2GTS

AF4GF
139
N8FWA
WB5NKC
138
N0SU
W0LAW
KB2ETO
W7ZIW
W7GB
137
WD4JJ
N3WAV
135
AA3GV
N2AKZ
N5OUJ
134
KA1GWE
W7NWP
133
AA3SB
W9CBE
KC7ZZB
AA2SV
132
WD0GUF
131
KC7SRL
130
W3VK
K5DPG
NN2H
AF4PU
129
WA4QXT
WU4C
WX4H
128
WD8DHC
K5IQZ
WA0TFC
KB5TCH
AF4NS
WB2QIX
KC2FZT
WB2FGL
127
KG2D
N2WDS
AD4IH

126
KE1AI
W4NTI
K9LGU
125
N1JBD
K0IBS
WD9FLJ
W5GKH
KA4UIV
124
W1ALE
WD9HII
NR2F
123
AA8SN
W7GHT
122
AG9G
121
W5CDX
K9GBR
KD1LE
KF6OIF
120
W1PEX
NZ1D
W6JPH
K7MQF
WN0Y
WB5NKD
119
KA8WNO
N3WKE
WA8EYQ
W7BO
W3OKN
118
W2CS
W9ZY
W4CKS
N9TVT
K0PIZ
KA7AID
KC5VLW
KA2DBD
N9MN
117
W1JX
N2GJ
N7AIK

116
K7GXZ
115
N9KNJ
KC6SKK
KA2CQX
114
W1QU
W3BBQ
N5JUU
113
W5AYX
KA4HHE
K2PB
WA4EIC
112
KA4LRM
W5MEN
AD6LW
111
N8DD
110
N3ZKP
109
WB4TVY
WB4ZNB
W2PII
108
KC8CON
K4MTX
N7DRP
K4WKT
W2GUT
107
AA4AT
WA8SSI
AF2K
106
W4CC
105
AA2ED
104
KK1A
KT4TD
103
W2JHO
102
KJ9J
W4DGH
K2VX

101
AB4XK
KC6NBI
100
KA1VEC
WB2IIV
K2DN
99
KC3Y
KA7TTY
98
W4XI
AA4HT
WB7VYH
96
K4BW
WA2CUW
KF4KSN
KE6MIW
95
AF4QZ
WB4PAM
94
KE4GYR
W3IPX
KG4CHW
93
AA4YW
K3CSX
K5MC
N1LAH
KC7SGM
92
W8IVF
KR4MU
W2LC
KD4HGU
90
K8ZJU
KC8GMT
K8LEN
89
K8VFZ
KA2BCE
88
W1JTH
87
AE4NW
WJ3K
KT6A
86
W4AUN

85
WI2G
84
WI8K
W2CC
AD6HR
83
K4AIF
KE3FL
82
KO4OL
WA1QAA
W4QAT
WA4GLS
81
K3UWO
KG5GE
80
K1SEC
W7QM
78
W4EAT
77
KE4VBA
76
W4PIM
KA9FVX
K4BEH
75
WB4UHC
N5GG
KJ7SI
AA4BN
74
K1UQE
AF4CD
WA2YOW
73
WA4EYU
72
KT4SJ
KC7SGL
KB4WBY
AE4MR
71
W7VSE
N4MM
70
WA8DHB

The following stations qualified for PSHR in May but were not listed in this column last month: AF4NS 131, WU4C 129, KA4HHE 117, W4WXA 111, K4WKT 95, K4BEH 73.

Section Traffic Manager Reports
June 2000

The following ARRL Section Traffic Managers reported: AK, AR, AL, AZ, CT, ENY, EPA, EWA, GA, IA, ID, IL, KS, KY, ME, MN, MI, MDC, MS, NC, ND, NFL, NNJ, NH, NLI, NTX, NV, OH, OK, OR, ORG, SBAR, SC, SD, SDG, SFL, SNJ, STX, VA, WCF, WI, WMA, WNY, WPA, WV, WWA.

Section Emergency Coordinator Reports
June 2000

The following ARRL Section Emergency Coordinators reported: AL, AK, CT, ENY, EWA, IN, KS, KY, LA, MDC, MI, MO, NLI, OH, VA, SFL, STX, TN, SV, WMA, WCF.

Brass Pounders League
June 2000

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*
NM1K	801	333	993	10	2137
WX4H	4	478	726	12	1220
KK3F	22	638	596	44	1300
WB5ZED	25	474	577	22	1098
K9JPS	1	556	30	508	1095
N5IKN	0	515	183	332	1032
W1PEX	0	131	876	6	1013
N2LTC	0	392	426	16	834
K7BDU	41	465	318	6	830
W9RCW	0	368	2	362	732
W5SEG	25	330	304	0	659
WA9VND	13	347	226	12	598
W9YPY	0	281	312	0	593
W6DOB	0	144	353	53	581
W9IHW	2	283	32	256	573
KJ3E	160	115	290	8	573
WZ7V	0	276	26	260	562
N3YSI	—	—	—	—	561
W6IVV	12	255	271	0	538
KA2ZNZ	15	253	199	66	533

BPL for 100 or more originations plus deliveries: K5NHJ 189, W3HK 175, N5JZ 149, K9GU 102, KB5WEE 101, The following station qualified for BPL during April, but was not listed in this column: NR2F 667.

Tristan da Cunha and Gough Islands (ZD9)

Among the more remote entities on the ARRL DXCC list are the islands of Tristan da Cunha and Gough (ZD9). These two isolated islands are about 350 kilometers (230 miles) from each other in the South Atlantic Ocean between South America and Africa. (Tristan, Inaccessible, Nightingale, Center and Stoltenhoff are the five islands that which make up the Tristan archipelago.)

Tristan da Cunha was formed from a volcano that projects 2,060 meters (6,760 feet) from the Atlantic. Portuguese navigator Tristao d'Acunha discovered the island in 1506. He was unable to land, but that didn't stop him from naming the island after himself.

DXpedition to Tristan da Cunha—September 2000

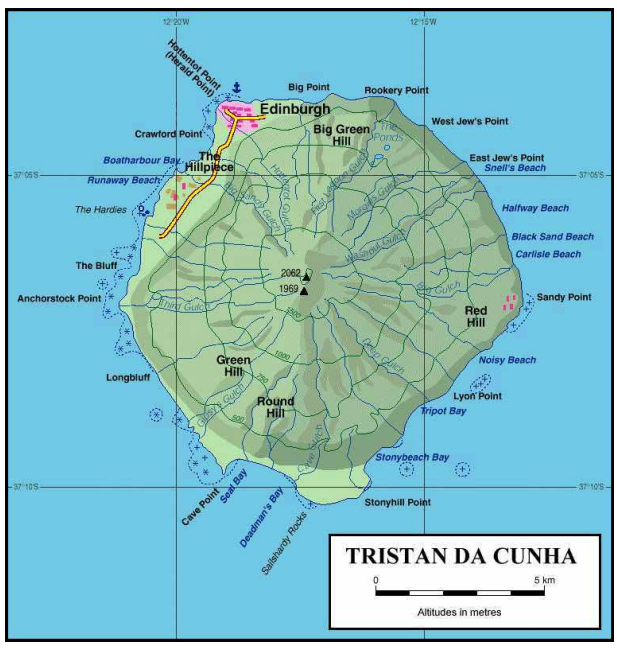
Bob Henderson, G3ZEM (now 5B4AGN), and his wife Karen will leave Cyprus and return to the UK on August 24 to make final preparations for their trip to Tristan da Cunha. After a very brief stay in England they depart for Cape Town, South Africa on August 27, where they look forward to reacquainting themselves with the antennas and associated equipment, which were advance-shipped from the UK in July. On August 31, they will join the Antarctic explorer MVSA *Agulhas*, setting sail for Tristan da Cunha.

The journey from the Cape through the notoriously heavy seas of the Roaring Forties can be rough, and bad weather at Tristan da Cunha can add delays of several days in off-loading both passengers and cargo. With luck, Bob and Karen will enjoy smooth passage and a timely landing on the island on September 4.

If everything runs according to schedule, ZD9ZM will take to the airwaves on Tuesday, September 5. The primary focus of activity during the 20-day stay on the island will be CW on all bands from 10 to 160 meters. Low-band activity may, however, be limited because power is frequently unavailable through the night. Yagi antennas will be in use on 20 meters and up, while a vertical is planned for 40 through 160 meters and a dipole on 30 meters. Some operation on RTTY is contemplated, though this will be limited. Bob will also be equipped for 6 meters and will monitor the band for propagation to Europe and North America. The prime objective of the operation will be to make CW contact with as many stations as possible in the time available. As on previous trips, Bob will favor operating frequencies ending in 3 and will listen up 2 kHz.

Communication from Tristan da Cunha by telephone is limited, but Bob plans to get details of his operating schedule, including any intended RTTY or 6 meter activity, through to Steve, G3VMW. Steve will act as pilot during the operation and will disseminate the information to the DX media and provide a summary on a ZD9ZM Web page, which will be located at **http://www.dxtechnology.com/zd9zm**. Steve will also provide an e-mail address to which requests and comments relating to the operation may be sent for consolidation and forwarding to Tristan.

The QSL route for ZD9ZM is via William G. McDowell, K4CIA, 13208 Norwood Rd, Raleigh, NC 27614-9134. QSL requests may be direct, in which case an SAE and adequate return postage must be included, or via the bureau. Requests for bureau cards may also be made by e-mail to **k4cia@mindspring.com**.



In 1993, Tristan da Cunha and Gough Islands ranked # 28 on the ARRL DXCC Most Wanted list. In 1999, it was # 53. Resident amateurs who are active include Andy, ZD9BV; Lorraine (YL), ZD9CO; Brian, ZD9CX; Jimmy, ZD9CR; and Ian, ZD9IL.

KINGMAN REEF DXPEDITION

In last month's column, you read that the Kingman-Palmyra DX Group is going to Kingman Reef (KH5K) and Palmyra Atoll in October 2000. Tom, N4XP, has supplied more details on the upcoming trip plus some very interesting pictures of this past May's short stints from these two Pacific specks.

During May and June, Chuck, N4BQW; Dave, WB4JTT; and Mike, KH6ND; were rotating duties on Palmyra. In fact, Chuck actually made a surprise visit to Kingman Reef for a 24-hour stint. While he was on this tiny V-shaped reef, several squalls came through causing Chuck to leave the airwaves and protect his gear. The winds were so strong they knocked over Chuck's antenna several times!

Between now and the full-scale October DXpedition to Kingman Reef, you can expect to see short stints on the air from several of the guys from Palmyra. Even so, their purpose for being on Palmyra has little to do with Amateur Radio. They are assisting with the transition of the island from the ownership of the Fullard-Leo family to the Nature Conservancy.

Kingman Reef ranks as #16 on the ARRL 100 Most Wanted List, and even higher on European needed lists. The planned assault on the island will be for about 12 days in October, which will include two full weekends. Exact dates were still not available at press time, so keep an eye on your favorite DX bulletin.

Current plans are to have five or six stations for operations on 6 through 160 meters, including activity on CW, SSB and RTTY. There may be a possibility of satellite work as well. The team will have Titanix and Battle Creek Special antennas for the low bands.

The overall operating effort will only be limited by the small physical size of the reef, which was confirmed in May by N4BQW to be smaller than originally thought. Tom Harrell, N4XP, says, "The reef is only about

Bernie McClenney, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

This is a view of the Palmyra Atoll from the air. The atoll is made up of some 52 small and heavily vegetated islets.

A World War II-vintage bunker housed the stations for Chuck, N4BQW/KH5, and Dave, WB4JTT/KH5, while on Palmyra.

200 meters long and 8 meters wide. This will make finding space for every facet of the operation a difficult task."

The team will be made up of 16 operators with experience in operations from remote and sparsely populated locations: Bob Allphin, K4UEE; Harry Booklan, RA3AUU; Chuck Brady, N4BQW; Kimo Chun, KH7U; Pat Guerin, NH6UY; Tom Harrell, N4XP; Al Hernandez, K3VN; Dave Johnson, WB4JTT; Jari Jussila, OH2BU; Franz Langner, DJ9ZB; Ann Santos (YL), WA1S; Garry Shapiro, NI6T; Ned Stearns, AA7A and Vrata Vaverka, OK1KT.

Transportation costs to this remote location will be considerable. Contributions of any size to help defray the costs of this DXpedition will be greatly appreciated and may be sent to Tom Harrell, N4XP, 2011 New High Schoals Rd, Watkinsville, GA 30677.

The Kingman-Palmyra DX Group will have a Web site at **http://www.qsl.net/krpdxg**. Don Greenbaum, N1DG, will be the Webmaster. Klaus Wagner, DL1XX, will be the European pilot station. QSL cards for these operations go via K4TSJ.

BHUTAN—YET ANOTHER OPERATION

Members of the Clipperton DX Club plan to be in Bhutan this month. The French group will consist of Alain, F6ANA; Denise, F6HWU; Alain, F5LMJ; Vincent, F5MBO/G0LMX and Gerard, F2VX. Look for this group operation to take place for about 9 to 10 days between September 1 and 15. They have acquired some of the A52A antennas, which were left at the Pine Wood Hotel in Thimphu. QSL this operation via F8RZ.

ERITREA

In mid-June, Ethiopia and Eritrea ended almost two years of war. Plans are currently underway for a 1 to 2 month DXpedition to Eritrea, which ranks # 7 on the ARRL Most Wanted list. The emphasis of this trip will be to train locals to become Amateur Radio operators. Watch the DX bulletins for more news on this one.

COCOS KEELING AND CHRISTMAS ISLANDS

Bert, PA3GIO, has been one busy IOTA DXpeditioner. So far this year, he has been to four islands in Belize and Tanzania. And if that is not enough, he has more plans in the Indian Ocean for late August and early September. He'll be active as VK9CQ on Cocos Keeling (OC-003) from August 26 to September 1. Next, he will operate as VK9XV from Christmas Island (OC-002) between September 2 and 13. From both islands, he will be using a TS-50 transceiver with 100 W and a doublet antenna. Plans are to be active on 10 through 80 meters, SSB only. He has a Web site at **http://www.qsl.net/pa3gio/**. QSL via PA3GIO.

DX CONVENTIONS

Don't forget the three DX Conventions this month. The W9DXCC will be held on September 16 in Chicago. For the latest news check **http://www.qth.com/w9dxcc**. September 30 the Europeans have a choice of the Clipperton DX Convention, which will be held this year in Andorra (C3), or the Italian HF DX Convention.

DXCC ANNOUNCES NEW 15 METER AWARD

The DX Century Club is pleased to announce the addition of a 15-meter single-band DXCC award. Beginning June 1, 2000 DXCC printouts have been set to reflect credits on 15 meters. The start date for the new 15-meter DXCC award was July 1, 2000. Fifteen-meter DXCC certificates will be dated but not numbered. Deleted entities do not count towards this award. Those who have an active 5-Band DXCC processed prior to DXCC computerization, and do not have 100 entities in the computer (on 15 meters), will be allowed to submit enough credits on that band to bring the computerized record to the first 100 needed for this award with no per QSO fee. Simply include postage and the award fee. The award fee is $10. Please note your 5-Band DXCC award number and original issue date on the application form in the block specified.

If you do not know what credits you have on 15 meters, you should contact DXCC for an updated report prior to submitting further credits. This will help both you and DXCC in that it will avoid duplicates and additional costs (QSL costs over the limits noted in DXCC Rule #15 are $0.15 per QSO).

If you have e-mail access and can read Adobe .PDF files, contact DXCC at **dxcc@arrl.org** for a copy of your record. If you do not have e-mail access, please send a note to DXCC along with $1.50 for postage, or an SASE with $1.50 postage attached. If you have not submitted since the late 1991, your records are not in the computer and an SASE with valid postage is required for a hard copy.

Please contact DXCC for any comments and/or questions relating to these new awards at **dxcc@arrl.org**.

WRAP UP

That's all for this month. Special thanks go to F2VX, G3ZEM, N4BQW, N4XP, PA3GIO, *The Daily DX* and WB4JTT for helping to make this month's column possible. Keep sending those articles, pictures and newsletters. Hope to meet you at W9DXCC on September 16. Until next month, see you in the pileups!—*Bernie, W3UR* QST

N4BQW's portable operating position on Kingman Reef.

Into the 21st Century

It would be foolish to predict what changes might take place in the world above 50 MHz very far into the new century. A hundred years ago, radio apparatus consisted of mechanical spark-gap transmitters and detectors called *coherers* operating at wavelengths of hundreds of meters. Wavelengths less than 10 meters were considered inconceivably short and undoubtedly useless for communication. It was unusual to hear other stations even a few hundred miles distant.

The vacuum tube had not been invented a hundred years ago, and there was no way to amplify signals. Electronics that became possible just a generation later, such as the superheterodyne receiver and radio-frequency power amplifier, were not even conceived. Certainly no one in 1900 could have foreseen that Yagi antennas, solid-state transceivers, digital signal processing or any number of other innovations would become commonplace a century later.

Envisioning radio a hundred years hence is probably equally fruitless. Progress in electronic technology has taken place at an accelerated pace in the 20th century and shows no sign of slowing. We might imagine all sorts of uses for digital electronics and the marriage of radio and computers, but it is not so easy to forecast more specifically what technologies will be adopted by radio amateurs in the coming decades.

Equipment Twenty-Five Years Hence

So let's be realistic and speculate about a mere quarter century. Rigs have been getting smaller for some time, but as Doug Beck (W7MQY) and others observed, the size of the human hand will place a natural limit on miniaturization. Still, more can be packed into a little box. One of the major manufacturers plans to introduce a multimode transceiver that covers 160 meters through 23 cm this year. Charlie Barkowski (N2IM) thinks a 160-meter through 3-cm rig is well with the realm of possibilities. Could a UHF kilowatt amplifier the size of a brick be very far off?

Beyond that, it is likely that ready-to-run commercial rigs that operate on all microwave bands will become available. Gene Zimmerman (W3ZZ) expects that "microwave equipment will become simple enough and reliable enough for nontechnical appliance operators to use. Components will exist off the shelf that allow operation at 75 GHz and above." Jerry Daugherty (W9FS) anticipates rigs that will cover all bands from HF to SHF and be truly all mode, including capability for high-definition television with a built-in liquid crystal display screen and miniature video camera.

Manufacturers already make computer-based transceivers, but Kent Britain (WA5VJB) predicts transceivers based entirely on software will soon appear. He explains that analog voice signals can be processed through a digital IQ modulator to produce SSB, FM, spread spectrum or any one of dozens of other transmission modes, some yet to be invented. Receiving simply involves reversing the process. "Just by pushing a button . . . a tiny rig can be virtually any modulation mode." Bob Mobile (K1SIX) also predicts that digital voice communications will entirely replace SSB, FM and other outmoded analog techniques. Improvements in digital error correction will bring amazing enhancements over present analog equipment.

Operating

Harold Chase (WA1VVH) is among many who are pessimistic about the ever increasing threats to band allocations, especially in the microwave region. Many kinds of consumer electronics will gobble up huge slices of spectrum and the temptingly large and notoriously underutilized amateur bands are vulnerable. This will happen at the same time that amateurs find new uses for those same frequencies. How much of the bands will remain is anyone's guess.

According to many forecasters, CW will virtually disappear; it will be replaced by a variety of digital modes. Gene Zimmerman suggests that "the best and most popular weak-signal digital mode has not been invented yet." In the mean time, he thinks meteor scatter will become completely automated and the need for trained operators will be eliminated. Of course, fully automatic scatter contacts using packet have already been made, but some see the same idea could be extended to cover all modes.

Indeed, fully computer-integrated rigs will change the very nature of QSOs. Many contacts "will not require any operator in the shack. You'll come home from your seven-hour work day and find DX QSOs listed on your computer," according to Doug McGarrett. He also thinks the QSL cards will be simultaneously printed on your printer, but that seems doubtful. Rather, the computer will already have sent and received confirmation by electronic mail, updated your personal WAS, VUCC and DXCC lists and informed ARRL of your increments toward the standard array of operating awards.

Pat Rose (W5OZI) envisions an entirely computer-operated station, a natural outgrowth of those who monitor the bands via repeater links and operate via remote control. Indeed, a station of the future will hardly require any human intervention at all, once set up. "Using voice and CW recognition techniques, the computer will automatically lock on only to DX that is needed, rotate the antenna array to the correct bearing, turn on the instant 1500-W amplifier, and notify the operator via satellite cellular telephone.

"If the operator does not answer within 15 seconds, the home station will automatically work the DX station, log it appropriately and prepare the QSL for mailing." Pat recognizes that mailing may be outmoded, so in that case, the computer will happily send the confirmation by e-mail. "It is possible that by the time the operator returns home, the QSL will have been received," presumably sent by an automated e-mail QSL service on the DX end. Wow, there will be hardly anything left for an operator to do!

Space Communications

Steve Ford (WB8IMY) expects that "we'll see more FM-repeater satellites, such as OSCAR 27. They have proven to be very popular, especially among newcomers." Others see even further progress in amateur satellites. Doug McGarrett foresees that "some time into the 21st century, there will be a geosynchronous satellite carrying Amateur Radio, and it will be a repeater for digi-

This Month

September 9-11	ARRL September VHF QSO Party
September 16-17	ARRL 10-GHz Cumulative Contest
September 21	Transequatorial propagation peaks ±2 weeks
September 23-24	Italian EME Contest
September 23	Pacific Northwest VHF/UHF Conference (St Helen, OR)
September 24	Excellent EME conditions
September 29-30	Western States Weak Signal Society Conference
September 29-30	Microwave Update 2000 (Trevose, PA)

Emil Pocock, W3EP ♦ Box 100, Lebanon, CT 06249 (Voice 860-642-4347, fax 860-594-0259) ♦ w3ep@arrl.org

tal radio on 1296 MHz. It might also have a 2 meter sideband repeater for old timers." Chip Margelli (K7JA) suggests that because of great strides in microwave research, "satellite bandwidth capacity will become so huge that round-the-world communication will become completely routine, thanks to ultra-low power gateways."

Moonbounce will become easier because of DSP, and digital EME contacts will become commonplace. Solid-state amplifiers running 100 W on 10 GHz will make moonbounce as easy as using a cellular telephone is today. The entirely integrated microwave equipment would be mounted on the rear of a 3-foot dish, entirely controlled by a computer to keep it pointed at the Moon. Automated digital searches will find the station you seek to contact and initiate the connection. The operator can intervene manually at that point to send a personal message, or sit back and let the computer complete the brief formalities.

What about Amateur Radio beyond the environment of the Earth? Carlton Davis (K3EO) suggests that "sophisticated DSP will allow amateurs to conduct Venus-bounce experiments." Paul Shuch (N6TX, Executive Director of the Search for Extraterrestrial Intelligence League) puts in a plug for real outer-space communication. He suggests that "during the 21st century, the ultimate DX is going to be measured in light years, not kilometers. Grid squares will need to be replaced by celestial coordinates." Are we that close to contact?

ON THE BANDS

Sporadic E leads the news for June—perhaps not unexpectedly. There were a considerable number of days with single- and double-hop conditions across the continent, as well as widespread opportunities to work outside the continent. There were a few 2-meter E-skip openings, as well as a few days with aurora and auroral-E conditions. Dates and times are UTC, as is the standard practice.

50 MHz Sporadic E

There was sporadic E on 6 meters nearly every day in some part of the country. That is expected for June. It was not even unusual that there were double-hop conditions on many of those days. Ron Finger, W7ZT (DM41) in Arizona, for example, found many stations from New Brunswick (VE9), Quebec (VE2), Maine, Vermont and New York during the late afternoon of June 9. Indeed, there were many such occasions, including during the June 11-12 weekend of the ARRL VHF contest. Thanks to K6LMN, K7UV, VE9AA, VY2SS and many others for their reports.

Six Meter DX

As F-layer propagation wound down in early June throughout much of the world, attention turned to the possibilities of working intercontinental DX via multihop sporadic E. US and Canadian six-meter operators were not disappointed. There were ample opportunities to work South and Central America, Europe and even Africa and Japan. Indeed, some fortunate operators in the center of the country worked all of those areas!

South and Central America

On more than half the days of the month, there were single- and double-hop sporadic-E openings into the Caribbean, Central and South America. The number of countries represented in US and Canadian logs was impressive. E-skip links to some lingering F-layer propagation provided contacts to HK, PY, LU and CX, especially for those in the Southeast. During the evening of June 5-6, for example, AC4TO (EM70), WB4WXE (EM74) and W4WRL (FM04) heard or logged several PY, LU, CX, along with 9Y4AT, COs, HR1RMG, J87AB, KP4s, TIs, V31PC, V44KAI, YN1SW, YVs and ZF1DC.

Although W4 and W5 call areas were favored along these paths, the Northeast and Midwest also had a number of opportunities to make interesting contacts. One such opening took place over the evening of June 11-12, when K1JT (FN20) and K2OVS (FN30) reported C6A/K9KNW, HP2CWB, TI, V3, YN, YS1AG, along with VP9ID, through the contest QRM. Other calls reported by US and Canadian operators included KP2BH, PZ5RA, TG9NX and VP2V/W6JKV—an impressive tally overall. Thanks to HK3YH, TI5KD, YV4DDK, VE9AA and N0JK for their contributions.

Europe

Any lingering thought that transatlantic 6-meter sporadic-E propagation is unusual can now be dispelled. The band opened across the Atlantic on at least 18 days in June, impressive, but not unusual! This year's transatlantic activities were quite similar to last June's (see this column for September 1999), when there were 16 days of openings. Indeed, during the previous half-dozen years, there has been transatlantic propagation an average of more than 10 days each June.

So what is news this year? Certainly, the summaries (shown in Table 1) look similar to preceding years' results. One difference may be the phenomenal success of a single operator, Bruce Sternstein, K2RTH (EL95), in Miami. Bruce made 134 transatlantic QSOs in 19 European, 3 African and 1 Asian country during openings on 10 days in June. He added 18 new entities to his DXCC tally, including such sought-after calls as 5B4FL (Cyprus), 9A3FT (Croatia), HB9JAW (Switzerland), GD0TEP (Isle of Man) and S57A (Slovenia).

The other difference may have been the wide geographic distribution of US stations able to make it into Europe this June. Figure 1 indicates the grids of all known stations making transatlantic contacts, but almost certainly stations in adjacent grids could have done just as well. Table 2 provides some additional details of notable contacts. Distances are approximate.

Table 1
Transatlantic 6-Meter Sporadic E in June

Date	Time	North America-Europe and Africa
4	1110-1625	VE1, 9, W1-(CU3), CT, EH, EH9, (9A), 7Q
5	1525-1710	W4-EH8, CT, EH, F
6	1600-1745	VE1, W1-CT, EH, FH
7	1615	(W4)-G
8	1300-1415	W1, 4, 5-EH8, EH
9	1515	W1-(CU3)
	2130-2300	VE3, W1, 5, 7, 8, 9, 0-EH, G, F, I, DL, S5
10	2100-2245	W1-EH8
11	1140	W4-EH
	2200-2330	W1, 4, 0-EH8, (G), (I)
12-13	1740-0040	VE9, W1, 4, 5, 7-EH8, G, GI, GM, GW, GD, PA, DL, S5, (9A)
16	1330-1350	W1-(CU3), EH
	2320-2330	W1, 5-(CU3), EH8, EH
19	2110-2150	W1-CU3, EH8, CT, EH
20-21	2110-0030	W4-CT, EH, EI, G, GW, F, DL, (SM), 9A
22-23	1210-0100	W1, 3, 4, 5-EH8, CT, EH, EH9, CN, G, GI, GM, GW, GD, G, F, ON, OZ, I, S5
23	1000-1645	W1, 2, 3, 4, 5, 8-(CU3), CT, EH, EH9, C3, G, GU, F, PA, ON, HB9, DL, I, 5B
24	1120-1200	W1, 2-(CU3), EH
	1615-1645	VE9-9J
	2130-2200	W1-CT, EH, 9A
25	1155-1305	W4-EH, 9H
	2040-2335	VE9, W1, 4, 0-CT, EH, F, EH6, I, 9H
26	1305-1700	W1-EH8, CT, EH, EH6

Table 2
Notable 6-Meter E Transatlantic Contacts in June

Date	Stations	Distance (km)
23	K2RTH (EL95)—5B4FL (KM25)	9700
13	W7RV (DM43)—S59A (JN76)	9585
9	AA7A (DM43)—EH7GTF (IM87)	9150
23	W5UWB (EL17)—F1IXQ (JN15)	8625
9	W5HUQ (EM35)—IW5BZQ (JN53)	8350
25	K0GU (DN70)—EH7KW (IM67)	8000
8	W5OZI (EM00)—EH8BPX (IL18)	7750
9	WA0KBZ (EM48)—IK1MTZ (JN35)	7750
22	K0GU (DN70)—OZ4VV (JO46)	7575
9	KA9CFD (EN40)—IK1MTZ (JN35)	7550

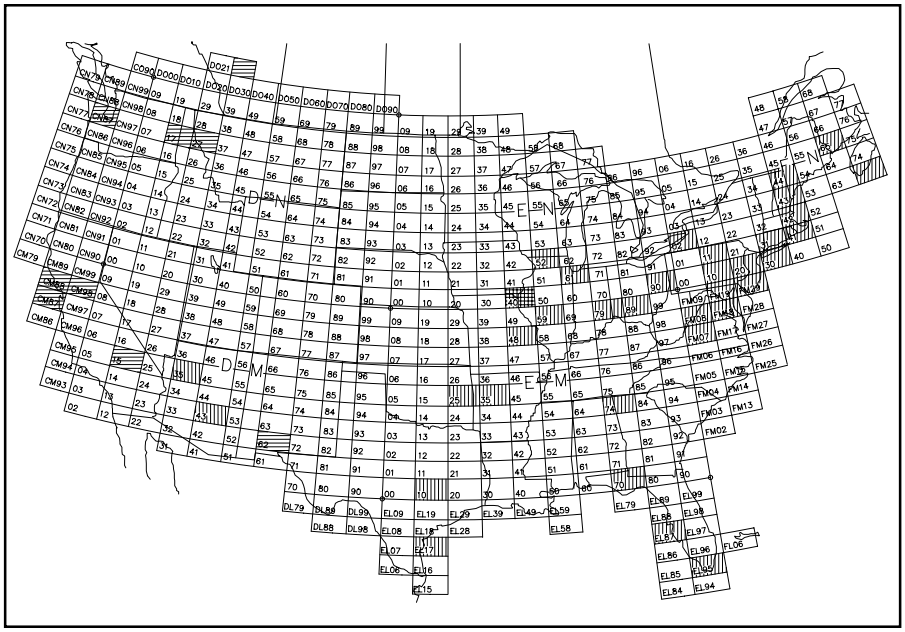


Figure 1—Grids from which 6-meter contacts were made with Europe (vertical hatching) and Japan (horizontal hatching) were widespread across the US. Note the overlap in the center of the country.

Japan

Six-meter sporadic-E openings from North America to Japan are rare, but they also occur each summer. This June, 6-meter contacts between Japan and the lower 48 states took place on three early evenings. This is not rare in itself, but the extent of the openings in North America was unprecedented. See Figure 1 for a suggestion of the extent of openings to Japan

Hatsuo Yoshida heard K6FV/b on June 11 around 0640, for the first North American signals of the season. On the evening of June 15-16, he worked several Alaskans. The path finally broke open on June 24, beginning around 0330 and lasting until at least 0530. Six-meter operators scattered through the W6, W7 and VE6 call areas made the grade that evening. JA1VOK hooked up with VE6TA and JI2EWL found VE6XT, probably the first ever JA-VE6 contacts via sporadic E.

The opening on June 25 got a comparatively late start at 0550, but lasted until 0850. Again, stations in W6 and W7 call areas, at least as far south as K7ICW in southern Nevada, found the Japanese. The June 30 opening may have been the most extensive ever for Japan to North America. In addition to the usual run of W6 and W7 calls, Japanese operators found US stations at least as far to the east as Illinois, between 2300 and 2335.

KA9CFD (EN40om) hooked up with JH2COZ (PM94) and JA1VOK (QM05ar) at about 10,250 and 10,100 km, among the longest sporadic-E contacts ever reported. These are impressive contacts, but any claims to a new distance record were dashed the next evening, when at least one Okinawa (JR6)-to-Colorado contact was made. That distance is just less than 11,000 km. Details next month.

DX During the June 10-11 VHF Contest

Conditions during the June contest were exceptionally good in most parts of the country. Quite a few stations tallied more than 200 grids on 6 meters, especially those in the southwest. US contesters worked more than a dozen Central and South American countries. K1JT (FN20), for example, logged C6, CO, CX, HP, TI, V3, VP9, and YN. W1LP/mm made more than a thousand QSOs from six different grids in the Gulf of Mexico.

US stations also made a handful of contacts in Europe during the contest, but undoubtedly many more contacts were missed because of QRM. Some successful contacts are shown in Table 3. More regrettable were the misses. K2RTH/4 discovered that G4BUR called him over a 40-minute period around 2100 on June 10, but Bruce never heard him through all the QRM. This is a familiar story from several past June contests.

Doug Rolph, G0UYC (JO02), wrote that he began to hear W4s calling "CQ contest" about 2030, but managed to work only WA8TTM/4 out of 10 different stations he heard. Doug suggests that stations use phonetics more often and take time to listen for weak signals and DX that might be calling.

Table 3
Six-Meter Transatlantic Contacts in the June Contest

Date	Time	States
10	2045	WA8TTM/4 —G0UYC
10	2100	K1SIX (FN43)—EH8BPX
11	1141	AC4TO (EM70)—EH7GTF
11	2332	WB4WXE (EM74)—EH8BPX
		K0FF (EM48)—IK1MTZ

Two-Meter Sporadic E

With such a great month for sporadic-E propagation, it should be no surprise that there were more than half a dozen 2-meter skip events somewhere across the country. These openings were quite typical. Most took place in the evening and lasted for less than an hour. Signals were generally very loud with considerable QSB. Thanks to W5UWB, N6KBX, W6OMF, W6TOD, K7ICW and W0OHU for their reports.

Aurora and Auroral E

The big aurora and auroral-E event of the month took place during the major geomagnetic storm of June 8-9. Two days earlier, a coronal-mass ejection on the sun's surface propelled a shock wave across space, which hit the Earth's magnetic field at 0841 on June 8. The geomagnetic K index suddenly jumped from 4 to 7 at 0900, indicating a major geomagnetic storm in progress. Canadian and northern-US stations were making auroral contacts on 144 MHz by 2000.

Auroral propagation was limited to the northern tier of states, but the subsequent auroral-E propagation was more spectacular. As early as 0100, six-meter stations as far flung as Connecticut and Alaska reported auroral-E contacts. W3EP (FN31), N1RWY (FN54) and others in the Northeast made contacts from Newfoundland to Montana, Wyoming, Washington and Oregon. Kevin Forster, NL7Z, (BP51) in Alaska, made 37 QSOs by 0220 across Canada and the US, as far east as western New York and south to N0JK (EM17) and WB4WXE (EM74), 5300 km distant. The opening lasted past 0645, when W3EP hooked up with W7GJ in Montana and N7EIJ in Washington.

Tropospheric Ducting

Tropo conditions throughout the Mississippi Valley were good on June 7 and 8. Ed Fitch, W0OHU (EN34) in Minnesota, found K5VH (EM00) in southern Texas on both 144 and 432 MHz early on the morning of June 7. Sam Whitely, K5SW (EM25), worked into Missouri, Mississippi and Tennessee on 144 and 222 MHz on the evening of the 8th.

VHF/UHF/MICROWAVE NEWS

September Conferences

The Mt Airy VHF Society is hosting Microwave Update 2000 at the Holiday Inn Select in Trevose, Pennsylvania, September 29 through 30. See **www.ij.net/packrats/MUD_2000/mud.html** for more information, or contact John Sorter at **JohnKB3XG@aol.com**.

The Pacific Northwest VHF/UHF Conference is planned for September 23 in St Helen, Oregon. For more information e-mail Arnie Jensen, W7DSA, at **n7yag@columbia-center.org**.

Italian EME Contest

Mario Alberti, I1ANP, announced the results of the 6th Italian EME Contest, which was run this past autumn. Among US stations at top spots in the dozen or so entry categories was W7HAH (32 QSOs on 144 MHz, 41 to 80 elements category), K2GAL (59 QSOs, 144 MHz, 81 to 160 elements) and W5UN (120 QSOs, 144 MHz, over 321 elements). The 7th Italian EME Contest, which includes all bands 144 MHz and higher in multiple categories based on antenna size, is scheduled for September 23 to 24 later this year. Contact Mario for details via **1ianp@gw-ir5lun.col.it**.

PRB-1: A Good Thing, but Still not a Panacea

By Brennan Price, N4QX
ARRL Field and Regulatory Correspondent

PRB-1, the limited federal preemption of municipal land use regulations for Amateur Radio installations, is a useful tool when applying for a building permit for a tower. According to the Commission's rules, zoning authorities cannot preclude Amateur Service communications, but must reasonably accommodate amateur communications and enact the "minimum practicable regulation to accomplish the state or local authority's legitimate purpose" [97.15(b)]. Prior to the issuance of PRB-1, challenging overly restrictive ordinances was difficult. The formal statement of federal interest in an effective Amateur Service has helped us come a long way in fifteen years.

But as the ARRL announced in September 1985, when the FCC first stated its limited preemption, "PRB-1 is not a panacea." It merely requires local governments to make reasonable accommodation and to enact only the minimum restrictions on amateur antennas. It does not quantifiably dictate what is or is not reasonable in terms of height, setback, placement or aesthetic restrictions. In November 1999, the FCC declined to clarify its standards, denying an ARRL request to clarify and strengthen PRB-1. "We do not believe that it would be prudent or that is appropriate to set such a standard for amateur antennas and their supporting structures because of varying circumstances that may occur when a particular antenna configuration is under consideration," the Commission said in its denial. In other words, what is reasonable accommodation in rural Wyoming may be excessive on Staten Island. The FCC found that PRB-1 is just fine the way it is; "We believe that the policy enunciated in PRB-1 is sound." The ARRL disagrees to some extent with this assessment and has asked the Commission to reconsider portions of that decision.

When dealing with a local zoning authority, it is as important to know what PRB-1 *doesn't* say, as well as what it does. This knowledge, coupled with persistence, tact and diplomacy, will often yield a favorable result. The following are some typical questions that the ARRL Regulatory Information Branch is asked. Our answers are designed to help you understand PRB-1, its uses and limitations, and how to use PRB-1 in the most advantageous manner.

Q: My city council says I can't put up an antenna and support structure at all. Can they do that?

A: No. Such an ordinance is clearly not a reasonable accommodation of amateur communications and would certainly be preempted.

In the face of such an ordinance, the best route is to persuade your council to change the ordinance. Talking with your city or county attorney about PRB-1 is an effective way to start the process. Town council members are usually not familiar with federal regulation of radio matters, let alone the vagaries of federal preemption. If you directly challenge their authority to write whatever zoning regulations they want, you are not likely to get a favorable response. While your municipal attorney is not likely to be an expert on radio regulation, he or she will at least know where to look to verify that PRB-1 exists, and that an absolute prohibition runs counter to the letter of the regulation.

Q: I want to put up a 70-foot tower. My city inspector tells me he's willing to approve a 65-foot structure. Can they limit me to 65 feet?

A: Unless you're in Virginia or Oregon, you probably need to prepare a compelling case for the extra five feet, and this may mean applying for a conditional use permit. PRB-1 requires local governments to be reasonable, but does not prescribe a particular height as such. The body of published court opinion holds that, in most cases, 65 to 75 feet is a reasonable height in most circumstances. Remember, though, that "reasonable accommodation" varies from place to place. You need to make a case that the antenna height you are seeking is needed for what you need to do.

Virginia and Oregon have state laws that codify a height below which local zoning authorities may not regulate, absent reasonable screening, setback and placement requirements. Virginia hams may go up to 75 feet (and, in sparsely populated areas, 200 feet). Oregon hams may erect towers up to 70 feet, in the absence of a "clearly defined health, safety or aesthetic objective of the city or county."

Eight other states (Florida, Louisiana, Massachusetts, Maine, New Hampshire, Texas, Washington and Wyoming) have codified the essence of PRB-1 into state law, without specifying what "reasonable accommodation" is. If you happen to live in one of these states, the appropriate state law is an additional tool for you to use in challenging a non-compliant ordinance. At press time, ARRL Section and Division officials are lobbying for similar legislation in California and Rhode Island.

Even if your state has not written PRB-1 into state law, the preemption still applies; it may not be as obvious to municipal land use officials. You just have one less thing to back you up. In any case, it is your responsibility to show why you need an antenna at a particular height and location.

Q: Seems like the quickest way to get through the red tape is to apply for a variance from the city's ordinance. Is that advisable?

A: If it is not politically possible to directly challenge an ordinance and try to get the municipal government to change it, variances and conditional use permits are potential tools for a land use that is not permitted under the ordinance.

Variances are difficult to obtain. There are two types: use variances and area variances. A use variance is a request by a landowner to use his or her property in a way not permitted by the ordinance. If an ordinance prohibits transmitting antennas, for example, one must seek a use variance, and make a showing that the landowner has a particular hardship in order to justify it. An area variance is more typical in the Amateur Radio context; it asks for a dimensional waiver from the ordinance, such as, for example, where an ordinance limits all building height to 35 feet, and an amateur wants a 75-foot tower. Typically, PRB-1 will justify a use variance for some height in excess of 35 feet, but the burden is on the amateur to justify it.

Conditional Use Permits (CUPs) are procedures in the ordinance, which allow certain changes from what is permitted under the ordinance if a showing of justification is made. Beware, however, because a CUP (or variance) hearing requires a prior public notice and the opportunity for neighbors to object. Come to the hearing prepared for all types of objections, from property value issues to RF exposure and everything in between.

Q: The zoning inspector wants me to submit building plans before he'll grant a permit for my tower. Can he do that?

A: Yes. Local governments are allowed to enact regulations to address legitimate

John C. Hennessee, N1KB ♦ Regulatory Information Specialist

health, safety and aesthetics concerns. An antenna is, above all else, a structure. It is perfectly reasonable for a government to require that permitted structures be sound, and for plans for such structures to be submitted. You likely couldn't construct a substantial addition to your house without filing plans. A tower is no different.

Fortunately, a tower is simpler than most construction projects. It shouldn't be too difficult to comply with a request for building plans. The ARRL may be able to refer you to a Volunteer Consulting Engineer who can do the job for you. More information on that later.

Q. Why won't they let me put up a 200-foot tower with three repeaters and Yagis for each band from 160 meters to 1.2 GHz?

A: It not realistic to expect that 200-foot towers are an absolute matter of right under PRB-1. Municipalities are required to *reasonably* accommodate amateur installations in order to make such communications possible. That means they have to let you put up a functional antenna. That doesn't mean they lose the right to regulate for legitimate health, safety and aesthetics concerns.

The body of court opinion with respect to PRB-1 is generally favorable to amateurs, recognizing structures in the 65- to 75-foot range as reasonable in typical residential neighborhoods. There are a number of cases where rulings have been adverse. In these cases, typically the amateurs involved sought conditional or special use permits, and the showings made by the amateur in support were not found by the court to be sufficient.

The words of Mick Jagger fit this situation perfectly: "You can't always get what you want/But if you try sometimes/You just might find/You get what you need." If, in your negotiations with a local government, a counteroffer is made that isn't quite what you're looking for, give it some thought. Does the offer enable you to do what you need to do? If what they offer is less than what you really need, can you rationally explain why, and suggest a compromise height?

If the local zoning authority makes a counteroffer, it behooves you to at least consider whether such a counteroffer constitutes reasonable accommodation. If you don't do so, you could end up without anything more than what the ordinance permis as a matter of rights.

Q. Sounds like this is going to take time, energy and money. Is help available?

A: Yes. The ARRL Regulatory Information Branch (RIB) can provide information, suggest strategy and provide referrals to legal counsel and structural engineers.

The PRB-1 document itself, as well as some useful cases, draft ordinances, and background information, is available on the *ARRLWeb*: **http://www.arrl.org/field/regulations**. These are also available in paper form from ARRL Headquarters. In order to offset the cost of copying and mailing some 200 pages of material, there is a charge for the paper PRB-1 package ($10 for ARRL members, $15 for non-members).

The RIB staff, which consists of Regulatory Information Specialist John Hennessee, N1KB, and myself, will be glad to suggest ways to deal with tricky situations. John can be reached by telephone at 860-594-0236, and I can be reached at 860-594-0272. RIB's e-mail address is **reginfo@arrl.org**.

While the RIB staff has substantial experience in guiding amateurs to successful outcomes in zoning matters, they are not lawyers. In some situations, professional legal or engineering advice may be needed. The ARRL maintains a list of Volunteer Counsels (VCs) and Volunteer Consulting Engineers (VCEs) who may be able to help you. All VCs and VCEs are licensed amateurs, and have agreed to provide other amateurs with tower-related problems an initial consultation free of charge. A current list of VCs and VCEs may be found at **http://www.arrl.org/field/regulations/local/vc-vce.html**.

Q. I'm a lawyer or a professional engineer. How do I get to be a VC or a VCE?

A: VCs and VCEs must be full ARRL members and licensed amateurs. VCs must be admitted to the bar in the state for which they practice law, and VCEs must be Registered Professional (structural, civil or mechanical) Engineers.

The ARRL does not expect that VCs and VCEs will provide their services for free. However, in exchange for ARRL referrals of amateurs to you, we ask that you agree to provide an initial consultation to amateurs free of charge. After the initial consultation, you are free to work out an acceptable rate with the amateur if he or she wishes to retain your services.

There are some states where there are no VCs or VCEs registered, and amateurs in these states really need your help. At press time, there are no VCs in Delaware, Mississippi, Puerto Rico, North Dakota, South Dakota, and Vermont. There are no VCEs in Alabama, Alaska, Delaware, Idaho, Kansas, Maine, Maryland, Montana, Nebraska, Nevada, North Dakota, Oklahoma, Puerto Rico, South Dakota, Vermont, the Virgin Islands, West Virginia, Wisconsin or Wyoming. If you are a lawyer or professional engineer in any of these states, we can quite possibly steer some business your way.

If you are interested in becoming involved in either program, please complete the appropriate application at **http://www.arrl.org/field/regulations/local/vc-vce.html**, or contact the RIB for more information.

Q. Can I just put up my tower without a permit and hope nobody notices?

A: That would be a very bad idea. Yes, there are some amateurs who have done that and experienced no trouble whatsoever. And it is tempting to try to sneak by when other local amateurs are playing by the rules and encountering endless hurdles. But it only takes one complaint to cause problems not only for you, but also for all the other amateurs in town. Erecting a structure without a proper permit is looked upon unfavorably by the courts, can subject you to significant penalties, and could affect your liability in case of an accident or tower failure.

Q. I've got a house with deed restrictions against antennas. Any relief for me?

A: Yes. Short of moving, operate from your car.

I know, that's a flippant answer, but so far, despite the ARRL's efforts to the contrary, the FCC continues to explicitly exclude covenants, conditions, and deed restrictions (CC&Rs) from the purview of PRB-1 in its 1999 denial of the League's request for a clearer, stronger statement of preemption. The Commission views CC&Rs as contractual obligations that amateurs freely enter and are bound by, and to date, those states that have codified PRB-1 have not taken a contrary view. To claim that such a view is reasonable in today's real estate market is rather specious and it is legally questionable; nevertheless, it is the law of the land.

In the interim, the best defense that amateurs have against CC&Rs is to do homework *before* signing a contract to purchase a house. The time to find out about CC&Rs in a potential new home is not at closing, but at the outset. Protect yourself. Do a title search before signing the contract. Check the deed restrictions at the local courthouse. At a very minimum, write a clause into the purchase contract, invalidating the agreement to purchase if CC&Rs exist prohibiting outdoor antennas or support structures. And don't rely on oral promises that everything will be OK in the end. Get it in writing. Without something in writing, once you've bought a house with CC&Rs, you are at the mercy of your homeowners association and your neighbors.

The very existence of PRB-1 signifies a hard-fought victory for Amateur Radio. The limitations of PRB-1 require us to fight more battles. The ARRL continues to seek a stronger, clearer preemption statement, one that will allow all of us to fulfill the basis and purpose of our service. But such relief is not imminent, and until such relief arrives, recognition of PRB-1's limitations is key to its successful use. QST

A Radio in Every Computer

Because I am a ham, I am the family electronics guru (or nerd) by default. Therefore, I occasionally get service calls from various relatives to perform some electronics-related chore. Recently, my sister and aunt bought new computers (Apple *i*Macs) and asked me to install them. I agreed to their requests because the installations would be a piece of cake (Macs are like that) and would give me an opportunity to test drive some new computer equipment.

In each case, I had to get the computer on-line and test-surf it on the net. For test surfing, I pointed the bundled Web browser at various Web sites that I frequent and was astonished at how quickly the Web pages loaded. In comparison, surfing with my home computer was slow despite the fact that my computer and the *i*Macs both use 56k V.90 modems. I surmised that the speed difference was because my computer has a 133-MHz processor, while the *i*Macs were almost three times as fast with 350-MHz processors.

I could not get over the difference in speed and began developing a bad case of throughput envy. It got so bad that I stopped surfing the net with my home computer, which I dubbed "diMac," as in I'll die of old age waiting for the Web page to load. I stopped eating, too. Not because I was depressed, but to save money to buy a new computer. That lasted about half a day, but I found other ways to sock money away for a new computer.

After filling my sock, I bought an Apple PowerBook, the top-of-the-line model with a 500-MHz G3 processor, 128 Mbytes of RAM, 12-Gbyte hard drive, DVD-ROM drive, ZIP drive, etc, etc. It blew away my old computer, as well as the *i*Macs, and I became a very happy camper.

Oh, I forgot to mention that I outfitted my PowerBook with a radio. Not AM and FM but DSSS, that is, a Direct Sequence Spread Spectrum 2.4-GHz transceiver called the AirPort card. It is about the size of a credit card and plugs into an expansion slot beneath the computer keyboard. It provides wireless Internet access by communicating over the air with an AirPort base station, which is a seven-inch-diameter transceiver that resembles a flying saucer and provides the copper-wire connection to the Internet.

The transceivers talk to each other at data rates up to 11 Mbit/s (that's Ethernet speed). My base station is connected to a telephone line using its internal 56k V.90 modem, so I am not pushing the AirPort's speed limit. However, for what it's worth, I see no difference in Web page loading speeds whether my computer is connected to the Internet directly via phone line or remotely via 2.4 GHz.

Figure 1—A capture of Apple's Web page that describes the AirPort (http://www.apple.com/airport/).

The transceivers' 15-dBm nominal output power provides a 150-foot coverage area, which is adequate for me. I have carried my PowerBook all over my one-acre lot and have not noticed much signal-level drop from the base station. (The AirPort software has a virtual S-meter, ie, a graphic display of the signal level received from the base station.) By the way, the PowerBook has two antennas to provide diversity reception, which results in better range and performance.

The bottom line is that I can sit on my deck or in my living room with nary a wire, while communicating over the Internet with my PowerBook, just like Amateur Radio data communications was meant to be.

The AirPort card goes for $99 and the base station, $299. AirPort communications is not limited to Apple computers; it is compatible with any wireless products that conform to the IEEE 802.11 DSSS standard, which leaves the door wide open for PC notebook users to join the AirPort network.

Follow-up to "A Weather Station in Every Shack"

In July, I wrote here that a low-cost weather station kit (the WS-1) was available from Dallas Semiconductor (www.ibutton.com/weather/index.html). You could connect the WS-1 to your ham radio station with the T238 interface kit that is available from Tucson Amateur Packet Radio (TAPR at www.tapr.org/tapr/html/Ft238.html).

About three weeks after the column appeared, Dallas Semiconductor announced that increased demand for the WS-1 kit (after its mention in some Amateur Radio publications) "prematurely depleted" their supply, and the system is no longer available. Dallas stated that it would post an official memo responding to the situation. Meanwhile, you can order the fully assembled and tested weather station from Texas Weather Instruments, Inc at www.texas-weather.com (at a substantially higher cost than the kit).

Most agree that the WS-1 kit will never be sold again, but we await Dallas' official memo to clarify the matter. In the meantime, TAPR has generously agreed to cancel any T238 interface orders for those folks who were unable to buy the WS-1 kit.

DIGITAL COMMUNICATIONS CONFERENCE

Orlando, Florida is the place to be September 23-24 for the ARRL/TAPR Digital Communications Conference. You'll be treated to an outstanding lineup of seminars, speakers and more. Contact the TAPR office at 940-383-0000 or on the Web at http://www.tapr.org. See "Coming Conventions" elsewhere in this issue as well.

Stan Horzepa, WA1LOU ♦ One Glen Ave, Wolcott, CT 06716-1442 ♦ wa1lou@arrl.net, www.tapr.org/~wa1lou

A "Hot" Afternoon in Greenland

By Dave Boprie, WS8P

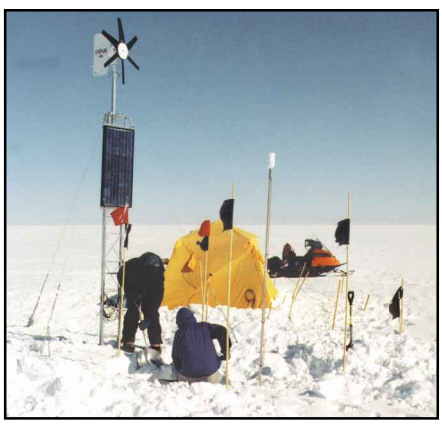
On the afternoon of May 17, 2000, hams monitoring OSCARs 27 and 14 were astonished to hear me calling from Summit, Greenland, longitude 38.3525°, latitude 66.4824°, grid HQ02qx. The response was overwhelming. During the brief passes I managed to complete more than a dozen contacts, but there were many more calling. FM isn't the best mode for satellite pileups!

The purpose of my journey to the frozen wastes was to download data and make repairs to the University of Michigan Magnetometer sites at Summit and Raven Skiway. These magnetometers were engineered and built at the UM Space Physics Research Laboratory and measure the Earth's magnetic field.

We were blessed with some great weather most of the time and light winds. Toward the last couple of days we were getting early morning temps of about –27° C. Lodging was either in an "arctic oven" or in larger Weatherport tents. Kitchen and dining facilities were provided in one of the larger, more permanent structures. Elevation at Summit was 10,600 feet, but pressure altitude was approximately 13,000 feet, so we were working with about a third less oxygen.

Dave Boprie, OX/WS8P, works OSCAR 27 from the relative comfort of the Weatherport tent.

Dave Boprie (left) works UO-14 while team member Steve holds the Arrow antenna.



Digging through layers of snow to recover magnetometers at Summit, Greenland.

We finished our work on the instruments earlier than expected and that provided the opportunity I was looking for. I assembled the Arrow antenna, plugged in the Kenwood THD7A handheld and started calling as OX/WS8P. It was a blast working the FM repeater satellites from the Arctic. A little more oxygen and less snow shoveling and this could be really fun!

18th SPACE SYMPOSIUM AND AMSAT-NA ANNUAL MEETING

Portland, Maine, is the host city for the 18th Space Symposium and AMSAT-NA Annual Meeting October 27-29, 2000. The host hotel is the Holiday Inn West, located approximately three miles from the Portland Jetport. You can call for hotel reservations at 207-774-5601, or reserve on line at: **http://www.portlandholidayinn.com/**. For more information and symposium tickets, contact AMSAT-NA at 301-589-6062.

This should be one of the most important AMSAT meetings in many years—especially if Phase 3D is in orbit by the time the meeting begins. I hope to see you there!

DARTSAT

There's another Amateur Radio satellite in your future—this one courtesy of the Thayer School of Engineering at Dartmouth College. The diminutive nanosatellite is known as *DARTSAT* and with luck we'll see it in orbit by the middle of next year.

DARTSAT will carry out several experiments during its estimated one-year lifespan, but it will also function as an Amateur Radio FM repeater. The repeater uplink will be on 2 meters with a downlink on 70 cm. The downlink transmitter will produce about 300-mW output, which places it in the same class as OSCAR 27. You can learn more about DARTSAT by visiting their Web site at: **http://engineering.dartmouth.edu/~dartsat**.

The DARTSAT team: (back row, left to right) Mike Ferchak; Amish Parashar, KE6EZM; Shyam Yadait; Todd Kerner, KB2BCT; (front row, left to right) Courtney Vanyo; Augustus Moore. QST

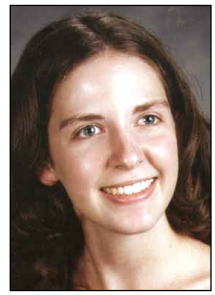
Steve Ford, WB8IMY ♦ QST Managing Editor

Millennial Scholarship Recipients—Winners All!

Into a new decade, a new century, a new millennium come these bright faces of youthful hams. Scholars today, all are working to achieve academic goals that will aid them in future careers and vocations. The ARRL Foundation is proud to be partners with the many contributors that support our scholarship efforts. Let's meet the recipients of your generosity:

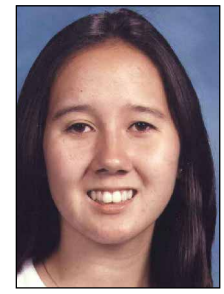
Derrill Dabkoski, AC6UY
San Francisco, CA—University of California-Berkeley,
The ARRL Scholarship to Honor Barry Goldwater—$5000

Rebecca Sakarias, KL7RC
Juneau, AK—Southern Oregon University
The Mary Lou Brown Scholarship—$2500



Emily M. Bradley, AE4CV
Shalimar, FL—University of Florida-Gainesville
The Earl I. Anderson Scholarship—$1250

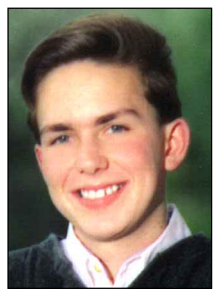
Robert A. Mason, AI8J
Todd, NC—American Institute for Computer Science
The L. Phil and Alice J. Wicker Scholarship—$1000



Leslie K. Karp, KC6WZQ
Torrance, CA—Harvey Mudd College
The Charles N. Fisher Memorial Scholarship—$1000

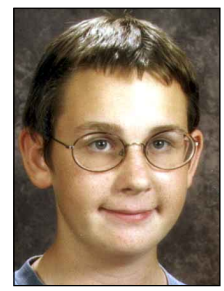
Andrew J. Halbert, KI0AU
Falls City, NE—University of Nebraska-Omaha
The K2TEO Martin J. Green Memorial Scholarship—$1000

Ethan C. Gartrell, KC0EGZ
Stockton, KS—Kansas State University
The Irving W. Cook, WA0CGS Scholarship—$1000

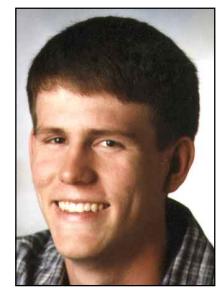


Seth J. Pensack-Rinehart, KG0RG
Loveland, CO—University of Colorado—Boulder
The F. Charles Ruling, N6FR Memorial Scholarship—$1000

Janice C. Rock, AF4LT
Warrior, AL—University of Alabama Huntsville
The Charles Clarke Cordle Memorial Scholarship—$1000



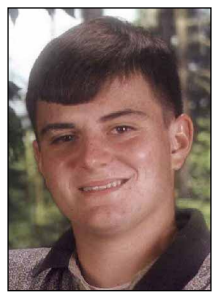
James R. Martin, KD5FAN
Flower Mound, TX—University of North Texas
The Tom and Judith Comstock Scholarship—$1000



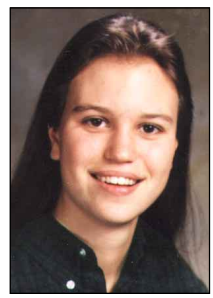
Trent E. Drenon, KF6BUY
Burney, CA—California State Polytechnic University-San Luis Obispo
The General Fund Scholarship—$1000

Sandy C.H. Liang, KH7VV
Honolulu, HI—Massachusetts Institute of Technology
The General Fund Scholarship—$1000

Beaver E. Eller, AA7LL
Franklin, GA—Southern Adventist University
The General Fund Scholarship—$1000



Jeffrey B. Hires, KF4TQC
Perry, FL—University of Florida
The General Fund Scholarship—$1000



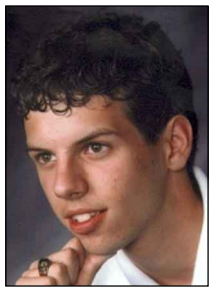
Jennifer M. Watt, N1TGF
Stratford, CT—Fairfield University
The New England FEMARA Scholarship—$600

Kevin S. Goodwin, N1JMY
Wayland, MA—Framingham State College
The New England FEMARA Scholarship—$600

Deborah E. Bennett, K1DEB
Jaffrey, NH—University of New Hampshire
The New England FEMARA Scholarship—$600

Janine M. Oxer, N1VHU
Greenwich, CT—Pennsylvania State University
The New England FEMARA Scholarship—$600

Mary E. Lau, N7IAL ♦ Secretary, ARRL Foundation Inc.



