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December 1999

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- Kenwood CS-4125 oscilloscope

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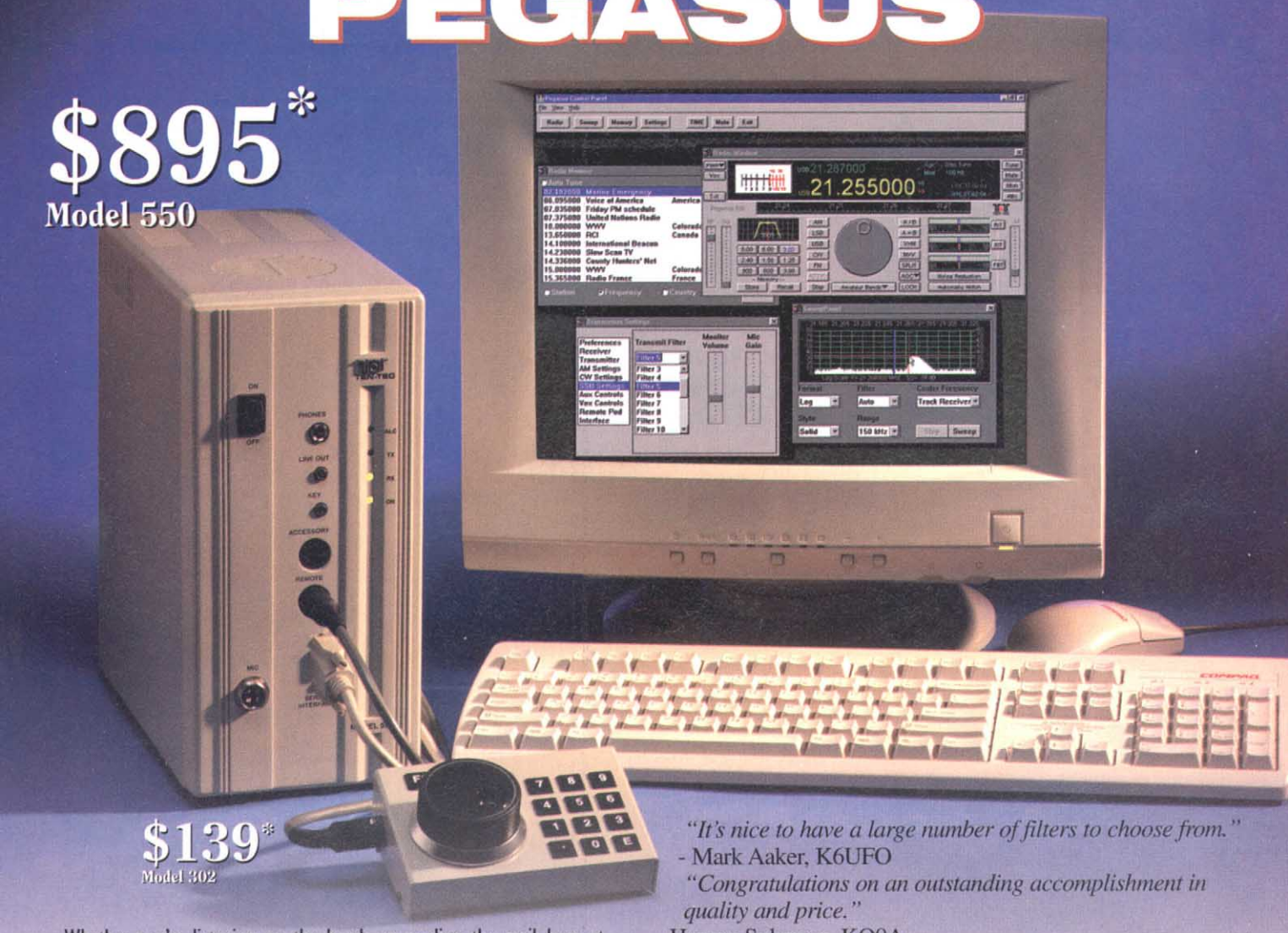
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Our Cover

A holiday fantasy by Henryk Kotowski, SM0JHF, sets the mood this month. From all of us on the *QST* staff, best wishes for a happy and joyous Holiday Season!

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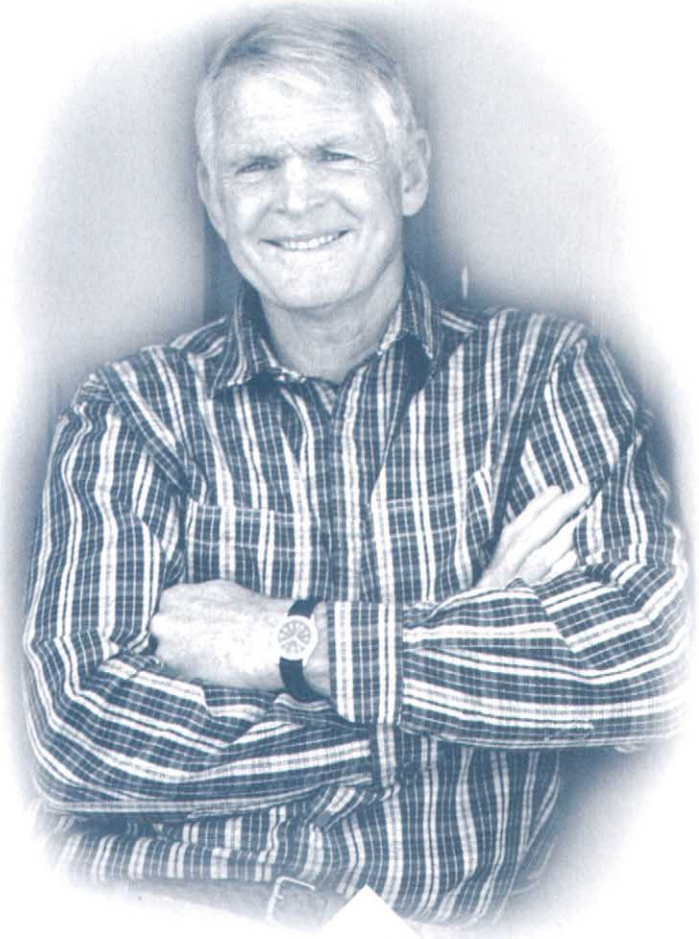
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"It Seems to Us..."

Amateur Radio Heroes

Whether you regard the turn of the century as 1999/2000 or 2000/2001, now seems the best time to look back on the century just past—to clear our intellectual palates so we can be ready to taste the future.

A&E Television Networks commissioned a panel to identify the 100 most influential people of the millennium. Probably no one would agree with all of their selections, but it is difficult to argue with their choice of the single most influential person: Johannes Gutenberg. Without the invention of movable type by this 15th century printer, the ideas and contributions of those who came after him would be largely unknown to us today.

As the 15th was the century of the printed word, so the 19th was the century of steam transportation. Societies throughout the world were changed forever by the advent of rapid, reliable railroads and steamships. The photograph and the telegraph also left their indelible mark. What about the 20th? There are innumerable contenders. Many 19th century inventions—the electric light, the telephone, sound recording, the automobile, and of course radio, to name but a few—changed how people think and how the world works only after the turn of the century. The time in which we live also will be remembered for later developments such as the airplane, the computer, nuclear power, and artificial satellites. This list barely scratches the surface, for it doesn't take into account the great advances in such fields as biology, medicine, and agriculture.

But let us return to our favorite subject. Marconi is on A&E's "Top 100" list, not as far up as we would have placed him but prominent nonetheless. A strong argument can be made that the century now drawing to a close deserves to be called the Century of Radio, because the developments in wireless communication that are now occurring are just as revolutionary as those that marked its dawn. Just as the printing press has continued to influence society right up to the present day, so too will radio—including Amateur Radio—continue its influence into the future.

Which radio *amateurs* were the most influential during the Century of Radio? Who are our heroes? Here is a *very* incomplete list of nominees.

• We can legitimately claim *Edwin Howard Armstrong* as an amateur. His superheterodyne circuits and invention of frequency modulation led to fame if not to fortune, but he was also one of the builders and operators of 1BCG, the first amateur station to be heard across the Atlantic.

• Modern DXpeditions operate under conditions that are a far cry from those faced by the first Amateur Radio expeditioners. *Donald H. Mix, 1TS* was on board the schooner *Bowdoin* to operate WNP when the MacMillan Arctic Expedition set out in 1923. The service that Don provided during 16 months of polar exploration ensured that radio henceforth would figure in the planning for any similar undertaking.

• The next MacMillan Expedition included Richard Byrd. October 1925 *QST* reported that *Arthur A. Collins, 9CXX* was "the first to be in communication with WNP on 20 meters and has been WNP's mainstay ever since for 20-meter work." What *QST* did not report, although many newspaper articles of the time did not overlook the fact, was that young Art Collins was 15 years old. The Byrd connection helped the later success of the Collins Radio Company, through which Art made so many contributions to amateur, civil, and military communications.

• The 1925 MacMillan Expedition also included *John L. Reinartz, 1QP*, who was already renowned for his superior receiver designs and pioneering shortwave work including the first published explanation of ionospheric "skip."

• The same year brought *F. E. Handy, 1BDI*, to ARRL Headquarters as Communications Manager, a position he held for more than 40 years. Ed's place on any list of Amateur Radio's heroes was secured early when he authored the first edition of *The Radio Amateur's Handbook*. His influence helped shape virtually every facet of amateur operating.

• Lest anyone think this list is or should be all-American, let us inject here the names of *Frank Bell, z4AA*, whose New Zealand station dominated the early shortwave distance records, and *Ernst Krenkel, RAEM*, whose exploits as a radio operator in the Soviet Arctic are probably without parallel.

The history of amateur VHF development is replete with heroes. Here are just a few. *Ralph "Tommy" Thomas, W2UK*, and *Paul Wilson, W4HHK*, pioneered two-meter meteor scatter in 1953. Paul is still at it – he celebrated his 75th birthday in September by making his first contact on 24 GHz! As KH6UK, Tommy teamed up with *John Chambers, W6NLZ*, in 1957 to be the first to bridge the incredible distance between Hawaii and southern California on 144 MHz. They later duplicated the feat on 220 and 432 MHz. *Nicola Sanna, IØSNY*, no doubt was inspired by their example as he labored for three years to extend his own distance record on 10 GHz, reaching 1,166 km across the Mediterranean in 1982.

The trouble with starting such a list is that it's impossible to stop without doing a grave injustice to so many who deserve to be on it. There are those who developed and popularized SSB. There are those who conceived and implemented the amateur satellite program and those who have kept it growing to this day. There are those who, in the tradition of *Hiram Percy Maxim, W1AW*, have devoted themselves to protecting amateurs' access to the radio spectrum. And there are so many, many more.

Who are *your* nominees?—*David Sumner, K1ZZ*

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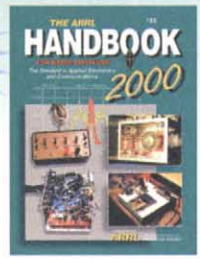
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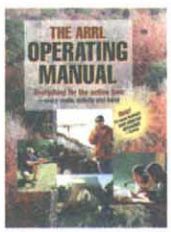


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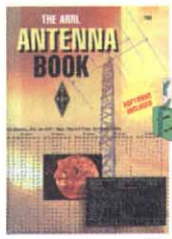
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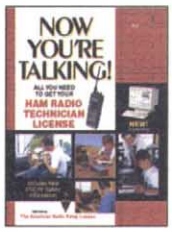
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DC Currents

By Steve Mansfield, N1MZA
Manager, Legislative and Public Affairs

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

HR.783 Closes Year with 125 Cosponsors, Senate Bill may be on Horizon

As lawmakers wrapped up the first year of the two-year 106th Congress and headed home for the holidays, support for HR.783, the Amateur Radio Spectrum Protection Act, had grown to at least 125 cosponsors. The biggest hurdle in the House remains getting the bill to be taken up by the Commerce Committee, which must approve it before it can go on for a vote by the entire House. So far, the committee has given no indication of when (or even whether) it plans to take up the bill.

On the Senate side, a Senator has stepped forward with an offer to introduce an identical companion bill in the Senate after the Congress reconvenes in January. The ARRL has already met with about two dozen Senate offices in search of original cosponsors for that anticipated legislation. Watch this column in the coming months for news of the introduction of the bill (and its bill number). No doubt we'll be encouraging you to write to your Senators urging cosponsorship.

But how can you get your representative to sign on if he or she has not already done so in spite of your letters? Chuck Williams, KI7DG, reports that The Okanogan County Amateur Radio Club was especially resourceful in reaching Congressman Doc Hastings (R-WA-4th). The club delivered a signed letter from the club to the Congressman at a town meeting urging him to sign onto the bill. Chuck followed up with a breakfast meeting the next morning and explained how important the issue was to his group. Sure enough, Congressman Hastings signed on.

Thanks to all of the ARRL members who have already written! And, for those who haven't written but plan to, visit the ARRL Web site at **http://www.arrl.org/govrelations/hr783.html** for a sample letter and addresses.

Cosponsors for HR.783

Introduced by Rep. Michael Bilirakis (R-FL-9th)
(Number in parentheses following state name indicates the total number of congressional districts in that state)

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

Alaska (1)
(No cosponsors yet)

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

Arkansas (4)
Vic Snyder (D-2nd)

California (52)
George Miller (D-7th)
Barbara Lee (D-9th)
Fortney Pete Stark (D-13th)
Tom Campbell (R-15th)
Sam Farr (D-17th)
James E. Rogan (R-27th)
Grace F. Napolitano (D-34th)
George E. Brown (D-42nd)
Ken Calvert (R-43rd)

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

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

Delaware (1)
(No cosponsors yet)

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

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

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

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

Illinois (20)
Luis V. Gutierrez (D-4th)
Danny K. Davis (D-7th)
Jerry Weller (R-11th)
Jerry F. Costello (D-12th)
Ray LaHood (R-18th)

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

Iowa (5)
James A. Leach (R-1st)

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

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

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

Maine (2)
Thomas H. Allen (D-1st)
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Maryland (8)
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Bruce M. Vento (DFL-4th)
Bill Luther (DFL-6th)
Collin C. Peterson (DFL-7th)

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

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

Montana (1)
(No cosponsors yet)

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

Nevada (2)
(No cosponsors yet)

New Hampshire (2)
(No cosponsors yet)

New Jersey (13)
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Frank Pallone, Jr. (D-6th)
Steven R. Rothman (D-9th)
Rodney P. Frelinghuysen (R-11th)

New Mexico (3)
(No cosponsors yet)

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Benjamin A. Gilman (R-20th)
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James T. Walsh (R-25th)
Maurice D. Hinchey (D-26th)
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John P. Murtha (D-12th)
Joseph M. Hoeffel (D-13th)
William J. Coyne (D-14th)
Michael F. Doyle (D-18th)

Rhode Island (2)
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South Carolina (6)
(No cosponsors yet)

South Dakota (1)
(No cosponsors yet)

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John J. Duncan, Jr. (R-2nd)

Texas (30)
Max Sandlin (D-1st)
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Other Spectrum Issues also at Play on The Hill

- The Defense Appropriations Bill, HR.2561, contains a provision calling for the FCC to initiate additional spectrum auctions originally called for under the Balanced Budget Act of 1997, but to "ensure that the spectrum to be used for public safety is protected from interference." The bill also contained a provision calling for a spectrum harmonization study by the NTIA to determine how best to protect the Global Positioning System from interference.

Similar concerns about the integrity of the spectrum were expressed in the Federal Aviation Administration Reauthorization bill, S 86. This bill contained a "sense of the Senate" provision that the FAA "give high priority to developing a national policy to protect the frequency spectrum used for the Global Positioning System that is critical to aviation communications and safe operation of aircraft."

Wireless 911 Bill Passes Both Houses

Telecommunications legislation made very slow progress the first session of the 106th Congress, but a few bills made it through. One of the more interesting was S.800, a bill designating "911" as a universal national emergency telephone number. While 911 is generally the wireline emergency number, in many states the cellular system uses a different number and horror stories appeared in the *Congressional Record* of callers involved in serious highway accidents who were unable to determine what the local cellular emergency number was. According to comments by Representative Pat Danner (D-MO-6th), there are as many as 15 different emergency numbers nationally.

The bill was a generally bipartisan effort to create the framework for implementing a single universal emergency phone number that will work across the country, whether on wireline or cellular phones, replacing the current hodgepodge of state statutes. S.800 also creates the framework to permit the implementation of location finding technology for cellular. The bill also contains privacy provisions on how caller location information may be treated, so that it may only be used for emergency purposes without the subscriber's consent. Some lawmakers, such as representative Edward Markey (D-MA-7th) were concerned that, without privacy provisions in the law, wireless providers could "track individual's movements throughout society; where you go for your lunch break; where you drive on weekends." Markey called such data "not information that wireless companies ought to collect, monitor, disclose, or use without one's approval."

The bill is expected to be signed by the President.

Kennard says the new FCC is "Cleaning out the Ghosts of Regulators Past"

♦ In spite of a growing number of major mergers and consolidations in the telecommunications industry, FCC Chairman William Kennard told a gathering at Georgetown University Law Center that the Commission has achieved some major victories in what he said was Congress's objective in the 1996 Telecommunications act of "breaking bottlenecks" and opening telecommunications to competition.

Among the FCC's achievements, the chairman said, was adopting rules that opened local telephone exchanges to competition, and establishing rules of interconnection and co-location. Kennard said the Commission is permitting broadband and other advanced services to enter the market unregulated, and touted efforts to wire school classrooms to the Internet and to adopt rules to enhance access for the disabled, rural residents and others who have not been effectively served by new telecommunications.

Kennard said that his blueprint for a restructured FCC was an agency that is "fast, flat and functional," apparently alluding to his efforts to trim down the Commission's legendary bureaucracy. The three pillars of the "new" FCC, he said, will be competition, consumer protection and access to advanced services. Kennard said that rapid and continuous change in new telecommunications virtually requires a commission that can change to keep up with the new environment. The regulatory process, he noted, is "linear and methodical, to provide due process, but the market process is not."

"At the FCC we are cleaning out the ghosts of regulators past," Kennard said, and discussed efforts to support 100% electronic filing and electronic licensing. He also lauded the Commission's Biennial Review effort, noting that they had completed 24 of the 32 proceedings to reduce "unneeded" rules.

ARRL Members Ask Congress for Help on Restructuring Report & Order

The long-delayed FCC Amateur Licensing Restructuring report and order was given a small kick in the seat of the pants by Texas Congressman Pete Sessions (R-5th) who wrote and called the Commission after having met with the Dallas Amateur Radio Club over the summer. The deadline for public input in the proceeding was January 15, 1999, and a draft report based on the extensive input supplied by the Amateur Radio community is rumored have been circulating since as early as May. The restructuring proceeding was part of the FCC's Congressionally mandated biennial review. The final report is expected to make some alterations to the existing licensing structure.

After a follow-up conversation with ARRL Director Jim Haynie, W5JBP, Congressman Sessions agreed to try to direct Congressional attention to the Commission in an attempt to resolve the inexplicable bureaucratic delay in issuing the report.

"A delay of this sort from a government agency that exists to serve the public is simply unacceptable," Sessions said. "According to the information I've gotten from the Dallas Amateur Radio Club and ARRL, the long delay in this matter has begun to act as a roadblock to licensing exams and a number of related concerns. Who wants to take an exam for a license that might change any time now?" Sessions' efforts to understand the issue were helped significantly by the fact that his chief of staff is Jeff Koch, NU5Z. Jeff reports that Congressman Sessions both wrote to FCC chairman Kennard and had telephone conversations with the FCC's legislative affairs staff. He notes that Mr. Sessions was not satisfied with the FCC's response to his initial communication, and will continue to push to get the report released.

Congressman Sessions is not the only one concerned about the issue. The ARRL has also continued to press for prompt release of the report and order, and has written to the Commissioners and has met with the staff of the Senate Commerce Committee to outline Amateur Radio concerns. The Commerce Committee Chairman is Senator John McCain, who has already made waves by expressing his concern over the backlog of approximately 64,000 pending items the FCC had on its plate earlier this year.

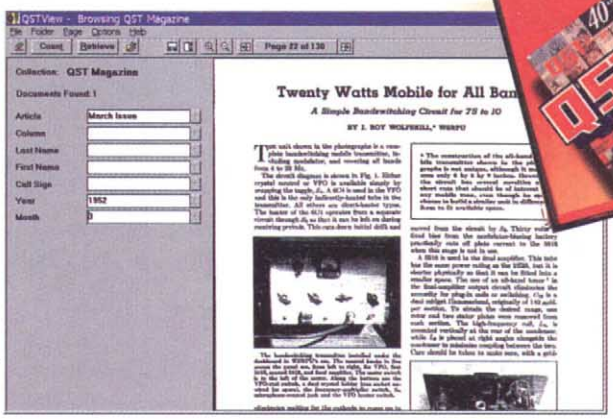
Media Hits

- Dan Donovan, KF4VIS, reports that Hurricane Floyd coverage by WYFF-TV in Greenville, South Carolina, put ham radio right in the middle of the action. Dan is a PIO, and sent news releases to local media publicizing Amateur Radio activities.
- A story in *The Star* from Marion, Ohio detailed the enthusiastic Amateur Radio activities of the Robinson household. Mentioned in the story were husband Wirt, NE8X, wife Virginia, KA8MFG, daughters Verna, WD8NEA and Alicia, WD8NED, and son Robert, KA8MFH.
- In Howell, Michigan, the *Livingston County Press* reports that John Ohm, W8IS, has had a lifelong fascination with radio, and conveyed a bit of the magic John feels when he gets on the air.
- Randy Kelling, W4KI, is cited in a story on Alabama SKYWARN activities in the *Birmingham News*. Also mentioned was Mark Parmley, WA4UHC. The article features a great photo of Randy on storm watch duty, and discusses the importance of SKYWARN activities in ensuring local safety.
- Sam Brown, WA4IUM, produced a story for WNOX AM/FM in Knoxville, Tennessee on Amateur Radio emergency communication efforts following the recent earthquake in Turkey. The story was aired over several Tennessee radio stations. Sam was the recipient of the ARRL Media Excellence Award in 1997.

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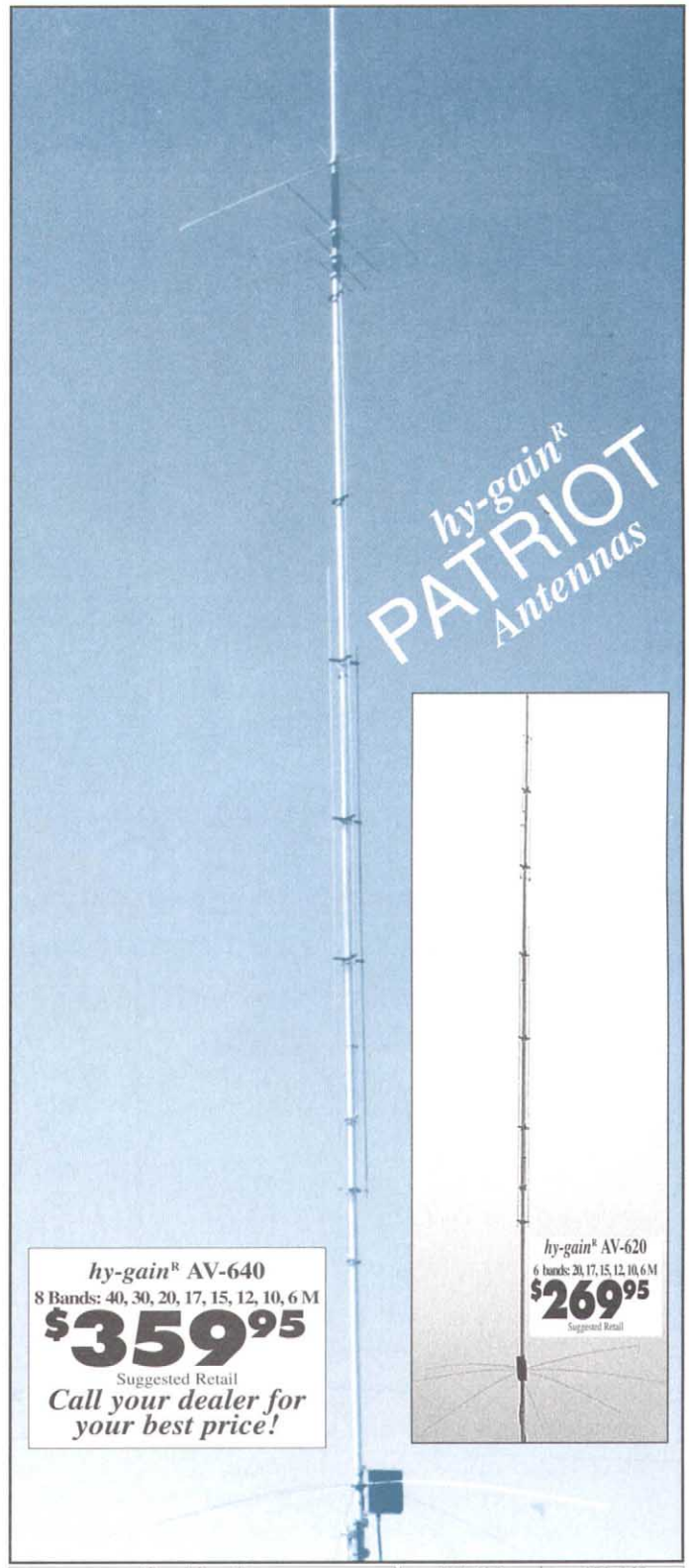
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40M	N/A	150
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20M	500	500
17M	500	500
15M	500	500
12M	500	500
10M	1500	1500
6M	2000	1500
VSWR at resonance (typical)	1.5:1	1.5:1
Power handling (watts output) key down 2 minutes	1500	1500
Vertical radiation angle (degrees)	17	17
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Wind survival (mph)	80	80

Happy Holidays from *QST*!