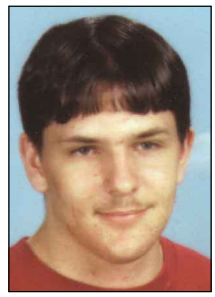
Christopher R. Gonyea, KB1AZK
Goshen, NH—Wentworth Institute of Technology
The New England FEMARA Scholarships—$600

Peter P. Kantorowski, N1VAK
Seymour, CT—Naugatuck Valley Community College
The New England FEMARA Scholarships—$600

Michael D. Macino, KB9IHS
Columbia City, IN—Purdue University
The Francis Walton Memorial Scholarship—$500

Michael R. Placek, KB9SCH
Oak Creek, WI—Milwaukee School of Engineering
The Edmond A. Metzger Scholarship—$500

Kristin N. Pressley, KC5HTC
Hattiesburg, MS—University of Southern Mississippi
The Mississippi Scholarship—$500



Caleb W. Mulina, KC5KGT
Franklinton, LA—Louisiana State University
The Fred R. McDaniel Memorial Scholarship—$500

Tiffany S.K. Mah, N9SML
Buffalo Grove, IL—Washington University
The Chicago FM Club Scholarship—$500

Wendy A. Musicer, KE4KCP
Alpharetta, GA—University of Michigan
The Eugene Sallee, W4YFR Memorial Scholarship—$500

Scholarships were also awarded to the following students not shown: **David E. Reimer, KB0RXX,** Sublette, KS—Kansas State University, *The Paul and Helen L. Grauer Scholarship*—$1000; **Daniel S. Zimmerman, N3UMH**,Erie, PA—Clarkson University, *The Perry F. Hadlock Memorial Scholarship*—$1000; **John C. Blessing, N0YRL,** Shawnee, KS—Kansas State University, *The PHD-ARA Scholarship*—$1000; **Daniel Y. Adler, KB2ZFX,** Far Rockaway, NY—Yeshiva University, *The Henry Broughton, K2AE Memorial Scholarship*—$1000; **Richard S. Garrett, AA0CR**, Florissant, MO—American University, *The General Fund Scholarship*—$1000; **Matthew C. Wood, N1YQE,** Brewster, MA—Rensselaer Polytechnic Institute, *The New England FEMARA Scholarship*—$600; **Marc A. Spardello, W1NJ,** Johnston, RI—Quinnipiac College, *The New England FEMARA Scholarship*—$600; **Michelle M. Thompson, N1PNT,** Newtown, CT—Western Connecticut State University, *The New England FEMARA Scholarship*—$600; **Isaac J. Waldron, N1YZI,** Meredith, NH—Worcester Polytechnic Institute, *The New England FEMARA Scholarship*—$600; **Rob I. Furman, N1ROB,** Boston, MA—Furman University, *Dr. James L. Lawson Memorial Scholarship*—$500; **Alan R. Schwab, KB9REU,** Orland Park, IL—Kettering University, *The Six Meter Club of Chicago Scholarship*—$500; **Rebecca L. Brown, N5WML,** Grants, NM—New Mexico Tech, *The Albuquerque ARC Scholarship*—$500; and, **Charles W. Dickson, KB9SZX,** Greenfield, IN—Purdue University, *The IDEA Scholarship*—$500.

To apply for Year 2001 scholarships, download our application at **http://www.arrl.org/arrlf** or write to: *The ARRL Foundation, Inc, 225 Main St, Newington, CT 06111*. Deadline for applications with transcripts affixed is **February 1, 2001**. QST

STRAYS

QST CONGRATULATES...

◊…Carl W. Hickman, N5XE, who has been elected the position of president of the Oklahoma Fire Chiefs Association. Hickman, an 18-year veteran of Oklahoma's fire service, is the Fire Chief for the Sulphur, Oklahoma fire department. Chief Hickman's term as president runs through April 2001.

◊…and Bethel Educational ARS member, Eric Griffin, N1JSY, who has graduated with honors from the University of Pennsylvania. He has a bachelor of arts degree in anthropology. Griffin was secretary of Theta Xi fraternity and a member of the freshman crew team. He was awarded a Netter Fellowship to work with the Urban Nutrition Initiative with a focus of improving the nutritional well-being of inner-city youth. Griffin was project coordinator for the Injury Free Coalition for Kids of Philadelphia and conducted research for the University of Pennsylvania Hospital. Griffin will be on assignment for the Peace Corps as a health project coordinator in the South Pacific.

◊…and Mike Lozano, K5RLY, who retired as Senior Meteorologist at KCCI-TV in Des Moines, Iowa. Mike gave his last forecast on June 9, 2000.

COAST GUARD CLUB

◊ Free membership is offered in the Coast Guard Club to any Amateur Radio operators who have, or are, serving in the US Coast Guard, regular or reserve. For further information, contact Don Gardner, AD4PT, at 3908 Briarwood Ave, High Point, NC 27265-1204; **ad4pt@arrl.net**.

WANTED: LAPTOP MANUAL

◊ I'm looking for an owner's manual for a Leading Edge model DC-8212 laptop PC. Please contact Dick Hade, K9HSK, at **rhade@webtv.net**.

WANTED: B-29 PILOT'S MANUAL

◊ Inspired by the article about General Curtis LeMay in the May 1997 *QST*, I am looking for a B-29 pilot's manual. Please contact Terunori Inda, JA3TXZ, 34-6 Nishi-and, Ando, Nara 639-1066, Japan; **ja3txz.inda@nifty.ne.jp**.

Next Stray

The Stancor ST-203-A

First offered as a kit in the late 1940s, the ST-203-A 10-meter transmitter became a popular rig because of its size and innovative design. Hams were experimenting with 10-meter mobile operating at the time and the Stancor Transformer Company, which was already famous for their pre-war transmitter kits, decided to produce a rig for this "market."

Kit building was becoming a big part of ham radio; it was fun to do and saved money. The ST-203-A kit came with 94 detailed step-by-step building instructions. Clearly worded instructions and diagrams showed the operator how to set up the ST-203-A and interconnect the power supplies, antennas and receivers. There were also several paragraphs on how to tune and operate the radio.

Ruggedly constructed with an easily removable bottom plate, the ST-203-A was convenient to place in the trunk near the antenna. The built-in relay switched the antenna between the transmitter and receiver and activated the B+ power supply. Either a vibrator power supply or a (then) readily available PE-103-A war-surplus dynamotor supply could power the ST-203-A. It could also be powered by an ac supply for fixed operation.

Many collectors still put their ST-203-As on the air today. It is capable of 100% AM modulation, transformer coupled, with a pair of 6V6 tubes. The microphone for this radio is also surplus—a popular T-17-B. At the heart of the RF section is a 6V6 crystal oscillator driving a 2E26 in class C.

Is anybody still running one of these old radios mobile, perhaps in a vintage auto? Please let me know, and send a photo. I'll have more on the ST-203-A on my Web site: **http://www.eht.com/oldradio/arrl/index.html**.

The Stancor ST-203-A with the cover removed.

(Right) The Almo Radio Company ran this advertisement in the December 1949 *QST* promoting the Stancor ST-203-A.

Homebrew—1943

Hal Murken was a student at his Ramsey, New Jersey high school when he built this station in the very early 1940s. He was 17 years old with a class "B" ham operator's ticket, but no station call. He said it was frustrating not being able to use the transmitter because of the war.

His transmitter was a type-47 oscillator with two type-46 tubes in the final. On the desk, he used an autodyne regenerative receiver that consisted of a type-24A RF amp, type-27 detector and two type-27s in the audio section. He had a set of plug in coils that covered 150 kHz to 30 MHz. Just above was his 5-meter superhet receiver, which had a resistance-coupled IF. He also had a 5-meter "rush-box" transceiver for local work (not shown.) His key was an already old Vibroplex. A pair of Brandes headphones rounded out his homebrew station.

As part of the war effort, the Navy gave a code test at his high school. Hal received a score of 100%. The Navy was quick to visit Hal's parents, and inspected his ham shack. At 17½ years of age, Hal was off to teach radio for the Navy in Louisiana. Later he found himself on the staff of Admiral Sowell and served aboard the battleship *West Virginia*, BB48.

After the war he received the call W2QKM, went to college, became an engineer and ran his own engineering firm for 31 years. He's still active as NQ2Y, supervises two local repeaters, is vice president of his ham club and operates HF with a Kenwood 950 transceiver, a linear amp and a beam antenna. Hal is hoping to hear from some of his old buddies.

K2TQN'S OLD RADIO MUSEUM SCHEDULE FOR LATE AUGUST

K2TQN's Old Radio Museum will be on exhibit Saturday, August 19, along with the operation of special event station W2T by the Old Barney ARC. This will take place on the International Lighthouse Activity Weekend, August 19-20, from the Tucker's Island Lighthouse in Tuckerton, New Jersey. The lighthouse is a full-scale replica of the Tucker's Island lighthouse, which succumbed to the Atlantic Ocean back in 1927. It is the focal point of the new Tuckerton Seaport project, a working seaport built to preserve, present and interpret the "Baymen" and their way of life.

W2T operation will be from 1300 UTC on August 19 to 0300 UTC on August 20, and on August 20 from 1300 UTC to 2000 UTC. Frequencies to monitor are 7265, 14265, 21365, 28465 +/- QRM. Also, 146.835 (–600/PL-3A) and 146.52 MHz simplex. QSL via N2OO, PO Box 345, Tuckerton, NJ 08087. SASE (or SAE with IRC) for QSL. Send 9 × 12-inch SASE with appropriate postage/IRCs if you want a certificate with your QSL.

On Sunday, August 20, the museum will be at the Gloucester County ARC Hamfest in Mullica Hill, New Jersey. See **http://www.gcarc-w2mmd.org/events.html** for more information.

Look for my call letters on my hat and say hello.—*K2TQN* QST

John Dilks, K2TQN ♦ 125 Warf Road, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

Vintage QRP

Firing up an older QRP rig like a Heathkit HW-7 or Ten-Tec PM-2 or 3 can be a very rewarding experience, while simultaneously providing a heavy-duty reality check. One harmless idea that seems to eventually creep into every QRPer's dreams is to own one or two pieces of vintage QRP gear. Left unchecked, this can become an obsession and yet another "collection" takes shape!

An exterior shot of the HW-7. Note the large aluminum knob on the preselector shaft. This knob provides extra mass (weight) and the added circumference makes it easier to accurately peak the RF front end on the HW-7.

An interior view of the HW-7. The audio filter is on the right-hand side of the rear panel and the NoGa PiG is piggybacked on the left side of the rear panel.

Real QRP Rigs are Green!

One of my favorite rigs is the Heathkit HW-7, my very first QRP radio. I have many fond memories of using the HW-7 while stationed in the Azores (CT2BH) in the early 1970s. Then there was the ARRL Field Day in 1974 that found me operating my trusty Hot Water-Seven from the shore of Lake Thunderbird (Oklahoma) while suffering a bout of epididymitis. *Ouch!*

I recently located an excellent specimen of an HW-7 from a friend in Canada. This particular set had only one modification: an active audio filter had been installed with the controls mounted on the rear panel. Otherwise, this set was pristine. Money changed hands and I soon had my cherished HW-7.

The HW-7 fired right up and the receiver was full of signals. I squirted some DeOxit into all the controls and the band switch to remove any corrosion. Power output was about 1.5 W on 40 meters (my favorite band). The one thing I remember from my past experiences with the HW-7 was the AM breakthrough encountered when using this rig in the presence of a local AM broadcast station, or on 40 meters at night!

QRO to the Rescue!

My main station includes an old Dentron MT-3000A 3-kW antenna tuner! Why use a big brute of a tuner like the MT-3000A? Simply put, big tuners are made with low-loss components and exhibit very low insertion loss. This is just what you need for QRP. I hooked the HW-7 into the Dentron and proceeded to tune around the band. While I did experience some slight SW broadcast, overload it was not the "receiver swamping" that I remembered from days gone by. The local AM station two miles away did not come over the HW-7's receiver, either. Wow! A tuned circuit ahead of the HW-7 front end really does make a difference!

I banged out several back-to-back QSOs on 40 meters with the vintage rig. While the receiver is quite broad, the active AF filter helped immensely. This vintage rig was definitely up to the task of having some fun on 40 meters.

Anybody Seen a PiG?

One of the shortcomings of these older rigs is the lack of internal keyer. Today, thanks to the invention of the PIC microcontrollers, it is a very simple task to add a memory keyer to almost any radio. In addition to the keyer, I also wanted to incorporate some form or battery monitor/voltage protection circuitry. Enter the NoGa PiG!

What in God's name is the NoGa PiG? Well, NoGa stands for North Georgia QRP Group. The PiG is their latest novel club project: the Power indicator/Guard. Not only does the PiG monitor input voltages, it offers reverse polarity protection, low voltage input indication, over voltage and over current protection and has extra space on the board for the addition of a PIC memory and an audio hiss filter. Everything fits on one small (2.75 × 2 inches) PC board. All parts for the voltage protection circuitry come with the basic kit (obtainable from the NoGa guys). The builder supplies the parts for the keyer and hiss filter.

My PiG was assembled with little fanfare. One thing I did learn was that the R3/R4 voltage divider values provided in the kit did not set the undervoltage threshold where I wanted it. I ended up replacing R4 with a 10 kΩ miniature potentiometer. The 10-kΩ pot was adjusted so that a low voltage indication appears (the LED lights) with 11.25 V dc on the supply line. This means that as long as the supply voltage is over 11.25 V, the LED will remain extinguished. Once the supply voltage drops to 11.25 V dc or lower, the LED lights up, informing me that my battery power supply is nearly exhausted.

After I was satisfied that the NoGa PiG was working properly, I installed it inside the HW-7 by piggybacking on top of the active AF filter board using some spacers. I ran the LED up to the front panel and taped it to the side of the meter, where it illuminates the meter face should the battery supply voltage fall below 11.25 V. I used one of the K1EL PIC keyers in the PiG. The keyer control switch (a SPST normally open momentary contact pushbutton) is mounted in a small 1/4-inch hole drilled in the back panel. The 1/8-inch stereo jack for keyer paddles was placed on the back panel as well.

QRP KUDOS!

"QRP Power" congratulates Joe Everhardt, N2CX and Mike Bryce, WB8VGE on being inducted into the QRP Amateur Radio Club International's Hall of Fame during Dayton 2000. Both of these experienced QRPers personify the spirit of QRP. Well done, Joe and Mike.

QRP WebSurf

This month we'll take a look at the NoGa (pronounced "know-gah") Web site at: **http://www.qsl.net/~nogaqrp**. This site contains all the info you need to order your own NoGa PiG. The NoGa QRP group is a great bunch of people. Having family in the Atlanta, Georgia area, I have met with the NoGa folks on several trips down south. They are a fun group. QST

Rich Arland, K7SZ ♦ 25 Amherst Ave, Wilkes Barre, PA 18702 ♦ k7sz@arrl.org

COMING CONVENTIONS

ARKANSAS SECTION CONVENTION

September 16, North Little Rock

The Arkansas Section Convention ("All-Arkansas Hamfest"), sponsored by the Central Arkansas Radio Emergency Net (CAREN), will be held at the North Little Rock Community Center, Pershing Blvd and Willow Street; Exit 153A off I-40, S to Pershing Blvd, W on Pershing to Willow St. Doors are open 8 AM. Features include flea market, dealers, VE sessions, refreshments. Talk-in on 146.94, 444.2. Admission is $5. Tables are $18 each. Contact Scott Derden, K5SCD, Box 2893, Little Rock, AR 72203, 501-312-1881, **k5scd@arrl.net**; **http://carenclub.webjump.com**.

W9DXCC CONVENTION

September 16, Rolling Meadows, IL

The W9DXCC Convention, sponsored by the Northern Illinois DX Assn, will be held at the Holiday Inn "Holidome", 3405 Algonquin Rd; I-90 N to Rte 53 to Algonquin Rd Exit, left at light, hotel on right. Doors are open for registration at 8 AM, convention begins at 9 AM. Features include DXpedition presentations, programs, antennas, ARRL forum, DXCC QSL card checking, hospitality suites (Friday and Saturday), banquet (7 PM, guest speaker Wayne Mills, N7NG). Talk-in on 147.36. Admission is $50 in advance (before Sep 7), $55 at the door (convention and banquet); $28 in advance, $30 at the door (convention only). Contact Bill Smith, W9VA, 1345 Linden Ave, Deerfield, IL 60015, 847-945-1564, **w9va@aol.com**; **http://www.qth.com/w9dxcc**.

HUDSON DIVISION CONVENTION

September 16, White Plains, NY

The Hudson Division Convention, sponsored by the Westchester Emergency Communications Assn, will be held at the Westchester County Center, Central Ave and Bronx River Pkwy; I-287, Exit 5, Rte 119 E to Center on left. Doors are open 8 AM to 2 PM. Features include flea market, forums, VE sessions, special events station. Talk-in on 147.06 (114.8 Hz). Admission is $7. Tables are $25. Contact Thomas Raffaelli, WB2NHC, 544 Manhattan Ave, Thornwood, NY 10594, 914-741-6606, **wb2nhc@weca.org**; **http://www.weca.org**.

ALASKA STATE CONVENTION

September 16-17, Anchorage

The Alaska State Convention, sponsored by the Anchorage ARC, will be held at the Ben Boeke Indoor Ice Arena. Doors are open Saturday 10 AM to 5 PM, Sunday 10 AM to 3 PM. Features include swapmeet, commercial vendors ($35 flat fee), dealers, auction, VE sessions, FCC commercial license exams, banquet (Saturday eve, special guest speaker Gordon West, WB6NOA), Country Store, demos, forums (ARRL, QRP, DX, satellite), refreshments. Talk-in on 147.3. Admission is $3, under 13 free. Tables are $10 (plus 10% of sales). Contact Lil Marvin, NL7DL, 1030 Denali St, Anchorage, AK 99501-3712, 907-277-6741, **rlment@alaska.net**; **http://kl7aa.akconnect.com**.

WESTERN NEW YORK SECTION CONVENTION

September 16, Hamburg (Buffalo)

The Western New York Section Convention (11th Annual Buffalo Hamfest and Computer Show), sponsored by the Rochester ARA, will be held at the Erie County Fairgrounds, International Agri-Center, Rte 62, South Park Ave. Doors are open for setup Friday afternoon; public Saturday 6 AM for all activities. Features include huge indoor electronics flea market, commercial exhibits, vendors, outdoor tailgate flea market ($5 per 9-ft × 18-ft parking space plus admission), ARRL forum (11 AM, conducted by Atlantic Division Director Bernie Fuller, N3EFN), other forums. Admission is $6. Tables are $10 (plus admission). Contact Harold Smith, K2HC, 300 White Spruce Blvd, Rochester, NY 14623, 716-424-7184, fax 716-424-7130, **info@buffalohamfest.org**; **http://www.buffalohamfest.org**.

August 26
Missouri State, Columbia*
West Virginia State, Weston*

August 26-27
New England Division, Boxboro, MA*
New Mexico State, Rio Rancho*

August 27
Kansas State, Salina*

September 9
Kentucky State, Louisville*

October 14
North Texas Section, Denton

October 20-22
Pacific Division, Concord, CA

*** See August *QST* for details.**

DIGITAL COMMUNICATIONS CONFERENCE

September 23-24, Orlando, FL

The ARRL/TAPR Digital Communications conference will be held at the Orlando Airport Marriott, 7499 Augusta Dr, Orlando, FL 32822. For reservations contact the Marriott at 407-851-9000, or on the Web at **http://marriotthotels.com/MCOAP/**. Events include seminars, symposiums, a Student Paper session, banquet and much more. Conference registration includes conference proceedings, sessions, meetings and lunch on Saturday. Pre-registration (before September 1) is $45. Registration after September 1 (or at the door) is $55. Banquet registration is $30. Contact the TAPR office at 940-383-0000 or on the Web at **http://www.tapr.org**.

ROANOKE DIVISION CONVENTION

September 23-24, Virginia Beach, VA

The Virginia State Convention, sponsored by Tidewater Radio Conventions, will be held at the Virginia Beach Pavilion, E end of Hwy 264. Doors are open Saturday 9 AM to 5 PM, Sunday 9 AM to 4 PM. Features include hamfest and computer fair; flea market; dealer booths ($150); exhibits; forums; seminars; special guest speaker Riley Hollingsworth, K4ZDH; tailgating ($15); VE sessions. Talk-in on 146.97. Admission is $5 in advance, $6 at the door. Tables are $30. Contact Art Thiemens, AA4AT, 2836 Greenwood Rd, Chesapeake, VA 23321, 757-484-2857 or 757-426-3378, **aa4at@arrl.net** or **hamfest@exis.net**; **http://www.vahamfest.com**.

MICROWAVE UPDATE CONVENTION

September 29-30, Trevose, PA

The Microwave Update Convention, sponsored by the Mt Airy VHF Radio Club (Pack Rats), will be held at the Holiday Inn Select, Bucks County, 4700 Street Rd, just N of Philadelphia; PA Turnpike to Exit 28, take ramp for US 1 S for 0.1 mile, take Street Rd W Exit, Holiday Inn is 1 mile W on the left. Doors are open 8 AM to 5 PM. Features include topics related to Amateur Radio from 903 MHz to light, evening flea markets, noise figure testing, equipment tune-up clinic, banquet (Saturday eve). Admission is $40 in advance, $45 at the door. Contact John Sortor, KB3XG, 1214 N Trooper Rd, Norristown, PA 19403, 610-584-2489, **johnkb3xg@aol.com**; **http://www.ij.net/packrats/MUD_2000/mud.html**.

SOUTHWESTERN DIVISION CONVENTION

October 6-8, Scottsdale, AZ

The Southwestern Division Convention, sponsored by the Scottsdale ARC, will be held at the Ramada Inn Valley Ho, 6850 Main St. Doors are open Friday for registration at 2 PM, exhibits 4-7 PM, Saturday registration 8 AM, exhibits 9 AM-5 PM, Sunday 8 AM to noon. Features include Rawhide Dining/Entertainment (Friday, 5:30 PM) Antenna Party at No Host Bar (Friday, 7-9 PM), ARRL President Jim Haynie, W5JBP, technical speakers, exhibits, forums, programs, hospitality suites, VE sessions, Western Banquet, (special guest speaker Riley Hollingsworth, K4ZDH), Wouff Hong ceremony, Sunday Breakfast (8 AM, special guest speaker Dr Vince Thompson, K5VT), RV parking. Talk-in on 147.18. Admission is $15. Contact Walt Schuknecht, N7IZM, 8502 East Laredo Ln, Scottsdale, AZ 85250-6757, 480-947-0338 or 602-735-3988, **n7izm@arrl.net** or **swdc2000@w7asc.org**; **http://www.w7asc.org/swdc2000**.

CONNECTICUT STATE CONVENTION

October 8, Wallingford

The Connecticut State Convention, sponsored by the Nutmeg Hamfest Alliance, will be held at Mountainside, High Hill Rd; I-91, Exit 15, E on Rte 68, left on Research Pkwy, right on Carpenter Ave, left on High Hill Rd to Mountainside. Doors are open for setup at 6 AM; public 9 AM to 3 PM. Features include hamfest/computer show, large flea market, major vendors, technical seminars, special guest speaker Wayne Green, W2NSD, ARRL speakers (New England Division Director Tom Frenaye, K1KI, and CT Section Manager Betsey Doane, K1EIC), demonstrations, VE sessions, ample free parking, refreshments. Talk-in on 147.36. Admission is $6, under 12 $3. Tables are $25 ($20 if reserved and paid for by Sep 1), outside space $15. Contact Gordon Barker, K1BIY, 9 Edgewood Rd, Portland, CT 06480, 860-342-3258, **k1biy@juno.com** or **nutmeghamfest@qsl.net**; **http://www.qsl.net/nutmeghamfest**.

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 **September 1** to be listed in the **November** 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.)

Alaska (Anchorage)—Sep 16-17, Alaska State Convention. See "Coming Conventions."

†**Alaska (Fairbanks)—Sep 23.** *Spr:* Arctic ARC. Fairbanks Community Food Bank, 724 26th Ave; from S Cushman St go 1 block W on 26th to corner of 26th and Bjerremark (1 block W of A&B Mazda). Swap 'n Sell ham gear, electronics, computers, vendor displays, operating HF and VHF stations, Arctic ARC Annual Meeting (1:30 PM), VE sessions, hidden transmitter hunt (3:30 PM), banquet (7:30 PM, Rivers Edge Resort; special guest Gordon West, WB6NOA), ARRL forum with Northwestern Division Director Greg Milnes, W7OZ (Wednesday, Sep 20, 11:30 AM, The Royal Fork Restaurant, 3rd St and Steese Hwy). *TI:* 146.28/146.88 (103.5 Hz), 444.8/449.8 (103.5 Hz). *Adm:* Free (optional donation of a can of food for the Food Bank). Tables: $10 (reserve). Jim Movius, KL7JM, Box 83992, Fairbanks, AK 99708, 907-452-6347, fax 907-453-6349, **ajmovius@gci.net**; **http://www.mosquitonet.com/~fbrown/00hamfest.htm**.

Arizona (Scottsdale)—Oct 6-8, Southwestern Division Convention. See "Coming Conventions."

Arkansas (Bentonville)—Sep 23. Shirley Harris, KC5RDU, *TI:* 147.03.

†**Arkansas (Mountain Home)—Sep 9;** set up 6:30 AM; public 8:30 AM to 1 PM. *Spr:* Twin Lakes ARC. National Guard Armory, 806 Fuller St; from US 412/62 SW turn N on US 62 B, go approximately 1/4 mile N to Fuller, first left off US 62 B. *TI:* 147.075. *Adm:* $4, under 13 free. Tables: $8 (8 ft), $6.50 (5 ft), includes 1 admission ticket per table. Miles Waldron, N5QMI, 20 Terry Pl, Mountain Home, AR 72653-6713, 870-492-4466; **mpwaldron@centurytel.net**.

Arkansas (North Little Rock)—Sep 16, Arkansas Section Convention. See "Coming Conventions."

†**California (Santa Rosa)—Sep 16;** sellers 6:30 AM, buyers 7:30 AM. *Spr:* Sonoma County Radio Amateurs. Lewis Adult Education Center, corner of Lewis Rd and Lomitas Ave; Hwy 101 to Steele Ln, go E 8 blocks to corner of Lewis and Lomitas. Vendors (double parking spaces $10 each), VE sessions (9 AM to noon), refreshments. *TI:* 146.73. *Adm:* Free. Rick Reiner, K6ZWB, c/o SCRA, Box 116, Santa Rosa, CA 95402, 707-575-4455, **k6zwb@cds1.net**; **http://www.cds1.net/scra/**.

†**California (Ventura)—Sep 24,** 9 AM to 4 PM. *Sprs:* Ventura County ARC, Poinsettia ARC, and SMRA 6 Meter Group. Arroyo Verde Park, Redwood Glen Picnic Area, corner of Foothill Rd and Day Rd; from the 101 Freeway, exit on Victoria Rd, off ramp head N on Victoria Rd, turn left on Foothill Rd, turn right at Day Rd. Swap tables, tri-tip BBQ (make reservations early), parking ($1). *TI:* 146.88 (127.3 Hz). *Adm:* $7 (adults), $4 (children ages 6 to 12), age 5 and under free. George Kreider, KN6LA, 484 Deerhurst Ave, Camarillo, CA 93012, 805-388-2488, **kn6la@vcnet.com**; **http://www.jetlink.net/~ko6oy/barbq.html**.

†**Connecticut (Newtown)—Sep 17;** set up 7 AM; public 9 AM to 2 PM. *Spr:* Candlewood ARA. Edmond Town Hall, Rte 6; Exit 10 off I-84, follow signs. Flea market, new equipment dealers, computers, electronics, tailgating ($6, includes 1 admission), handicapped accessible, ample parking, refreshments. *TI:* 146.67 (100 Hz). *Adm:* $4, under 12 free. Tables: $10 (includes 1 admission). Seab Lyon, AA1MY, 12 Willow St, Beacon, NY 12508, 914-831-3124, **sslyon@att.net**; **http://www.danbury.org/cara**.

Connecticut (Wallingford)—Oct 8, Connecticut State Convention. See "Coming Conventions."

Florida (Daytona Beach)—Sep 30. Gerry Skinner, K4LVZ, 904-673-0197.

†**Florida (New Port Richey)—Sep 24,** 9 AM to 3 PM. *Spr:* Suncoast ARC. New Port Richey Recreational Center, 6630 Van Buren Rd; US Hwy 19 to Main St, E on Main to Van Buren, N on Van Buren to Center, follow signs. Inside air-conditioned exhibit hall, tailgating ($3 plus admission). *TI:* 145.35, 147.15. *Adm:* $5 (nonham spouses and under 12 free). Tables: $15, electricity $5 (plus admission). Ron Wright, N9EE, 8849 Gum Tree Ave, New Port Richey, FL 34653, 727-376-6575; **n9ee@akos.net**.

Georgia (Dallas)—Sep 16. Bill Houston, WD4LUQ, 770-445-9191.

†**Illinois (Grayslake/Chicago)—Sep 23-24;** flea market 6 AM both days; exhibit buildings Saturday 8 AM to 4 PM, Sunday 8 AM to 3 PM. *Spr:* Chicago FM Club. Lake County Fairgrounds, Rtes 45 and 120; I-294 to Rte 120, W to Rte 45. Huge outdoor flea market, indoor vendors, forums, VE sessions, free camping (outdoor electrical hookups available), free parking. *TI:* 146.76 (107.2 Hz). *Adm:* advance $6, door $8. Tables: $20 (good both days). Mike Brost, WA9FTS, 5127 N Monterey Ave, Norridge, IL 60706, 708-457-0966, **mbrost@tellabs.com**; **http://www.chicagofmclub.org**.

†**Illinois (Peoria)—Sep 16-17;** 6 AM to 4 PM. *Spr:* Peoria Area ARC. Exposition Gardens, Northmoor Rd; I-74 to Exit 91B, N on University, 3.8 miles to Northmoor Rd, left to gate. Outdoor flea market, forums, VE sessions (Sunday, 10 AM to 1 PM). *TI:* 147.075. *Adm:* advance $5 (2 stubs), door $5 (1 stub). Tables: $10 and $15 per 8-ft tables (inside). Jim Williams, N9HHU, Box 3508, Peoria, IL 61612-3508, 309-692-3378, **jimn9hhu@juno.com**; **http://www.w9uvi.org**.

Illinois (Rolling Meadows)—Sep 16, W9DXCC Convention. See "Coming Conventions."

†**Indiana (Bedford)—Oct 1,** 6 AM to 3 PM. *Spr:* Hoosier Hills Ham Club. Lawrence County 4-H Fairgrounds, US 50 W; from junction of SR 37 and US 50 W, 1/2 mile down on US 50 W. VE sessions (noon), free chili supper (Saturday eve). *TI:* 146.73 (107.2 Hz). *Adm:* $6. John Scheiwe, KB9LTI, RR 14, Box 1481, Bedford, IN 47421, 812-279-0050, **chairman@hoosierhillshamfest.org**; **http://www.hoosierhillshamfest.org**.

Iowa (West Liberty)—Oct 1. Steve Fowler, KA9AQR, 309-537-3678.

†**Maine (Lincoln)—Sep 23,** 8 AM. *Spr:* Bagley ARC. Ella P. Burr School, Rte 2; I-95, Exit 55, take connector Rd to Rte 2 (3 miles), left on Rte 2 through Lincoln for 3 1/2 miles, school on right. VE sessions. *TI:* 147.0. *Adm:* $2 (children free when accompanied by an adult). Tables: $4. Max Soucia, N1KGS, 423 Rte 7, Dover Foxcroft, ME 04426, 207-564-8943 or 877-723-3346; **n1kgs@arrl.net**.

†**Maryland (Bowie)—Sep 24,** 8 AM to 3 PM. *Spr:* Foundation for Amateur Radio. Prince George's Stadium, 1/2 mile S of US Rte 50 on Rte 301; 15 miles E of Washington, DC and 20 miles S of Baltimore. Commercial vendors, tailgating ($10), VE sessions. *TI:* 146.52. *Adm:* $5. Tables: $25. Dan Blasberg, KA8YPY, 8800 Rhode Island Ave, College Park, MD 20740, 301-345-7381, **blasberg@bellatlantic.net**; **http://www.amateurradio-far.org**.

†**Maryland (West Friendship)—Oct 8;** set up 6 AM; public 8 AM to 3:30 PM. *Spr:* Columbia ARA. Howard County Fairgrounds, off Rte 144; take I-70 to MD 32 Exit to Rte 144; Fairgrounds 1 block from 32/144 intersection. Hamfest/Computerfest, giant flea market (opens 6 AM), large indoor display area, tailgating ($10), vendors, electronics, equipment, antennas, VE sessions, handicapped accessible, free parking, refreshments. *TI:* 147.135 (156.7 Hz), 146.52. *Adm:* $5, nonham spouses and children free. Tables: $20 (for 1-4 tables), $18 (for 5 or more tables). Randy Krenz, N3HFK, c/o CARA, Box 911, Columbia, MD 21044, 410-796-2587 or 410-750-0379, **n3hfk@arrl.net**; **http://www.qsl.net/cara**.

Massachusetts (Cambridge)—Sep 17. Nick Altenbernd, KA1MQX, 617-253-3776.

†**Michigan (Grand Rapids/Caledonia)—Sep 16,** 8 AM to 2 PM. *Sprs:* Grand Rapids ARA, Lowell ARC, and Michigan ARA. Caledonia High School Gymnasium and Parking Lot, 9757 Duncan Lake Ave SE; Hwy M-37, SE of Grand Rapids. VE sessions. *TI:* 147.26 (94.8 Hz), 146.52. *Adm:* advance $4, door $5. Tables: $8 per 8-ft table, $6 per outdoor space. Lee Burgess, W8ZP, 46 Indiana Ave SW, Grand Rapids, MI 49504-6278, 616-458-9297, **hamfest@w8dc.org**; **http://www.w8dc.org**.

†**Michigan (Lansing)—Oct 8;** setup 6 AM; public 8 AM to 2 PM. *Sprs:* Central Michigan ARC and Lansing Civil Defense Repeater Assn. The Summit, 9410 Davis Hwy (Dimondale); off Exit 98B, I-96. Forums (ARRL, DX), VE sessions (9 AM, first-come, first-served; preregistration suggested), plenty of parking. *TI:* 145.39, 146.52. *Adm:* advance (with SASE) $5, door $6, under 13 free. Tables: advance $10.50, door $12.50 (plus admission). J. Ervin Bates, W8ERV, Box 80106, Lansing, MI 48909, 517-676-2710, **w8erv@arrl.net**; **http://www.qsl.net/cmarc/hamfair.html**.

†**Minnesota (Rush City)—Sep 9;** sellers 7 AM, buyers 8 AM. *Spr:* East Central Minnesota ARC. Rush City High School, W Second Ave. Tailgating ($5 per spot), ARES display, refreshments. *TI:* 145.33. *Adm:* $3. Tables: $5. Larry Jilek, KA0MEN, 51835 Belle Isle Dr, Rush City, MN 55069, 320-358-4205; **lj@ecenet.com**.

†**Missouri (Warrensburg)—Oct 7,** 8 AM to 1 PM. *Spr:* Warrensburg Area ARC. American Legion Post 131; from Hwy 13 take Business 50 E for 1 mile. VE sessions, refreshments. *TI:* 146.88. *Adm:* Free. Tables: $12. Denise Haye, N0PVZ, 1826 NW 530, Kingsville, MO 64061, 816-697-3426, **we0g@microlink.net**; **http://www.call.to/waarci.**

New Hampshire (Rochester)—Oct 6-7. "Hosstraders", Joe Demaso, K1RQG, 207-469-3492.

†**New Jersey (Teaneck)—Oct 7,** 8 AM to 2 PM. *Spr:* Bergen ARA. Fairleigh Dickinson University, 1000 River Rd; George Washington Bridge to Rte 4 W, about 5 miles to River Rd Exit. Flea market (outdoor spaces are $10 each, includes admission; limited number of spaces with electricity are $20 each), vendors, VE sessions (8-10 AM, Novice thru Extra, bring original FCC license, a photo copy, and positive ID), lots of parking, refreshments. *TI:* 146.79. *Adm:* $5, nonham spouses and children free. Jim Joyce, K2ZO, 286 Ridgewood Blvd N, Westwood, NJ 07675, 201-664-6725, **jjjoyce@cybernex.net**; **http://www.bara.org**.

†**New Mexico (Alamogordo)—Sep 2,** 7 AM to 3 PM. *Spr:* Alamogordo ARC. Otero County Fairgrounds, Hwy 54 and Fairground Rd; N side of Alamogordo on Hwys 54/70. Forums (ARRL, MARS, 3939), VE sessions. *TI:* 146.8 (100 Hz). *Adm:* Free. Tables: $5 each. Larry Moore, WA5UNO, 1830 Corte Del Ranchero, Alamogordo, NM 88310, 505-437-0145; **n9cqoxstitch@netmdc.com**.

New York (Hamburg/Buffalo)—Sep 16, Western New York Section Convention. See "Coming Conventions."

†**New York (Margaretville)—Sep 23;** set up 6 AM; public 9 AM to 4 PM. *Spr:* Margaretville ARC. Margaretville Firemens' Fairgrounds; from NYC/Long Island go N to Kingston then W on Rte

†ARRL Hamfest

Gail Iannone ♦ Convention Program Manager

28; at junction of State Rtes 28 and 30. Tailgating ($7), VE sessions. *TI:* 146.985, 449.125, 146.52. *Adm:* $4. Tables: $10 (for space only; tables available for an additional $5). Lester Bourke, KB2DCE, Dry Brook Rd, Arkville, NY 12406, 845-586-3186 or 845-586-2324, **bourke@catskill.net**; **http://www.catskill.net/marc**.

New York (White Plains)—Sep 16, Hudson Division Convention. See "Coming Conventions."

†**New York (Yonkers)—Sep 24;** set up 7 AM; public 9 AM to 3 PM. *Spr:* Metro 70cm Network. Lincoln High School, Kneeland Ave; NYS Thruway (87 S) to Yonkers Ave Exit, go W to St Johns Ave, go 2 blocks, turn right on Theresa Ave, next block turn left onto Kneeland. Giant electronics indoor flea market, vendors, VE sessions, free parking, unlimited free coffee. *TI:* 440.425 (156.7 Hz), 223.76 (67 Hz), 146.91, 443.35 (156.7 Hz). *Adm:* $6, under 12 free. Tables: advance $19, door $25 (if available). Otto Supliski, WB2SLQ, 53 Hayward St, Yonkers, NY 10704, 914-969-1053; **wb2slq@juno.com**.

†**Ohio (Cincinnati)—Sep 17,** 8 AM to 4 PM. *Spr:* Greater Cincinnati ARA. Kolping Center, Springdale and Mill Rds; exit I-275 N of Cincinnati to US Rte 127 S, left on Springdale Rd to Mill Rd, right to Communications Expo. Flea market, dealers, forums, hidden transmitter hunts, VE sessions, free parking, refreshments, free coffee and donuts at 8 AM until gone. *TI:* 146.88. *Adm:* advance $5, door $8. Tables: indoor $50 each or 5 for $200; outdoor $10 per space or $40 for 5 spaces, tables not furnished in flea market. Jim Weaver, K8JE, 5065 Bethany Rd, Mason, OH 45040, 513-459-0142; **k8je@arrl.net**.

†**Ohio (Cleveland)—Sep 24.** *Spr:* Hamfest Assn of Cleveland. Cuyahoga County Fairgrounds; 1 1/2 miles W of I-71 and Bagley Rd interchange, 1/2 mile S on Eastland Rd. Technical forums, VE sessions, refreshments. *TI:* 146.73 (110.9 Hz). *Adm:* advance $4.50, door $5. Tables: $20 (includes 1 admission), $15 for each additional table (plus admission). Ron Nichols, N8LZA, 800-CLE-FEST or 216-999-7388, **info@hac.org**; **http://www.hac.org**.

†**Ohio (Findlay)—Sep 10,** 8 AM to 3 PM. *Spr:* Findlay RC. Hancock County Fairgrounds, 1017 E Sandusky St; State Rte 568, 1 mile E of Main St. Flea market ($5 per space). *TI:* 147.15. *Adm:* $5. Tables: $14 (inside). Bill Kelsey, N8ET, c/o Findlay Radio Club, Box 587, Findlay, OH 45839, 419-423-4604 or 419-423-3402, **kanga@bright.net**; **http://www.bright.net/~kanga/w8ft/hamfest.html**.

†**Ohio (Medina)—Oct 8,** 8 AM to 2 PM. *Spr:* Medina Two Meter Group. Ohio National Guard Armory, 920 Lafayette Rd (State Rte 42); take SR 42, 1 1/2 miles W of downtown Medina. VE sessions, refreshments. *TI:* 147.03. *Adm:* advance $4, door $5. Tables: advance $9, door $10. Michael Rubaszewski, N8TZY, 4264 Alpine Hill Ct, Brunswick, OH 44212, 330-273-1519, **n8tzy@webcombo.net**; **http://www.qsl.net/m2m**.

Ontario (Oakville)—Sep 29-30. Brian Smith, **odxa@compuserve.com**.

†**Pennsylvania (Schnecksville)—Sep 16.** *Spr:* Delaware Lehigh ARC. Schnecksville Fire Company, Rte 309; 4.3 Miles N of Rte 22. Tailgating ($7). *TI:* 146.7 (151.4 Hz), 444.9 (151.4). *Adm:* $5. Tables: $11 (indoor). Carl Seier, AA3IX, 5234 Plata Dr, Coplay, PA 18037, 610-261-0403, **aa3ix@arrl.net**; **http://www.kutztown.edu/faculty/chuk/dlarc/**.

Pennsylvania (Trevose)—Sep 29-30, Microwave Update Convention. See "Coming Conventions."

Pennsylvania (Uniontown)—Sep 2. Carl Chuprinko, WA3HQK, 304-594-3779.

†**Pennsylvania (Wrightstown)—Oct 1;** sellers 6 AM; buyers 7 AM. *Spr:* Mt Airy VHF RC. Middletown Grange Fairgrounds, Penns Park Rd; between Rtes 413 and 232, N of Richboro in Bucks County. *TI:* 224.58, 146.52. *Adm:* $5. Tables: $15 per 8-ft indoor table; $10 per outdoor car space. Joseph Keer, KU3T, 468 Cheswyck Dr, Harleysville, PA 19438, 215-256-1464, **ku3t@amsat.org**; **http://www.ij.net/packrats/MUD_ 2000/mud.html**.

†**Pennsylvania (York)—Sep 16-17;** Saturday 1-8 PM, Sunday 8 AM to 4 PM. *Spr:* York Hamfest Foundation. York County Area Vocational Technical School, 2179 S Queen St; Exit 6 off I-83, go S 1 block to Pauline Dr, E on Pauline Dr to first entrance on right. Seminars (Sunday, FCC with Riley Hollingsworth, K4ZDH), VE sessions, tailgating (Sunday only). *TI:* 146.52. *Adm:* $5. Tables: advance $15, door $20. John Shaffer, W3SST, 2596 Church Rd, York, PA 17404, 717-764-8193 or 717-764-4805, **w3sst@yorkhamfest.org**; **http://www.yorkhamfest.org**.

Rhode Island (Forestdale/North Smithfield)—Sep 16. Rick Fairweather, K1KYI, 401-725-7507.

†**South Dakota (Sioux Falls)—Sep 30,** 9 AM to 3 PM. *Spr:* Sioux Empire ARC. Old National Guard Armory, Sioux Empire Fairgrounds; Exit 79 off I-29, go E to first traffic signal, N to Fairgrounds (sign on corner). VE sessions (10 AM to noon). *TI:* 146.895. *Adm:* advance $4, door $5. Tables: $10; commercial $15 (with electricity). Will Gravning, KE0Z, Box 91, Sioux Falls, SD 57101, 605-647-2606, **w0zwy@qsl.net** or **gravning@iw.net**; **http://www.qsl.net/w0zwy**.

Texas (Webster)—Sep 23. Kyle Swarts, KD5HQD, 713-666-5854.

Virginia (Virginia Beach)—Sep 23-24, Roanoke Division Convention. See "Coming Conventions."

Washington (Chehalis)—Oct 1. James Kruger, KK7AB, 360-748-1930.

†**Washington (Graham)—Sep 9;** set up Friday 4-9 PM; public Saturday 9 AM to 3 PM. *Spr:* Radio Club of Tacoma. Frontier Park, 21718 Meridian Ave E; I-5, Exit 127, go E on Hwy 512 for 8.6 miles, exit on Meridian Ave E (Hwy 161), go S on Meridian for 7 miles, Park is on right side. VE sessions, RV camping ($7, with power $10), free parking. *TI:* 147.38 (103.5 Hz), 146.58. *Adm:* $5 (under 16 free with adult). Tables: $20, commercial $30. Roger Terwilliger, WA7ANJ, 5402 E "K" St, Tacoma, WA 98404-2615, 253-475-4293, **rtwig@worldnet.att.net**; **http://www.w7dk.org**

†**Washington (Walla Walla)—Sep 23,** 8 AM to 4 PM. *Spr:* Walla Walla Valley ARC. National Guard Armory, intersection of Poplar and Colville Sts. Seminars, ARRL meeting, ARES meeting. *TI:* 146.96. *Adm:* $5, nonham spouses and kids $2.50. Tables: $10. Mel Hickman, KK7SR, Box 321, Walla Walla, WA 99362, 509-529-8828; **kk7sr@arrl.net**.

Attention All Hamfest Committees!

Get official ARRL sanction for your event and receive special benefits such as free prizes, handouts, and other support.

It's easy to become sanctioned. Contact the Convention and Hamfest Branch at ARRL Headquarters, 225 Main St, Newington, CT 06111. Or send e-mail to **giannone@arrl.org**. QST

NEW PRODUCTS

UPDATED LICENSE MANUALS FROM GORDON WEST

◊ Gordon West, WB6NOA, offers an updated series of Amateur Radio license study manuals that reflects the changes brought about by the recent FCC Restructuring. These include new manuals for the Element 2 Technician class, the Element 3 General class and the Element 4 Extra class. West has also released a "Learning Morse Code" cassette tape course that includes 6 audio cassettes specifically recorded for the 5 WPM Element 1 exam.

The new 192-page Element 2 Technician Class Book covers all 394 questions and answers in the current question pool and includes text that further explains the correct answers. The manual provides many illustrations and also contains a section detailing the VHF and UHF band plans.

Additional information includes an explanation of the restructured Amateur Radio service and an overview of the study of Morse code using the Farnsworth method. The covered material is valid through June 30, 2003.

The 160-page Element 3 General Class Book covers the 385 questions and answers contained in the updated General class question pool. There's a 16-page pullout section that details the recent changes to the General class licensing requirements.

This manual is also generously illustrated. Portions of the text focus on understanding propagation, high-frequency operating techniques and band plan courtesies. The study material presented in this book is valid through June 30, 2004.

The 240-page Element 4 Extra Class Book covers the 676 questions and answers contained in the updated Extra class question pool. West provides shortcuts and math formula explanations intended to help readers through the challenges presented by the more advanced math problems that appear on the Extra class exam.

There are detailed sections on the specific frequency privileges of all license classes—including the Advanced class—and a discussion of RF safety. The study material in this book is valid through June 30, 2002.

West's new 6-cassette Morse code tape set employs the Farnsworth method to develop Morse skills to the required 5-WPM level and sets the stage for rapid advancement in proficiency once you've earned your ticket.

West also produces commercial radiotelegraph test preparation materials for the 16- and 20-WPM code groups and 20-WPM plain language elements, and has recently updated his study manuals for the General Radiotelephone Operator License with Radio Endorsement exams.

Gordon West's publications are available from your favorite Amateur Radio dealers or through W5YI. Radio School Inc, 2414 College Dr, Costa Mesa, CA 92626; tel 714-434-0666; **http://www.gordonwestradioschool.com/**.

NMO MOUNT GPS ANTENNA FROM ANTENEX

◊ Antenex Inc has recently released their GPSU15M NMO mount 1.585 GHz GPS antenna.

The compact, rugged, cylindrically shaped package measures approximately 1 1/2 inches high and 2 3/4 inches in diameter.

NMO-type mounting is commonly used on a wide variety of VHF and VHF/UHF mobile Amateur Radio antennas. The availability of a vast selection of NMO mounting hardware will greatly simplify installation of this GPS antenna for mobile applications.

For more information on the GPSU15M 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; **http://www.antenex.com**.

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Next New Product

Mobile to the Max!

[You've heard that technical innovation in ham Radio is a lost art? Don't believe it! I have dozens of letters and photos from hams that say otherwise. This month, Mark, KA9LXP, tells about his unique mobile station.—*WF4N*]

KA9LXP, MOBILE

By Mark Brueggemann, KA9LXP, 8105 Kathryn Ave SE, Albuquerque, NM 87108-4113; **ka9lxp@arrl.net**, **http://www.qsl.net/ka9lxp**

The first question most people ask about my truck is "Gee, what are all the antennas for?" My reply? "For all the radios!" Peeking inside my Chevy S10 pickup, the curious are greeted by the sight of seven Motorola commercial VHF and UHF transceivers and one 10-meter SSB rig. This assemblage provides coverage from 10 meters through 440 MHz. Although I'm sure I'm not the first ham to use eight transceivers in a mobile station, what sets my installation apart from others is the level of integration. Instead of just bolting transceivers in any available space and having microphones, speakers and wires going everywhere, all the radios and control heads were purposely selected and mounted in a uniform way. Custom cabling and interfacing enable these radios to operate together with just one microphone and no visible wiring.

Operation

I designed and built a control head, which allows any selected radio to be used with a single microphone and overhead speaker. Remaining radios may still be monitored through a secondary floor speaker, even when I'm transmitting. This allows me to monitor all the radios at once and not miss traffic on other bands. A control head indicator identifies active radios, eliminating the distraction of trying to figure out which radio I'm hearing. Received audio may also be routed to the CD input of the AM/FM tape player, with the primary radio's audio fed to the left speakers, and unselected radio audio mixed and fed to the right speakers. If desired, received audio can be patched to a 100 W PA speaker in the front grille for monitoring outside the vehicle.

Conventional operation is via a standard DTMF hand mike, but a shifter-mounted PTT switch and cellular mike on the visor permit hands-free QSOs.

Since commercial transceivers aren't directly programmable, I dedicated an old 286 laptop to run all the programming software. A spreadsheet on my home computer simplifies the task of managing the hundreds of programmed ham and public safety channels.

Technical

The Motorola radios I used are a combination of dash and remote mount, and include an A7 Spectra, an MCX1000, some MaxTracs, and an old Mocom 10. The heart of the system, the control head, was built using a Systems 90 head for hardware. In it, transmit audio, along with PTT, is routed to the selected radio through a bank of op-amps for individual level control and buffering. Receive audio and COS logic are fed into a bank of comparators which are used to light the RX LEDs and feed the mixing amplifier. Post-audio amplification is done in the primary and secondary paths using 12 W amplified speakers. The vehicular repeater function is implemented by routing the selected radio's received audio to a VOX circuit that keys the 440-link transceiver. The link's COS controls the selected radio's PTT. Channel selection, scan and other functions are manually controlled at each radio.

Construction

I began the four-month long installation by removing most of the truck's dash and heater system. Layer by layer, I installed the needed assemblies and wiring. The dash was reinforced with $^3/_4$-inch plywood along its length, and the 75 or so pounds of radios are attached to the plywood. Each transceiver has its own antenna—six antennas are mounted on the roof, one on the fender, one on the bumper. Roof-mounted antennas are standard NMO mount $^1/_4$ wavelength whips. Power is supplied via terminal strips through four fuse banks, fed by two 6-gauge cables and two 40-A relays, fused directly to the 12-V battery. Since only one radio transmits at a time, power used by this setup isn't as much as you might think. Typically, the current consumption is 7A in receive, and 22 A or so in transmit.

Not Just The Radios Are Electric...

Even after adding all the radio stuff and a several-hundred watt, 10-speaker stereo, I still wasn't finished! Two years ago, I removed the gasoline V6 engine and converted the truck to electric power. It's now propelled by a dc electric motor and 24 lead-acid golf cart batteries. With almost 22 kW/h of storage capacity, there is more than enough power to keep all the gadgets fed. The 300 W peak draw of the radios is nothing compared to the 50 kW that the motor can draw. With a 70-mile range and top speed well over any legal limit, my truck is now the ultimate mobile ham toy. As my daily driving vehicle, it averages over 8000 miles a year. I like my electric truck for its simplicity, economy and high fun factor. It's especially fun to hear people complain that there's no room in today's cars to fit a 2-meter rig, then invite them to see what I fit into a compact pickup. Plus, now that it's electric, I have no more worries about alternator or ignition noise! QST

NEW PRODUCTS

WINDOWS Logging Software

◊ Sharps Ltd announces the release of their *Sharps Logger* Amateur Radio contact logging software. Version 1.0 is a 32-bit *Windows 95/98/NT/2000* program on CD ROM.

Sharps Logger comes complete with a 68-page manual. An online "help" feature is also provided.

The program is capable of supporting multiple logs limited only by available disk space on the computer with a maximum log size of 32,000 entries.

Additional highlights include call sign CD access, DX *PacketCluster* support, QSL card design and label generation, built-in CW and voice keyer, world maps with station locations, log manipulation with *Cabrillo* support and much more.

Price: $59.95 plus $5 shipping. For additional information contact Sharps Ltd, 580 Thrush Dr, Rock Creek, OH 44084; tel 440-563-4115; fax 603-307-7903; **sales@sharpsltd.com**; **http://www.sharpsltd.com**.

Next New Product QST

Roger Burch, WF4N ♦ Box 100, Island, KY 42350 ♦ wf4n@arrl.org

SILENT KEYS

It is with deep regret that we record the passing of these amateurs.

*WA1OPE, Peter M. Fryncko, Oxford, CT
K1RG, Robert E. Greim, Natick, MA
W1RIM, John J. Duda, Edinboro, PA
KB1SS, Douglas P. Waterhouse, Lindsborg, KS
K1VLK, Frank P. DiPesa, Revere, MA
W1WM, Robert E. Thompson, Deer Isle, ME
WA2AXH, Donald H. Cole, Ocala, FL
W2BDL, J. R. Johnson, Succasunna, NJ
W2DME, Philip B. Petersen, Neptune, NJ
KB2EUA, Miriam Kravitz, Woodbury Heights, NJ
WA2FKA, Robert L. Soper, Elmira Heights, NY
K2HJX, Arthur C. Lindsley, Hyde Park, NY
NB2I, Gordon S. Batchelor, Laguna Vista, TX
N2KXC, Barbara J. Orvis, Syracuse, NY
WB2LLZ, John R. Yancone, Rochester, NY
W2MVX, Jarvis A. Collins, East Hampton, NY
N2NE, Walter Adams, Webster, NY
K2OLL, Ray C. Linnertz, New Port Richey, FL
WB2OQS, Harry J. Hanbury, Yonkers, NY
W2OUM, C. R. Vander Brooke, Rochester, NY
K2QGH, Howard F. Hirst, Pitman, NJ
WA2VUF, Charles E. Butterfield, Rochester, NY
KB3ABY, Anthony J. Sfarra, New Ringgold, PA
W3DES, Frank W. Blair, Wyomissing, PA
N3EIZ, Philip F. Stumpf, Lancaster, PA
W3EUP, George W. Banzhoff, Lancaster, PA
W3HSW, Charles N. Haser, Alexandria, VA
K3OQR, Frank M. Chepponis, Gibsonia, PA
*K3PHY, Wilmer T. Burns, Willow Grove, PA
WO3P, George N. Pappas, Bernville, PA
W3UEA, Charles A. Ball, Irwin, PA
K4BWA, Irving D. Foster, Kingsport, TN
K4FQJ, Eugene H. Wilbur, Urbana, IL
K4FVI, Charles A. Morgan, Hampton, VA
WD4GBR, Eugene H. Tyler, West Palm Beach, FL
WB4GMS, George W. Pope, Joelton, TN
W4ISY, Richard E. Klingler, Ocala, FL
W4KDP, Robert N. Whitehurst, Tuscaloosa, AL
W4MGL, Monroe M. Freedman, Plantation, FL
KD4MJB, Lucille D. Floyd, Eden, GA
KA4MLZ, Isobel S. Smith, Antioch, TN
N4MXB, Gary R. Petsch, Hopkinsville, KY
KF4MYI, Frank H. King, Deatsville, AL
K4OEZ, John C. Maxwell, Cusseta, GA
W4OMG, Floyd H. Dunlap, St Louis, MO
W4PAM, Ramon M. Pace, Ashland, KY
N4PQK, Robin P. Hood, Asheville, NC
KA4PRJ, Marion M. McCullough, Zephyrhills, FL
WA4TFG, Jack T. Beverly, Red Springs, NC
WB4TNI, Judson B. Sides, Birmingham, AL
KB4UMM, James E. Muncy, Clinton, TN
*K4VOS, William A. Resch, Pittsford, NY
N4YZC, Lee G. Waggener, Nashville, TN
N5BBW, John Storch, Llano, TX
W5CAE, Ernest C. Burch, Lindale, TX
WA5EKU, Lloyd D. Geiselbrecht, Gatesville, TX
WB5JCK, Rodney Scarbrock, Monroe, LA
W5KLI, Frank C. Neal, Houston, TX
NE5K, Harold R. Ecke, Lufkin, TX
W5KXQ, B. J. Courtright, New Braunfels, TX
W5MNY, Robert B. Hood, Longview, TX
W5MQH, Harry L. Barr, El Dorado, KS
W5OP, Charles H. Thomsen, Houston, TX
KF5OX, Donald B. Powell, Las Cruces, NM
KC5RIB, Hazel W. Orman, Biloxi, MS
KI5UE, Roger E. Matter, Los Alamos, NM
W5UTQ, Raymond F. Schmitz, North Tonawanda, NY
KA6ATU, Walter M. Rulison, Fresno, CA
W6AXT, George F. Moynahan, San Jose, CA
KB6BUL, Louis C. McCall, Adamsville, TN
W6GGU, Willard C. Livingston, San Jose, CA
WD6GLS, John L. Elwell, Rancho Palos Verdes, CA
WD6GXS, Fred L. Lewis, Orange, CA
KK6HH, Donald E. Coker, North Hollywood, CA
W6HRK, Walter M. Chase, Fallbrook, CA
*K6HVN, Robert D. Laughlin, Salem, OR
W6IFO, S. H. Macdonald, San Anselmo, CA
KC6IHR, Donald W. Dewey, Sierra Madre, CA
KM6LO, Harry J. Kozlowski, La Puente, CA
WA6MUT, Daniel J. Lancaster, Mi Wuk Village, CA
W6OML, R. A. Powell, Sun City, CA
WA6PZQ, James E. Keller, Fresno, CA
K6SHC, Lawrence M. Frazier, West Covina, CA
K6SI, Karl Kauffman, Carmel, CA
WH6T, Richard D. LaChance, Kailua, HI
AC6UB, Eldon D. Nickel, Grover Beach, CA
KQ6VD, Donald G. Swanger, Modesto, CA
N6VUI, Linda K. Dollarhide, Orange, CA
W6YZW, George R. Burge, Los Angeles, CA
W7DAA, William F. Sanders, Salem, OR
W7DZO, Frank R. Olsen, Belfair, WA
K7JZS, Westley E. Shull, Anacortes, WA
W7LI, Thurlow V. Wauchope, Portland, OR
W7LNP, Elisha Roberts, Tempe, AZ
W7OCA, Joseph H. Rudolph, Tacoma, WA
W7OES, Clarence M. Schmauch, Spokane, WA
W8HQK, John H. Rieth, Goshen, OH
K8JNS, Daniel F. Finlay, Milford, MI
N8JYB, William E. Casey, Charlotte, MI
W8LVB, Joseph Lazar, Elyria, OH
W8NOF, Royal D. Hillier, Sarasota, FL
KB8PAO, Howard E. Proud, Cincinnati, OH
KA8USX, George Gillum, Middletown, OH
KB8VVJ, Philip A. Cox, New Carlisle, OH
K9ANV, Raymond J. Sunderland, Tomahawk, WI
WA9BYZ, Paul A. Rice, Evansville, IN
K9CG, Charles M. Green, Grapevine, TX
K9DDM, Howard D. Ferguson, Frankfort, IN
WD9EGL, Frank R. Raschert, Peoria Heights, IL
W9FYC, Arthur R. Taylor, Muncie, IN
W9HSN, Robert J. Reeves, Greencastle, IN
W9IFW, John E. Dingle, Indianapolis, IN
W9IXT, Ermel R. Fagg, Cory, IN
W9KEQ, William T. Hines, Washington, IL
K9KWQ, Alvin Kaplan, Grayslake, IL
W9OVZ, William J. Komistra, Racine, WI
N9QJP, Mary H. Selk, Springfield, IL
WA9SZV, Donald J. Glaubitz, Milwaukee, WI
KY9V, Donald R. Harper, San Antonio, TX
WB9VYK, Arthur L. Anderson, Chippewa Falls, WI
N9YGY, E. William Easterday, South Whitley, IN
W9ZSK, William T. Elliott, Martinsville, IN
W0AIX, Hugh Byal, Mingo, IA
W0ALS, Robert Lamb, Farlington, KS
*N0CLS, Lucille Lackore, Winona, MN
K0DGX, Walter D. Keith, Des Moines, IA
W0DSH, Joseph B. McAlpine, Denver, CO
W0FDA, Arnold Kauble, Coralville, IA
NG0H, J. E. Sees, Springfield, MO
W0HNW, Leland W. Jones, Garrison, ND
W0PH, Guy A. Simmons, Branson, MO
W0QOB, George A. Howard, Littleton, CO
W0WJB, Richard D. Plummer, Topeka, KS
G5RV, R. Louis Varney, Burgess Hill, West Sussex, UK
VE3PCK, Paul Klekos, Flesherton, ON, Canada
ZL2BCX, John W. Luxford, Feilding, New Zealand

*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

MFJ TNC HOST MODE SOFTWARE FROM CSS

◊ Creative Services Software announces the release of *Multicomm Host for Packet*, a 32 bit *Windows 95/98/NT/2000* host mode program for MFJ TNCs.

Multicomm Host uses the TNC's "BLP" host mode for packet communications. Howard Goldstien, N2WX created the BLP host mode in 1991. The software supports all MFJ/TAPR TNC2s that include the BLP host mode (the MFJ-1270 - MFJ-1276 with 1.2.9× firmware, the MFJ-1278 or the TAPR TNC2 with 1.1.× firmware with BLP).

Highlights include multi-stream and multi-port operation with up to 10 streams per packet port; text and binary transfers with YAPP; COM 1 to COM 35 compatibility; multiple monitor windows and user definable colors, fonts and macros. Text can be saved to a file that is compatible with Microsoft *Word*.

A demo version of the software can be downloaded from **http://www.cssincorp.com/multicommhost**. A multimode version of the software is slated for release later this year.

For additional information contact Creative Services Software, 503 W State St, Suite 4, Muscle Shoals, AL 35661; tel 256-767-3739; fax 256-381-6121; **info@cssincorp.com**; **http://www.cssincorp.com**

MFJ CONVENTIONAL POWER SUPPLIES

◊ MFJ Enterprises has added two new conventional 13.8 V dc regulated power supplies to its product line.

The supplies are intended for powering dc equipment, such as transceivers and station accessories, from 110 V ac.

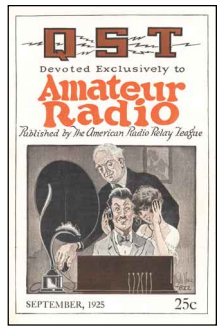
The MFJ-4322 is rated at 20 A continuous service (22 A surge). It measures $4^{3}/_{4}\times8\times11^{3}/_{4}$ inches and weighs 19 lbs. The MFJ-4312 is rated at 10 A continuous (12 A surge), measures $4^{3}/_{4}\times8\times10^{3}/_{4}$ inches and weighs 14 lbs.

Claimed specifications for the regulation of either supply state that the output variation is below 1.5%. The ripple voltage is said to be below 60 mV for the MFJ-4322 and below 40 mV for the MFJ-4312. Over-voltage and over-temperature protection, and fold back short circuit current limiting features are included.

Price: MFJ-4322, $99.95; MFJ-4312, $69.95. For more information, visit your favorite Amateur Radio products dealer or contact MFJ Enterprises, PO Box 494, Mississippi State, MS 39762; tel 800-647-1800, fax 601-323-6551, **http://www.mfjenterprises.com/**. QST

75, 50 AND 25 YEARS AGO

September 1925

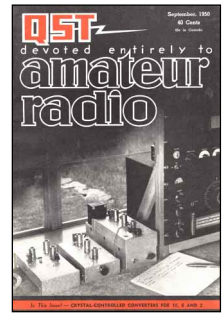


◊ Clyde Darr, 8ZZ, provides the cover art—a young couple, heads together, cozily share a pair of earphones to listen to the radio … as the chaperoning father prepares to plug in the loudspeaker, for their "convenience." The editorial notes that, with cooler weather coming on, the DX season is about to begin. It cautions hams to listen outside the US bands for the DX stations that operate on wavelengths outside the US bands in order to avoid the "local smother" of US stations.

William Adams writes about "Reviewing the Receiver," telling hams how to improve their receiving performance. Eugene C. Woodruff, 8CMP, tells about "Practical Lecher Wires" and how to use them to determine your transmitter's wavelength. "Locating 'Power Leaks' by Radio" discusses equipment and techniques for finding sources of power-line noise. G. H. Burchill writes about "Designing the Secondary Coil," and presents a very useful chart for choosing coil diameter and wire size for a desired wavelength. A. L. Budlong tells about "Adding Punch to Your Neutrodyne." R. H. Chadwick presents Part 1 of "Transformers and Reactors in Radio Sets." W. H. Hoffman writes about "A Power-Amplifier Transmitter for the Low Waves," which he has used successfully on 77, 40 and 20 meters.

A Stray announces that "Another country is on the air. PKX at Malabar, Java, is on 84 meters with apparently plenty of power."

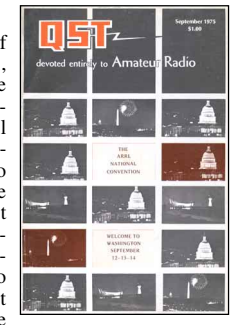
September 1950



◊ The cover photo shows the crystal-controlled converters for 10, 6 and 2 meters that are featured in this issue. The editorial discusses the fact that the United States has begun military mobilization because of the United Nations' decision to intervene in Korea, and assures hams that the rumor that ham radio might be shut down is nothing more than a rumor. Another topic covered is the recent advent of voice-controlled SSB transmitters around 3999 kc. The operators use them for rapid-fire conversations rather than the usual series of long monologues in a roundtable QSO—what a revolutionary concept!

Ed Tilton, W1HDQ, and Vernon Chambers, W1JEQ, collaborate to describe their "Crystal-Controlled Converters for V.H.F. Use" on 28, 50 and 144 Mc. Robert Vreeland, W6YBT, tells about his lightweight and compact transmitter-receiver for 80 C.W. in "The Mountaineer—A Hiker's Portable," a rig that uses several of the 1-volt-filament tubes that were developed for portable broadcast receivers. J. L. Flanagan, W1SJT, tells about "A Simple Voice-Operated Keyer for Automatic Break-In Operation," now that the editorial has piqued the readers' interest in the technique of voice-operated transmit. By Goodman, W1DX, continues the ARRL series of articles on amateur operating with "Working DX." An accompanying Gil Cartoon shows a ham with large ears listening hard, with the caption "Do a lot of snooping." Grand advice for any era!

September 1975



◊ The cover is an array of photos of Washington, DC—soon to host the ARRL National Convention. The editorial address "WARC Preparation," looking forward to the ITU meeting to be held in 1979. At that meeting, the entire spectrum of frequency allocations "from 10 kHz to whatever the upper limit will be by then, will be under scrutiny." The editorial goes on to describe the preparations that are being made on behalf of Amateur Radio.

Dennis Rasmussen, W6MCG, and Don Gerue, K6YX, present "Harmonic TVI, A New Look at an Old Problem." Famous HF contest operator Katashi Nose, KH6IJ, describes "An Alternative Method for Phasing Crossed Yagis for Circular Polarization," a follow-on to his earlier article on the subject in January 1973 *QST*. Two series of articles continue—"Learning to Work with Semiconductors, Part V," by Doug DeMaw, W1CER, and Jay Rusgrove, WA1LNQ; and "The DXer's Crystal Ball," by Ed Tilton, W1HDQ. A Stray shows the new plaque that the Board of Directors recently authorized, to honor hams who have, at any time, held the Number One spot on the DXCC Honor Roll. Ray Petit's article wonders, "Coherent CW—Amateur Radio's New State of the Art?"

Chet Opal, K3CUW, tells how to build "The Micro-TO Mk II Keyer", with new features to update the eight-year-old design. Ed Meade, K1AGB, describes "A High-Performance 50 MHz Amplifier" that will run the legal power limit.

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. 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. 3/00

SPECIAL EVENTS

Greenbelt, MD: Central Maryland Amateur Radio Club, KB3BLR, 2200Z **Sept 1** to 0200Z **Sept 4**, for the Greenbelt Labor Day Festival and Parade. 3.870 7.245 14.245 21.320. Certificate. CMARC, PO Box 788, Greenbelt, MD 20768.

Monterey, CA: Bay ARC, K6S, 0000Z **Sept 1** to 2400Z **Sept 15**, during the California Sesquicentennial. 14.250 21.325 28.450 7.250. QSL. Will Costello, PO Box 1332, Monterey, CA 93942.

Nutley, NJ: Robert D. Grant United Labor Amateur Radio Association, N2UL, 1200Z **Sept 2** to 2400Z **Sept 4**, for "CQ Labor Day," as Labor honors the nurses of the world. 28.420 18.120 21.375. Certificate. RDGULARA, PO Box 716, Nutley, NJ 07110-0716.

Platteville, WI: Hidden Valleys Amateur Radio Club, K9S, 1500Z **Sept 2** to 2200Z **Sept 3**, during the 15th Annual National Points Platteville Sheepdog Trial. General phone and CW subbands. Certificate. HVARC, K9S, PO Box 112, Platteville, WI 53818-0112.

Paradise, AZ: Cochise ARA, K7RDG, 1800Z **Sept 2** to 1800Z **Sept 3**, operating from the ghost town of Paradise, AZ. 3.885 7.040 14.305 21.288. Certificate. Cochise ARA, PO Box 1855, Sierra Vista, AZ 85636-1855.

Galveston, TX: External Communications Group—UTMB, W5G, 1300Z **Sept 8** to 2400Z **Sept 9**, to commemorate the 100th anniversary of the country's worst natural disaster—the 1900 Galveston Hurricane. 3.905 7.235 14.258 18.145. QSL. Joe Dispensa, K5WBA, 110 Dolphin, Galveston, TX 77550.

Louisville, KY: Greater Louisville Hamfest Association, KU4VG, 1200-1800Z **Sept 9**, celebrating many years of commitment to Amateur Radio. 28.420 21.300 14.290 7.250. Certificate. GLHA, Attn: Certificate, 1312 Holsworth Ln, Louisville, KY 40222.

Oshkosh, WI: Radio Amateurs of Wisconsin, K9RAW, 1400-2100Z **Sept 9**, during Event Day at Winnebago Mental Health Institute. 7.240 14.240 21.350 28.350. Certificate. Mark K. Miller, 336 W 8th Ave, Oshkosh, WI 54902.

Kittanning, PA: Fort Armstrong Wireless Association, K3TTK, 1300-2000Z **Sept 9**, celebrating the 200th anniversary of Armstrong County, Pennsylvania. 14.275. Certificate. Kathleen Anthony, 130 Tiffany Dr, Leechburg, PA 15656.

Springfield, MO: Southwest Missouri Amateur Radio Club, W0C, 1600-2000Z **Sept 9**, commemorating the US Civil War battle at Wilson's Creek. 14.230 21.230 28.230 146.910. Certificate. Bruce Braithwaite, 751 W Sherwood Dr, Springfield, MO 65810.

Gloucester City, NJ: Gloucester City Amateur Radio Club, W2S, 1600-2000Z **Sept 9**, celebrating the 377th anniversary of the first settlers at Gloucester Point. 7.265 14.265 146.55. Certificate. Gloucester City Amateur Radio Club, 331 Greenwood Ave, Gloucester City, NJ 08030.

Corona, CA: Corona Norco ARC, W6PWT, 0000Z **Sept 9** to 2400Z **Sept 10**, during Barney Oldfield Day, the 1912-1914 Circle City road races. 7.250 14.250 21.350 28.450. QSL. Fred Roberts W6TKV, 5464 Peacock Ln, Riverside, CA 92505.

Laguna Woods, CA: Leisure World Amateur Radio Club, W6LY, 1400Z **Sept 9** to 2000Z **Sept 10**, celebrating the 36th birthday of Leisure World, Laguna Woods. 7.250 14.250 21.380 28.380. QSL. Ernie Senser, 3031 Calle Sonora, Apt B, Laguna Woods, CA 92653.

Plattsburgh, NY: CVARC, W2UXC, 1400Z **Sept 9** to 1900Z **Sept 10**, commemorating the Battle of Plattsburgh during the War of 1812. 7.265 14.265. Certificate. CVARC W2UXC, PO Box 313, Morrisonville, NY 12962.

Henri-Chapelle, Belgium: Verviers Radio Amateur Group, ON4USA, 0800Z **Sept 9** to 1600Z **Sept 10**, commemorating the 55th anniversary of the liberation of eastern Belgium.14.044 14.200 21.300 28.400. QSL. Post Office Box 11, Verviers 1, B-4800, Belgium.

Flagstaff, AZ: Northern Arizona DX Association, K6A through K6L, 0000Z **Sept 9** to 2359Z **Sept 17**, celebrating legendary Route 66 with stations operating from towns along the highway. 7.066 7.266 14.066 21.366. Certificate. NADXA c/o Jerry Conover, 2756 N Mariah Way, Flagstaff, AZ 86004-7516.

Freedom Township, OH: Portage Amateur Radio Club, KB8UUZ, 1600Z **Sept 1**1 to 0300Z **Sept 18**, during National Prisoner of War/Missing in Action Week. 28.350 21.350 14.260 7.260. Certificate. Tom Parkinson, KB8UUZ, 9992 State Route 700, Mantua, OH 44255.

Aiken, SC: Aiken Contest Club, AC4WW, 1100Z **Sept 15** to 0600Z **Sept 21**, during "5 Islands in 5 Days." 14.260 21.260 28.460. QSL. Doug Glass, 127 Trailwood Ave, Aiken, SC 29803.

Big Bear Lake, CA: Big Bear Lake Amateur Radio Club, K6BB, 1600Z **Sept 16** to 2300Z **Sept 17**, for the Big Bear ARC 25th Anniversary. 7.235 14.250 21.325 28.390. Certificate. BBARC, K6BB, PO Box 790, Big Bear Lake, CA 92315.

Chambersburg, PA: Cumberland Valley ARC, W3ACH, 1300-2100Z **Sept 16**, operating vintage equipment during the 45th anniversary of the CVARC. 7.265 14.265. Certificate. Cumberland Valley ARC, PO Box 172, Chambersburg, PA 17201.

Menomonee, MI: Marinette & Menomonee Amateur Radio Club, W8PIF, 1700-2300Z **Sept 16**, celebrating 50 years of ARRL affiliation. 7.250 14.250 21.350 28.450. QSL. M&M Amateur Radio Club, PO Box 1082, Marinette, WI 54143.

Slidell, LA: Ozone Amateur Radio Club, W5SLA, 1300-2200Z **Sept 16**, celebrating 36 years of community service and ham radio fun. 14.250 7.240. Certificate. Michael White, 404 Holmes Dr, Slidell, LA 70460.

San Pedro, CA: Lane Victory ARC, W6LV, 1600Z **Sept 16** to 2359Z **Sept 17**, honoring Merchant Marine seamen who died for our country. 7.245 14.250 21.350 28.380. Certificate. Lane Victory ARC, W6LV, Attn: QSL Manager, PO Box 629, San Pedro, CA 90733.

Ellis Island, NJ: Nutley Amateur Radio Society, W2GLQ, 1300Z **Sept 16** to 2100Z **Sept 17**, for the first radio event at Ellis Island National Park. 40-10 meters. QSL. Nultey Amateur Radio Society, c/o Nutley Red Cross Bldg, 169 Chestnut St, Nutley, NJ 07110.

Tiffin, OH: Seneca Radio Club, W8ID, 2200Z **Sept 16** to 0400Z **Sept 17**, during the 22nd annual Tiffin-Seneca Heritage Festival. 14.275 7.275 28.350 145.45. Certificate. James Luman, N8UOS, 964 S Bon Air Ave, Tiffin, OH 44883.

Belleville, MI: Yankee Air Museum, W8YAF, 1200-2000Z **Sept 17**, commemorating the YAF Founder's Day open house. 7.270. Certificate. Frank Nagy, N8BIB, 24315 Waltz Rd, New Boston, MI 48164-9167.

Lubbock, TX: Lubbock Amateur Radio Club, K5L, 1600Z **Sept 22** to 0300Z **Oct 1**, operating during the 83rd annual Panhandle-South Plains Fair. 7.265 14.265 21.365 28.465. QSL. Lubbock Amateur Radio Club, K5LIB, PO Box 16797, Lubbock, TX 79490.

Ashland, KY: River Cities Amateur Radio Assn, KG4DVE, 1500-2000Z **Sept 23**, for National Hunting & Fishing Day. 14.230 14.235 14.240 14.245. QSL. Paul Conley, 118 McKnight St, Ashland, KY 41101.

Marion, IN: Grant County Amateur Radio Club, W9EBN, 1500-2100Z **Sept 23**, during the James Dean Festival and customized car show. 7.255 14.255 28.355 146.790. Certificate. L.B. Nickerson, K9NQW, 517 N Hendricks Ave, Marion, IN 46952.

High Point, NC: High Point Amateur Radio Club, W4UA, 1400-2100Z **Sept 23**, during the 28th annual Yesteryear in Motion Antique Farm Show. 7.240 14.240 147.165. Certificate. HPARC, PO Box 4941, High Point, NC 27263-4941.

Milton, ON: Mississauga Amateur Radio Club, VE3MIS, 1400-2000Z **Sept 23** and **Sept 24**, operating from the Halton Radial Railway Museum. 7.230 14.240 28.340. Certificate. MARC, c/o Michael Brickell, 2801 Bucklepost Crescent, Mississauga, ON L5N 1X6, Canada.

Delaware City, DE: Delaware County Amateur Radio Association, W3P, 1600Z **Sept 23** to 2100Z **Sept 24**, operating during the USI Pea Patch Island Expedition. 14.260 21.260 28.260. QSL. Dan Cashin, N3LMY, 1335 Harrington Rd, Havertown, PA 19083.

Richmond, IN: White Water Valley Amateur Radio Club, K9M, 1200Z **Sept 23** to 1600Z **Sept 24**, operating from "McMaze" Indiana to raise funds for the Ronald McDonald house. 7.265. Certificate. Ken Marker, 3425 Woods Dr, Richmond, IN 47374.

Waubeek, IA: Amateur Radio Venture Crew 1085, KC0CRP, 1800Z **Sept 29** to 1800Z **Oct 1**, from the Hawkeye Area BSA Council Camporee "Scouting into the Future." 14.245 7.135 28.345 21.350. Certificate. Jim Covington AA0XJ, 161 Broadmore Rd NW, Cedar Rapids, IA 52405.

Randleman, NC: Tri-county ARC, NC4AR, 1300-2000Z **Sept 30**, celebrating the NASCAR Days annual festival. 7.268 14.268 145.410. Certificate. NC4AR, PO Box 747, Trinity, NC 27370.

Parker, KS: Jayhawk ARS and KC ATV Group, W0LB, 1400Z **Sept 30** to 1400Z **Oct 1,** during the annual Kansas Star Party. 28.270 21.270 14.270. Certificate. Jayhawk ARS, W0LB, PO Box 2075, Kansas City, KS 66102.

Catawba, NC: Centralina Amateur Radio Club, W4M, 1400Z **Sept 30** to 2000Z **Oct 1**, during the 16th annual Harvest Folk Festival at historic Murray's Mill. 7.060 7.230 14.280 28.425. QSL. K4CCR, PO Box 9671, Hickory, NC 28601.

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 with *two* units of First Class postage 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 Requests Form" in the lower left-hand corner. You can also submit your special event information on-line at **http://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; ie, 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

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

CONTEST CORRAL

Feedback

A change in scoring in the Club Competition for the **1999 November Sweepstakes** moves the **River City Contesters** from the Medium Club category to the Local Club category and makes them the winners with a total score of 1,864,126. The operator of the **W5YM** School Club/College Division winner in the 1999 November Sweepstakes should be listed as N5DX.

In the **1999 ARRL 160-Meter Contest**, K5MC misreported their entry as a Single Op station when it was a Multiop entry, with K5JMR and W5WC also participating from the station in the LA section.

In the **2000 ARRL January VHF Sweepstakes**, W8WNX should be listed as Single Op Low Power in the Michigan section

W1AW Qualifying Runs are 10 PM EDT Tuesday, September 5, and 7 PM EDT Wednesday, September 20. The K6YR West Coast Qualifying Run will be at 9 PM PDT on Wednesday, September 6. Check the W1AW schedule for details.

September

2-3

All-Asian DX Contest, phone. See June 2000 *QST*, p. 104.

Labor Day CW Sprint, sponsored by the Michigan QRP Club, 2300Z Sep 4 to 0300Z Sep 5. CW only, 160 80 40 20 15 10 6 meters. Classes: <250 mW; 250 mW to 1 W; 1 W to 5 W; and over 5 W. Exchange RST, state/province/DXCC country and power output (MI-QRP members send membership number). Work stations once per band. Score 2 pts/QSO w/nonmembers in W/VE; 4 pts/QSO w/nonmembers outside W/VE; and 5 pts/QSO w/MI-QRP members. Score: QSO points × states/provinces/DXCC countries worked per band × 1.25 for homebrew receiver or transmitter with commercial combinations, or × 1.5 for totally homebrewed stations. Awards. Send logs to L. T. Switzer, N8CQA, 654 Georgia Ave, Marysville, MI 48040-1243; **n8cqa@tir.com**; **http: //www.tir.com/~n8cqa/rules2000.htm**.

9-11

ARRL September VHF QSO Party. See August 2000 *QST*, p. 114.

Worked All Europe Contest, phone. See August 2000 *QST*, p. 104.

North American Sprint, CW, sponsored by *NCJ*, 0000-0400Z Sep 10 (local time, Sep 9); phone is 0000-0400Z Sep 17 (local time, Sep 16). Sprints are separate. 80, 40, 20 only. North American stations work everyone; others work NA stations only. Exchange other station's call, your call, serial number, name, and state/province/DXCC country. 3.540 3.850 7.040 7.225 14.040 14.275. Work stations once per band. QSY rule: Stations calling CQ, QRZ, etc, may only work one station in response to that call; they must then move at least 1 kHz before working another station or 5 kHz before soliciting another call. Once you are required to QSY, you may not make a new QSO on the previous frequency until you have made a contact at least 1 or 5 kHz (as required) away. Team competition. Awards. Electronic entries accepted. Send CW logs to Mark Obermann, AG9A, 6713 Forestview Ln, Niles, IL 60714; **cwsprint@ncjweb.com**. Send phone logs go to Rick Niswander, Box 2701, Greenville, NC 27836; **ssbsprint@ncjweb.com**. Logs must be sent no later than 30 days after the end of the contest. More information is available on the Web at **http: //www.ncjweb.com/**.

End of Summer PSK-31 Sprint, sponsored by QRP ARCI. PSK-31 only, 2000-2359Z Sept 10, 20 meters only. Work stations once. Categories single op, multi-op, and DX. Exchange RST, state/province/country (SPC), ARCI number (or power for nonmembers). Count 5 points for members, 4 points for nonmembers on different continents and 2 points for nonmembers on the same continent. Multipliers are SPC. Power multiplier is >5W = ×1; 1-5 W = × 7; 250 mW-1 W = × 10; <250 mW = ×15. Final score is QSO points × total SPCs × power multiplier. Suggested frequency is 14070.15. Send log within 30 days to Randy Foltz, 809 Leith St, Moscow, ID 83843; **rfoltz@turbonet.com**; **http://personal.palouse.net/rfoltz/arci/psk31.htm**.

SOC Marathon Sprint, sponsored by the Second Class Operator's Club (SOC), 1800Z to 2400, Sept. 9. CW only, 160-6 meters. Categories: Single Op, All Band. Work stations once per band. Exchange: RST, state/province/country (SPC) and SOC member number (nonmembers send output power). Score 5 pts for each SOC member QSO, 4 pts for each non-member QSO on a different continent, and 2 pts for each nonmember QSO on the same continent. Power mults: <= 250 mW = ×15; 250 mW-1 W = ×10; >1-5 W = ×7; >5 W = ×1. Scoring: Total QSO pts × total SPCs worked per band × power multiplier. Awards: Certificates for top ten scorers and for each SPC leader. Send log, dupesheet (if >100 QSOs) and summary sheet to: Dale Martin, KG5U, 12610 Barbizon Dr, Houston, TX 77089-6506; **kg5u@hal-pc.org**; **http://sochams.homepage.com/20000909.htm**.

16-17

ARRL 10 GHz and Up Cumulative Contest. See July 2000 *QST*, p. 93.

North American Sprint, phone. See Sept. 9-11.

QCWA QSO Party, sponsored by Quarter Century Wireless Assn, from 1800Z Sept 16 until 1800Z Sept 17. CW, phone or mixed-mode. Work stations on each of 15 possible bands: 160, 80, 40, 20, 15, 10 meters CW and phone; 6 meters; 2 meters; 1.35 meters; 70 cm and up. Work stations in your own QCWA chapter only once. No crossband or repeater QSOs. QCWA members exchange call signs, the last two digits of the year first licensed, chapter number ("AL" if not a member of a chapter). Nonmembers exchange call signs, the last two digits of the year first licensed, and the state, province or country. Scoring: 1 pt per phone QSO, 2 pts per CW QSO. Count 1 multiplier for each QCWA chapter, plus each nonmember state/province/country. Contacts with HQ station W2MM count as 3 multipliers per band. Awards. All logs must be received no later than 1 month after contest. Send logs to: Dick Newsome W0HXL, 2924 North 48th St, Omaha, NE 68104-3726; **http://www.teleport.com/~qcwa/qsoparty.htm**.

Air Force Anniversary QSO Party, Celebrating the formation of the USAF (Sept 17, 1947), from 0001Z Sept 16 to 2359Z Sept 17. Participants use contest identifier as follows: USAF members, veterans, retirees, Civil Air Patrol members: ID with AF plus the number of years ago that you joined the USAF; Non-Air Force members: ID with "AF1." Work stations once per band and mode. 3.550 7.050 7.250 14.050 14.250 21.050 21.350 28.050 28.550. Scoring: Score each contact based on ID number (eg, AF50, 50 pts; AF20, 20 pts) multiply the number of points by the number of different IDs worked, add 100 pts for each station worked that is operating from any current or previous Air Force installation or any museum. Logs must include times of operation, each station worked, point suffix and must have point suffixes totaled by page. A plaque will be awarded to the overall winner; certificates to top three scorers in each US state and each country. Logs must be received by Oct 15 by Razorback RC, K5HOG, 1033 Marlboro Rd, Lothian, MD 20711; **k5hog@aol.com**; **http://ourworld.compuserve.com. homepages/k5xs/**.

Washington State Salmon Run, sponsored by Western Washington DX Club. 1600Z Sep 16 to 0700Z Sep 17 and 1600-2400Z Sep 17. 160 80 40 20 15 10 6 meters. Classes: CW, SSB or mixed mode; QRP, low power (less than 200 W) and high power; single or multi-op single transmitter; Washington club station; mobile; Washington county DXpedition; SWL. Exchange RS(T) and county for WA stations; RS(T) and state, province, or DXCC country for stations outside WA. 2 pts/SSB QSO, 4/CW QSO. Work stations on each band and mode. Portables and mobiles may be worked for QSOs and multiplier credits in different counties. Multipliers for WA stations are states, provinces, DX countries and WA counties; for others Washington counties. Count multipliers just once regardless of band or mode. Special bonus: QSO with W7DX will add a 500-point bonus for each mode—total 1000 points. Scoring: QSO points from all bands × total multipliers plus bonus points. Awards. Send logs by Oct 31, Western Washington DX Club, PO Box 395, Mercer Island, WA 98040; **salmonrun@wwdxc.org**; **http://www.wwdxc.org/salmonrun**.

Scandinavian Activity Contest, CW, sponsored by SSA, 1200Z Sep 16 to 1200Z Sep 17 (phone, 1200Z Sep 23 to 1200Z Sep 24). Single op all bands; single op low power (100 W or less) single op QRP; multi-single; SWL. 80, 40, 20, 15, 10. Send RS(T) and serial number. No cross-mode contacts. European stations score 1 pt/QSO with Scandinavian stations on all bands. Non-European stations score 1 pt/QSO with Scandinavian stations on 20, 15, 10 and 3 pts/QSO on 80, 40. Multipliers are Scandinavian call areas (eg, SM3, OJ0, OX3, TF2) per band. Finals score is QSO pts × multipliers. Awards. Send logs by Oct 31 to SSA Contest Manager Jan-Eric Rehn, SM3CER, Lisataet 18, SE-863 32 Sundsbruk, Sweden; **sac@contesting.com**; **http://www.sk3bg.se/contest/text/sacnsc.txt**.

Tennessee QSO Party, sponsored by the Tennessee Contest Group, 1800Z Sep 17 to 0100Z Sep 18. All bands excluding 30, 17 and 12 meters. Send RS(T) and state/province/DXCC country (TN stations send county). TN stations work anyone; others work only TN stations. No repeater or packet robot contacts. Score 1 pt/phone QSO, 2 pts/CW or digital QSO. Multipliers are TN counties (95 max); TN stations, total of states/provinces/DXCC countries. You may claim an additional multiplier for each 5 QSOs you make with the same TN county. 100/pts for working K4TCG on each band/mode. TN mobile stations get 500 pts for each TN county from which 15 or more QSOs are made. CW, 3.540 7.040 14.040 21.040 28.040; phone, 3.900 7.240 14.280 21.390 28.390; Novice/Technician, 3.700 7.130 21.140 228.140 28.390 50.195 144.195 146.550 223.50 446.000. Awards. Send logs postmarked by Nov 12 to Tennessee QSO Party, c/o Douglas Smith, W9WI, 1385 Old Clarksville Pike, Pleasant View, TN 37146-8098; **w9wi@bellsouth.net**; **http://www.k4ro.net/tcg.htm/**.

23-25

Scandinavian Activity Contest, SSB. See Sept. 16-17.

CQ/RJ WW RTTY Contest, sponsored by *CQ* magazine and *The RTTY Journal*, 0000Z Sep 23 to 2400Z Sep 24. 80, 40, 20 15, 10 meters. Single-op all-band high or low power; single-op single-band; single-op assisted; multi-single high or low power; multi-multi. W/VE stations send RST, state/province, and CQ Zone number; others send RST and CQ Zone number. Work stations once per band. Score 1 pt/QSO with own country, 2 pts/QSO same continent, 3 pts/QSO different continent. Multipliers are states (48), provinces (13), DXCC/WAE countries and CQ Zones per band. Final score is QSO points × multipliers. Awards. All entries must be postmarked no later than December 1. CQ RTTY DX Contest, 25 Newbridge Rd, Hicksville, NY 11801; **cqwrtty@kkn.net**.

Alabama Heart of Dixie QSO Party, 1800Z Sept 24 to 0100Z Sept 25. All bands except 30, 17 and 12 meters. Alabama stations work anyone, others work only Alabama stations. Exchange state/province/DXCC entity (AL stations send county) and RS(T). No repeater contacts. Classes: Single-op, multi-op, QRP, and mobile. CW: 1.815 3.540 7.040 14.040

(continued on page 112)

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

2000 ARRL International EME Competition Rules

1. Object: Two-way communications via the Earth-Moon-Earth path on any authorized amateur frequency above 50 MHz.

2. Date and Contest Period: Two full weekend 48-hour periods (0000 UTC on Saturday through 2359 UTC Sunday.) **The 2000 dates will be the weekends of October 21-22 and November 18-19.**

3. Entry Categories:

3.1. Single Operator: One person performs all operating and logging functions, equipment adjustment and antenna alignment.

3.1.1. Multiband.

3.1.2. Single Band: Single-band entries on 50, 144, 222, 432, 902 and 1296-and-up categories will be recognized in awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 8, Awards.

3.2. Multioperator: Two or more persons participate; includes neighboring amateurs within one call area, but with EME facilities for different bands on different team members' premises, as long as no two are more than 50 km (30 miles) apart. Multioperator neighborhood groups may use the same call signs at each location if permissible under national licensing rules and regulations. If not permissible, separate call signs may be used for the multi-operator neighborhood entry. **When operating under this neighborhood provision, all logs must be submitted together in a single envelope or email with a single summary sheet showing the combined operation, designating the principal call sign for the entry.** All multi-operator call signs will be shown in the results.

HENRYK KOTOWSKI, SM0JHF

The SM5FRH 2-meter EME array in Katrineholm, Sweden.

Is Your Entry Complete?

Among the biggest obstacles to accurate score reporting for ARRL contests are incomplete or outdated summary sheets. Remember: A complete entry must include an accurate summary sheet with all information provided. If you are using copies of older summary sheets, it is easy to obtain the latest versions. Official entry forms and complete rules for the 2000 ARRL International EME Competition are available electronically from several sources. You may request the latest version by sending an e-mail to the ARRL Internet Infoserver at **info@arrl.org**. The subject line is ignored. Enter the following text in the body of your message:

HELP
SEND EME.FRM
SEND EME.RLS
QUIT

Forms and rules for all ARRL contests may be downloaded in either ASCII or Adobe .PDF format from the ARRL's Web site at **http://www.arrl.org/contests/forms/.** If you don't have the Adobe reader, it may be downloaded for free from a link at the Contest Form page. If you do not have Web or e-mail access, you can drop an SASE with two units of postage and a note requesting the specific forms that you need to: ARRL, Contest Form Request, 225 Main St, Newington CT 06111.

If you are using a commercial logging program, please make certain that your version includes all of the required summary sheet information. Some older versions do not provide complete information. A quick check to verify that all required information is on your summary sheet will help ensure that your entry is accurately recorded and reported in *QST*. Please help the Contest Branch better serve you by making sure you are using the latest summary sheets and required log file formats. If you need additional information, please contact e-mail **n1nd@arrl.org**, or call 860-594-0232.

3.3. Commercial equipment: Stations using equipment that is not amateur (such as a dish antenna for lab equipment owned by an institution or government agency) will have their scores listed separately.

4. Exchange: For a valid contact to occur, each station must send and receive both call signs and a signal report in any mutually understood format, plus a complete acknowledgment of the calls and report. Partial or incomplete QSOs should be indicated on your log, but not counted for contest credit. Stations may be worked once per band for credit.

5. Scoring:

5.1. QSO Points: Count 100 points for each complete EME contact.

5.2. Multiplier: Each US and Canadian call area, plus each DXCC country (not US/Canada) worked via EME on each band.

5.3. Final Score: Multiply QSO points by sum of multipliers worked on each band for your final score.

6. Miscellaneous:

6.1. Fixed or portable operation is permitted. Stations operating outside traditional call areas must indicate so, identifying the call area of the operating site.

6.2. Contacts may be on CW or SSB. Only one signal per band is permitted.

6.3. A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently under any other call sign during the contest. An exception is made for family stations where more than one call has been issued, and then only if the second call sign is used by a different operator.

6.4. There is no specified minimum terrestrial distance for contacts, but all communications must be copied over the moonbounce path, regardless of how strong (or weak) a nearby station's terrestrial signal may be.

7. Reporting: Entries must be postmarked no later than December 19, 2000 (30 days after the contest) and must include complete log data. Official forms are available in the ARRL Web site (**http://www.arrl.org/contests**) or for an SASE request to the Contest Branch. Your summary sheet should show a band-by-band breakdown of QSOs and multipliers, and include details of your station setup and a photo. **E-mail entries should be submitted to EMEcontest@arrl.org and paper/diskette entries should be submitted to EME Contest, ARRL, 225 Main St, Newington, CT 06111.**

8. Awards:

8.1. Certificates will be issued to the top five stations worldwide in each of the entry categories: single operator multiband; single operator single band (separate awards for each band); and multioperator.

8.2. Additional awards will be issued where significant achievement or competition is evident. In addition, each station that successfully completes at least one EME contact during the contest period will receive a certificate commemorating that achievement.

9. Other: See "General Rules for All ARRL Contests" in November 1999 *QST*.

2000 ARRL RTTY Roundup Results

By Dan Henderson, N1ND
Contest Branch Manager

After all of the hoopla of Y2K subsided, were you left in a funk? Did the non-event of worldwide communications crashes and disaster leave you a bit empty? Did you need an outlet for your pent-up need to operate? Were you looking for some type of operation to test your Y2K compliant equipment?

If you were, perhaps you took advantage of the 2000 ARRL RTTY Roundup. During the weekend of January 8-9, hundreds of digital enthusiasts took to the airwaves in what is becoming one of the ARRL's more popular contests. Perhaps the increased interest in digital communications is tied to the increased use of computers. Surveys show that a large majority of active hams have computers in the shack. The availability of programs such as *WriteLog* and *RTTY by WF1B* make this mode a "new discovery" even for many of the old-timers in the hobby.

While digital contesting brings in many newcomers, don't make the mistake of overlooking the seasoned veterans when looking for the competition. As a matter of fact, all four W/VE category winners from 1999 repeated their victories in 2000. Ron, K5DJ, topped the Single Op High Power category defeating VE6WQ operated by Joel, VE6JY (who jumped from a middle of the pack finish in 1999 to a Top Ten finish), by a score of 165,255 to 149,060. Ron, W7NN, finished third with another good effort 137,973 points. New division scoring records were set by K5YG (Delta), G0AZT/W6 (Pacific), K4GMH (Roanoke) and VE6WQ (VE6JY, op) in Canada.

The winner and still undisputed Single Op Low Power Champion is Don Hill, AA5AU. For the sixth consecutive year, and for the eighth time in the 12-year history of this contest, Don won the category. This time he was in a close race with Bruce, WT4I—143,444 to 141,700. Don's dominance of this category extends to the fact that besides his eight wins ('89, '93, '95-00 inclusive), he also owns a pair of second-place finishes ('91 and '92) and a third-place finish ('90). In this day of higher participation and better equipment, AA5AU is one of the outstanding contesters in any aspect of the hobby. Third place in the category goes to another familiar call—Dick, N1RCT, with a score of 133,453. Setting new division records in the category were KG9X (Central), N2KI (Hudson), KI6DY (Midwest), N6OJ (Pacific), KA4RRU (Roanoke), WT4I (Southeastern) and K6NDV (Southwestern).

The sole overall record that was broken in 2000 was the W/VE Multi-Op Low Power record, which is now held by the ops at repeat-winner AD5A with a score of 90,240. Special mention goes to the crew at AA4NC, with a score of 85,500 that also broke the old record and finishes in second place in the category. Another familiar call sign, N1JEB, finishes once again in the Top Three. Besides AD5A in the West Gulf

Top Ten

Single Op

W/VE—Low Power

AA5AU	143,444
WT4I	141,700
N1RCT	133,453
KA4RRU	114,108
KG5EG	97,965
W1TY	96,126
KG9X	93,520
KI6DY	92,169
K6NDV	89,680
N2KI	87,550

W/VE—High Power

K5DJ	165,255
VE6JY (VE6WQ, op)	149,060
W7NN	137,973
K4GMH	122,245
WW7OR (W7GG, op)	118,342
W0DC (at W0BV)	115,710
K5YG	106,572
VA7CC	106,488
KE7AJ	106,227
N1GF	103,362

DX—Low Power

LV5V (LU5VV, op)	80,808
UP5P (UN5PR, op)	67,800
P40X (NX9O, op)	53,416
EA1CRB	52,164
YU7AM	50,391
I2SVA	50,274
LU8HWD	43,500
HA5BSW	42,240
AL7BB	40,262
SP9UNX	40,107

DX —High Power

P40B	129,136
UT0I	114,120
S58T	107,406
HK3WGQ	101,520
CT1AOZ	92,616
DJ5JK	81,812
S54E	75,492
YU7YG	67,165
8S4RY	64,800
CE8SFG	63,264

Multioperator

W/VE—Low Power

AD5A	90,240
AA4NC	85,800
N1JEB	79,101
AA9RR	62,496
KG0QG	58,497
W5VZF	56,602
W4AQL	50,915
VE6RAJ	47,201
K0FG	41,448
K8VT	40,680

W/VE—High Power

W0SD	146,970
K9NS	142,926
NE3H	104,160
KR6E	91,296
K0BX	75,296
KG0PI	68,970
W3WKR	50,490
W1RH	25,232

DX—Low Power

KP2D	107,600
S57IIO	59,813
9A7P	50,018
YU7AL	43,068
9A5D	39,512

DX—High Power

OT0E	130,440
UX0Z	129,210
GW4JBQ	98,700
OL5Q	83,930
OM3REU	61,798
LZ4KAC	47,800
3Z1V	29,068
JH6ETS	28,224

Region Leaders

Boxes list call sign, score, class (S = Single Operator, M = Multioperator), and power (A = Low Power, B = High Power).

Northeast Region
(New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections)

N1RCT	133,453	S	A
W1TY	96,126	S	A
N2KI	87,550	S	A
WA6ILT/1 (at AA1ON)	74,970	S	A
KE1AK	74,072	S	A
N1GF	103,362	S	B
W3MF	92,759	S	B
N2FF	92,085	S	B
W2KI	79,254	S	B
K3UG	75,712	S	B
N1JEB	79,101	M	A
W3DSX	20,000	M	A
NE3H	104,160	M	B
W3WKR	50,490	M	B
W1RH	25,232	M	B
K5ZD	3,120	M	B

Southeast Region
(Delta, Roanoke and Southeastern Divisions)

AA5AU	143,444	S	A
WT4I	141,700	S	A
KA4RRU	114,108	S	A
KG5EG	97,965	S	A
AF4Z	82,606	S	A
K4GMH	122,245	S	B
K5YG	106,572	S	B
N5ZM	98,780	S	B
W4GKM	87,859	S	B
KK5OQ	82,418	S	B
AA4NC	85,800	M	A
W5VZF	56,602	M	A
W4AQL	50,915	M	A

Central Region
(Central and Great Lakes Divisions; Ontario Section)

KG9X	93,520	S	A
N9CK	87,120	S	A
VE3GLN	68,967	S	A
KD8FS	62,700	S	A
W8EB	53,105	S	A
ND5S	84,637	S	B
AE9D	80,256	S	B
KE9NA	79,055	S	B
W8KX	60,420	S	B
K8AA	55,341	S	B
AA9RR	62,496	M	A
N8LRG	53,848	M	A
K8VT	40,680	M	A
K9NS	142,926	M	B

Midwest Region
(Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections)

KI6DY	92,169	S	A
N3SL	83,210	S	A
WK0F	54,240	S	A
VE4COZ	53,222	S	A
W0HW	49,966	S	A
K5DJ	165,255	S	B
W0DC (at W0BV)	115,710	S	B
VE5CPU	93,258	S	B
W2JGR	61,920	S	B
WA0SXV	61,110	S	B
AD5A	90,240	M	A
KG0QG	58,497	M	A
K0FG	41,448	M	A
KO0Z	38,456	M	A
KK5CA	16,531	M	A
W0SD	146,970	M	B
K0BX	75,296	M	B
KG0PI	68,970	M	B
N0MJ	6,900	M	B

West Coast Region
(Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT/Yukon Sections)

K6NDV	89,680	S	A
N6OJ	84,200	S	A
K7WM	83,129	S	A
KJ7TH	82,344	S	A
AD6G	68,208	S	A
VE6JY (VE6WQ, op)	149,060	S	B
W7NN	137,973	S	B
WW7OR (W7GG, op)	118,342	S	B
VA7CC	106,488	S	B
KE7AJ	106,227	S	B
VE6RAJ	47,201	M	A
KR6E	91,296	M	B

division, AA9RR (Central), W5VZF (Delta), N8LRG (Great Lakes), KG0QG (Midwest), N1JEB (New England), AA4NC (Roanoke) and W4AQL (Southeastern) established new division marks.

Finishing out the W/VE champions for 2000 was the capable stable of ops at W0SD who eked out a close victory over the K9NS crew—146,970 to 142,926. The ops at NE3H make an appearance in the box with their effort of 104,160 points. New division records in the category were set by K9NS (Central), K0BX (Midwest) and KR6E (Southwestern).

One special note: several members of the *QST* editorial staff sponsored a special PSK31 Plaque for the year 2000 ARRL RTTY Roundup. Many stations reported good activity on PSK31 during the contest. The winner of the special PSK31 plaque for the highest score on that mode is Barry, W2UP. Barry scored 18,156 points on an outstanding 267 QSOs and 68 multipliers on this exciting new mode. With the release of new software for PSK31 (including the popular *DigiPan*,) PSK31 activity will certainly continue to increase in next year's Roundup.

The 2001 ARRL RTTY Roundup is scheduled for January 6-7 and will officially kick off the first full weekend of ARRL contesting in the new millennium. With the growth of computer-based equipment and the phenomenal interest in personal computers, many predict that the RTTY Roundup will continue to develop into one of the League's premier contests. Its melding of computers and Amateur Radio may be one way to attract the "Internet generation" back to radio communications. We encourage you to experiment in the next few months with traditional RTTY, as well as explore some of the newer digital modes, such as PSK31, G-TOR, Clover and PACTOR. The digital world doesn't have to be confined to the Internet. Come join the run in January 2001 with the ARRL RTTY Roundup!

Plaque Winners

Plaques are awarded to the overall winner in each entry category—Single and Multi Op Low and High Power—for both W/VE and DX entries. Division-level plaques are awarded to the top scoring Single Op station (Low or High Power) in each ARRL Division and Canada. The top scoring High or Low Power Single Op station that does not win the Division level high-score plaque may purchase a Division plaque for their category. Unsponsored plaques may be purchased for $60 each by contacting the ARRL Contest Branch.

Category	*Winner*	*Sponsor*
W/VE Single Operator Low Power—NM7M Memorial	AA5AU	Wayne Matlock, K7WM
W/VE Single Operator High Power—W7RM Plaque	K5DJ	Frank Fallon, N2FF
W/VE Multi-Single Low Power	AD5A	*WriteLog*
W/VE Multi-Single High Power	W0SD	
DX Single Operator Low Power	LV5V (LU5VV, op)	Neal Campbell, K3NC
DX Single Operator High Power	P40B	Dick Stevens, N1RCT
DX Multi-Single Low Power	KP2D	
DX Multi-Single High Power	OT0E	
Atlantic Division Single Operator High Score	W1TY	Daniel Senie, N1JEB
Central Division Single Operator High Score	KG9X	Donald Hill, AA5AU
Dakota Division Single Operator High Score	W0DC (at W0BV)	Lawrence Gandy, AH8LG
Delta Division Single Operator High Score	K5YG*	Great Lakes DX/Contest Club
Great Lakes Division Single Operator High Score	ND5S	Amateur Radio Transmitting Society, W4CN
Hudson Division Single Operator High Score	N2FF	Frank Fallon, N2FF
Midwest Division Single Operator High Score	KI6DY	
New England Division Single Operator High Score	N1RCT	
Northwestern Division Single Operator High Score	W7NN	Vern Combs, KJ7TH and Jim Luderman, A7UN
Pacific Division Single Operator High Score	N6OJ	Lawrence Gandy, AH8LG
Roanoke Division Single Operator High Score	K4GMH	
Rocky Mountain Division Single Operator High Score	KT0DX	
Southeastern Division Single Operator High Score	WT4I	Jim Mortensen, N2HOS
Southwestern Division Single Operator High Power	KE7AJ	Jules Freundlich, W2JGR, TG9VT Memorial
West Gulf Division Single Operator High Score	AB5K*	Glenn Vinson, W6OTC
Canadian Single Operator High Score	VE6JY	Foothills Amateur Radio Teleprinting Society
Special PSK31 Plaque	W2UP	*QST* Editors: WB8IMY, AA1GW and N1RL

*Division level plaques are awarded to the second place finisher if the Division winner is awarded an overall category plaque.

Scores

Scores are listed by DXCC Countries and ARRL/RAC Sections. Line scores list call sign, score, QSOs, multipliers, and power (A = Low Power, B = High Power). Multioperator stations show additional call signs or packet.

Africa

Mauritius

3B8/I5JHW	8,775	195	45	A

Canary Islands

EA8/DJ1OJ	8,094	142	57	A

South Africa

ZS6RVG	20,066	254	79	A

Asia

Singapore

9V1XE (VK3DXI, op)	1,675	67	25	A

Japan

JA2BY	11,151	177	63	A
JR1KSK	4,784	104	46	A
JA3EVZ	4,488	88	51	A
JH3WKE	2,394	63	38	A
JA1BUI	2,160	60	36	A
JA1BYL	1,230	41	30	A
JH8KYU/1	1	1	1	A
JH1OAI	9,900	165	60	B
JL6HKJ	6,486	138	47	B
JH3AIU	5,200	104	50	B
JH2OMM	725	29	25	B
JA1SJV (+packet)	8,967	147	61	A
JH6ETS (+ops)	28,224	336	84	B

Asiatic Russia

UA9OGC	3,441	111	31	A
RU0AT	675	45	15	A
RI9C	46,870	545	86	B
RA0AM	18,250	365	50	B
UA0AGI	9,504	216	44	B

Kazakhstan

UP5P (UN5PR, op)	67,800	678	100	A
UN9FD	1,690	65	26	A

Europe

Croatia

9A7P (9A5AEI, 9A6NHH, ops)	50,018	562	89	A
9A5D (9A3AY, 9A3NS, 9A4DU, 9A4NC, 9A5DU, 9A5ADM, 9A5ANY, ops)	39,512	449	88	A

Portugal

CT1AOZ	92,616	908	102	B

Fed. Rep. of Germany

DL7VOG	28,308	337	84	A
DJ3NG	25,650	342	75	A
DL8NBE	14,528	227	64	A
DK3ML	6,721	143	47	A
DL6UAA	3,066	73	42	A
DL9YP	2,760	69	40	A
DJ8ES	1,820	52	35	A
DJ6TK	1,749	53	33	A
DJ1YFK	864	36	24	A
DJ5JK	81,812	724	113	B
DL4RCK	33,108	372	89	B
DL4MCF	17,538	222	79	B
DJ2YE	5,535	123	45	B

Spain

EA1CRB	52,164	567	92	A
EA4CI	23,205	455	51	A
EC2ADR	13,144	212	62	A
EA1AHY	11,850	158	75	A
EA1BD	10,368	162	64	A
EA7GXX	6,240	120	52	A
EA1AHA	2,555	73	35	A
EA5DWS	1,908	53	36	A
EA4WP	1,800	60	30	A
EA4AZJ	741	39	19	A

Moldova

ER2000L	10,143	147	69	A
ER5OK	8,800	176	50	A

Estonia

ES1RF	8,967	147	61	A

Belarus

EW1EA	29,260	380	77	A
EU1MM	9,234	162	57	B

France

F/KF6EDK	10,250	205	50	A
F5PVJ	6,435	143	45	A
F8BDQ	3,344	76	44	A

England

G0KRL	23,868	306	78	A
M0CFV	22,720	320	71	A
G0URR	2,628	73	36	A

Northern Ireland

GI4KSH	16,698	242	69	B

Scotland

MM0BYC	39,672	456	87	A

Guernsey

GU0SUP	9,856	154	64	A

Wales

GW4KHQ	59,682	609	98	B
GW4JBQ (+GW4VXE, GW5NF)	98,700	940	105	B

Hungary

HA5BSW	42,240	480	88	A
HA9OA	1,566	58	27	A
HA3LI	60,700	607	100	B

Switzerland

HB9DCM	13,041	189	69	A

Italy

I2SVA	50,274	513	98	A
IK2QCF	32,785	395	83	A
IZ7ATH	17,292	262	66	A
IK2XRW	14,924	364	41	A
IV3SKB	7,980	140	57	A
IK3SSJ	5,664	177	32	A
I4HRH	5,151	101	51	A
IK7YTX	3,690	123	30	A
IK8SCR	3,400	100	34	A
IV3HAX	1,824	57	32	A
IK1NEM	1,350	50	27	A
IV3KSE	936	39	24	A
I1COB	56,212	611	92	B
I4GHW	40,131	441	91	B
IK1FVO	21,300	355	60	B
IK2RZP	21,128	278	76	B
IK2BUF	12,144	176	69	B
IK7YUA (+IK7XIV)	38,232	472	81	A

Norway

LA7CL	33,440	380	88	B
LA7AJ	19,404	252	77	B

Lithuania

LY3BH	33,454	389	86	B

Bulgaria

LZ2UF	25,550	350	73	A
LZ2MP	1,924	52	37	A
LZ4KAC (LZ2JE, LZ2MP, LZ2NP, LZ2VL, LZ2YO, LZ4AE, LZ4HM, LZ4NV, LZ4UG, ops)	47,800	478	100	B

Austria

OE1KTS	3,915	87	45	A

Finland

OH5TF	24,332	308	79	A
OH3NGB	22,824	317	72	A
OH5HCK	16,644	228	73	A
OG1MM	3,528	84	42	A
OH2LU	63,138	619	102	B
OG2BP (OH2BP, op)	26,058	303	86	B
OH2GI	14,352	208	69	B
OG7A (OH7MN, op)	11,592	207	56	B

Czech Republic

OK2WO	18,500	250	74	A
OK2SG	10,902	158	69	A
OK2BJT	7,686	126	61	A
OK2VP	6,909	147	47	A
OK2BMC	4,692	138	34	A
OK2CJM	3,128	68	46	A
OK2BXW	48,118	491	98	B
OK2EQ	2,288	88	26	B
OL5Q (OK1HRA, OK1FFU, OK1FLC, OK1VSL, ops)	83,930	770	109	B

Slovakia

OM3PR	12,152	196	62	A
OM6RU	4,320	96	45	A
OM3TJT	2,211	67	33	A
OM3REU (OM1II, OM2KW, OM1MW, OM3TA, ops)	61,798	583	106	B

Belgium

ON4BG	8,496	144	59	A
OT0E (ON4ANT, ON4GG, ON4AME, ON4AOI, ops)	130,440	1087	120	B

Denmark

OZ9AG	9,600	160	60	A

Netherlands

PA0EHF	10,626	161	66	A
PA7RCE	3,996	111	36	A

Slovenia

S57U	32,960	412	80	A
S58T	107,406	918	117	B
S54E	75,492	699	108	B
S56A	30,820	335	92	B

Sweden

SM7BHM	34,356	409	84	A
SM6SRW	20,650	295	70	A
SM5UFB	12,198	214	57	A
8S3A	7,889	161	49	A
SM6BSK	7,482	174	43	A
SM4LLN	4,176	87	48	A
SM4RLD	3,366	102	33	A
SM5AAY	2,584	76	34	A
8S4RY	64,800	648	100	B
SM6WQB	43,610	490	89	B
SM6FUD	16,864	248	68	B

Poland

SP9UNX	40,107	461	87	A
SP2EWQ	31,120	389	80	A
SN8A	21,980	314	70	A
SP2IU	12,740	140	91	A
SP1PLA	11,859	201	59	A
SP9LKS	10,521	167	63	A
SP7DQR	9,360	156	60	A
SP4MPH	7,350	150	49	A
SP4SKA	2,394	63	38	A
SP2EIW	1,530	51	30	A
SN7N (SP7NMW, op)	42,872	466	92	B
SP3RBT	2,135	61	35	B
3Z1V (SP1MHV, SP1-304-KO, ops)	29,068	338	86	B

Greece

SV1DNW	7,708	164	47	A
SV/OK1YM	8,729	203	43	B

European Russia

RA1ACJ	20,066	254	79	A

RA4CTR 14,674 253 58 A
RA6AR 12,042 223 54 A
UA4LU 8,788 169 52 A
RV3QX 5,781 123 47 A
RA3BB 5,400 120 45 A
UA6LP 588 28 21 A
RU3RQ 540 30 18 A
UA4CJJ 29,547 469 63 B
RZ1AZ 26,960 337 80 B
RN3OA 24,300 300 81 B
UA6AN 18,550 265 70 B
RK6AWJ (UA6AHF, RA6ABW, ops) 43,741 527 83 B

Ukraine
UT2UZ 1,408 44 32 A
UU9JQ 1,160 116 10 A
UT0I 114,120 951 120 B
UT1IA 46,920 510 92 B
UT9NA 23,625 315 75 B
UX0Z (+ops) 129,210 1095 118 B

Latvia
YL3FW 910 35 26 A
YL2KF 27,300 325 84 B

Romania
YO3APJ 12,403 157 79 A

Yugoslavia
YU7AM 50,391 509 99 A
YU7YG 67,165 665 101 B
YU7AE 5,200 130 40 B
YU7AL (+4N7RGH,YZ7EM) 43,068 444 97 A

North America
Barbados
8P6SH 26,207 359 73 A

Alaska
AL7BB 40,262 491 82 A

Virgin Islands
KP2D (KP2N, NP2E, NP2W, NP2DJ, ops) 107,600 1076 100 A

Puerto Rico
KP4VP 34,650 462 75 A
WP4LNY 2,257 61 37 A

Oceania
East Malaysia
9M6US 11,286 198 57 B

Hawaii
AH6OZ 40,754 574 71 B

Australia
VK4UC 55,765 587 95 B
VK6GOM 20,865 321 65 B

Indonesia
YB5QZ 10,994 239 46 A

South America
Chile
CE8SFG 63,264 659 96 B

Colombia
HK3WGQ 101,520 940 108 B

Argentina
LV5V (LU5VV, op) 80,808 777 104 A
LU8HWD 43,500 500 87 A
LU6AM 29,700 396 75 B

Aruba
P40X (NX9O, op) 53,416 607 88 A
P40B 129,136 1153 112 B

Brazil
PY2MNL 34,314 399 86 A
PR7AR 2,739 83 33 A
PY1KS 768 32 24 A

Venezuela
YV5AAX 20,336 248 82 A

USA

1

Connecticut
K1RO 57,618 594 97 A
WA1EHK 55,998 549 102 A
WB8IMY/1 19,000 250 76 A
WB1ABR 17,176 226 76 A
KE1AU 9,486 153 62 A
KA1IXG 3,382 89 38 A
AA1GW 2,613 67 39 A

Eastern Massachusetts
WA6ILT/1 (at AA1ON) 74,970 735 102 A
KE1AK 74,072 788 94 A
WZ1Q 31,592 359 88 A
WU1F 12,600 175 72 A
K1JE 9,576 152 63 B
W1RH (+N1UVA) 25,232 332 76 B

Maine
N1RCT 133,453 1181 113 A
WN1G 29,388 372 79 A
W4ZGR/1 2,730 65 42 A
KA1RFD 2,535 65 39 A
N1GF 103,362 966 107 B
K1TGS 28,700 350 82 B

New Hampshire
AA1KL 26,322 321 82 A
W1ECT 24,563 319 77 A
AA1QD 3,102 66 47 A
WK1P 2,405 65 37 A
WB6BIG/1 24,846 303 82 B

Rhode Island
K1SD 51,900 519 100 A

Vermont
AA1SU 25,737 373 69 A

Western Massachusetts
N1NVX 40,542 466 87 A
N1MGO 5,250 105 50 A
N1JEB(+N1JIT) 79,101 799 99 A
K5ZD (+K6LA) 3,120 78 40 B

2

Eastern New York
N2KI 87,550 850 103 A
WB2SPN 2,574 78 33 A
W2KI 79,254 777 102 B

NYC-Long Island
KA2D 47,188 502 94 A
KF2XF 4,646 101 46 A
N2LEB 2,108 62 34 A
N2FF 92,085 877 105 B

Northern New Jersey
K2YG 26,752 304 88 A
KF2QS 9,750 150 65 A
KO2FB 9,558 162 59 A
KB2EBL 5,733 117 49 A
K2AL 572 26 22 A
KC2FUP 16 4 4 A
K2B(NO2T, op) 75,378 739 102 B
N2ED 17,550 225 78 B

Northern New York
WM2U 44,000 500 88 A
NT2W 2,627 71 37 A

Southern New Jersey
KC2SZ 15,194 214 71 A

Western New York
W1TY 96,126 866 111 A
N2WK 73,295 685 107 A
WA2EYA 23,940 315 76 A
KX2H 9,765 155 63 A
KF2VX 8,062 139 58 A
W2MKW 7,614 141 54 A
KG2NO 5,940 132 45 A
KB2EOQ 3,234 77 42 A
K2CF 540 27 20 A

3

Eastern Pennsylvania
K3WNI 29,148 347 84 A
W3MEL 26,070 330 79 A
WA3IIA 11,375 175 65 A
W3DZH 10,350 150 69 A
KD3TB 1,768 52 34 A
N3NZ 1,140 95 12 A
W3MF 92,759 851 109 B
W2UP 18,156 267 68 B
W3DSX (+W3GJS) 20,000 250 80 A
NE3H(+K3SV) 104,160 930 112 B
W3WKR(+ops) 50,490 561 90 B

Maryland-DC
N3UN 16,206 219 74 A
W3FQE 5,300 100 53 A
W3ZJ 1,530 51 30 A
K3UG 75,712 728 104 B

Western Pennsylvania
K3FH 28,762 394 73 A
WA3GPP 11,716 202 58 A
WA3BM 9,272 152 61 A
WW3S 6,960 120 58 A

4

Alabama
KG5EG 97,965 933 105 A
W4/KL7Q 61,336 697 88 A
KE4KWE 35,428 521 68 A
AG4W 57,166 566 101 B

Georgia
W4AQL (WJ2RM, KE4QLI, KU4WJ, ops) 50,915 599 85 A

Kentucky
W4LC 51,060 555 92 A
K4WW 33,366 402 83 A
KU4GR 6,540 109 60 A
KF8MW 25,872 336 77 B
WC4I 7,812 126 62 B

North Carolina
N2NFG 52,448 596 88 A
W4WS (N4VHK, op) 7,644 156 49 A
W4TTY 3,360 80 42 A
AA4NC (+W4CC) 85,800 780 110 A

Northern Florida
NX4W 39,498 454 87 B

South Carolina
W8CNL 5,500 100 55 A
W4UK 25,347 357 71 B

Southern Florida
WT4I 141,700 1300 109 A
AF4Z 82,606 802 103 A
KR4U 34,400 430 80 A
N4CU 1,092 42 26 A

Tennessee
KC4SAW 23,902 323 74 A
WB9BSH 8,580 132 65 A
W4GKM 87,859 853 103 B
W5BEN 23,733 293 81 B
W4CZ 22,092 263 84 B

Virginia
KA4RRU 114,108 1028 111 A
W2YE 17,520 219 80 A
N6MW 13,192 194 68 A
N3MA 12,040 215 56 A
W4JLS 8,085 147 55 A
N3TG 8,083 137 59 A
K4GMH 122,245 1063 115 B

5

Arkansas
WA0TDQ 11,610 215 54 A
AC5DK 1,250 50 25 A
N5ZM 98,780 898 110 B
K5XH 56,159 631 89 B

Louisiana
AA5AU 143,444 1316 109 A
K5CZD 3,096 72 43 A

Mississippi
W5EHM 17,464 236 74 A
K5YG 106,572 996 107 B
KK5OQ 82,418 841 98 B
W5VZF (+WA4DDE, KB4HB) 56,602 622 91 A

North Texas
AE5P 38,922 499 78 A
KA5CRL 2,590 74 35 A
N5TY 24,420 330 74 B

Oklahoma
WA9AFM 7,700 154 50 A

South Texas
KI5NG 35,640 405 88 A
K4NR 10,203 179 57 A
N5LYG 9,984 192 52 A
N5NXS 8,996 173 52 A
AJ4F 5,808 132 44 A
K5DJ 165,255 1437 115 B
AB5K 52,871 637 83 B
W5BBR 25,900 350 74 B
AD5A (+AB5EB) 90,240 940 96 A
KK5CA (+WA5UZB, KD5GUY) 16,531 271 61 A

West Texas
WF5E 12,485 227 55 B

6

East Bay
AC6DR 29,330 419 70 A
KF6BIR 17,287 293 59 A
N6TQS 15,876 252 63 A
KE6QR 6,288 131 48 A
W6/G0AZT 76,154 754 101 B

Los Angeles
K6NDV 89,680 944 95 A
WA6BOB 17,528 313 56 A
KC6G 8,100 162 50 A
K6HGF 63,525 825 77 B
KR6E (+KE6YTT, KE6YTW) 91,296 951 96 B

Orange
W6ZL 10,976 196 56 A

Santa Clara Valley
W6ISO 15,552 288 54 A
K6RFM 10,248 183 56 A
K6EP 8,640 160 54 A
W6IT 1,160 40 29 A
N2ALE/6 544 32 17 A
K3MC 80 10 8 A
NN6XX 56,848 646 88 B

San Diego
W6CN 15,192 211 72 A
W6IWO 60,200 700 86 B
N6QEK 30,266 409 74 B

San Francisco
N6OJ 84,200 842 100 A
AD6G 68,208 232 294 A
K6WAP 9,600 160 60 B
W6JOX 4,223 103 41 B

Sacramento Valley
N6GG 7,695 135 57 A

7

Arizona
K7WM 83,129 857 97 A
K7NO 28,836 356 81 A
W7ZT 16,817 251 67 A
KJ7GU 8,120 145 56 A
KG7YQ 3,081 79 39 A
KE7AJ 106,227 1073 99 B
W7WW 89,240 970 92 B

Eastern Washington
WV7Y 17,632 232 76 A
KB7HJM 1,767 57 31 A
K7DSR 11,040 184 60 B
WS7I 2,516 74 34 B

Idaho
KJ7TH 82,344 876 94 A
N7UVH 40,211 509 79 A
K7ZO 13,320 222 60 A
KJ7LM 6,916 133 52 A
WA7NDD 4,280 107 40 A

Montana
K7VK 28,812 343 84 A
N7MNY 9,126 169 54 A

Nevada
W6ITR/7 825 33 25 A

Oregon
AA7IH 8,120 145 56 A
WW7OR (W7GG, op) 118,342 1106 107 B

Utah
AA7TR 4,914 126 39 A

Western Washington
W7LD 59,436 762 78 A
KB7N 43,650 582 75 A
AD7U 42,160 496 85 A
K9MRQ 4,747 101 47 A
W7GTO 792 36 22 A
W7NN 137,973 1243 111 B
N7VGO 46,580 548 85 B

Wyoming
WG7Y 33,892 458 74 B

8

Michigan
KD8FS 62,700 660 95 A
W8EB 53,105 559 95 A
K8SIA 24,178 314 77 A
W8HCS 22,336 349 64 A
N8CN 11,514 202 57 A
ND5S 84,637 791 107 B
W8KX 60,420 570 106 B
K8AA 55,341 559 99 B
K8VT (+WA8RTP) 40,680 452 90 A

Ohio
NI8Z 37,440 416 90 A
W8DN 19,345 265 73 A
W8IDM 14,208 222 64 A
W8AZA 13,651 187 73 A
WB8IEA 7,400 148 50 A
W8LLY 5,123 109 47 A
AF8C 3,040 80 38 A
W8WTS 2,106 78 27 A
N8RPA 1,378 53 26 A
N8LRG (+ops) 53,848 508 106 A

West Virginia
KG8WB 30,000 400 75 A
N8YYS 24,640 320 77 A

9

Illinois
KG9X 93,520 835 112 A
W9IL 25,284 294 86 A
KF9LI 23,840 298 80 A
W9RM 23,100 300 77 A
AA9NF 22,365 315 71 A
K9BJM 13,398 203 66 A
W9ILY 12,312 171 72 A
WD9EKA 10,797 183 59 A
W9YS 7,320 122 60 A
W9IM 5,808 121 48 A
KA9NZI 2,607 79 33 A
KA9TQO 1,325 53 25 A
AE9D 80,256 836 96 B
KE9NA 79,055 815 97 B
W9OL 54,630 607 90 B
K9NS (K9HMB, K9PW, K9RS, KS9U, KS9W, N9NCX, W9MU, ops) 142,926 1162 123 B

Indiana
KB9MCM 9,381 177 53 A
W9VHE 1,078 49 22 A
WA9ALS 54,320 560 97 B

Wisconsin
N9CK 87,120 880 99 A
W4WNG 13,542 222 61 A
W9ISC 6,250 125 50 A
W9PVD 23,870 310 77 B
WD9GWH 3,666 94 39 B
AA9RR (+packet) 62,496 672 93 A

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Colorado
KT0DX 40,000 500 80 A
K0ZV 33,796 476 71 A
N0IBT 18,410 263 70 A
AB0HJ 6,200 124 50 A
W0DET 19,642 322 61 B

Iowa
N3SL 83,210 785 106 A
WK0F 54,240 565 96 A
WA0NDN 6,278 146 43 A
K0FG (+KD0VU) 41,448 471 88 A

Kansas
KI6DY 92,169 931 99 A
WA0LPV 2,850 75 38 A
KG0PI (+K0BJ, K0FJ) 68,970 726 95 B

Minnesota
W0HW 49,966 581 86 A
WA0LPV 19,008 264 72 A
KG0RK 13,600 200 68 A
K0RC 6,600 132 50 A
KE0WW 3,948 84 47 A
KB0OBT 3,003 77 39 A
KC0FZR 42 7 6 A
W0DC (at W0BV) 115,710 1102 105 B
W2JGR 61,920 720 86 B
K0IR 36,309 399 91 B
N0MAJ 2,380 70 34 B
W0PRJ 2,016 56 36 B
W0GJ 4 2 2 B
N0MJ (+packet) 6,900 150 46 B

Missouri
KE0LY 28,386 342 83 A
N0AJ 24,450 326 75 A
WA0WIK 10,080 160 63 A
N0EID 6,768 144 47 A
KS0M 6,708 129 52 A
WA0SXV 61,110 679 90 B
WB0BBY 29,775 397 75 B
KG0QG (+KI0IV) 58,497 629 93 A
KO0Z (+NF0Q) 38,456 418 92 A
K0BX (+packet) 75,296 724 104 B

Nebraska
K0DI 23,360 365 64 A

South Dakota
W0SD (+AC0M, WB0YQT, W7XU, WA0UFS) 146,970 1278 115 B

Canada

New Brunswick
VE9WH 30,800 385 80 A
VE9MY 9,240 154 60 B

Nova Scotia
CG1AOE 16,951 253 67 A

Quebec
VE2AXO 12,567 213 59 A
VE2OWL 7,800 156 50 A
VE2CNJ 7,425 135 55 A
VE2FFE 3,432 88 39 A
CG2PIJ 480 30 16 A

Ontario
VE3GLN 68,967 711 97 A
VA3SB 24,163 331 73 A
VE3WQ 23,506 322 73 A
VE3BUC 17,252 227 76 A
VE3VAC 11,682 177 66 A
VE3MUD 6,118 133 46 A
VE3RHJ 3,914 103 38 A
VE3HOL 17,152 256 67 B

Manitoba
VE4COZ 53,222 598 89 A

Saskatchewan
VE5CPU 93,258 942 99 B
VE5RI (VE5EI, VE5CMA, ops) 8,120 145 56 A

Alberta
VE6CKG 29,016 403 72 A
VE6JY (VE6WQ, op) 149,060 1285 116 B
VE6RAJ (+VE6RRD) 47,201 613 77 A

British Columbia
VE7QO 24,225 323 75 A
VA7CC 106,488 986 108 B
VE7SOD 70,560 735 96 B

Yukon
VY1JA 19,738 278 71 B

QST

STRAYS

WANTED: GENERAL ELECTRIC DELTA MANUALS

◊ I'm looking for manuals for a pair of General Electric Delta transceivers, models Comb-N3B106 and Comb-5950. Robert Hilton, N9SJV, 5809 Heatherview, Fort Wayne, IN 46818.