Ham holidays in miniature. When Albert Hunt, KF4EHH, built an intricate dollhouse for his wife Rachel, KF4EHI, he included her Amateur Radio station in a Christmas motiff. To make the scene complete, Al even added a miniature of her dog SuSu.



Kris Kringle at the trailhead. Shirley Ploeger, W0AVG (right), is a volunteer communications aid at Kathy Trail State Park in central Missouri. When St Nick visited the trailhead in Marthasville, Shirley showed up with his Christmas gift list.

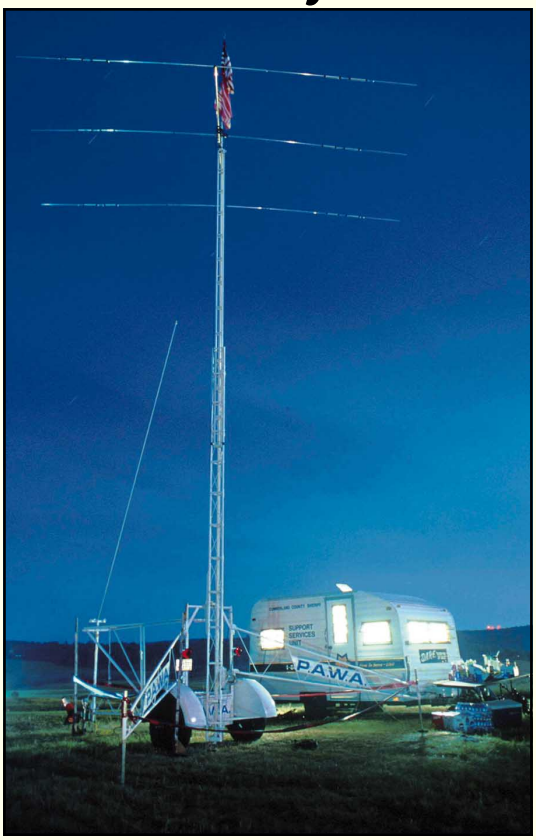


You never know what you'll find under a Christmas tree—or above one, for that matter. In Bend, Oregon the tower of ARRL Section Manager William Sawders, K7ZM, supports this brilliant celebration of the Holidays.



Santa (AA2SR) makes a stop at the children's ward of Port Jefferson Hospital in eastern Long Island, New York. Using his H-T Santa communicated with his elves (KA2HTV, KG2M, N2OX, KC2ACL and N2ZN) to check who was naughty or nice.

Visions of Field Day 1999



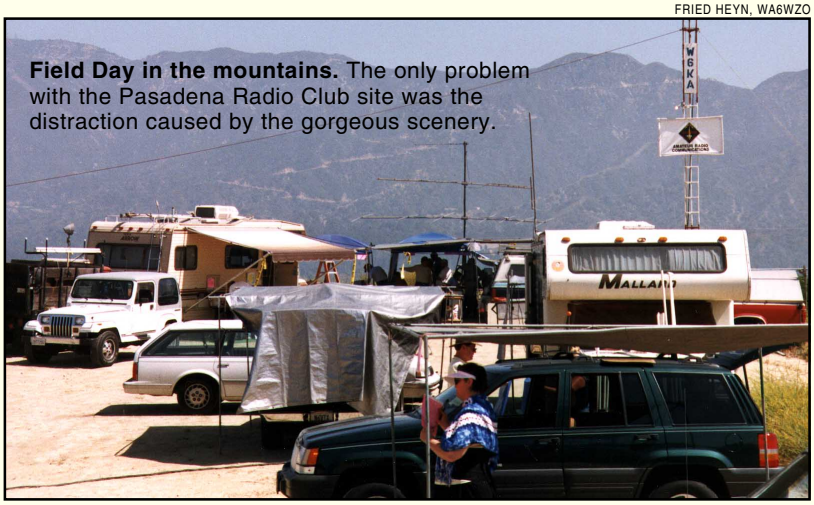
"Tower by Moonlight" was shot by Mike Leonard, KA1IOD at the Portland (Maine) Amateur Wireless Association Field Day site. Yes, a tower and beam antenna can be a thing of beauty!

FRIED HEYN, WA6WZO



Just one more antenna? Ivan, KB6AT, puts the finishing touches on the United Radio Amateur Club Field Day van.

FRIED HEYN, WA6WZO

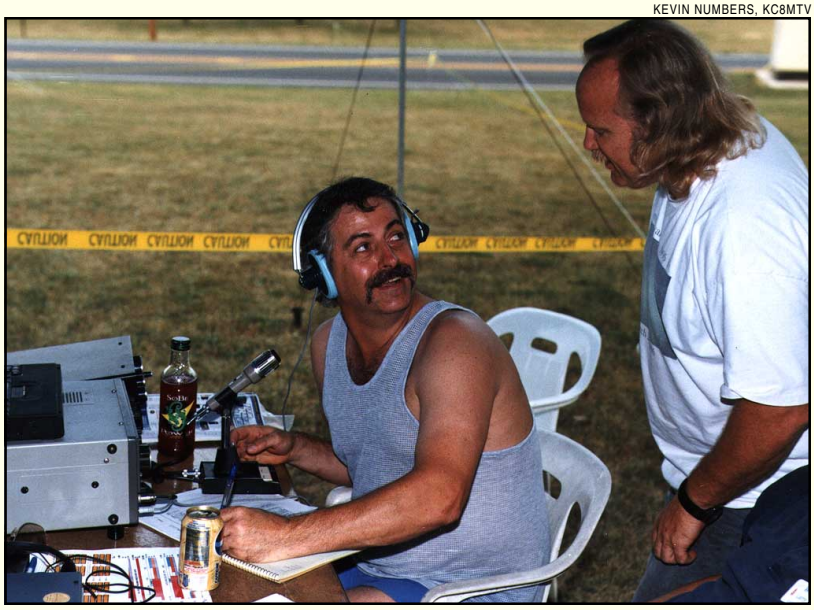


Field Day in the mountains. The only problem with the Pasadena Radio Club site was the distraction caused by the gorgeous scenery.



Ashley, KC2EEQ, draws a crowd as she makes a CW contact with W8ACW. A group of Tiger Scouts dropped by the Field Day station to see Amateur Radio in action.

KEVIN NUMBERS, KC8MTV



This year the Lancaster/Fairfield County (Ohio) Amateur Radio Club set up their first 6-A Field Day operation. Chuck Bruckelmeyer, W8LCT (seated), works phone while fielding questions from Mike Hamilton, KC8LCY

BRUCE HERRICK, WW1M



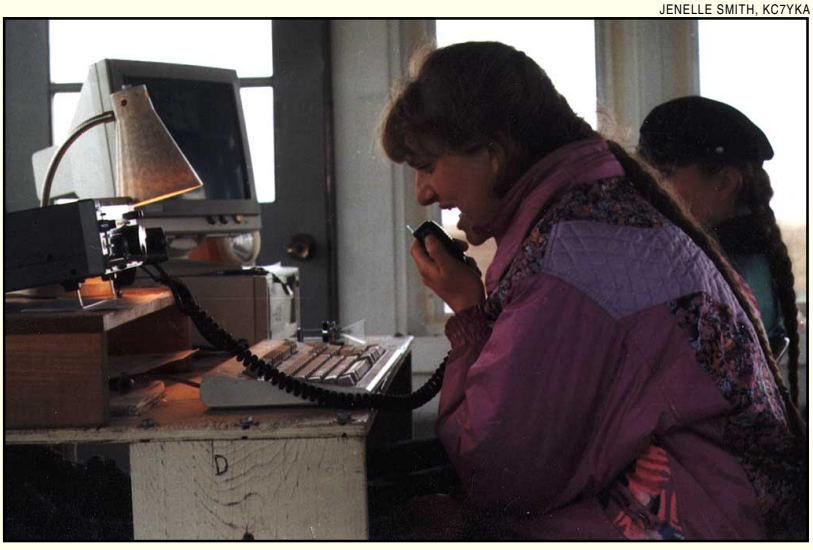
Brian, WA4LIR, works the paddles while Doug, AB1T, logs at W1NVT, the Radio Amateurs of Northern Vermont station near Essex Junction.

STAN CALDWELL



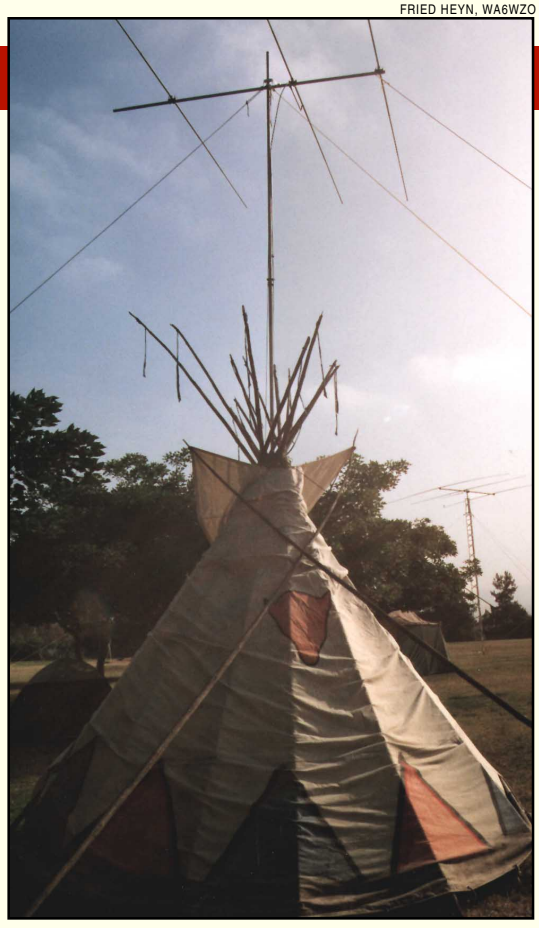
Let's see where we stand! Ray Rocker, WQ5L, checks the log before hammering out more CW contacts at the Hattiesburg (Mississippi) Amateur Radio club site.

JENELLE SMITH, KC7YKA



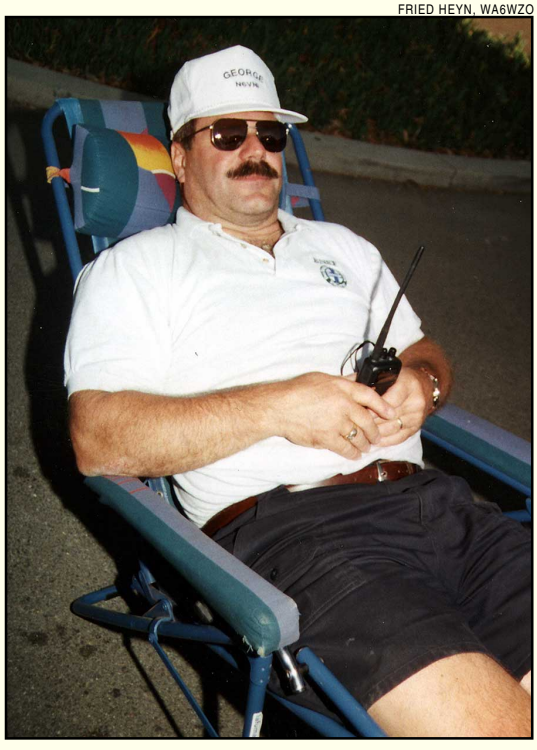
Frantic Field Day! Adina Ownbey, AB7YB, shouts the exchange from a mountain lookout tower in Northern Idaho.

FRIED HEYN, WA6WZO



Any shelter will do—even a teepee! The Southern California Amateur Transmitting Society attracted plenty of attention with this imaginative station set up.

FRIED HEYN, WA6WZO



Are you sure his eyes are open? George, N6VNI, prefers relaxed Field Day operating.



FT-8100R
The versatile FT-8100R Dual Band Mobile offers rugged RF design, 50 Watt (VHF)/35 Watt (UHF) power output, 310 memory channels, Dual Receive (VV/UU/VU), Enhanced Smart Search,™ CTCSS Encode, and a TX Time-Out Timer. (ADMS-2E programming software available.)



FT-100
This ultra-compact HF/VHF/UHF 100W Transceiver provides SSB, CW, AM, FM and AFSK coverage of the HF, 6M, 2M and 70 CM bands. Features include 300 memory channels, built-in Electronic Memory Keyer, DSP, IF Shift, IF Noise Blanker, and CTCSS/DCS.



FT-3000M
This 70W high-powered 2M FM Mobile provides extended UHF receiver coverage, AM Aircraft RX, and is MIL-STD approved. The FT-3000M features 81 memory channels, Smart Search,™ CTCSS/DCS, optional ADMS-2E programming software, and is 1200/9600 Baud Packet compatible.



FT-290RII
Ideal for base, vacation, or expedition use, this 25 Watt 144 MHz Multimode Transceiver is outstanding for emergency, travel, or weak-signal DX work. Optional battery pack allows over-the-shoulder portable use for search-and-rescue operation.



FT-2600M
This heavy-duty VHF FM Mobile is encased in a durable aluminum die-cast chassis/heatsink assembly, and manufactured to MIL-STD 810 requirements. Features include 60 Watt power output, 179 memory channels, direct keypad frequency entry from microphone, Alphanumeric memories, and PC programming capability with optional ADMS-2E software.

FT-90R
The new FT-90R VHF/UHF Mobile Transceiver wasn't given the name Micro Mobile for nothing. Weighing only 1.42 pounds, half the size of the competing brands, it fits almost anywhere. But don't let the size fool you. The FT-90R is one powerful Dual Band FM Transceiver. The high-performance receiver front end utilizes a GaAs MES FET device for excellent sensitivity, allowing for greater simplex range and access to distant repeaters. The adaptable Micro Mobile has programmable function keys, a high-capacity memory system and a versatile scanning system for active operation.



LITTLE BIG MOUTH.

Life is an adventure. So whether you're on expedition or vacation, you will probably encounter some rough going along the way. And when you do, you'll be glad that your mobile transceiver is a Yaesu. With units small enough to install almost anywhere and rugged enough to achieve military approval for shock and vibration, Yaesu is the obvious choice for dependability. Its exceptionally clear signal and wide dynamic range tame even the most crowded bands, and provide outstanding protection from intermodulation in urban areas. Learn more about Yaesu products on the web at www.yaesu.com

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FT-920
The FT-920 HF/6M Transceiver is designed for today's active Ham. It features high-speed DSP in all modes, 127 memory channels, AFSK or FSK Digital operation, new-technology MOSFET PA finals, high-speed Automatic Antenna Tuner, and high-resolution LCD display.



FT-1000D
Truly an elite-class HF masterpiece, the 200 Watt FT-1000D provides Dual Receive (in-band or cross-band), Cascaded IF Filters, extraordinary Dynamic Range, DDS, high-speed Automatic Antenna Tuner, and 100 memory channels.



FT-100
This ultra-compact HF/VHF/UHF 100 Watt Transceiver provides SSB, CW, AM, FM and AFSK coverage of the HF, 6M, 2M and 70 CM bands. Features include 300 memory channels, built-in Electronic Memory Keyer, DSP, IF Shift, IF Noise Blanker, and CTCSS/DCS.



FT-840
Affordable yet feature filled, the FT-840 is an ideal traveling companion. It offers 160-10M TX with general coverage RX, 100 memory channels, DDS, CTCSS, Twin Band Stacking VFOs, and excellent receiver dynamic range.



FT-600
This compact 100 Watt HF Transceiver offers the utmost in operating simplicity. The MIL-STD rated FT-600 covers the 160-10M Amateur bands with General Coverage Receive, 100 memory channels, Direct Keypad Frequency Entry, and a front-mounted speaker.



VL-1000/VP-1000
The VL-1000 Quadra System is a Solid-State Linear Amplifier featuring four twin-MOSFET PA modules to produce 1000 Watts of clean power output on 160-15 Meters (500 Watts on 6M, modifiable for 12/10 meters). Included are an Automatic Antenna tuner, 2 Input and 4 Output Antenna Jacks, and extensive status displays on the multi-function LCD.

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The introduction of the FT-847 completely redefines base station operation by offering three radios in one–HF, VHF/UHF and Satellite. A full power multi-mode transceiver, the appropriately named Earth Station covers the HF, 50 MHz, 144 MHz and 430 MHz bands, and it includes crossband Full Duplex operating capability for satellite work. Its exceptional receiver performance is ready for all aspects of DX work thanks to the DSP filtering. And for local FM work both CTCSS and DCS encode/decode are built in. The FT-847 is an engineering breakthrough offering you the earth, the sky, and the moon in one compact package.



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Your opinions count! Send your letters to "Correspondence," ARRL, 225 Main St, Newington, CT 06111. You can also submit letters by fax at 860-594-0259, or via e-mail to: **qst@arrl.org**. 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.

WINTER SAFETY

♦ What happens when winter comes to the "outback" of the Pacific Northwest? Sometimes not much, but other times—look out!

Most people think that the states of Oregon and Washington are idyllic places where the winters are mild and damp. According to the stereotype the only northwestern states with brutal winters are Idaho and Montana. In truth, Oregon and Washington also receive ample blasts of snow.

Washington's Mt Baker is one of the snowiest places in the world. Last winter's total snowfall on the mountain was measured at 95 feet. Even in the lowlands it often becomes bitterly cold, with swirling winds and blowing snow, making winter travel in this area quite dangerous. By necessity some do venture out in the maelstroms, and some become trapped in these icy conditions.

On February 18, 1999 the Noontime Net was active on 7.268 MHz and Clyde Little, AA7WC, in Grants Pass, Oregon was the net control. At approximately 10:30 AM Clyde received a weak call from Loyd Davis, K8EI, who stated that he was traveling south of Lakeview, Oregon on Highway 395. He told Clyde that he was enveloped in a blizzard and had slid off the roadway. Loyd was stuck fast in a snow bank.

Because of propagation conditions, Larry Marshall, W6CI, had a better signal path to Loyd. He stepped in and helped pinpoint Loyd's position and condition. Within minutes Larry linked up with Terry Swartz, KI7PS, of Klamath Falls, Oregon and passed along the information. Terry immediately telephoned the Oregon State Highway Patrol and notified them of the emergency situation. The State Patrol called the Highway Maintenance department and a snowplow was dispatched to plow the road and locate Loyd.

The Noontime Net remained in contact with Loyd, the Highway Patrol and the Maintenance crews. They passed frequent updates to Loyd. Thanks to cooperation between all parties concerned, the rescue was successful.

What can you do, should you find yourself in a similar situation? Before the winter travel season arrives, study any resources you can find about winter driving. Assemble a survival kit (flashlights, candles, etc) and keep it in your car or truck. And above all else, keep your VHF, UHF or HF mobile station—and your vehicle—in good operating condition. You never know when you will find it necessary to call for help. Loyd Davis did, and now he is safe at home with his family in Bountiful, Utah.—*Jan M. VanAllen, K7YH, Kent, Washington*

CW FRUSTRATION

♦ I am writing this letter out of frustration with the CW exams. More than 20 years ago I attempted to learn Morse code in order to obtain my Novice license. I tried for several years without success.

With the advent of the codeless Technician license I finally was able to become a ham. I passed the written exam after a month of studying. Within a few months, however, I became bored with VHF. I decided to buckle down and try to learn Morse again so that I could explore the HF bands.

After *several hundred* hours of practice and three attempts, I passed the 5-WPM exam. My Technician Plus ticket now gives me at least partial access to HF. Of course, I want to go farther up the license ladder and obtain full HF privileges.

I consider myself a relatively smart person. I'm 42 years old, have a graduate degree, and have always been able to accomplish whatever I set my mind to. Attempting to learn Morse is the most difficult thing I have ever done, and it has ruined Amateur Radio for me. The struggle to advance in this hobby has turned into pure drudgery. I haven't switched my radio on in months!

In the interim I've passed my General written exam. I have been attempting to master Morse at 13 WPM, again spending hundreds of hours without success. I admit that I have a bad attitude. I never wanted to know Morse. I don't care about it and never wanted to use it. Morse has made me miserable, and unless I can come to terms with my failure to comprehend the dots and dashes, my equipment is going up for sale.

If you want to get more people interested in Amateur Radio, the solution is simple: Get rid of the CW exam requirements.—*Michael P. Anzalone, KB1DQR, Needham, Massachusetts*

[Michael passed his General on September 13, 1999—*Ed*]

FROM RESCUER TO VICTIM

♦ I was saddened to learn of the electrocution death of Raymond J. Feeley, K1CSB, while attempting to assist a motorist who had hit a utility pole. His death only brings home two basic principles taught to all emergency services personnel:

1. When attempting to become a rescuer, don't become another victim. Survey the entire scene from a safe distance to determine the known and potential hazards. Assume all electrical wires to be live!

2. If it is not safe for you to enter the scene, wait for personnel who are properly trained or equipped to do so.

While I applaud the willingness to provide assistance, we must all remember that if you are unfamiliar with the situation, or you are improperly equipped to handle it, the prudent thing to do is to call the incident in to the proper authorities, and do nothing more.

I once came upon a similar situation while returning from a hamfest. A car had rammed a utility pole in a driving rainstorm. The electrical wires were still attached to the pole, but not for long. I figured that I had just enough time to call for help, then quickly enter the vehicle. A few minutes later, while keeping the driver's neck aligned to prevent further injury, the wires came down. Safe within the insulated automobile, we waited for 45 minutes while the fire department de-energized the lines.

I knew the risk I had assumed. Had the wires come down while I was approaching or entering the vehicle, I would have been "toast," while the victim in the car would have been unaffected unless he decided to exit. But I followed the first rule by carefully surveying the scene. My survey showed that I had the time I needed.

Many amateurs want to provide public service, which is fine. Let's just do all we can to minimize the risks and avoid becoming victims ourselves.—*Howard Burkhart, KB6MYE, Emergency Medical Technician, San Pedro, California*

IS ANYONE OUT THERE?

♦ Taking a trip up and down the East Coast last summer, I was struck by the almost total silence on 146.52 MHz, both on the roads and in the major cities. Although I was unable to monitor continuously for the entire 2000 mile trip, I spent at least 6 hours a day doing so on the road, and logged only nine QSOs on .52 during the entire trip.

This is a staggering lack of activity, indicating that .52 is either no longer the de facto calling frequency, or that local groups of VHF hams are more clannish than ever. C'mon hams! Listen to 146.52 once in a while. Answer the passing stranger on the Interstate. We're still out there!—*Bob Harvey, K2PI, Warrenton, Virginia*

BOIL THE CORK

♦ I thoroughly enjoyed "'Key with Vintage' CW Paddles" by Vidi la Grange, ZS6AL, in the August *QST*. Who would imagine that you could make a functional key from something as mundane as a cork? I have a suggestion to make, though. Boil the cork in a pan of water for a minute or two before using it. The cork will swell to its original size. For a large, high-quality cork start with one from a champagne bottle.—*Charles Schwab, N4XBU, Lovettsville, Virginia*

THE KINDNESS OF STRANGERS

♦ About two years ago a friend and fellow ham, Louis, ZS1HE, was diagnosed with cancer. He fought a brave battle against the disease, but in early September a previously undetected tumor in his brain suddenly caused almost total paralysis. He lost the ability to talk, and only had use of his left hand. Staff at the hospital noticed that he was trying to communicate by tapping what appeared to be Morse code with that hand, but no one on the staff could decipher it.

I suddenly remembered the Morse reader designed by Francesco Morgantini, IK3OIL, which was featured in the August *QST*. To my dismay I quickly discovered that I had misplaced my August issue. In an e-mail message to Steve Ford, WB8IMY, *QST* Managing Editor, I explained the desperate situation and asked if there was some way I could obtain a copy of Francesco's article as quickly as possible.

I expected to receive cost information for ordering a reprint of the article. After all, like most magazines, *QST* doesn't distribute its material for free. Imagine my surprise when I received the article in Adobe Acrobat PDF format in my e-mail the very next day. It turns out that Steve, along with Jodi Morin, KA1JPA, in the *QST* production department, had bent the rules for me. With the Acrobat file in hand, I was able to build the reader and get it working quickly.

The story does not have a happy ending, though. In the time it took me to build the reader, Louie's condition worsened and he was placed on morphine, which rendered him unconscious most of the time. Louie finally passed away on September 12.

Even though my help came too late for Louie, this exercise confirmed my conviction that there are still people in the ham community who are willing to go out of their way to help total strangers. I also wish to extend my sincere thanks to Francesco Morgantini, IK3OIL, who designed this simple, useful circuit and generously made it available to those less gifted.—*Gustav Kuhn, ZS1NZ, Bothasig, South Africa*

NEGLECTING THE VISUALLY IMPAIRED

♦ I am a totally blind ham and I enjoy receiving *QST* through the National Library Service. As I read the *QST* "Product Reviews" I've been pleased to note that at least a couple of companies are beginning to offer voice-readout options for many transceiver functions, including frequency displays.

I wonder when transceiver manufacturers will realize just how many blind hams there are in the Amateur Radio community? Voice-readout options should be available for all new transceivers. And they should work with *all* functions, not just a few.

I hope some of the manufactures will realize that there are a lot of hams who are blind or partially sighted. Many of us will be happy to pay for a full-featured voice-readout option if it is made available. It means a lot more to us than just a clever gimmick.—*John Jacques, KG7FA, Apache Junction, Arizona*

SLIPPERY SLOPE

♦ There is a growing sentiment among some state and federal legislators that certain aspects of radio communication should be regulated or enforced by state authorities, rather than exclusively by the Federal Communications Commission. Although a portion of the ham radio community supports the concept in some instances, this is dangerous proposition that could have dire side effects for Amateur Radio operators in the long run.

Various laws have been proposed that would give state authorities the ability to enforce regulations against such things as illegally amplified or modified CB radios and radio interference. On the surface, radio amateurs would seem to benefit from such laws, but once the states have the power to control certain aspects of electronic communication, it is a slippery slope leading to further infringement of radio operators' privileges.

In the past some state jurisdictions enacted laws prohibiting scanners in one form or another, challenging ham operators' use of their legal VHF and UHF equipment. Although the FCC eventually rectified this situation, these laws initially placed Amateur Radio operators at odds with state regulations. Recently the Iowa legislature enacted an "eavesdropping" statute making the monitoring of *any* nonbroadcast electronic communication a class-D felony (see "DC Currents," September 1999 *QST*). The FCC will probably act to ensure that this law does not impact ham radio, but it represents an increasing desire by the states to regulate electronic communication.

The Amateur Radio community must resist this "regulation creep" by opposing any delegation of radio communication control to the states. State regulation of antenna structures in the past has taught us well that state legislators are not always benevolent toward Amateur Radio.—*Jeffrey L. Baker, WK3U, ARRL Volunteer Counsel, Miami, Florida* QST

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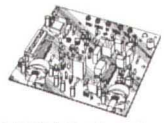
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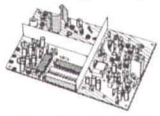
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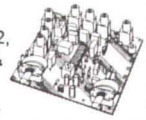
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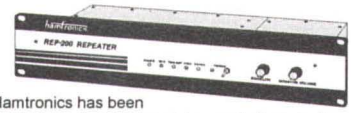
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This Month in Amateur Radio

December is one of the most delightful months of the year. The Holiday Season spreads its infectious cheer throughout the world, touching hearts everywhere.

December is also one of the best months for Amateur Radio! Propagation on the HF bands is outstanding, and this December we may also see spectacular conditions on VHF as well. Consider it a Holiday gift from Old Sol!

If you've never tried 160 meters, this is an ideal month to get your feet wet. The **ARRL 160-Meter Contest**, December 3 through 5, provides an outstanding opportunity to see what the "Top Band" can really do. Even if you don't have enough space for a full-size 160-meter antenna, throw as much wire into the air as you can and use an antenna tuner or other matching scheme to load it on 160. With a little patience and creativity, you'll be astonished at what you can accomplish during this enjoyable contest. The rules are in your November *QST*.

Last year's **ARRL 10-Meter Contest** was a DXer's dream—and this year it is expected to be even better! Just a few watts will work the world when the band is hot. December 11 and 12 are the dates to mark on your calendar!

Special event stations are a Holiday Season staple, and we have an excellent assortment this year. You'll find **holiday stations** on the air from Bethlehem, Indiana; Belen (Bethlehem), New Mexico; Marion, Indiana; Nazareth, Pennsylvania and Dallas, Texas. See "Special Events" in this issue.

How do you keep warm during a Canadian winter? You operate a fast and furious contest! December 19 is the date of the 24-hour **Radio Amateurs of Canada Winter Contest**. You'll find complete rules on the Web at **http://www.rac.ca/CANWIN.htm.**

Technically speaking, this **New Year's Eve** will not usher in a new century or millennium. That takes place *next* year. But try telling that to the billions of people who will spend the evening of December 31, 1999 at the greatest global celebration humanity has ever known! We suspect that most hams will be dancing in the streets with everyone else, but no doubt some will steal away to celebrate on the air with **Straight Key Night**. Look for the announcement in this issue.

A number of **special-event stations will be on the air for Y2K**. Listen for W1N from Rockford, Illinois; W2T from Austin, Texas; W0SOE in Wichita; W7VNE operating from Anaconda, Montana; K2M from Dallas, Texas, K2Y in Indianapolis and WA9SPT in Marion, Indiana. "Special Events" has complete details.





The sure cure for a "frosty" December is a hot contest!



The greatest celebration of all time is scheduled for New Year's Eve as we welcome the year 2000. Amateur Radio will be celebrating too with Straight Key Night and special-event stations galore.

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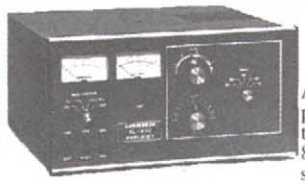
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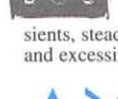
Stops power-up inrush current and absorbs momentary high voltage spikes to your amplifier. ICP-120 for 110 to 120V, ICP-240 for 220-240 V.

ATR-15 Legal Limit Antenna Tuner . . . $399



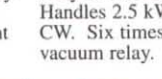
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By Rol Anders, K3RA

FIELD DAY

A Mirror of Amateur Radio History

Steeped in tradition and mystery, today's Field Day evolved from humble beginnings in the Golden Age of Radio. Anything but stable, Field Day rules and practices have changed radically since the 1930s.

Be careful when you start to search *QST* archives for the answer to a simple question—it can become an obsession! That's the lesson I learned when, following my participation in Field Day this year with the Potomac Valley Radio Club (W3AO—7A MDC), I was asked whether I thought we had set a new Field Day record. Because I volunteer at the Historical Electronics Museum in Linthicum, Maryland, which happens to have a nearly complete set of *QST*s in its library, I figured I would spend a lunch hour at the museum and dig up the 7A and overall Field Day records. In pursuing this goal I quickly learned that: (1) this is *not* a simple question; (2) the history of Field Day reflects the history of communications technology in general and ham radio in particular; and (3) old *QST*s are fascinating!

Here is a chronology of Field Day starting from the first outing in 1933. In the process of piecing this together, I learned (or relearned) much about what has happened to ham radio in the past 66 years.

1933: Field Day #1 QSO Leader Uses 1x4 Call Sign to Save Time

Great ideas often have humble beginnings, and Field Day is no exception. A one-column announcement in the June 1933 *QST* states that, for 27 hours starting the second Saturday in June at 4 PM local time (no daylight savings yet!), there would be an opportunity for "portables" to go into the field to contact as many stations as possible. Says F. E. Handy, W1BDI, in the announcement, "The real object of this contest is to test 'portables' wherever they may be available.... If successful, we want to make it an annual affair." To score the event, each QSO with fixed stations will count 1 point, contacts with other portables count 2 points, and DX contacts count 3 points. Multiply QSO points by the total number of ARRL sections, plus countries worked. No mention is made of a required exchange, which clearly must include an ARRL section!



By the '50s Field Day had grown into a major event worthy of its own *QST* cover.

The September 1933 *QST* announces that the winner of the First Annual Field Day is a non-club group signing W4PAW. Club members made 62 QSOs and had a multiplier of 28 sections/countries for a grand total of 1876 points. The Central Illinois Radio Club, W9ZZAL, tops the QSO totals with 98! What's the "ZZ" all about? Until 1933 it had been necessary to get a special license to operate portable, and these licenses all had suffixes starting with ZZ. In 1933 the FCC allowed portable operation under a home call sign. Why did the CIRC use their old call sign? Well, operating portable under the new rule called for an even longer station ID—your call sign followed by the break sign (double dash) *three times,* followed by the call area (1 through 9)!

1934: 60 W is QRO!

It looks like Handy's wish is coming true—there *will* be a Field Day number 2! The Field Day period remains the same, although the chosen weekend in June will range from the first to the third for a long time to come, eventually settling on the fourth full weekend of the month.

The characteristics of today's competition are beginning to be established. Emphasis is shifted to the total number of stations contacted—the multiplier for sections and countries has been removed. At this point, multi-band contacts are not permitted. DX contacts, while still allowed, receive no special point advantage. The scoring system begins to resemble Field Day as we now know it,

International Field Day—June 10th–11th

CLUBS, 56-mc. operators, *all* hams with licenses for portable stations, attention!! Starting Saturday at 4 p.m. local time (June 10th) and ending Sunday at 7 p.m. local time (June 11th), all U. S. A. and Canadian station owners are invited to schedule "field activities," excursions with concentrated operation of *portable* transmitters and receivers. Only portable stations, actually in the field, away from the "home" address are eligible to submit field day scores.

The object will be for each "portable" station to work as many other amateur stations as possible — each to count one point toward a score. *Any or all amateur frequency bands may be used*, voice or c.w. telegraph likewise. The "total" of such points may be multiplied by the number of A.R.R.L. Sections worked. Contact with another *portable* station at any point except its base, or home address, will "rate" double credit, or two (instead of one) points. Two-way work with a foreign station shall entitle the operator of the "portable" to triple credit, or three (instead of one) points, in addition to which each foreign country (prefix) may be added to the number of Sections to increase the "multiplier." The R.S.G.B., N.V.I.R. and R.B. are sponsors of similar national field days in Europe, and we hope this may assume an international complexion. All amateurs with licensed *portable* stations are invited to take part . . . each such station will please report its *power* and *frequency* band used, and its *log* of operation and *score* for the period given, within the week following the Field Day. Also, gang, don't forget to comply with F.R.C. regulations for portable station operation. Notify your Radio Supervisor of the approximate location and time of intended operation of the "portable" by postal or letter, just in advance of the "field" radio work. We shall be interested to know how many clubs plan outings, and also suggestions for a similar activity for 1934 (if you want one) will be welcomed.

Besides offering an opportunity to get out in the open in this fine spring weather, the real object of this contest is to test "portables" wherever they may be available. If successful we want to make it an annual affair. — *F. E. H.*

The first Field Day was announced in the June 1933 *QST* by F. Edward Handy, W1BDI.

with 3-, 2-, or 1-point multipliers per QSO depending on power output. The technology of the '30s is highlighted by the fact that the breakpoints are set at 20 W and 60 W! As technology changes these breakpoints are modified many times throughout the years to come.

The desire to encourage operation independent of public mains is also expressed by a 2X multiplier if either the receiver or transmitter is independent of public mains (3X if both are independent). The 3X multiplier is destined to last 37 years until it's removed in 1971! No special exchange is needed. The ops must simply indicate whether their stations are portable. At this early time in Field Day history, only portables are listed in the scores.

1936: The Year with Two Field Days!

The June 1936 Field Day is so popular a second one is held on August 22-23 with identical rules. Participation in both Field Days is about the same, as winning contact totals in June and August are 143 and 136, respectively.

1937: The "Field Day Message" is Born

The special Field Day of August 1936 apparently becomes Field Day number 4, as the Fifth *Annual* Field Day is announced for June 19-20. In a battle that continues to the present between creative rules interpretation and the "spirit of the law," the League outlaws "manufactured contacts with stations of the same field group." The Field Day message bonus, another venerable Field Day tradition, is born as 10 points (before multiplier) are awarded for a single properly formed and serviced message to League Headquarters stating the number of ops, location, "conditions," and power. Multipliers and QSO points are unchanged. For the first time, the winning QSO total exceeds 200 (204), with a breathtaking average rate of 7.5 QSOs per hour.

1938: I'm Not Ready to QRT!

The contest period is extended to 26 hours—from 4 PM Saturday to 6 PM Sunday.

1939: Everyone Form a Circle

For the first time, the area within which all equipment must be located is defined as a restrictive 100-foot radius. Do they mean this to include your 160-meter dipole?

1940: Modern Field Day Rules Emerge

Significant changes are afoot. For the first time, a station can be contacted on multiple bands. Results are grouped by the number of simultaneous transmitters used. The 100-foot circle expands to 500 feet, giving those multi-transmitter teams a little breathing room. Home stations are encouraged to work Field Day stations, and their scores will be listed, but no multipliers are allowed (a rule that never changed). The Field Day message to ARRL HQ now earns 25 points, points are given for Field Day handling of other teams' messages, and both home and portable stations get one point for each message copied and one point for a message passed on. From 1933 to 1980 message points will be changed no less than 12 times!

1941: Field Starts Simultaneously Across the Country (by Accident?)

The Field Day period now starts at 4 PM EST across the country. Strangely, this change may have come about by accident. To smooth the FCC approval every portable station needs for Field Day operation, the League informs the FCC of the Field Day period. In aptly numbered announcement 73-D, the FCC refers to a single operating period for all stations. My guess is that the League's communication to the FCC lists the period from 4 PM EST June 7, to 6 PM EST June 8, inadvertently establishing a single starting time.

Last year's change to allow contacts on multiple bands was apparently unclear, so this year's rules make a point to state that phone and CW are separate "bands" for the purposes of Field Day contacts. Also, even in these early days stations must be complaining about being in "black holes" as far as contesting is concerned. In response, an overall 1.5X mul-

HIGH CLAIMED-SCORES — 1946 FIELD DAY

As this issue goes to press, Field Day logs have been received from 104 club groups, 53 nonclub groups and individuals, and 45 home stations.

We are passing along the highest claimed-scores so far reported. These are subject to checking, and should not be considered a final tally.

CLUB GROUPS

(Listing shows club name, call used in FD, claimed-score, and number of simultaneously-operated transmitters.)

Jersey Shore Amateur Association	W2FC/2	9621–8
Frankford Radio Club	W3BES/3	8568–7
Tri-County Radio Association	W2KHK/2	6921–8
Northwest Amateur Radio Club	W9IT/9	6363–5
Monmouth County Amateur Radio Association	W3AC/2	6237–7
Motor City Radio Club	W8ONK/8	4500–3
St. Paul Radio Club	W9KYC/ø	4338–6
Greater Cincinnati Amateur Radio Assn.	W8JIN/8	4320–2
Four Lakes Amateur Radio Club	W9RNX/9	4239–3
Somerset Hills Radio Club	W3ZD/2	3978–5
York Road Radio Club	W3IU/3	3879–5
Steel City Amateur Radio Club	W8TUD/3	3870–5
Palomar Radio Club	W6BKZ/6	3756–6
Mountaineer Amateur Radio Association	W8BOK/8	3555–6
Mon Yough Amateur Transmitters Association	W8OC/8	3267–2
Amateur Transmitters Assn. of Western Pa.	W8BSO/3	3249–4
Wisconsin Valley Radio Association	W9RQM/9	3060–2
Narragansett Assn. of Amateur Radio Oprs.	W1LWA/1	3051–1
Minneapolis Radio Club	WøOBM/ø	2961–3
Northern Nassau Wireless Association	W2FJV/2	2907–5
Tulsa Amateur Radio Club	W5IAS/5	2875–4
Kalamazoo Amateur Radio Club	W8DM/8	2817–3
Beacon Radio Amateurs	W3ATR/3	2707–2
Lancaster Radio Transmitting Society	W3LN/3	2664–1
Delaware Valley Radio Association	W3AQ/2	2538–3
Milwaukee Radio Amateur Club	W9SYT/9	2538–3
Cuyahoga Radio Association	W8GW/8	2529–2
York Radio Club	W9GY/9	2502–3
Bridgeport Amateur Radio Club	W1MWN/1	2457–3
Cahokia Amateur Radio Club	W9TCK/9	2427–3
So. Lyme Beer, Chowder and Propagation Soc.	W1EH/1	2371–1
North Newark Amateur Radio Club	W2PY/2	2322–3
Greater Cincinnati Amateur Radio Assn.	W8SLO/8	2313–1
Racine Megacycle Club	W9PWJ/9	2214–3
Joliet Amateur Radio Society	W9HVZ/9	2181–3
Fort Worth Kilocycle Club	W5AA/5	2142–2
New Haven Amateur Radio Association	W1GB/1	2106–4
South Hills Brass Pounders and Modulators	W8BK/3	2061–2
Toledo Radio Club	W8ARF/8	2061–3
Iowa City Radio Club	WøIFB/ø	2040–3

NONCLUB GROUPS & INDIVIDUALS

(Listing shows call used by each group, number of operators, claimed score, and number of simultaneously-operated transmitters.)

W9ERU/9	10–2574–3	W1BDI/1	5–1428–1
W9RCQ/1	1–2115–1	W7RT/7	1–1424–1
W6PNU/6	4–1978–2	W8KYW/3	9–1368–2
W6STA/6	3–1876–2	W9VPD/9	4–1233–2
W2FBA/2	2–1827–1	W8UPS/4	5–1170–2
W9PEK/9	11–1512–2	W8VMF/3	4–1134–1
W8FBC/8	3–1467–1	W1GKJ/1	4–1116–1
W9AVE/9	7–1431–3	W1JWG/1	2–1057–1
W1LLX/1	2–1428–1		

High claimed scores from the first post-World War II Field Day.

tiplier is established for the Northwest, Pacific, Rocky Mountain, Southwest and West Gulf areas "to assist in equalizing contact opportunity…in these less populous areas." This West Coast handicap remains until 1950.

1942-1945: "Closed for the Duration"

As is the case with so many activities, Field Day posts a "Closed for the Duration" sign during WW II. In fact, so does all ham operating.

1946: The Post-War Era—A VHF-Only Category Debuts

Field Day returns after the war with virtually no changes. Starting time is back to local time (more evidence that the 1941 change was inadvertent). For the next three Field Days there is a VHF-only score listing designed "to lend point to the participation of VHF Emergency Corps networks that may wish to arrange special activities or simulated tests on these dates."

1948: CQ Field Day on 11 Meters?

Eleven meters is now available to hams (for a while) and it counts as a Field Day band. There are no CW/phone subbands on 11 meters, but phone and CW count separately here, too. The period is shortened to 24 hours, starting at 4 PM local time. Each station worked is now worth one point (regardless of whether fixed or portable). The 2X multiplier for *transmitters* that are independent of commercial mains is dropped. Battery operation now is recognized with a 1.5X multiplier.

1949: Field Day Mobile Operation Comes of Age

The growing interest in mobile operation results in some significant rules changes. This year, four categories are recognized: (1) Club and group (no battery multiplier); (2) One or two operators; (3) Mobile; and (4) Home stations. Also, the Club Aggregate Mobile listings are established whereby clubs can compete with teams of mobile stations. This special listing will last until it's quietly dropped in 1978. In other changes, a specific exchange of signal report and ARRL section is required for the first time, and the Field Day message now goes to the Section Communications Manager (today's SM) or the SEC rather than to HQ.

1950: Modern Field Day Classes are Established

The four classes offered last year are modified and labeled with letters for the first time: A—Club or non-club portable; B—Unit or individual portables (1 or 2 ops); C—Mobile; and D—Home. The Field Day "circle" is increased to 1000 feet. The wording last year said "25 points for each such [Field Day] message." What was meant, we learn, was 25 points for each team's *single* Field Day message (some stations, not unexpectedly, had cranked out a pile of Field Day messages looking for 25 points *each*).

1951: Duck, Cover and Turn on Your CONELRAD Monitor

Says June 1951 *QST*: "At a time when civil defense is organizing, the Field Day provides an unparalleled opportunity for mass testing of our emergency facilities." To encourage emergency preparedness, home stations on emergency power will be listed separately as Class D, while home stations on commercial power will be listed as Class E.

1952: "Having a Wonderful Time, Wish You Were Here"

The 1950 rule that allowed one point for any message originated during Field Day has resulted in some groups cranking out meaningless "rubber stamped" messages during Field Day to generate points. Because the emphasis is on contact totals and not message generation, the League responds by eliminating the bonus points for message origination after a trial of only two years.

1957: Simultaneous Start Returns

Field Day starts at 4 PM EST and ends at 4 PM PST, as usual, but now everyone can operate any 24 consecutive hours of the 27-hour period. The purpose of the change is to "encourage long-distance QSOs." For the first time, more than 10,000 hams participate, a 430% increase over the first postwar event in '46.

1963: Will "Manufactured" Contacts Ever be Eliminated?

Although contacts with other members of a Field Day group were outlawed way back in 1937, some creative types have determined that the rules don't ban those who are not "Field Day operators" from using the Field Day transmitters to work the group for points. The League counters by allowing a Field Day transmitter to be used only under one call sign.



If you think computer logging is a modern development, check out the key-punching station at the 1966 K2INO/3 Field Day effort. The cards containing the contact data were processed by an IBM 1401 computer at Johns Hopkins University after the event. K0OVZ is shown operating the key punch while WA2BUJ hunts for contacts.

1966: The Modern "Bonus Era" Begins

The simple Field Day message bonus concept, around since nearly the first Field Day, is expanded, bringing the beginnings of a wonderful aspect that one wag, who shall remain nameless (KE3Q), has characterized as "part radio contest, part scavenger hunt." Publicity is emphasized and 100% freedom from commercial power is stressed by a 500-point post-multiplier bonus for achieving at least two of the following three: (1) Use of no commercial power anywhere; (2) Publicity; or (3) Originating a message to the SCM or SEC.

1968: The Field Day Period is the Field Day, Period

A major change is adopted that makes setup within the 27-hour period *mandatory*, and the starting time is advanced two hours to 1900Z to accommodate the change. All home stations, emergency powered or on commercial mains, now compete in a single D category. The 1.5X multiplier for battery power now applies to categories A, B and C. Bonuses provide for 200 points each for publicity, 100% emergency power and/or message origination. Lastly, and largely ignored, the exchange is now section only—but in practice many can't resist sending a signal report anyway!

1969: An Idea Whose Time Has Not Come

Last year's mandatory setup within the 27-hour event period was not popular, so it is now optional (that is, ops can use the entire 27 hours if they start setup within that period). (Personal note: This was the year of my first Field Day victory—1A with WA3EPT/3, Johns Hopkins University Students and Alumni.)

1970: Increasing Novice Participation

To further encourage beginners, a "free" Novice station (set up and run by Novices) is allowed for groups running three or more transmitters. The League continues to battle with creative rules interpretation (or, depending on your viewpoint, technology advancements) by outlawing "octopus" hardware for interleaving transmissions to avoid moving to a higher transmitter category. (We had made great use of that technique in our '69 1A win.) On another note, I guess we are getting better at setting up, because the starting time is advanced yet another hour to 1800Z.

1971: Why Old-Timers Can't Remember Whether Home Emergency Power is Class D or E

After three years of being combined, Classes D and E are separate once again. The designators, however, are reversed. Class D is for home stations on commercial power,

while Class E encompasses home stations on emergency power. (I guess the feeling is that E for Emergency makes more sense.)

Major changes in the scoring system reduce points across the board. The 3X multiplier for 100% emergency power is eliminated and replaced by a requirement that all A and B transmitters now *must* be on emergency power. The 1.5X multiplier for battery operation is eliminated and replaced with limiting the QRP multiplier to battery operation only. The power multiplier now applies to the maximum power used at any time during the period. The four-QSO multiplier categories are reduced to three with a maximum of 3X for QRP/battery. Bonus points are now as follows: 100 points per transmitter for 100% emergency power; 50 points for publicity; 50 points for message origination; and 5 points per message relayed. Last, in a surrender to habit, the signal report is returned to the exchange!

1972: Batteries are on Their Own

Ops using battery power no longer compete with ops using non-battery sources. Scores are listed separately.

1973: The Space Age Comes to FD

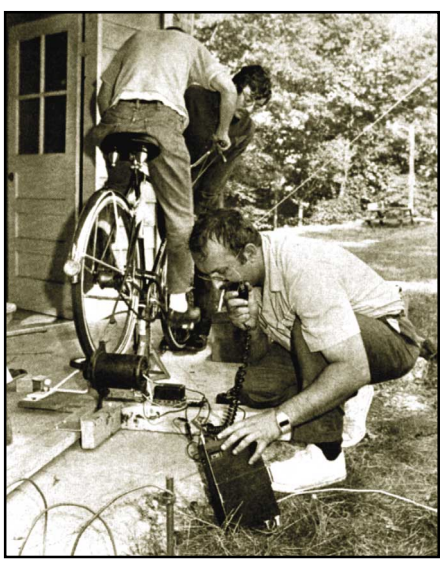
The repeater rule is waived for OSCAR 6 contacts and a 50-point satellite bonus is instituted.

1974: The Energy Crisis Strikes FD

A 100-point bonus is added for making natural power QSOs. The 15-minute rule for band changes further discourages tricky techniques for counting two transmitters as one.

1975: Is SSB Taking Over?

SSB is demonstrating its superiority to "conventional" AM, and phone QSO rates are so high that the mode threatens to dominate Field Day. To compensate, the 2X rule for CW QSOs is instituted on a trial basis (personal note: Hooray!).



In 1976 the Indianapolis Power & Light ARC made a natural-power contact. Gary, K9LNX, operated the radio while Ron, WB9DKL, supplied the muscle. Mike, WA9BWY, assisted by holding the bike in place.

1976: The 10,000 QSO Mark is Broken

Field Day results show the many unusual prefixes permitted by US amateurs celebrating the Bicentennial. W1VV/1 celebrates with 10,010 contacts! In doing so, the group surpasses the 1933 QSO record in its first 15 minutes of operation.

1977: Bring on the Techs!

Technician amateurs are now permitted to set up and operate the Novice station. Also, we have apparently solved the energy crisis because the natural power bonus is gone! The 2X rule for CW is "permanent."

1980: 1A CT

RST is replaced with category and class in the exchange. FCC and Field Day rules no longer require portable call sign designators Set-up time is tightened—nothing can be installed prior to 24 hours before the start of the Field Day period. Natural power was judged to be politically correct and too much fun to be eliminated—so it's back as a 100-point bonus. The satellite and Field Day message bonuses advance to 100 points. Copying the W1AW message is worth 100 points for the first time.

1981: 1001001

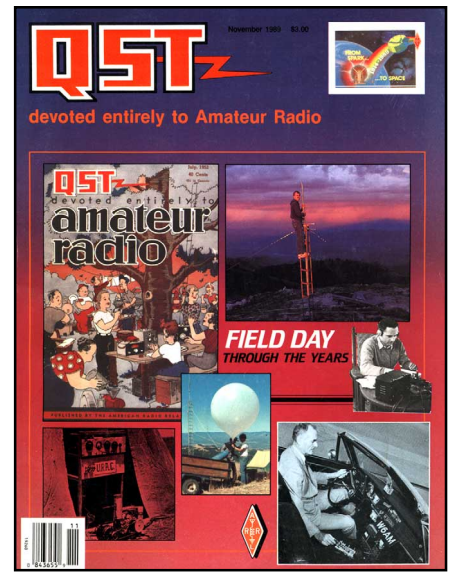
Computers are becoming ubiquitous and, as a result, packet radio is soaring in popularity. Field Day enters the digital era by providing a 100-point bonus for a single packet QSO, permitting one "free" packet station and waiving the repeater rule for packet to allow digipeaters and nodes to be used. The 15-minute rule is eliminated at VHF and above. The Yankee Clipper Contest Club and The Wireless Institute of the Northeast combine using call sign W2RQ to turn in a QSO total of 11,201—unbeaten 18 years later!