WANTED: HP DATA SHEET

◊ I need a data sheet for a 4 × 5-inch Hewlett-Packard CRT, stock number 5083-5791, serial number 600081. Lewis Stafford, W4LGK, 2353 Kilkenny Way NE, Marietta, GA 30066.

By Dan Henderson, N1ND
Contest Branch Manager

1999 ARRL 10-Meter Contest Results

Don't ever let anyone tell you that the height of the sunspot cycle doesn't interest even the casual operator. At least, that is one of the conclusions that can be drawn from the results of the 1999 ARRL 10-Meter Contest.

For the second year in a row, a record number of entries were received. The 2791 entries and checklogs represent three times as many entries as received for the 1995 contest, near the bottom of the cycle (910 entries received). Approximately 63% of the logs were submitted in electronic format, and using those as a point of reference, over 1.27 million QSOs were completed during the contest. These numbers made the 1999 ARRL 10-Meter Contest the single most participated in contest ever, with 3307 participants, including those listed as ops at the various multioperator efforts.

Even with the increase in electronic submissions, over 1000 paper logs were still received at Headquarters. While electronic logs make the result reporting process more accurate (and are a bit less time consuming), remember that handwritten paper entries are still acceptable as entries for all ARRL contests. But whether you submit electronic files or paper logs, please make certain that your entry meets the rules for submission. Submitting logs or summary sheets that are incomplete, or that contain extraneous information, makes it more difficult to accurately report the contest scores.

With great conditions you expect scoring records to fall. This contest was no exception as five overall scoring records were set. Doug, KR2Q, set a new Single Op CW Only QRP record with 401,236 points. Alejandro, LU5WW, set a new Single Op Mixed Mode Low Power record with his 1,663,700 points. Congratulations to CE5/SM3SGP, VK4EMM, C6A/K2PS, K1RO, KG9X, and N8OO who also broke the old mark for the category.

A new record for the Single Op CW Only Low Power category was set by Dave, AG8L, operating at WP2Z. Dave becomes the first person to break the one million point mark in the category with his score of 1,202,852. Also breaking the old point record for the category were W5AO, operating from NA5B, and 8P9JO.

Olli, OH0XX operating from PZ5JR had perhaps the best effort of the contest in the Single Op, CW Only High Power category.

Affiliated Club Competition

Unlimited Category	Score	Entries
Potomac Valley Radio Club	31,844,222	71
Yankee Clipper Contest Club	22,153,688	55
Medium Category		
Frankford Radio Club	18,385,056	32
Society of Midwest Contesters	15,349,648	30
Florida Contesters	12,978,924	22
Southern California Contest Club	10,193,152	18
Minnesota Wireless Assn	9,803,590	27
Tennessee Contest Group	8,252,292	25
Northern California Contest Club	6,753,984	18
South East Contest Club	6,272,082	7
Texas DX Society	5,417,264	11
North Texas Contest Club	4,877,278	9
Carolina DX Assn	4,438,444	6
Order of Boiled Owls of New	3,749,156	9
Mad River Radio Club	3,741,056	14
Western Washington DX Club	3,654,160	7
Willamette Valley DX Club	3,428,964	5
North Coast Contesters	3,316,938	7
Kansas City DX Club	3,146,828	8
Kentucky Contest Group	3,140,280	4
ARA of Southwest Florida	2,837,052	12
Grand Mesa Contesters	2,769,152	6
Central Arizona DX Assn	1,896,688	6
Radio Amateurs of Northern	1,567,180	3
South Jersey Radio Assn	1,342,272	6
Rochester (NY) DX Assn	1,140,648	6
Southeastern DX Club	1,069,028	4
Western New York DX Assn	968,560	3
Southwest Ohio DX Assn	883,138	3
Northern Arizona DX Assn	535,580	4
Franklin County ARC	475,090	3
Mother Lode DX/Contest Club	471,368	3
Holiday City ARC	380,102	5
Six Meter Club of Chicago	342,276	6
Northrop Grumman Radio Club	304,538	4
Salt City DX Assn	287,522	3
West Allis RAC	242,842	6
AK-SAR-BEN	219,688	3
Local Category		
Hudson Valley Contest & DXers	4,769,186	6
River City Contesters	3,399,526	6
Central Texas DX and Contest	2,522,270	6
Ozark Contest Club	1,368,568	5
Green River Valley ARS	1,299,924	4
Utah Contest Club	1,223,366	3
Great Falls Area ARC	1,208,376	4
Loudoun ARG	1,150,522	4
West Valley ARA	782,206	5
Worldradio Staff ARC	412,894	4
West Park Radiops	276,124	6
Northern New York Contest Club	160,810	3
Williamsburg Area ARC	158,282	3
Metro DX Club	156,240	3
Sussex County ARC	115,200	3

Top Ten, W/VE

Mixed Mode, QRP

N7VY	471,618
K0RI	413,700
W4DEC	365,904
WA6FGV	326,928
K0OU	323,950
NX7K	295,274
WA7LNW	198,144
W5TD	154,380
WA8ZBT	142,140
N2NH	111,492

Mixed Mode, Low Power

K1RO	1,361,532
KG9X	1,309,528
N8OO	1,280,052
N4ZI	1,178,332
K4MA	1,150,264
WD5K	1,141,920
KZ1M	1,095,718
W3EP	1,033,654
K6RO	1,015,854
W6UT	989,380

Mixed Mode, High Power

KQ2M	2,717,366
WC4E	2,574,438
W9RE	2,367,360
W5WMU (KZ5D, op)	2,334,002
VE6JY (VE6WQ, op)	2,132,820
W4MYA	1,906,524
N4ZC (K4ZA, op)	1,842,650
W7GG	1,716,084
K3ZO	1,711,200
N5LZ	1,700,460

Phone Only, QRP

WA0JYC	101,404
W3ATV (at N3INW)	97,020
N8MWK	75,030
W8QZA/6	70,680
W6CN	69,552
KA1PRD	65,856
WB0IWG/T	51,004
KI0II	47,652
KS4GW	42,480
N5FPW/T	41,334

Phone Only, Low Power

K4XS	815,300
N2NB	687,960
K6KAY	561,660
WA7EQW	484,120
WJ7S	406,742
VE3XN	376,320
AA5FJ	347,328
AC0W	346,632
KT0DX	341,202
K1SD	325,252

Phone Only, High Power

KZ5MM	1,139,044
K5TR (at W5KFT)	1,111,500
W4ZV	1,090,726
K6LL	1,036,766
WB9Z	875,758
K7RI	868,140
W0SD	854,772
K5AM	823,884
K9HMB	744,106
K4JNY	723,384

CW Only, QRP

KR2Q	401,236
K5WO	306,448
N9NE	290,160
N0UR	276,424
K0PC	228,228
KU7Y	222,604
K3SV	214,704
AA1CA	214,200
N8AP	195,168
W9OP	189,952

CW Only, Low Power

NA5B (W5AO, op)	803,400
K0SR	801,724
KB1EAX	737,060
WD4AHZ	732,536
VO1MP	688,012
K1VUT	666,528
K5WA	632,968
K7UAZ (N4OGW, op)	631,652
N8II	622,512
K9QVB	614,040

CW Only, High Power

W4AN (W4PA, op)	1,400,168
K1TO	1,360,100
N5RZ	1,349,152
K4OJ	1,345,140
K8AZ (K8NZ, op)	1,311,200
NS0Z (AG9A, op)	1,284,916
N4BP	1,254,960
N8RR	1,116,192
W6EEN (N6RT, op)	1,100,400
KB9S	1,012,944

Multioperator

K3MM (at W3LPL)	3,225,792
N4UK	2,765,094
N2NT	2,625,392
W3PP	2,619,264
NX5M	2,580,960
AA8U	2,500,238
K0RF	2,323,620
K1TTT	2,240,322
K5MDX	2,195,560
W4MR (at AA4NC)	2,089,090

Top Ten, DX

Mixed Mode, QRP

HA5BSW	492,570
HA2A	485,974
DL6RDR	347,060
LY2FE	276,276
RW9TA	177,944
DL8TWA (K3TW, op)	131,614
9A2EY	93,656
Z32AF	61,932
UA0KBG	51,632
G3FNM	22,712

Mixed Mode, Low Power

LU5WW	1,663,700
CE5/SM3SGP	1,523,632
VK4EMM	1,400,400
C6A/K2PS	1,352,036
LU3HIP	967,754
ZF2RT (W0GJ, op)	949,524
V73CW	881,620
ZV8O (PV8DX, op)	845,130
LU5FF	822,780
JM6CIP	748,416

Mixed Mode, High Power

P40V	2,950,432
V26X (K8CX, op)	2,497,278
KH6TO (at NH7A)	1,750,128
T99W	1,428,480
OL5Y (OK1FUA, op)	1,332,120
S50K	1,317,244
KL7RA	1,309,230
RW2F (UA2FB, op)	1,195,262
VK4UC	1,096,714
ER0N (UT7ND, op)	903,336

Phone Only, QRP

NP2Q	127,036
LU1VK	121,158
YU1KN	91,052
LW3DX	68,250
OK1GW	40,160
JA3LFK	37,888
LU1HN	20,020
RA0CCV/3	18,330
RA3DGH	14,726
OH5NHI	14,310

Phone Only, Low Power

VP2VF	578,100
OT4AYM	508,128
OT4MA (ON4MA, op)	469,404
YU1AAX (YU1JW, op)	409,248
TI1Z (TI4ZM, op)	348,100
G0AEV	329,588
KP2BH	328,548
YT7A	325,748
ON5LL (ON6ZX, op)	294,276
AY0N (LU2NI, op)	288,708

Phone Only, High Power

FK8GM	1,092,000
CT3BX	1,075,806
ZW5B (PY5EG, op)	1,073,200
TM1C (F6CTT, op)	860,880
PJ2I (ON4CFD, op)	804,004
FM5FJ	802,464
TM2V (F6GLH, op)	711,620
PW2C (PY2KC, op)	687,792
3E1DX (HP1XVH, op)	673,104
DF9ZP	648,174

CW Only, QRP

BV3FG	235,316
JA1YNE (JP1OGL, op)	191,992
YT7TY (YZ7DM, op)	121,824
SP5DDJ	95,976
EA7AAW	94,484
F6OIE	82,800
GM4HQF	82,360
JA6UBK	81,260
9A7P (9A6NHH, op)	80,640
LZ2RS	73,840

CW Only, Low Power

WP2Z (AG8L, op)	1,202,852
8P9JO	950,684
LY2TA	632,060
JF1SQC	615,984
SU9ZZ	611,832
WP3C	563,500
UA0JB	543,000
NH2DX (KH2D, op)	511,700
9A3VM	464,724
EA5FID	447,216

CW Only, High Power

PZ5JR (OH0XX, op)	2,100,744
VR2BG	872,460
NP3G	866,804
S58A	862,800
PP5BRV	819,808
TZ6DX	812,952
S50R	771,456
SP2FAX	763,960
EA1DAV	763,776
G3ZEM	746,760

Multioperator

VP5B	3,673,930
CT8W	2,834,352
KH7R	2,730,060
LU4FM	2,597,630
CX5BW	2,265,200
FM5DN	2,228,928
OT9T (at ON4UN)	2,073,660
NP3X	2,052,834
XE2DV	1,913,156
M5X	1,841,456

Olli's 2,100,744-point effort demolished the existing record set in 1992 by over 733,000 points. Also breaking the old record for the category was W4PA, operating from W4AN. Finishing out the record setting performances in 1999 was the VP5B Multioperator effort, whose score of 3,673,930 is now the mark for multiops to shoot for in future contests.

The 2000 ARRL 10-Meter Contest will be contested December 9-10. Remember: electronic files for that contest must be in the Cabrillo file format. Look for information on the format in the November issue of *QST* when the General Rules are published. Judging from the conditions the past several months, we can also look for another great contest and heated competition.

Log checking results for the contest may be requested by sending an e-mail to **k8cc@contesting.com**. Include in the subject line your call sign and "1999 10 Meter Request".

Scores

Scores are listed by DXCC Countries and ARRL/RAC Sections. Line scores list call sign, score, QSOs, multipliers, class (A = Mixed Mode, B = Phone only, C = CW only, D = Multioperator), and power (A = QRP, B = Low Power, C = High Power).

Africa

Tunisia

3V8BB (I5JHW,I5NSR, ops)
978,600 2132 210 D

Libya

5A1A 84,660 318 86 A C

Tanzania

5H3RK 155,904 445 87 C C

Zambia

9J2FR 412,034 1549 133 B C

Madeira Islands

CT3BX 1,075,806 3039 177 B C
CT3DZ 255,250 1021 125 B C
CQ9T (CT3CD,CT3HF,CT3KN, ops)
1,393,664 2147 256 D
CQ9K (CT3BD,CT3BM,CT3DL,CT3HK, CT3IA,CT3KU,ops)
1,052,640 3061 172 D

Canary Islands

EA8/DJ1OJ 285,688 555 134 A B
EC8AZP 308 14 11 B C
EA8CN 440,496 873 126 C B
EA8AMW 45,696 167 68 C B

Egypt

SU9ZZ 611,832 1379 111 C B

Mali

TZ6DX 812,952 1613 126 C C

Chagos Islands

VQ9IO (N1TO,W4QM,W3PO, ops)
574,656 1040 146 D

Zimbabwe

Z21KD 108,120 530 102 B C

South Africa

ZS6BXN 245,520 931 132 B C
ZS6HO 5,032 74 34 B C
ZS0E (ZS6AJS, op)
174,356 479 91 C B
ZS5T 68,552 209 82 C B

Antarctica

R1AND (RW1AI, op)
24,128 121 58 A C

Asia

Palestinian Authority

E4/G3WQU 34,320 195 44 C B

Asia

Vietnam

3W6US (YB0US, op)
46,200 245 70 A B

Israel

4Z5FW 146,880 510 72 C B

Kuwait

9K2/OK1TYM 18,792 174 27 C B

West Malaysia

9M2TO 594,432 1275 129 A C
9M2JI 84,912 366 58 C B

Taiwan

BV3FG 235,316 661 89 C A
BV7FF 247,064 694 89 C C

China

BA4DW 30,820 188 67 A B
BY1DX (OH2PM, op)
717,120 1429 160 A C

Armenia

EK4JJ 1,932 28 23 A B
EK6LP 4,692 51 23 C B

Kyrgyzstan

EX0Y 65,636 538 61 B B
EX2A 4,536 54 21 C B

Turkmenistan

EZ8CW 11,016 153 36 B B

South Korea

HL1/JI1EFP 34,200 171 50 C B
HL5AP 27,648 128 54 C B

Thailand

HS0GBI 10,656 84 36 A B
E21EIC 536,536 1336 154 A C
HS0/VE3XO 124,270 731 85 B B
E20REX 4,368 79 28 B B
HS1CKC 71,890 455 79 B C

Japan

JN2FSE 9,588 61 47 A A
JM6CIP 748,416 1150 192 A B
JQ6NAW 567,036 972 171 A B
JE0UXR 468,714 718 191 A B
JR8OGB 347,598 738 157 A B
7L1ETP 258,108 537 137 A B
JR4GPA 193,700 481 130 A B
JI7OED 184,080 428 118 A B
7L4IOU 156,442 431 143 A B
JA0BMS/1 144,200 364 73 A B
JH6OPP 131,216 318 118 A B
JN3SAC 100,224 272 108 A B
JA1BUI 98,088 252 122 A B
JA1AB 95,920 298 88 A B
JA2BQX 95,760 292 114 A B
JA7LMU/1 71,356 243 89 A B
JK2VOC 67,080 258 78 A B
JR1LQK 66,780 267 105 A B
JA3UWB 62,376 225 92 A B
JA8NSF/1 59,532 186 82 A B
JJ3TBB 46,650 184 75 A B
JA1XRH 43,200 165 72 A B
JA1HFY 42,840 172 84 A B
JA1XUY 24,766 116 61 A B
JI1FLB 21,492 114 54 A B
JA1XPU 15,900 102 53 A B
JG3NKP/1 15,080 77 52 A B
JM2RUV 3,200 47 25 A B
JJ2TKX 2,926 45 19 A B
JG5VIA 1,092 23 21 A B
JF5FGY 1,056 22 22 A B
JR3EOI 700 14 14 A B
JA8RWU 900,360 1407 205 A C
JI5SKS 545,592 995 179 A C
JA0QWO 457,500 780 183 A C
JA9XBW 349,296 627 152 A C
JA2AXB 298,616 680 163 A C
JH7BZR 249,984 770 126 A C
JA2FSM 204,000 550 136 A C
JR1LEV 171,456 380 141 A C
JE1REU 164,724 395 106 A C
7J1ABD (WA6URY, op)
56,610 196 85 A C
JF2FIU 27,846 209 51 A C
JJ1JRH 22,624 123 56 A C
JA4YPE 10,000 89 40 A C
JA1AAT 4,875 61 39 A C
JA3LFK 37,888 256 74 B A
JR7RJZ 11,160 180 31 B A
JE7DOT 5,070 65 39 B A
JH3DMQ 1,900 50 19 B A
JH4UTP 159,962 661 121 B B
JA7NVF 112,800 600 94 B B
JA5EO 107,476 554 97 B B
JL3VUL 105,210 501 105 B B
JA7ERJ 62,820 349 90 B B
JK7DWD 55,714 313 89 B B
JG7PSJ 50,954 349 73 B B
JA6EFT 47,816 278 86 B B
JR3RIY 42,978 247 87 B B
JH6FTJ 41,080 260 79 B B
JA2GHP 31,974 219 73 B B
JA1EEG 27,950 215 65 B B
JA9TQY 24,912 173 72 B B
JR1MRG 23,668 194 61 B B
JA2BEY 22,444 181 62 B B
JR3CVO 18,544 152 61 B B
JH2WHS 17,112 138 62 B B
JR7LVK 15,794 149 53 B B
JE1GZB 11,880 108 55 B B
JH8DHV 10,164 121 42 B B
JH1RDU 8,800 100 44 B B
JA1RRA 7,920 99 40 B B
JA1ALX/9 7,448 98 38 B B
JR2TRC 5,846 79 37 B B
JA2AIF 5,460 65 42 B B
JJ3APB 4,440 60 37 B B
JH1RMH 3,640 70 26 B B
JL2HUJ 3,416 61 28 B B
JA0HYU 3,180 53 30 B B
7N2UQC 3,172 61 26 B B
JH4ARK/1 1,080 30 18 B B
JI8GZS 992 31 16 B B
7K2PBB 624 24 13 B B
JG1GCO 544 17 16 B B
JH7POF 420 15 14 B B
JI6BRB 336 14 12 B B
JI8BUR 288 16 9 B B
JH1TUX 220 11 10 B B
JR1BSV 72 6 6 B B
JA3WFQ 32 4 4 B B
JA8GTO 18 3 3 B B
JA7OWD 441,184 1622 136 B C
JA6WFM 302,086 1154 131 B C
JI1ACI 280,064 1088 128 B C
JE6ZIH (JR6GKT, op)
254,880 1062 120 B C
JA3LDH 54,000 296 90 B C
JH1UUT 42,670 251 85 B C
JA8TEZ 6,160 88 35 B C
JA1ANA 1,488 31 24 B C
JA1YNE (JP1OGL, op)
191,992 464 103 C A
JA6UBK 81,260 239 85 C A
JA5CDL 24,420 111 55 C A
JF1SQC 615,984 1253 123 C B
JH8SLS 316,852 700 113 C B
JA1NLX 261,248 628 104 C B
JQ1UKK/7 242,104 568 106 C B
JI1RXQ 207,744 541 96 C B
JN1NOP 142,688 390 91 C B
JA1PS 133,588 367 91 C B
JQ2FFS 130,720 378 86 C B
JK1LYP 125,120 368 85 C B
JA5ATN 104,160 310 84 C B
JM1NKT 99,960 293 85 C B
JA0EMS 97,280 320 76 C B
JA2OJ 95,632 278 86 C B
JA2IU 94,952 286 83 C B
JF1EQA 93,292 281 83 C B
JH0EPI 91,512 281 82 C B
JA4BAA 74,260 235 79 C B
JA7ARW 70,500 236 75 C B
JG3LGD 66,144 212 78 C B
JA2KKA 61,908 231 67 C B
JA9DDF/2 61,272 223 69 C B
JA2DHL 59,924 211 71 C B
JA1CP 51,992 195 67 C B
JJ6TWQ 44,392 179 62 C B
JH6TYD 42,700 175 61 C B
JA4AQR 33,536 130 64 C B
JA1QZC 32,660 115 71 C B
JH3JYS 31,200 130 60 C B
JA2UJ 30,912 138 56 C B
JH1DYV 26,784 123 54 C B
JE5XIC 21,624 106 51 C B
JN2QYN 21,008 100 52 C B
JA1GS 19,200 100 48 C B
JG0EXP 18,792 87 54 C B
JR0BQD 17,696 78 56 C B
JR3NDM 15,308 89 43 C B
JA3AA 14,352 92 39 C B
JH1SBE 13,912 94 37 C B
JN7OJA 12,728 85 37 C B
JA2MEI 12,324 79 39 C B
JJ1LRD/2 11,792 68 44 C B
JA1JQY 11,704 86 38 C B
JA7KM 11,664 79 36 C B
7K1EQG 11,100 75 37 C B
JA1AZS 8,680 70 31 C B
JL1EAN 7,920 60 33 C B
JA1BBA 7,000 50 35 C B
JE1JAC 6,944 62 28 C B
JN3DSH 6,600 55 30 C B
JH1PXY 5,824 56 26 C B
JH1NXU 5,184 48 27 C B
JL1IHE 1,980 32 15 C B
JE1KDM 1,768 26 17 C B
JF7VVL 1,064 19 14 C B
JR0EFE/7 1,008 18 14 C B
JA9EUG 836 19 11 C B
7N3WRN 396 11 9 C B
JM6NJU 36 3 3 C B
JH3AIU 678,084 1403 121 C C
JA2ZJW (JH2CMI, op)
648,096 1257 129 C C
JH1AZO 353,012 782 113 C C
JA1HP 159,120 389 102 C C
JK1OPL 128,592 344 94 C C
JA3ARM 101,964 292 87 C C
JA9CWJ 71,568 284 63 C C
JA1GTF 31,720 130 61 C C
JA2VQF 12,804 97 33 C C
JH7CJM 12,000 60 50 C C
JI1CQA 7,320 60 30 C C
JK4BQX 4,704 56 21 C C
JJ3YBB (JA3PJL,JH3FQF,JF3MOK, JF3RLG, JS3VEX, ops)
1,317,960 1920 252 D
JN3PYQ/1 (+packet)
758,120 1127 220 D
JA6ZLI (JJ6WYS, op)
682,080 1052 210 D
JE5MCV (+JA5OVU,JA5DQH)
401,212 1197 161 D
JA9YBA (JR9QNJ,JF0EGG, ops)
83,904 315 96 D
JN1YUU (+ops) 8,400 100 42 D
JA2YKA (JI4RDO,JN2FMH,JK2XXK, JP2LUQ, JH3FBK, ops)
113,322 320 101 D

Mongolia

JT1BV 78,110 535 73 B B
JT1BH 423,516 1217 87 C C

Jordan

JY9NE (N3FNE, op)
9,990 111 45 B B

Lebanon

OD5/F5SQM (F6FYA, op)
272,580 885 77 C B

Ogasawara

JD1BIA 29,028 246 59 B B

Turkey

TA3J 4,620 110 21 A B
TA4ED 30,336 316 48 B B

Asiatic Russia

RW9TA 177,944 481 118 A A
UA0KBG 51,632 245 56 A A
RA0JT 1,904 78 8 A A
UA0KCL 1,296 28 12 A A
RA0FN 457,166 806 179 A B
RA0JJ 255,060 663 117 A B
RA0FF 218,680 516 142 A B
RA9UK 207,016 593 113 A B
RW9QA 102,486 360 87 A B
UA9JMS 95,864 290 92 A B
RA9AN 89,380 306 82 A B
RZ9WZ 53,760 337 70 A B
UA9YAB 20,178 103 57 A B
RW0LZ 7,676 64 38 A B
UA9MA 763,392 1620 168 A C
RI9C (UA9CDV, op)
570,380 1168 158 A C
UA9CDC 307,384 594 154 A C
RA9AC 2,700 34 30 A C
UA0ZBK 249,432 1094 114 B B
UA9CL 34,300 245 70 B B
UA9ACJ 29,618 251 59 B B
UA0SJ 12,060 134 45 B B
RW9HA 200,090 1177 85 B C
RS0F (UA0FZ, op)
174,834 883 99 B C
UA0SE 180 15 6 B C
RV9COI 19,188 123 39 C A
UA9CBM 7,800 76 26 C A
UA0JB 543,000 4344 125 C B
UA0SAD 151,420 565 67 C B
UA9APA 98,864 334 74 C B
RA0JD 81,984 336 61 C B
UA0AGI 93,800 350 67 C C
RK9JWR (RA9JR,RV9JR,UA9JMB, ops) 529,312 1324 136 D
RK9CZO (RX9CAZ,RA9CDH, ops)
305,368 727 133 D
RZ9AWK (UA9AFS, RZ9AE, RV9BB, ops) 182,664 489 129 D
RV0AR 180,420 970 93 D
RA0AM 11,408 63 62 D

Kazakhstan

UP6P (UN6P, op)
488,400 1095 150 A B
UN4L 373,576 953 98 C C
UP6F (UN7FZ, op)
334,428 961 87 C C
UP4L (UN7LZ, op)
187,200 650 72 C C

Hong Kong

VR2BG 872,460 1665 131 C C

Europe

Croatia

9A2EY 93,656 315 92 A A
9A5Z (9A2LM, op)
52,152 200 82 A B
9A7V 36,294 160 69 A B
9A3CY 42 4 3 A B
9A6ACY 57,984 302 96 B B
9A7P (9A6NHH, op)
80,640 285 70 C A
9A3VM 464,724 991 117 C B
9A3RE 333,000 750 111 C B
9A5I 276,012 560 123 C B
9A6DM 637,280 1138 140 C C
9A2AJ 263,520 547 120 C C

Portugal

CT1GFK 8,208 60 36 A B
CT1EAT 258,816 1013 128 B B
CT1GWC 97,236 438 111 B B
CT2GVG 24,920 178 70 B B
CT4MS 13,824 108 64 B B
CT1DIZ 622,440 1995 156 B C
CQ0ODX (CT1FMX, op)
279,672 1084 129 B C
CT1BNW 92,820 390 119 B C
CT1ELF 13,920 120 58 B C
CT1AOZ 291,720 710 102 C C
CT8W (F1HAR,F5HRY,F5MZN,F6EPY, F6FVY, ops)
2,834,352 2946 324 D
CT1A (CT1GPQ,CT2GFJ,CT1GFK, ops) 643,356 1335 189 D

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DL6RDR 347,060 567 185 A A
DL8TWA (K3TW, op)
131,614 353 119 A A
DK5AX 233,036 556 149 A B
DF6LQ 50,720 185 80 A B
DL3JK 35,926 153 71 A B
DJ1MM 15,180 92 46 A B
DK3KD 406,700 842 166 A C
DF1LON 172,050 432 155 A C
DL1ECG 121,128 356 147 A C
DL5JMN 2,376 27 22 A C
DH5YDT 8,904 106 42 B A
DL5IAM 6,396 82 39 B A
DL3AG 47,872 272 88 B B
DL4VAB 5,772 74 39 B B
DJ0BX 640 20 16 B B
DJ6QO 180 10 9 B B
DF9ZP 648,174 1831 177 B C
DL8UD 513,590 1595 161 B C
DL8PC 344,268 1179 146 B C
DL2ARD 320,916 1138 141 B C
DJ3HJ 232,448 908 128 B C
DL9NDS 196,750 787 125 B C
DL6NBC 150,650 655 115 B C
DJ1YFK 64,904 266 61 C A
DK4CU 22,860 127 45 C A
DL1LAW 18,480 140 33 C A
DL2TM 10,080 63 40 C A
DL4EN 267,728 577 116 C B
DL5GG 198,816 455 109 C B
DK5IM 153,924 381 101 C B
DL5KUD 131,712 343 96 C B
DL5ASE 110,448 352 78 C B
DL5SVB 102,384 316 81 C B
DJ3XD 63,336 203 78 C B
DF3OL 58,800 195 75 C B
DL1SAN 53,312 196 68 C B
DL2GBB 48,180 165 73 C B
DL2ZAV 43,188 183 59 C B
DL3BZZ 37,996 161 59 C B
DJ2QV 36,952 149 62 C B
DK2JX 34,048 133 64 C B
DF5WN 33,280 131 64 C B
DL3BRA 28,860 111 65 C B
DJ2YE 24,596 143 43 C B
DL3DRN 20,304 94 54 C B
DL2ANM 18,800 80 47 C B
DM3XI 17,776 101 44 C B
DL3PS 13,200 110 30 C B
DJ6TK 13,172 89 37 C B
DL4AAE 12,480 80 39 C B
DL2MIH 6,708 43 39 C B
DL1IAO 680,464 1198 142 C C
DL2MEH 477,000 952 125 C C
DL7BY 361,216 660 136 C C
DL6JZ 222,784 472 118 C C
DL6UNF 169,488 396 107 C C
DL2GK 157,700 412 95 C C
DJ9RR 129,960 341 95 C C
DL1TH 72,960 239 76 C C
DL5RMH (+DK7YY,DL6RAI)
1,329,126 1724 267 D
DF0HTE (DL1SFK,DL3SBI,DL8SAD, ops) 735,980 1223 245 D
DF4TD (+DL1GBQ,DL4GBA)
432,280 771 214 D
DL5YM 280,140 667 140 D

Spain

EA7AKJ 308,476 566 161 A B
EA2BNU 281,124 546 137 A B
EA1HF 257,312 471 172 A B
EA5ARC 140,220 375 123 A B
EA7GXX 76,832 223 98 A B
EA1CS 48,600 159 100 A B
EA5FFC 371,304 707 191 A C
EA3AR 36,448 246 67 A C
EA5DWS 8,928 93 48 B A
EA2SN 3,366 51 33 B A
EA4KD 217,956 887 123 B B
EA3BOX 171,828 775 111 B B
EA3FCQ 80,750 425 95 B B
EA5DFX 76,428 386 99 B B
EA3CS 76,146 343 111 B B
EA3KT 71,400 340 105 B B
EA4ATI 61,370 323 95 B B
ED1FFC 47,066 233 101 B B
EC3AGC 46,150 325 71 B B
EC2AZY 26,082 207 63 B B
EA1ET 21,594 177 61 B B
EA3FEJ 12,600 100 63 B B
EA3OP 7,704 107 36 B B
EA7HE 450 15 15 B B
EA3ATM 569,596 1815 157 B C
EA4EAP 555,104 1827 152 B C
EA1DLU 324,810 1203 135 B C
EA5GRB 220,296 804 137 B C
EA2BB 193,050 715 135 B C
EA6TC 91,300 415 110 B C
EA3DUZ 48,090 229 105 B C
EA3MR 43,660 296 74 B C
EA3GHQ 39,500 250 79 B C
EA1BVP 23,184 161 72 B C
EA1GL 18,204 123 74 B C
EA1EDF 7,104 96 37 B C
EA4KN 4,148 61 34 B C
EA1DFP 2,496 32 39 B C
EA3AAW 2,200 44 25 B C
EA7AAW 94,484 298 79 C A
EA5AWI 44,720 171 65 C A
EA5FID 447,216 847 132 C B
EA7AJR 359,040 814 110 C B
EA3ALV 133,216 362 92 C B
EA3BOW 121,776 355 86 C B
EA5EU 110,592 384 72 C B
EA7ASZ 63,024 201 78 C B
EA5SM 46,720 159 73 C B
EA1BXW 8,960 64 35 C B
EA1DAV 763,776 1326 144 C C
EA5WU 716,832 1368 131 C C
EA5YU 420,352 820 128 C C
EA4TX 341,088 747 114 C C
EA3BHK 92,000 250 92 C C
EA1FBB 14,848 128 29 C C
EA1BYA 6,936 51 34 C C
EA5ABE 1,728 24 18 C C
EA7EZQ 840 15 14 C C
EA4RKU (+ops) 419,664 1242 168 D
EA4BT 80,360 410 98 D
EA5BM 652,960 1060 154 D

Balearic Islands

EA6XQ 14,336 81 56 A B

Ireland

EI5DI 450,722 747 179 A B
EI4DW 312,256 717 164 A B
EI8IR 397,048 1601 124 B C
EI9HQ 382,774 1440 133 B C
EI8GS 258,448 1114 116 B C

Moldova

ER0N (UT7ND, op)
903,336 1227 228 A C
ER0F (UX0FF, op)
423,654 1441 147 B C

Estonia

ES1ABR 40,172 242 83 B B
ES1QX 16,800 140 60 B B
ES5TX 7,380 90 41 B B
ES1XT (ES1JL, op)
106,656 303 88 C B
ES6PZ 3,440 172 20 C B
ES5Q (ES5RW,ES5RY,ES5QX, ops)
709,200 1133 197 D

Belarus

EW6DI 11,440 78 55 A A
EU1SA 141,696 354 123 A B
EW7DX 2,850 71 19 A B
EW6DF 48,160 301 80 B B
EW1ABF 7,128 108 33 B B
EU6TT 1,258 37 17 B B
EW4MM 172,360 695 124 B C
EU1DX 387,840 808 120 C B
EU6DX 38,340 135 71 C B
EW3LN 6,720 60 28 C B

France

F5SNV 157,284 406 153 A B
F5POJ 133,278 383 97 A B
F5TVG 77,826 209 109 A B
F5RZJ 786,298 1261 223 A C
F5CYS 14,098 133 53 B A
F5TDK 266,798 1004 133 B B
F8BJI 89,556 439 102 B B
F5ASD 77,616 396 98 B B
F5BLC 28,420 203 70 B B
F8BDQ 19,320 161 60 B B
F5MGD 5,214 79 33 B B
F8CRF 726 33 11 B B
TM1C (F6CTT, op)
860,880 2531 170 B C
TM2V (F6GLH, op)
711,620 2211 161 B C
TM1R (F5VCO, op)
586,440 1810 162 B C
F5LBL 438,152 1532 143 B C
F5BBD 135,660 570 119 B C
F8CIO 61,600 308 100 B C
F6CLM 1,080 30 18 B C
F5NJG 72 6 6 B C
F6OIE 82,800 276 75 C A
F6FTB 21,624 102 53 C A
F5NLX 5,096 49 26 C A
F5NKX 251,104 531 118 C B

F6IIE 209,280 543 96 C B
F8AKC 201,744 462 108 C B
F6GKQ 181,692 440 103 C B
F8PDR 163,620 404 101 C B
F5ICC 116,056 324 89 C B
F5AMQ 114,480 317 90 C B
F5YJ 79,316 251 79 C B
F5JDG 71,928 242 74 C B
F2FX 15,664 89 44 C B
F5NQL 11,400 75 38 C B
F2DE 7,696 52 37 C B
F8IPH 605,184 1174 128 C C
F6CXJ 152,760 400 95 C C
F5JBR 105,792 303 87 C C
F6ABI 40,748 167 61 C C
F8CNR 29,480 134 55 C C
TM1T (F8BPN,F5NBX,F6CQU,F5PSA, F6HKA, ops) 1,678,512 2118 264 D
TM5Z (F5LEN,F5RMY,F5PTM,F8AQK, ops) 1,128,116 1562 255 D
F6KPQ (F5PHW,F6DZD,F6ETI, ops) 995,026 1464 223 D
F5IQA (+F6IOC,F6IRF,F6HYE) 961,422 1436 231 D
F6KDF (F5NOD,F6PXT,F6JJX,F5SIH, ops) 785,400 1226 220 D
F3KT (+F6GIN,F5MYK,F5ORE,F5LMJ, ops) 777,480 1230 190 D
TM1V (FB1BON,F5TRO,F8BIQ,F4BHZ, ops) 680,212 1335 206 D
F6KJX (F5MFL,F5ROX,F5MLJ,F5AEB, F6CBX,F5SOH,F8CDM, ops) 211,636 453 157 D
F6KTL (F5MAX,F5LGQ,F6CKH,F5OQL, ops) 168,504 708 119 D

England

G3FNM 22,712 163 68 A A
G0WMW 251,316 446 179 A B
G6QQ 147,250 348 125 A B
G8D (G3SJJ, op) 601,794 998 201 A C
G3TMA 431,298 669 189 A C
G3WGN 323,990 555 179 A C
G0AEV 329,588 1107 149 B B
G0NWY 30,384 211 72 B B
G4NXG 16,206 111 73 B B
M0/KC5ICY 3,364 58 29 B B
MU0C (G0OFE, op) 482,516 1702 142 B C
G4OJH 363,780 1290 141 B C
G4FDC 54,812 193 71 C A
G3SXW 289,500 577 125 C B
G3LHJ 110,208 337 82 C B
G3RSD 34,944 182 48 C B
G4ZME 15,996 92 43 C B
G3ZEM 746,760 1268 147 C C
G5G (G0LII, op) 661,360 1181 140 C C
G2QT 269,212 630 107 C C
G3UFY 73,200 244 75 C C
M5X (G0IVZ,G4TSH, ops) 1,841,456 2050 284 D
M5W (G0MTN, M0COK, M0COP, G0EYO, ops) 130,560 431 128 D

Northern Ireland

GI0OUM 9,400 94 50 B B
GI0SRM (+GI0SFX) 251,472 1105 111 D

Scotland

MM0BQI 29,400 176 75 A B
MM0BYC 57,316 322 89 B B
GM0JKF 37,800 252 75 B B
GM0ECO 475,904 1664 143 B C
GM4HQF 82,360 290 71 C A
GM3CFS 206,488 487 106 C C

Guernsey

2U0ARE 18,544 122 38 C B

Wales

GW0VSW 936 15 18 A B
GW3NJW 276,916 647 107 C B
GW3SYL 104,748 300 87 C B

Hungary

HA5BSW 492,570 758 195 A A
HA2A 485,974 783 193 A A
HA1CW 668,650 1002 215 A B
HA8ZO 331,336 619 166 A C
HA5ORK 2,052 54 19 B A
HA0GK 58,872 223 66 C A
HA4YF 145,112 373 97 C B
HA4YG 9,472 64 37 C B
HA8FK 335,008 722 116 C C

Switzerland

HB9FBO 409,344 1312 156 B C
HB9IAL 42,400 199 53 C A
HB9DAX 6,120 120 51 C A
HB9DDE 4,400 44 25 C A
HB9ARF 209,880 530 99 C B
HB9DCM 181,440 431 105 C B
HB9DOT 53,820 207 65 C B
HB9HFN 25,920 120 54 C B
HB9HQX 17,384 106 41 C B
HB9AFH 15,908 97 41 C B

Italy

IK1YEE 62,328 636 98 A B
IK3SSJ 44,590 222 91 A A
IK2UCK 65c7,450 956 225 A C
IK4MTF 39,060 152 70 A C
IK2WYI 9,152 73 44 A C
IK5WGK 6,640 83 40 B A
IK2WZV 128,136 562 114 B B
IV3ZUY 68,392 332 103 B B
IV3RCH 22,880 176 65 B B
IZ2ABN 20,368 152 67 B B
IK4RQJ 16,320 136 60 B B
IK2WZQ 13,216 112 59 B B
IZ1DFK 10,486 107 49 B B
IK3KSE 5,600 70 40 B B
IZ2BHQ 4,352 64 34 B B
IK2WFN 2,976 48 31 B B
IZ8BIQ 1,392 25 25 B B
IK2DUU 496,434 1581 157 B C
I8UZA 283,968 988 144 B C
IK4AUY 217,088 848 128 B C
IK1HSS 167,648 676 124 B C
IK2PTR 156,348 774 101 B C
IK6GPZ 147,660 535 138 B C
IK4QJM 69,426 399 87 B C
IK4UXB 60,660 336 90 B C
IK4ADE 28,712 194 74 B C
IK5ZTW 25,740 195 66 B C
IK2RPK 23,120 170 68 B C
IK3XTY 17,228 146 59 B C
IK3OGL 15,136 176 43 B C
IK3CXG 13,664 122 56 B C
IK7YZF 10,044 93 54 B C
IK0PHW 2,808 52 27 B C
IK1RAC 3,224 31 26 C A
I3JSS 236,640 579 102 C B
IZ2AVK 208,236 469 111 C B
IK7JWY 156,672 384 102 C B
IZ2AEW 108,996 291 93 C B
IK5ZWU 86,688 299 72 C B
IT9NVA 57,720 222 65 C B
IK2WXV 42,640 164 65 C B
IK2AIT 16,640 104 40 C B
IK3UVK 3,360 40 21 C B
IZ8AJQ 1,564 23 17 C B
IK0HBN 440,880 834 132 C C
I2UIY 436,352 974 112 C C
IK3QAR 357,500 709 125 C C
IK2AHB 321,216 717 112 C C
IZ3ALF 266,304 580 114 C C
IZ0AIS 19,200 119 40 C C
IK4UPB (+IK4UPB,IK4MRH,I4UFH, I4JMY,I4YSS,IK4IEE,IK2QEI,IZ2AAJ, ops) 1,559,214 1913 309 D
IT9CHU (+IT9QSF,IT9BLB,IT9VDQ, IT9EQO,IT9CZJ) 1,142,622 1645 257 D
IZ2AHF 521,532 1084 198 D
IK2ZVU (I2OKW,I2BJS,IK2PIG,IZ2ACZ, ops) 478,740 849 202 D
IK8TLZ (+IK8TEO) 430,404 732 186 D
IQ7R (IZ7ATH,IK7XNF,IK7YTX,IK7LYL, ops) 236,318 564 173 D
I1WXY 208,816 842 124 D
I1TDF (+I1PIN,I1ABT,IK1JLJ,IK1AQM, IX1BGJ,I1DEP,IZ1AEL,IK1ZFQ) 103,712 464 112 D
I3MDU 3,456 54 32 D

Sardinia

IS0IGV 135 341 127 A B
IS0SLR 17,898 157 57 B B
IS0GSR 54,560 341 80 B C
IS0HQJ 158,080 415 95 C C

Norway

LA5JX 28,420 203 70 B B
LA7TN 5,394 93 29 B B
LA1YE 191,296 488 98 C B
LA2HFA 128,520 357 90 C B
LA5FH 22,140 123 45 C B
LA6YEA 657,216 1141 144 C C

Luxembourg

LX1NO 551,908 1714 161 B C
LX1KC 352,924 1234 143 B C
LX2AJ 38,628 222 87 B C

Lithuania

LY2FE 276,276 530 161 A A
LY3BA 386,482 679 173 A B
LY1DS 33,920 149 80 A B
LY3CI 364,266 605 177 A C
LY2IJ 281,096 537 164 A C
LY3CY 10,062 129 39 B B
LY3BH 183,844 779 118 B C
LY1DT 55,200 200 69 C A
LY2TA 632,060 1102 143 C B
LY2AT 76,140 235 81 C B
LY2EC 40,468 151 67 C B
LY2FF 13,248 92 36 C B
LY1CX 218,000 498 109 C C
LY2OX 174,400 436 100 C C
LY2KM 106,400 280 95 C C

Bulgaria

LZ2NB 125,040 325 120 A B
LZ2JE 71,262 229 111 A C
LZ1DP 7,098 86 39 A C
LZ2A 57,440 359 80 B B
LZ2FM 2,432 64 19 B B
LZ2ES 125,324 646 97 B C
LZ2RS 73,840 260 71 C A
LZ1IQ 2,800 35 20 C A
LZ2GS 128,744 266 121 C B
LZ2TF 85,952 272 79 C B
LZ1QH 23,864 116 51 C B
LZ1NJ 1,900 25 19 C B
LZ5W (LZ1MC, op) 555,244 1092 127 C C
LZ1FH 49,920 209 60 C C

Austria

OE1WEU 192,722 441 173 A C
OE3BCA 36,816 156 59 C A
OE2LCM 133,760 351 95 C B
4U1VIC (JH4RHF,VE3IAY, ops) 601,060 972 205 D

Aland Islands

OH0Z (OH1EH,OH1MM,OH3WW, ops) 1,806,066 2108 269 D

Finland

OH6HAE 30 3 3 A A
OH6EI 38,398 170 73 A B
OH7WW 277,056 648 156 A C
OH3JR 520 15 13 A C
OH5NHI 14,310 159 45 B A
OH5PA 7,788 66 59 B B
OH5HCK 3,776 59 32 B B
OH3RR 161,036 634 127 B C
OH2RA 2,924 43 34 B C
OH2YL 20,328 121 42 C A
OH7MM 345,600 675 128 C B
OH5NE 69,600 232 75 C B
OH6RC 47,736 153 78 C B
OH3TZ 38,552 158 61 C B
OH2BPA 25,752 444 58 C B
OH7HMC 15,132 97 39 C B
OH3KOH 14,760 82 45 C B
OH8OB 13,904 79 44 C B
OH8LC 9,116 53 43 C B
OH1UP 3,220 35 23 C B
OH2NN 2,576 28 23 C B
OH1BOI 42,032 148 71 C C

Czech Republic

OK1FJD 87,584 261 112 A B
OK2EQ 39,032 145 68 A B
OL5Y (OK1FUA, op) 1,332,120 1658 255 A C
OK2SG 130,816 274 146 A C
OK1GW 40,160 251 80 B A
OK1AXB 99,938 455 107 B C
OK2PAY 410,256 777 132 C B
OK1HX 255,300 554 115 C B
OK1AES 231,732 473 123 C B
OK1FFC 224,640 519 108 C B
OK2ZI 223,808 536 104 C B
OK1OX 126,160 331 95 C B
OK2ZJ 120,576 315 96 C B
OK2HI 97,760 371 65 C B
OK1HFP 70,080 219 80 C B
OL7D (OK1FHI, op) 68,328 218 78 C B
OK1AOU 46,360 193 61 C B
OK2TBC 46,116 183 63 C B
OK2PBG 36,000 151 60 C B
OK2BNC 25,200 100 63 C B
OK2AJ 10,440 87 30 C B
OK2BHE 9,600 240 40 C B
OK1MD 635,960 1222 130 C C
OK2PDT 372,444 753 123 C C
OK2SJ 123,704 329 94 C C
OK1GS 115,104 327 88 C C
OK1FTW 2,992 136 22 C C
OL5Q (OK1HRA,OK1FFU, ops) 117,180 567 93 D
OK2KRT (OK2BJS,OK2DW,OK2XA, ops) 51,948 186 74 D

Slovakia

OM5AW 461,352 753 188 A B
OM4DN 150,080 392 112 A B
OM4KK 36,144 251 72 B B
OM3YK 8,836 94 47 B B
OM8CA 8,190 117 35 B B
OM3EA 76,074 409 93 B C
OM7YC 11,172 114 49 B C
OM4AWS 104,652 321 81 C B
OM3PA 64,408 194 83 C B
OM6AMZ 29,480 133 55 C B
OM3PC 692,076 1177 147 C C
OM3KZA (OM3TPN,OM2ZZ,OM3CHY, OM3YDX,OM3CUG, ops) 70,304 230 104 D

Belgium

OT4CAS 58,330 211 95 A B
OT4AYM 508,128 1608 158 B B
OT4MA (ON4MA, op) 469,404 1326 177 B B
ON5LL (ON6ZX, op) 294,276 1072 137 B B
ON4TO 146,060 545 134 B B
ON4CJN 19,200 160 60 B B
OT9A (ON4ASB, op) 574,668 1878 153 B C
OT4ATW 365,328 774 118 C B
ON4XG 170,952 419 102 C B
ON6TJ 72,036 261 69 C B
OT9T (at ON4UN) (DL2CC,ON4UN, ops) 2,073,660 2110 321 D
OT4WW 1,343,502 1449 303 D
OT7SA (ON4AAM,ON6OX,ON7GR, ON4ACT, ops) 302,680 522 161 D
OT9E (ON4CBA,ON4CDW,ON4CEK, ON4AME,ON5LW, ops) 174,838 817 107 D
OT7RT (ON1WI,ON2BAK,ON4CEQ, ON4NM,ON5JM,ON5OH,ON6VC, ON7SS,ON8SQ, ops) 64,962 227 81 D

Faroe Islands

OY4M 40 3 2 A C

Denmark

OZ6PI 7,896 89 42 A B
OZ1KRF 121,770 615 99 B C
OZ5EV 120,064 469 128 B C
OZ8AE 175,980 417 105 C B
OZ1BMA 65,952 229 72 C B
OZ8SW 52,480 205 64 C B
OZ5MJ 78,408 241 81 C C

Netherlands

PA0RBO 2,952 54 31 A A
PA3EMN 112,716 326 101 A B
PA3HBI 23,400 120 50 A B
PA0RBS 11,562 123 47 A B
PA3FNE 253,110 628 165 A C
PA1BX 8,624 59 44 A C
PA0JNH 14,520 132 55 B B
PA0KDM 8,034 103 39 B B
PA3HGF 2,464 44 28 B B
PA3DVA 1,056 24 22 B B
PA0IJM 138,376 706 98 B C
PA0UDP 8,200 82 50 B C
PA3FSC 7,072 68 26 C A
PA3ELD 135,168 384 88 C B
PA0JED 127,696 344 92 C B
PA3BFH 116,604 368 79 C B
PA3GRM 49,920 207 60 C B
PA3CAL 49,104 186 66 C B
PA0SKP 33,276 141 59 C B
PA3BGQ 20,160 105 48 C B
PA3BEJ 7,600 50 38 C B
PA5TT 87,848 277 79 C C
PA0CYW 72,996 231 79 C C
PI4COM (PA3EWP, PA5ET, PA7FM, ops) 1,418,956 1832 271 D
PI4CC (PA3BAG,PA3BSQ,PA3EPD, PB0AIU,K5RT, ops) 1,254,000 1595 250 D
PA0KHS 57,148 314 91 D

Slovenia

S57XX 490,140 714 210 A B
S50K 1,317,244 1891 254 A C
S55A 252,174 520 159 A C
S54E 254,716 827 154 B B
S57UYX 87,138 423 103 B B
S51F 19,500 150 65 B B
S58DX 67,488 304 111 B C
S53AU 55,648 188 74 CB
S58A 862,800 1439 150 C C
S50R 771,456 1334 147 C C
S53O 678,960 1230 138 C C
S50Q (+S57AW,S56M) 1,674,432 2040 272 D
S51TA (+S55OO,S53CC,S53MM) 1,592,976 2089 264 D
S56A 338,724 566 194 D

Sweden

SK6AW (SM6DER, op) 58,432 197 88 A B
SM6WXO 28,756 134 79 A B
7S2E (SM2DMU, op) 562,020 981 190 A C
SM7BJW 169,974 412 133 A C
SM6FUD 34,650 139 77 A C
7S3R 9,360 65 40 A C
SM6FJY 14,248 137 52 B B
SM7M 2,100 43 25 B B
7S2A 19,706 167 59 B C
SM6BSK 171,864 431 99 C B
SM5G (SM5JBM, op) 80,032 245 82 C B
SM6CST 57,960 644 90 C B
SM4SX 51,712 202 64 C B
SM3X (SM3CVM, op) 25,272 117 54 C B
SM7TKL 16,200 90 45 C B
SM0BDS 9,100 65 35 C B
SM0JHF 165,528 417 99 C C
SM5CIL 141,768 357 99 C C
SM6WQB 60,564 190 98 C C
SM7EH 50,700 195 65 C C
SM3AVW 41,472 162 64 C C

Poland

SQ9HYM 174,812 437 137 A B
SP5BB 11,628 97 51 A B
SP8KJU 7,140 57 35 A B
SP9PT 89,180 226 130 A C
SP9LAS 400 13 10 A C
SP7MTF 84,800 400 106 B B
SP9ODY 82,468 389 106 B B
SP7SEW 51,300 285 90 B B
SP5LCC 48,260 254 95 B B
SP8LBK 30,184 196 77 B B
SP7A 23,184 168 69 B B
SP8OON 11,440 104 55 B B
SP6AXW 9,024 96 47 B B
SP9CP 2,600 50 26 B B
SP7LHX 390 15 13 B B
SP9LJD 276,024 1113 124 B C
SP6IXF 238,374 969 123 B C
SN8V 157,014 671 117 B C
SP9QMP 58,880 320 92 B C
SP5LKM 51,000 250 102 B C
SP6OJG 200 10 10 B C
SP9MQH 60 6 5 B C
SP5DDJ 95,976 279 86 C A
SP2EWQ 56,832 222 64 C A
SP4GFG 16,660 85 49 C A
SP1NY 136,808 348 98 C B
SP3VT 90,288 342 66 C B
SP6BEN 74,100 247 75 C B
SP8FHJ 47,104 184 64 C B
SP5CGN 30,096 132 57 C B
SP3AZO 23,852 90 67 C B
SP5BNB 23,836 101 59 C B
SP2FAX 763,960 1345 142 C C
SP3FAR 22,464 143 39 C C
SP9KRT (SP9ADU,SP9EMI, ops) 29,000 145 50 D

Greece

SV1DNW 44,400 296 75 B B
SV1DZB 45,600 300 76 B C
SV1DKL 152,192 463 82 C B
SV1DKR (+SV/OK1YM 860,574 1331 221 D
SV1AFA (SV1CIB, SV1DPI, SV1DPX, ops) 152,640 491 106 D

San Marino

T77WI 26,908 217 62 B B

Bosnia-Herzegovina

T99W 1,428,480 1772 248 A C

Iceland

TF3AO 10,176 159 32 B C
TF3IRA (TF3AO,TF3HP, ops) 45,954 333 69 D

Kaliningrad

RW2F (UA2FB, op) 1,195,262 1573 251 A C
RA2FBC 368,032 741 124 C C
RN2FA 71,540 245 73 C C

European Russia

UA4LU 552,512 1032 178 A B
UA1AJW 183,806 511 133 A B
RA1AKE 116,150 351 115 A B
UA3SAQ 111,128 372 116 A B
RA3AF 66,144 247 78 A B
RU3WR 60,816 273 84 A B
RA1ABU 15,120 103 45 A B
RA6AR 11,316 69 41 A B
UA6LP 7,990 78 47 A B
RM4W (RW4WR, op) 818,680 1449 194 A C
RW3GU 764,820 1208 210 A C
RK6CZ 760,984 1109 214 A C
UA4LCH 686,694 1188 193 A C
RU4HP 686,372 1163 194 A C
RE4HW 542,150 956 175 A C
RA3AJ 459,010 790 197 A C
UA3AB 431,340 817 195 A C
RA6LW 396,576 852 144 A C
RW4AA 208,146 616 113 A C
RA3AA (W3UA, op) 156,168 468 108 A C
RV1CC 119,476 332 119 A C
UA3AGS 40,664 442 92 A C
RZ1AZ 27,040 155 80 A C
RA0CCV/3 18,330 235 39 B A
RA3DGH 14,726 199 37 B A
RA4UAT 918 27 17 B A
RA3DNC 51,360 321 80 B B
UA3LHL 51,040 319 80 B B
RU3DVR 46,240 289 80 B B
U1BA 19,380 190 51 B B
UA4LBK 15,480 172 45 B B
RA4CC 156,148 758 103 B C
UA3BL 136,290 649 105 B C
UA4FRV 52,640 376 70 B C
RV6LOB 15,900 160 50 B C
RW3WR 42,944 177 61 C A
UA1OMS 19,844 121 41 C A
UA6LCJ 6,656 64 26 C A
RN3QO 348,928 751 116 C B
RA1ACJ 226,240 505 112 C B
UA3ABJ 221,840 590 94 C B
UA3ABT 128,128 365 88 C B
RA3XO 124,548 321 97 C B
RA4CTR 105,592 394 67 C B
RW1ON 65,720 265 62 C B
RV3LO 58,480 217 68 C B
RK3AD 31,360 140 56 C B
UA4QK 28,600 130 55 C B
RV3DAK 16,464 98 42 C B
RN1AO 7,888 68 29 C B
UA6AK 2,508 33 19 C B
RA6AX 361,984 807 112 C C
RM3C (RA3CW, op) 340,752 687 124 C C
UA4CJJ 221,432 622 89 C C
RV6AB 19,080 112 45 C C
R3/K3NA 60 5 3 C C
RU1A (RV1AW,RN1AM, ops) 1,487,296 1735 272 D
RM6A (RN6BN,RA6CM,RA6CO, RU6CZ, ops) 1,449,240 1860 260 D
UF3CWR (RV3BR,RZ3AZ, ops) 749,216 1160 208 D
RK3AWE (RK3FT,RK3FM,RU3DGD, RA3DKE, ops) 440,176 865 164 D
RZ1AWO (+ops) 422,466 793 173 D
RK3QWM (RU3QD,RA3OU,RA3QH, UA3QFY,UA3QJJ, ops) 226,780 634 145 D
UA3AP 142,728 326 114 D
UA4HEJ 142,688 448 98 D
RZ4AYT (RA4AI,UA4A-350,UA4A-356, ops) 17,808 158 42 D