1984: We Finally Get it Right

Over the years we've had a heck of a time settling on the best way to score battery, low, medium and high power categories. Here's another try: The power breakpoints are adjusted so that the 5X multiplier applies to 5 W instead of 10 W (for battery or equivalent), and 2X applies to <150 W rather than <200 W. (These definitions will stick for at least the next 16 years! In particular, the 5X multiplier for QRP/battery turns out to be a good equalizer—the change will result in overall first place finishes by the entrants in this category in eight of the next 16 Field Days.)

1993: VHF Becomes a Major Field Day Factor

The growing influx of Technician licensees changes Field Day in a big way—there is now a 100-point bonus for making 10 VHF/UHF contacts and one "free" VHF/UHF station is permitted for Classes A and B.



Another Field Day retrospective graced the December 1989 *QST*.

1994: I Guess They Don't Need a 1.5X "Equalizer" Anymore

K6CAB (Conejo Valley ARC) logs the modern Field Day record score of 30,150 by operating in the 15A battery category with 3460 5-W QSOs!

1998: No More "Zero A" Entries

This year digital modes go from special handling to "mainline" modes. Although the "free" packet station and packet bonuses are eliminated, digital modes (including RTTY and PSK31) are added as a third mode on every band. Perhaps motivated by the "0A" tongue-in-cheek entry made by one station working exclusively on packet via the internet (thus *no* transmitters!), nodes and digipeaters are now outlawed for Field Day contacts. Finally, VHF/UHF has become such a mainstay that the 100-point bonus for 10 contacts is no longer needed.

So, that brings us up to date. Oh, I nearly forgot why I started all of this. Scores are fairly comparable from 1975 on—the year that the 2X multiplier went into effect for CW. With that definition, the Potamac Valley Radio Club team *did* set a modern record for 7A. In fact, our 26,324 claimed score is the highest non-battery score ever recorded in any category under the modern rules—beating N1FD's record set in 1998 by the narrow margin of 50 points!

Now, I wonder how the DX Contest got started…

You can contact Rol at 6021 Lawyers Hill Rd, Elkridge, MD 21227-5207; **anders@erols.com**.

By Dennis Motschenbacher, K7BV

Pileup Fun in the Midnight Sun

One of the rewards of being editor of the *National Contest Journal* has been making new acquaintances with other enthusiastic contesters and DXers such as Ari, OH1EH. Ari keeps *NCJ* readers informed about the activities of Contest Club Finland (CCF), one of the largest European contest groups.

In early 1998, Ari and his station partners Jukka, OH2MAM, and Juha, OH1JT, told me they were building a super station in the Aland Islands—OH0Z. By the end of that summer, the antenna towers were up and the ops were preparing to make a surprise assault on established European contest records.

Ari asked me if I'd like to operate from his new facility. I've visited nearly 50 countries but have never been to Europe. I instantly said "Yes!" and put my bid in for the 1999 CQWW WPX CW contest in May—in the Single Operator class.

I made the trip sound like a vacation so my wife, who handles the family budget, would accompany me (along with two of her sewing club friends). I'm not much of a tourist when there's a radio nearby.

As a dedicated DXpeditioner I'm fond of uninhabited islands and reefs (see "High Adventure on St Paul's Island—The CY9AA DXpedition," in August 1998 *QST*). Could I travel to the Aland Islands, OH0, without stopping at Market Reef (OJ0)—which counts as a separate DXCC country? I think not!

Arranging for landing permission, transportation and shelter seemed difficult. Ari recommended that I write Lars, OH0RJ, "Mr. Market Reef." Three weeks later, Seppo, OH1VR, a renowned contester and DXer, suggested that such a trip could be arranged. Seppo and Lars share a business arrangement that involves leasing the major structures on Market Reef. Seppo wanted to join me on the trip if he could find the time.

I asked a few friends to assemble a support team for the DXpedition. George, K5KG, of recent 3B7RF fame, agreed to perform pilot station duties; Bud, W6PBI, loaned me an expensive set of finals for my amplifier; Scott, KA9FOX, created a terrific web site to inform the Deserving; and a new friend, Steve, KU9C, immediately agreed to take on the thankless duties of QSL manager.

With two weeks to go, preparations for Market Reef were proceeding as planned. Pasi, OH1MM, a 28-year-old contester, had joined the team. Our crew totaled four when Lars elected to join in the fun.

Departure

The trip from Reno, Nevada, to Helsinki took my "girls" and me 22 long hours, but we arrived Saturday, May 22, with all luggage and radio equipment intact. After a quick hotel nap we learned that we that were the guests of honor at a luncheon sponsored by the local CCF contingent. We tossed ourselves together just in time to be escorted to the restaurant by CCF President Harri, OH6YF. I was absolutely tickled to find well-known contesters OH2MM (EA8EA), OH1NOA, OH2BU and OH2MAM in attendance.

Quick good-bye kisses from my wife the next morning marked the immediate beginning of my Market Reef quest. I wouldn't see Lieska again for nine days. The DXpedition gang met Seppo at the TV station he owns in Tampere and adjourned to his lakeside cottage so I could finally get on the air with my new call sign, OH3/K7BV.

Seppo had coffee brewing to lessen the pain of his 5 AM wake-up call. We sped off to the coastal town of Turku, arriving in time

Some great DXpeditions come off with hardly a hitch. If you ignore missing hardware and a crazed, sleep-deprived operator, this was one of them!



The crew is ready (and eager) to begin the helicopter flight to Market Reef.



The Market Reef buildings viewed from the Swedish side of the rocks on a calm day

to board a ferry leaving for Mariehamn, the capital (and only town) of the Aland Islands. Pasi, OH1MM, met us at the port and we drove the car into the bowels of the immense Viking Lines ferry. Seppo procured a room so we could grab a few winks during the passage, but I couldn't rest knowing that the pileups were only hours away. I was also starting to feel the affects of a cold settling into my chest—a bad omen as I would later discover.

Six hours of sailing put us into Mariehamn on schedule. Ten minutes of dashing down its side streets placed us at the airport where Lars, OH0RJ, was loading our small helicopter with provisions.

As the pilot warmed up the engine, Ari, OH1EH, and his wife Katarina arrived and quickly introduced themselves. They promised to pick me up if (or when) I returned.

We crammed into the little rescue helicopter and, after a momentary clutch of claustrophobia gripped my gut (thank you, Vietnam), we gently lifted off.

As we traveled toward Market Reef, at least a hundred islands of all shapes and sizes passed below us. Touchdown was truly uneventful—much less exciting than my boat landings on KP5 and CY9. Our gear was tossed out of the chopper near the Market Reef lighthouse. Seppo and Lars shared some solemn words with me to help celebrate the moment.

Seven minutes later, disaster struck. A backpack containing my logging computer, keyer and paddle was missing. I was speechless. Had I come all this way only to misplace essential equipment and endanger the success of the mission? Seppo helped me regain my composure.

The backpack became a source of humor, although I suspect my friends were just trying to keep my spirits up as we tried to get my rig—and Seppo's rig—on CW, our favorite mode. We had time the first evening to get a multiband wire antenna up for Seppo and a Cushcraft A3 tribander, complete with rotator, in the air for me.

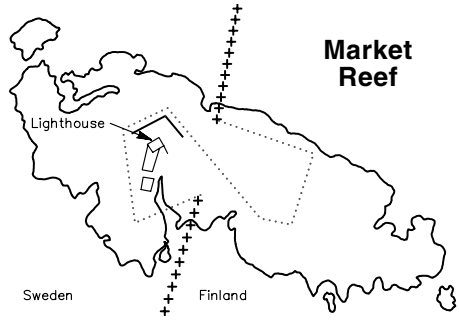
Before sending my first CQ, Lars had to perform a secret ceremony initiating Pasi and me into the Royal Order of the Chosen Few privileged to operate from Market Reef. I can't reveal the details other than to say that an expensive bottle of cognac is required!

On the Air

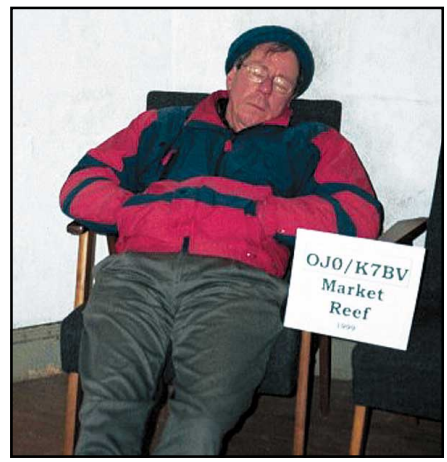
Seppo began by exploring 30, 17 and 12 meters, signing OJ0VR. My moment finally arrived. Using Seppo's computer I sent my first CQ. DL3HXX came back immediately. W4CO, from North America, was number three in the log. Thirty-five contacts later, JA6UBK, from Asia, made it through the pile-up. Twenty meters was wide open!

I soon became comfortable with the Finnish laptop PC. I was disappointed, though, because I couldn't achieve rates much over 250 QSOs per hour without my missing keyer paddle. But I was grateful to have the computer to use because there wasn't a spare paddle to be found on all of Market Reef!

Four hours later Lars stuck his head into



The + line indicates the original Sweden/Finland border. The dotted line shows the irregular border created several years ago to put the reef buildings in Finnish territory, hence creating a new DXCC entity!



With the pileup fun over, packing complete and antennas down, K7BV grabs a snooze while waiting for the helicopter.



Pasi, OH1MM, on the air from OJ0/K7BV.



The author plows through an OJ0/K7BV pileup.

my operating nook within the lighthouse to announce that it was "Eat it Now or Never" time. He had lovingly prepared his renowned "DX Soup" for just such occasions. Only Lars knows its contents, and I suspect it's better kept that way. It forms a warm lump inside chilled bodies; it's usually green, and meat of unknown origin is often an ingredient.

Our once-a-day meals were memorable because Lars would invariably recite entertaining Market Reef stories. Some were about the rock's history, while others highlighted the character defects exhibited by past operators. Because I display an abundance of character defects, I know I'll be a source of merriment for years to come.

Back to the rig and an endless string of 20-meter contacts. I was beginning to hallucinate, having slept only about five of the last 52 hours. My head cold was escalating but I was having too much fun. I hung in for 13 non-stop hours of CW pileup fun. At 10 AM Wednesday, I grabbed Pasi and told him he was about to make the first OJ0/K7BV SSB contacts. When he disappeared around the corner, I tossed his sleeping bag over me and blanked out for four hours.

Pasi did a good job quieting the clamor my pilot station, K5KG, was getting for phone contacts. After tossing down a slug of cold coffee to jolt my system awake, I jumped back into the operating chair. I switched to 15-meter CW, where K8CW was my first contact (1340Z). Bedlam followed as I was again racing to log as many contacts as possible.

Just before sunrise on Thursday—a vague event near the Arctic Circle—I moved to 40 meters. I desperately wanted to use the homebrew vertical antenna (complete with a black pirate's flag) Lars had placed atop the outhouse.

Seppo had to take a hasty midday helicopter ride home to take care of a business matter. Katarina showed up as a surprise guest when the chopper landed. She was probably the prettiest sight seen on Market Reef in decades!

I don't know if the wild look in her eyes was from the chopper ride or what she saw when she looked at me. I was unshaven and in the same clothes she had last seen me in days earlier. I had lost most of my voice and spoke in harsh whispers. I'd slept only 10 hours over the last three and a half days!

Seppo's computer flew out with him. Katarina had brought her husband's CW paddle from his OH0Z QTH, but it was an iambic model that I've never been able to master. My CW days were numbered. The loss of the computer also necessitated "paper logging," an ancient art that requires operators to *actually use a pencil and paper to keep track of QSOs!*

Seppo had been keeping his logs on paper throughout the trip because he'd given me his computer, a fact I was now able to acknowledge with even deeper appreciation. Pasi and I scribbled an additional 2000 call signs into our paper logs.

As the sun settled, Pasi and I moved to 80 meters, logging 215 hard-earned contacts. Friday morning propagation allowed only

five East Coast QSOs. 160 was out of the question!

We logged 6000 QSOs with 116 countries under my OJ0/K7BV call to go with Seppo's 2000 OJ0VR total—not bad for a short operation with modest antennas and one medically, if not mentally, handicapped operator—yours truly.

The helicopter was due back at noon, so the three of us packed our gear and closed down the expedition. Pasi again proved to be a real workhorse, taking down nearly all the antennas by himself while allowing me to make contacts to the last moment—another unselfish act of kindness extended my direction.

As our chopper headed towards Mariehamn I couldn't help smiling. I was zooming away from one rare QTH on my way to another!

The Abyss

By the time we landed, the adrenaline rush had faded. I was toast! My cold was so bad I'd completely lost my voice. I was trembling and incoherent when I greeted Ari and Katarina, who were there to pick me up as promised.

Ari immediately tried to talk me out of working the WPX contest, a mere 12 hours away. I rushed into my "I'm cool," "It doesn't really hurt," "I always smell like this" act to defer any scrutiny. Katarina, a nurse at a psychiatric facility, watched with quiet interest. I knew that if I made one false move I'd find myself strapped to a cot and wrapped in a straightjacket!

We compromised. We'd stop by the local pharmacy for some serious cold medication, drop my gear off at OH0Z and, if I was still discombobulated, I'd sleep for five hours at the cottage before the 48-hour contest started at 3 AM local time.

After five hours of sleeping like a mummy, the alarm clock startled me awake. I had lost about 10 pounds on Market Reef and hunger pangs were twisting my stomach into a knot. I wolfed down a BBQ chicken I found in the refrigerator, knowing that I wouldn't eat any solid food until the WPX was over.

Radio Sporting Team OH0Z

I stood outside the single room shack surveying the antennas that would make me a major player in the upcoming contest, secretly hoping I wouldn't embarrass myself. The two beautiful rotating towers (100 feet plus) bristled with nine Yagis designed and built by Finnish Antenna Ltd. The setup looked *loud* even against the gray midnight sky. Various 80- and 160-meter wire antennas hung from the towers. Ari and I discussed propagation and hooked up my precious computer, keyer and indispensable non-iambic paddle. The backpack had been waiting for me when the helicopter landed.

WPX CW '99

Ari stayed until 3 AM, making sure I didn't drift off into a stupor (how would he have known?). He checked me out on the coffeepot and left to get some sleep. I started the contest on 20 meters, finding the band open to most parts of the world. Having two towers with stacks of antennas was a major asset!

Seventeen hours later I took my first two-hour break. Ari had provided a foam rubber mat for napping. From that point on the contest is a complete blur.

As the skies brightened Monday morning, I completed my 36-hour stint an hour before the end of the contest. I only vaguely remember driving back to my cottage in the early morning light.

Five hours later, the dreaded alarm clock sounded again, reminding me that it was time to accompany Ari and Katarina to Mariehamn for a quick breakfast before saying good-bye.

I asked Ari if I'd had a good time. He stared blankly. By now he was used to my behavior and pretended to ignore the significance of the question. Ari proudly informed me that my score—3045 QSOs and 802 multipliers—was a new Scandinavian record, which, of course, pleased me. I only wish I had "been there" mentally to enjoy the fun!

My wife and her friends returned to the Islands aboard a ferry after visiting Stockholm for a few days. Friday, we spent a pleasant evening having Lars as a dinner guest and visiting his ocean-side home. Saturday, June 5, we boarded a FinnAir flight for Helsinki, the first leg on the long ride back to Nevada. Unfortunately, our luggage and the radio gear took a different flight. All but one bag eventually showed up.

The ride to our house was a bit breezy because some pathetic soul had seen fit to break out a window in our car to steal my tower tools. I hope the thief raps his knuckles with those tools as often as I have.

Return to Market Reef!

In early July, a business associate asked if there was *any way* I could attend an important business conference in London in September. I calmly responded that I would get back to him with an answer. Meanwhile, my pulse pounded as I dashed off a quick e-mail to Seppo, asking if he was ready to round up the gang up and again head to Market Reef! He immediately responded with an enthusiastic, "Yes!"

The September trip to OJ0 and OH0 proved to be a tough one. After the business meeting in London, Roger, G3SXW, picked me up for a pleasant evening shared with his wife Virginia. The actual DXpedition opened in the Aland Islands the next day with a concerted 80 and 160 meter effort by Ari, OH1EH, and me operating from the OH0Z super station throughout the evening of Monday, September 13th until sunrise on Tuesday. Only 110 QSOs were logged—a certain indicator that difficult radio conditions lie ahead for the Market Reef DXpedition.

My friends Seppo, OH1VR, Pasi, OH1MM and Lars, OH0RJ, again greeted me at the airport with big smiles. We all found it hard to believe we were together again about to begin another Market Reef adventure. But another omen of trouble ahead occurred at the Mariehamn airport when the helicopter pilot refused to carry us and our gear to the reef in one trip. He stubbornly demanded two expensive roundtrips.

Disturbed propagation greeted us after we rushed through antenna erection work necessitated by our delayed arrival on Market Reef. The propagation gods seriously challenged our attempt to reach our goal of 12,000 QSOs (10,000 QSOs were made). The trip did keep its 160 and 80 meter focus, though, making well over 1,000 much needed QSOs on those bands.

North American contacts were few and far between on all bands, with the RF-absorbing auroral zone extending deep into southern latitudes. K indexes as high as 6 were reported and visible aurora was noted as far south as southern Germany.

We erected an inverted-**L** antenna for 160 and a vertical for 80 on the reef, but even this did not produce a significant number of contacts with the North American Top Band crowd who so generously financially supported the second trip to Market Reef. I concentrated on these two bands each night, ignoring openings on the other bands. The antennas did produce QSOs on both bands as far away as VK6 and other distant points, but the only North American QSO completed on 160 was almost predictably made with VE1ZZ. Bernie, W3UR, snagged the first 80-meter contact. Forty meters was also a disappointment to North American with only one decent opening.

But tough radio conditions, colder autumn temperatures and winds approaching gale force could not keep my strong-willed Finnish friends from losing spirit. They worked hard with me to squeeze every possible watery contact out of the RF sponge, while sharing the special camaraderie that exists during challenging times.

You can contact the author at 4357 Appollonio Way, Carson City, NV 89704; **k7bv@arrl.org**.

Market Reef, OJ0

Market Reef is a collection of rocks in the northern reaches of the Baltic Sea that rise a few feet above mean sea level. During frequent storms, the lighthouse appears to float in the roiling seas while waves completely submerge the reef. On a good day you can find enough dry rock to string an 80-meter dipole.

The reef sits astride the offshore Finnish-Swedish border. During WWII mine-laying operations it was discovered that the lighthouse complex, owned by Finland, was actually several feet inside Swedish territory. After endless negotiations the Finns claimed the lighthouse site and awarded the Swedes an equivalent area from the Finnish side of the reef. The area given to the Swedes put foreign territory between the lighthouse and its mother country, Finland.

Don Urbytes, W8LGV

A PSK31 Tuning Aid

Do you find it difficult to tune in a PSK31 signal? Here's a helping hand!

When I read Steve (WB8IMY) Ford's PSK31 article in the May issue of *QST*,[1] I was hooked! I couldn't wait to give PSK31 a try! My initial enthusiasm was dampened a bit, though, when I discovered I had difficulty tuning in the narrow-bandwidth PSK signals. My HF rig is a computer-controlled Kachina transceiver[2] that operates in a *Windows*-controlled environment. I *really* enjoy using this rig, but when it came to tuning in a PSK signal, I hit a snag: The Kachina allows opening only one window at a time. Because tuning the Kachina requires displaying its virtual control-panel screen, I'm not able to display and use the PSK software's tuning screen. To overcome this nuisance, I developed the PSK31 Tuning Aid. Although the Tuning Aid is designed primarily for use with the Kachina, it is simple enough to easily be adapted for use with *any* transceiver.

Circuit Description

Refer to the schematic in Figure 1. Signals and dc power from the Kachina are routed via a cable connected between the transceiver's **ACC-1** jack and a DIN jack (J3) on the back panel of the Tuning Aid. If you're using the Tuning Aid with a transceiver other than a Kachina, feed the incoming audio signal into phono jack J1 (mounted next to J3). Power the circuit with a 9 to 12-V dc supply connected to J2; you can use an appropriately sized wall transformer. The 5-V dc supply developed by U1 powers the op amps and tone decoders which draw a total of about 100 mA.

[1]Notes appear on page 37.

As shown in Figure 1, the incoming signal is fed to U2A, an LM2904 voltage follower, through a low-pass filter consisting of a R3 and C3. The second half of the LM2904 (U2B) provides a gain of 10 and delivers the amplified signal to the inputs of three NE567 tone decoders, U3 through U5. Biasing networks on the noninverting inputs of U2A and U2B (R4/R5 and R7/R8, respectively) allow the signal to swing positively and negatively without becoming distorted.

The Tuning Aid uses three fixed decoder frequencies. While tuning, you can determine if the incoming signal is below, above or exactly at 1 kHz. U3 is tuned to approximately 900 Hz and U4 to exactly 1 kHz. U5 responds to an input frequency of approximately 1100 Hz. R13 (at pin 6 of U4) is used for fine-tuning to set the 1-kHz signal response of U4. Whenever the audio-input frequency matches that of one of the decoders' design frequencies, pin 8 of the respective NE567 (U3-U5) goes low, causing the associated LED (DS2, DS3 or DS4) to illuminate. For example, if the **LOW** LED (DS2) is illuminated when tuning in a PSK signal, tune your transceiver for a Tuning Aid input-signal frequency increase to light the yellow **1-kHz** LED. If the **HIGH** LED (DS4) is lit, an input-signal frequency decrease is required. R14, a 2.5-kΩ potentiometer (**FILTER**) connected to U4 pins 5 and 6, acts as a bandwidth control that allows changing the capture range of the Tuning Aid.

Assembly and Alignment

Construction and alignment of the PSK31 Tuning Aid are simple and straightforward; component layout is not critical. I built my prototype using RadioShack general-purpose IC PC boards, but ready-made PC boards are available from FAR Circuits.[3] The enclosure shown in the photographs is one I picked up at a local swap meet; any enclosure large enough to hold the components should do. My enclosure measures $1^{5}/_{8} \times 7^{1}/_{4} \times 5^{3}/_{8}$ inches (HWD).

To align the three frequency-decoder sections, use a signal generator and frequency counter to ensure accurate frequency measurement. While aligning my prototype, I fed a 900-Hz signal into U3 and hand-selected the value of R10 to decode that signal. With a value of 12 kΩ, I am able to decode a frequency of about 890 Hz. The response frequencies of U3 and U5 do not have to be exact. U5 is tuned similarly to U3, but this time an 1100-Hz signal is used. With a value of 9.1 kΩ for R16, U3's decode frequency is about 1110 Hz.

Setting up U4 requires just a little more time. Feed a 1-kHz signal into U4. Keep the bandwidth wide (high resistance at the **FILTER** control) and adjust R13 for a 1-kHz decode. Once U4 is tuned to 1 kHz, you can adjust the **FILTER** control to whichever bandwidth you desire. When the **FILTER** control (bandwidth) is set narrow, you need to be more careful when tuning your transceiver. The Tuning Aid's **GAIN** control setting is not critical; normally I set it at midposition.

Summary

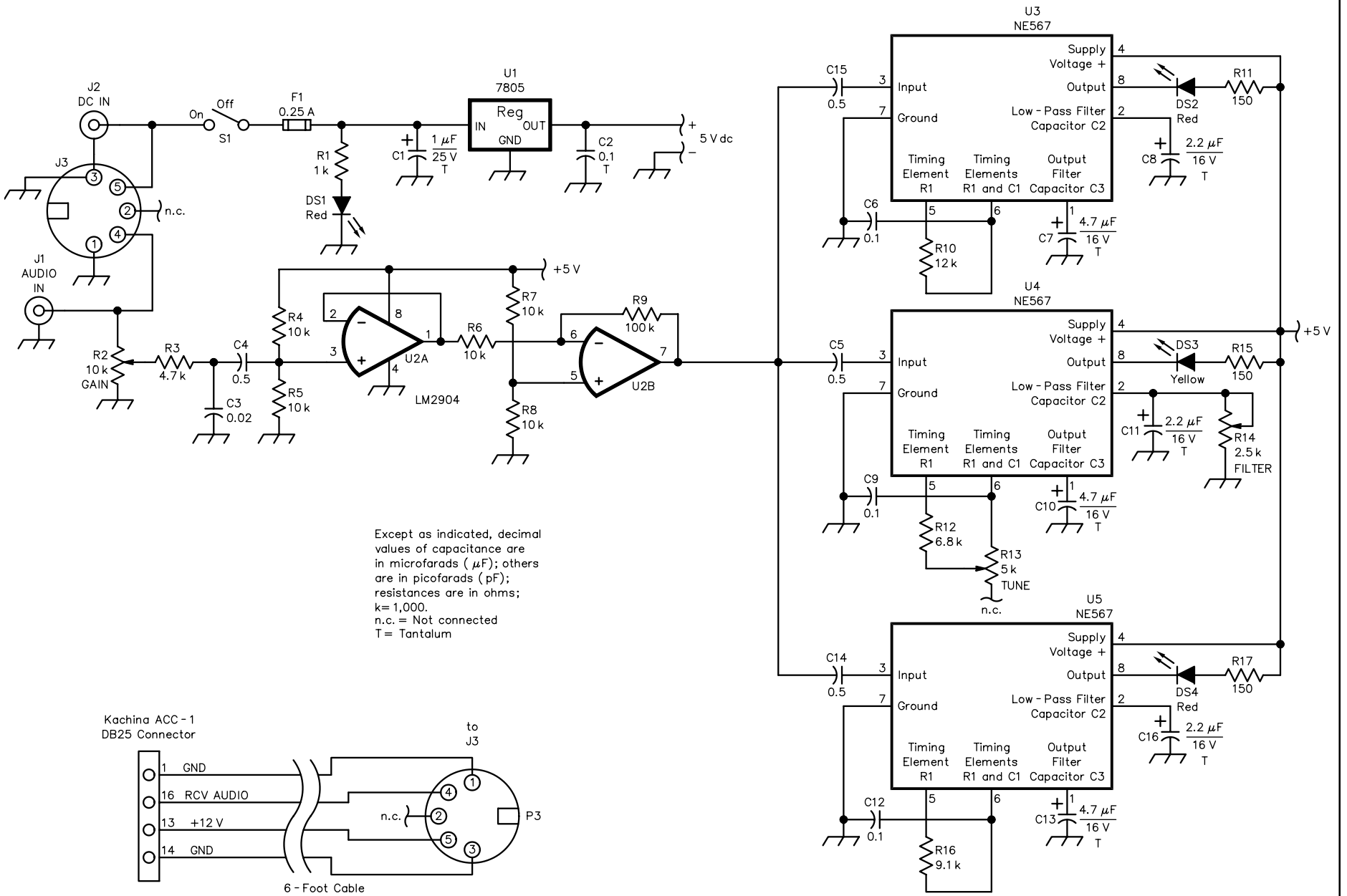
I have used this Tuning Aid for a few months now and find it quite useful and easy to operate. It works well with software



The Tuning Aid's front panel is clean and functional. From left to right are the **ON/OFF** switch, with DS1 above it, DS2 (**LOW**), DS3 (**1 KHZ**), DS4 (**HIGH**) and the **GAIN** control, R2.



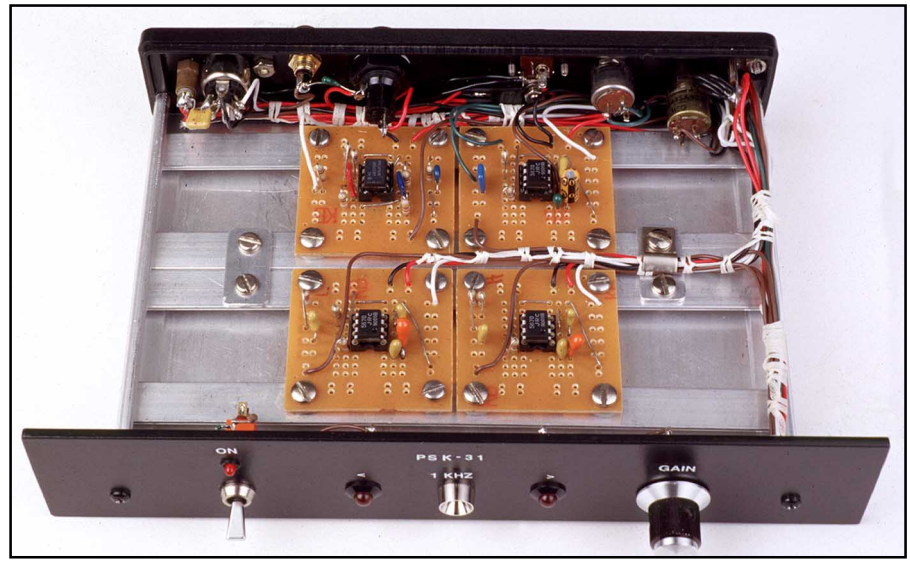
On the PSK31 Tuning Aid's rear panel are (left to right) the **FILTER** control (R14), **TUNE** pot (R13), dc input jack J2, fuse holder, and J1 and J3 (labeled **SIGNAL**).



Except as indicated, decimal values of capacitance are in microfarads (µF); others are in picofarads (pF); resistances are in ohms; k= 1,000.
n.c. = Not connected
T= Tantalum

Figure 1—Schematic of the PSK31 Tuning Aid. Unless otherwise specified, resistors are 1/4 W, 5% tolerance carbon-composition or film units. For part numbers in parentheses, RS=RadioShack; ME=Mouser Electronics, 958 N Main St, Mansfield, TX 76063-4827; tel 800-346-6873, 817-483-4422, fax 817-483-0931; **sales@mouser.com**; **http://www.mouser.com**. Equivalent parts can be substituted; n.c. indicates no connection.

C1—1 µF, 25 V tantalum (RS 272-1434)
C2—0.1 µF, 16 V tantalum (RS 11295821)
C3—0.02 µF, 16 V (ME 140-PF1H203)
C4, C5, C14, C15—0.5 µF, 16 V (ME 140-PF1H474K)
C6, C9, C12—0.1 µF, 100 V polypropylene (ME 1429-1104)
C7, C10, C13—4.7 µF, 16 V tantalum (ME 581-4.7K16V)
C8, C11, C16— 2.2 µF, 16 V tantalum (ME 581-2.2K16V)
DS1, DS2, DS4—Red LED (RS 276-018)
DS3—Yellow LED (RS 276-011)
F1—0.25-A fuse (RS 270-1002)
J1—Phono jack (ME 161-2052)
J2—Dc input jack (RS 274-1565)
J3—5-pin female DIN jack (RS 274-005)
J4—DB25 male connector (RS 276-1547); mates with the Kachina ACC-1 connector.
P3—5-pin in-line male DIN plug (RS 274-003)
R2—10 kΩ pot (ME 31CN401)
R13—5 kΩ pot (ME 31CN305)
R14—2.5 kΩ pot (ME 31CN302)
S1—SPST toggle (RS 275-624)
U1—7805 positive 5-V, 1-A voltage regulator (RS 276-1770)
U2—LM2904 op amp (ME 513-LM2904N)
U3—NE567 tone decoder (ME 513-NJM567D)
Misc: PC board (see Note 3) or dual general-purpose IC PC boards (RS 276-159), enclosure, fuse holder (RS 270-364), IC sockets, hardware.



An inside view of the author's neatly built prototype using RadioShack general-purpose IC PC boards. (PC boards are available from FAR Circuits, see Note 3). A surplus enclosure ($1^5/_8 \times 7^1/_4 \times 5^3/_8$ inches [HWD]) houses everything with room to spare.

such as *PSK for Windows* by Peter Martinez, G3PLX, and *Logger* by Robert C. Furzer, K4CY.[4] Give the Tuning Aid a try. I'm sure it will add to your PSK-31 operating fun!

Notes

[1]Steve Ford, WB8IMY, "PSK31—Has RTTY's Replacement Arrived?", *QST*, May, 1999, pp 41-44.

[2]Larry Wolfgang, WR1B, "Kachina 505DSP HF Transceiver," Product Review, *QST*, May 1998, pp 63-67.

[3]PC boards for this project are available from FAR Circuits, 18N640 Field Ct, Dundee, IL 60118-9269; tel 847-836-9148 (voice and fax). Price: $5.50 each plus $1.50 shipping for up to four boards. Visa and MasterCard accepted with a $3 service charge.

[4]You can find both programs on the Internet; try these sites: *PSK for Windows* **http://aintel.bi.ehu.es/psk31.html**; *Logger*: **http://www.chroniclenetworks.com/~dwm/Logger.htm**.

Don Urbytes, W8LGV, received his General class Amateur Radio License in 1951 at the age of 15, and upgraded to Extra Class about 10 years ago. Don literally grew up in the broadcast-engineering field, having started work at the age of 16 and making the transition from radio to TV in the '50s. Don attended electronics school at Fort Monmouth, New Jersey, from which he graduated with honors in electronic countermeasures. Don was in the US Army Security Agency for three years and later worked for seven years in the process-control field "making silicon." The last 26 years of Don's working career were at the General Motors Corp. Don retired in 1998 as Senior Experimental Engineer in Electronic Instrumentation and Controls. You can contact Don at 2297 W Catalina View Dr, Tucson, AZ 85742-4481; **durbytes@email.msn.com**.

New Products

HAMTRONICS LOW-NOISE VHF RECEIVER PREAMPLIFIERS

◊ Nearby FM broadcast stations, paging transmitters and or other strong out-of-band signals can overload the front end of your receiver. Adding a filter ahead of a receiver may block the interfering signal, but will also degrade the sensitivity due to the insertion loss. Hamtronics' new LNP series of preselectors include a low-noise preamplifier in front of the filter to establish a low noise figure before the signal reaches the filter stage.

In addition to an input filter in the preamp circuit, the device uses a three-pole L-C filter specifically optimized for the particular band. The preamp provides just enough gain to overcome the insertion loss of the filter stage with a little additional gain to help preserve the receiver's dynamic range characteristics.

The $1 \times 3^1/_2 \times 1/_2$ inch PC-board uses special RF-type RCA jacks for the coax connections. Power requirements are 10 mA at 12 to 15 V dc. Normally, the preselector is installed inside the radio in the 50-Ω signal path between the antenna and the receiver stage. Provisions are included to add an RF choke to the board, allowing the required dc power to be fed through the coax for remote mounting applications. Specific models are available for all popular bands between 132 and 180 MHz, including the 137 MHz weather satellite band.

The LNP series preselectors sell for $39. For more information contact Hamtronics Inc, 65 Moul Rd, Hilton, NY 14468; tel 716-392-9430; fax 716-392-9420; **jv@hamtronics.com**; **http://www.hamtronics.com**.

Next New Product

Strays

WANTED: INFO ON NAVY CW CONSOLE

◊ I'm searching for information on a 1960-era US Navy CW operating position (console). This console had the straight key located in a pigeonhole on the right side, a disappearing typewriter well, pigeonholes across the top and down the left side, and the receiver mounted above the top pigeonholes. Please contact Jim Bassett, W1RO/7, 7420 Silver Leaf Way, Las Vegas, NV 89147.

Next Stray

By John Hansen, W2FS

A Direct Frequency Entry Keypad for ICOM Transceivers



With just a few parts, this inexpensive add-on delivers a number of welcome features!

ICOM's IC-706 is an amazing radio! In a very small package, ICOM has included a fairly full-featured 100-W transceiver that covers a wide frequency range. To shrink the radio's size to this extent, however, it was impossible to include all the front-panel controls that you might expect to find on larger radios. Most notably missing is a keypad for directly entering specific operating frequencies. Additionally, changing bands on the '706 is somewhat awkward in that it involves repeatedly pressing the **TS** key until the cursor is over the megahertz digit, then rotating the tuning dial until the desired band is reached.

Although these actions might seem to be minor problems to some, for hams accustomed to using direct frequency entry, their absence is annoying, to say the least. For the visually impaired, these weak points might render the radio virtually unusable.

Fortunately, ICOM includes a computer port on the back of the '706. This port allows a number of functions to be computer controlled by running appropriate software. Although the designer probably envisioned the mating computer to be a standard PC, there's no reason we can't use a simpler means—such as a PIC microcontroller and a numeric keypad—to accomplish the same purpose. I used this approach to develop a simple frequency-entry keypad for my IC-706. The pad can also be used with most other ICOM radios that permit computer control.

Overview

The project is simplicity itself, requiring only a *programmed* 16F84 PIC microcontroller, a keypad and a few other inexpensive parts.[1] You don't need an ICOM CI-V interface to convert from RS-232-level signals to TTL level signals, because the PIC's outputs are already at TTL levels. The most expensive part of this project is the keypad itself. To limit this cost, I designed the circuit around a $19 RadioShack keypad/project box combination (RS 270-215). This RadioShack enclosure has a 9-V battery compartment and a convenient means for applying custom labels to the keys. Furthermore, the enclosure is *predrilled* to allow easy interfacing between the keypad and the box contents. Even the ribbon cable for connecting the keypad to your PC board is included! The only holes you need to make in the box are for the cable that connects the box to your radio and for the on/off switch. The end result is a reasonably professional-looking job for a homemade project.

Although a 12-key pad is adequate for providing frequency-entry functions, RadioShack's keypad has 15 keys. This got me thinking about adding other functions to the project. So, I included the ability to directly access any of the radio's memories (another feature omitted in the original '706), and a means to switch between the two VFOs and turn the split transmit/receive function on and off.

Circuit Description

The keypad circuit is shown in Figure 1. The eight lines from the keypad are connected to U1's eight Port B pins. Pins B0, B1 and B2 are designated as inputs. A +5-V pull-up signal is internally applied to these three pins. Thus, unless they are connected to an electric

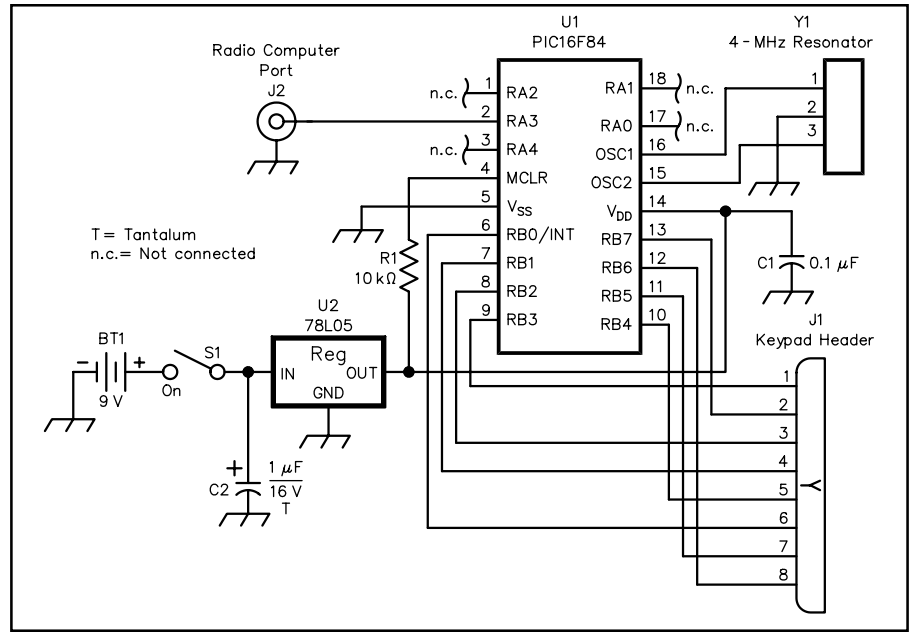


Figure 1—Schematic of the Direct Frequency Entry Keypad for ICOM Transceivers. Unless otherwise specified, resistors are 1/4-W, 5%-tolerance carbon-composition or film units. Equivalent parts can be substituted; n.c. indicates no connection.

[1]Notes appear on page 39.

ground, the PIC interprets them as being in a high state. The three input pins are connected to the three vertical columns of the keypad. Pins B3 through B7 are designated as outputs. Each of these pins is connected to one of the five horizontal rows of the keypad.

Most numeric keypads work as shown in Figure 2. A single wire connects to all of the keys in any given *row* of keys. Similarly, a single wire connects to each of the keys in any given *column* of keys. Thus, the number of wires needed for a given keypad is simply equal to the sum of the number of rows and columns. When a key is pressed, the relevant horizontal wire is connected to the relevant vertical wire.

To determine which key is being pressed, you merely need to know which two keypad wires are in contact and determine which key is connected to both of those wires. The PIC performs this function using its internal program. One pin at a time, the PIC takes each output pin to a ground state. As it does this, it looks to see which of the three input pins has switched to a low state. That will have occurred because that pin was connected to ground by the pressed key. By knowing which of its pins are connected, the PIC can determine which key is pressed. The procedure involves a number of processes within the PIC, but they happen so quickly that the result appears to be instantaneous.[2] Once the PIC has determined which key has been pressed, it sends an appropriately formatted command to the radio to accomplish the requested task.

Because so much of the work in this project is done by the PIC's software, little hardware is needed. Aside from the ceramic resonator and a capacitor and resistor required to support the PIC, the remaining components constitute a power supply to drop and regulate the battery's 9-V output to the 5-V level required by the PIC chip. If you prefer, you can use a battery holder and two AA (or AAA) cells and omit the power-supply components. The PIC seems to work just fine on 3 V, although this is technically outside the chip's specifications.

Using the Keypad

Figure 3 shows the RadioShack keypad layout. Before using the keypad for the first time, make sure that you have the proper computer port (CI-V) settings on your radio. Set the CI-V data rate to 9600 baud (or **AUTO**) and set the CI-V 731 mode to **OFF**. All ICOM radios have a CI-V address. That address must match the address used by the keypad. For example, the original '706 uses a hexadecimal address of 48h. This is the keypad's default setting, but you can reconfigure it. If your radio has a CI-V address that is not 48h (even the IC-706 Mk II is different from the original '706), you can either reconfigure the radio's address (refer to the IC-706 manual instructions), or you can reconfigure the keypad.

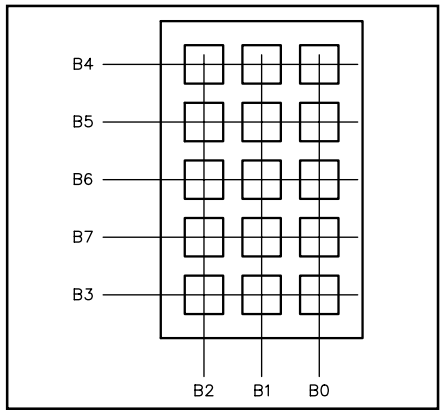
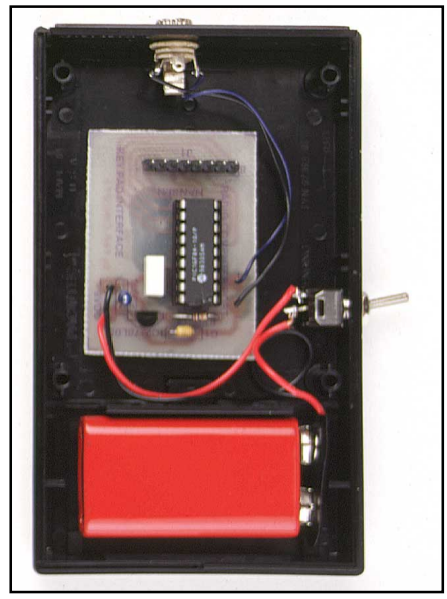


Figure 2—Pressing a key on the pad connects one PIC input line and one PIC output line. The PIC's internal program thereby determines the key pressed (see text).



An inside view of the keypad. What could be simpler to build?

To change the keypad address, simply press the asterisk (*) key *twice*, then key in the two-digit address that matches the address of your radio. You need to set the address only once (not each time you power up the keypad) because the address is saved in the keypad's nonvolatile memory. (One of the many nice features of the 16F84 is that it includes nonvolatile memory for such a purpose.)

Because ICOM addresses are specified in hexadecimal, it's possible that the CI-V address you want to use contains the hexadecimal digits A, B, C, D or E. Although the RadioShack keypad does not have these keys, I've provided a work-around. To specify one of these hexadecimal digits, first press the pound (**#**) key, then press **1** for A, **2** for B and so on. For example, if you want to specify the address 46, press ****46**. If you want to specify the address 2E, use ****2#5**. Remember: You only need to do this once (and only if you do not want to use the default value of 48h), not each time you use the keypad.

Keypad frequency entry is designed to be as intuitive as possible. Just enter the frequency's digits using the * key as a decimal point. When you are finished entering digits, press the **#** key. Generally, you don't have to worry if the frequency you are entering is in kilohertz or megahertz. If you enter **146*52#**, the keypad recognizes that you mean megahertz. If you enter **7120#**, the keypad knows you mean 7120 kHz. You would have obtained the same result if you had entered **7*120#** (7.120 MHz). The frequency can be specified down to the last hertz and you can omit trailing zeros. For example, if you enter **7#**, the pad knows you want the bottom of the 40-meter band. This provides a particularly convenient method of switching bands.

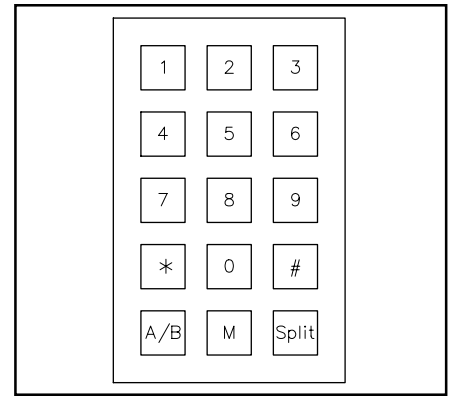


Figure 3—Key layout for the Direct Frequency Input Keypad.

You can enter memories by pushing the **M** key followed by the two-digit number corresponding to the memory that you want. Here you need not push the **#** key after entering the two digits, but you *must* enter exactly *two digits*. To go to memory 3, for example, you must enter **M03**. To return to the VFO mode from the memory mode, you can directly enter the new frequency you want, or simply push the **#** key without entering any preceding digits; that indicates you want to recall the last VFO frequency used.

The remaining keypad functions are fairly self-explanatory. The **A/B** key allows you to switch between the '706's VFOs from the keypad. The **SPLIT** button toggles the radio's split function on and off. By turning on the split, you can use the **A/B** key to monitor your transmit frequency.

Notes

[1]The source code used in this project's PIC16F84 is *not* public domain or shareware. However, individual radio amateurs may use it free of charge to make a keypad for their own Amateur Radio use. For commercial applications, please contact the author. The source code is available from the ARRL: **http://www.arrl.org/files/qst-binaries**. Kits for this project are available as follows (all prices postpaid): A *programmed* PIC16F84: $25; a *programmed* PIC and a PC board, $29; a kit of all parts including a PC board, excluding the RadioShack keyboard/box, $35. These items are all available from John Hansen, W2FS, 49 Maple Ave, Fredonia, New York, 14063. A PC board only for this project is available from FAR Circuits, 18N640 Field Ct, Dundee, IL 60118-9269; tel 847-836-9148 (voice and fax). Price: $4 plus $1.50 shipping for up to four boards. Visa and MasterCard accepted with a $3 service charge.

[2]For a discussion of programming considerations using matrix style keypads see: David Benson, *PIC'n Up the Pace* (Kelseyville, California, Square 1, 1997).

You can contact John Hansen, W2FS, at 49 Maple Ave, Fredonia, NY 14063; **john@hansen.net**.

Photos by Joe Bottiglieri, AA1GW

By Bert Kelley, AA4FB

A PIC SWR Meter



Need an SWR meter for your shack? Build this *computing* SWR meter!

No ham shack is complete without an SWR meter. Why? Because your rig is most content when it can see an SWR of 2:1 or less. To make your rig happy, you should know the SWR level between the rig and the tuner or antenna. How do you do that? With an SWR meter, of course!

I designed this SWR meter to use few parts, to be inexpensive and easy to build. The meter has two subassemblies: the processing unit and the SWR sampling unit. The dc samples of forward and reverse voltage are processed by a *programmed* PIC[1] microcontroller that computes the SWR and directly drives a large bright display. No calibration against another standard is necessary because the computed number *is* the SWR. The SWR is displayed as two digits—units and tenths of a unit. The processor and the display are mounted on a small PC board that mounts on the panel.

Determining SWR

The PIC has four ADCs (two of which are used in this application), RAM, the EPROM containing the program and an oscillator—everything needed in one small 18-pin package. There's more than enough on-board power in the PIC to directly drive the large LED display. The flow chart of shows how the PIC's program calculates SWR. The PIC's ADCs translate the two dc inputs from the sampling unit into two hexadecimal number equivalents identified as FWD and REV. The program determines if the FWD sample is sufficiently high to make an accurate measurement. If not, the letters **LP** (for "low power") are displayed. If the input is high enough, the PIC's software uses the following equation to arrive at an SWR value:[2]

$$(FWD + REV) / (FWD - REV) = SWR \quad \text{(Eq 1)}$$

where SWR is a hexadecimal number plus any remainder, REM.

The processor works with hexadecimal numbers that must be converted to decimal for display. If executing Equation 1 results in an SWR of 10 or more, the display indicates **HI**. If the value is less than 10, the SWR is equal to a decimal value between 1 and 9, because those numbers are the same in the hexadecimal and decimal numbering systems. The quantity (FWD – REV) is equal to one unit of SWR. REM, always less than the divisor, is converted to decimal by multiplying by 0Ah (10 decimal), then dividing again by (FWD – REV). This gives the answer in tenths of an SWR unit. From left to right, the display shows units, a decimal point and the tenths SWR value. A new SWR calculation is made every three milliseconds.

Construction and Circuit Description

In the prototype, the processing unit is mounted behind the enclosure's front panel, with the sampling circuit secured to the rear panel. C1 and C2 of Figure 2 provide a time constant appropriate for SSB. These capacitors should be tantalum units because they also serve to remove stray RF. Tantalum capacitors are physically smaller and are better RF bypasses than aluminum electrolytic capacitors.

The PIC (U1) is a high-impedance CMOS device, so observe proper handling precautions and use a wrist strap. R3 and R4 ensure that the maximum recommended input source impedance is not exceeded at any setting of R1 (**FWD**) and R2 (**REV**). Although the digits displayed on DS1 appear to be on continuously, they are alternately illuminated. U2 (a BCD-to-decimal decoder/driver) selects which digit is on at a given time. If you follow my construction technique, use a low-profile crystal in the oscillator circuit because physical clearance above the crystal is limited. Most 9-V plug-in transformers usually have sufficient dc filtering so no more is needed on the PIC board. C7 serves as a regulator-oscillation suppressor; C8 provides glitch suppression when U1 and U2 switch.

For DS1, I selected a bright green, 0.56-inch, two-digit common-cathode Panasonic display that can be seen easily from a distance. The display segments are connected in parallel; that is, segments a, b, c, etc, of one digit connect to like segments on the other digit. Of course, if you use the ready-made PC board (see Note 1), this wiring is already done for you. (Other common-cathode displays can be used, but they may not fit the ready-made PC board.) I checked the possibility of using RadioShack's 276-075 0.3-inch red displays. Those displays are easy to find, but their visibility, brightness and size pale in comparison to the recommended display. If you elect to use the RadioShack displays, you'll need to make your own PC board for them. The display-segment interconnections can be worked out by referring to the segment designations shown in Figure 2 and on RadioShack's packaging.