Ukraine

UR0I 667,290 1121 195 A B
UX5EF 108,100 314 94 A B
UR4EWZ 68,484 280 78 A B
UT4EO 22,440 153 55 A B
UT2IY 857,784 1329 206 A C
UT2QT 478,820 887 178 A C
U5WF 471,988 718 187 A C
EM8I (UT8IM, op) 344,692 855 137 A C
EM4E (UR5ECW, op) 295,438 776 143 A C
UX2MM 213,248 494 128 A C
UR3QCW 81,282 275 93 A C
UR6IJ 15,708 119 42 A C
UR5XAW 9,064 103 44 B A
US5WDL 8,424 108 39 B A
UR5QBB 85,932 462 93 B B
UT7QL 70,380 414 85 B B
UR7TZ 57,224 311 92 B B
UR5WIF 26,964 214 63 B B
UT1UA 13,224 114 58 B B
UT5EFV 11,232 144 39 B B
UY5ZZ 4,704 98 24 B B
UR5ZEX 1,026 27 19 B B
UT0D (UT7DX, op) 279,588 1013 138 B C
UX1HV 6,572 106 31 B C
US3QW 12,320 77 40 C A
UT3QT 164,160 468 90 C B
UT1FA 144,000 360 100 C B
UY5TE 97,280 320 76 C B
UR6ET 97,188 273 89 C B
UT3QQ 81,760 280 73 C B
UR4QOS 78,240 326 60 C B
UR6QS 12,300 75 41 C B
EO1I (UT1IA, op) 1,872 26 18 C B
UT5UGQ 960 16 15 C B
UT1QW 351,936 846 104 C C
UY5LW 247,192 583 106 C C
UT5UGR 150,776 401 94 C C
UT4EK 36,480 160 57 C C
UT7Z (UR5ZMH,UR7ZZ,UT0ZZ, UT4ZO,UY0ZG, ops) 1,285,284 1607 273 D
UU5J (UU1JA,UU2JQ,UU2JZ,UU4JDX, UU0JX, ops) 1,019,520 1470 236 D
UU7J (UU0JM,UU4JMG,UU8JK, UU4JDD, ops) 619,920 1060 189 D
UX8IXX (+US8IBS,US8ILZ,US8ICA, ops) 249,924 716 118 D

Latvia

YL2KA 163,668 368 138 A B
YL2GN 106,128 326 99 A B
YL2IP 20,196 99 66 A B
YL2EC 896 20 16 A B
YL2MF 6,480 81 40 B A
YL3BZ 12,474 99 63 B B
YL2UZ (at UW3DI/2) 219,780 500 111 C B

Romania

YO4AAC 19,200 137 40 A A
YO6BHN 275,184 523 168 A B
YO3APJ 223,360 431 160 A B
YO3CTK 46,096 188 67 A B
YO8MI 26,602 173 47 A B
YO4NF 713,754 1327 171 A C
YO3III 1,044 29 18 B A
YO5KTK (YO5CYG, op) 55,874 307 91 B B
YO6BZL 48,720 280 87 B B
YO6AUI 9,592 109 44 B B
YO7AQF 6,960 87 40 B C
YO8FR 101,728 395 88 C B
YO9FJW 66,820 257 65 C B
YO2ARV 40,296 146 69 C B
YO8DHD 25,004 134 47 C B
YO4BBH 9,800 200 50 C B
YO4AB 293,408 691 106 C C
YO8AXP/P 11,988 81 37 C C

Yugoslavia

YU1AST 349,264 617 166 A B
YU7KM 97,920 271 90 A B
YU1KN 91,052 442 103 B A
YU1AAX (YU1JW, op) 409,248 1421 144 B B
YT7A 325,748 1147 142 B B
YU1OJ 265,232 968 137 B B
YU7BCD (4N7AE, op) 197,520 823 120 B C
YT7TY (YZ7DM, op) 121,824 322 94 C A
YZ9A 692,760 1252 138 C C
YU7SF 86,944 247 88 C C
YZ7A (YU7CM,YU7BW,YU7KC,YU7LM, 4N7ZZ,YU7JDE, ops) 1,055,760 1333 249 D

Macedonia

Z32AF 61,932 215 78 A A
Z31JA 96,900 475 102 B B
Z31GB 24,288 132 46 C A

North America

Barbados

8P6SH 64,944 369 88 B C
8P9JO 950,684 1788 133 C B

Bahamas

C6A/K2PS 1,352,036 1876 218 A B

Cuba

CO8TW 8,320 65 32 C B

Martinique

FM5FJ 802,464 2572 156 B C
FM5DN (K2PF,KU9C, ops) 2,228,928 2812 282 D

Dominican Republic

HI8ROX 45,762 263 87 B C

Panama

3F3A 186,048 378 153 A B
3E1DX (HP1XVH, op) 673,104 2275 148 B C
3F1AC (HP1AC, op) 266,644 618 107 C B

Alaska

KL7RA 1,309,230 2399 195 A C
KL7FAP 159,732 987 81 B B
KL7/K8AF 7,344 54 34 C A
AL7IF 235,832 716 82 C B
KL9A (+KL7FH) 1,084,364 1826 173 D

Virgin Islands

NP2Q 127,036 698 91 B A
KP2BH 328,548 1255 131 B B
WP2Z (AG8L, op) 1,202,852 2244 133 C B
KP2D (KP2N,NP2E,NP2W,NP2DJ, ops) 712,800 1771 176 D

Puerto Rico
WP4LNY 150,912 440 131 A C
WP3C 563,500 1221 115 C B
NP3G 866,804 1556 139 C C
NP3X (WP3A,KP4WW, ops)
2,052,834 2927 259 D

Costa Rica
TI1Z (TI4ZM, op)
348,100 1475 118 B B

Antigua & Barbuda
V26X (K8CX, op)
2,497,278 3604 259 A C

Belize
V31JP 198,168 613 138 A C

British Virgin Islands
VP2VF 578,100 2351 123 B B

Turks & Caicos Islands
VP5B (K9DX,K9RS, ops)
3,673,930 4188 295 D
VP5W (K4LQ, W4OV, ops)
1,470,480 2319 220 D

Mexico
XE1DNF 53,888 421 64 B B
XE1ZTW 44,654 269 83 B B
XE1L 104,044 703 74 B C
XE2DV (+W7SE)
1,913,156 3039 227 D

Cayman Islands
ZF2RT (W0GJ, op)
949,524 1568 201 A B
ZF2DR (K5RQ, op)
633,984 2496 127 B C
ZF2AR (N6KI,W6VNR, ops)
1,734,770 2763 235 D

Oceania
Philippines
DU1ODD 87,984 331 117 A B
4F4IX 204,672 985 104 B B
DU1SAN 50,046 441 57 B B
DU67LER (DU1LER, op)
522 29 9 B B
DU1ODX 54,372 197 69 C B
DU3NXE 44,352 231 48 C C

New Caledonia
FK8GM 1,092,000 3501 156 B C

Minami Torishima
JD1BIC/JD1 255,024 830 77 C B

Mariana Islands
NH0E 119,024 347 86 C C

Guam
KH2/K4ANA 550,940 1024 163 A C
NH2DX (KH2D, op)
511,700 1075 119 C B

Midway Island
KH4/W4ZYV 176,880 1005 88 B B

Hawaii
KH7L 28,426 145 61 A B
KH6TO (at NH7A)
1,750,128 2980 202 A C
KH6CDO 768 16 24 B A
NH6YK 129,482 642 101 B B
KH6GMP 110,856 596 93 B B
KH6CQH 467,670 2228 105 B C
WE8P/KH6 462,420 2202 105 B C
WH6H 406,026 1972 103 B C
KH7R (+KH6ND, KH7U, ND3A)
2,730,060 3865 261 D
KH6IN (KH6B,KH6AFS,KH6BMM, ops)
68,832 239 72 D

Palau
T88XQ (JA6VZB,JH0XUP/6,JE2PCY, ops) 1,321,920 2237 204 D

Marshall Islands
V73CW 881,620 1742 170 A B
V73UX 13,200 120 55 B A

Australia
VK4EMM 1,400,400 1779 225 A B
VK2APK 510,752 835 176 A B
VK8AV 401,568 629 178 A B
VK4UC 1,096,714 1787 223 A C
VK5GN 803,250 1357 189 A C
VK4EJ 192,284 907 106 B B
VK2ARJ 163,680 880 93 B B
VK4NEF 127,296 612 104 B B
VK5EMI 56 7 4 B B
VK2IA 269,012 617 109 C B
VK4TT 135,636 381 89 C B
VK4ICU 53,560 205 65 C B
VK4XW 1,904 28 17 C B
VK4DZ (+VK4NM, VK4SN)
1,200,960 1652 240 D

Indonesia
YC0LOW 4,582 55 29 B B
YC8RBC 552 23 12 B B
YB5QZ 183,960 656 70 C B
YB3ZES (YD3BMB, op)
18,900 105 45 C B
YC8TXW 11,336 109 26 C B
YB1KOR 38,544 167 73 D

New Zealand
ZL2AL 217,854 649 133 A B
ZL1ANJ 445,536 1639 136 B C
ZL6QH (ZL2BSJ, op)
699,032 1479 118 C C

South America
Chile
CE5/SM3SGP
1,523,632 1917 242 A B
CE3BFZ 579,600 961 210 A C
CE4HP 4,000 50 40 B B
CE4B (CE4ETZ, op)
11,564 98 59 B C
CE8SFG (+CE8FGC)
629,370 1052 189 D

Uruguay
CX5BW (+CX8AT,CX8CP,CX9AU)
2,265,200 2634 280 D
CW3C (CX3BBU,CX2AM, ops)
273,552 643 164 D

Argentina
LU5WW 1,663,700 1846 262 A B
LU3HIP 967,754 1329 229 A B
LU5FF 822,780 1105 210 A B
LO7H 394,940 713 182 A B
LU1VK 121,158 477 127 B A
LW3DX 68,250 325 105 B A
LU1HN 20,020 153 65 B A
AY0N (LU2NI, op)
288,708 983 147 B B
LW7EIC 223,000 892 125 B B
LU8ADX 124,500 498 125 B B
LU1NAF 102,080 464 110 B B
AY5E 59,740 290 103 B B
LU5EVK 56,620 298 95 B B
LW7EGO 45,924 258 89 B B
LU9YAS 31,080 210 74 B B
LW9DAH 22,952 151 76 B B
LU5JKG 6,384 84 38 B B
L20F 564,084 1741 162 B C
LU1NDC 341,652 1204 142 B C
LU4MCS 113,288 476 119 B C
LT5Y (LU1YU, op)
102,080 464 110 B C
LU1EWL 371,220 802 115 C B
LU4FM
(LU1FAM,LU2FFD,LU3FP,LU4FAC, LU6FFQ, ops)
2,597,630 2923 301 D
LU5VV (+LU5VC)
1,782,602 2323 251 D
LU4DD (LU7EE,LU5UAI,LU9AY, LU8EW,LU4DX,LU4AXV,LU8DNO,LU3EPI, ops) 1,141,504 1418 224 D
LT5V (LU7YS,LU3VED,LU7VCH, LU8VCC, ops) 927,732 1452 247 D
LU1FC (LU5FSM,LU6FF, LU1FNH, LU2FRT, ops) 767,440 1090 212 D

Peru
4T4O
(OA4ST,OA4BHY,OA4AHW,OA4CVT, OA4CIH,OA4DJW,OA4DIX,OA4DKC, ops) 356,300 871 175 D

Aruba
P43E 516,336 1269 186 A B
P40V 2,950,432 3619 274 A C
P43T 189,720 511 93 C C

Netherland Antilles
PJ2I (ON4CFD, op)
804,004 2698 149 B C

Brazil
ZV8O (PV8DX, op)
845,130 1419 197 A B
PY1KN 173,460 351 147 A B
PT2AW 124,712 288 119 A B
PY2NY 64,796 213 97 A B
PY77YL 25,842 120 73 A B
ZZ2Z (PY2YP, op)
351,080 656 134 A C
PY2MNL 256,650 885 145 B B
ZY4K (PY4BK, op)
123,576 542 114 B B
PP5MQ 50,048 272 92 B B
PY2DJ 34,608 206 84 B B
PY2QA 23,184 161 72 B B
PY3CGP 19,328 151 64 B B
PR7FN 10,656 111 48 B B
PY5HSD 7,830 87 45 B B
PR7AR 4,480 70 32 B B
PR7SM 4,096 64 32 B B
PU7ENW 2,322 43 27 B B
PS8ET 2,312 34 34 B B
PR7QI 442 17 13 B B
ZW5B (PY5EG, op)
1,073,200 2683 200 B C
PW2C (PY2KC, op)
687,792 1933 178 B C
PY1HE 129,712 484 134 B C
PY2OZF 19,630 151 65 B C
PY1BQJ 19,176 101 47 C A
PY4FQ 17,264 83 52 C B
PY2GG 6,120 45 34 C B
PP5BRV 819,808 1507 136 C C
PY1NX (+PY1KS)
1,537,320 1796 276 D
PY3MHZ 517,484 923 209 D
PY2ABU (PY2YU,PY2AER,PU2NDX, PY2MPG,ops) 251,160 446 182 D
PY2ECP (+PU2NYV)
14,616 126 58 D
PY2P 8,670 84 51 D

Suriname
PZ5JR (OH0XX, op)
2,100,744 3211 163 C C

South Shetland Islands
LZ0A (LZ2UU, op)
672,192 1136 216 A B

Venezuela
YV5BY 420,014 1579 133 B C
YV7QP 45,408 171 66 C B

1
Connecticut
NM1K 41,712 170 88 A A
K1RO 1,361,532 1775 249 A B
W3EP 1,033,654 1339 257 A B
WB1GCM 200,412 552 114 A B
NX1Q 108,376 293 124 A B
KA1VMG/T 28,500 160 95 A B
KE1AU 11,088 104 44 A B
KQ2M 2,717,366 3323 283 A C
NT1N 1,348,480 1784 245 A C
W1CRS 39,360 215 80 A C
KE1LE 4,240 50 40 A C
WB1FWQ 96,520 508 95 B B
KA1SVK 68,040 379 90 B B
K5GMX 54,560 310 88 B B
W1XF 45,264 276 82 B B
W1RPG 25,480 182 70 B B
K1JBS 6,164 67 46 B B
K1MKF/T 2,304 48 24 B B
KA1NYQ/T 1,692 47 18 B B
W1AW (N1ND, op)
321,300 1275 126 B C
WY1U 71,680 223 80 C B
KA1ZD (+K1ZZ)
1,737,584 2017 262 D
N1NY (+N2IX,KC2CMA)
958,344 1387 219 D
KB1H (+AA1CE,N1LYA,KB1DFB)
698,880 985 240 D
N1NQD (+packet)
281,112 563 204 D
N4XR 57,596 187 77 D
W1BIH 37,120 115 80 D
N1KWJ 35,820 199 90 D

Eastern Massachusetts
W1MA 649,124 1012 194 A B
W1VIV 283,650 521 155 A B
K1HT 279,360 533 144 A B
N3KCJ 137,054 422 139 A B
K1GU 128,440 319 130 A B
WU1F 100,854 259 117 A B
W1CCE 96,460 264 91 A B
WB2DDB 31,950 159 71 A B
NZ1Q 265,024 478 202 A C
N1TB 234,432 582 144 A C
K1VV 129,720 325 138 A C
K1JE 60,480 265 90 A C
W1SRG (N1XYR, op)
31,104 129 64 A C
AA1O 20,008 147 61 A C
K1RC 12,700 127 50 B A
KA1DZV 119,460 543 110 B B
KA1ALT 63,650 335 95 B B
N1ZZN 58,058 319 91 B B
W1MMM/T 27,600 200 69 B B
WA1VIL 26,062 157 83 B B
W1DYJ/T 22,400 175 64 B B
WA1QFR 10,580 115 46 B B
W1AF 5,624 74 38 B B
W1WSN 3,360 48 35 B B
K1PLX 311,658 1227 127 B C
W1RY 262,944 996 132 B C
KV1J 148,250 593 125 B C
K1UR 116,176 548 106 B C
W1KRS 66,992 316 106 B C
K1VUT 666,528 1265 131 C B
K1DC 314,184 687 114 C B
KO1O 167,056 392 106 C B
N1EDM 143,420 355 101 C B
K1EP 20,972 107 49 C B
WA1WFH 17,028 98 43 C B
N1HOG 3,472 31 28 C B
K5MA 589,280 1159 127 C A
K1TH 221,924 501 109 C C
W1AX 127,328 345 92 C C
KR1B 87,316 262 83 C C
WO1N 66,216 186 89 C C
N1RR (+N1XS,WM1K,KU4BP/1)
1,619,136 2056 288 D
AD1C (+packet) 205,960 366 190 D

Maine
NY1S 447,304 771 187 A B
KD1OG 35,164 149 59 A C
KA1PRD 65,856 343 96 B A
KA1ZHI/N 26,160 218 60 B A
N1RWY/T 97,720 699 70 B B
KA1FLI 93,324 462 101 B B
W1CEK 3,712 64 29 B B
NY1E 719,968 2417 149 B C
W4ZGR/1 57,600 191 75 C A
K0ZK 21,200 100 53 C A
K1PQS 257,504 616 104 C B
K1MY 102,024 468 109 D

New Hampshire
W1XZ 33,020 161 65 A B
K1PDY 40,140 184 90 A C
KB1SO 276,556 1163 119 B B
WA1VKO/T 96,836 563 86 B B
KW1DX 82,800 414 100 B B
WA1ZYX 72,100 350 103 B B
AF1T 277,512 1119 124 B C
AA1CA 214,200 508 105 C A
KB1EAX 737,060 1346 137 C B
KG1V 147,200 400 92 C B
KR1G 889,440 1633 136 C C
W1ECT 615,984 1252 123 C C
K1PH (W6PH, op)
495,432 974 126 C C
K1BV 230,488 613 94 C C
K1DWI 64,800 214 75 C C
KC1F (+packet) 136,452 372 137 D
N1KWF 124,928 364 122 D

Rhode Island
K1VSJ 142,780 370 121 A B
W1WIU 68,808 732 94 A B
KS1J 949,848 1230 228 A C
W1RFQ 200,080 400 164 A C
K1SD 325,252 1334 122 B B
W1VHF (W1JJM, op)
306,306 1287 119 B C
AB1BX 128,320 402 80 C B
K2MN 7,440 60 31 C B
N1SW 757,792 1594 119 C C
KI1G 1,176,128 1481 272 D

Vermont
KM1Z 49,408 211 64 A B
N1MEZ 648,552 1639 183 A C
N1BCL/T 37,914 267 71 B B
W1SJ 717,460 2474 145 B C
N2FF 572,828 2017 142 B C
AA1SU 201,168 506 99 C B
W1SA 153,472 436 88 C B
K2LE 996,024 1763 141 C C
W1PU (N1ZUK,K1WEY,AA1SU,K1HD, ops) 379,688 1531 124 D
AA1VT (AA2DY,KC1MP,KD1DP,KD1UP, N1QWA, ops) 341,950 667 175 D

Western Massachusetts
KZ1M 1,095,718 1635 221 A B
W1KT 114,636 466 123 B B
N1ISB 18,040 164 55 B B
WA1UOL 9,130 83 55 B B
NC1I 184,164 894 103 B C
AE1B 200,772 503 99 C B
W1TO 154,760 363 106 C B
W3SM 107,532 308 87 C B
K5ZD 236,304 546 108 C C
K1TTT (+KB1W,WA1ZAM)
2,240,322 2662 287 D
AA1JD (NC1M,AA1LH,K1GWB,K1FFX, ops) 1,423,176 2105 228 D
KT1M 5,336 46 29 D

2
Eastern New York
W2ENY 147,132 374 134 A B
NA2M 64,896 214 78 A B
K2RI 59,136 205 88 A B
W2YK 16,936 108 58 A B
K2ZZ 590,862 1003 213 A C
N2DVQ 215,204 634 146 A C
WA1KKM 128,520 318 119 A C
K2ETA 15,582 159 49 B A
N2VZA/T 146,080 664 110 B B
K2KJ 88,810 415 107 B B
WB2KHE 7,476 89 42 B B
W1NXB 4,828 71 34 B B
N2MTG 20 5 2 B B
WT4Q 137,112 591 116 B C
KD2N 21,376 167 64 B C
W2WHO 1,140 30 19 B C
K2DW 155,588 399 97 C A
K2KL 109,472 311 88 C A
WW3K 88,976 267 83 C B
K2SX 566,052 1093 129 C C
K2UF 147,552 419 87 C C
W2RE (+AB2CE,KB2SFU)
1,910,652 2435 267 D
K2UG (KE2DX,WA2JQK, ops)
1,069,340 1789 254 D
W2XL (+N2MCI,N2MFZ,WA2MMX, WB2AQU,N2SA)
668,136 1120 194 D
KC2BTG (+KC2BTI)
11,554 109 53 D

NYC-Long Island
WB2BXO 191,260 455 146 A B
N2TO 169,644 450 134 A B
W3EH 41,584 166 92 A B
KA2TGI/N 6,384 53 42 A B
AG3G 5,696 50 32 A B
N2TX 1,053,600 1736 240 A C
N2UN 513,354 818 201 A C
N2NB 687,960 2201 156 B B
KS2G 188,710 835 113 B B
WA2CNV 152,950 649 115 B B
K2TGW 66,928 356 94 B B
KF2XF 66,440 302 110 B B
K2DUX 15,120 120 63 B B
KC2CJI/T 3,240 54 30 B B
WO2N 189,216 436 108 C A
WB2AMU 135,036 340 99 C A
NT2A 368,160 705 130 C B
KA2D 173,528 396 109 C B
KG2BI 72,224 240 74 C B
WB2DLA 46,280 176 65 C B
WW2G 16,592 121 34 C B
N2GA 9,720 81 30 C B
WB2ART 6,832 61 28 C B
WA2VZQ 131,744 356 92 C C
K2KV (+N2GA,WM2V)
820,636 1403 193 D
N1XL (+K2GH) 295,800 669 170 A D

Northern New Jersey
N2NH 111,492 371 114 A A
W2JEK 15,022 105 37 A A
W2EN 503,464 810 188 A B
K2WA 335,540 595 190 A B
W2CVW 163,226 348 131 A B
N2KJM 154,368 385 134 A B
K2YLH 29,054 197 73 A B
K2SZ 4,920 60 41 A B
K5KG 1,519,000 2060 245 A C
N2NC 161,102 400 109 A C
NO2EL 176,628 718 123 B B
N2NHN 65,404 394 83 B B
N2TTT 23,616 164 72 B B
N2EOC 231,936 906 128 B C
WA2BKN/T 19,716 159 62 B C
KR2Q 401,236 825 121 C A
W2TO 53,328 130 101 C A
N2NO 13,320 90 37 C A
NA2U 550,952 1126 122 C B
N2ST 167,424 429 96 C B
WA2VYA 549,376 1071 128 C C
N2NT (+N2NC)
2,625,392 2841 308 D
K2XR (+K2OWR,N2YFH)
1,764,940 2101 290 D
W2YC (+packet)
911,330 966 277 D
AB2DE (N2KPB,N2ZAS,KC2AVE, ops)
416,592 802 198 D
NO2R (+packet) 405,824 744 136 D
K3JF 335,972 607 182 D
K2TW (+packet) 99,968 283 88 D
N2BIM 35,144 113 92 D
N2WM 26,180 121 77 D

Northern New York
N2JNZ/T 21,970 169 65 B A
NG2C 74,880 360 104 B B
WZ2T 63,960 244 65 C A

Southern New Jersey
K2YY 602,504 886 212 A B
K1JT 425,980 655 190 A B
K2MK 190,656 389 144 A B
AA2WN 119,190 330 137 A B
K2VS 111,444 314 111 A B
W2UL 20,150 100 65 A C
KP2PD 13,860 99 70 B B
W2YRW 704 22 16 B B
KK2ED 331,200 1104 150 B C
KD2KS 226,182 759 149 B C
WK2G 532,704 1069 124 C B
WA2VQV 106,896 260 102 C B
K2VT 103,680 318 81 C B
K2JF 58,672 192 76 C B
W2JSF 1,560 26 15 C B
N2RF 97,960 307 79 C C
KD2I (+WB2TSY,N2ORM,W2MF, W2CE,KN2L,KN2T,KE2OI)
1,826,720 2486 280 D
N2VW (+packet) 44,100 179 98 D
N2SCJ (+packet) 41,400 230 90 D
K2WB 7,592 73 52 D

Western New York
KB2EOQ 11,960 91 52 A B
N2CK 11,092 112 47 A B
K2FU 1,066,758 1328 231 A C
N2WK 750,720 1024 230 A C
KB2QCW/N 34,416 147 72 A C
N2IM 22,320 180 62 B A
KG2AU 218,250 873 125 B B
KB2SGX 62,928 342 92 B B
N2LQQ 36,936 243 76 B B
N2USB 19,920 166 60 B B
KC2AAP/T 11,312 101 56 B B
NA2A 110,880 495 112 B C
KB2AED 102,272 544 94 B C
K2ZJ (AA2PQ, op)
95,764 538 89 B C
WR2V 80,878 371 109 B C
KF2VX 36,160 226 80 B C
AF2K 33,264 231 72 B C
K2SM 89,680 294 76 C A
KG2NO 14,420 102 35 C A
KW2J 400,256 848 118 C B
K2CS 175,552 420 104 C B
WA2EYA 111,428 312 89 C B
W2FUI 73,628 231 79 C B
KX2H 50,864 185 68 C B
WA2RZJ 41,076 162 63 C B
K2CF 23,312 123 47 C B
K2YW 19,260 107 45 C B
WB2DVU 17,296 94 46 C B
N2CU 531,368 1043 127 C C
W2EZ 138,000 371 92 C C
W6XR (+KB2MTI)
1,466,672 1965 248 D
W2RW (+WB2KAO)
142,352 402 124 D
W2SEX (+ops) 19,488 165 56 D

3
Delaware
N3ELK 72,738 449 81 B B
WB3ILM 28,336 184 77 B B
N8NA 110,080 317 86 C B
W3PP (+N4MO,N3KW,KD3UC)
2,619,264 2941 304 D
W3DOV (K0UWO,K3LT,KE3UY, N3KCB, ops) 14,504 109 49 D

Eastern Pennsylvania
WT3P 480,344 797 194 A B
N3RM 176,136 364 164 A B
W3KM 89,148 233 102 A B
W3MEL 51,522 274 93 A B
K3WW 1,544,418 1902 239 A C
KE3VN 60,016 208 121 A C
W3ATV (at N3INW)
97,020 490 99 B A
WB3IHF 29,850 199 75 B B
K3CKO 29,032 191 76 B B
N3PYZ/T 15,732 171 46 B B
W3NTD 15,080 130 58 B B
N3KYZ 11,984 107 56 B B
N3XOF 9,900 99 50 B B
WC3A 9,348 123 38 B B
KB3BRR 5,628 67 42 B B
N3TQK/T 3,220 70 23 B B
W3GM (N3MKZ, op
489,912 1644 149 B C
K3KFD 318,240 1224 130 B C
K1O (KC3TL, op)
263,520 1080 122 B C
KG2FH 58,752 306 96 B C
W3JRY 14,000 125 56 B C
N3JIX/T 11,880 108 55 B C
K3SV 214,704 494 108 C A
WI9WI 8,680 62 35 C A
NY3A 609,584 1227 124 C B
W3BGN 422,016 871 121 C B
WF3M 335,280 760 110 C B
KC3Q 145,436 351 103 C B
WY3T 98,256 275 89 C B
N4XU 66,576 227 73 C B
WA3IIA 46,080 160 72 C B
K3VA 10,656 74 36 C B
AA3TT 783,024 1479 132 C C
AA3B 380,800 801 119 C C
W3RJ 270,000 625 108 C C
K3QIA 94,116 252 93 C C
K3PP (+packet) 500,308 788 227 D
K3II (+packet) 373,444 633 178 D
KB3MM 82,064 222 92 D
NE3H 74,120 218 85 D
N3WD (N3VNX,N3XTP,N3RFF, W3CQB,N3LSY,KG3N,N3XSC,K3DUH, ops) 72,600 316 100 D

Maryland-DC
W3UJ 364,688 596 184 A B
K3NCO 257,400 502 165 A B
W3IP 255,612 559 179 A B
N1WR 255,090 500 165 A B
K3DSP 96,876 411 117 A B
W3UL 83,284 240 94 A B
K3HH 73,932 266 101 A B
K3DI 55,328 183 91 A B
K1RZ 31,442 141 79 A B
K3ZO 1,711,200 2327 240 A C
N3QC 1,588,704 2052 247 A C
N3NT 214,880 407 158 A C
W3KX 189,924 415 119 A C
W3DQ 80,270 305 115 A C
W3OU 43,708 191 98 A C
KT3RR 286,720 1024 140 B B
K3DNE 110,432 476 116 B B
AJ3M 78,306 421 93 B B
N3WIZ/T 10,600 106 50 B B
N3KTV 9,984 104 48 B B
N3EYB 5,460 78 35 B B
N3HBX 510,080 1594 160 B C
K4CGY 283,004 1018 139 B C
W3INK 99,384 492 101 B C
KF3BE 67,886 373 91 B C
W3YD 67,512 349 97 C B
K3IXD 56,916 279 102 B C
WD3P 25,168 121 52 C A
W3CB 318,080 705 112 C B
W3CP 165,888 383 108 C B
N3UMA 138,600 329 105 C B
WD3A 97,512 239 102 C B
W3DAD 60,088 202 74 C B
KB3EHY 17,112 92 46 C B
K2PLF 527,076 1089 121 C C
W3GN 441,264 947 116 C C
W3MC 289,808 612 118 C C
W3FQE 3,640 43 26 C C
K3MM (at W3LPL) (+W2GG)
3,225,792 3205 317 D
WR3L (+AA3SC,K2FT)
812,436 1126 237 D
K3SA 764,420 1090 185 D
W3GNQ (+WI2T)
281,232 845 162 D
N3AM 224,624 443 139 D
W3TMZ (+W1AB)
113,520 215 132 D

Western Pennsylvania
K3DE 153,932 968 159 A B
AA3LX 81,328 265 104 A B
WB0IWG/T 51,004 311 82 B A
N3WAV 25,740 195 66 B B
WA3GQU 8,316 99 42 B B
N3ZUD 3,886 67 29 B B
KA3AVB 2,912 52 28 B B
KM3J 224,256 876 128 B C
N3FAS 52,080 280 93 B C
WB3IFE 16,330 115 71 B C
N3MBC 10,384 118 44 B C
K3WWP 119,064 361 82 C A
AA3GM 23,040 120 48 C A
WW3S 276,000 552 125 C B
WA3SES 85,536 264 81 C B
W3IA 85,440 265 80 C B
K3FH 42,084 167 63 C B
NB4J 35,200 159 55 C B
AA3II 14,208 72 48 C B
K3JHT 1,456 25 14 C B
W3DXR 782,208 1349 194 D
W3GH (+packet)
441,936 965 198 D
K3TG 86,814 250 117 D
KB3A (+K3LD,KB3B,KB3EEV, ops)
39,508 192 83 D
N3YVG (+KB2YIN)
33,292 202 82 D

4
Alabama
W4DEC 365,904 714 168 A A
AG4W 202,640 745 136 B C
KR4QI 53,100 295 90 B C
W4NTI 67,744 231 73 C B
K4NVJ 6,448 52 31 C B
K4WI (+KV4T,KS4YT)
1,396,296 2287 258 D
KG5TA (+N5IKQ)
255,840 926 130 D
KU4BL (+KF4HFF)
64,896 338 96 D

Georgia

K4YJ 71,286 203 109 A B
KD4FTY/T 49,698 251 99 B B
WB4SQQ 48,600 269 90 B B
KB4BBC 11,100 111 50 B B
N4OLN 8,272 94 44 B B
N4ZRA 2,968 53 28 B B
KU4OH 32,264 218 74 B C
W4KYW 21,624 102 53 C A
K4GSX 20,064 112 44 C A
N4XFA 359,260 775 115 C B
N4NX 300,832 552 136 C B
NN4S 234,468 500 117 C B
KB4HZ 189,952 447 106 C B
K4PI 174,468 468 93 C B
K2UFT 172,280 365 118 C B
N4DU 56,064 219 64 C B
W4AN (W4PA, op)
1,400,168 2272 154 C C
K4BAI 658,260 1217 135 C C
NE4S 512,400 1050 122 C C
NQ4I 1,864,584 2397 282 D
K4PTT (+W4RLW)
12,720 104 53 D

Kentucky

KD4SN 78,994 296 127 A B
KG4BIG 54,108 199 81 A B
W4LC 137,456 484 142 B B
KD4CSW/T 7,878 101 39 B B
KN4IV 4,590 85 27 B B
K4IU 19,468 157 62 B C
K4FXN 371,040 773 120 C B
KE4LIA 41,832 166 63 C B
KS7O 800,856 1359 147 C C
K4AO 651,700 1224 133 C C
N4GN (+K4WW,KB9THR,N4OKX)
1,395,968 1657 287 D
KT4ZX (+WB4OSS,KG4BIG,KU4A,
KG4DJJ, ops) 753,536 1357 203 D

North Carolina

W2VMX 4,050 42 27 A A
K4MA 1,150,264 1573 236 A B
KF4OAD 40,500 160 75 A B
KU4SN 32,700 249 50 A B
N4TL 2,156 40 22 A B
N4ZC (K4ZA, op)
1,842,650 2284 269 A C
K2AV 202,940 397 146 A C
N5FPW/T 41,334 249 83 B A
N4ZAK 10,160 127 40 B A
WA1EHL 178,432 697 128 B B
K4TMC 147,888 632 117 B B
N1GMV 104,340 470 111 B B
NO4Y 45,580 264 86 B B
NX9T (at K4HA) 30,246 213 71 B B
KG4CXZ 8,648 94 46 B B
K4IJK 1,584 44 18 B B
W4ZV 1,090,726 3227 169 B C
NC4NC 260,004 922 141 B C
W4YDY 45,588 262 87 B C
W4UFO 23,460 138 85 B C
W4FAL 15,004 121 62 B C
KG4DZU 6,732 102 33 B C
WJ9B 430,992 877 123 C B
KB4JAA/T 38,912 151 64 C B
N4AF 909,872 1556 146 C C
N4CW 496,548 1061 117 C C
W4MR (at AA4NC) (AA4NC,N4CW,
KS4XG, ops) 2,089,090 2344 293 D
W4WS (at WB4MSG) (WB4MSG,
KT4CD,N4VHK,WB4KQN,KC4WSK,
ops) 1,043,172 1629 234 D
K3KO (+packet) 796,790 996 215 D
K4PB 236,900 513 115 D
W4ATC (N3QYE,KG4FMF, ops)
36,640 229 80 D

Northern Florida

KB4N 425,870 865 185 A B
W8IK/4 269,808 405 219 A B
WOEBA 99,360 289 108 A B
WC4E 2,574,438 3273 277 A C
W7QF 317,974 726 173 A C
WA4IMC 76,960 316 74 A C
KQ4YY 34,164 219 78 B A
K4XS 815,300 2630 155 B B
WA8NAZ 60,152 292 103 B B
N4EK 42,656 248 86 B B
N4LIO 27,060 165 82 B B
KX5U 1,134 27 21 B B
W4UEA 69,216 309 112 B C
KN4Y 395,500 868 113 C B
W3CZ 197,508 452 109 C B
WB4IHI 87,376 253 86 C B
N4GI 286,750 659 155 D

South Carolina

N1CC 109,512 313 117 A B
KS4YX 82,818 387 107 B B
KT4FP 49,104 248 99 B B
W2EA (N2FY, op)
28,036 163 86 B B
K4TSU 20,812 121 86 B B
WB4NRI 46,248 246 94 B C
K4KK 160,992 312 129 C C
N4GJ 99,716 255 97 C C
K0COP/4 82,560 259 80 C C
N4UK (+ND3F,K8ISK)
2,765,094 3051 321 D

Southern Florida

AJ4Y 909,130 1318 229 A B
K4LM 743,256 1165 222 A B
N4IG 660,960 932 216 A B
K4SN 605,160 1007 205 A B
WB2QLP 278,886 628 159 A B
WA2CPP 99,588 284 129 A B
N4DL 81,674 300 97 A B
W2JQ 4,884 50 33 A B
AD4TR 1,319,240 1992 215 A C
AE4RO 430,100 579 253 A C
W4ZW 272,436 565 146 A C
N4QV 162,676 350 134 A C
K9HUY 158,360 493 148 A C
K2OY 124,704 347 144 A C
WD4JR 123,816 324 132 A C
N4BG 90,024 321 93 A C
W4OX 29,680 146 56 A C
KS4GW 42,480 236 90 B A
KR4YL 175,968 752 117 B B
WA8QYJ 111,864 474 118 B B
WA3TIH 80,200 401 100 B B
K1DCB 65,688 356 92 B B
N4AOE 33,366 201 83 B B
K1PJ 23,400 180 65 B B
W8TWJ 14,640 120 61 B B
K4RFK 7,654 89 43 B B
KD4ZKX/T 7,392 84 44 B B
N2EGO 4,480 70 32 B B
WB2WIH 250,380 1070 117 B C
KB1HC 125,696 491 128 B C
KE4JZT 50,232 299 84 B C
N2PK 69,960 263 66 C A
WD4AHZ 732,536 1433 127 C B
W4SO 464,256 993 117 C B
N4GM 262,944 493 132 C B
AD4Z 260,064 513 126 C B
W4ZKE 64,800 162 100 C B
WB4OSN 31,232 121 64 C B
N4RP 6,392 47 34 C B
K1TO 1,360,100 2344 145 C C
K4OJ 1,345,140 2386 141 C C
N4BP 1,254,960 2240 140 C C
N4TO (+G4BUE)
325,720 654 170 D
W4BPH (NP3R,KU4BT,KF4LKV, ops)
23,482 141 59 D

Tennessee

N4ZI 1,178,332 1663 223 A B
WO4O 983,520 1282 240 A B
N2BR 28,424 166 76 A B
KE4YBS 26,268 119 66 A B
N4USG 16,956 106 54 A B
KG4ABM/T 1,170 42 13 A B
K4RO 1,421,696 1964 232 A C
W4DAN 203,056 437 148 A C
W4CAT (K1KY, op)
79,032 248 89 A C
W4OGG 6,308 64 38 A C
NY4T 197,316 783 126 B B
W4TD 124,300 550 113 B B
K4OOO 93,524 454 103 B B
KC5RCZ 88,776 411 108 B B
KF4ZR 78,584 418 94 B B
AC4LS 75,684 357 106 B B
AK4ST 40,500 270 75 B B
W4JH 24,864 168 74 B B
KF4ZHD/T 4,544 71 32 B B
N4JN 3,528 63 28 B B
KG4ALY 108 9 6 B B
K4JNY 723,384 2365 153 B C
KD4RKJ 32,528 214 76 B C
KE4OAR 4,092 66 31 B C
NA4K 219,308 503 109 C B
K0EJ 123,540 355 87 C B
W4TYU 58,240 206 70 C B
WD4OHD 58,156 214 67 C B
W4YGE 41,300 175 59 C B
W4AUI 10,336 76 34 C B
WD4PTJ/N 7,056 62 28 C B
W9WI 760,624 1388 137 C C
K4LTA 576,512 1127 128 C C
K4WX 515,460 1065 121 C C
K4AMC 253,524 571 111 C C
AC4JI 6,432 67 24 C C
W4BSF (W5EDQ, WA4WMN, KE4RKJ,
W4NPL, N4XNR, ops)
33,152 448 74 D
KW4JS (+KF4ASU)
27,200 194 68 D

Virginia

K4UK 300,720 535 168 A B
NC4S 269,748 525 177 A B
W2YE 110,656 295 133 A B
W4SD 67,116 199 94 A B
K5VG 49,572 168 81 A B
N3ZYU 21,824 139 62 A B
W4MYA 1,906,524 2508 254 A C
AI2C 786,760 1186 221 A C
K4VV 602,624 1054 214 A C
K4YT 555,048 928 234 A C
W3MGL 8,084 86 47 B A
W4IM 6,080 76 40 B A
KE3ID 3,240 54 30 B A
N4CRM 69,748 329 106 B B
K4DET 62,400 325 96 B B
K4PZC 54,782 301 91 B B
KU4FP 36,972 237 78 B B
N3GMW/T 7,070 101 35 B B
KD4RSL/T 72 6 6 B B
W4HZ 328,750 1313 125 B C
N4MM 273,624 877 156 B C
W4NYY 113,226 501 113 B C
KQ4I 69,030 295 117 B C
KS4JB 8,268 106 39 B C
N4KEV/T 2,784 48 29 B C
N4ROA 163,944 410 99 C A
K4GEL 27,048 145 46 C A
W4YE 268,180 580 115 C B
K4ORD 165,240 404 102 C B
K4RDU 119,680 347 85 C B
K4JM 90,376 284 79 C B
N4PD 86,944 246 88 C B
AA4KD 81,432 259 78 C B
AD4TJ 51,612 186 69 C B
W4HM 40,300 155 65 C B
WU4G 533,232 1056 126 C C
W4ZYT 114,448 311 92 C C
N4OT 49,824 173 72 C C
K4UX 1,520 20 19 C C
K1SE 1,926,578 2250 269 D
WA4QDM (+packet)
427,392 647 212 D
KO4MR (+packet)
73,458 231 159 D
W4JVN 36,490 205 89 D
W4CA (K1SO,KE4WFO,KS4BO,
KE4PIE,AB4YZ,K4WVS,KF4PHW,N3AYW,
ops) 31,464 228 69 D
N3RC 11,088 91 44 D

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Arkansas

KG5RM 415,626 807 159 A B
KG5NE 137,770 599 115 B B
KB5EKX 51,000 340 75 B B
KC5QBG/T 40,612 286 71 B B
KK5XF 20,502 153 67 B B
W5YM (AC5RR, op)
644,126 2317 139 B C
KW5RF 151,920 633 120 B C
KJ5WX 12,136 74 41 C A
K5LG 532,416 1128 118 C C
W5HUQ 42,120 195 54 C C

Louisiana

N5IB 109,140 308 102 A A
N8OO 1,280,052 1787 222 A B
N5ASA 24,048 167 72 A B
W5WMU (KZ5D, op)
2,334,002 3005 277 A C
AA5FJ 347,328 1294 134 B B
AE5T 305,916 1378 111 B B
KM5QG 15,730 143 55 B B
K5MC 424,688 831 127 C B
W5OT (WA5TWL, op)
131,140 388 83 C B
N8RR 1,116,192 1847 151 C C
W5DDX (+WM9M, WD8LLR, K1DW)
921,352 1752 212 D

Mississippi

AC5SU 138,910 341 145 A B
KM5NQ 6,384 76 42 A B
N5XX 1,033,288 1573 212 A C
N5KGY 117,096 476 123 B B
N5PA 18,522 147 63 B B
W5EHM 138,006 561 123 B C
W5OXA 114,938 569 101 B C
K5MDX (W5UE,WQ5L,N5FG,N5ZX,
KD5CQT, ops)
2,195,560 2996 262 D

New Mexico

NA5S 180,090 396 145 A B
W5GZ 15,732 138 57 B B
WB5OAP 10,032 114 44 B B
K5AM 823,884 2903 142 B C
K5OI 29,520 164 45 C A
K7IA 19,188 117 41 C A
NC5O 349,856 828 104 C B
W5YZ 320,912 646 124 C B
N5UL 241,472 616 98 C B
W5BIV 60,568 226 67 C B
N6ZZ 823,072 1512 136 C C
N7DF 539,968 1140 118 C C

North Texas

WA8ZBT 142,140 450 103 A A
WD5K 1,141,920 1590 240 A B
W5CWQ 281,076 564 177 A B
WK5K 152,152 391 133 A B
WA5VKS/T 41,888 265 77 A B
KD5HKS/T 13,502 91 43 A B
KD5FUM/T 2,300 40 23 A B
K5ZO 1,544,480 2236 245 A C
K5RX 840,224 1360 217 A C
N5JR 711,846 1212 213 A C
W5RNF 71,162 391 91 B B
KM5LO 34,632 234 74 B B
N5REO 26,130 201 65 B B
KC5AJX/T 21,000 175 60 B B
N5TY 360,460 1346 134 B C
AA5NT 192,148 794 121 B C
K5WO 306,448 712 107 C A
K6AZA 10,416 84 31 C A
KY5N 562,120 1069 130 C B
K5MU 546,840 1082 126 C B
N5AW 366,912 725 126 C B
W4YOK 93,324 300 77 C B
N5YA (+N5UM) 465,976 1044 157 D
KA5PQD (+W5GN)
395,200 970 100 D

Oklahoma

K0CIE 176,220 439 110 A B
WD0GTY 32,086 188 61 A B
N5PT 7,622 69 37 A B
WA9AFM 28,320 236 60 B B
KB5BOB 388,616 1567 124 B C
N5RXF 198,656 1025 97 B C
NA5B (W5AO, op)
803,400 1545 130 C B
N5NA 133,464 401 83 C B
K5HP 205,600 512 100 C C
WB5GMK 94,984 320 124 D
KB1ZQ (N1LPN,WL7FT, ops)
75,888 372 102 D
KC5ORP 25,344 143 66 D

South Texas

W5TD 154,380 303 166 A A
N5XT 237,636 485 161 A B
K4NR 152,220 418 129 A B
K0GEO 37,700 173 65 A B
W5CDS 16,704 144 58 A B
AG5U 280 13 10 A B
N5LZ 1,700,460 2325 235 A C
N5ZK (W5ASP, op)
817,190 1479 209 A C
N5MT 323,136 747 176 A C
K5NZ 321,100 791 130 A C
K5IUA 248,976 548 156 A C
W5IDX 180,720 1004 90 A C
W5GCX 167,310 407 165 A C
WA5IYX 169,476 974 87 B B
W9DX 40,896 284 72 B B
N5LYG 28,536 246 58 B B
N5AF 20,178 171 59 B B
WB0YEA 14,720 115 64 B B
WA5SAJ 14,200 142 50 B B
KZ5MM 1,139,044 3494 163 B C
K5TR (at W5KFT)
1,111,500 3705 150 B C
WC5TX (KA5BKG, op)
242,606 1333 91 B C
NA4M 129,438 799 81 B C
W5UFA 60,230 317 95 B C
N5DD 33,970 215 79 B C
W5BXX 6,006 77 39 B C
NO5W 35,712 186 48 C A
N5AFV 9,380 67 35 C A
WA8GHZ 5,184 48 27 C A
K5WA 632,968 1245 127 C B
KD5EDO 26,224 147 44 C B
K5HDU 6,480 54 30 C B
K5PI 753,872 1482 127 C C
AJ4F 81,432 261 78 C C
NX5M (+N5XJ,N4GCA,K5NZ,KB5ZFO)
2,580,960 3389 283 D
K5NA (+K5DU) 215,080 358 190 D
KD4HNX/T (+KD5AAD,N5TW)
167,616 864 97 D
AC5AA (+packet)
158,000 352 125 D

West Texas

W5ZO 807,128 1232 203 A B
N5ZC 918,460 1766 190 A C
KE5OG 206,640 860 120 B B
N5DO 610,616 1195 127 C B
NZ5M 6,600 55 30 C B
N5RZ 1,349,152 2218 152 C C

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East Bay

W6GKF 482,484 765 186 A B
K6XV 35,624 211 73 A B
KE6DSQ 26,780 205 65 A B
K6ZM (K6WG, op)
626,484 1311 166 A C
WA2BHJ 28,274 128 67 A C
KF6PKG 32,004 254 63 B B
KF6BIR 13,152 137 48 B B
KE6QR 8,080 101 40 B B
KE6NCX/T 720 20 18 B C
NF6S 303,292 671 113 C C
W6VOM (KE6NCX,KC6TYB,KF6EQA,
KF6CRZ,KF6VZW, ops)
3,168 44 36 D

Los Angeles

W6ZH 53,820 193 78 A A
K6RO 1,015,854 1662 201 A B
KQ6ES 380,436 721 147 A B
N6TW 368,784 699 156 A B
KU6T 190,762 489 143 A B
KN6DQ 157,896 412 129 A B
W6KC 141,276 390 122 A B
N6GL 136,578 375 103 A B
K6ASK 116,424 326 126 A B
N5BF 1,634 28 19 A B
K6LA 1,505,180 2235 233 A C
K6SE 180,608 418 136 A C
W7RF 17,640 100 45 A C
WB6NFO 119,116 614 97 B B
KQ6QW 102,626 529 97 B B
KB6WKT 88,320 480 92 B B
K6ZCL 77,700 518 75 B B
KD6KHJ 48,440 346 70 B B
W6FFH 45,650 275 83 B B
WA6HXF 44,506 289 77 B B
KC6G 15,510 141 55 B B
AD6AF 384 16 12 B B
N6TCZ 30 5 3 B B
W6AFA 350,384 1436 122 B C
KB6ATT 96,418 496 97 B C
WA7BNM 208,656 611 84 C B
W6BIV 161,680 465 86 C B
KC6T 89,280 309 72 C B
WA6BOB 41,968 171 61 C B
W6TRW (K6OUE,KE6PI,N6ED,KS4IS,
K0DI,K7UFO, ops)
355,446 813 147 D
W6SD (KD6KKQ,KD6PLU,K6TBA,
K6QWH,KE6GBO,KC6T,WB6NFO,
ops) 27,600 213 60 D

Orange

W7YA 84,870 251 123 A A
K6CF 206,080 510 160 A B
WA6GFR 35,424 154 82 A B
W6JEN/T 20,562 144 69 A B
W6QZ 4,402 50 31 A B
N6HC 1,020,992 1592 224 A C
WA6ZNOL 9,024 96 47 B A
W6SA 68,708 386 89 B B
KE6FQC/T 41,310 243 85 B B
KI7AO 30,248 199 76 B B
KJ6JO 12,864 134 48 B B
WW6O 202,242 911 111 B C
W6KK 324,756 861 93 C B
AA6PW 261,716 718 91 C B
AC6VN 222,324 569 97 C B
WD0AVV 141,000 461 75 C B
N6BM 100,762 304 83 C B
W1HIJ 73,920 263 70 C B
W6EEN (N6RT, op)
1,100,400 1963 140 C C
K6HRT 29,700 132 55 C C

Santa Barbara

WA6FGV 326,928 642 147 A A
W6VM 313,780 773 145 A B
KQ6XL 22,072 177 62 A B
W7CB 953,660 1649 205 A C
W6TK 754,210 1398 199 A C
W6FM 322,478 814 157 A C
WB6L 170,274 767 111 B B
KF6DBW/T 13,344 139 48 B B
K6TUJ/T 6,512 88 37 B B
N6NL 16,352 146 56 B C
N6HK 38,304 150 63 C B
N6BT (K2KW, op)
913,376 1670 136 C C

Santa Clara Valley

N6NF 400,452 934 151 A B
K6EP 125,760 316 120 A B
N6IV 67,518 278 93 A B
W6FS 12,960 102 60 A B
K6GT 526,932 1014 189 A C
W6PLJ 264,712 547 163 A C
K6XX 136,710 448 93 A C
W6ISO 52,644 195 82 A C
KQ6OB 75,970 535 71 B B
KF6UTE/T 56,784 364 78 B B
KR6CO 10,028 109 46 B B
N6IH 2,200 44 25 B B
N2ALE 2,000 40 25 B B
K6HNZ 511,232 1997 128 B C
N6BRA 396,492 1739 114 B C
NN6XX 212,238 907 117 B C
K6III 159,488 445 89 C A
KB6FPW 224 7 7 C A
WD6DX 133,796 401 83 C B
W9MAK 63,000 223 70 C B
K6RFM 15,792 93 42 C B
W6YX (W6KNS,W6LD,N7MH, ops)
1,672,864 2400 244 D
K6PUD (+N6DE)
568,974 1144 161 D

San Diego

K6AM 918,760 1410 206 A B
WN6K 727,776 1363 171 A B
AK6R 562,650 1545 165 A C
N6VH 286,184 595 166 A C
W8QZA/6 70,680 380 93 B A
W6CN 69,552 378 92 B A
W6YOO 8,446 103 41 B C
W6JVA 11,200 200 56 C B
AA6EE 6,936 51 34 C B
W6OVO (+N4DLA/6)
116,109 403 133 D
K6HAI 90,072 417 108 D

San Francisco

KC6AWX 235,542 1061 111 B B
W6ESJ 27,186 197 69 B B
WA6QCL 9,384 102 46 B B
KM6TG 80,884 277 73 C B
K6CTA 106,240 329 80 C C
KQ6NN 27,072 144 47 C C

San Joaquin Valley

K6MI 1,440 22 16 A A
K6CSL 101,864 293 107 A B
W6UDX 157,988 384 127 A C
KB6RMN/T 12,936 147 44 B B
KI6PG 6,364 86 37 B B
WB6GBS 4,224 64 33 B B
NN6NN (W6XK, op)
607,464 2596 117 B C
NI6FW 33,534 243 69 B C
W6TE (+WA6LUT)
209,580 998 105 D
WA6ALA (+KA6VAO)
85,680 419 102 D

Sacramento Valley

W6UT 989,380 1602 191 A B
KU6J 255,386 544 149 A B
N6JM 222,940 473 157 A B
N6AFI 102,604 348 113 A B
K6DGW 53,048 189 76 A B
N6GG 34,496 126 77 A B
KI6T 377,232 690 174 A C
K6BPB 17,976 106 42 A C
WR6WR 34,348 277 62 B A
K6KAY 561,660 2442 115 B B
W6QEU 125,928 583 108 B B
K6NO 156,946 809 97 B C
KF6OBS 29,678 209 71 B C
N6JV 405,840 883 114 C B
W6EU 346,788 739 117 C B
K6SG 250,648 641 97 C B
K6FO 89,628 291 77 C B
W6RKC 59,640 210 71 C B
K6KM (K6AW, op)
992,520 1839 135 C C
N6ZS (+packet)
1,494,108 2174 231 D

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Arizona

N7VY 471,618 1035 171 A A
K7FB 87,714 257 99 A A
N7JXS 51,034 184 79 A A
KN7Y 840,160 1658 178 A B
WE6G 232,128 610 144 A B
KJ7WY 158,788 106 106 A B
W7ZT 144,832 440 124 A B
K7NX 974,208 1730 192 A C
KN5H 681,170 1415 185 A C
K7ON 485,232 975 132 A C
K7XN 384,964 1054 157 A C
N7VBN/T 10,488 114 46 B B
KI7LS 5,032 68 37 B B
K7TR 1,204 43 14 B B
K9IVB/T 352 16 11 B B
K6LL 1,036,766 3436 151 B C
K7LY 265,760 1208 110 B C
K7RE 137,376 424 81 C A
NQ7X 76,472 241 79 C A
N7IR 44,304 213 52 C A
K7UAZ (N4OGW, op)
631,652 1323 119 C B
K7MQ 108,216 334 81 C B
NN7A 50,840 204 62 C B
W2HTX 24,000 100 60 C B
KC7V 910,800 1725 132 C C
W7ZMD 327,436 751 109 C C
W7YS 320,925 706 113 C C
W8AEF 298,620 707 105 C C
N7KU (NJ6D,KJ7IV, ops)
511,712 2351 232 D
W7IBM (N0ADI,N7DZ,N7OJT,WR7A,
ops) 1,018,500 1872 194 D
N7UJJ 121,590 470 105 D

Eastern Washington

WS7V 229,320 1092 105 B B
W7AVA 28,616 196 73 B B
W7WMO 145,360 393 92 C B
W7GB 68,320 304 56 C B
W7UB 32,524 170 47 C B
K7JAR (N7CKJ,AB7IZ,KD7GWX,
W7AIF,N7YRT,N7KWZ, ops)
63,148 411 77 D
KD7CPO 2,288 44 26 D

Idaho

KK7A 7,668 84 27 A A
K7ZO 200,640 1045 96 B B
K0TO 100,998 543 93 B B
KC7ESB 94,128 635 74 B C
KA7T 423,292 989 107 C B
WX7G 117,120 365 80 C B
K0IP (+AA7UN) 375,360 1565 120 D
KJ7TH (+W7II,KD7AKN,KK7AT)
314,028 1343 117 D
K7MK (+packet) 47,396 193 82 D

Montana

KS7T 348,392 686 148 A C
KC7NY 37,920 316 60 B B
K7JVT 18,178 149 61 B B
K7BG 1,004,948 1880 133 C C
W7ECA (N7CZ,AL7L,K7LRF,N8FKF,
KD7FMT,N7NBB,KD7CWY,KA6QXX,
KE6NVV, ops) 173,920 1088 80 D
K7ABV 11,330 84 55 D

Nevada

W1RO/7 5,476 48 37 A A
NW7O 61,904 212 106 A B
WA7STI 9,912 118 42 B B
W7EB 387,200 1760 110 B C
KM7TM 286,624 1352 106 B C
KU7Y 222,604 548 101 C A
WK2T 18,532 113 41 C B
K7GJ (K5RC, op)
937,916 1751 133 C C
K7NV 650,016 1460 111 C C

Oregon

NC7M 94,600 301 100 A A
KI7Y 529,720 910 170 A B
KR7X 66,794 259 91 A B
KC7ZFP 12,852 99 42 A B
W7GG 1,716,084 3010 219 A C
K7ZZ 1,028,826 1794 183 A C
VK4WLM/W7 27,068 202 67 B A
WA7EQW 484,120 1821 133 B B
WJ7S 406,742 1709 119 B B
WB7TIR/N 27,904 218 64 B B
KK1A 1,400 35 20 B B
KI7M 373,780 1700 110 B C
WA7ND 25,100 251 50 B C
KD7CJV/T 15,808 100 38 C A
N7OU 604,440 1314 115 C B
N7TL 50,020 202 61 C B
AA7IH 1,088 17 16 C B
KB7RTA (+KK7NJ)
424,354 1783 119 D
AA7LE (+KC7VWT)
137,352 438 118 D

Utah

WA7LNW 198,144 447 128 A A
NS7B 33,228 131 78 A B
KO7X 221,430 711 121 A C
KA2BIG 112,860 594 95 B B
KI7KA 65,142 423 77 B C
N7VM 522,816 1152 112 C B
W7CT 479,120 1058 113 C B
W8EQA 248,848 598 103 C B
AK7O 36,288 168 54 C B
W7HS 119,520 356 83 C C
AB7GP 43,036 203 53 C C
K7VT (K0UK,W0DET, ops)
262,900 1083 110 D

Western Washington

NX7K 295,274 603 161 A A
W7CD 109,560 304 110 A A
N7LOX 978,142 1886 173 A B
W7QN 439,530 913 147 A B
W7IIT 200,136 447 124 A B
W7OM 1,268,010 2117 219 A C
K1LOG 10,960 75 40 A C
KB7PKC 148,730 695 107 B B
W7PE 113,160 690 82 B B
KI7XA 36,000 225 80 B B
WD5JMC/7 19,656 156 63 B B
KC7WDL 17,136 168 51 B B
AA2DL 7,954 97 41 B B
KD7E 4,818 73 33 B B
N6TPT 2,688 48 28 B B
KD7CFF/T 1,080 30 18 B B

K7RI 868,140 3446 126 B C
K7CAR 530,422 2348 113 B C
W7GLC 73,032 358 102 B C
W7/JR1NKN 42,624 223 48 C A
N7EPD 478,848 1020 116 C B
AD7U 337,788 845 99 C B
N7ETC 248,368 711 86 C B
K7FU 145,692 513 71 C B
AB7RW WWDXC 129,000 425 75 C B
N7UX 78,876 313 63 C B
KB7N 66,640 238 70 C B
W7RGL 42,480 177 60 C B
KD7LJ 20,416 115 44 C B
K7DZ 256,540 633 101 C C
W7RM (K7NT,W7NX, ops) 1,466,388 2222 231 D
N7KE (AC2K,K1LOG,K7SZL,KB7N, N9KAH, NW7DX,W7QC,W7VP, ops) 1,037,110 1788 185 D
N7PP (W7BUN,KA2YMZ,N7DOE, ops) 437,632 2104 104 D
N4SL (+WB7FJG,KD7BZX) 347,424 885 141 D

Wyoming

N7JT 9,890 115 43 B A
N7UW AF7E,NQ7Q,KB7VQV,WB7K, KD7FHE,W7LE,KB7SGP, ops) 31,376 296 53 D

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Michigan

WD8S 282,384 661 148 A B
K8GT 178,200 393 135 A B
WB8RFB 98,580 305 93 A B
N8NX 97,240 292 110 A B
KC8JMX 68,482 353 97 A B
KC8FXR 66,048 220 86 A B
WA8OLD 32,574 144 61 A B
WX3M 30,856 144 58 A B
W8JY 353,732 705 191 A C
N8KR 276,256 582 178 A C
AA8PA 227,700 805 138 A C
KC8LMG 39,888 277 72 B B
AA8LB 23,550 157 75 B B
AA8YC 22,272 192 58 B B
K0DAT 16,272 113 72 B B
N8WTH 11,800 118 50 B B
KF8JA 7,410 95 39 B B
AB8DX 4,356 66 33 B B
N8DEF 2,912 52 28 B B
WA8AEN 416 16 13 B B
K8ET 257,024 1004 128 B C
K6VWE 30,104 212 71 B C
KA8QCU/T 26,106 229 57 B C
N8AP 195,168 453 107 C A
K8LJQ 180,708 405 111 C A
K8CV 8,024 59 34 C A
W8MJ 227,752 582 98 C B
K8IR 213,864 466 114 C B
K8ER 181,720 413 110 C B
W8RU 100,100 275 91 C B
KB8PGW 49,920 190 65 C B
K8SIA 36,504 168 54 C B
K8SB 33,984 143 59 C B
W8WVU 2,360 56 10 C B
N8EA 236,460 563 105 C C
AA8U (+N8NX,ND5S,K8MJZ,JE2LUN, KT8X,N8VW,KF8QE) 2,500,238 2867 299 D
KC8ELY (N8NJE,N8ESW,N8MMF, N8ZDW,KC8DNE, ops) 17,646 173 51 D