Before mounting parts on the PC board, use it as a template to mark on the enclosure the location of the four corner mounting holes and those for R1, R2 and the display. Make the **FWD** and **REV** test points using leads from C3 and C4. When you install the two capacitors, allow their ungrounded leads to project from the back of the board by about $^1/_4$ inch. (These test points are used when calibrating the circuit.) Space the displays from the board so they project through the panel cutout when the board is $^3/_8$-inch or so away from the panel. If you can't find $^3/_8$-inch spacers to mount the display board, $^3/_4$-inch-long #4-40 machine screws—each equipped with three nuts and secured to a corner of the board—will do the job.

Sampling Unit

The sampling unit (Figure 3) I selected is similar to the one shown in *The ARRL Handbook*.[3] It has a fairly constant dc output at 100 W on all bands from 160 through 10 meters and delivers the proper sampling voltages. I modified the circuit to suit the

[1]Notes appear on page 43.

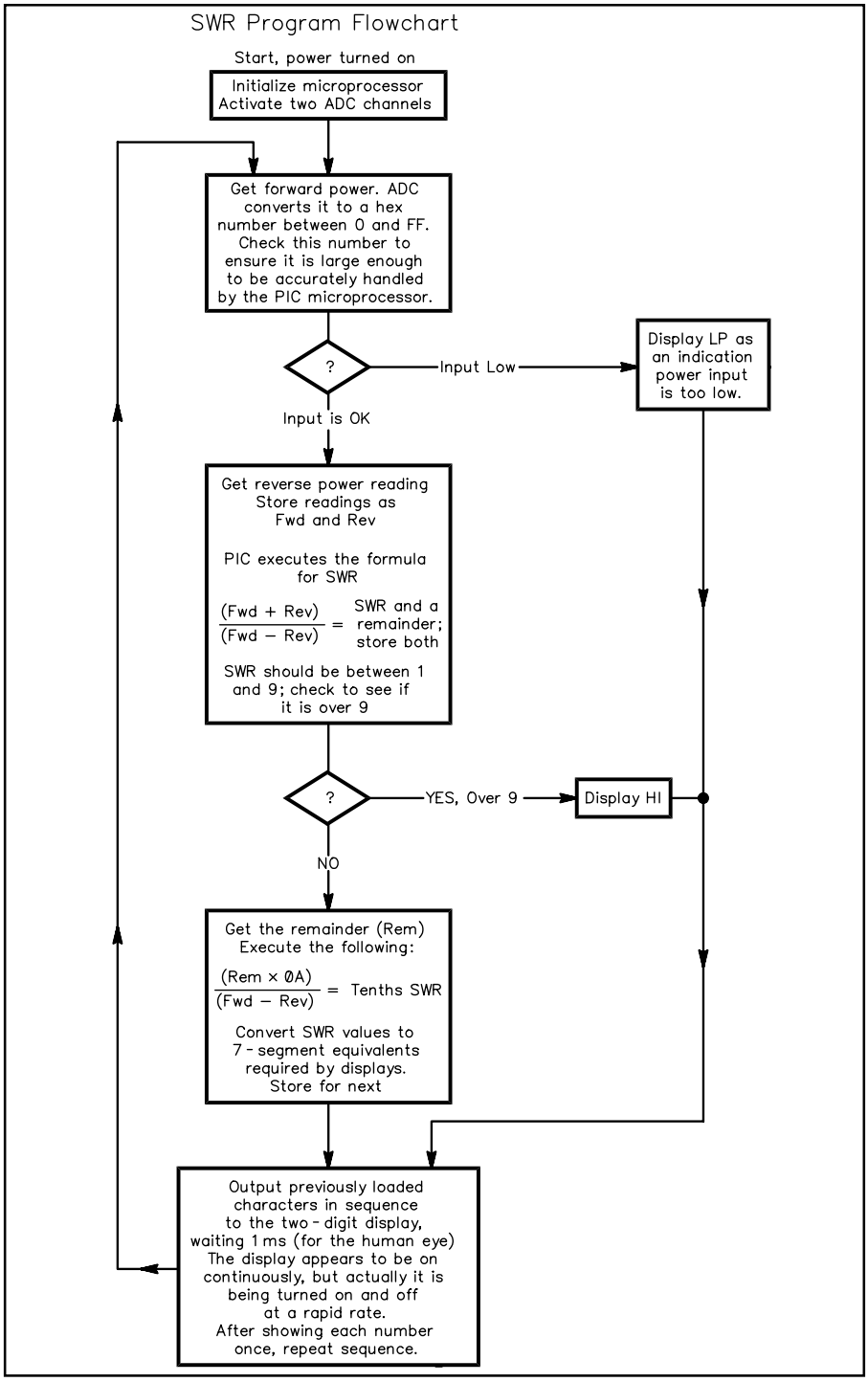


Figure 1—Flowchart showing operation of the PIC's program.

parts available and made it easier to adjust. The pickup voltage decreases as T1 turns are increased. For handling a power level of 1 kW, the *Handbook* suggests using 40 turns on the core. In my prototype, I used small pieces of unetched PC board material secured to the PC-board groundplane with epoxy cement to serve as insulated soldering points for all the components, including the nulling capacitor. The photo shows the **FWD** and **REV** outputs filtered by feedthrough capacitors (optional) mounted on a shield. The shield may not be needed, but it helps brace the cabinet's somewhat flimsy rear panel. I used parallel resistor combinations at R10 through R13 because those values were stocked locally.

The *Handbook* refers to small changes in indicated SWR as power is increased;[4] this meter exhibits the same effect. The change is caused by differences in diode conduction with current. Because the change is in the order of one or two tenths of an SWR unit, it is of no importance. Placing two 1N34 diodes in parallel reduces this effect, so I kept them in the circuit. I suggest you use 1N34 diodes with *transparent* bodies; the 1N34 RadioShack diodes with cyan-colored bodies *of the same part number* exhibit a greater variation in characteristics.

Checkout

Before plugging in the ICs, check the power-supply output to be sure it's between 4.95 and 5.05 V.[5] That done, turn off the supply, insert the ICs (verifying proper orientation) and apply power. The display should greet you by showing **LP**. If it does not, some easy troubleshooting is called for. Ensure the oscillator is running by listening for the presence of its 4-MHz signal with your station receiver. If that's okay, the PIC is probably working. At U1, pin 1, is a handy test signal. Temporarily attach a piezo element (RadioShack 273-071 or similar)—not a buzzer—between U1 pin 1 and ground. You should hear a loud tone of about 368 Hz. If this tone is present, the PIC is driving the displays. If the display problem persists, check the display connections and ensure U2 is properly seated in its socket.

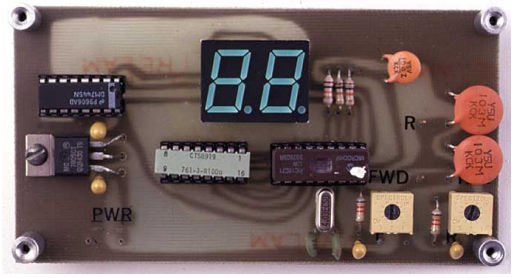
When the display shows **LP**, you may want to verify the PIC's calculation performance. It is an interesting test. See Figure 4 for a simple hookup to simulate all possible SWR values.

As shown in Figure 4, connect the **FWD V** test-circuit pot to the +5-V regulated supply (verify the voltage) and connect the arms of the **FWD** and **REV** pots of Figure 4 to the appropriate test points of Figure 2. Almost as soon as the **FWD V** pot is advanced, the **LP** indication should disappear and an SWR value appear. The SWR indication will change as the **REV V** control is adjusted. You will find the SWR changes little, if at all, as the **FWD V** potentiometer is adjusted in either direction. All you need now is a calculator and a digital voltmeter. Using a DVM, read the **FWD V** and **REV V** dc voltages at their respective test points, punch the values into a calculator and following the simple formula, compare the answer with the SWR value displayed. For example:

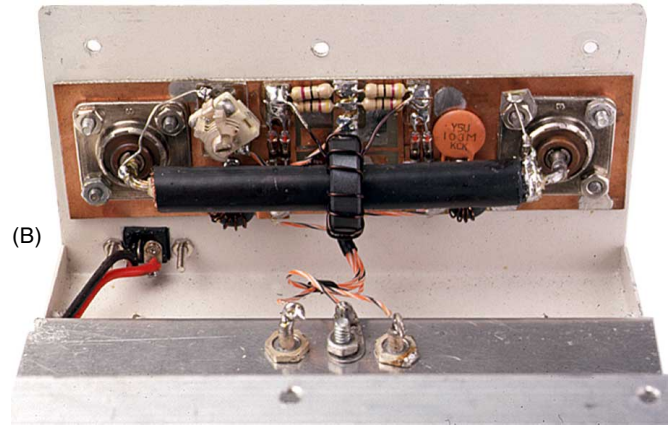
FWD = 4.5; REV = 1.27; FWD + REV = 5.77 V; FWD – REV = 3.23 (Eq 2)

5.77 / 3.23 = 1.786 SWR; 1.7 appears on the display (Eq 3)

After the test, set the calibration at the test points and balance the bridge. Attach a transmitter and a dummy load to the bridge's coax connectors, J1 and J2 of Figure 3. Check the load's resistance with the DVM to verify it is 50 Ω (especially if you haven't done that lately). Clip a digital voltmeter between the **FWD** test point and ground. Preset R1 and R2 at midposition. Start with low power on CW on your most-used operating frequency. The **LP** display should disappear and an SWR reading appear. If that doesn't happen, check the **REV** test point. If the **REV** is high and the **FWD** is low, the winding on T1 is probably reversed. Exchange the wire ends of T1.



(A)



(B)

The SWR meter's display (A) and pick-up (B) PC boards. In the prototype shown, an air-dielectric trimmer is used at C10.

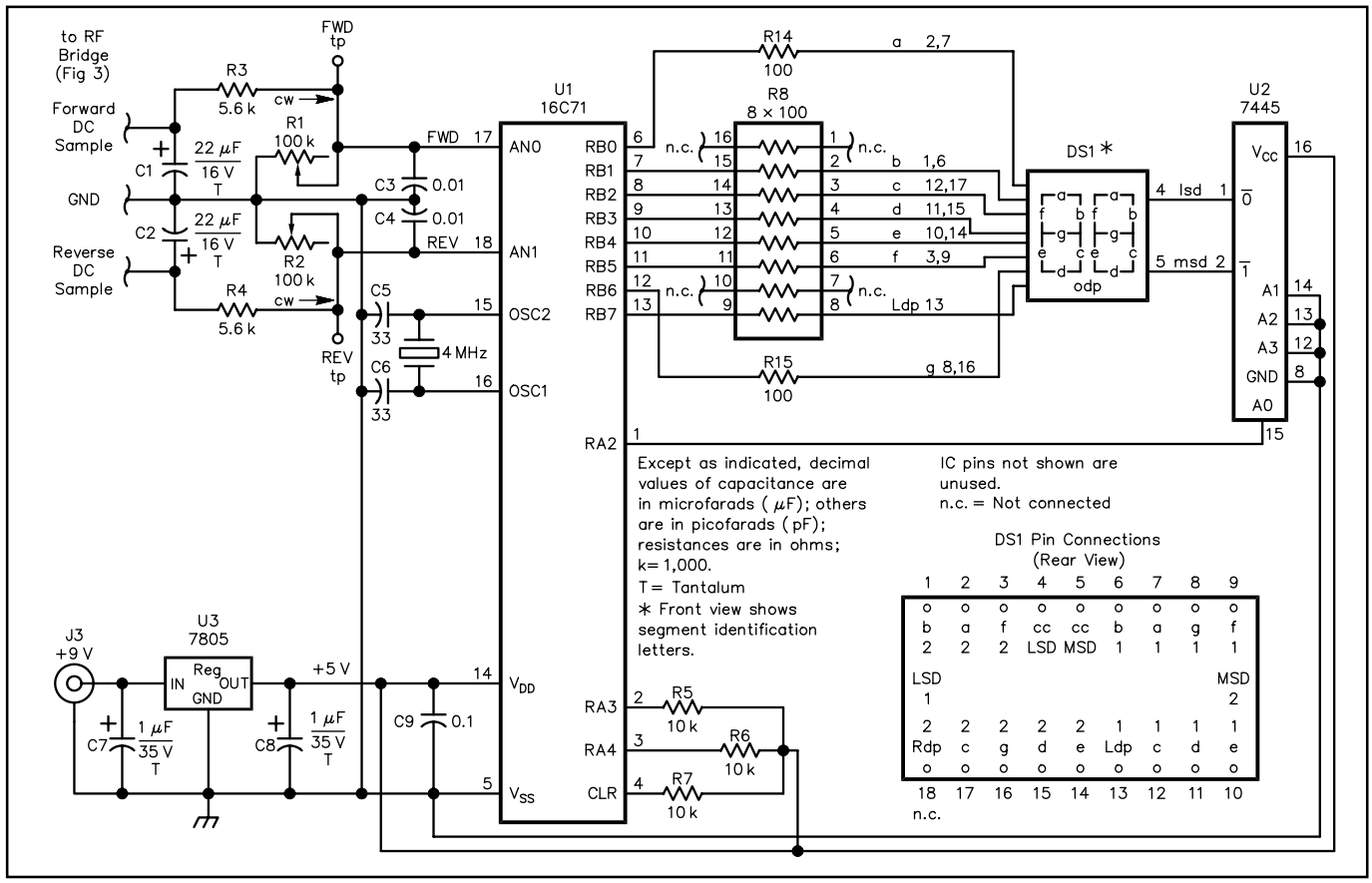


Figure 2—Schematic of the PIC SWR meter circuit. Unless otherwise specified, resistors are 1/4 W, 5% tolerance carbon-composition or film units. Equivalent parts can be substituted; n.c. indicates no connection. DK part numbers are Digi-Key; RS = RadioShack; JCO = Jameco. Parts are available from Digi-Key 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** (Panasonic displays, inside back cover of their catalog); Jameco Electronics, 1355 Shoreway Rd, Belmont, CA 94002; tel 650-592-8097, domestic fax, 800-237-6948, international fax, 650-592-2503; **info@jameco.com**; **http://www.jameco.com** and RadioShack—see your local distributor. RadioShack Faxback number: 800-323-6586 (24 hrs, 7 days).

C1, C2—22 µF, 16 V tantalum (JCO 94094)
C3, C4—0.01 µF (RS 272-131, JCO 15229)
C5, C6—33 pF disc ceramic (from RS 272-0806 assortment, or JCO 97244)
C7, C8—1 µF, 35 V tantalum (RS 272-1434, JCO 33662)
C9—0.1 µF, 50 V disc ceramic (RS 272-0135, JCO 15270)
DS1—Panasonic LN526GK two-digit green display (DK P-359; a JCO 24707 red/orange display is a suitable substitute and is pin-compatible with the Panasonic display.)
J3—Coaxial dc jack (RS 274-1565)
R1, R2—100 kΩ trimmer (JCO 43027)
R3, R4—5.6 kΩ (JCO 31270)
R5-R7—10 kΩ (JCO 29911)
R8—100 Ω DIP resistor network (JCO 108556)
U1—7445N, BCD-to-decimal decoder/driver (JCO 50403)
U2—7805T 5-V, 1-A positive regulator (RS 276-1770, JCO 51262)
Y1—4-MHz crystal, low profile HC-49/U holder (JCO 137832); see text.
Misc: Cabinet 3×5×5 5/8-inch HWD (RS 270-253); two 16-pin low-profile sockets (RS 276-1998, JCO 112221); one 18-pin low-profile socket (RS 276-1992, JCO 112230); 9-V dc wall transformer, center pin positive (JCO 100845); short length of RG-8 coaxial cable; epoxy cement (RS 64-2313); four 3/8-inch threaded spacers (JCO 77500); approximately 12 feet of #22 enameled wire (RS 278-1345); PC board (RS 276-1499). A 24-pin socket (JCO 112264) will accept the 18-pin display and allow it to project farther through the panel. Remove the unused socket pins before mounting the socket on the PC board.

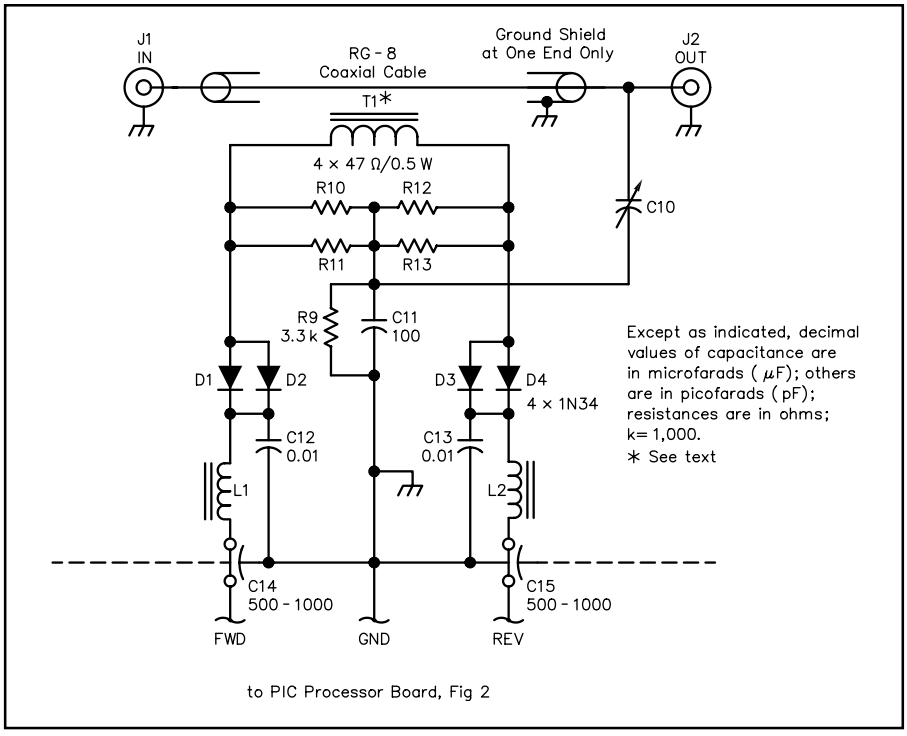
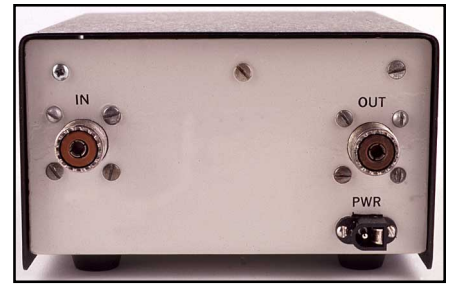


Figure 3—Schematic of the pick-up unit. J1 and J2 are approximately 3 3/4-inches apart (on center) to accommodate a 4 3/8-inch length of RG-8 coax used as the primary winding of T1.

C10—3.5-13-pF air-variable trimmer capacitor, 250 V (JCO 134818)
C11—100 pF silver mica (JCO 16002)
C12, C13—0.01 μF, 50 V disc ceramic (JCO 15229)
C14, C15—Optional 500-pF feedthrough capacitors, 50 V or more
D1-D4—1N34 germanium diodes (RS 276-1123); see text.
J1, J2—SO-239 coaxial connector (RS 278-201)
L1, L2—10 turns #22 enameled wire on an FT-43-2401 ferrite bead; (one source of ferrite beads and toroid cores is Amidon, Inc, 240 Briggs Ave, Costa Mesa, CA 92626; tel 800-898-1883, 714-850-4660, fax 714-850-1163).
R9—3.3 kΩ, 1/2 W resistor (RS 271-1122)
R10-R13—47 Ω, 1/2 W (RS 271-1105)
T1—FT-82-61 toroid core wound with 11 evenly spaced turns of #22 enameled wire



Rear-panel view of the SWR meter.

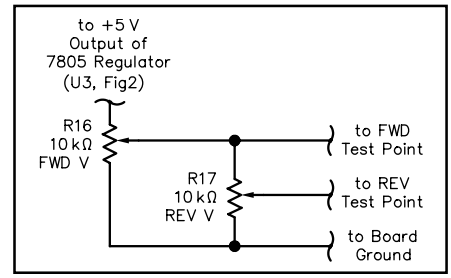


Figure 4—A simple circuit for testing and adjusting the SWR meter without applying RF power. See text.

R14, R15—10 k Ω pot, RS 271-1715; optional parts, two knobs (RS 274-424) and case (RS 270-1801), or pot (JCO 29081), knobs (JCO 104176) and case (JCO 18921).

Then, while monitoring the **FWD** test point, increase power to normal. Adjust R1 so the test point voltage is 4.5 V. This allows for handling slightly more power without exceeding the maximum of 5 V.

Move the DVM to the **REV** test point and adjust C10 for a null. The null should be very low, 0 V or little more at full power. Recheck the **FWD** level and tweak R1 for a reading of 4.5 V, if necessary. Turn off the transmitter and swap the cables to J1 and J2. With the transmitter set at the same power level, adjust R2 for 4.5 V at the **REV** test point. Restore the cabling. Check the operation of the meter on the all bands you operate while monitoring the **FWD** test point voltage. If you find a band where the voltage is high, set R1 and R2 on that band. It is normal to have some voltage-level variation on the various bands. We don't want to feed more than 5 V to the PIC's input.

Summary

I am learning to write code for the PIC (thanks to John, W2FS)[6] and have made the assembly listing available as well as the hex file. A PIC can eliminate a lot of hardware and is tolerant of beginners' mistakes. I was unable to program the 16C71 with any of several simple programmers. So I purchased a Microchip PICSTART PLUS that programmed the same chip with the same hex file first try. Ah! Success! The package contains the programmer, instruction manuals, a CD-ROM and two large data books. Programmed PICs and a PC board are available (see Note 1). Happy PIC'n!

Notes

[1]*Programmed* 16C71 PICs, PC boards and some parts for this project are available from FAR Circuits, 18N640 Field Ct, Dundee, IL 60118-9269, tel 847-836-9148 (voice and fax). A semi-kit consisting of a programmed PIC, pick-up and display PC boards, a crystal and a two-digit display is priced at $24 plus $1.50 shipping for up to two semi-kits; PC boards only, $9 plus $1.50 per set. Visa and MasterCard accepted with a $3 service charge. A copy of the PIC code (.ASM and .HEX) is available in PICSWR.ZIP at **http://www.arrl.org/files/**.

[2]Mark J. Wilson, AA2Z, Ed, *The 1987 ARRL Handbook*, (Newington: ARRL, 64th ed., 1987), page 25.14.

[3]*The 1987 ARRL Handbook*, p 34.12.

[4]Robert Schetgen, KU7G, Ed, John Grebenkemper, KI6WX, "The Tandem Match—An Accurate Directional Wattmeter," *The 1996 ARRL Handbook*, (Newington: ARRL, 73rd ed., 1995) p 22.37.

[5]I've found 7805s that deliver 4.8 V. Although this is acceptable logic voltage, this level restricts the operating range of the ADCs in the PIC.

[6]John Hansen, W2FS, "Using PIC Microcontrollers in Amateur Radio Projects," *QST*, Oct 1998, pp 34-40.

Adelbert "Bert" Kelley, AA4FB, is retired from engineering maintenance at WFLA-TV in Tampa, Florida. You can contact Bert at 2307 S Clark Ave, Tampa, FL 33629-5707; **aa4fb@mindspring.com**.

All photos by Joe Bottiglieri, AA1GW. QST

Strays

YEAR 2000 ON THE MERIDIAN

◊ Radio amateurs from the Cray Valley Radio Society are planning to establish a DX-pedition-style station on the prime meridian at Greenwich, London for two months from December 31, 1999 to February 29, 2000. In the first 24-hour period radio contact will be made with amateur stations around the world as their own median lines pass into the year 2000, starting with ZL and finishing with KH6. With the support of the Radio Society of Great Britain and the Radio Communications Licensing Agency, the unique call sign of M2000A has been issued to the station for this event only. For further information see the M2000A Web site at **http://www.qsl.net/m2000a**.

Next Stray QST

By Bob Brown, NM7M

Bubbles in the Ozone Layer

Propagation guru Bob Brown, NM7M, tells us about how he accidentally discovered the Rocky Mountains, using simple radio equipment!

If you're a radio amateur on the HF bands, you've no doubt learned a lot about how radio propagation works. Through study and first-hand experience, you've grown to understand how the sun creates the various regions of the ionosphere—D, E and F—and how these regions change when the sun rises and sets. You know something about *skip*, how signals are bent back toward ground by the F region.

When I returned to ham radio after I retired from a career in academia, I wanted to learn more about how signals were propagated. I tried out DXing on the various bands. Like you, I knew that if you chase DX, 10 meters is best in the daytime. Just the opposite is true at the lower end of the spectrum, where chasing DX on the 80 and 160 meter bands is for Night Owls.

The D Region

Experience shows that signals on the low bands suffer terrible absorption in the day. The electrons in the D region simply consume all the signals when the sun is shining. RF drives the electrons into collisions with atoms and molecules, in effect heating the atmosphere ever so slightly. At night, the sun does not directly ionize the D region. But still there are weak sources of ionization—starlight, cosmic rays and solar radiation scattered by the high atmosphere.

The electrons released by these extra-terrestrial sources get caught up in ion chemistry, becoming attached to oxygen and some other molecules to form negative ions. These negative ions are so massive that they don't respond well to RF, and low-frequency signals go right by them without suffering any loss in intensity. So the D region is a bit more complicated than most of us think, with electrons and positive ions as well as negative ions at night.

My interests gradually gravitated to the lower bands. To understand DXing there, I had to learn the details of how the D region changed at sunrise, since that's when things get very interesting on 80 and 160 meters. Topband DXers benefit often from the way signals can dramatically rise out of the noise around dawn at the Eastern terminus of a propagation path.