Ohio

N8XA 101,136 325 129 A A
KA8NRC/T 23,296 111 64 A A
KU8E 935,532 1283 234 A B
WA8RCN 600,000 1000 200 A B
W8UPH 348,348 622 182 A B
N8AA 138,224 366 106 A B
K8KR 132,672 476 96 A B
NW8F 85,086 245 87 A B
KC8KKJ/T 2,800 56 25 A B
K4LT 497,394 894 151 A C
K5ZG 138,700 320 146 A C
N8MWK 75,030 305 123 B A
ND8DX 320,920 1130 142 B B
W8DD 243,040 868 140 B B
KE8KT 110,656 532 104 B B
N8PCN 81,536 416 98 B B
KA8WQL 77,616 396 98 B B
KB8YBE 50,400 300 84 B B
KI8I 49,980 255 98 B B
N8FWA 45,760 286 80 B B
W8TTS 44,960 281 80 B B
KB8UJZ 40,960 257 80 B B
KC8HWV 40,656 242 84 B B
K8VUS 34,760 220 79 B B
KI8CS 34,416 239 72 B B
W8SJU 34,040 230 74 B B
KC8BZV 27,520 215 64 B B
KC8MGC 26,314 223 59 B B
KC8JNC 24,898 211 59 B B
K8CZ 19,706 167 59 B B
N8SSE 17,608 142 62 B B
KC8CSD 6,000 75 40 B B
KA8SBI/T 4,480 70 32 B B
NA8W 105,336 462 114 B C
W8KEN 77,616 396 98 B C
WA8NVW 3,420 57 30 B C
KD8FW 54,096 193 69 C A
W8GOC 136,032 325 104 C B
W8PN 105,244 315 83 C B
WT8P 104,544 297 88 C B
N8CPA 72,640 225 80 C B
W8IDM 61,028 208 73 C B
K9NW 53,436 219 61 C B
W8AZA 49,824 173 72 C B
AF8C 38,976 203 48 C B
W8DHG 30,744 122 63 C B
KC8HYI 6,820 55 31 C B
WA8YRS 3,420 46 19 C B
K8AZ (K8NZ, op) 1,311,200 2200 149 C C
W8AV 923,440 1649 140 C C
W8CAR 625,000 1249 125 C C
KE8M 536,536 999 134 C C
N8WS 32,696 134 61 C C
N8BJQ (+packet) 647,504 1133 143 D
N3II 576,296 792 251 D
W8KKF (+packet) 185,654 623 149 D
KF8UN (+KC8IHR,KC8LIN) 149,404 455 96 D
KA8PGV (N8JBG,KD8SQ, ops) 70,884 358 99 D

West Virginia

K5IID 756,196 1064 226 A B
K2UOP 792,356 1177 226 A C
N4SEA 157,440 640 123 B B
W8LD (KB8AOB, op) 2,100 50 21 B B
KB3AUG 261,368 883 148 B C
K8OWL 1,800 30 15 C A
N8II 622,512 1186 131 C B
K3JT 539,760 1035 130 C B
WA8WV 154,140 366 105 C B
K8OQL 386,496 791 122 C C

9

Illinois

KG9X 1,309,528 1718 253 A B
N9IJ 444,636 733 179 A B
K9JE 313,560 604 180 A B
AK9Y 239,904 478 147 A B
N9GH 152,880 382 140 A B
KG9N 96,672 319 114 A B
AA9KH 61,320 209 73 A B
N9MSG 34,224 149 93 A B
W9BZP 30,400 200 76 A B
W9DY 13,888 81 56 A B
K9PG 13,288 111 44 A B
N9KHR 9,288 87 36 A B
WA9FIH 5,472 59 36 A B
WD9DCW 720 20 15 A B
WA9LKZ 168 7 7 A B
K9ZO 1,004,852 1446 229 A C
KO2R 226,728 529 134 A C
N9TK 103,740 312 95 A C
KG9ML 68,712 269 84 A C
W9LNQ 18,768 88 68 A C
WO9S 5,110 70 35 A C
W9GG 222,480 927 120 B B
K9JLS 154,700 595 130 B B
N9CDX 87,024 445 98 B B
NW9V 85,238 391 109 B B
KF9US 53,326 293 91 B B
NA9RB 52,452 282 93 B B
KF9TI 36,300 242 75 B B
K9PY 31,512 202 78 B B
AA9QT 19,488 203 48 B B
N9TUQ 18,240 160 57 B B
KG9PF 14,950 115 65 B B
KB9CYL 12,584 121 52 B B
KB9PQV 10,058 107 47 B B
K9NA 9,120 95 48 B B
W9NHX 7,630 109 35 B B
KB9UWU/T 5,760 90 32 B B
W9HL 3,080 55 28 B B
KE9EX 2,494 43 29 B B
N9YCT 2,438 53 23 B B
KB5TFX 2,394 57 21 B B
KA9NZI 756 21 18 B B
WN9GUC 182 13 7 B B
WB9Z 875,758 2592 169 B C
K9HMB 744,106 2497 149 B C
N2BJ 698,646 2197 159 B C
WA9CCQ 70,848 369 96 B C
NN9K 148,148 407 91 C A
K9QVB 614,040 1191 129 C B
K9WA 400,752 757 132 C B
K9YA 235,004 539 109 C B
K9GY 169,728 415 102 C B
K9MMS 159,192 403 99 C B
K9CS 74,256 221 84 C B
W9YO 30,500 125 61 C B
N9SDT 26,220 95 69 C B
W9IXX 20,988 99 53 C B
W9DA (KB9KTC, op) 12,000 100 30 C B
W9OF 617,400 1049 147 C C
W9YYG 345,384 701 123 C C
K9UQN 177,160 430 103 C C
W9VA 32,184 149 54 C C
WE9A (+ops) 1,292,256 1769 252 D
K9XD (+K9PG,K9YO,N9VVV) 1,178,814 1819 221 D
K9MOT (K9PW,K9QI,K9RR,N9KNS, ops) 1,083,316 1440 251 D
KF9ZZ (KB9QYL,AA9RH, ops) 69,156 306 113 D

Indiana

N4IY 1,344 32 12 A A
W9AU 572,416 888 208 A B
WT9U 333,870 656 155 A B
K9WX 52,728 197 78 A B
KB5EAM 34,030 196 83 A B
WA0JTL 21,720 139 60 A B
W9RE 2,367,360 2968 270 A C
WD9ATU 13,536 144 47 B B
K1HG 12,204 113 54 B B
W9EEU 8,000 100 40 B B
KB9THU/N 2,720 68 20 B B
W9NY 372,330 1379 135 B C
KC9QP 104,130 445 117 B C
WA1MKE 40,552 274 74 B C
K9DIY 4,600 50 23 C A
KJ9C 413,960 788 131 C B
K9BG 101,184 272 93 C B
KC9TV 43,432 179 61 C B
K9IG 198,648 534 93 C C
K9JWI 114,552 333 86 C C
WN9O (+W9IU) 953,854 1259 227 D
K9IU (N9NI,KG4FGL,KA9OKT, N2VQD,N9QNP, N9PTG,KB9LTH, KA9SAW,N9DHX,ops) 230,230 514 161 D

Wisconsin

AF9J 29,736 154 59 A A
WA1UJU 566,200 895 190 A B
K9KR 150,588 400 141 A B
W9YCV 12,138 108 51 A B
W9XT 1,560,416 2163 248 A C
K9QC 439,350 802 145 A C
WI9M 55,556 204 86 A C
N9PQU 281,650 1075 131 B B
N9NUN/T 126,048 624 101 B B
KB9LIE 40,800 255 80 B B
KA9JAC 35,850 239 75 B B
WB9PUB/T 33,132 251 66 B B
N9MUC 30,672 284 54 B B
KA9JCP 27,404 221 62 B B
K9BTQ 9,500 125 38 B B
KF9AF 414,288 1644 126 B C
WE9V 372,384 1294 144 B C
KF9YR 30,084 218 69 B C
W9NAW 10,080 112 45 B C
N9NE 290,160 618 117 C A
W9OP 189,952 447 106 C A
N9CIQ 99,180 261 95 C A
N9XX 58,692 199 73 C B
W9HR 50,700 169 75 C B
N9EZ 40,672 164 62 C B
NI9C 34,344 158 54 C B
KB9S 1,012,944 1796 141 C C
N9SD (+N9VA,KB9FTG) 391,072 800 176 D
N9CK (+K9SAM) 298,928 628 119 D
K9OSH 17,280 95 45 D

0

Colorado

K0RI 413,700 740 175 A A
K0ZV 926,816 1526 176 A B
WA0JYC 101,404 502 101 B A
KI0II 47,652 361 66 B A
KT0DX 341,202 1387 123 B B
KD0NB 167,024 803 104 B B
K5GAY 145,628 743 98 B B
KI0LF 25,472 199 64 B B
KI0ND 17,204 187 46 B B
KG0ZI 642,048 2510 128 B C
KB0CY 44,820 249 90 B C
W0AJ 7,912 92 43 B C
KI0G 39,820 182 55 C A
N0TK 21,344 116 46 C A
W0ETT 303,452 704 107 C B
N0HF 268,140 615 109 C B
KC0GIS/N 33,228 207 39 C B
W0QL 57,600 200 72 C C
K0RF (+W0UA,KQ7I) 2,323,620 3067 270 D
KV0Q (+KT0F,N0VBW,N0NR) 1,810,644 2392 258 D
K0CL (+N0KE)1,791,000 2514 250 D
K0YW (+W6SR) 1,420,896 2504 228 D
N0KV (+N0IAK,WA1JHK) 661,552 1579 173 D

Iowa

NU0Q 296,784 556 162 A B
NE0P 103,452 284 111 A B
WK0F 84,002 332 97 A B
K0SRL 5,252 80 26 A B
WA0VBW 2,162 47 23 B A
KA0DX 98,654 461 107 B B
N0RKX 56,488 307 92 B B
WB0SNL 25,200 210 60 B B
KB0CWZ/T 17,066 161 53 B B
KB0IYC/T 784 28 14 B B
W0ETC 481,344 1744 138 B C
W0PPF 48,800 305 80 B C
WB0B 78,840 268 73 C B
N0DY 878,992 1600 137 C C
KE0FT (+K2DRH) 647,572 1067 194 D
W0YI (WA0QMU,NP2N/O, ops) 475,392 977 192 D
K0DAS (+ops) 228,516 817 137 D

Kansas

KB0MZG 251,394 773 143 A B
K0RY 95,030 286 85 A B
KB0WPY 43,654 248 73 A B
WB0YJT 68,676 251 97 A C
W0CEM 67,840 424 80 B B
N0AB 36,960 240 77 B B
N0VMW/T 32,830 245 67 B B
KA0EIC 17,024 152 56 B B
WD0BWM 9,540 106 45 B B
K0LLS/T 2,632 47 28 B B
KU0KU 2 1 1 B B
N0UU 147,744 648 114 B C
KK0SS 89,040 530 84 B C
K0IEW 39,000 250 78 B C
KI6DY 168,000 497 84 C B
KG0UA 143,632 381 94 C B
K0GY (+W0TM) 1,719,990 2182 261 D

Minnesota

K0OB 660,484 1171 187 A B
WA0VHX 151,232 462 136 A B
W0UC 145,912 363 122 A B
WA2MNO 49,644 207 63 A B
K0MPH 11,618 114 37 A B
KB0OQQ 7,072 81 34 A B
KM0O 1,355,222 1959 229 A C
WA0MHJ 683,280 1031 219 A C
N0FW 466,506 1113 159 A C
N0IJ 133,956 314 122 A C
K0QB 84,240 323 104 A C
KF0GX 21,384 198 54 B A
AC0W 346,632 1313 132 B B
WA0GNO 50,764 343 74 B B
W0BUD 30,120 251 60 B B
WB0GGM 29,232 203 72 B B
KA0ZIA/T 20,536 151 68 B B
K0DMR 18,894 141 67 B B
K0SV 13,200 100 66 B B
KC0CJP/T 2,450 49 25 B B
KA0DAQ 69,174 427 81 B C
KA0ZPP 35,224 238 74 B C
KF0UK 25,056 216 58 B C
N0PFY/T 11,232 108 52 B C
N0UR 276,424 631 109 C A
K0PC 228,228 504 133 C A
WV3B 16,000 106 40 C A
K0SR 801,724 1503 133 C B
KN0V 162,960 419 97 C B
KI0F 151,984 412 92 C B
W0ZQ 79,424 272 73 C B
WR0DK 53,520 220 60 C C
K0TT (+W0PI) 1,649,552 2383 262 D
KR0B (+N0BKL,KS0T,KJ0B,N0RA, KB0KQA) 1,627,410 2148 255 D
N0MJ 542,754 929 207 D
K0IR 403,488 935 108 D
K0AD (+packet) 348,880 703 140 D
KT0R (+packet) 160,440 384 140 D
W0SW 51,128 308 83 D
W0PRJ 1,102 22 19 D
KC0FZR/N 8 2 2 D
N0MAJ 2 1 1 D

Missouri

K0OU 323,950 644 155 A A
KC0CWU 107,640 327 90 A B
W0YZZ 68,530 770 89 A B
K2HT 50,246 192 97 A B
K0MLH 38,880 232 80 A B
N0YKN/T 16,112 109 76 A B
N9HDE 2,784 60 29 A B
WA0SXV 221,250 382 177 A C
K0HOF 203,856 823 124 B B
N9TRO 74,448 423 88 B B
KK2G 28,470 219 65 B B
N0XR 15,288 156 49 B B
N6TDM 450,072 1786 126 B C
KS0M 97,580 286 85 C B
KA0OUV 85,760 268 80 C B
KI0MI 8,064 71 28 C B
NS0Z (AG9A, op) 1,284,916 2312 139 C C
NS0B 20,320 127 40 C C
KI0LO (+packet) 184,800 770 120 D
KG0US 75,472 215 89 D
KB0VVT 63,450 212 75 D

North Dakota

N0RDJ 20,608 179 56 A B
ND0DX 58,904 391 74 A C
W0HSC (KB0KFX, op) 572 22 13 D

Nebraska

K0IL 146,900 437 113 A B
KB0WHY 65,988 422 78 A B
AB0FX 56,520 195 90 A B
NU0C 22,272 189 58 A B
KC0FUD 1,892 41 22 A B
N0OFR/T 63,474 447 71 B B
N0LGU/T 34,036 254 67 B B
KB0ARZ 19,584 144 68 B B
KB0AWB/T 16,268 166 49 B B
N0WJV/T 9,102 111 41 B B
WD0CJK 2,500 50 25 B C
KT0K 553,112 1151 119 C B
WN0L 99,416 289 86 C C

South Dakota

W0GC 66,402 207 93 A B
N0PFS 22,330 204 55 B B
WB0ULX 17,688 132 67 B B
W0SD 854,772 3097 138 B C
KF0FN (+WD0T) 1,505,446 2248 229 D
N0IGP (+K8SD) 234,080 921 112

Canada

New Brunswick

VE9DXR 70,470 435 81 B B
VE9NC 48,752 278 88 B B
VE9FX 164,536 628 131 B C
VE9MY 154,000 700 110 B C
VE1KB 35,620 137 65 C B
VE9DX 491,512 915 134 C C
VE9AA 120,080 395 76 C C

Newfoundland

VO1SO 150,856 692 109 B C

Nova Scotia

VE1JS 206,108 866 119 B B
VE1NB 227,264 536 106 C B

Newfoundland-Labrador

VO1WET 351,654 1343 129 A B
VO1RE 5,520 69 40 B B
VO1MP 688,012 1311 131 C B

Quebec

VE2AWR 600,990 953 195 A B
VE2WAT 401,778 791 153 A B
VE2OWL 36,000 186 75 A B
VE2MAQ 22,878 188 41 A B
VE2ZP 15,072 82 48 A C
VE2PIJ 32,224 212 76 B A
VE2GWL 82,618 409 101 B B
VE2SAI 58,500 390 75 B B
VE2LHP 15,222 129 59 B B
VE2FFE 16,684 97 43 C B

Ontario

VA3UZ 552,840 821 204 A B
VE3STT 190,762 428 143 A B
VA3IX 97,216 299 124 A B
VE3KZ 1,279,696 1812 242 A C
VE3OI 306,252 604 141 A C
VE3OJN 48,594 272 89 A C
VE3XN 376,320 1344 140 B B
VA3JK 288,048 1059 136 B B
VE3BUC 117,856 508 116 B B
VE3MQW 106,700 485 110 B B
VA3SWG 57,138 321 89 B B
VA3EZ 35,644 266 67 B B
VE3SKX 6,120 85 36 B C
VE3VFR 396,032 827 119 C B
VE3KP 352,032 766 114 C B
VE3ZT 205,632 503 102 C B
VE3WZ 42,504 160 66 C B
VE3PN 552,796 1223 113 C C
VE3MIS (VE3XAP,VA3UA,VE3SQG, VE3IMG, VA3MRB,VA3MDB, ops) 452,010 719 183 D
VE3EJ 443,250 634 225 D
VE3HG (+VA3GGF,VE3RZ) 257,520 543 174 D
VE3OIL (+VE3NPB) 183,830 447 155 D

Manitoba

VE4YU 137,922 360 127 A B
VE4MG 50,784 323 69 A B
VE4RA 24,272 148 82 B B
VE4MF 140,940 435 81 C B
VE4IM 117,624 338 87 C C
VC4X (VE4XT, VE4VV, ops) 1,129,240 1993 218 D

Saskatchewan

VE5QRP 44,444 269 82 A A
VE5SF 936,000 1775 180 A B
VE5MX 6,660 67 30 A B
VE5GC 310,592 840 92 C B
VE5AAD 3,588 39 23 C B

Alberta

VE6ZT 92,536 538 86 A B
VE6JY (VE6WQ, op) 2,132,820 3114 255 A C
VE6FU 77,760 648 60 B B
VE6BF 119,392 344 82 C A
VE6EPK 326,112 944 86 C B
VE6EX 5,760 96 15 C B
VE6FI 433,680 1804 120 D
VE6LB 181,272 497 91 D

British Columbia

VE7QO 486,126 1090 113 A C
VE7CVM 306,128 1444 106 B B
VE7DUG 83,460 642 65 B B
VE7VDX 221,392 1096 101 B C
VE7XO 62,466 359 87 B C
VE7XF 266,168 675 98 C B
VE7VF 242,544 649 93 C B
VE7SL 168,640 496 85 C B

Marine Mobile

UA2FM/MM 129,328 313 137 A B
LU9JTC/MM 18,290 155 59 B B

Checklogs

LA8CE, WA2BMH, AC7AF, RZ1NEW, RK1NWA, EA7DWJ, K6BUM. N4ZC, K6TIM, N9MBK, N6ZE, DL1JFM, LU1BW, EA1CXY, W7LR, K3SWZ, SP5ANQ, LA6XF, PY2AA, N5KAE, T99RM, DL8DZV, DL7AKQ, 7S6W, PY5IP, PA0UV, KB8ZYY, WA2QQF, SP9CQ, SP2NJE, UA0JD, SM2UJW, 9N7UD, EA8ZZ, OK1ZP, EA3BIM, DH5MM, PY2TNT, UA1NDX, RZ1NWT, OK1DDV, DL5NA, PY7IQ, RU3DG, KC2DLR, OK2HZ, SP4DZT, EA1FAE, PY3AU, SM0FM, EA5BZS, YO3GDA, KK7UV, SM0BNK, IK4RVG, SM3RUJ, RA3AD, PA3CMI, DL6MWG, N7LOA, DJ9DZ, SP6CES, SK0UX, UA3XCK, UA6BS, W3HDH, UA0ZC, F8ATS, YO2QC, PA3FOZ, LZ2PL, YO4XF, ON4LFA, YO7LBX, VK2MB, RU4HP, JA3YPL, SP7ICE, RK9CWW, YO9IF, DL5CX, DL6DSA, ER1LW, K6ZCL, IK4MED, UA0YAY, EA5EDN, HG3DX, EA2AAE, K1DSF, UA0CW, OY7SS, CX9AU, SM3EVR, RW6BQ, AA4V, OK1CZ, WD4K, PY2KPY, UA2CZ, OL5DX, OK1KZ, OK1KCF, AA1ON, W7ED, K9XE, LZ1AQ, JA0FVU, G3TXF, W2MMR, RI9C, NU4Y, N1TB, LU6ETB, LT5F, IK0ESW, IK1ZOE

QST

(Contest Corral continued from page 102)

21.390 28.390; FM: 146.550. Score 1 pt/phone QSO, 2 pts/CW or digital QSO. Multipliers are Alabama counties (67 max); AL stations, total of states/provinces/DXCC entities. Mobile stations in Alabama may claim a 100-point bonus for each county from which they complete one QSO. Awards. Logs must be postmarked before Oct 25. Send logs to Heart of Dixie QSO Party, Christopher Arthur, 606 Underwood Rd, Russellville, AL 35654; **kt4xa@mindspring.com**; **http://www.qsl.net/kt4xa/aqp/**.

2000 Fall Classic (and Homebrew) Radio Exchange, 1900Z Sept 24 to 0400Z Sep 25. Exchange name, RST QTH (state, province or country), and receiver and transmitter type (if homebrew, send final amp tube or transistor type). The same station may be worked with different equipment combinations on each band and on each mode. On CW call "CQ CX;" on phone call "CQ Classic Exchange." Nonparticipants may be worked for credit. Suggested frequencies: CW—3.545 7.045 14.045 21.135 28.180; Novice/Tech—3.695 7.120 21.135 28.180; phone—3.880 7.290 14.280 21.380 28.320. Multiply total QSOs (all bands) by total number of different receivers plus transmitters (transceivers count as both), plus states/provinces/countries worked on each band and mode. Multiply that total by your CX multiplier—the total age (in years) of all receivers and transmitters used, three QSOs minimum per unit. For transceiver, multiply age by two. If equipment is homebrew, count it as a minimum of 25 years old unless actual construction date or date of its construction article (in the case of a "reproduction") is older. Send logs, comments, anecdotes, pictures to: Allan Stephens, 106 Bobolink Dr, Richmond, KY 40475; **modsteph@acs.eku.edu**. QST

SECTION NEWS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Randall Carlson, WB0JJX—Looking for something interesting to do with Amateur Radio? Consider trying to work one of the many special-events stations that are in operation almost every weekend. These are special stations that are placed into operation to commemorate an event, or location. They can range from state fairs, to museum ships, to lighthouses. Almost all have some sort of special QSL card, and some may even have a special call sign. Make sure you follow any specific QSL instructions. Most will have suggested operating frequencies but make sure to tune around a little. A list of upcoming special event stations is published each month in *QST* in the Special Event Column. Have fun with it. Traffic (June) DTN QNI 172 QTC 19 in 22 sess. DEPN QNI 24 QTC 2 in 4 sess. KCARC QNI 42 QTC 1 in 4 sess. K3JL 43. 73, Randall.

EASTERN PENNSYLVANIA: SM., Allen R. Breiner, W3TI—SEC: Eric Olena, WB3FPL. ACC: Steve Maslin, N3ORH. OOC: Alan Maslin, N3EA. STM: Paul Craig, N3YSI. SGL: Allen Breiner, W3ZRQ. TC: Lawrence Thomas, AA3PX. ASMs: Ron Creitz, KB3CFV, Paul Craig, N3YSI, Vince Banville, WB2YGA, Dave Heller, K3TX, George Law, N3KYZ, J. Yogi Bear, WB3FQY, Harry Thomas, W3KOD. Due to the resignation of N3CXC, the new EC for Northumberland Co is now N3VTE. Field Day messages were received in proper format from the following EPA clubs: Murgas ARC, Tioga Co ARC, Susquehanna Valley ARC, Reading Radio Club, RF Hill ARC, Cumberland ARC, Tamaqua Wireless Assn, Columbia Montour ARC and Jim, N2EY/3. Field Day for K3CT turned out to be different this year. K3NG and W3OWP got the local Boy Scout troop interested and plans took off from there. The Scouts set up the Field Day camp site and took over the food preparation. The boys worked Field Day while the scouts worked on their Radio Merit Badge. With the number one event of the year, Field Day is now history and hamfest season is coming to a close. Emergency preparedness part of Amateur Radio has reported a number of tornadoes accompanied with highly destructive force and property damage. Luckily there were no lives lost. Hurricane season is underway and county ECs will be on alert. Along with tornadoes and hurricanes, we have that traditional thunder and lightning. Did you set some time aside this summer to update your shack grounding system? Lawn mowers have a nasty habit of chopping off ground wire connections. The month of October and the Simulated Emergency Test are fast approaching. ECs should plan now to organize ideas to get your ARES group involved in that annual event. Consider it a second Field Day and don't forget to send your report to the SEC. The SGL, STM and SM were guest speakers at the Delaware Lehigh ARC meeting at the Northhampton Community College. A certificate of commendation was presented to Clarence, W3PYF, for his 52 years of continued service as EC for Northhampton Co. The EPA section family picnic brought forth a number of new faces that you hear behind the mic and key. The change to a central location in the section made it more convenient for all to attend. The decision was made to hold next year's event on July 14, 2001, at the Christian Youth Center picnic grove, New Ringgold, PA. June Tfc: N3YSI 561, W3HK 359, W3IPX 297, W3UAQ 102, N3EFW 97, W3IVS 79, N3SW 69, W3NNL 57, W3JKX 45, N3IRN 34, WB3DCT 30, W3YWV 22, KB3CEZ 16, W3TI 13, N3JSO 13, N3AO 12, N3KYZ 11, W3ZRQ 11, KB3BBR 10, N3AS 9, W3ZQN 8, KB3CVO 8, KA3LVP 7, AD3X 4, K3ARR 4, W3KOD 3, N3ZXE 3, N3AT 2, W3ROQ 1. Net Reports: EPAEP&T 244, EPA 220, PFN 44, PTTN 41, SEPTTN 38, LCARES 9, MARCTN 4, D3ARES 3, D4ARES 1, MCOES 1.

MARYLAND/DC: SM, Bill Howard, WB3V, 410-551-6775, wb3v@arrl.org. ASM/RACES: Al Nollmeyer, W3YVQ (w3yvq @arrl.net). BM: Al Brown KZ3AB 301-490-3188 (kz3ab@arrl .net). SEC: Mike Carr, WA1QAA (bamcc@erols.com) 410-799-0403. STM: Bruce Fleming 301-863-6582 (MEGASWOOP@aol.com). MDC Section Web homepage http://users.erols.com/wb3v/mdc/. ALLE EC N3TDM reports 65 members, 5 sessions of the Mountain Amateur Radio Club Tri State Two Meter Net on 146.880 with PL Tone of 123.0, with an average 18 of check ins. The ALLE ARES/RACES group participated in the monthly RACES COMEX. The RACES drill had 22 check ins. CHAR EC W3TOM reports 22 members, 5 sessions of the Charles County Amateur Radio Emergency Service Net: 3 weekly nets, 1 COMEX RACES/ARES net, & 1 Walk-A-Thon public service event. Tom reports that the net meets on 443.700 MHz + with liaison to MEPN through packet. The PSE was the March of Dimes Walk-a-Thon. 12 Amateurs gathered at the St Charles Towne Center to support the event. Participants: W3TOM KA3GRW N3YRZ K3GRG KB3EHK KB3EHY N3ZVU N3ZXS N3RUA N3SFY KA3POX K3KIF. ANAR EC N3QXW reports 38 members, 4 sessions of the ANAR ARES Net which meets on 147.805 with liaison to EPA, NCAC, MEPN, WVA, BTN & MDD,1 training session, and one COMMEX. On 17 June, N3QXW, N3GT, N3SEO, N3SEP and WB4OGP participated in the ANAR annual LEPC HAZMAT exercise. ARTES members N3GT, W3NI and N3UXD assisted the Maryland Mobileers with Field Day operations at Down's Park in ANAR. CARR EC N3JIA reports 64 members, 4 sessions of the CARET (Carroll Amateur Radio Emergency Team) Net on 145.410 MHz with liaison to MEPN, MDD, and MSN by KE3FL and to BTN, WVPN, DTN, MEPN, Central Net, and Western Net by KG6TU. OES reports received from: N3JIA KE3FL and WX3F. 73 - Bill ,WB3V, and with the nets: Net/NM/QND/QTC/QNI: MSN/KC3Y/29/70/252, MEPN/N3WKE/30/53/461, MDD/WJ3K/58/345/754, MDD Top Brass KJ3E 235, AA3SB 149, AA3GV 169, BTN AA3LN, No report, SMN/KE3OX/no report, May BTN/AA3LN/31/41/348, Tfc: KK3F 1300, KJ3E 573, N3QA 414, AA3GV 164, AA3SB 141, W3YVQ 135, W3CB 112, WB4FDT 98, N3DE 82, N3WK 76, N3WKE 69, KC3Y 49, WJ3K 38, K3CSX 21, WA1QAA 20, N3EGF 17, N3ZKP 17, N3KGM 12, W3VK 9, W3YD 4, WA3WRT 4, KE3FL 2. May WB4FDT 102. PSHR: KJ3E 296, KK3F 204, W3YVQ 148, N3WK145, W3CB 143, AA3GV 135, AA3SB 133, W3VK 130, N3WKE 119, N3ZKP 110, KC3Y 99, K3CSX 93, WJ3K 87, KE3FL 83, WA1QAA 82.

NORTHERN NEW YORK: SM, Thomas A. Dick, KF2GC, http://www.northnet.org/nnyham. E-mail: kf2gc@arrl.org. ASMs: KD2AJ, WZ2T, WB2KLD, N2ZMS, WA2RLW. ACC: WB2BAU. BM: KA2JXI. OOC: N2MX. PIC: N2SZK. SEC: WN2F. STM: N2ZGN. TC: N2JKG. Our Section is very active with Public Service during the summer months and summer 2000 was no exception as we have logged many thousands of man hours providing communications for the Tinman triathlon in Tupper Lake, the Ironman USA in Lake Placid, and the Schroon Lake Marathon. These triathlons usually last all day and into the evening which means many hams work extra hours dedicated to providing reliable communications between authorities, contestants and medical ambulance related information to various control points. It takes many clubs to pull this off, and I am proud of all the hams and our NNY Section's clubs that get involved and make these public service events possible. Moreover, the Olympic area is under the national spotlight and many of these events are broadcast on national sports programs. It takes a special effort by these radio amateurs to make these events a success.

SOUTHERN NEW JERSEY: SM, Jean Priestley KA2YKN (@K2AA) e-mail ka2ykn@voicenet.com. ASM: W2BE K2WB W2OB N2OO N2YAJ. SEC: N2SRO. STM: K2UL. ACC: KB2ADL. SGL: KB2WKY. OOC: K2PSC. TC: W2EKB. TS: W2PAU. WB2MNF AA2BN KD4HZW WB3IJB WA2NBL KA1AOR N2QNX N2XFM. Welcome, Gloucester City Amateur Radio Club of Camden County. They became affiliated just days before Field Day. Small but mighty, they not only impressed me with a super first Field Day, but they impressed the township. Many locals came with gifts of food and a thirst for knowledge of ham radio. The club was formed of a local ARES and supported by emergency management. A local paper did a nice article. Well done, Gloucester City. Drawing new members into a club is more difficult today. Why not send a letter to all hams in the area and invite them for cake and coffee. QRZ lists by Zip code. Plan a program to aid them in learning about our hobby. Tfc rpt, June: Net QNI rpts: NJPN 186, NJSN 158, NJM 164, NJN/E 236, NJN/L 212, JSARS 345, SJVN 289, WA2CUW 99, K2UL 97, KB2RTZ 86, K2UL-4 78, AA2SV 72, WB2UVB 44, W2AZ 20, N2WFN 8, N2VQA 7, KA2CQX 3, KC2ETU KB2VSR KB2YBM 1. PSHR totals KB2RTZ 201, K2UL 182, WB2UVB 152.

WESTERN NEW YORK: SM, Scott Bauer, W2LC—Summer is over, any new yagis in the air ? Contest season is coming soon with Sweepstakes, CQWW DX, 160 m and the 10 m contests, among others. The 10 meter contest should be great this year at the sunspot peak. Easy to work stations worldwide with 100W and a dipole. Don't miss it! New appointees: Joe, KB2WII, OO; Andrew, N2TUK, TS; Martin, KC2CWN, OES and ORS; Marion, KA2BCE, ORS. Congratulations and welcome to a fine group of new WNY appointees. HAMFESTS: Sept 17, Auburn at Emerson Park on Owasco Lake; Sept 23, Buffalo at Erie Cty fairgrounds; Sept 23, Margaretville; Sept 30, Elmira at Chemung County fairgrounds, Horseheads; October 7, RAGS Hamfest, at the Pompey Hill Fire Dept. Net Summaries:

Net	*NM*	*Sess*	*QNI*	*QSP*	*Net*	*NM*	*Sess*	*QNI*	*QSP*
BRVSN	WB2OFU	23	162	2	CHN	W2EAG	30	175	55
CNYTN	WA2PUU	30	372	70	EBN	WB2IJZ	22	44	7 0
ESS	W2WSS	30	239	52	NYPHONE	N2LTC	30	175	265
NYPON	N2YJZ	30	285	108	NYS/E	WB2QIX	30	319	203
NYS/L	W2YGW	30	227	239	NYS/M	KA2GJV	30	183	68
NYSCN	W2MTA	3	18	2	NYSPTEN	KD2V	30	341	49
OARCN	N2KPR	4	30	5	OCTEN/E	KA2ZNZ	30	1591	173
OCTEN/L	KA2ZNZ	30	669	231	OMEN	K2DYB	2	12	0
STAR	N2NCB	27	322	12	VHFTHIN	KB2VVD	1	10	0
WDN/E	N2JRS	30	557	76	WDN/L	W2GUT	30	511	73
WDN/M	KB2VVD	30	570	54	TIGARDS	W2MTA	4	22	3

Traffic (Jun) * indicates PSHR, # for BPL: N2LTC*# 834, KA2ZNZ*# 533, W2MTA* 355, KA2GJV* 337, NN2H* 191, W2FR* 115, KC2EOT* 114, N2KPR* 109, WB2QIX* 100, KG2D* 87, W2LC* 78, N2CCN* 77, WI2G* 72, K2GTS* 68, W2PII* 65, NY2V* 50, W2GUT* 48, KA2DBD* 46, WA2UKX* 28, N2WDS* 24, AF2K* 23, K2DN* 22, WB2IJH 22, KB2ETO* 21, AA2ED* 17, KA2BCE* 10, W2RH 8, KB2WII* 3. Digital; Stn Rx/Tx: N2LTC 185/144, KA2GJV 21/10, K2DN 3/0, NY2V 0/3.

WESTERN PENNSYLVANIA: SM, John Rodgers, N3MSE—ASM-ARES: WB3KGT. SEC: N3SRJ. ASM-Packet: KE3ED. OOC: KB3A. 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. One of the best aspects of my position as Section Manager is the opportunity to visit with the amateurs of the section. I had a great time traveling around the section during Field Day and also visiting many of the clubs at their meetings. This year, many of the clubs got media coverage during the operation of Field Day. My own club, BCARA, was filmed for a special segment and appeared on the 11 o'clock news. They also did a "Hometown Hello" that was telecast on a few different days. It is good to see this type of positive coverage to promote Amateur Radio. At hamfests and when visiting the clubs, I have been able to learn about the activities of the groups in order to share the ideas with others. Recently quite a bit of involvement with young people has been occurring and I am very happy to see this happening. Every opportunity that we have to promote the Amateur Radio service is one more chance to protect our spectrum. I am looking forward to the various operating events that happen each year and am getting my plans together for the Pa. QSO Party in October. Don't forget the various nets around the section with ARES and traffic handling. If you need information about the nets in your area, drop me an e-mail or catch me on the air, and I will get information out to you. Look forward to seeing you at an upcoming event or work you on the air. 73, John Rodgers, N3MSE, WPA-SM, n3mse@arrl.org

CENTRAL DIVISION

ILLINOIS: SM, Bruce Boston, KD9UL—SEC: W9QBH. ACC: N9KP. STM: K9CNP. PIC: N9EWA. TC: N9RF. OOC: KB9FBI. DEC-Central: N9FNP. DEC: S/W: KB9AIL. Illinois Governor George Ryan proclaimed June as Amateur Radio Awareness Month. The announcement was carried by several media outlets. Thanks to North Shore RC member W4NVY for spearheading this effort. The following clubs received 100 bonus points for sending a Field Day message to the Section Manager: Starved Rock ARC, Peoria Area ARC, North Shore RC, SIU & SARA Clubs, National Trails ARC, Motorola ARC, Sangamon Valley RC, Jacksonville ARS and Illinois Valley ARC, Streator ARC, Hamfester's RC, and McHenry County Wireless Association. The Mongomery Co ARES EC WA9RUM reports the club provided communications for the A.D.A. tour de cure bicycle ride. K9HSK reports the Red Covered Bridge ARC, Princeton, provided communications for the Princeton Heart walk on June 10th. KB9JKE was in charge with seven club members assisting. According the Halo, the newsletter of the Six Meter Club of Chicago, slow scan enthusiasts are invited to join the Slow Scan Net each Wednesday at 7 PM. An informal group meets on 144.360 MHz on FM simplex. Twenty-two SMCC members and friends assisted with communications at La Grange Park's Ninth Annual "Run for the Roses" five kilometer run and walk. The STARS group operated Field Day from a new location this year; the grounds of Jerling Junior High in Orland Park. DEC N9FNP reports the Macon County ARES was called by ESDA for assistance on a Search & Rescue operation in Richland County. N9FNP operates a central region ARES net each Wednesday evening at 9:30 PM local time near 3890 kHz. The DEC invites ARES members to check-in. Eight members of the Schaumburg ARC helped with the Hike for Life in Busse Woods. The group also assisted the Elgin ARS with the Tour de Cure for the Northern Diabetes Assn. Western Illinois ARC has been asked to provide communications for the annual Kart races in Quincy. Streator ARC was asked to help with the annual Run for Glory marathon. York RC members provided communications for the Tour de Foot race and the Elmhurst Memorial Day Parade. Ten Wheaton Community RA members provided assistance during the Northeastern Illinois Special Olympics event. The WCRA also had an amateur radio display at a Yorktown theater in conjunction with the showing of the film *Frequency*. The theater manager placed the club's display in the main entrance where they were clearly visible. May traffic: K9CNP 126. June traffic: W9HLX-51, WB9TVD 33, W9FIF-16, NC9T-14, WA9RUM 6. ISN report de WB9TVD QNI-175, QTC-77, Sessions-29. 9RN report de KF4UBX sessions 60 traffic 171 average 2.85 time 596 min. rate of traffic 3.48, represented Illinois 96% NN9M W9HLX NS9F N9PLM. Ninth region C4 report de W9FC traffic 180 sessions 60 time 365 min average 3.0 rate .493 percent 97% QNI—ILN K9CNP KF9ME NS9F. W9VEY Memorial Net report de K9AXS 202 with 6 check-ins.

INDIANA: SM, Peggy Coulter, W9JUJ—ASM for Resources & Recruitment, W9IH. SEC: K9ZBM. ASEC: WA9ZCE: STM: W9FU. OOC: KC9V. SGL: WA9VQO. TC: W9MWY. BM: KA9QWC. ACC: N9RG. Sympathy extended to the families and friends of Silent Keys: June 1, John W. Holden, K9MMQ, Warsaw and June 14, Philip Porter, W9ASC, Kokomo. They will be missed. The Indpls Hamfest and Central Division Convention is history. Hope you were there and met old and new friends. Wx was agreeable this year. There was a new award given for Technical Excellence. There were 7 nominees. Receiving this award was Roger Grady, K9OPO, Kokomo. Others named were Raymond Andrews, K9DUR, West Terre Haute, Merle Heinlein, KB9NOH, Danville, Kevin McNeely,KB9CRA, Gas City, Michdael Poe, KB9SGN, Ellettsville, Jay Sissom, KA9OKT, Bloomington and James Smith, K9APR, New Castle. Congratulations to all of them for their accomplishments. This was given at the ARRL forum. The American Red Cross Disaster Group and the Michiana Amateur Radio Club through the work of their members is recognized as a SSC. The Tippecanoe ARA will hold their hamfest on Aug. 20th in Lafayette and the Michiana Valley Hamfest Asso. will hold their hamfest in Goshen on Jan. 14, 2001, Land of Lakes, Angola, Aug. 6 and Kokomo & Grant Co. at Greentown Aug 13. If you haven't seen it look on the Internet for the IN web page at WWW.INARRL.ORG. Check it out and let me know what you think. Members of the Amer. Red Cross Disaster Radio Group of Indls assisted the Red Cross at the 500 Festival Parade and thev500 mile race. Those helping were KB9PJT, W9HBO, WD9GMM, K9DBY, AA9WU, KB9CMU, KB9TSV, KB9RPB, W9GRE, WB9CHR, K9BYA, KN9NZY and KB9MCM. Reminder: If you know someone who is worthy of the Amateur of the Year award, maybe they received your club's Amateur of the Year award, send nominations to IRCC by Oct. 1 to Sandra Parker, KA9RNY, P.O. Box 181 Auburn 46706. This award will be presented at the Fort Wayne IN State Convention Hamfest in Nov. NMs ITN/W9ZY, QIN/KJ9J & K9PUI, ICN/K8LEN, WN/AB9AA, VHF/W9FU.

Continued on page 120.

Steve Ewald, WV1X ♦ Assistant Field Services Manager

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.
anaheim@hamradio.com

BURBANK, CA
2492 W. Victory Bl., 91506
(818) 842-1786
(800) 854-6046
Eric, KA6IHT, Mgr.
Victory Blvd. at Buena Vista
1 mi. west I-5
burbank@hamradio.com

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp
oakland@hamradio.com

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa
sandiego@hamradio.com

SUNNYVALE, CA
510 Lawrence Exp. #102
94085
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101
sunnyvale@hamradio.com

NEW CASTLE, DE
(Near Philadelphia)
1509 N. Dupont Hwy., 19720
(302) 322-7092
(800) 644-4476
Rick, K3TL, Mgr.
RT.13 1/4 mi., So. I-295
newcastle@hamradio.com

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, KK7PL, Mgr.
Tigard-99W exit
from Hwy. 5 & 217
portland@hamradio.com

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.
John, N5EHP, Mgr.
denver@hamradio.com

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17
phoenix@hamradio.com

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi. no. of I-285
atlanta@hamradio.com

WOODBRIDGE, VA
(Near Washington D.C.)
14803 Build America Dr.
22191
(703) 643-1063
(800) 444-4799
Mike, N4MDK, Mgr.
Exit 161, I-95, So. to US 1
woodbridge@hamradio.com

SALEM, NH
(Near Boston)
224 N. Broadway, 03079
(603) 898-3750
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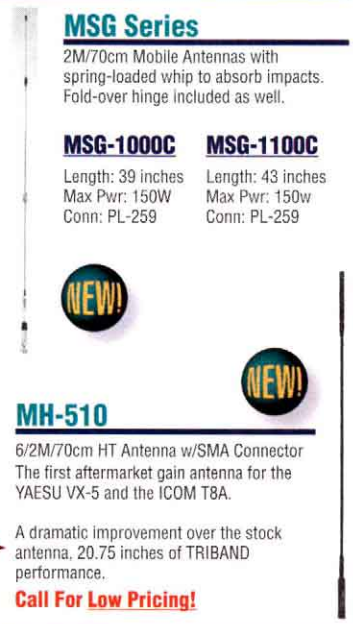

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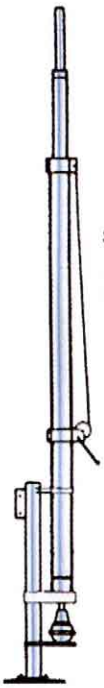

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ATR-20, $459. Handles a full 1.2 kW SSB and 600 Watts CW. It's designed to safely handle the full SSB power of Ameritron's AL-811/811H/80B, ALS-500M/600 and other 1.2 kW SSB amplifiers. Compact all metal cabinet.

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AMERITRON's legal limit amplifiers use Peter Dahl super heavy duty Hypersil power transformer capable of 2500 Watts!

Ameritron's *most powerful* Amp

with Eimac® 8877 ceramic tube

AL-1500

$2845

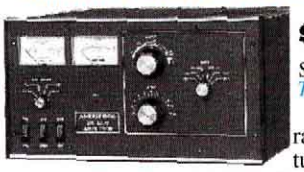
Suggested Retail

TrueLegalLimit™

Ameritron's *most powerful* amplifier uses the herculean Eimac® 8877 ceramic tube. It's so powerful that 65 Watts drive gives you the full output power -- and it's just loafing because the power supply is capable of 2500 Watts PEP. All HF bands, all modes. 77 pounds, 18½Dx17Wx10H in.

Ameritron's *toughest* Amp

with Eimac® 3CX1200A7 tube



AL-1200

$2395

Suggested Retail

TrueLegalLimit™

Get ham radio's *toughest* tube with AL-1200. The Eimac® 3CX1200A7 has a 50 Watt control grid dissipation and the lowest history of field replacement of any modern transmitting tube that we use. 90 Watts in gives you full power out. All HF bands, all modes. 76 pounds, 18½Dx17Wx10H in.

Ameritron's *classic* Amp

with 2 graphite plate Amperex® 3-500ZG tubes

AL-82

$2295

Suggested Retail

TrueLegalLimit™

Most linears using 3-500s can't give you 1500 Watts because their lightweight power supplies *can't* use these tubes to their full potential. AL-82 is ham radio's *only* super 3-500 amp! 100 Watts in gives you full power out. All HF bands, all modes. Hefty 76 pounds, 18½Dx17Wx10H inches.

1.5 *plus* kW SSB HF Amp

with 2 Eimac® 3CX800A7 tubes

AL-800H, $2395 suggested retail. Two Eimac® 3CX800A7 tubes produces 1500 *plus* Watts SSB PEP with 55 Watts drive. 52 lbs., 8½Hx16½Dx14¼W in. **AL-800, $1695** suggested retail, single 3CX800A7, 1250 Watts out with 70 Watts drive.

NearLegalLimit™ Amp

with four Svetlana® 572B tubes

AL-572, $1395 suggested retail. New class of *Near Legal Limit*™ amplifier gives you 1300 Watts SSB PEP power output (70 Watts drive) for 65% of price of full legal limit amps! Instant 3-second warm-up. 40 lbs. 8½Hx15½Dx14½W inches.

1 kW Desktop HF Amp

with Amperex® 3-500ZG tube

AL-80B, $1299 suggested retail. Gives you full kilowatt SSB PEP output (85 Watts in) from a whisper quiet compact desk- top linear. 8½x14x15½ in. Plugs into 120 VAC outlet. Graphite plate *Amperex®* 3-500ZG tube. Nearly 70% efficiency. Weighs 48 lbs.

Precision SWR/Wattmeter

AWM-30, $149 suggested retail. Active circuit gives *true* peak/average readings on lighted Cross-Needle meter. 3000/300 Watt ranges. Remote sensor.

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Net	Freq	Time/Daily/UTC	QNI	QTC	QTR	Sess
ITN	3910	1330/2130/2300	2175	449	1636	90
QIN	3656	1430/0000	68	21	223	24
ICN	3705	2315	54	8	278	26
IWN	3910	1310	2172	—	300	30
IWN VHF Bloomington			523	—	450	30
IWN VHF Kokomo			674	—	150	30
IWN VHF Northeast			1286	—	600	30
Hoosier VHF nets(9 nets)			993	26	858	64

D9RN QTC 171 in 60 sessions IN represented by WB9QPA, W9UEM, N9KNJ, KB9NPU and K9BMB. 9RN QTC 180 in 60 sessions IN represented by KJ9J, KO9D, K9PUI, WB9UYU and W9FC. Thanks to all stations that represent IN in the region nets. Tfc: W9FC 255, W9ZY 96, WB9QPA 87, KO9D 75, AB9AA 68, W9UEM 60, KJ9J 60, W9FU 57, K9GBR 53, W9JUJ 51, KB9NPU 48, KA9EIV 46, K9PUI 33, K9RPZ 16, KA9QWC 16, W9EHY 10, WB9NCE 7, K9CIV 3, K9CUN 2, K9OUP 1.

WISCONSIN: SM, Don Michalski, W9IXG—SEC: WB9RQR. STM: K9LGU. ACC: KF9ZU. SGL: AD9X. OOC: W9RCW. PIC: K9ZZ. TC: K9GDF. ASM: K9UTQ, W9RCW, W9CBE. BM: WB9NRK. It is with deep regret that I inform you of the passing of Ed Van Sickle, 75, NQ9X. Ed was active in passing traffic to remote sites. The June 9RN report shows Wisconsin with a 91% representation. We had good FD activity! Here are some reports: HVARC- 15 members; Fox Cities ARC- 12 members; WB9JIC- 2 operators; UW BARS- 12 members; FLARC- 17 members; Wisc. Rapids ARC- 12 members. Well done! Les Hunt, KB9QZQ, is the new treasurer for MRAC! The MRAC VEC team processes licenses in only 1-2 weeks. Super! SEC, Stan Kaplan, has a new ARES/RACES Web site. Go to: http://www.execpc.com/~skaplan/. SGL, AD9X, has posted recent news on mobile communications legislation, spectrum protection, and antenna restrictions at the section Web site: w9ixg.eboard.com. The Wisconsin Emergency Alert System plan is now on the web. Go to: http://www.sbe24.org/eas/ for details. Here's an important tip: registering with the FCC's ULS can benefit hams before it is time to file for re-application. The ULS will protect your call sign within the system and could prevent it from inadvertently being deleted or reissued due to an error! So, go to: http://www.fcc.gov/wtb/uls/ or call 888-225-5322 to register ***now***! Don't forget the HVARC special event station, K9S, which runs from September 2-3. Be there! QCWA are inviting those hams that have been licensed for 25 years or more to join. Wisconsin has 3 chapters and new, younger, members are needed. There are many benefits! Interested hams can contact Vern Teske, W9RYA, or go to www.qcwa.org for info. 73, Don. Tfc: K9JPS 1095, W9RCW 732, W9YPY 593, W9IHW 573, WZ7V 562, N9TVT 372, K9GU 226, W9CBE 177, N9BDL 109, N9CK 88, N9FHI 81, W9UW 79, W9YCV 69, K9LGU 68, AG9G 56, N9KHD 56, KE9VU 50, KA9FVX 36, AA9BB 33, KB9ROB 33, W9BHL 29, WB9ICH 28, K9HDF 25, KA9BHK 12, WD9FLJ 12, W9PVD 1.

DAKOTA DIVISION

MINNESOTA: SM, Randy "Max" Wendel, N0FKU—Sorry to report SK Bill Rau, W0NUI of Henderson, MN, in late June. I met Bill in the late '70s when I started the weekly High School Highlights show at St. Peters' KRBI radio station where Bill was engineer. He was a great guy and always had a smile. Brady Palmquist, W0BGP, and Al Schostag, N0GLV, also former KRBI'ns attended Bills' wake, reported that Bill was laid to rest with his straight key in his hand. I had not seen Bill in several years and it would have been nice just to shake his hand again and see that big wide smile one more time. Field Day 2K is behind us and the wx was nicer than last year. State Fair time is upon us, time to devour some pronto pups (yummy). It's been 7 yrs in this house, and about now I hope to reconfig some antennas for winter useage. Got to get this new FT-847 on the satellites and also chew up some digital airspace. I haven't used pactor in a few yrs. ARES groups have been educating themselves with MN Incident Mgmt System(MIMS) and state DEM picture ID's are planned as a result. Our STM Bob Meyer W0LAW reported in late June that he now has a computer and Web access! It took a little rubbin' but now he's got a new computer that will do anything except change the oil on his jeep! Now if Bob would quit spending so much time on the flight simulator since he's on the airport commission in Marshall. Now Bob proposes they add on to the runway to accommodate 747's! Sure, then get Schwans to fly out some ice cream in bulk to my house...next thing you know, Paul Washa, W0TOK, will be over since he thinks ice cream is yummy too, right Paul? We now have a card checker, Glenn Johnson, W0GJ@arrl.net 14164 Irvine Ave NW Bemidji MN 56601. 73 de Randy Wendel.

Net	Freq	Time	QNI/QTC/Sess	Mgr
MSPN/E	3860	5:30 P	615/69/30	W0WVO
MSPN/N	3860	12 P	371/85/30	WA0TFC
MSSN	3710	6 P	N/A	vacant
MSN/1	3605	6:30 P	203/89/30	W0HPD
MSN/2	3605	10 P	136/41/30	K0PIZ
PAW	3925	9A-5P	2741/72/68	KA0IZA

Tfc: WO0A, W0LAW, WA0TFC, K0PIZ, KB0OHI, KN9U, K0WPK, W0WVO, K0PSH, KA0IZA, WD0GUF, N0JP.

NORTH DAKOTA: SM, Bill Kurtti, WC0M—I am sad to report the another friend, W0RGT, is a Silent Key. Ted was very active for many years in Grand Forks before moving to Lake Clitherall. He was an active DXer & rag chewer. The Peace Garden Hamfest went well, attendance was down but that was expected with all the year 2000 activity. Congratulations to KE0VF on being elected the Ham of the year. The Grand Forks BBS was shut down because of the loss on the link to Fargo along with very little activity. All attending the Stanley picnic had a good time visiting with one another along with a good picnic lunch. I received 6 Field Day reports from stations in the field & 1 home station. Fargo Hams were called out for a SKYWARN watch that turned out to be a major disaster when up to 7 inches of rain fell & caused major flooding in many parts of the city when the storm drainage system was overloaded. After the storm they were on standby for 5 days in case

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-259B **$259.95**

Call or write for Free Manual

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. 7½x2½ x2¼ inches. Use two 9 volt batteries or 110 VAC with MFJ-1312B, $12.95. *Free* "N" to SO-239 adapter.

SWR Analyzer Accessories

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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 will repair or replace (at our option) your MFJ *SWR Analyzer*™ for one full year.

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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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of city & county communications failure. Traffic: N0RDJ 6. Data net, 28 sess, 679 QNI, 19 QTC. WX net, 25 sess, 608 QNI, 12 QTC, Goose River Net, 4 sess, 30 QTC, KB0XT, HF net Mgr.

SOUTH DAKOTA: SM, R. L. Cory, W0YMB—Year 2000 Field Day is now history. A total of 5 messages were received for the 500-point bonus. HUB ARC at Aberdeen was invited to have a booth in a tent provided by the City for Project Impact to build a disaster-resistant city. An excellent exposure to the public for Amateur Radio. The technical school has received an ICOM 765 HF rig from Lake Area Tech School at Watertown. SD QCWA Chapter 102 pres Frank Shaw, NU0F, has suffered a serious heart attack. We hope, when you read this, that he has recovered. Write your Congressman to support HR783. If too busy, then send QSL cards and put on it "Support Amateur Radio — co-sponsor HR783." Be sure to attend the Sioux Falls Hamfest on Sept 30. The SD Novice Net will be on vacation until sometime in the fall. Starting date will be announced.

DELTA DIVISION

LOUISIANA: SM, Mickey Cox, K5MC — AC5EU and KD5ITA are new PIO and OES appointees, respectively. AC5VN is the new net manager for the Ouachita Parish ARES Net. Newly elected officers for the Delta DX Association (DDXA) are K1DW, President; K5IQ, Vice-President; W5ZE, Secretary; W5JYK, Treasurer; and W5KB, Director. New officers for the Westside ARC are N5SC, President; KC5QKA, Vice-President; KC5PSB, Secretary; W5OS, Treasurer; K5BW, Activities Manager; W5YZC, Membership Manager; and KC5MFA, Publicity Manager. Congratulations to all! The following clubs reported Field Day activities via radiograms: Westside ARC (W5ABD), Thibodaux ARC (W5YL), DDXA (W5RU), Twin City Hams (W5EA), and Southwest LA Amateur Repeater Club (W5BII). I hope that all FD participants had a blast and are already planning for next year. Congratulations to the New Orleans ARES Club for becoming ARRL affiliated. Don't forget the upcoming LA QSO Party September 30. In my opinion, contesting and traffic handling are the two best activities to hone one's operating skills. If you're new to contesting, state QSO parties are fairly relaxed and are a great way to get started. So fire up your station the last Saturday in September and make those parish hunters happy. Tfc: WB5ZED 1098 (BPL), K5IQZ 234, W5CDX 169, K5MC 166, KG5GE 28, K5DPG 18. PSHR: WB5ZED 215, K5DPG 130, K5IQZ 128, W5CDX 121, K5MC 93, KG5GE 81. Net Reports: sessions/QNI/QTC. LTN: 30/309/79.

MISSISSIPPI: SM, Malcolm Keown, W5XX—Section Web Site: www.arrlmiss.org. Web Master: K5IBM at k5ibm@arrl.net. DEC: KD5CKP, K5IMT, WB5OCD N5XGI, N5ZNT. EC: KK5BY, KD5CKP, W5DGK, W5DJW, K5DMC, KB5DZJ, KD5FUO, N5HTQ, WD5IMP, WB5OCD, W5PES, WA5TEF, KC5TVI, KC5TYL, KB5WJJ, N5XGI, KB5ZEA, N5ZNT. The ARRL has made a re-mailer service available to Section Managers whereby timely information can be sent to ARRL Members via e-mail. If you have a hamfest, club meeting, local emergency exercise, tailgate party, etc. that you would like to publicize, send a plain text e-mail message to w5xx@arrl.org, who will pass it on to the ARRL server for re-mailing if the material is appropriate. But remember the remailed messages only go to ARRL Members, who have signed up for an arrl.net e-mail address. If you haven't signed up, go to the Members Only Site on the ARRL Web Page and sign up pronto, so you won't miss any hot info. Mississippi hams were out in force for the Y2K Field Day. Clubs reported on the air as of this writing were: Bluff City ARC (W5KHB); Chickasaw ARA (W5GWD); Columbus ARC (AA5MT); Hattiesburg ARC (AG5Z), Jackson ARC (W5PFC), Jackson Co ARC (W5WA), Kosciusko ARC (KC5YCH), MDXA/Keesler ARC/West Jackson Co ARC (K5MDX), Laurel ARC (N5PA), Mississippi Coast ARA (AC5QJ), Meridian ARC (W5FQ), Olive Branch ARC (K5K), Tri-State Radio Group (KT4XA), Tupelo ARC (KK5K), and the Vicksburg ARC (W5XX). PIO Rpt: W5KWB. EC Rpt: KD5CKP, KD5FUO, WB5OCD, N5ZNT. Net Reports: sessions/QNI/QTC. MSPN 30/2770/54, MTN 30/90/64, MSN 30/1050/14, PBRA 30/932/19, Jackson Co ARES/RACES 30/546/29, MSSN 22/64/2, WCMS ARES 13/122/2, MAEN 4/69/0, MCARES 4/40/10, Stone Co ARE 4/36/0, JARCEN 4/78/1, MLEN 4/66/1, MBHN 4/27/0, NW MS ARES 3/38/0. PSHR: KB5W 144, N5XGI 140, K5VV 130, W5XX 89, KJ5YY 73. Traffic: KB5W (BPL) 534, N5XGI 52, K5VV 48, W5XX 13. Compilation of traffic statistics provided by KJ5YY, Mississippi STM.

TENNESSEE: SM, O.D. Keaton, WA4GLS— UCARS officers are KF4FLW- pres; KE4URW- vp; KS4NG- sec/treas. Club meetings are the 3rd M of the 3rd month of each quarter. E-mail ks4nb@arrl.net for more information. Paul, AC4QZ, retires as editor of ZERO BEAT. Thanks, Paul, for the great job. We welcome Phylllis, KG4DTX, as the new editor. We know this job is still in good hands. DCARC officers are: Rebecca, AF4QB- Pres, Evan, KG4ABM - VP, Jeff, NY4N - Sec/Treas. Thanks, Vollie, for this info. JCARA members participated in the "Roan Groan," and the Carnegie Classic." Bill, WJ2L, is new editor of "The RATS Tale." Good to know that his job is still in capable hands. Good luck, Bill. Thanks to Ralph, W4CJY, and Danny, KC4DNA, for the great organizational work they did for the Special Olympics, and to all those who assisted in this great event. SPARKS, June issue, listed 68 recent upgrades in the Memphis area. Delta ARC has organized an Elmer shack. Thanks to BSFARC members, WA4WMN, K4TOM, W5EDQ & KE4YIH for assisting in the Big South Fork competitive trailride. Lucy Scandlin organized the event. Mid-South SKYWARN was alerted May 27 because of bad weather conditions. The group coordinated and reported the weather conditions during the time that Memphis NWS had lost all phone line communications. ETDXA officers are David, K4PZT- pres. Jack, K4IBP-VP, Pete, WM4U- Sec/Treas, Bert, K4AR-Trustee. Jeff, KG4ENR-Web Master & Paul, KC4BWG-SYSOP. Knoxville Hamfest/Delta Division Convention was very well attended including the forums. Thanks to Jean Wolfgang, WB3IOS, who visited from ARRL HQ and Rick Roderick, K5UR, Delta Division Director, for their support in making this event successful. DRN-5 rpt, 62 sess. 729 mess. TN rep 40% by W4OGG and KE4GYR. Net sess/QTC/QNI: TMPN 30/38/2142; TCWN 17/10/102; TEMPN 22/48/730; TEPN 26/97/1954; TSCWN N 20/1/76. Tfc: N4PU 60, KE4GYR 56, W4SQE 52, WA4HKU 38, W4SYE 33, WA4GLS 20, KI4V 8, WD4JJ 7, W4HZD 6, WA4GZZ 1.

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MFJ-989C *Legal Limit* Antenna Tuner

MFJ uses super heavy duty components to make the world's finest legal limit tuner

MFJ uses super heavy duty components -- roller inductor, variable capacitors, antenna switch and balun -- to build the world's most popular high power antenna tuner.

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MFJ AirCore™ Roller Inductor gives high-Q, low loss, high efficiency and high power handling.

MFJ's exclusive *Self-Resonance Killer™* keeps damaging self-resonances away from your operating frequency.

Large, self-cleaning wiping contact gives good low-resistance connection. Solid 1/4 inch brass shaft, self-align bearings give smooth non-binding rotation.

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MFJ will repair or replace your MFJ-989C (at our option) *no matter what* for one year.

The rugged world famous MFJ-989C handles 3 KW PEP SSB amplifier input power (1500 Watts PEP SSB output power). Covers 1.8 to 30 MHz, including MARS and WARC bands.

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).