At sunrise, solar radiation returns to the D region, ionizing the atmosphere. Solar radiation at sunrise can also free up electrons held by those massive negative ions mentioned above, by a process called *photo detachment*. Thus, as the sun starts to climb in the sky, shining first on the 90-km level of the D-region, you would expect electrons to start being freed and for absorption to start to increase immediately. That should take a toll on the strength of DX signals on the low bands. But like they say on one TV commercial: "Not exactly!" It depends on *which* sunrise you're talking about, the one related to the shadow cast by the solid earth as it moves down the D region or the one that starts later—the sunrise related to the shadow cast by the ozone layer.

Interestingly enough for the D region, signal absorption at sunrise begins when the sun rises above the ozone layer, *after* already rising above the solid earth. That means that visible sunlight at dawn is not really energetic enough to free electrons from negative ions—it takes solar ultraviolet (UV), which is strongly absorbed by ozone, to do the job. So when the sun climbs a bit higher in the sky, over the ozone layer, photo detachment begins. But "higher in the sky" means "later in time," so those precious low-band DX openings at Eastern-side dawn can last longer than the onset of visible sunlight would imply. This extra time can be 15 to 30 minutes longer, depending on the season, thanks to the ozone layer.

On the HF bands, DXers can study propagation using the NCDXF beacons on 14.100 MHz, but the only beacons near the lower bands I could think of were the Navy transmitters down in the low-frequency range. These are running all the time down at 30 to 300 kHz. I managed to find a superb beacon, NPG, on 55.5 kHz from Dixon, CA. I've been monitoring the RTTY signals from NPG for more than a year.

The path to my QTH on Guemes Island, WA, is essentially North-South in direction from NPG and is 1,125 km long. I receive not only the one-hop skywave but also the ground wave. At 55.5 kHz, signals are propagated in the waveguide made up by the lower D region and the ground. The reflecting region drops from about 90 km at night to 75 km in the day.

Since both the sky and ground waves come from the same transmitter, they can produce a fade by interfering destructively when they reach my QTH. This fade depends on the phase difference between the skywave and the groundwave, and that phase difference is directly related to the path difference between the two. Now it turns out that the difference in path lengths at 55.5 kHz decreases by about a wavelength at sunrise. I record an intensity change that goes through a minimum every morning as the phase difference goes through a 360° change. That is the way I can study the D region, just by watching how NPG signals change at sunrise.

My experimental setup is simple, consisting of a B&W 160-meter dipole at 40 feet, a Heathkit VLF converter, a Yaesu FT-757GX transceiver, a home-brew rectifier/filter and the A/D converter in a Radio Shack digital multimeter. I check the time with WWV every morning and use my old 80386 computer to record NPG's signals through the RS-232 port at 15-second intervals.

Figure 1 shows a typical record of the sunrise signature for June 15, 1998. This is testimony that electrons start to appear in the D region at about 1150 UTC. Full skywave absorption is there again by 1205 UTC, after which only the groundwave signal is present.

If you go to your Nautical Almanac, you'll find that sunrise—the arrival of visible light at 90 km above the mid-point of the path (43.45° N, 123.25° W)—occurs at 1125 UTC, when the sun is 9.6° degrees below the horizon. So you can see that the ozone layer has delayed the start of sunrise on the D region until 1150 UTC in the middle of June, giving lowband DXers 25 minutes more DXing. If that weren't enough, the delay in the onset of D-region absorption is even longer in winter!

A Surprise

My NPG monitoring program has been

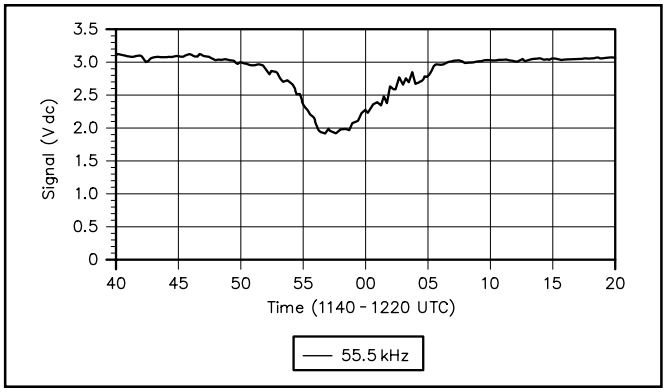


Figure 1—A typical sunrise signature of NPG on June 15, 1998, at NM7M. Note the drop in signal strength for roughly 15 minutes as the skywave path length from NPG in Dixon, CA, to Guemes Island, WA, changes over 360° due to rotation of the Earth. This results in destructive interference with the ground wave, always present on this path at this very low frequency.

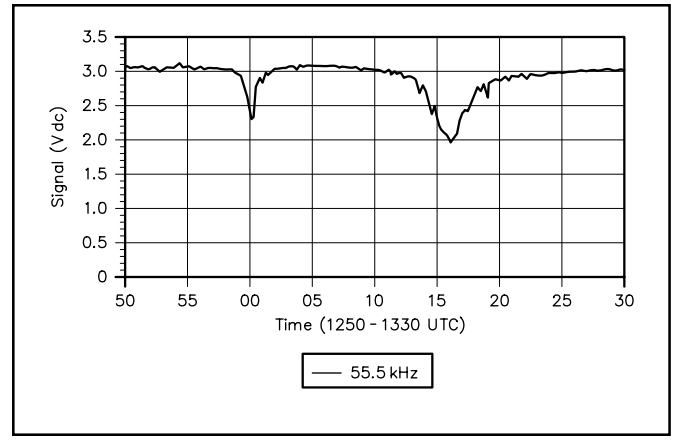


Figure 2—Sunrise signature of NPG on September 7, 1998, showing a short precursor fade, which starts at about 1300 UTC and lasts about 4 minutes, together with the longer, more-typical fade starting at 1313 UTC.

going for over a year now and I see sunrise signatures every morning, except when magnetic activity is very high. (That's another story and I don't want to get into it now.) But very early in the NPG study there was quite a surprise. Brief episodes of signal loss can occur even *before* the sunrise signature started. They lasted 4 to 5 minutes, beginning to end, quite a bit shorter than the normal sunrise signature. A good example is shown in Figure 2.

At this point I have logged more than 75 of these occurences, ranging from barely detectable fades to a signal loss of –2.5 dB. However, their solar depression angles are in a very narrow range, around $-7.5° \pm 0.2°$. That isn't exactly what you'd expect from a homogenous gaseous medium. Something more *solid* than a gaseous fluid must be organizing these drops in signal level. What did these early-onset fades represent?

I agonized over that for a long time. After a while, I concluded that I must be seeing bursts of solar UV making their way through the ozone layer well before the real RF-absorption sunrise. What if there were *bubbles* of lower ozone density moving about in the ozone layer? Such a bubble would be transparent to UV and for low-frequency RF; it would result in a path difference and a different absorption level in the ionospheric skywave compared to the ground wave.

Bubbles are not new to me. When I taught physics at the University of California in Berkeley one of my colleagues was Donald Glaser, who won the Nobel Prize for his invention of the bubble chamber used in high energy physics. Supposedly he got the idea for the bubble chamber while watching bubbles rise in a glass of beer. But my bubbles seemed to be different. I have described them to friends as being like a froth at the top of the ozone layer—like the head on a glass of beer.

That's where the matter stood for awhile, until I got to thinking how quickly the bubbles come and go, much faster than the normal sunrise signatures I had been recording due to the slow rotation of the earth on its axis. So I considered a simple model (see Figure 3) to determine the location of these bubbles. The solar depression angle A is related to the time of the bubble, taken from a nautical almanac. The azimuth of the bubble is the direction from the midpoint of the path to the sun. I then used the fact that the ground distance to the point where the UV ray is tangent to the ozone layer is simply the solar depression angle, expressed in radians, multiplied by the Earth's radius, 6371 km. With a little trigonometry, I obtained the 35-km height of this bubble by using 90 km as the height of the D region where solar UV reached. Now things were getting interesting!

This procedure located the bubble event in Figure 3 at a distance of 840 km from the midpoint of the path from NPG to my QTH, at a heading of 74° East of True North. I located that point on a map, putting it in Montana. I took the rest of my bubble data, worked out where the bubbles would be located and got another surprise—the bubbles were all close to the Rocky Mountains in the summer months, and a few were down by the Wasatch Mountains in the winter.

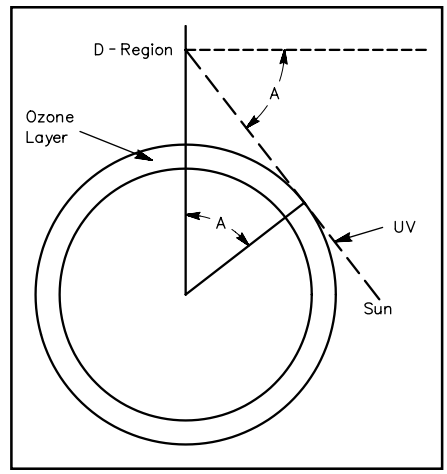


Figure 3—Solar UV ray geometry (not to scale) for a bubble event.

While I have over 75 bubbles in my log, a small collection is shown in Figure 4, along with a line showing the location of the ridge line of the front range of the Rocky Mountains. So those mountains are what organized, as it were, the bubble events. On seeing that plot, a friend remarked that I'd managed to find the Rocky Mountains, using nothing but a clock and a low-frequency receiver! I never thought of it that quite way, but I guess he's right.

These bubble events could explain episodes of brief QSB for 160-meter operators at sunrise. On Topband, where signals are usually weak and often just at the ambient atmospheric noise level, even small fades can last long enough to be really annoying. For Topband DXers, such fades may be just another bit of unexpected QSB, but for me the unexpected part was their origin. As best I can tell, ozone bubbles are an *orographic effect* from lift and turbulence over the Rocky Mountains. This effect is well known to sailplane pilots, who set altitude records by taking advantage of the lift when air waves build up over a mountain range. But my bubbles were well above the 50,000-foot level—more like twice that height.

While the flow of air over mountains can be turbulent, bubbles in the ozone layer may prove to be at the extreme limit of such turbulence. The bubbles in the ozone layer act like waves breaking in the atmosphere, leaving a void behind. Time and further study will tell more about them.

After this experience with ozone and low-frequency radio propagation, I appreciate more than ever that the neutral atmosphere and its minor chemical constituents are not just stationary targets for solar radiation. The *motion* of atmospheric com-

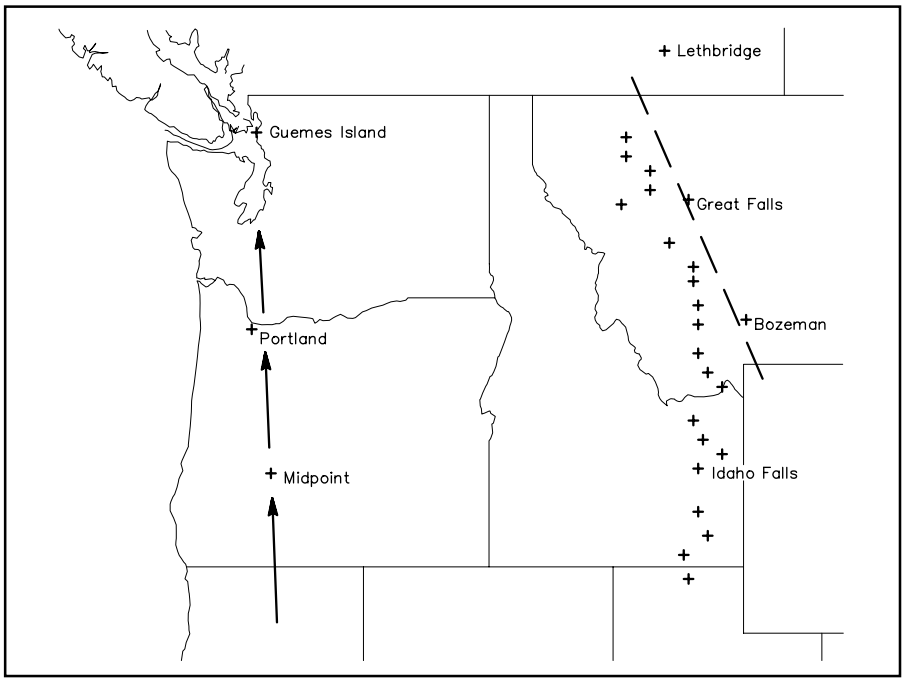


Figure 4—The geographic locations of a representative collection of bubble regions in the ozone layer. The path from NPG to Guemes Island, WA, is shown on the left and the ridge line of the front range of the Rocky Mountains on the right.

ponents is important and can affect propagation, for better or for worse.

This point was brought home to me by studying low-frequency signals. I doubt it would have been all that apparent at high frequencies, where direct ionization from solar radiation is the main factor. In any event, my "discovery" of the Rocky Mountains is not going to get me any prizes, since Chinese and Russians have already discovered the Himalayas, the Andes and the Pamir Mountain Ranges. Their observations give a global aspect to bubbles in the ozone layer. In ham radio terms, DXers to the West of those other high mountains are also at risk for the same kind of QSB I've observed in Washington state.

What makes my work different is that I did it by looking horizontally *across* the ozone layer using radio techniques, albeit quite by accident. Other peoples' work involved planned experiments, looking vertically *through* the ozone layer, upward from ground level or down from satellites, using optical methods. They found slow, seasonal features of the ozone in the atmosphere, showing lower ozone content near those mountain ranges in the summer. On the other hand, I have brief glimpses of high-altitude fluctuations in ozone density that can occur from wave motions over the mountains, mostly in summer.

I like to think of my work as one big remote sensing experiment, where the effect being explored occurs over the Rockies, while my "detector" is the D region over Oregon and my "readout" is here in Washington. I guess I'm doing things the hard way. But to me it's also the fun way, since it shows what can be done with simple radio equipment. Stay tuned for further developments.

You can contact the author at 7040 Channel View Dr, Anacortes, WA 98221-9501;
bobnm7m@cnw.com

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 W6OWP, with K6YR as an alternate. 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.

By Bill Kennamer, K5FUV

New DXCC Awards for the New Millennium

Ring in the next millennium with some fresh DX challenges.



DXing is one of the oldest facets of Amateur Radio. The wonder of DXing is timeless, and the fluid nature of our geopolitical world continually renews the excitement.

A new millennium will dawn on January 1, 2001, but the ARRL will start the celebration in 2000 by making several additions to the popular DXCC program. These changes include new awards, and a new program for all-band DXers.

The DXCC Challenge

The DXCC Challenge is a new program designed to expand the horizons of hams who already hold their 5-band DXCC awards. It is open to 5-band DXCC holders *only*.

Individual standings in the DXCC Challenge will be based on accumulated credits for contacts made on all eligible bands within the DXCC program, *using current DXCC entities only*. This includes credits already received by DXCC for contacts with the current DXCC List entities after November 15, 1945.

The DXCC Challenge standings will be calculated annually with a September 30 submission deadline. Standings will be reported as numbers only. Plaques will be made available for those who accumulate 1500 DXCC Challenge credits. Plaque endorsement bars will be available for increments of 500 credits.

The DXCC Challenge program will begin on January 1, 2000 and will include submissions received through September 30, 2000. For 2000 the eligible bands are: 160, 80, 40, 20, 10 and 6 meters. The list of eligible bands will be increased each year until all bands are included.

DeSoto Cup

Beginning in 2000 we will award the annual DeSoto Cup, named for Clinton B. DeSoto, W1CBD, who wrote the definitive 1935 *QST* article that inspired the original DXCC program. The DeSoto Cup will be awarded to the DXer who is at the top of the DXCC Challenge list on September 30th of any given year. Only one cup may be awarded to any DXer in his/her lifetime.

20-Meter Single-Band DXCC Award

Also new in 2000 is the 20-Meter Single-Band DXCC award. This is the first of several new single-band awards that will be phased in over the next year or two.

Contacts with current entities on the DXCC List will be credited, beginning with QSO dates of November 15, 1945. (Any contact on any mode counts for this award.)

DXCC reports returned after August 1, 1999 will show 20-meter contact credits. You can request an award certificate (and submit additional 20-meter cards) after January 1, 2000. For those with a 5-Band DXCC issued before April 1, 1992, up to 100 20-meter cards may be submitted with no per-card charges applied if you do not already have 100 current credits on 20 meters. (Example: You have a 5-Band DXCC dated September, 1983, but have since submitted 30 current cards for 20 meters. You may submit 70 cards to bring your total up to 100 with no per-card charge.) Award certificates will be dated, but not numbered.

DXCC 2000 Millennium Award

To whet the appetite for DXing in the next millennium, the DXCC 2000 Millennium Award available for the newcomer, Old Timer, and anyone in between. Think of it as a way to prepare yourself in 2000 for the great millennial DXing to come!

The DXCC 2000 Millennium Award period begins 0000 UTC January 1, 2000, and ends at 2359 UTC on December 31, 2000. All contacts must be made during this time period.

The DXCC 2000 Millennium Award certificate is awarded for working 100 or more of the entities on the ARRL DXCC List. Contacts may consist of any combination of bands or modes.

You must certify on the original application the authenticity of log extract information for contacts with the 100 entities on the DXCC List. No QSL cards are required for this award.

The DXCC 2000 Millennium Award is separate and distinct from the traditional DXCC awards programs. *Qualifying for the DXCC 2000 Millennium Award does not provide credits for the traditional DXCC awards programs*. Applicable rules of the DXCC program, such as location of stations and conduct, apply to the DXCC 2000 Millennium Award.

The DXCC 2000 certificate is available to members and nonmembers. No endorsements of any kind are offered. Certificates are dated, but not numbered.

The official application must be used to facilitate processing. Application forms are available for an SASE, or an SASE with one IRC for amateurs outside the US. Send your requests to: DXCC 2000 Millennium Applications, American Radio Relay League, 225 Main St, Newington, CT 06111 USA. Applications may also be downloaded from the Web at: **http://www.arrl.org/awards/dxcc**.

Send your completed application within one year of the close of the DXCC 2000 Millennium period to ARRL HQ along with $10 US to cover costs of printing postage, and handling.

Who knows what the next millennium will bring? Perhaps, by the beginning of the fourth millennium, DXCC will be awarded for working 100 stars, planets, or even galaxies! I'm looking forward to DXing in the third millennium. How about you?

Bill Kennamer, K5FUV, is ARRL Membership Services Manager. You can contact him by e-mail at **k5fuv@arrl.org**. QST

By Rosalie White, WA1STO

Kid's Day—January 1, 2000!

It doesn't get much better than to share an hour or more of on-the-air fun with your kid or other kids.

Have you always wanted to get your child, or another child, excited about our hobby? If so, Kid's Day will be great fun for both of you. Kid's Day doesn't require much time, is casual, and you don't have to learn anything new. Invite a girl or boy to visit your ham shack for 15 minutes or more to talk to other kids who've been asked to do the same. If the kid isn't your own, ask the parents to visit, too, and you may double the number of future new hams!

The past two Kid's Days have seen around 400 children, the majority age 7 to 11, making QSOs. This past June many of you set up stations in parks and museums. Others chose to create stations in their own backyards and invite neighborhood kids.

DX stations and their young operators checked in, too. Axel, DL8NDG, in Germany worked with his area club to establish Kid's Day. ZL1UWZ got the New Zealand Association of Radio Transmitters to publicize Kid's Day as well.

Some of you had just as much fun making contacts on repeaters (don't forget to ask the sponsor-club for permission), and in some cases, this activity drew higher levels of participation from local amateurs.

The Boring (Oregon) Amateur Radio Club started Kid's Day a few years ago and, in 1999, asked ARRL to take over sponsorship. The concept remains the same: relaxed operating without pressure.

During the six-hour event youths can make one QSO or many; some kids make hundreds! A kid's attention span is around 20 minutes. If no one answers their CQs, they won't call for long. Don't act disappointed. Tell them you'll listen a while, and call them when things pick up. If they make even one QSO they'll remember what's important—the fun of the experience and the interest you showed in them. Kid's Day isn't a contest, although there is a more-or-less standardized exchange. Let the kids make friendly ragchews. You'll need patience—kids may be shy, make mistakes and take many breaks. Don't correct them. Just be the control op, make sure you or they ID at the right time, and follow third-party traffic rules for DX QSOs.

If your Kid's Day operator is already licensed, invite him or her to your station with you as control op. He or she may not have HF privileges and would be thrilled to use bigger antennas and power.



A grin of pleasure from Alexes Presti, age 7 who is studying for his Novice while using dad's call sign, WB5P, and his radios.



Kevin Lynch, age 10, operated at AD8T garnering 8 states in 13 QSOs.

Schedule time for Kid's Day on January 1. If nothing else, make plans to get on the air and talk to the Kid's Day junior ops. Be friendly and ask them about things they relate to—pets, hobbies or the weather. Read the Soapbox comments and you'll see why Kid's Day is becoming so popular.

Kid's Day Rules

Purpose: Kid's Day is intended to encourage young people (licensed or not) to enjoy Amateur Radio. It can give young people hands-on on-the-air experience so they might develop an interest in pursuing a license in the future. Kid's Day is intended to give hams a chance to share their stations with their children.

Date: January 1, 2000.

Time: 1800 to 2400Z. No limit on operating time.

Suggested exchange: Name, age, location and favorite color. You are encouraged to work the same station again if an operator has changed. Call "CQ Kid's Day."

Suggested Frequencies: 28350 to 28400 kHz; 21380 to 21400; 14270 to 14300 kHz and 2-meter repeater frequencies with permission from your area repeater sponsor. Observe third-party traffic restrictions when making DX QSOs.

Reporting: E-mail logs and comments to: **kids@contesting.com**. You may review these postings at **http://www.contesting.com/kids/**. Those without Internet access may forward comments to the Boring Amateur Radio Club (see address below).

Awards: All participants are eligible to receive a colorful certificate. Send a 9 × 12 SASE to: Boring Amateur Radio Club, PO Box 1357, Boring, OR 97009.

Kid's Day June 1999 Soapbox

What a great idea! This is the first time my kids worked Kid's Day; I couldn't get them off the radio.—*Bryan Rogers, AE4PT*

We had a great time, including my wife who swore she wanted nothing to do with ham radio. The experience inspired me to hurry with my upgrade; I heard stations on 20 meters that we could have easily worked if I had my General.—*Tim Billingsley, KD5CKP*

My granddaughter Lindsay (10) loved making radio contacts with other kids. She now wants to get her license. That's what I wanted to hear!—*Steve Benell, WA9JNM*

I got my ticket last year and this was my first Kid's Day. I had a terrific time.—*Patrick Shepherd, VA3PHS (age 10)*

Anna and Mary were looking forward to Kid's Day for several weeks, and were not disappointed. On 20 meters there was wall-to-wall QRM just like CQWW or ARRL DX—no problem finding kids. The girls are now looking forward to Field Day fun.—*Anna, Mary and Michael Joens, K1JE*

This was our third year operating Kid's Day. My son Steven (10) was really looking forward to it. What was exciting for him (and me) was his contact with W5RRR at the NASA Johnson Space Center. Kent was great with the kids, explaining the function of NASA JSC.—*Steven and Michael Dinelli, N9BOR*

NEW HAM COMPANION

The Doctor is IN

Q Daryl, W4DAI, asks, "I have just acquired a used aluminum HF-vertical antenna. What is the best way to clean it up for operation?"

You didn't say if your antenna has traps. If so, they should be cleaned with a mild detergent solution. Any stubborn insect residue can be cleaned with common alcohol. Of course, be careful not to get anything inside the traps themselves.

The aluminum portions can be made to look like new with a product called NevrDull. It is available at hardware and home improvement stores, and one can will last many, many years. It's probably the best stuff I've found for polishing metal of any kind. (No, the Doctor doesn't own stock in NevrDull and the company is not a *QST* advertiser!)

Q My station computer has been behaving like a signal generator! I'm hearing signals from 160 meters all the way through 2 meters. It's particularly annoying when the signals appear right on top of the stations I want to work. What can I do?

The first thing to do is simplify the system. The interfering signals could be coming from a variety of sources, including any peripheral devices (printers, monitors and so on).

Start by switching off as many external devices as possible and disconnecting their cables from your computer. If possible, use just the computer, keyboard and monitor. This is probably the most straightforward way to uncover the sources of your interference.

You can often suppress the interference substantially by installing common-mode ferrite chokes (see Figure 1) at the proper points—preferably as close to the computer or peripherals as possible. Just make sure you use toroids made of Type 43 ferrite material. Figure 2 shows the points in a typical system where it may be most effective to install common-mode chokes. You'll find much more information about computer-generated interference—and how to get rid of it—in *The ARRL RFI Book*.

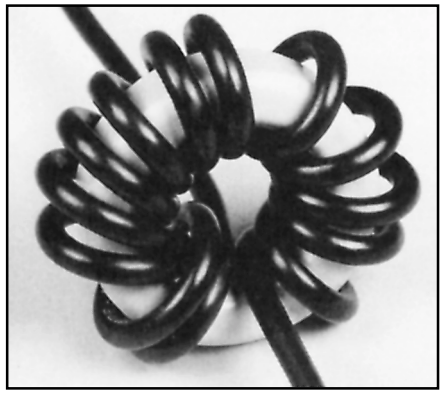


Figure 1—You can make a common-mode choke by wrapping several turns of the offending cable through a ferrite torroid.

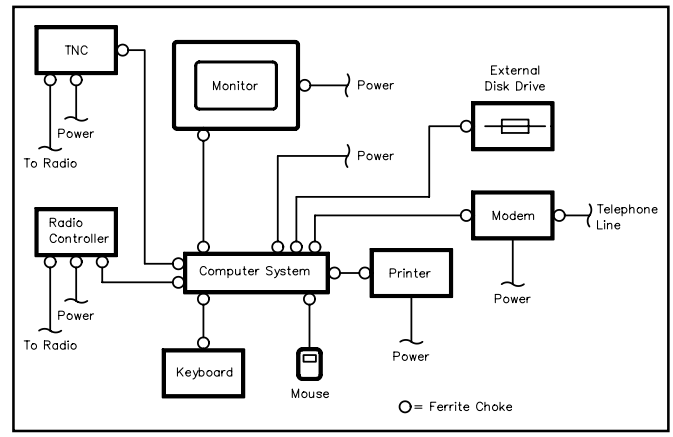


Figure 2—You don't have to place chokes at all of the points shown, but these are the most effective locations in a typical station computer system to suppress interference.