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MFJ-986 Two knob *Differential-T™*

MFJ-986

$329.95

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

MFJ-962D

$269.95

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore™* roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10¾x4½x10⅞ in.

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.

MFJ-949E *deluxe* 300 Watt Tuner

MFJ-949E

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More *hams use MFJ-949s than any other antenna tuner in the world!* Handles 300 Watts. Full 1.8 to 30 MHz coverage, 48 position *Precision48™* inductor, 1000 Volt tuning capacitors, *full size* peak/average lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, dummy load, *QRM-Free PreTune™*, scratch proof Lexan front panel. 3½Hx10⅝Wx7D inches. **MFJ-948, $129.95.** Economy version of MFJ-949E, less dummy load, Lexan front panel.

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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GREAT LAKES DIVISION

KENTUCKY: SM, Bill Uschan, K4MIS—ASM:. Tom Lykins, K4LID. SEC: Ron Dodson, KA4MAP. SGL: Bill Burger,WB4KY. STM: John Farler, K4AVX. PIC: Steve McCallum, W2ZBY. TC: Scotty Thompson. BM: Ernie Pridemore, KC4IVG. ACC: Todd Schrader, KF4WFZ. The monitor on the Packard Bell died so I am using my son's new laptop. September 9 is the date for the Greater Louisville Hamfest. I hope to see a lot of friends at this Hamfest. The AD meeting that was scheduled for July 1, 2000, was cancelled. All ARRL affiliated clubs should check the Web pages and read about the new club incentives for the promotion of Amateur Radio. Points need to be accumulated for awards. Also check out the ARRL Web pages and learn more about "The Big Project." It's well worth the effort. The ARRL VEC is caught up on processing applications received from the many ARRL VEs. In the last Section News, I mentioned that Connie Hamilton was the ASM for the SE Ohio Section. She is the ASM for SE Ohio.

Net	*QNI*	*QTC*	*Sess*	*NM*
KTN	1838	77	29	K4LID
KSN	184	28	30	KO4OL
CARN	N/A	24	28	AD4EI
TSTMN	327	25	30	KG4EAB
4ARES	59	3	5	WA4RRR
7ARES	3	3	5	WD4PBF

Tfc: K4AVX 48, AE4NW 33, KO4OL 24, WB4ZDU 8.

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: John LaRock, K8XD (k8xd@voyager.net). TC: Dave Smith (DSmith @smithassoc.com). Youth Activities: Steve Lendzion, KC8MCQ (kc8mcq@arrl.net). BM: Thomas Durfee, Jr., WI8W (wi8w@arrl.net). The 2000 Section Emergency Test (SET) will take place within our Section on Saturday September 23. The State Emergency Operations Center (SEOC) will be operational from 10 AM to 4 PM to accept message traffic on 3932 kHz/7232 kHz, the designated state emergency frequencies. Please plan to use as many served agencies as possible during this exercise. Please keep in mind all of the newly licensed and those that have earned upgrades with HF privileges and plan to use them to give them a feel for operating under actual emergency conditions. Now is the time to start assignments for National Traffic System (NTS) Liaison to get your traffic into the traffic nets listed below. A special schedule will be sent to all just before SET. This is our most important annual event to exercise our readiness and ability to serve the public under simulated emergency conditions. Any questions can be addressed to our Section Emergency Coordinator (SEC) listed above. I would like to thank Carl Hillaker for his service during the past year as our Section Youth Programs Coordinator and would like to welcome Steve Lendzion, KC8MCQ, of Fowlerville as he takes on the responsibility of this very important appointment. For those of you that have any youth programs within your organization or would like help getting started please contact Steve via e-mail listed above or at 517-223-7685. Thanks, Steve, for accepting this challenge. Traffic reports for June 2000: KB8ZYY 343, K8GA 258, AA8PI 194, K8LJG 149, K8KV 91, N8FPN 89, K8AE 86, WX8Y. 73. W8RTN 71, WB8SIW 65, W8RNQ 52, K3UWO 52, N8JGS 47, AA8SN 43, K8UPE 33, KI8GR 24, WI8K 22, K8ZJU 22, KC8GMT 21, N8TDE 14, WA8DHB 10, KB8EIW 8, K8AI 5, N8EXS 1, K8CPA 1.Please support the following Section Traffic Nets: June 2000 NTS Net Reports.

Net	*QNI*	*QTC*	*Sess*	*NM*	*Freq*	*Time*	*Day*
QMN	640	283	60	WB8SIW	3.663	6:30&10 PM	Daily
MACS	185	57	30	W8RNQ	3.953	11 AM	Daily (1 PM Sun.)
MITN	362	187	30	N8FPN	3.952	7 PM	Daily
UPN	938	47	34	AA8SN	3.921	5 PM	Daily (Noon Sun.)
GLETN	545	89	30	VE3SCY	3.932	9 PM	Daily
SEMTN	493	130	30	WI8K	146.640	10:15 PM	Daily
WSSBN	685	29	30	K8JRE	3.935	7 PM	Daily
D8 ARES	No Report			VE3EUI	3.932	7:30 PM	Friday
VHF Nets	602	20	48	KB8ZYY	Various		

WN/AB9AA, VHF/W9FU.

OHIO: SM, Joe Phillips, K8QOE, Fairfield, (to contact me, see page 12)—The Ohio Section welcomes Brenda Krukowski, KB8IUP, chairperson of the Toledo Hamfest and former president of the Toledo Mobile Radio Association, as Affiliated Clubs Coordinator (ACC) for the Ohio Section. She succeeds Joanne Solak, KJ3O. Mantua, who resigned after 15 years of service in this cabinet position. Mrs. Krukowski and her husband, Chuck, KB8FXJ, co-edit the "TMRA AR BEACON," and she has also served the TMRA as secretary, a member of SKYWARN and the Toledo area Amateur Radio Emergency Service (ARES). In 1997 Brenda was named Toledo Ham of the Year by the Lucas County ARES. As ACC, she will work with ARRL Special Clubs and encourage other Ohio ham radio clubs to join in Special Service Club privileges." Here is a listing of the Field Day messages I received thanks to Ohio's traffic nets; K8AQ (West Chester), W8UP (Cambridge), W8TK (Delaware), W8NP (Canton), W8SWS (Piqua), WS8B (Xenia) W8QLY (New Springfield), K8SCH (Cincinnati), W8DGN (Bellbrook), N8CWG (Green County), WO8HIO (Toledo), W8EDU (Huntsburg), W8DZ (Cincinnati), KB8ZAM (Akron), N8YWX (West Union), W8ID (Tiffin), KB8SHE (Lisbon), K8SSJ (Hamersville), W8UM (Cleveland), KI8IL (Lorain), and K8FH (Medina). (If ECs and DECs read this before August 26th, that's the day you meet at 10 AM with the SEC in Columbus (Red Cross Center). For the rest of us, we gather 9 AM, Saturday, September 16th at the Ohio EMA facility on Columbus northside for the Ohio Section Conference. Pizza parties, sponsored by the Ohio Section, are at both...OHIO SECTION CONGRATS TO (A) Joe Conte, AB8AU, Rick Pavelko, N8TGO, and Jim Eritano, AB8EP, of Barberton, who give regular ham radio demonstrations each month at the Barberton Public Library, (B) sponsors of the increasingly popular Ohio QSO party, this year August 26-27. Several Ohio clubs embark on this, and (C) The Lancaster

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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.

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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

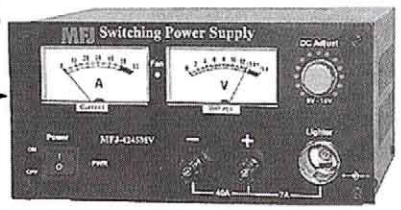
You won't burn up our power supplies!

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. 2.86 lbs. 5¾Wx2½Hx10¾D 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
plus s&h

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.

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All are protected by MFJ's famous No Matter What™ one year limited warranty.

Eagle-Gazette newspaper who June 13th reminded readers to look back 40 years ago at the Lancaster and Fairfield County hamfest. The September Hamfests; Findlay (Hancock County) ARC (10), GCARA Communications Expo in Cincinnati, (17) and Hamfest Association of Cleveland (24) ...DE ... K8QOE.... Now for our June traffic reports;

Net	QNI	QTC	QTR	Sess	Time	Freq	Mgr
BN (E)	149	55	233	30	1845	3.577	WD8KFN
BN (L)	194	73	374	30	2200	3.577	NY8V
BNR					1800	3.605	W8LDQ
OSN	120	46	496	30	1810	3.708	WB8KQJ
OSSBN	1400	526	2434	90	1030, 1615, 1845	3.9725	KF8DO

OHSection ARES Net 1700 Sun 3.875 WD8IHP Tfc: N8IO 170, WB8KFN 150, KD8HB 145, N8DD 144, N8FWA 131, W8STX 128, WA8SSI 97, KA8FCC 85, WA8EYQ 75, WA8HED 63, N8TNV 62, W8BO 58, KC8HJL55, W8PBX 54, KI8IM 51, NS8C 44, KF8DO 42, N7CEU 41, KD9K 41, N8CW 32, N8IBR 30, KB8SBK 28, NY8V 28, KB8RGY 22, KA8VWE 21, WD8KBW 20, KC8DWM 19, N8AK 19, WB8HHZ 18, KB8TIA 17, N8GOB 15, KC8KYP 14, WB8PMH 12, W8RG 12, N8WLE 11, KK8J 8, KC8HPR 7, KC8HTP 5, W8GDQ 3, K8QIP 3, KX8B 3, KI8O 2, KE8FK 1, N8HAI 1, K8WC 1. (May) KA8VWE 36.

HUDSON DIVISION

EASTERN NEW YORK: SM Rob Leiden, KR2L—STM: Pete Cecere, N2YJZ. 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. Net Reports (Jun 2000) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 34/8 CDN 283/127 ESS 239/104 HVN 495/286 SDN 398/161 NYPHONE 175/532 NYPON 285/227 NYS/E 319/430 NYS/M 183/151 NYS/L 227/505 Section News: getting your club's programs together for the fall? Let us know how we can help! Want to join the Section Field Organization? Let me know and we'll get you started! 73 de Rob. PSHR: N2YJZ 189, N2JBA 171, KC2DAA 158, W2AKT 148, WA2YBM 144, WB2ZCM 144, W2JHO 103, WB2IIV100. Tfc: N2YJZ 203, WB2IIV 119, N2JBA 93, WB2ZCM 49, KC2DAA 47, WB2ZCM 49,WA2YBM 36, N2TWN 30, W2JHO 25, W2AKT 22, W2CJO 22, N2AWI 20, KL7JCQ 2, K2AVV 5, WA2BSS 2, KC2BUW 1.

NEW YORK CITY / LONG ISLAND: SM, George Tranos, N2GA—ASM: KA2D, N1XL, K2YEW, W2FX, KB2SCS. SGL: N2TX. SEC: KA2D. ACC: N2MUN. PIC-East: N2RBU. PIC-West: K2DO. TC: K2LJH. BM: W2IW. OOC: N1XL. STM: WA2YOW. ARRL Hudson Division Awards dinner is Sept. 15 in New Rochelle, NY. Convention is Sat, Sept. 16 at Westchester County Center in White Plains. It was fun visiting all of the Field Day sites again this year, 15 clubs in 2 days! Thanks to Vice Director W2XX for joining me on Saturday and Director N2FF for doing so on Sunday. Other NLI staff who participated in Field Day visits included KA2D, N1XL, W2FX, KB2SCS, N2MUN, K2DO, N2NFI, WA2WKV and Past Director WK6R. Congratulations to all the clubs for their efforts and thanks for your hospitality! Congratulations to new club officers for LIDXA: President Marty NN2C, VP Pat KE2LJ, Secretary Ed K2MFY & Treasurer Russ W2RL. Check the NLI Web Page at www .arrlhudson.org/nli for more information on upcoming events. NYC/LI VE exam list follows: Manhattan: BEARS, ABC Cafeteria, 125 West End Ave at 66th Street, Contact Jerry Cudmore W2JRC at 212-456-5224 for dates & times; East Village ARC, 2nd Friday at 7 PM, Laguardia HS, Amsterdam Ave and West 65th Street, Manhattan. Contact Robina Asti KD2IZ at 212-838-5995; Columbia University VE Team, 3rd Monday at 6:30 PM, Watson Lab, 6th Floor, 612 West 115th Street, Manhattan. Contact Alan Crosswell, N2YGK, at 212-854-3754; Queens: Hellenic ARC, 4th Tuesday at 6:30 PM, Pontion Society, 31-25 23rd Ave, Astoria, NY. Contact George Anastasiadis, KF2PG, at 516-937-0775. Nassau County: Grumman ARC (W5YI), 2nd Tuesday at 5 PM, Northrop-Grumman Plant 5, South Oyster Bay Road via Hazel Street, Bethpage, NY. Contact Bob Wexelbaum, W2ILP, at 631-499-2214; LIMARC, 2nd Saturday at 9 AM, NY Institute of Technology, 300 Building, Room 311, Northern Blvd, Greenvale, NY. Contact Al Bender W2QZ at 516-623-6449. Suffolk County: Great South Bay ARC, 4th Sunday at 12 noon, Babylon Town Hall, ARES/RACES Room, 200 East Sunrise Hwy, North Lindenhurst. Contact Tom Carrubba at 631-422-9594; Larkfield ARC, 2nd Saturday in Feb, May, Sep, Nov, Huntington Town Hall, Room 114. Contact Stan Mehlman, N2YKT, at 631-423-7132; Peconic ARC, exams held January, April, July, and October on next to last Friday at 6:30 PM at Southold School, Oaklawn Ave, Southold, NY. Contact Ralph Williams N3VT at 631-323-3646. Mid Island ARC, last Weds of each month at 7 PM at 36 Dew Flag Rd, Ridge NY 11961, Contact: Mike Christopher W2IW at 631-924-3535. Report all changes to N2GA before the 12th of the month. Tfc: WB2GTG 316, N2AKZ 157, W2RJL 105, KB2KLH 73, WA2YOW 27, KA2D 12.

NORTHERN NEW JERSEY: SM, Jeff Friedman, K3JF—Another Field Day has come and gone. Both Frank Fallon,N2FF, and myself covered approximately 300 miles on Saturday visiting 8 Field Day Sites. We enjoyed great weather and the bands seemed to cooperate. In fact the bands were good enough that the Cherryville Repeater Association is claiming, from their record checking, they have broken the W4AT (Orlando ARC) record set back in 1994 for 6A. Cherryville claims 6,600+ QSOs equating to 20,946 points. Frank was impressed by County Line ARC's noise abatement equipment. Two 4X4 plywood sheets placed in a triangle pattern behind the generators. This cut the noise to the playground to a mere whisper. Congratulations to all the clubs and individual hams who participated in this years Field Day. It was enjoyable for all - even the steaks served at the Sussex County ARC. The National Weather Service/SKYWARN has set up 2 servers: 1. General Weather discussion, storm reports and quarterly newsletter -http://www.egroups.com/groups/ MTHOLLYSKYWARN 2. Storm Watch - http://www.egroups.com/groups/MTHOLLYSVRWX. All are invited to access the lists. Finally the Northern New Jersey Section SEC Mike Hoeft, K2MPH, is sponsoring an Emergency

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.

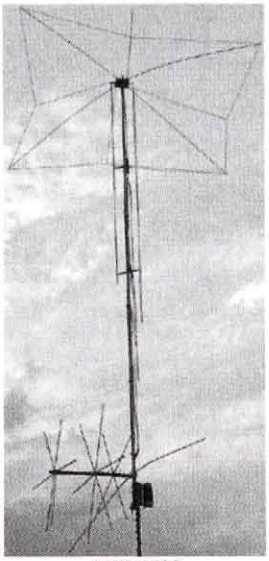
Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

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.

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.



MFJ-1798
$289.95
Ship Code F

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.

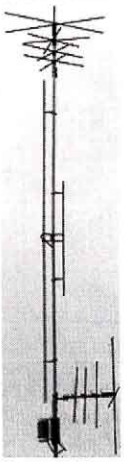
MFJ's G5RV Antenna

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



MFJ-1796
$209.95
Ship Code F

Only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments,small lots, trailers. Perfect for vacations, field day, DXpedition, camping.

Efficient end-loading, no lossy traps. Entire length is always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting 1 band has minimum effect on others.

MFJ-1792, $169.95. Full size 1/4 wave radiator for 40 Meters. 33 feet, handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $189.95. Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

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(ARES) training session on September 23rd. Reservations are required since we are limited to approximately 80 participants. The session begins at 8:30 AM and will continue into the afternoon. If you have ARES/Races members or Hams who would like to participate in Emergency Volunteer work email Mike and reserve your position. He can be reached at k2mph@arrl.net. Time and place may change so make your contact with Mike. This is going to be an intensive and worthwhile session open to all Sections. THANKS TO MIKE ! Don't forget to send your support letters to your NJ State Senators and Assembly-men asking for their support of the NJ Auto Registration Ham License Bills - A-1593 and S-1341. Best Regards, Jeff. Tfc: KC2AHS 71, N2OPJ 50, KC2FZT 48, KB2VRO 45, K2VX 42, N2RPI 34, K2PB 34, N2GJ 17, W2CC 16, N3RB 4. N2ATJ 2, KB2VVB 2, N2TTT 2.

MIDWEST DIVISION

IOWA: SM, Jim Lasley, N0JL—ASM: N0LDD—SEC: NA0R. ACC: N0IJP @ KE0BX. BM: K0IIR @ W0CXX. SGL: K0KD. CVARC includes and interesting story on the origin of the term HAM. Did you get to hear KPH on CW again? Sounds like FMARC had quite a FD. I rcvd FD messages from: Iowa City ARC, FMARC, CVARC, Jones Co ARC, and Davenport ARC. Thanks to all who participated. With me on call I didn't wander too far from home. I did work 40 on 40 CW for TARS and 33 on 80 CW (Gee... 73QSOs!) for the combined group from Centerville and Chariton. I did have to make a stop at work about 2130 Local for a few minutes. It is good I didn't go too far! DARC had the weather clear for the potluck and a visit by KWQC-TV. SEITS is trying to get some youth activity by noting the ARRL Youth Skeds Database at http://www.arrl.org/ead/youthdkeds/. Looks like a good way to get together. From the TIDXC News I note the K1KD (son of K0JGH) and his new bride (daughter of NU0C) have started an antenna farm. TIDXC is looking at the possibilities of a DXpedition to something more rare than W0! Sorry to note the loss of KB0DAF. I received a message from W4JSB of his experiences at the Dayton Hamvention. Bob had a knee replaced on April 10 and was a bit apprehensive about the trip. He found he spent more time resting than walking and 'rented' and then 'leased' a fold up chair from six guys from Iowa. He doesn't even know who they are but for the fellowship. Bob says that if they are typical of Iowa hams, ham radio is well in Iowa. Whoever you are, thanks for being the kind of hams we want to meet. 73 es cul de N0JL. Newsletters were received from CVARC, FMARC, DARC, SEITS, TIDXC, SARA, CAARC, TSARC. Traffic: W0SS 202, KA0ADF 49, N0JL 17, WB0B (May) 9, WB0B 4.

KANSAS: SM, Orlan Cook, W0OYH—ASM/ACC/OCC: Robert Summers, K0BXF—SEC: Joseph Plankinton, WD0DMV. STM: Ron Cowan, KB0DTI. SGL: Marshall Reese, AA0GL. PIC: Scott Slocum, KC0DYA. TC: Frank Neal, N8FN. ARRL KS Convention August 27 at Salina. See www.colossus.org/kar/ for details. Please welcome aboard new Official Relay Station June KB0WEQ, new Emergency Coordinator Allen KC0CFL and two Official Emergency Stations Scot KC0HFX and Rick KF4LM. I visited five Field Day sights and received radio msgs from the following of their participation: N0NB, W0MI,N0RZ, K0KSN, K0LB, KF4LM, W0RR,W0ERH, and KS0KS. Sid, N0OBM shut down his BBS in Salina. There were no users for some time. Thanks, Sid, for providing KS with a fine BBS all of these many years. Let's start thinking about the 2000 SET. We will be discussing it at the State Convention Section meeting May. Kansas Nets: sessions/QNI/QTC, KSBN 31/990/74; KPN 22/291/23: KMWN 31/565/447; KWN 31/718/485; CSTN 27/1781/95; QKS 59/300/73; QKS-SS 11/22/8; SEC 58/709/21. TEN 271 msgs 62 sessions Kansas 50% QNS AC0E KX0I AA0OF W0WWR NB0Z WB0ZNY W0SS mgr. BBS reports: W1AW Bul/Per/NTS AA0HJ 3/319/0. Tfc: N0JK 599, WB0ZNY 69, W0WWR 65, W0OYH 53, NB0Z 34, KB0DTI 31, KX0I 31, N0RZ, N0ZIZ 11, W0FCL 4.

MISSOURI: SM, Dale Bagley, K0KY—ASM: John Seals, WR0R. ACC: Keith Haye, WE0G. BM: Brian Smith, KI0MB. OOC: Mike Musick, N0QBF. PIC: Dennis McCarthy, AA0A. SGL: E.B. DeCamp, KD0UD. STM: Charles Boyd, KE0K. SEC: Patrick Boyle, K0JPB. TC: Wayland McKenzie, K4CHS. Cliff Ahrens, K0CA, DXCC Card Checker. In June, I attended the Midwest-Dakota Division Convention in S. Sioux City, NB. I had a great opportunity to visit with Division Leadership and visiting with all the Amateurs at the event. The NCMO Hamfest was a fine Hamfest, with Tom Hammond, N0SS, and Rich Beckwith, WN0X, presenting a forum on QRP and the Elecraft K-2 xcvr. Ed Brockelmeyer, K0EB, and Ken Foster, KC0AMH, demonstrated an interesting tower erecting system. The NCMO Hamfest is sponsored by Macon County ARC, Tri-County ARC, Linn County ARC and NEMO ARC. I enjoyed attending the Ozark Hamfest in Houston, MO. The rain didn't dampen the great amateur can do spirit of the Houston ARC. Willie Adey, N0TPE, Club President; Kent Sturgeon, KB0LTN, Jerry Thieman, KB0SFO, and Jack White, WD0EIE, were all excellent hosts and worked hard on this year's Hamfest. Mike Musick, N0QBF, Section OOC has appointed Brian Smith, KI0MB, as an OO. Larry Anthony, WB0VAM, has been appointed as a Technical Specialist and also as a Public Information Officer for the Kennett, MO, area. The Boeing Employees Amateur Radio Society, of St. Louis has taken on the sponsorship of the Missouri QSO Party. Glenn Gercken, N0PNQ, will chair the project for the B.E.A.R.S. I know that under their leadership, the MO QSO Party will be fun and well ran. Net Sess/QNI/QTC: WAARCI 4/85/0; MTN 30/317/80. JOHNSON Co ARES 5/59/0; AUDRAIN ARES 5/43/1. Tfc: KE0K 140. PSHR: KE0K 140.

NEBRASKA: SM, Bill McCollum, KE0XQ—ASMs: W0KVM, N0MT, WY0F, WB0ULH & WB0YWO. The OOC is pleased to announce that Danny, K0DED is now an Official Observer and a member of the Amateur Auxiliary. On July 1st, members of the AK-SAR-BEN ARC sponsored an information booth at Elkhorn Days, Displays included HF, APRS, SSTV, VHF and Morse code. Thanks to K0NSA, W0NSA, N0TRK, KA4ZZQ & N0HPP. The Bellevue ARC held its annual picnic on July 15th at the home of N4OWG and his YL MiYong. 30 club members and spouses attended. ARES groups have been out on Tornado Watches lately, and things have gone pretty smoothly. Remember to get our new hams involved by teaming them up with "seasoned pros". Their have been several complaints of

MFJ *tunable* Super DSP filter

Only MFJ gives you tunable and programmable "brick wall" DSP Filters

U.S. Patent D374,010
MFJ-784B
$249.95

MFJ's *tunable* super DSP filter automatically eliminates heterodynes, reduces noise and interference *simultaneously* on SSB, AM,CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX, weak signal VHF, EME, satellite.

You get MFJ's *tunable* FIR linear phasse filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 57 dB attenuation 75 Hz away.

***Only* MFJ gives you 5 *tunable* DSP filters. You can tune each lowpass, highpass, notch, and bandpass filter including optimized SSB and CW filters. You can *vary* the bandwidth to pinpoint and eliminate interference.**

***Only* MFJ gives you 5 *factory* pre-set filters and 10 *programmable* pre-set filters that you can customize. Instantly remove QRM with a turn of a switch!**

MFJ's *automatic notch* filter searches for and eliminates *multiple* heterodynes.

You also get MFJ's advanced *adaptive noise reduction*. It silences background noise and QRN so much that SSB signals sound like FM.

The *automatic* notch and *adaptive* noise reduction can be used with *all* relevant tunable pre-set filters.

***Automatic gain control* (AGC) keeps audio level constant during signal fade.**

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in MFJ's exclusive *tunable* FIR bandpass filters.

You can tune the center frequency from 300 to 3400 Hz, and vary the bandwidth from 30 Hz to 2100 Hz -- from super-tight CW filters to wide razor-sharp Data filters.

You can use two tunable filters together. For example, tune one to mark, one to space and set bandwidth tight for a super sharp RTTY filter.

Tunable highpass/lowpass filters

You can tune the lower cutoff frequency 200 to 2200 Hz and the upper cutoff frequency 1400 to 3400 Hz. This lets you create custom filters for voice, data and other modes.

Signals just 75 Hz away literally disappear -- they are reduced 57 dB!

Automatic notch filter

MFJ's automatic notch filter searches for and eliminates multiple heterodynes in milliseconds. It's so fast, that even *interfering* CW and RTTY signals can also be eliminated.

You can *selectively* remove unwanted tones using the two *manually tunable* notch filters -- an MFJ exclusive. Knock out unwanted CW stations while you're on CW.

Adaptive Noise Reduction

Noise reduction works in all filter modes and on all random noise -- white noise, static, impulse, ignition noise, power line noise, hiss.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

15 *pre-set* filters -- factory set or you custom program

You can select from 15 *pre-set* filters. Use for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode.

If you don't like our pre-set filters, you can program your own -- an MFJ exclusive! Save center frequency/bandwidth, lowpass/highpass cutoffs, auto/manual notch, noise reduction -- all filter settings -- in 10 programmable filters.

Plus more . . .

A push-button bypasses your filter -- lets you hear the *entire* unfiltered signal.

2½ Watt amplifier, volume control, input level control, speaker jack, PTT sense line, line level output. 9½x2½x6 inches.

Plugs between your transceiver or receiver and external speaker or headphones. use 12 VDC or 110 VAC with MFJ-1315, $14.95. Cable Pack, MFJ-5184, $7.95, includes receiver cable, DC cable, 2 open-end TNC cables.

New Features

MFJ's exclusive *tunable Spotting Tone*™ -- accurately tunes even the narrowest CW filter.

MFJ's exclusive *Adaptive Tuning*™ -- tuning rate automatically becomes finer as you narrow bandwidth -- makes narrow filters easy-to-use.

MFJ's exclusive *FilterTalk*™ -- sends precise filter settings in Morse code.

Has automatic notch with variable aggressiveness, new quieter 2½ Watt audio amplifier, new speaker switch keeps phones always active.

Manual and automatic notch can be used together. Noise reduction, automatic notch and custom filter you saved in memory is selected.

You get an accurate easy-to-use input level indicator, improved manual notch in the CW mode, adjustable line level output, more Mark-Space frequencies and baud rates for data filters and automatic bypass during transmit for monitoring CW sidetone, voice or data by sensing the PTT line.

Firmware Upgrade

For MFJ-784, order **MFJ-55, $29.95**. Gives you most features of the MFJ-784B.

60 dB Null *wipes out* noise and interference

MFJ-1026
$179.95

Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

It's *more effective* than a noise blanker because interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an *adjustable phasing network*. You can combine two antennas to give you various directional patterns. You can null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312B, $14.95. 6½x1½x6¼ inches.

MFJ-1025, $159.95. Like MFJ-1026 less built-in active antenna, use external antenna.

Add DSP to any Multimode

MFJ-781
$129.95

Add "brick wall" DSP filtering to any TNC or multi-mode data controller. Copy signals buried in noise and QRM. Under severe QRM, DSP greatly improves copy of Packet, AMTOR, PACTOR, GTOR, Clover, RTTY, SSTV, WeFAX, FAX, CW -- nearly any digital mode. Automatic gain control, On/Off Bypass switch. Plugs between transceiver and multi-mode. Uses 10-16 VDC or 110 VAC with MFJ-1312B, $14.95. 4½x2½x5 inches.

DSP for your MFJ-1278/B

Plug a MFJ-780 "brick wall" DSP filter into your MFJ-1278/B multi-mode and you won't believe your eyes when you see solid copy from signals completely buried in QRM! MFJ-1278/B automatically selects the correct DSP filter for Packet, AMTOR, Pactor, RTTY, ASCII, FAX, Color SSTV, Navtex or CW. Plug in a MFJ-780 and copy signals that other multi-modes can't. *Some soldering needed.*

MFJ-780
$99.95

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hams "airing their dirty laundry" over some repeaters in the state. If you have a complaint against a ham, keep it off the air. It gives the public a bad impression of our hobby and could hurt people. Net Reports: WNE Net, QNI 877, QTC 12 & 26 sessions. NE 40M Net, QNI 237, QTC 8 & 26 sessions. Lincoln/Logan ARES, QNI 111, QTC 2 & 13 sessions. Mid NE 2M ARES, QNI 325, QTC 2 & 30 sessions. NESM, QNI 717, QTC 23 & 30 sessions. NCHN, QNI 279, QTC 16 & 28 sessions. Tfc : KE0XQ 20, WY0F 6, W0EXK 2, W0UJI 2, WB0ART 2, WC0O 2, KA0DBK 2, K0RRL 2.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Betsey Doane, K1EIC—EC Doug, W1EDJ (formerly KA1PQB), and his group deserve special commendation for their work coordinating the Amateur Radio communications for Opsail 2000. Doug and DEC Bob, KA1BB, are working closely with the American Red Cross to provide a real service at this event. The schedule shows several venues and an organized list of operators at each. Many volunteers have come forward and answered the call—a big thank you to all of you from the CT Section! At this writing, I'm looking forward to attending. Thanks for your many FD messages-hope you all had as much fun as I did-what weather! Congrats to Rick, N1VXP, on having received an award from the City of Hartford for meritorious service in providing communications and for his state of readiness during the Y2K monitoring effort. Rick is very active in both NTS and ARES and has been licensed for just a few years—real proud of you! Many thanks to Jeff, WB3DLG, for having served as president of the Candlewood ARA, a Special Service Club—great job, Jeff! Congrats to John, W1JMA (formerly N2DVX) on becoming CARA's new president. New appointments: Adam, KB1ETO, ORS; Barb, K1EIR ,EC Lower Naugatuck Valley American Red Cross; Dan, KA1SZP, EC, Durham. Congrats! Many thanks to WA1TMA who was EC Durham for many years—keep in touch. Why not sign up for Nutmeg News Notes electronic edition at Members-Only Web page: http://www.arrl.org/members-only/. I promise not to clutter your e-mail! Net sess/QNI/QTC: WESCON 30/290/75; NVTN 30/112/110; ECTN 28/262/108; CPN 30/202/38; CN 25/81/67; BOMN 26/399/412; NCEN 5/190/71 Tfc: NM1K 2137, KA1VEC 419, K1UQE 152, KE1AI 117, KA1GWE 114, WA4QXT 84, K1STM 59.

EASTERN MASSACHUSETTS: SM, Joel Magid, WU1F—Nets and traffic report submitted by STM Bill, NZ1D.

Net	*Sess*	*QTC*	*QNI*	*QTR*	*NM*
EMRI	60	151	165	642	K1SEC
EMRIPN	30	72	122	405	WA1FNM
EM2MN	30	129	254	475	N1LKJ
HHTN	30	55	130	330	N1IST
CITN	30	56	268	490	N1SGL
WARPSN	4	14	48	NA	K1BZD
NEEPN	3	8	9	NA	WA1FNM
*CHN	30	54	175	341	W2EAG

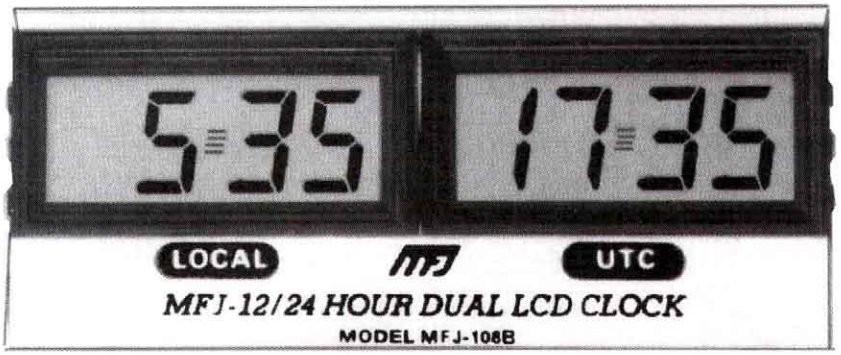
Tfc: W2EAG 136, N1LKJ 125, NZ1D 82, K1SEC 76, WA1LPM 74, WA1FNM 67, N1LAH 45, KD1LE 31, K1BZD 31, N1TDF 30, N1TPU 26, KB1EB 25, N1IST 19, WA1VRB 9.

MAINE: SM, Bill Woodhead, N1KAT—ASMs: WA1YNZ, KA1TKS. STM: N1JBD. BM: W1JTH. SGL: W1AO. ACC: KA1RFD. OOC: KA1WRC. PIC: KD1OW. SEC: N1KGS. Asst Dirs: W1KX, KA1TKS, K1NIT. Web Site: N1WFO. Amateurs statewide have been doing their part to keep our hobby noticeable to the public and to safeguard the volunteers in various outdoor events this summer. Saluting the volunteers who participated in the American Lung Association Bike Trek Across Maine: W1LEE, KA1JGF, KA1GPQ, KA1HMB, KA1SIZ, W1HTG, NS1Q, N1NAF, AE1Q, KQ1L, AK1FKS, KB1AWS, N1VVN, N1QJX, N1RDA, KA1RFD, KA1CNG, KA1YCW, N1PEO. Hams in the Oxford area have definitely put a dent in the traditionally male dominated presence in radio events by having all YLs conduct communications during the Pottle Hill Road Race. Congratulations to all the women who participated: KA1VZL, KB1EWW, N1SVE, N1XUB, K1GAL, KB1CDM, N1ZIR, N1BBY,N1YKD, WA1YZV, N1YIS/YL. In a supporting role, were the OMs: N1YIS(the Dad), N1JTH, W9WBA, W1IF, N1GZB, KB1CAC. A new standard has been in Maine set for YL participation in radio events for others to aspire to!

NEW HAMPSHIRE: SM, Mike Graham, K7CTW—I'm most pleased to announce that Jason Greene has accepted the appointment as SEC for New Hampshire. Jason has many years of experience in emergency communications, and brings some fresh ideas to the table. Welcome Jason! Field Day this year was lots of fun for Jim, WW1Y and I. On Saturday morning, June 24, we traveled up to Lancaster and visited the NCARC site, about 8 zillion miles out in the boonies! The most interesting facet of their operations was their solar power and battery setups, and a nifty 40-meter loop antenna. We then traveled down to Castle In The Clouds where CNHARC was set up. Talk about a beautiful setting, and top notch for VHFing! The use of ladders for antennas was the best I've ever seen. We proceeded in the late afternoon down to Stratham to visit the PCARC operation. Their innovation in antennas, including balloons and use of a forestry tower and the great hospitality struck me as tops. Sunday morning bright and early at the new NARC FD site in Hollis. Big and impressive, but applaud the club for working in so many new faces. Then up to CVARC. Great operation, but absolutely the best food and galley I've ever seen. Looked catered. Finally, we visited Twin State, operating in Meriden. As always, top notch operating and great score, and Murphicus Strikus on the genny as we arrived. Thanks to all for wonderful hospitality. For now, best 73. Net sess/QNI/QTC: GSFM 30/239/30; GSPN 28/119/46; VTNH 30/166/143. Tfc: W1PEX 1013, WA1JVV 193, WB1GXM 55, W1ALE 50, N1NH 44, N1CPX 7.

RHODE ISLAND: SM, Armand Lambert, K1FLD—ASM: W1YRC. OOC: W1AOM. STM: KA1JXH. TC: N1DKF. PIC: WB1P. SEC: N1JMA. Field Day this year was impressive. Particularly noticing the elaborate FARC set up. A restored fire truck filled with water served as a hospitality station. Also impressive was their ATV set up with a 20' boom antenna. Most other clubs, this year, seemed to have scaled down operations by a

MFJ 24/12 Hour Clocks



Shown actual size

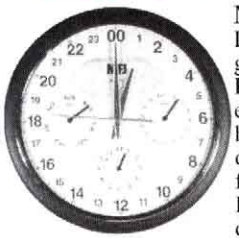
Dual 24/12 hour LCD Clock

MFJ-108B

$19.95 plus s&h

MFJ-108B dual clock has separate 24 hour and 12 hour displays. Lets you read both UTC and local time simultaneously. Features huge high-contrast 5/8 inch LCD numerals that makes it easy to read across the room. Mounted in solid brushed aluminum frame with sloped face for easy viewing. Synchronizable to WWV for split-second timing. Quartz controlled for excellent accuracy. Long life battery included. 4½Wx1D x2H in. MFJ's famous *No Matter What*™ one year limited warranty. *$6 s&h.*

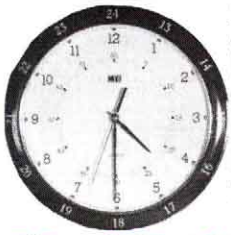
DXer's Wall Clocks



MFJ-125, $29.95. 12 inch DXer's Quartz wall clock gives 24 hour time plus more. Has three smaller independently settable dials for 12 hour time, day of week and date. No more day/date confusion when logging DX! Highly visible, easy-to-read dials! Has Seconds hand.

MFJ-115, $24.95. Set this 24 hour clock to UTC/ GMT and you can determine the time in any time zone of the world at any time of the day. Premier world cities encircle its colorful world map face to indicate time zone. 12 inch face is easy to see across room. Has Seconds hand.

MFJ-105C, $19.95. *World's most popular ham radio wall clock!* True 24 hour Quartz movement. Huge 12 inch black face with large white numerals give excellent visibility across room. Attractive gold colored hour, minute and seconds hands.



MFJ-126, $24.95. 12 hour Quartz movement gives 12 hour time on inner dial (for XYL) and 1200 to 2400 hour time on its outer dial (for you). Attractive clean, white face is highly visible. Real glass cover! Handsome hunter green trim. Has seconds hand.

Hi-Contrast LCD Clocks

MFJ-119B, $49.95. Giant LCD Display 24/12 Hour Clock. Has *giant* see-across-the-shack 2¼ inch time digits. Digital calendar or clock modes. Displays inside temperature (F/C), relative humidity, month, date and day of week. Handsome hunter green and tan color. Wall mount. 8½x9 inches.

MFJ-118, $24.95. 24/12 hour clock has jumbo 1¼ inch LCD digits. Displays 24 or 12 hour time, year, month, date, and day of week. 100 year full calendar. Hang on wall or desk mount. 5¾Wx2½Hx½D in.

MFJ-107B, $9.95. 24 hour UTC Clock has large 5/8 inch LCD numerals. Synchronizable to WWV. Solid brushed aluminum frame lasts for years. Long life battery included. 2¼x1x2 in.

MFJ-112, $24.95. 24/12 Hour World Map LCD Clock displays time in *every time zone in the world.* Selected time zone flashes on LCD world map. Displays 24 or 12 hours, minutes, seconds, year, month, date, day, time zones, cities. Single button accesses pre-set second time zone. Alarms for two time zones. Adjusts for daylight savings time.

MFJ-152, $24.95. Read Indoor *and* Outdoor temperatures *and* 24/12 Hour time at-a-glance on huge 3/4 inch LCD digits! Choose F or C. Stores minimum and maximum temperature readings. Has backlight for in-the-dark viewing, outdoor temperature sensor with ten foot cable.

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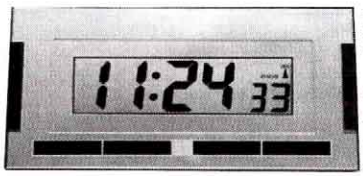

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third. It will be interesting to see what happens next year with the increases in upgrades and new licenses with recent restructuring./ The PRB-1 issue is in the RI legislative spotlight again. Please urge your representatives to contact Senator Oster and support his efforts on our behalf./ The Tri-City ARC is pleased to announce their annual auction to be held Oct 21 at the Waterford Senior Citizen's Center on Rt. 85 in Waterford, CT. Set up time is 8-9 AM, auction is at 10 AM. Contact person is Austin Wolfe, AA1SV (860-443-2459 or email AA1SV@downcity.net)/. I am enjoying HF mobile a lot more this year. With an increase in accommodating hardware and longer commutes, more hams are participating in this increasing popular aspect of our hobby. Hope to catch you there soon. 73, Armand, K1FLD.

VERMONT: SM, Bob DeVarney, WE1U—Field Day certainly was interesting, what with the Tornado Watch over most of the state. I almost thought we would have a chance to really try out our emergency communications capability. At the Field Day group I was with, the storm came through just before the end of the contest, so we had to pack up 5 complete stations in the rain and 30 mph winds. Our Section Traffic folks have been real busy lately, and our STM, KB1DSB deserves a lot of credit for getting things back up and running smoothly. Here are a few of their net reports: June YL net report: Sessions- 4, Checkins- 38, No traffic. GMN June sess 26 sta 626 tfc 20. VTNH: 30 sess, 166 QNI, 143 QTC. Thanks to all for your hard work, and 73 de WE1U.

WESTERN MASSACHUSETTS: SM, William C. Voedisch, W1UD, w1ud@arrl.org—ASM: N1NZC. ASM (digital) KD1SM. STM: W1SJV. SEC: K1VSG. OOC: WT1W. Field Day is over, clubs are in hiatus for the summer and vacation time is fast approaching. I received reports from all the clubs that were in the field. No reports of accidents. Vacations will be taking place for the next two months and news will be at a premium. Ever thought of dropping an e-mail and keeping me informed what your plans are? It would be a lot easier writing this column if I had some feedback of your activities. Propagation is up and down as it usually is in the summer. There have been a number of good 6 meter openings to Europe and North Africa. Managed to work the 3 DXpeditions that were scattered over the world. Still can't figure how I can have a 599 and I can barely hear him. What happened to true reports? Guess everyone gets the same report! Still would like to know how my signal was over in the Indian Ocean and southeast Asia. Start thinking of doing antenna maintenance. It's a lot earlier doing it on a sunny day instead of during a snow storm. Safer, too! Tfc (May): N1ISB 23, W1ZPB 105, W1SJV 16, KD1SM 11, K1TMA 227, W1UD 197. 73, Bill.

NORTHWESTERN DIVISION

ALASKA: SM, Kent Petty, KL5T — Welcome new field organization members: STM and APRS TS Linda Mullen (AD4BL). APRS: Internet Gateway now operational in Anchorage with 3 digipeaters up. Contact WL7BF or KL5T in Anchorage for more information. AD4BL spearheading APRS activity in Fairbanks. Contact Rob Wilson (AL7KK) for input to state PRB-1 effort. Alaska HF Pactor Gateway project underway. Currently Anchorage is on-line. Stations are needed in major section hubs to beef up system. Fairbanks to be next in the network. Contact Pete Marsh (AL7PI) for info. Encourage section-wide check-in to HF nets: Sniper's Net 3920 daily 1800 AST, Bush Net 7093 daily 2000 AST, Motley Group 3933 daily 2100 AST, and Alaska Pacific Net 14292 M-F 0830 AST. Please report communication drills and exercises, emergency communication activations, and public service activities on FSD-157 to KL5T. Traffic: AL7N 6. PSHR: AL7N 35.

EASTERN WASHINGTON: SM, Kyle Pugh, KA7CSP—There are many changes that occurred in the EWA section leadership positions in July. The new positions are: Gordon Grove, WA7LNC, SEC. Albert P. Appel, KC7JNJ, DEC for Dist. A; Mark Tharp, KB7HDX. DEC for Dist. B; Mabel Babbitt,WB5AVH, DEC for Dist. C; and Glenn Moore, N7VBW, DEC for Dist D. Nathan Jeffries, KI7QT, is EC for Spokane County, and Jeff Stidham KC7FUY, is EC for Walla Walla County. Richard A. Meznarich AG5M, now is BM for the EWA Section, and Jay Townsend, WS7I, is DXCC Card Checker. Many thanks to Jack Babbitt WA5ZAY, Pat Dockrey, NQ7M, and Don Allan, W7HRH, for their fine volunteer work for many years. The Walla Walla hamfest is Sept. 23. There were 6 out of 10 OO reports for June. 73, KA7CSP. Net Activity: WSN: QNI 617, tfc 177; Noontime Net: QNI 8621, tfc 307; WARTS: QNI 2970, tfc 82. Tfc: K7GXZ 235, W7GB 148, KA7EKL 86, KK7T 31, K7BFL 30. PSHR: W7GB 138, K7GXZ 116.

IDAHO: SM, M.P. Elliott, K7BOI — OOC: N7GHV, SEC: AA7VR, STM: W7GHT. The 2000 Boise River Festival is history and an excellent ham radio demonstration was held again this year. The effort was lead by Gary Peek, K7TIH. John Cline, K7BDS, of the State Bureau of Disaster Services is circulating proposed legislation for a tower bill to be introduced in 2001. The "draft" language has been sent to each club in the state. Be sure and get your comments to John ASAP. Ham radio was represented at the Western Idaho Fair again this year. Many CW messages were passed. It is September and time for club meetings to pickup again. Get out to a local meeting and get involved! 73 — Mike, K7BOI. Tfc: W7GHT 143, WB7VYH 82, KB7GZU 60, and N7MPS 9. PSHR: W7GHT 123, WB7VYH 98, and N7MPS 55. Net (Sess/QNI/QTC/Mgr.): FARM-30/2186/15/W7WJH; NWTN-30/1086/86/KC7RNT; IDACD-22/ 446/8/K7UBC; IMN-30/391/112/W6ZOH.

MONTANA: SM, Darrell Thomas, N7KOR—June was a very active month for Amateur Radio gatherings in the Montana Section. The month started with the annual SE Montana picnic at Hardin with 60 attending on June 3-4th. The Lincoln Hams hosted a campout at Bartlett Creek on June 10-11th. 24 Hams attending tried various modes during the VHF Contest. The annual Fathers Day Picnic/NE Montana Hamfest was held June 17-18 at Fort Peck, MT. 52 Hams attended this event. The month finished with Field Day on June 24-25th. Several clubs and groups across the state participated in this event. The next big gathering will be the Glacier/Waterton Hamfest in July. Net/QNI/QTC/NM MSN May 111/1 June 111/2 W7OW; MTN 1559/40 N7AIK; IMN 391/112 N7MPS. PSHR N7AIK 117.

OREGON: SM, Bill Sawders, K7ZM—ASM: KK7CW. SEC:

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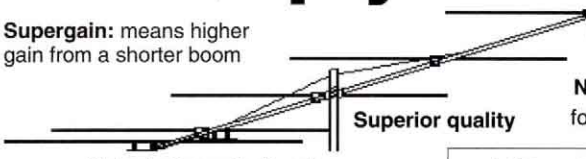

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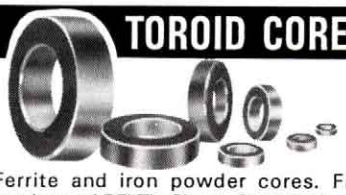

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WB7NML. STM: W7IZ. SGL: N7QQU. OOC: NB7J. STC: AB7HB. ACC: K7SQ. In case you didn't know, my deadline for the September issue of *QST* is July 12th. So, the Field Day weekend just ended! It was a great fun-filled weekend, as usual. I received several messages from Oregon clubs, to assure you of those important bonus points. All messages were sent via "traffic nets". I appreciated all of them, and I hope to receive more next year. The Mount Bachelor Repeater (145.450-), is up and working fantastic. At 9,045 feet elevation, it's Oregon's highest repeater. A new Celwave antenna was installed and reports have come in from as far north as Goldendale, Washington, south to Keno, Oregon, east to Glass Butte, a few miles west of Burns, and west to sections of the Willamette Valley. The North Sister Mountain protects the signal from getting into the repeaters in Portland and Seaside. It's an open repeater, and, if you can "bring it up", you are welcome to use it. New Club Officers have been elected to one-year terms at the Portland Amateur Radio Club. President is Neal Sacon, N7RX. Vice-president is Patrick Roberson, W7LEW. Treasurer is Lee Hopper, KD7CTF. Membership Secretary is Darrell Graham, KC7AOI, and Recording Secretary is Ken Morton, KD7JDR. Good luck to all in your new newly elected positions. Am I on YOUR club's newsletter mailer? If not, I'd love to hear from you! See you at the 54th annual Walla Walla Valley Hamfest on September 23rd, and plan now to attend the BIG Swap-toberfest 2000, on Saturday, October 21st, at the Polk County Fairgrounds, in Rickreall. More on this next month. Keep in touch. NTS PSHR totals for June: N7YSS 150, KC7ZZB 133, KC7SRL 131, KA7AID 118, N7DRP 108, KK1A 104, KC7SGM 93, KC7SGL 72, W7VSE 71.

WESTERN WASHINGTON: SM, Harry Lewis, W7JWJ—Do you have a newly issued General Class license? If you do, then the National Traffic System needs you. Join one of the Washington traffic nets such as WARTS which meets on 3970 kHz at 6 PM, or the Noontime Net which meets of course at noon on the same frequency. A surprising note is that CW is alive and well. Check out the Washington Section net which meets on 3658 at 6:45 PM. For those involved in emergency communications, drop by the Washington State Emergency Net at 6:45 Monday evenings on 3987 kHz. Accumulated points earned for the handling of messages entitle one to be listed on the Public Service Honor Roll, and possibly to receive the prestigious Brass Pounders League award. Note that K7BDU qualified for BPL again with 830 traffic points. Other traffic handlers are as follows: N7AJ 34, W7BO 197, W7LG 49, W7MQF 48, W7NWP 118, W7QM 52, KJ7SI 24, K7SUQ 18, W7TVA 266 and W7ZIW 184. Due to pressure from other activities Les Tomlinger, W7UFI, has resigned as EC for Snohomish County. We thank him for his volunteer efforts. Something is always happening in District 5. Cowlitz County was recently isolated when a fiber optics cable was cut between Seattle and Portland. Hams immediately went on standby to provide communications between hospitals. Clark Co ARES members were presented the outstanding award for the year from the county for their efforts in the river monitoring program. Some Clark Co members participated in a round robin packet radio exercise practicing up and down loading messages using their packet skills. As SEC N7NVP says, "This is a skill many of us need to practice. We all know digital traffic, both HF & VHF will be needed during disasters, but packet is not being used enough to maintain the skill level we need. Let's follow the Clark Co lead and get back up to speed again."

PACIFIC DIVISION

EAST BAY: SM: Andy Oppel, KF6RCO—ASMs: KC6TYB, KE6QJV. SEC: KE6NVU. DECs: WA6TGF/Alameda County, KO6JR/Contra Costa County, WA7IND/Napa County, K6HEW/Solano County, N6UOW/Training, W6CPO/Technical Services, KQ6TM/Section Plans and Administration. OOC: KD6FFN. EB Web Page: http://www.pdarrl.org/ebsec/. Webmaster is KB6MP. Please welcome KD6FFN as the new EB OOC. Contra Costa County declared 6/19 - 6/23 as Amateur Radio Week. NALCO is sad to report KE6NKZ, SK. NALCO conducted successful fire patrol for the Berkeley FD on Memorial Day with KF6OBQ, AB6WF, K6APW, WB6PIV, WA6CCF, N6LFW, KF6JRO and W6WTI participating. I visited some impressive Field Day sites: ACSCT, UCARC, ACARC, KR6AE and ORCA. VVRC members K6ZU, NI6V, KD6FZY, WH6AB, KF6KFP and K6HEW provided communications for the Cystic Fibrosis Walk. MDARC welcomed new member KB6MYV. I upgraded to General at the MDARC VEC session. LARK supports 3 scholarships at Las Positas College. SARS members K6KLL and KE6RYN helped developed a video promoting Amateur Radio which will air on local Channel 28. W6VZ sadly reported his father K6BJJ, former MDARC office and founding Sec/Treas of SIRARC, a SK. EBARC upgrades to General: WA6TNI, WB6PIV, KF6HEX, W6WTJ, K6USW, KF6JRO and KF6HFA; to Extra: KG6AEE, AC5QI, KQ6ZL, FK6BYM, WI7YN, K6SEZ, AD6OO and KE6RS. VVRC members KF6ZSH, KD6FZY, KF6VBJ, WH6AB , K6HEW, KF6KFP and KA6FDI provided communications for the Fiesta Days Parade. LARK upgrades to General: KB6DLT and K6DRU; to Extra: KN6FW, KK6WB, AD6OD and N6SVD. June tfc: W6DOB 581, WB6UZX 28. PSHR: W6DOB. BPL: W6DOB. Tfc nets: NCN1/3630/7PM; NCN2-Slow Sess 3705/9 PM; 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: Dick, W6OLD. SEC: Paul, NN7B. TC: Jim, NW7O. OES: Joe, N7JEH. Thanks to both W6OLD and NN7B for holding down the fort this past month. Field Day reports from NN7B, and NW7O, served 95 dinners at Las Vegas event. KB7REO, EC in Las Vegas area very active in recruiting effort, generating lot's of support. Looking forward to the SNARS hamfest in Reno. Newsletters from SNARS, FARS, LVRAC, SIERA and RARA. The High Speed road race up in Elko using the W7LKO repeater reported by N7JEH was a good exercise. The Nevada 2000 car, truck, motorcycle and quad off road race started July 8th and will go through Mesquite, Ely, Elko, Reno, and Tonopah ending in Las Vegas on the 15th. It will definitely test the different amateur communications systems throughout Nevada. SIERA's Pony Express Reride participation July 14th-16th sounded like a good workout for amateurs too. Check out following Web sites: www.cvrc.net/ares/ www.pdarrl.org/nevsec/officers.html pdarrl.org/nevsec/southrptr.html. Reminder. Please notify me

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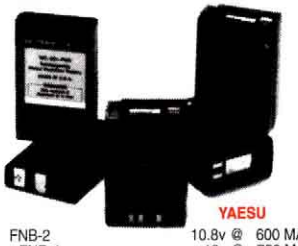

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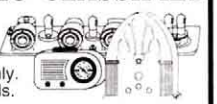

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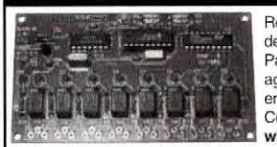

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PACIFIC: SM, Ron Phillips, AH6HN—ASMs: Harry Nishiyama, KH6FKG, Lee Wical, KH6BZF, Jim Reid, KH7M. Stu Johnston, NH6DR. Dennis Niles, KH6XT. Dan Spears, NH7UW. SEC: Dennis Carvalho, KH7H. TC: Chuck Cartwright, AH7Y. PIC: Russ Roberts, KH6JRM. ACC: Bob Schneider, AH6J. Dan Spears, NL7UW, reports that the EARC has moved their meeting location to the American Red Cross Building, 4155 Diamond Head Road. Meetings are still held on the third Thursday of the month at 1900L, talk in on the 146.880 repeater. The club honored Ray Mikami, KH6AFM, with a Certificate of Lifetime Membership. Ray is a founding father of the EARC, and has served the club since its inception. Dan has also accepted the additional responsibility of OOC and will be recruiting some new people. Corky Kirk, W6ORS, has returned to Hilo after some time in Antigua Guatemala. He operated TG9/W6ORS, mostly on 10M with the DX-70T and an MFJ-1621 Portable Antenna. Welcome home, Corky. Chuck McConnell, W6DPD, and his wife spent a week with members of the BIARC. He is one of the few people who can check DXCC cards. Thanks much, Chuck for your service. Everyone is reporting a successful Field Day and all enjoyed the event. ARRL Board of Directors will meet in early July. One item on the agenda is the new DXCC rules, which are not too well accepted. Let's hope the Board has some reasonable answers. Aloha & 73s.

SACRAMENTO VALLEY: SM, Jerry Boyd, K6BZ—As I write this column, Pacific Division Vice-Director Bob Vallio, W6RGG, and I have just returned from the State Capital where we appeared as witnesses before the Assembly's Local Government Committee. That Committee's hearing concerned SB 1724 which, if adopted by the full legislature, will extend PRB-1 protection for Amateur Radio antenna structures to California. The Local Government Committee approved the bill on a 9-0 vote and recommended that the full Assembly approve it on the consent calendar. If that occurs, and the Governor signs the bill, it becomes law. Lots of California amateurs contributed to the success of the bill thus far. EMCOMM 2000, the first of what will be an annual event, was held in the Redding area in late July. Attendees at the event, co-sponsored by our Section ARES and State OES, were from Northern California, Southern Oregon, and Western Nevada. Thanks to K6SOJ for originating the concept and coordinating the event and to WA6SLA, WO6P, W1SAR, and others for their support. WB6JOT is a SK. Carl was one of the most accomplished Technician Class DX'ers on 10 meters with a very high DXCC total. He will be missed! The July issue of the Yuba-Sutter ARC newsletter had a very good discussion on how to recruit new club members. Check their Web page www.jps.net/ysarc/ . Congrats to the Mt. Vaca Radio Club for its efforts in support of the Western States Endurance Run. Finally, congratulations to W1SAR on his appointment as Shasta County EC. Until next month, 73 de K6BZ.

SAN FRANCISCO: SM, Len Gwinn, WA6KLK—ASM: KH6GJV. SEC: KE6EAQ. ASM visited USS Pampanito ARC, Lambda ARC, San Francisco ARC, and participated in SCRA Field Day with Boy Scouts, CAP Cadets, and Sonoma County dignitaries. SEC visited Lake County Field Day and participated in SCRA Field Day. SM visited Anchor Bay ARC and Humboldt Hamfest. Lambda supplied communications for Shanti poker run and is gaining many new members. Humboldt County put on a Ham/Tech Fest (THANKS Marcie!!) with other agencies and had a large turnout. They also handled communications for portions of the Redwood Motorcycle Run and for all of the Headwaters Canoe Marathon. Del Norte upgrades WA6ZDO, KE7AM to extra, KA7PRR, N6MUI to general. SCRA (Santa Rosa) ham/swapfest is on September 16. ARES members should contact CDF about inclusion into the CDF VIP communications program and training. K6DFM Willits SK.

SAN JOAQUIN VALLEY: SM, Donald Costello, W7WN— ASM: Mike Siegel, KI6PR. ASM: John Lee, K6YK. ASM: Pat Fennacy, W6YEP. SEC: Kent LeBarts, K6IN. Victor Magana, N1VM. OOC: Charles McConnell, W6DPD. ACC: The ARRL has a Memorandum of Understanding (MOU) nationwide with the American Red Cross regarding communications assistance during emergencies. I urge all radio clubs of the San Joaquin Valley to check in with your local county chapter of the Red Cross in order to establish a working relationship with them. Each chapter usually provides a videotape introduction to disaster services which qualifies you as a Disaster Services Member of the American Red Cross. I would also suggest that each radio club set up, if not already in operation, an ARES group. ARES in SJV section is directed by Kent LeBarts, K6IN, and if your club would like more information on ARES contact Kent at k6in@elite.net or call him at (209) 723-2020. You can never be too prepared for an emergency. Have a meeting with your family soon and decide on a course of action should an emergency strike. Practice exit from your home in the event of fire or earthquake. If you commute to work carry a box or bag in the trunk with a couple bottles of drinking water, comfortable shoes if you have to walk, first aid kit, nonperishable snacks, coat, flash light, rain protection and an HT, of course. At home have at least 72 hours supply of drinking water, food, lighting and battery operated radio. Sounds like a lot of preparation you say. Well, it could just save your life or that of a family member.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W – SEC: KM6GE. BM: WB6MRQ. TC: WA6PWW. OOC: KB6FPW. As promised, here are the clubs I received Field Day messages from (100 point bonus if your club is one of them!), Foothills Amateur Radio Society (K6YA), Palo Alto Amateur Radio Association (W6OTX), Cupertino Amateur Radio Emergency Service (K6AB?), Milpitas Amateur Radio Emergency Service (AA6NX) and K6MI in Carmel Valley. The Naval Postgraduate School ARC did final Field Day planning at their meeting (as did most clubs!). The NPGARC meets the 2nd Thursday of the month at 7 PM local in Spanagel Hall Room 400 at the school. They also have a monthly "Eyeball Breakfast" (!?!) 0800 on the first Saturday at the Marina Village Restaurant in Monterey. West Valley ARC as did planning for their Foothill Flea Market in June in addition to FD planning. WVARC meets the 3rd Wednesday, 7 PM at the Campbell Community Center. See http://www.wvara.org for details. The Saratoga ARA heard from Jack Maxfield of the Red Cross on emergency preparedness. They meet at 7:30 PM every second Wednesday at the Saratoga Fire Station. The club/ARES net meets every Tuesday at 7:30 PM on 28.4 MHz (SSB) and 146.655-(114.8pl). The Santa Cruz County ARC has a new URL for their

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Website, www.k6bj.org. SCCARC meets at 7:30 PM on the third Friday at (temporarily) the Dominican Hospital Main building, 1515 Soquel Dr, Santa Cruz. The Lockheed-Martin ARC has FD pictures on their Web site www.qsl.net/lmeraarc. They meet at the Sunnyvale Town & Country Round Table on fourth Thursdays, 5 PM for dinner, 6 PM for meetings. Contact Terry WB6PVU for details. 73 de Glenn WB6W. Tfc: June, W6PRI 2.

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. Thanks to the many clubs and ARES groups who sent Field Day messages to me. Too many to mention here but I'll have a list posted on our section Web site. Glad to see our section has such great participation in both Field Day and the Simulated Emergency Test. On July 11, I had the pleasure of visiting the founding meeting of the Radio Amateurs of Montgomery (County) in Troy. Jim Aderholt, KI4DH, is the new President and the trustee of the 147.09+ repeater. This group and the repeater will cover an important area which until recently has not been active in ARES. Gene Scarborough, W4YBQ, DEC Area 10 gave an interesting presentation on the ARES organization which was well received by the new club. I think they will do a great job. John, KR4ZJ, is the new Net Manager for the Eastern North Carolina Traffic Net. ENCTN is an important net for us as it covers much of the area of our state that is frequently affected by hurricanes. The Shelby Hamfest will be upon us shortly after most of you read this column. The hamfest is Saturday and Sunday, September 2-3. During the hamfest Saturday there will be a meeting of the National Traffic System at Jackson's Cafeteria on Hamrick Street in Shelby (same location as last year). This is not far from the hamfest site, and I hope you will join us. June Traffic: AB4E 327, W4EAT 238, KI4YV 232, NC4ML 231, W2CS 192, N4AF 124, KE4JHJ 123, K4IWW 107, W4IRE 89, AC4DV 84, AA4YW 66, W3HL 66, K4AIF 36, KE4AHC 35, W4CC 26, WA4SRD 21, WD4MRD 18, AD4XV 14, KB8UCZ 13, KT4CD 6, W4DYW 5, KC4PGN 5, NT4K 4, KR4ZJ 4, WA2EDN 4, KF4YHG 2.

SOUTH CAROLINA: SM, Patricia Hensley, N4ROS—Today, I am still reflecting on thoughts which I made the Fourth of July on the SCSSB Net. It is a privilege to live in a state which contributed so much to the founding of our country. And, it is not only a privilege, but also a responsibility for us as amateur radio operators to serve our state and nation. Mr. Dale Hatfield, Chief, FCC Office of Engineering and Technology, recently stated that amateur operators will begin to experience "pressure" in justifying their free use of the radio spectrum. He further stated that future use will require increased service to communities, expanded experimentation and provision of educational opportunities for stimulating interest in amateur radio. I am proud to say that SC amateurs have been meeting these challenges on a continuing basis: our ARES/RACES program has been officially recognized by the SCEPD and written into the state Emergency Response Plan; the SCSSB net is one of the oldest continually operating NTS nets; my school was the first in the Southeast to participate in the SAREX mission; and we have an ongoing effort to establish school radio clubs throughout the state supported by local clubs (This is also a major goal of our ARRL president). We in the SC amateur radio community already have a proud history. However, in the next several years, Amateur Radio will be facing increased challenges. We will all need to continue to work closely together to maintain continued success of our ongoing programs. This will ensure a future for which we can also be justifiably proud. I will look forward to seeing you at the SC ARRL State Convention in Sumter. Tfc: K4JMV 76, KT4SJ 67, KA4LRM 58, KA4UIV 50, AF4QZ 50, W4DRF 50, WA4UGD 44, W4CQB 12, K4BG 11.

VIRGINIA: SM, Lynn Gahagan, AF4CD—SEC, OOC: KR4UQ. ASM/A: KE4NBX. ASM/B: W4TLM. ASM/C, TC: W4IN. ASM/D: KC4ASF. PIC: W2MG. STM: W4CAC. I am pleased to announce that Tony Amato, KR4UQ, has agreed to accept the appointed position of Section Emergency Coordinator. I am sure he will do a great job and he certainly is very well qualified for the position. Please give Tony your support. All Official Appointees are reminded that reports are due monthly to help us keep our spectrum. Folks, the League uses your figures to show what amateurs do month in and out, all year - every time someone tries to swipe some of our frequency allocations. Please cooperate and take a few minutes every month to send in your reports. On Sunday June 25th at 1630 hrs Halifax County ARES along with the Halifax Co. Sheriff's Department, Rescue Squad, Fire Department and the State Police searched for a five year old girl who wondered away from home. The search ended when the child was found trying to cross a dual lane highway at 2130 hrs. The hams that participated in the search were Ray Rutherford, KO4PF, Tommy Reagan KF4FBO, Eddie Smoot, KF4WJE, and his wife Patsy Smoot, KG4GWO. VDEM, Va Dept of Emergency Management (used to be VDES) has purchased a 90-watt UHF repeater amp for the W4ZA UHF side of the Va State EOC packet link. It is now installed. By the time you read this, a new Kenwood TM-D700A will also be installed at ZA. This is part of the statewide UHF backbone we started working on two years ago. Progress is being made, slowly but surely. The custom Virginia ARES/RACES patches sold out, all 600. They went extremely fast. No word yet as to when another batch will be ordered. On Saturday and Sunday September 23rd and 24th at the Virginia Beach Pavilion, the 2000 ARRL Roanoke Division Convention will be held. Special guest, Riley Hollingsworth of the FCC is planning to attend. There will also be many forums including DX and ARRL officials present. Please do not miss this fine Hamfest. I always enjoy attending it. 73 de AF4CD. Tfc: W3BBQ 174, WA4DOX 158, W4CAC 124, KR4MU 114, KR4MA 82, K4MTX 74, AA4AT 66, K4YVX 60, N4ABM 56, WB4ZNB 54, KD4FUN 50, AF4CD 47, K0IBS 39, W4YE 18, W4VIC 17, W4UQ 15, WB4UHC 6, W4JLS 6, W4IN 4, KB4CAU 4, W4MWC 2, K4JM 2, N4FNT 2.

WEST VIRGINIA: SM, O.N. (Olie) Rinehart , WD8V— I don't know if whether I have a genuine feeling of guilt or whether I am fortunate to have another source or resource for information. Quite a bit of information I am receiving is from the Internet. I do tend to be a little gun shy, and I guess others do, when talking Internet, e-mail and yes, digital means or modes for fear

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that this new technology could distract from our on-the-air activities, traffic nets, traffic handling and public or emergency services. We must remember that Amateur Radio has thrived because of two major accomplishment, 1) public service, both nationally and internationally (public service being the good will created by international communications as well as the great deal of good done and the recognition of these deeds-emergency and public service communications), and 2) the efficient technologies for use of the spectrum, i.e. CW, AM (DSB) to SSB, TTY, to leading edge spectrum techniques, i.e. Digital, Pactor, Amtor, PSK. I urge you all to accept the continuing role that amateur radio has and must play in our future. One good way is to embrace the ARRL proposed continuing education and certification program. The present chapter or lesson in this program, I believe, is very closely related to AREA/RACES. Your best friend and deserving your support today, is the American Radio Relay League! Was very good to see so many of you WV Hams at the Mill. Yes, Ed Hare, this includes you. 73. Tfc: KA8WNO 250, WD8V 227, KC8CON 71. WVFN 812/105/30 KC8CON; WVMDN 564/20/30 WW8D; WVN E 96/55/30 W8WWF; WVN L 123/81/30 W8WWF.

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 Field Day come and gone. This one was celebrated by folks in Daniels Park, district 22, Ben Baker, KB0UBZ reporting. The Montrose ARC reported in from Sunset Mesa near Montrose, reported by Royce, AA0JD. The Buckhorn ARC in Northern Colorado up on Buckhorn Mountain, by Randy, W0AVV; Fremont County at the park, and Park County (reporting info lost in crash) and the Woodland Park bunch Mike, K0TER, reported for PPRAA and MARC (nice write-up and pictures in the 'Zero Beat' newsletter). Congrats to all the hams that worked the MS 150! Too numerous to mention all but thanks. It comes to my attention that the Edge of Space Sciences balloon trackers are the best around! 41 flights up to now with NO losses of payload! In conversation with Merle, K0YUK, he predicts that since SA (the GPS system error) is off that one of the balloon hunters will catch the payload by hand! We'll report it here when it happens! Next time you see either the ASM, Jeff, N0WPA or the TC, Bob, AE0B, give them a hearty pat on the back! They each got their pilots license in the past few months! They are partners in a Cessna and we'll probably see them flyin' in to the swapfests! 73! Tim, WB0TUB.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS & N5ART. SEC: K6YEJ. STM: N7IOM. NMs: WA5UNO & W5UWY. TC: W8GY. ACC: N5ART. New Mexico Roadrunner net handled 107 msgs with 734 checkins. New Mexico Breakfast Club handled 188 msgs with 971 checkins. Yucca net handled 27 msgs with 601 checkins. Caravan Club Net handled 5 msgs with 48 checkins. SCAT net handled 15 msgs with 526 checkins. Four Corners Net handled 78 msgs with 365 checkins. GARS Net (no report). Rusty's net handled 107 msgs with 734 checkins. Valencia Co Net handled 11 msgs with 37 checkins. Deming ARC Net handled 18 msgs with 68 checkins. Our sincere thanks to all who participated in any way at Field Day 2000. Received lots of FD msgs and the reports were very good. Lots of good PR in several newspapers around the state. Good to hear from old friends, WB5QDS and W5PLK. We certainly miss them here in NM. The ARRL NM State Hamfest is to be held Aug 26-27 with Bill Cross, W3TN, of the FCC Gettysburg office as principal speaker. Bill was the prime mover in the re-write of the new Amateur Radio regulations. We are very fortunate to have Bill with us. Walt Stinson, W0CP, our RM Div Dir will also be with us. State Convention Web Page: qsl.net/dchf. El Paso Hamfiesta is Oct 28-29, followed by Socorro Hamfest on Nov 4. Sorry to report a Silent Key: George Hauser, W6NLA, of Las Cruces. 73, W5PDY.

UTAH: SM, Mel Parkes, AC7CP—Summer sure went fast! Now that summer is over and we are entering the fall season I hope that you are making plans to support your local club and events in your area. JOTA is a neat way to introduce young people to ham radio and we certainly could use more young hams. Please plan to support those who are providing special JOTA weekend events. If one isn't scheduled for your area please put the word out to the local scout groups that you will open up your shack for those who may be interested in learning about the opportunities ham radio can provide. Many clubs are beginning the process to nominate officers for the 2001 calendar year. Please give some consideration to running for a position in your club and if not at least volunteer to help out with a committee or event your club is planning. 73 de AC7CP

WYOMING: SM, Bob Willliams, N7LKH— We have had some individuals interested in becoming Official Observers. Their names have been sent into HQ and the materials have been shipped to them. With the new FCC restructuring, there are new criteria for the OO role which makes it have a more immediate effectiveness. Within the WY Section there remains a need for more Emergency Coordinator participation. Keep in mind that the EC is the pointy end of the ham participation in support of our general public service activities as well as our support for real, serious emergencies. We have several counties with no EC persons identified to take the lead in providing emergency communication in the event of critical need. It is an interesting activity, and I urge anyone interested in participating to contact either me via mail, phone, e-mail or a message on the Cowboy Net, or Steve Cochrane, WA7H, Section Emergency Coordinator, or Jerry Pyle, WB7S, ASM supporting emergency services implementation. We are trying to erase any distinction between ARES and RACES in the section.

SOUTHEASTERN DIVISION

ALABAMA: SM: Bill Cleveland, KR4TZ—ASMs: W4XI WB4GM KB4KOY. SEC: KC4PZA. STM: K4JSJ. BM: KA4ZXL. OOC: WB4GM. SGL: KU4PY. ACC: KV4CX. TC: W4OZK. PIC: KA4MGE. The 4th annual Alabama Heart of Dixie QSO Party will be held on Sunday September 24. For more information, e-mail Christopher Arthur (KT4XA) at kt4xa@mindspring.com

YAESU

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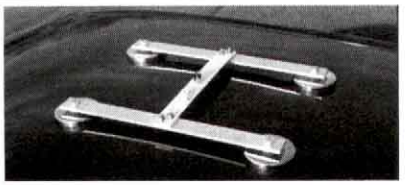
or visit the Alabama QSO Party Web site at www.qsl.net/kt4xa/aqp. The Mobile Amateur Radio Club is having its HAMFEST on Friday September 15 and Saturday September 16 at the Elks Lodge 108 on Dauphin Island Pkwy in Mobile, Alabama. Doors open to the public on Friday from 5:00 PM to 9:00 PM and on Saturday from 8:00 AM to 2:00 PM. Talk-in will be on the 146.82 repeater. For more information, you can call the Hamfest Chairman – Larry Early (WB4YOR) at 334-342-7601 or visit the Mobile ARC Website at www.anglefire.com/al/marc3/. Congratulations to Christopher Arthur, KT4XA, for being named Newsline's Young Ham of the Year for 2000. You may remember Chris from his being our ASM over Youth Activities for the past couple of years, as well managing our Alabama QSO party. Job well done Chris, you deserve it. You can find more up-to-date information about what is going on within the Alabama Section at www.qsl.net/al-arrl. 73, Bill Cleveland, KR4TZ.

GEORGIA: SM: Sandy Donahue, W4RU—ASM/South Ga: Marshall Thigpen, W4IS. ASM/Legal: Jim Altman, W4UCK. SEC: vacant. 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. I have good news and bad news. Since I am accused of being negative, the bad news first. Tom Rogers, KR4OL, has resigned as SEC in Georgia. As I am writing this I am looking for a replacement. By the time you read this I hope to have found one. I did find an outstanding Affiliated Club Coordinator (ACC), Susan Swiderski, AF4FO. Susan is the better half of team Swiderski. Hubby Mike, K4HBI, is the OOC in Georgia. My thanks to Bob Lear, K4SZ, who took over the ACC job with the sudden death of Jud Whatley 2 years ago. The Gainesville hamfest was July 8 at the admirably air-conditioned Ga Mountains Ctr. Good attendance and an outstanding flea market. Future fests include the Augusta hamfest on Oct 7 and the Rome hamfest Oct 14 and the Lawrenceville hamfest Nov 4-5. Come by and say Hey! At the Gainesville affair, the annual meeting of the Ga Cracker Radio club happened (daily early morning net on 3995 kHz). They re-elected their entire slate of officers and reported membership at a new high of 112. The Atlanta Radio Club is planning an ambitious renovation of their repeater systems. K4PE is leading. SEDXCC has named a new DX field card checker. Bill Barr, N4NX, will be authorized to check QSL cards for DXCC credit at hamfests and club meetings. The only other League authorized card checker is Martin Holzman, WB4MOG, in Statesboro. I visited six Field Day sites this year, sampling the cuisine and pigging out at the GARS mega feast. 73, Sandy. Tfc: June: WB4GGS 116, AF4NS 108, WU4C 83, K4ZC 27, KA4HHE 27,K4WKT 24, K4JNL 22, K4BEH 18 K4BAI 15, AF4PX 15.

NORTHERN FLORIDA: SM, Rudy Hubbard, WA4PUP—ASM Capital: K4VRT. ASM-ECEN: K1CE. FL Crown ASM-N4UF. Suwanee: ASM-W2DRW. ASM-WCEN: NR2F. ASM-WPAN: KO4TT. ASM-APRS: WY8O. ACC: WA4B. BM: N4GMU. OOC: AF4EW. PIC: KF4HFC. SEC: WA4NDA. SGL: KC4N. STM: WX4H. TC: KO4TT. Packet: N4GMU. It is a pleasure to announce seven ASMs, one for each of the seven districts. These appointments are administrative, for the purpose of assisting the Section Manger. There are many administrative matters the ASM can help the SM. Based on the reports many enjoyed Field Day. Reports received are as follows:W1LR, EC Clay County, operating with 39 oprs and 3 stations, Orange Park ARC. KF4HFC, PIC, 50 oprs, 21 ARES and 4 stations, Seminole County, W4RYZ, 14 oprs, Panama City ARC, N4EC, 40 GARSs and QCWA opr Stephen Foster School. There are others I have heard about, but did not receive any reports. W4IZ reported over 3000 contacts logged during the 24-hour period. The food must have been great, for many have reported their enjoyment of food in particular. We must have some good chefs. Dept of Revenue has responded to NOFARS concerning sales tax at hamfest. The response was well written and leaves little doubt as the answer is taxes are to be collected. The only recourse is the writing the legislators requesting support to make it legal not to collect the sales tax. This would be a long up hill fight. The Jax Hamfest has been approved for October 28th. You should see this in *QST* before October. Hope to see you there de 73, Rudy, WA4PUP. Tfc: NR2F 180, KF4NFP 179, AF4PU 119, KD4MH 84, WB2FGL 74, N9MN 71, KE4PRB 70, W5MEN 65, KG4EZQ 61, AD4DO 60, AF4GF 57, W4KIX 31, K4JTD 29, KC4FL 25, KG4ELJ 20, N4JAQ 14, KM4WC 14, W8IM 13, KF4WIJ 8, AB4PG 8, KJ4HS 8, WX4J 8, WB8NER 6, WD4LIF 4, WB9GIU 4, WB2IMO 3, WA4EYU 2, K1CE 2.

PUERTO RICO: SM, Víctor Madera, KP4PQ—Las clases que ofrece el PRARL para candidatos a la licencia de la FCC comenzaron con gran éxito. Instructores: WP4AOH, KP4VS, WP4LNY, KP4NCC, KP4SJ, NP3OD, KP4ABG y otros. Un buen grupo de personas se adiestra para tomar los exámenes. Tuvimos la oportunidad de reunirnos con oficiales de FEMA que trabajan en ("NVOAD") "National Voluntary Organizations Active in Disasters" para desarrollar un programa de ayuda en casos de desastres. Ya los "Field Checkers" del DXCC están activos. Una buena oportunidad para los DXers validar sus QSLs sin tener que enviarlas fuera. Continua la auditoría de la FCC a las sesiones de exámenes. Docenas de personas están siendo llamadas a re-examen sin que hasta la fecha alguno se haya presentado. En reunión con el Comandante de la Policía a cargo de tránsito, se nos prometió seguimiento en cuanto a la nueva ley de tablillas especiales relacionado con alegadas denuncias a radioaficionados debido a mala orientación a los oficiales. Los interesados en entrenarse para "OOs" deben comunicarme su interés para organizar seminarios. Envíen información sobre sus interés vía email a kp4pq@arrl.org.

SOUTHERN FLORIDA: SM, Phyllisan West, KA4FZI - SEC: W4SS. STM: KJ4N. ACC: WA4AW. PIC: W4STB. TC: KI4T. OOC: K4GP. BM: KC4ZHF. SGL: KC4N. DEC/ASM: N4LEM, WB9SHT, AA4BN, KD4GR, WB2WPA. Field Day thunderstorms over all of SFL did not dampen enthusiasm as 14 FD reports indicated great success in the entire section. Some sparsely populated counties combined efforts while other counties had several sites. In conjunction with their FD activities, hams in Indian River and St Lucie counties set up a demo at the Hurricane Safety Expo where 1100 visitors were introduced to ham radio in action. Not only did people express interest in becoming licensed, but an attending group of Girl Scout Cadets are planning to work toward a communications badge. The photo and story are on ARRL Members Only, In Brief for June 30 or



An upgraded model of the W3BMW Mag Mount is now available. The model 3.0 has larger, fully enclosed magnets and massive 7/16" stainless steel attaching hardware. Frame construction is 6061-T6 bar and stainless steel. Price is $85.95, plus $11.45 S&H to all contiguous U.S. locations. Optional stud kit is $4.25, and extra insulators are $.25 each.

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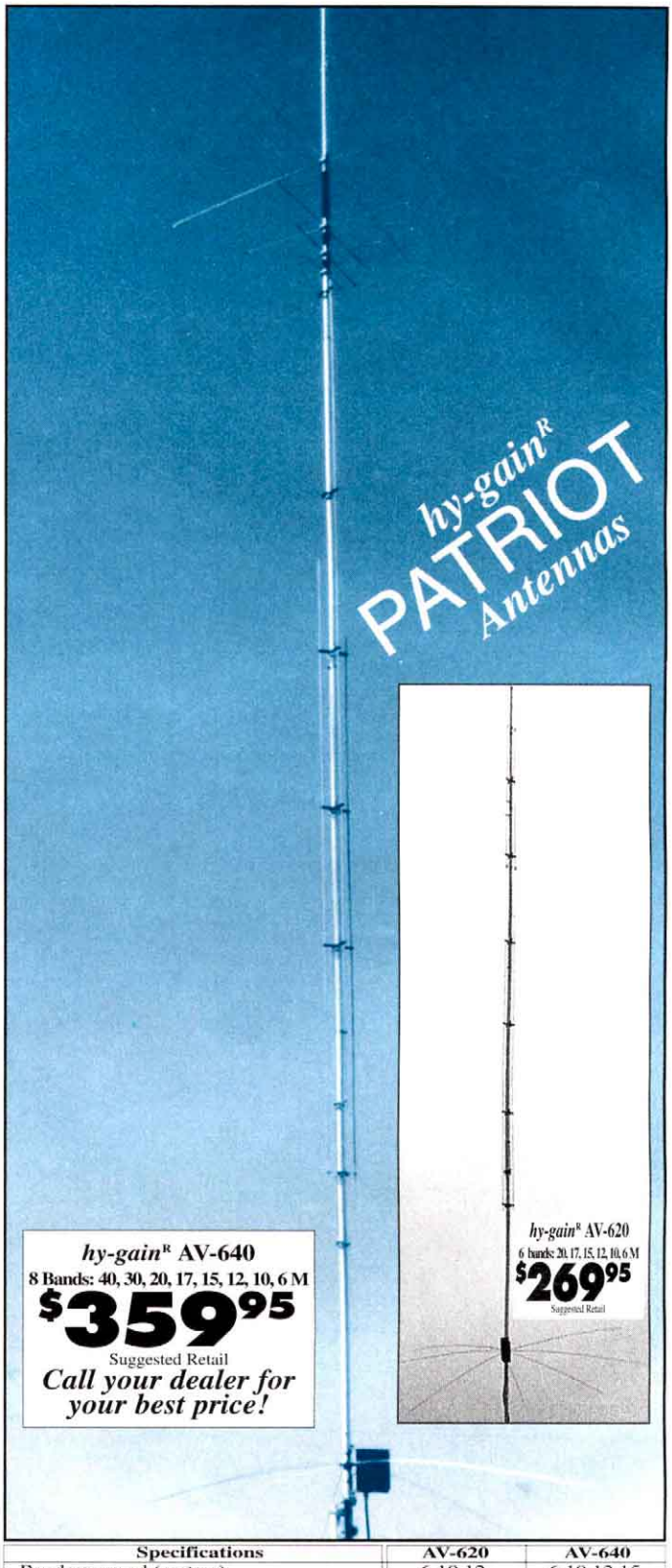

Specifications	AV-620	AV-640
Bands covered (meters)	6,10,12, 15,17,20	6,10,12,15, 17,20,30,40
2:1 VSWR Bandwidth (KHz)		
40M	N/A	150
30M	N/A	175
20M	500	500
17M	500	500
15M	500	500
12M	500	500
10M	1500	1500
6M	2000	1500
VSWR at resonance (typical)	1.5:1	1.5:1
Power handling (watts output) key down 2 minutes	1500	1500
Vertical radiation angle (degrees)	17	17
Horizontal radiation angle (degrees)	360	360
Height (feet)	22.5	25.5
Weight (pounds)	10.5	17.5
Wind surface area (square feet)	2.4	2.5
Wind survival (mph)	80	80

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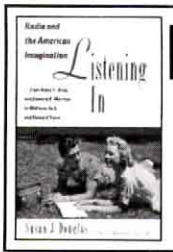

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our section Web page (**www.sflarrl.org**). Five Palm Beach clubs joined forces this year with 100 hams participating and excellent media coverage. Their ECOM vehicle didn't make it to FD this year because it was called to assist at a real emergency, the site of an airplane crash. Broward extended their communication practice by helping out at the 4th of July parade in Sunrise. It is with sincere regret that I report Howard Gilpin, W3SRU, has become a Silent Key. "Gil" was Lee County EC for many years and his past efforts are greatly appreciated. Bob Dutka, KG4EAH, replaced him as EC in February of this year. A noteworthy emphasis from the Dade newsletter for new HF hams and a reminder for old-timers: Practice the HF courtesy of listening and asking, "Is this frequency in use?" (QRL? for CW) several times before calling CQ. It will make HF operating a more pleasant experience for all. Traffic by KJ4N: WA9VND 598, KA4FZI 431, KC4ZHF 333, K4FQU 303, KB4WBY 229, KD4GR 182, KD4HGU 137, WB4PAM 103, WA4EIC 88, KD4JMV 87, K4VMC (club) 71, AA4BN 56, WA4CSQ 55, KT4XK 49, KJ4N 41, KG4CHW 34, KE4UOF 33, KE4IDG 29, W4WYR 17, W8SZU 15, KE4WBI 14, AF4NR 9, K4OVC 8, W3JI 5, (May) KG4CHW 25, (May) W4DWN 50. 73 de KA4FZI.

VIRGIN ISLANDS: SM, John Ellis, NP2B, St Croix. ASM: Drew, NP2E, St Thomas. ASM: Mal, NP2L, St John. SEC: Duane, NP2CY. St Thomas. PIC: Lou KV4JC, St Croix. ACC: Debbie, NP2DJ. St. Thomas. NM: Bob, VP2VI/W0DX, Tortola. VI section Web site (http://www.viaccess.net/~jellis). Especially good to see Drew, NP2E, at the luncheon in St Thomas along with rest of the group, also the group in St John. No Field Day activity to report, 147.25 repeater has storm antenna up for the season. KP2G, George, has comprehensive weather every morning except Sunday on Lou, KV4JC's, Caribbean Maritime Mobile Net, 7241 kHz, net starts at 1100Z, WX at 1115Z. Al, KP2CF, to take over as ARRL VE liaison on St Croix. Expect a minimum of 8 folks taking exams on July 15. New Ham, Manny, NP2KW - he works for the local water and power authority. Manny will keep the call when he upgrades! Some new PSK-31 interest in territory, look for us above 14.070. Repeaters 146.63 St John, 146.81 St Thomas and 147.25 St Croix. Hoping for a calm hurricane season, 73, John NP2B (np2b@atthehelm.com).

WEST CENTRAL FLORIDA: SM, Dave Armbrust, AE4MR **ae4mr@arrl.org** http://www.wcfarrl.org. ASM NA4AR, ASM-Web KR4YL, ASM-Legal K4LAW, SEC KE4MPQ, TC KT4WX, BM KE4WU, STM AB4XK, SGL KC4N, ACC AC4MK, PIC AB2V.Please join me in welcoming Jon Pearl, W4ABC, as the new OOC for the section. George Baustert, W3BL, has resigned as OOC due to health reasons. Congratulations to Dan, K1TO, and his partner, Jeff, N5TJ, as repeated WRTC Champions! W1AW/4 makes 11,379 contacts in IARU HF Championship shattering all prior records from W1AW. NA4AR and myself drove 790 miles to visit 17 field day sites in 30 hours this year. Sept. 24 is the Suncoast Hamfest in Pasco County. June:

Net/NM	*QNI*	*QTC*	*QND*	*Bulls*	*Sess*
AIN/WA4ATF	56	8	98	1	3
ARES/KE4VBA	85	0	93	0	4
SPARC/KF4FCW	423	35	750	0	30
Turtle/KT4TD	366	59	421	0	30
HCAN/KD4CQG	70	0	66	4	4

Be sure to check in to the WCF Section Net at 7:30 PM Sundays on 3.9725 MHz. PSHR: K4RBR 150, K4SCL 147, KT4PM 141, AD4IH 127, KT4TD 104, AB4XK 101, AA4HT 98, KF4KSN 96, W4AUN 86, KE4VBA 77, AE4MR 72. SAR: K4SCL 252, AB4XK 102, AD4IH 93, KT4PM 60, AA4HT 46, K4RBR 29, KE4VBA 24, KF4KSN 22, KT4TD 21, AE4MR 12, W4AUN 10. 73, Dave, AE4MR.

SOUTHWESTERN DIVISION

ARIZONA: SM, Clifford E. Hauser, KD6XH—Field Day is over for the year 2000. Again we demonstrated that Amateur Radio can provide emergency communications on a moment's notice. It does not matter if this communications is for local use (2-meter or 440) or long distance (dipole draped over the trees to full size beam antenna on a portable trailer), we can do it. I received messages from Scottsdale ARC, Central Arizona DX Association, Radio Society of Tucson, IBM ARC, Catalina ARC, and Green Valley ARC. I noticed in the newsletters of two (2) clubs that the Dolan Springs ARC had an excellent article on loop antennas and the Yavapai amateur radio club had a very good article on why we need to be "Elmer's". Tucson Repeater Association has joined the "Arizona Desert Air Waves" monthly newsletter and along with many other Phoenix clubs already participating, this little newsletter provides a lot of information on what is happening on a monthly basis and has several interesting articles each month. Have you made your reservations for the ARRL Southwestern Convention 2000? This will be in Scottsdale at the Ramada Inn on 6-8 October 2000. So far there are over 50 programs scheduled with the standard exhibiters to be present. If you need more information, you can contact me at 520-744-9095 or visit the website at www.w7asc.org/swdc2000. There will be a swap meet in Kingman on 16 September 2000 at the Mohave community college. Scheduled time for this event is 0600-1400 hours. Talk-in is 146.76 (-) with a PI 0f 131.8. See you all there. Remember that we keep our frequencies because amateur radio is a public service organization. If you haven't experienced the joy of using amateur radio to help at a community event, then you are missing a lot of fun. My e-mail address is kd6xh@arrl.org, and my home telephone number is 520-744-9095. If you call and I am not home, please leave a message and I will call you back. I am normally at home after 1930 hours each evening. 73, Clifford Hauser, KD6XH.

LOS ANGELES: SM, Phineas J. Icenbice, Jr., W6BF— Some of our LA types come up with good ideas once in a while. KF6YAN, Mark, suggested that ARRL use the Volunteer Examiners to check QSL cards since they are a reliable and capable group who meet on a regular basis to perform their normal tasks. It is often said that they usually have a few spare moments that could be spent on checking QSL cards. Fried, WA6WZO, our outstanding Director, has agreed to promote our cause at headquarters. Dave Bell, W6AQ (PIC), has informed me that Ken Widelitz, K6LA, is going to WRTC as a contestant, and Dave is going to take some of his famous video for the records—since the phenomenon of propagation is one of our most im-

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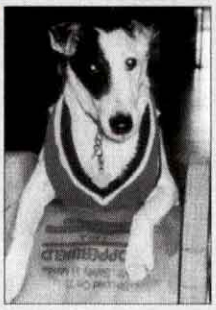

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RG58/U 95% BRAID UV RESISTANT JACKET 2.5dB/400 WATTS@ 30MHz	.15/FT	.13/FT	.11/FT
RG58A/U STRD CENTER 95% TC BRD UV RESISTANT JKT 2.6dB/350 WATTS @ 30MHz	.17/FT	.15/FT	.13/FT
RG214/U STRD SC 2 95% BRD NC/DB/UV JKT 1.2dB/1800WATTS @ 30MHz	.25FT/UP	1.75/FT.	
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1418 8/COND (2/14 6/18) BLK UV RES JKT. Recommended up to 300ft	.47/FT	.45/FT	.43/FT
1216 8/COND (2/12 6/16) BLK UV RES JKT. Recommended up to 500ft	.78/FT	.74/FT	.70/FT
1806 18GA STRD 6/COND PVC JACKET Recommended for Yaesu Rotors	.23/FT	.21/FT	.19/FT

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14GA SOLID *"COPPERWELD" (for long spans etc.)*	.15/FT	.12/FT	.08/FT	.06/FT
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portant subjects in radio. It's also, maybe, one of the least understood contributor to good communications technology. This is especially true for our new HF hams. It has been reported by Al, W6UBM, that monitoring the HF bands since the massive up grading, in April, that the "position of propagation fundamentals" needs to be upgraded in *QST*. The new HF operators are asking lots of good questions. These questions are not being adequately answered, on the air or in *QST*. We are suggesting that HQ consider setting up a Department in *QST*, just for "Propagation Theory & Practice," with a regular technical editor. The so-called, one way propagation phenomenon, and the, ideal free space radiation characteristics, compared to the non-ideal residential surroundings are just two of the typical questions begging for more information and sound theoretical answers. The SCN monthly activity report by Barry, A6HR: QTC 28, QTR 147 & QNI 53. 73 de Phineas, W6BF.

ORANGE: SM, Joe Brown, W6UBQ, 909 687 8394. ASM: Riv Co, Joe, KO6XB, 909 685 7531. ASM: Org Co, Art, W6XD, 714 556 4396. ASM: SB Co, James, KE6LWU, 909-824-5424. SANDARC reports that John Hudson, WA6HYQ, has been appointed HAMCOM 2002 Convention Chairman. IECARO reports Judy Loman, W6YBS, is holding the HAMCOM 2001 slot. Van AA6SD won the raffle prize for the $2000 shopping spree. How much he spent on raffle tickets remains a mystery. The Mother Lode DX/Contest Club is trying to stimulate club competition for the 2000 running of the Calif QSO party. For further information, contact W6RKC@arrl.net or AB1U@snet.net. SMOKE SIGNALS, the PREZ SEZ, if anyone has any suggestions or ideas for speakers, let your Vice President know. Trying to find interesting speakers for each month is a real task. Sometimes, we run outta ideas. Any suggestions would be most helpful. de Steve N6ZSQ. Landlines, San Gorgonio Pass ARC members worked four hot days at the Cherry Festival this year. SPARC is a member of PASSCOM, a planning Committee for the Emergency Communications and Disaster Response. Members were allowed to man four booths, while representing their own organization, as well as PASSCOM. THE CIRCLE CITY COMMUNICATOR, President's Message. It's not too early to think about running for one of the offices in your club. You might consider stepping forward. The club is only as good as what we put into it. In the alternative, members could meet socially each month and talk about ham radio and what's been going on in each individual's ham shack. Think about where you want your club to go and what you can do to make it happen. de Joe KO6XB. BCWS Field Day Great Publicity Success. We received front page coverage in the Sun Post Newspaper's June 27th issue of our VP, Tom K6RMJ with his 15 minutes of fame. OCCARO Officers nominated and elected unanimously are: Chairman, Bob KD6BWH, Vice Chairman, Heiko AD6OI, Secretary, Lloyd W6DMS. NTS Traffic: W6QZ 194, KC6SKK 177, W6JPH 145, AD6OZ 70. DIGITAL: W6QZ NTS BBS 501. PSHR: W6QZ 158, W6JPH 120, KC6SKK 115. de Glenn, N6GIW.

SAN DIEGO: SM, Tuck Miller, NZ6T, 619-475-7333— Can it be the end of summer already? Seems like it just started. This is going to be a busy month. Not only with club meetings, but with public service events as well. On September 23rd we will have the Ham Radio Roundup. Also on the 23rd, is the Friendship Festival, and annual event held in El Cajon where many cultures gather, and share their foods and craft. For some reason, when the hula girls take stage, seems as if everything else stops. Clubs from around the section will gather, set up displays, and actually run radios. It is similar to a mini field day. These are sad times at the Southbay Amateur Radio Society. Long time member, Sid Burnett, W6KSI, passed away, just one week short of his 93rd birthday. Sid, first licensed in 1922 served in the US Navy as a telegrapher, where he was very proficient in the Japanese code. Sid will be sorely missed throughout the south bay. It is almost time for the Southwestern Division Convention, held this year in Scottsdale, AZ. Get your reservations in. Speaking of conventions, John Hudson, WA6HYQ, has been named the chairman of the 2002 convention, scheduled to be held in Americas Finest City. He will be looking for people to head up committees, etc. Why not volunteer ahead of time, and make his job easier? Duncan, KF6ILA, really put the lifeblood back in, not on the Del Mar Fair, but into the NTS as well. Duncan took over as fair chairman this year, and did a fantastic job. Getting many referrals to the clubs of the San Diego Section, he also helped to get 143 messages into the NTS system. Traffic: KT6A 309, KD6YJB 230, W6SLF 122, KE6IQQ 61 KF6YVQ 32, KO6BU 6, WA6IIK 2. PSHR: KT6A 87. Until next month... Remember, Helping Others ...Always Worthwhile! 73, Tuck, NZ6T.

SANTA BARBARA: SM & STM, Rob Griffin, K6YR, 805-543-3346 & k6yr@arrl.org—SEC: Jack Hunter, KD6HHG (kd6hhg@arrl.net). ACC: Michael Atmore, KE6DKU (jatmore@telis.org). OOC, Howard Coleman, W6HQA (w6hqa@arrl.net). PIC: Jeff Reinhardt, AA6JR (jreinh@ix.netcom.com). TC: Warren Glenn, KM6RZ (wglennrz@ix.netcom.com). ASM-Ventura, Don Milbury, W6YN (w6yn@juno.com). ASM- Internet, Jack Bankson, AD6AD (jax@west.net). DECs: Santa Barb-Dave Lamb,WA6BRW (dlamb@silcom.com) SLO-Bill Peirce, KE6FKS (ke6fks@arrl.net). VEN-Dave Gilmore, AA6VH (aa6vh@arrl.net). The SB Section Clubs turned out in force for the 2000 Field Day. Congrats to PRARC, SARC, SVSARC, SBARC, VCARC, VCARS & PARC! 2000 Santa Maria Swapfest was a well attended event /w great wx. Congrats to the Satellite ARC for a fine effort. Join the Section Reflector: Send a blank e-mail to: http://www.egroups.com/subscribe/arrlsb and be part of the Info Hotline. Receive instant updates on Section news-FREE! SB Sec Web: wwww.qsl.net/arrlsb. Join in our Section NTS traffic nets: SCN slow speed NTS Net, M-F, at 1915 local on 3598 kHz & SCN/SB at 2100 local on 147.000+(131.8), 224.90-(131.8) & 449.300-(131.8). PSHR/Tfc: K6YR 168/262, KF6OIF 121/52, KE6MIW 96/26, KC6NBI 101/- & AD6LW 112/-. That's 30. In memory of Mort, W6JU. Rob, K6YR, SM.

WEST GULF DIVISION

NORTH TEXAS: SM, Don Mathis, KB5YAM—STM: KC5OZT. BM: KC5OZT. SEC: K5MWC. SGL: N5GAR. OOC: WB5UDA. ACC: WN5PFI. ASMs: KX5K, K5RE, KK5QA, KK5NA, N5JZ, KB5LWZ, KD5HIS, AD5X, W5GPO. Visit the section Web page at (http://www.lsic.net/net/ntexas.html) for the most current information. The Arlington HamComm 2000 is now history. I felt that it was one of the better organized ones that I have been to. Great job Maury. I appreciated the efforts that you made to

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0508G	1	170	28	15/0.7	Standard	367
0510G	10	170	25	15/0.7	Standard	319
0550G	5-10	375	59	15/0.7	HPA	524
0552G	20-25	375	54	15/0.7	HPA	486
144 MHz						
1403G	1-5	10-50	6	15/0.7	LPA	163
1405G	1-2	100	14	15/0.7	Standard	295
1410G	5-10	160-200	28	15/0.7	Standard	328
1412G	25-45	160-200	22	15/0.7	Standard	286
1450G	5-10	350+	56	15/0.7	HPA	572
1452G	10-25	350+	52	15/0.7	HPA	525
220 MHz						
2203G	1-5	8-35	5	14/0.8	LPA	168
2210G	5-10	130	20	14/0.8	Standard	346
2212G	25-45	130	16	14/0.8	Standard	316
2250G	5-10	225	40	14/0.8	HPA	579
2252G	10-25	225	36	14/0.8	HPA	537
2254	75	225	32		HPA	494
440MHz						
4405G	1-5	15-50	9	12/1.2	LPA	309
4410G	10	100	19	12/1.2	Standard	367
4412G	15-30	100	19	12/1.2	Standard	355
4448G	1-5	75-100	25	12/1.2	HPA	429
4450G	5-10	185	35	12/1.2	HPA	585
4452G	25	185	30	12/1.2	HPA	547

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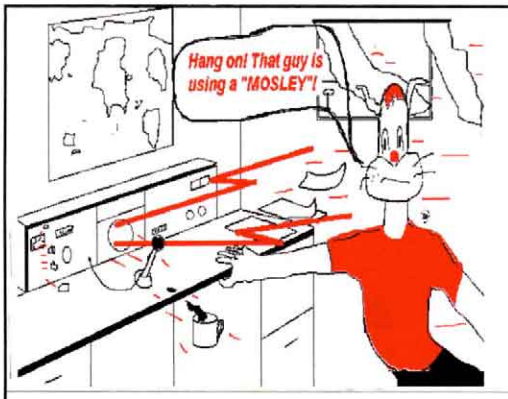

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During this sale period only, we will take off an additional 10% off the regular sale price of the antennas listed below! (Prices shown are with the sale discount already applied.

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CL-106 $1,007.95 CL-156 $1,611.85 CL-206 $2,169.85
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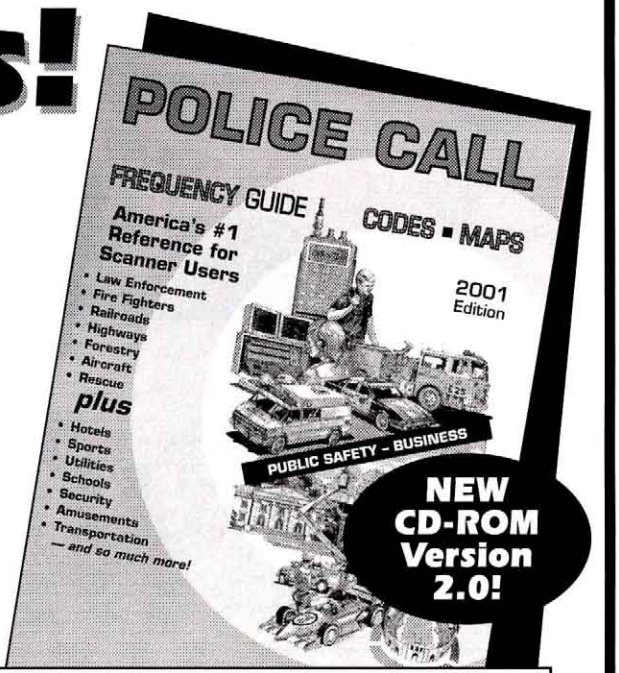

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support ARRL and the section. The Field Day experiment of having a section 'headquarters' was a success. We had over 14 transmitters and over 14 antennas in service at different times. Got a chance to work with PSK31, ATV, 6 Meters, 220 MHz, 2 meters SSB along with the normal HF modes. Gave everyone a chance to try something new. Over 20 people came out and made over 250 contacts. More and better next year. Harry P. Pfeifer Award. The year 2000 Harry Pfeiffer award has been awarded to Colin Buckup/N5GG. This is an annual award given to the operator of the year on Tex CW Net. If you don't know Colin he comes from Brazil and was formerly PY2CGB and then AC5TV and now N5GG. He is NCS for Wednesday's and has been doing liaison for the DFW area. Thank you, Colin, for your outstanding contribution to the Tex CW Net and the DFW nets in general. Glad to have you with us. I would like to highlight the steady outstanding section service provided by Carolyn, KC5OZT, STM. She keeps the section traffic nets running smoothly, day in and day out. I don't tell her that often enough how much I appreciate her efforts. Come join us at the Denton Ham Fest on October 14. There will be many section activities there again. SAR for June 2000—K5NHJ 410, KC5OZT 374, N5JZ 346, KB5WEE 266, W5AYX 239, K5AO 218, KC5VLW 115, WA5I 100, KB5TCH 63, N5GG 12, KB5YAM 7, N8QVT 1, AC5UZ 0. BPL: K5NHJ 189 orig./deliveries, N5JZ 149 orig./deliveries, KB5WEE 101 orig./deliveries.

OKLAHOMA: SM, Charlie Calhoun, K5TTT—ASMs: N6CL, W6CL. SEC: W5ZTN. ACC: KB5BOB. PIC: WA9AFM. OOC: WA9VMY. SGL: W5NZS. STM: K5KXL. Well, I logged 520 miles and around 100 contacts in the mobile on Field Day. Just had a blast getting to see everyone. Just so you know what's going on in OK, Ardmore City council passed antenna legislation which did not exempt amateur installations. We are working to rectify that as of this writing. Mel, K5KXL, is working on getting the information together for the Net Directory. If you did not receive a net registration card for your net, please contact him k5kxl@worldnet.att.net so you can have your net listed in the directory. Looking forward to seeing many of you at Ham Holiday. The Wouff Houng ceremony will commence Saturday evening and your SM will be there. I will report more on Ham Holiday in next months column. Hopefully by now we have caught up on the missing traffic reports, if not, all traffic reports that were not printed in this column will be printed. I apologize for the omissions in the prior months columns. Well, better get packing, your SM is leaving for the Central States VHF conference in Winnipeg, MB, Canada tomorrow morning. Section Web site http://www.busprod.com/k5ttt 73 for now, Charlie. Tfc: N5IKN 1032, WB5NKC 254, K5KXL 178, WB5NKD 109, WA5OUV 82, WA5IMO 76, KI5LQ 72, KE5JE 68, KM5VA 57, KK5GY 52, W5REC 22, N5FM 1.

SOUTH TEXAS: SM, Ray Taylor, NR5ED— ASMs: 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: W5JAM. SGL: K5PNV. First in the agenda for September is to correct a mistake I made in the July Section Manager News. It was K5BNH who received the Whitney Nugget Award, not K5BNI. Please accept my most humble apology for such an error. It was not a computer error, but a human error, mine. One bit of information, on June 30 at 5 AM we lost all phone service into and out of New Braunfels, TX. July 1 we had some use of local calls only. July 8th still problems, so if you sent an e-mail and didn't get an answer, try again. The drill July 8th went well. We were checking out the communications along the coast for hurricane season. Hams are beginning to see their need to help in public service. I want to thank all that participated. We had the 2 meter link fail between Corpus Christi and San Antonio, so everything took place on HF including traffic. Other links were checked out and worked well. We had over 100 checkins in one and a half hours. The agencies that participated where as follows: Most of the National Weather Service offices, NASA, many of the city EOCs, Fire Departments, Navy, Army, and Air Force MARS were all well represented. Remember there is no such thing as a mistake, the term should be: IT WAS A LEARNING EXPERIENCE. If operators would at least listen to the training on 3873 Monday, Tuesday, Thursday, and Friday 7 PM, when time permits, there would be no guess work involved as to procedures during emergencies and drills. If you missed Ham Com 2000, I hope you attended the Austin Summerfest. There was more goodies than you could possibly need. Hope you got to meet David Woolweaver, the new West Gulf Division Vice Director. I want to compliment those of you who left the cool comfort of home to participate in Field Day. It was more than hot, but we still had a good turn out here in South Texas. I have not seen the scores yet. The band conditions were not to great due to solar activity. I saw some using slow scan tv, APRS, PSK-31, and HF. I saw antennas that were truly nightmares but they worked and worked well. We are seeing a large number of new Hams coming to the nets and the clubs. I hope they enjoy their new hobby, remember they are our replacements. Help them to make good operators. We are having an increase in club affiliating with the League in South Texas. Have a good September. 73 and God Bless. Tfc: W5SEG 659, W5KLV 275, W5TUK 216, KA5KLU 201, W5GKH 79, W5ZX 50, N5NAV 50, W5ZIN 45, N5OUJ 37.

WEST TEXAS: SM, Charlie Royall, WB5T, 915-944-0469, WB5T@arrl.org. ASMs: Cley, K5TRW. Ron, KB5HGM. Jerome, K5IS. Fred, W6VPI. Sandy, W5MVJ. SEC: Alex, N5LRH. OOC: John, KO5D. OBM: Frank, N5WT. Resignations: H. Gehring, PhD, KJ5EO, DEC, El Paso. Thanks, Herb, for the many years of service. SK-William Curter, K5CZS, 71, died 6-16-00. He served in USAAC as a radio operator on B-29s. Was a TV engineer for 25 years with KTVE, El Dorado, AR, and KIDY San Angelo TX. Region 5, Cycle 1 and 2 phone net: 60 sessions, QTC 634, QTR 1206 minutes. WTX represented 36% by N5XB, J. Clement. On 6-16-00, the Lubbock Contest Club had a cookout-included feral pig and spring lamb. A good time had by all, including persons walking by the park who were attracted by the smells! Strangers were made welcome, fed, and introduced to Amateur Radio. Next day, 20 members of the club provided communications for the Half Iron Man Triathlon. Yours truly attended the cookout by special invitation. Thanks guys and gals-It was outstanding! El Paso Hamfiesta, 28-29 Oct. See you there. Until next time, 73 de Charlie, WB5T.

HamAds

l) Advertising must pertain to products and services which are related to Amateur Radio.

2) The Ham-Ad rate for commercial firms offering products or services for sale is $1.00 per word. Individuals selling or buying personal equipment: ARRL member 50¢ per word. Non-ARRL member $1 per word. **Bolding** is available for $1.50 a word.

3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8½" x 11" sheet of paper.

4) Send ads to: the ARRL, 225 Main St., Newington, CT 06111 ATTN: Ham Ads. Or via fax 860-594-0259 or e-mail: hamads@arrl.org Payment must be included with ads (check or any major credit card accepted).

5) Closing date for Ham-Ads is the 15th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received September 16th through October 15th will appear in November *QST*. If the 15th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day. Please contact Melissa Yrayta at 860-594-0231 for further information.

6) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

7) New firms or individuals offering products or services for sale must check with us to determine if a production sample (which will be returned) should be submitted for examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must stand by and support all claims and specifications mentioned in your advertising.

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RAINBOW AMATEUR RADIO ASSOCIATION - The gay/lesbian club. Active weekly H.F. nets, monthly newsletter, e-mail reflector, web page: www.rara.org. Chat Room. Privacy respected. E-mail: rara@qsl.net or P.O. Box 191, Chesterland, OH 44026-0191.

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THE GREATER CINCINNATI ARA *Communications Expo 2000* hamfest/electronics show is September 17: Kolping Center north of Cincinnati, OH. Show open 8AM through 4PM. Commercial exhibitors indoors, flea market, radio-controlled race car races, ARRL officials, good food, free parking, excellent prizes, hidden transmitter hunts, interesting forums, VE exams, ladies' program, great atmosphere. Admission: $5/s.a.s.e. by September 10; $8 at gate; 12 and under free. The Kolping center is at 10235 Mill Rd. five minutes souh of exit 36 of Interstate 275 in northern Hamilton County. Talk in:146.88-. See http://w3.one.net/~rkuns/expo2000/. Indoor exhibit chairman Gary Osborne, W8XS, osborne@fuse.net, 513-474-0287; Flea market/advance ticket chairman Tom Denham, K8VOE, tdenham@eos.net, 513-779-3951; VE exams Scott Henninger, W8GS, w8gs@arrl.net, 513-683-7373; General Chairman Jim Weaver, K8JE, k8je@arrl.net or Call: 1-513-459-0142.

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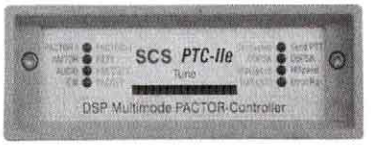

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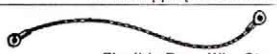
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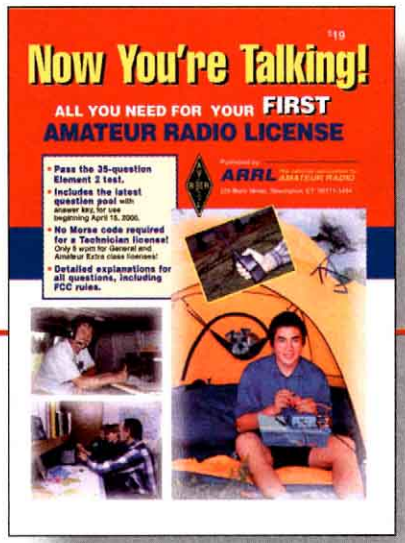

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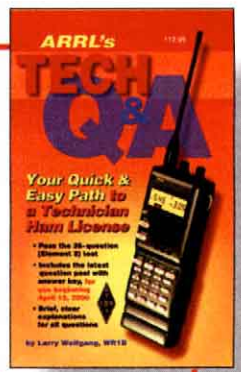

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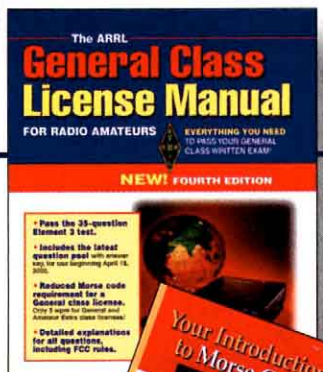

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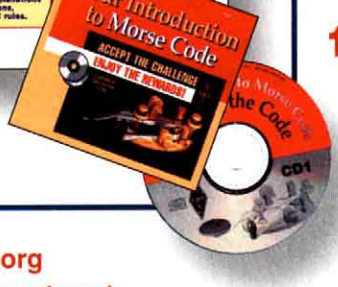

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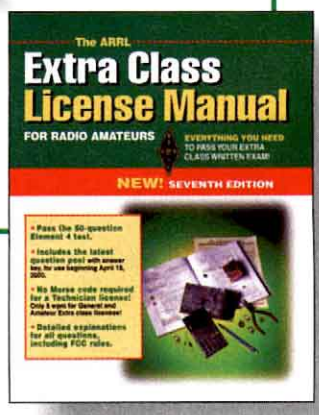

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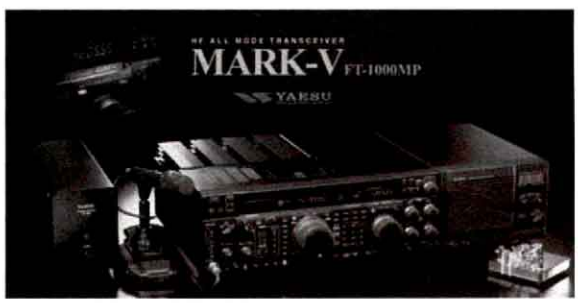

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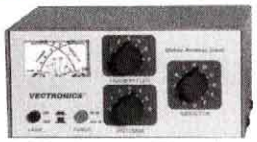

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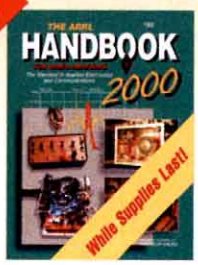

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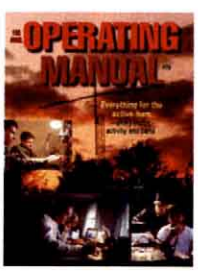

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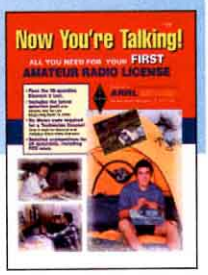

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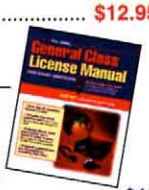

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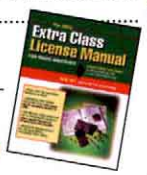

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NR770HBNMO/NR770RA	$55/49
X200A/X300A	$129/159
X500HNA/700HNA	$229/369
X510MA/510NA	$189/189
X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

More Diamond antennas in stock

MFJ ANTENNAS

259B Antenna Analyzer	$219
1798, 80–2m Vertical	$239
1796, 40/20/15/10/6/2m Vert.	$179
1793, 80/40/20m Vertical	$159
1792, 80/40m Vertical	$145
1788, 40–15m Loop	$399
1786, 30–10m Loop	$349
1780, 14–30 MHz Loop	$229
1768, 2m/70cm Beam	$65
1762, 3 Element 6m Beam	$65

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	$10/11
1/2"x9"EE / EJ Turnbuckle	$15/16
1/2"x12"EE / EJ Turnbuckle	$17/18
3/16" / 1/4" Preformed Grips	$4/5

Please call for more hardware items

HIGH CARBON STEEL MASTS

5 FTx .12" / .18"	$35/59
10 FT x .12" / .18"	$65/110
15 FT x .12" / 17 FT x .18"	$95/180
20 FT x .12" / 22 FT x .18"	$120/219
12 FT x .25" / 17 FT x .25"	$189/267

GAP ANTENNAS

Challenger DX	$259
Challenger Counterpoise	$25
Challenger Guy Kit	$14
Eagle DX	$269
Eagle Guy Kit	$22
Titan DX	$299
Titan Guy Kit	$22
Voyager DX	$389
Voyager Counterpoise	$49
Voyager Guy Kit	$38

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	$129/169/189
G6-270R, 2m/70cm Vertical	$149
G6-144B/G7-144B	$109/159

Hustler Resonators in stock–call

ANTENNA ROTATORS

M2 OR-2800P	$1095
Yaesu G-450A	$239
Yaesu G-800SA/DXA	$319/399
Yaesu G-1000DXA	$479
Yaesu G-2800SDX	$1069
Yaesu G-550/G-5500	$289/589

ROTATOR CABLE

R51(#20)/R52 (#18)	$.22/.32/ft
R61 (#20)/R62 (#18)	$.28/32/ft.
R81/82/83/84	$.25/.39/.52/.85/ft

PHILYSTRAN GUY CABLE

HPTG1200I	$.39/ft
HPTG2100I	$.52/ft
PLP2738 Big Grip (2100)	$5.50
HPTG4000I	$.79/ft
PLP2739 Big Grip (4000)	$7.65
HPTG6700I	$1.15/ft
PLP2755 Big Grip (6700)	$10.95
HPTG11200	$1.55/ft
PLP2558 Big Grip (11200)	$16.50

Please call for more info or help selecting the Phillystran size you need.

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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-756PRO ..... 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!
The Yaesu FT-1000MP Mark-V is a competition class HF DSP transceiver with auto tuner, 200 Watts RF output, and more!

FT-1000MP ..... In Stock!
Competition class HF DSP transceiver.

FT-1000D ..... In Stock!
The FT-1000D is a competition class HF XCVR featuring true dual RX, automatic tuner, 200 watts RF output, and more.

Quadra System ... Lower Price!
Solid state 1 kW autotuning amplifier.

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, and features digital signal processing, built-in RS-232 interface, tone encode/decode, and more. Supplied with an up/down microphone and DC power cord.

FT-920 ..... Yaesu Special!
The Yaesu FT-920 is an all mode HF/6m transceiver featuring digital signal processing, automatic antenna tuner, CW memory keyer, CTCSS tone encode/decode, 127 memories, and more. Supplied with up/down 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 ..... New!
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-2100H ..... Great Low Price!
The IC-2100H is a rugged 2m mobile XCVR with CTCSS tone encode/decode/scan, DTMF paging/squelch, 113 memory channels, switchable display color and more.

FT-90R ..... New!
New ultra-compact 2m/70cm dual band mobile transceiver with detachable control panel, and huge extended RX range.

FT-2600M .. New Lower Price!
Rugged 2m mobile with intermod-proof receiver, big display, and an illuminated DTMF mic. Built to MIL-STD 810.

FT-8100 ..... New Lower Price!
Great 2m/70cm dual band mobile, 45/35 Watts, removable front panel, and more!

FT-100D ..... New!
The Yaesu FT-100D is an ultra-compact all mode transceiver for HF/6m/2m/70cm operation. The radio features a removable control panel, digital signal processing, CW memory keyer, built-in RS-232 interface, tone encode, 200 memory channels, VOX, and more. Supplied with a DTMF hand mic, DC power cord and mounting bracket.

FT-840 ..... New Lower Price!
The Yaesu FT-840 is an all mode HF transceiver with 100 watt output, optional FM unit.

IC-W32A ..... New Lower Price!
IC-Q7A ..... Icom Special!
IC-T7H ..... Icom Special!
IC-T81A ..... New QuadBand HT!
IC-T2H ..... Amazing Low Price!
IC-R3 . Video RX, Coming Soon!

IC-207H ..... Great Low Price!
The Icom IC-207H is a 2m/70cm dual band mobile transceiver featuring CTCSS tone encode/decode, 182 memory channels, removable front control panel, and more. Supplied with a back-lit DTMF hand mic, mounting bracket, and a DC power cord.

IC-PCR1000 ..... Icom Special!
IC-PCR100 ..... Icom Special!
IC-R8500 ..... In Stock!
IC-R75 ..... New, In Stock!
IC-R2 ..... In Stock!
IC-R10 ..... Icom Special!

G-2800SDX $1069
Heavy duty antenna rotator handles 34 sq. ft. of antenna load, and features 450° rotation, preset and variable speed.

G-1000DXA $479
G-800SA/DXA $319/399
G-450A $239
G-5500 ..... $589
G-550 ..... $289

VX-5R ..... Now In Stock!
Tiny 6m/2m/70cm triband HT, with CTCSS tone encode/decode/scan, high capacity Lithium-Ion battery pack, extended RX with AM/FM and FW Wide modes, and more.

FT-50RD ..... Yaesu Special!
VX-1R ..... Yaesu Special!

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"Brick-Wall" Selectivity

Today's elite-class operators demand the best RF weaponry available. Yaesu's exciting new MARK-V FT-1000MP answers the call, with an expanded array of receiver filtering, 200 Watts of power output, and Class-A SSB operation capability for the cleanest signal on the band. Enhanced front-panel ergonomics save you seconds in a pile-up or a contest "run," and Yaesu's HF design and manufacturing know-how ensures that no short-cuts have been taken in our effort to bring you the best HF transceiver money can buy. For more QSOs in your log, and more awards on your wall, there is only one choice: the MARK-V FT-1000MP from Yaesu!

I. IDBT: Interlocked Digital Bandwidth Tracking System

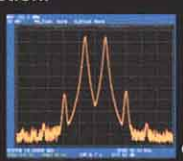
The IDBT feature greatly simplifies operation by matching the bandwidth of the DSP (Digital Signal Processing) system to the net bandwidth of the 8.2 MHz and 455 kHz IF stages. The IDBT system accounts for the settings of the IF WIDTH and SHIFT controls, and automatically sets a DSP bandwidth which matches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

II. VRF: Variable RF Front-End Filter

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.

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.



Class A 75 W PEP IMD

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 suppressed 50 dB or more, and 5th- and higher-order products typically down 80 dB or more!

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!

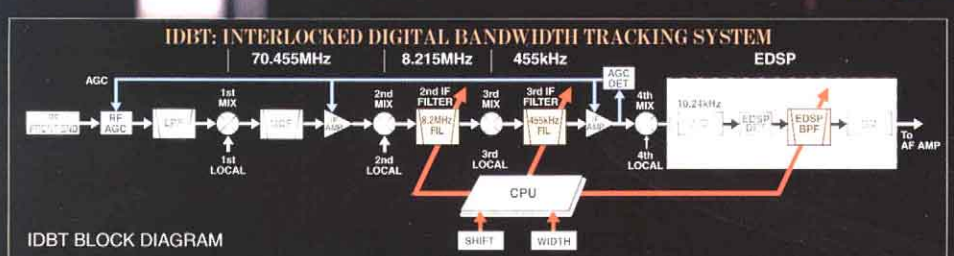
IDBT: A Breakthrough in Selectivity!

DC 30 V / 13.8 V Power Supply FP-29

Photo shows optional MD-100A8X Deluxe Desk Microphone

HF 200 W All-Mode Transceiver

MARK-V FT-1000MP



IDBT BLOCK DIAGRAM

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