Q Dave, WB2AZE, asks, "I have a 40X IDE CD-ROM drive in my station PC. Is there any compelling reason to upgrade to one of the new DVD drives?"

Not really. Unless you want to purchase or rent DVD movies to watch when the bands are dead, there are no DVD ham applications at the present time. Beyond the price tag, installing a DVD drive in your machine requires a decoder board that will occupy yet another precious motherboard bus slot.

Q Can you tell me what laptops are known to be compatible with PSK31?

If a laptop has a built-in sound card with audio inputs and outputs, it should be useable for PSK31. In practice, however, some laptops have sound systems that refuse to work with the PSK31 software. Others lack the necessary processor muscle.

A few months ago Martin Campbell, KB0HAE, conducted a survey on one of the PSK31 e-mail reflectors to determine which laptops were being used successfully with PSK31. The following list represents the reports of reflector subscribers. It is *not* a comprehensive list of compatible laptops.

Compaq Armada 1572
Dell 3500 Pentium II 266 laptop with 64 MBytes RAM
Gateway 5150 w/ 300 MHz Celeron
Hitachi MX166
Micron Pentium 166 MHz with 32 MBytes RAM
Mitsuba 486/66 DX
Mitsubishi Amity CN1 (P133/48MB RAM)
NEC Versa 486/33
Toshiba 420 CT
Toshiba Tecra 300CDT
Toshiba Satellite
Toshiba Satellite Pro
Winbook XL 266 MHz Pentium II

Q Dan, KE6LBX, "I am having a hard time tuning my QRP transceiver for zero beat on CW. It seems as though the stations are always telling me that I'm off frequency. With low power on a crowded band, I know that zero beating is important, but I don't really know how to do it. Can you help?"

All you need to do is to match the tone of the received CW signal to the receiver's offset. If your rig has an offset of 800 Hz, that's what you would tune for. Most transceivers have offsets between 600 and 800 Hz, and they are usually adjustable so that you can select the tone that is most pleasing to you. If you don't know what your rig's offset is, and you don't have the equipment to measure it, then you have to use trial and error to find the right tone. (This assumes that the transmit-receive offset is set via the

VFO and there isn't a separate fixed-frequency BFO employed.) One word of caution: If you're using a direct-conversion receiver or a wide filter, you may end up on the wrong side.

Q Is it possible to create a QRP transmitter using little more than a CMOS logic chip? It would seem that you could get one to sustain an oscillation and generate RF at HF frequencies.

It is indeed possible! Lew Smith, N7KSB, designed a 1/2 watt CW transmitter for 10, 15 and 20 meters and it has been featured in *The ARRL Handbook*. The transmitter design is based on a 74HC240 octal inverting buffer. One section acts as a crystal oscillator (with a crystal for the desired fundamental frequency) while four sections amplify the signal (see Figure 3). The 74HC240 can get fairly hot in this application, so you must attach a heat sink. The supply voltage must also be held to a maximum of 8 V to help ensure the survival of the chip. Finally, this transmitter can be a prodigious harmonic generator, so you must use an output filter composed of capacitors C1 and C2, as well as inductors L1 and L2. See Table 1 for filter component values. L1 is sensitive to lead length, so keep its leads as short as possible.

Q I worked a fellow on 160 meters recently and he said that he was using a "shunt-fed tower." What is that?

Anything can be made to radiate RF if you feed it properly—including towers. The shunt-feeding system shown in Figure 4 is used by K6SE to get his 70-foot crank-up tower to radiate on 75 and 160 meters. The beam at the top of the tower isn't a problem. In fact, it provides some beneficial top loading.

Table 1
Output Filter Component Values for the 74HC240 Transmitter

Band	*10*	*15*	*20*
C1 (pF)	330	470	680
C2 (pF)	100	150	220
L1 (turns, length [inches])	3, 5/8	4, 5/8	5.5, 5/8
L2 (turns, length)	7, 5/8	10, 1	12, 1

C1 and C2 can be mica or ceramic. L1 and L2 are made from #14 wire with air cores wrapped on a 3/8-inch diameter form.

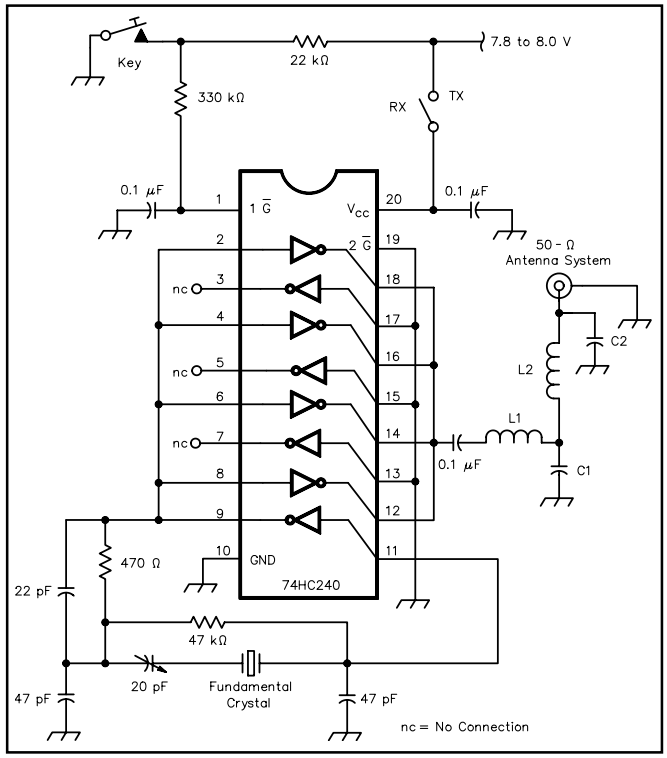


Figure 3—The 74HC240 transmitter designed by N7KSB.

In Figure 4 you'll notice two wires running up each side of the tower and connected to variable capacitors. This is the actual shunt feeding/matching system. You tune the system for resonance by first adjusting the capacitors for the lowest SWR on the desired band, then increasing or decreasing the spacing between the wire and the tower to reduce the SWR further. Shunt feeding a tower in this fashion requires a very good ground system for optimum performance, but the results can be impressive on the low bands for DX work. You'll find more shunt-feeding methods described in ON4UN's *Low-Band DXing*, available from the ARRL.

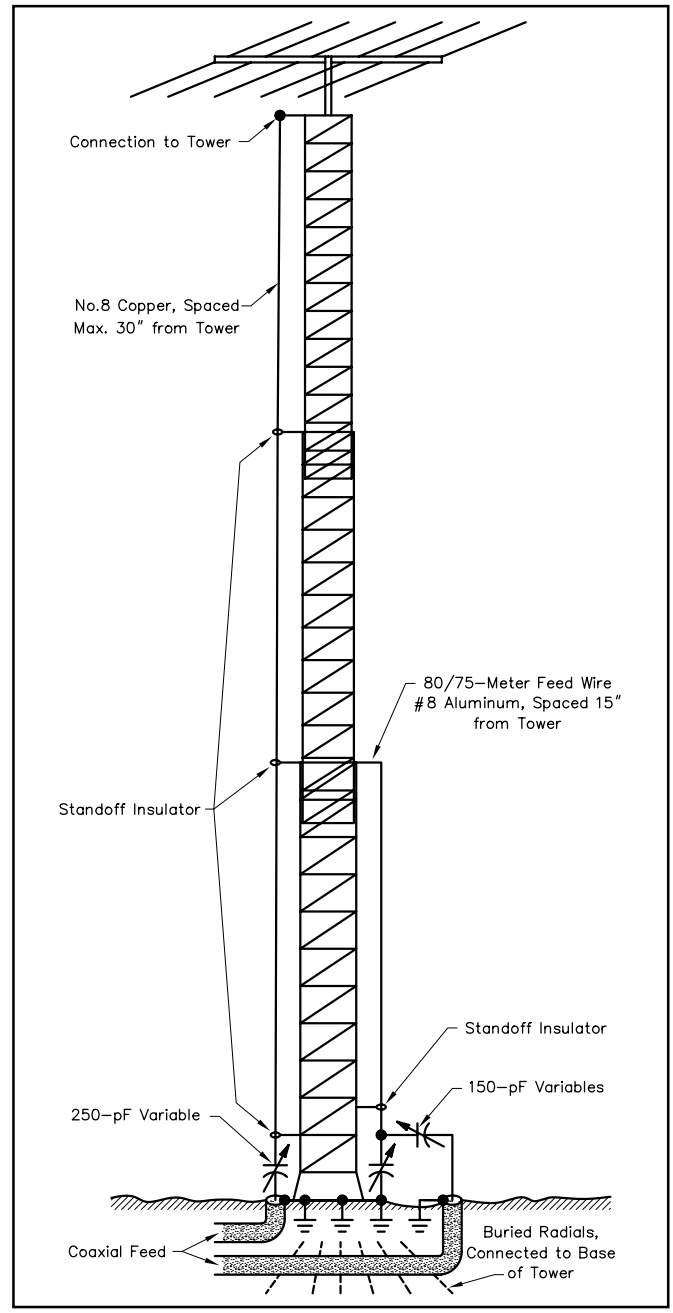


Figure 4—The details of the shunt feeding/matching system designed by K6SE and described in *The ARRL Antenna Book*. The 1.8 MHz feed (left side) connects to the top of the tower through a horizontal arm of 1-inch diameter aluminum tubing. The other arms have standoff insulators at their outer ends. The 80-meter side (right) is similar, connecting to the tower at a point 28 feet above the ground.

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. QST

By Scott Schultz, N0IU

The HF-FM Link

Find a repeater link to 10 meters and work the world!

Ah yes, Old Sol is beginning to smile on us once again. As the sunspot numbers are increasing, so is favorable propagation at the upper end of the HF spectrum, especially 10 meters. At the top of the 10-meter band, from 29.0 to 29.7 MHz, amateurs are permitted to use FM. This is where you'll find the fascinating realm of the HF FM repeater.

Unlike your local VHF/UHF repeater system, where the purpose is to facilitate communication across towns or regions, these HF FM repeaters can relay conversations across the globe! For those of you who have recently earned your license, and have not had the thrill of working the world on 10 meters, you are in for a treat. (I tell people the only reason I got my Amateur Extra ticket in 1995 was so I would have something to do until 10 meters opened up again!) If you are a Technician, Technician Plus, or a ham laboring under severe restrictions that prohibit outdoor antennas, read on. You may still be able to get in on the fun of working the world with your VHF/UHF H-T or mobile rig.

How Linked Repeaters Work—And How To Find Them

The key to all this fun can be found in a jewel of a publication, *The ARRL Repeater Directory*, but it may take a little digging on your part. The very first repeater listings found in the book are for 10 meters. Find the listing for your area and if there is a 10-meter repeater, see if there is an "l" (lower case L) in the "Notes" column. If there is, this means it is a *linked* or crossband repeater system.

A crossband 10-meter FM repeater is typically linked to a VHF and/or UHF repeater system. A crossband repeater system has (at least) one receiver and one transmitter for each band. In the case of a 2 meter/10 meter system, whatever comes in on the 2 meter receiver is retransmitted on the 2 meter output frequency as well as the 10 meter output frequency. Likewise, if there is activity on the 10 meter side, the 10 meter receiver simultaneously sends its output to both the 10 meter and 2 meter transmitters (see Figure 1).

The most frequently asked question about linked 10-meter FM repeaters comes from Technicians who are not sure if it is legal for them to talk to someone who is using the "10-meter side" of the repeater. After all, Technicians do not have HF privileges, yet they are creating signals on 10 meters through the linked system. There is an easy rule of thumb to follow: As long as the *input* to the repeater is in the proper band segment (above 50 MHz for Technicians), the *output* frequency doesn't matter. In other words, as long as the owner/trustee of the repeater has the privileges to operate on 10 meter FM, so do you! Remember that *you* are not transmitting on 10 meters, *the repeater is!* The same rule holds true, by the way, for amateur satellites that relay signals from 2 meters to 10 meters (like RS-13).

Suggested Operating Techniques

When the band is open there is a pretty good chance that you will not be the only station waiting to use the repeater. The ham waiting for his turn probably does not care how many brothers or sisters the DX operator has, what his dog's name is or how long he has been a ham. The thrill of making a genuine DX contact is hearing the distant station come back with your call sign and knowing your voice was heard hundreds or thousands of miles away. By keeping the conversation short you give other amateurs a chance to share the excitement. Besides, 10-meter propagation can drop off as quickly as it appears—the DX that was there for you may suddenly vanish for everyone else.

Conclusion

Find a repeater system that has a 10-meter link and learn how to use it. In some systems the 10-meter links are active continuously. Special beeps or Morse strings may signal link availability. The more common practice, however, is to use DTMF (TouchTone) codes to activate the links. In many cases you may discover that you must become a member of the group that supports the repeater before you will be allowed to use the link codes.

241 Burning Leaf Dr
Saint Peters, MO 63376-7048
sschultz@megsinet.net

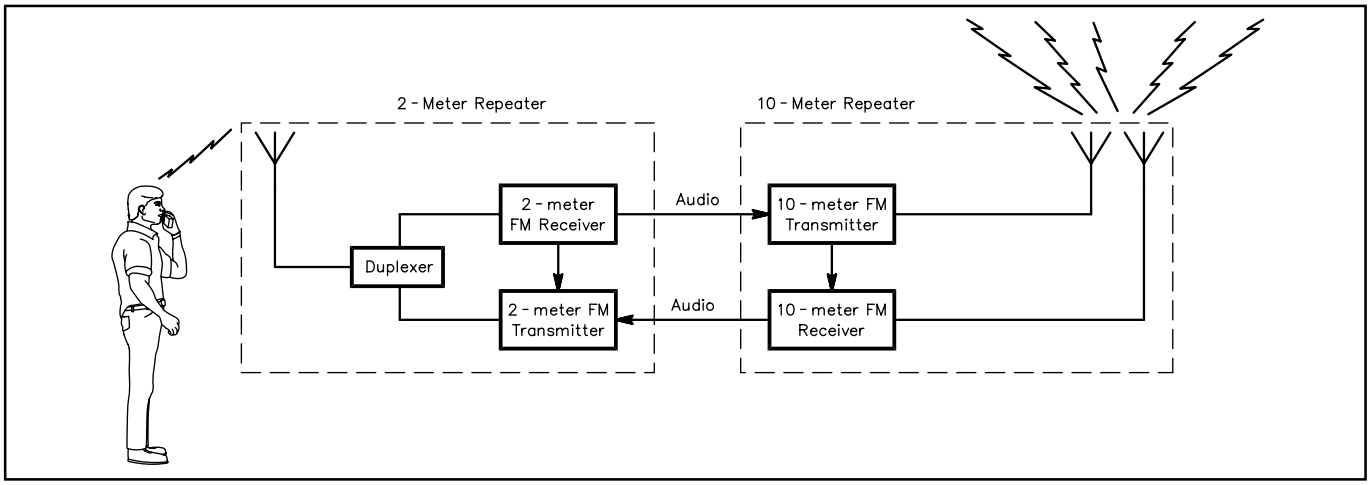


Figure 1—A typical linked repeater system. The transmit and receive audio from the 2-meter repeater is passed to a 10-meter repeater. When the link is active, everything that is repeated on 2 meters is also transmitted on 10 meters. Everything heard on 10 meters is transmitted on 2 meters.

L. B. Cebik, W4RNL

Whips, Tubes and Wires: Building a 10-Meter L Antenna

Here's an easy antenna for local and DX work!

The **L** antenna has been around for quite a while. The basic idea seems to have originated with VK3AM in the early 1950s as described by L. A. Moxon, G6XN. Ralph Holland, VK1BRH, includes the **L** in his computer studies.[1] I stumbled across the same idea accidentally, trying to answer some questions from a new ham who lived in an area where locals used both vertical and horizontal antennas on 10 meters. How could he communicate effectively with both groups using only one compact antenna? And could he cover the entire band and all its modes with this antenna?

One simple answer to these questions is the **L** antenna (or just "**L**"), as shown in Figure 1. We'll look at more precise dimensions further on, but for 10 meters, each leg is between 8.25- and 8.5-feet long, depending on the material we choose. Let's review the basic properties of the antenna and where it might be useful.[2]

First, the **L** is simply an inverted-**V** rotated to place one leg straight up and the other straight out. One result of this move is to reduce the footprint of the antenna. It is now only a little over 8 feet from side to side. You can support this antenna easily, making the L attractive for hams with very limited space.

Second, the **L** has a feedpoint impedance at resonance of about 45 Ω. This makes it suitable for direct use with 50-Ω coaxial cables. However, since the nonsymmetrical physical structure seems ripe for common mode currents on the line, the use of a choke or bead 1:1 balun at the antenna terminals is strongly recommended. With elements at least $^3/_8$-inch in diameter, and with the antenna resonated at about 28.85 MHz, the system should show less than a 2:1 SWR from 28.0 to 29.7 MHz. Moreover, if you use reasonable care in setting the length of the vertical section, you can do almost all pruning to the more accessible horizontal section.

Third, the **L** has both vertically and horizontally polarized radiation. The horizontally polarized radiation is concentrated broadside to the horizontal leg. Positioning this leg to catch the most desired directions is important. The vertically polarized radiation forms a nearly circular pattern from the vertical leg. Figure 3 shows how the overall radiation pattern of the **L** develops from combining both the vertically and horizontally polarized fields.

For DX communication, polarization is not usually very significant, since refraction through the ionospheric layers tends to skew the initial polarization. For local point-to-point communication on 10 meters, however, cross polarization can severely reduce signal strength. Fortunately, the **L** can permit communication with both horizontal dipole and Yagi users on the one hand and with vertical users or repeaters on the other.

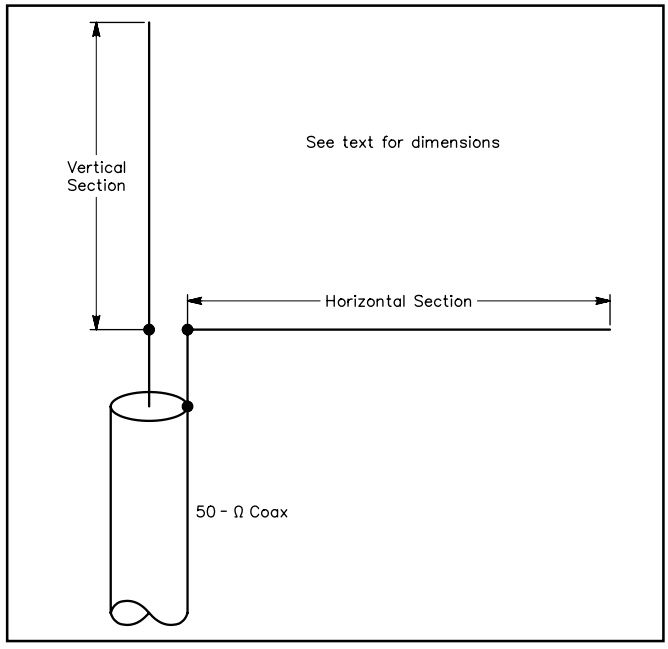


Figure 1—The basic outline of an L antenna.

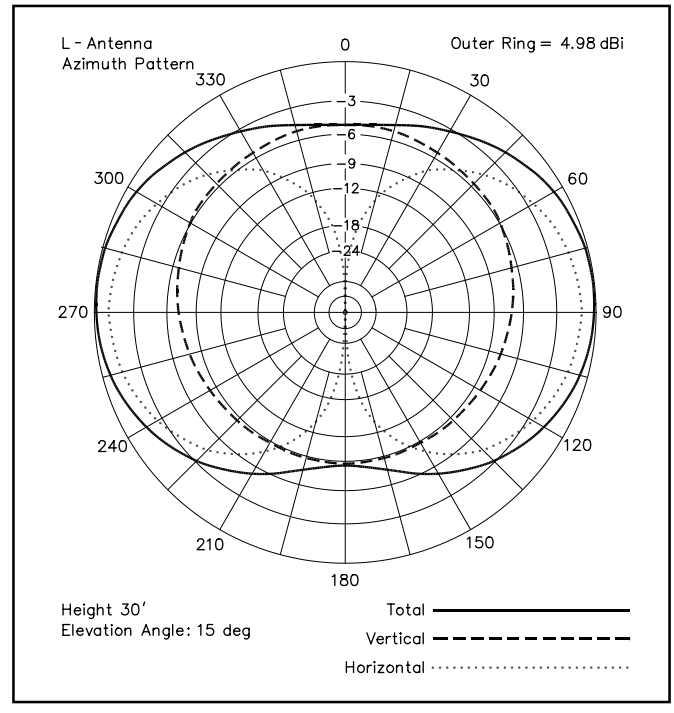


Figure 2—The horizontally and vertically polarized far fields—plus the total far field—radiation patterns of an L antenna for 28.85 MHz at 30 feet over average ground.

Whips

Ready-made elements already exist in the form of the ubiquitous stainless steel mobile whip. These elements are both sturdy and handy, since they come with a threaded base that promises bolt-together construction. They stand up to the weather very well and are more impervious to corrosive atmospheric effects than most materials. They seem to be good candidates for use in the **L**.

The use of ready-made elements sometimes involves more work than we initially anticipate. Figure 3 shows perhaps the simplest way to mount two whips, one horizontal, the other vertical. Because whips are fairly heavy, the plate to which they mount must also be heavy: steel at least 1/8-inch thick. The plate requires one major bend to form a lip about 2 inches long. The vertical portion should be about 12 to 18 inches long, and about 3 inches wide. Dimensions are not critical. The values suggested here are designed to ensure maximum strength for the mounting plate.

The weight of the plate plus the whips requires a sturdy mast or stub (for roof-top mounting), and secure attachment. The sketch shows **U** bolts, but 5/16-inch stainless steel nuts and bolts through the plate and mast would work, if properly aligned. Stainless steel hardware, which is now readily available at hardware depots, is advisable for corrosion resistance.

The plate itself requires treatment to prevent rust. A good coat of metal primer and a top coat of rust retarding paint is the minimal treatment. However, normal scarring of the surface will permit rust to form. An alternative is a professional chroming job.

Whips come with threaded studs which must be insulated from the mounting plate. Mounting adapters are available, and most are between 1 and 2 inches long. The adapters require a half-inch hole in the plate and normally use an insulated shoulder washer.

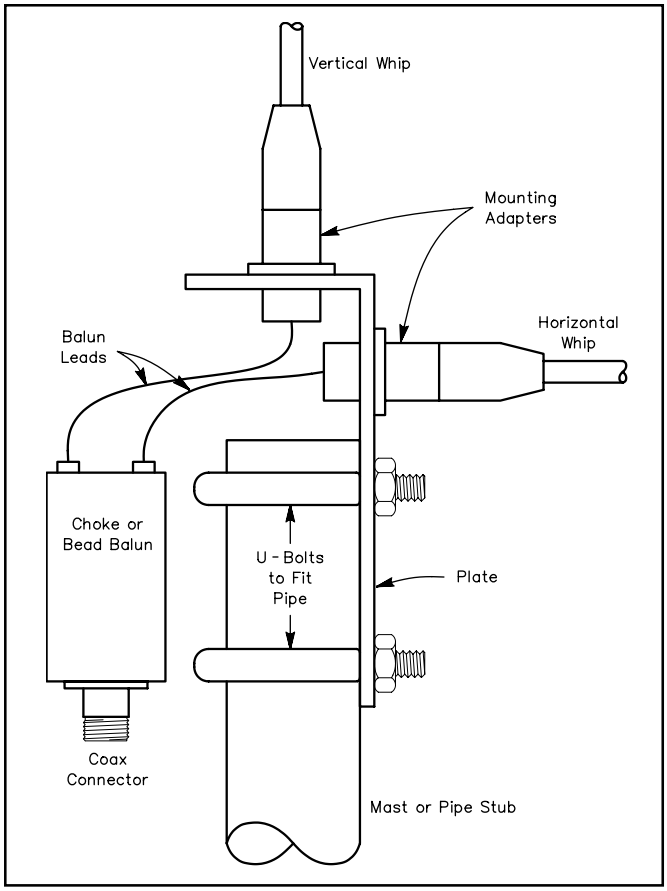


Figure 3—One possible method of mounting an L antenna using stainless steel mobile whips.

The horizontal element is more likely to create wear on the shoulder washer than will the vertical element. Careful tight connections with locking washer are necessary for a durable installation.

The sketch in Figure 3 also shows a 1:1 choke or bead balun. Since these devices come in many shapes and sizes, I have not shown a specific mounting method. I placed the balun in the sketch just as a reminder that its use is advisable.

The whips themselves will be something over 100 inches long. You'll find whip antennas at RadioShack that are 102.5 inches long. When you add the length of the adapters, each element becomes up to 105 inches long. The most desirable length for each is about 101 inches, which requires some trimming. Be careful of sharp ends after cutting. Every inch of length change will move the resonant point about 100 kHz. Because whips are well under 3/8 inches diameter, full band coverage may not be feasible with an SWR of less than 2:1.

Aluminum Tubing

Aluminum tubing at least 3/8 inches in diameter will provide full band coverage. I recommend 6061-T6 or similar tubing of good strength for antennas. Since this tubing often comes in 6 foot lengths, the elements may be made up from 4.5-foot sections of 1/2-inch diameter stock, with extensions using 3/8-inch stock. Expect the stepped-diameter elements to be longer than uniform 3/8-inch elements, despite the use of a larger size tube for the inner portion. Computer models suggest that an 8-foot 3-inch vertical element and an 8-foot 7-inch horizontal element provides resonance at 28.85 MHz. With the two-step elements, the vertical should be about 8-feet 6-inches long. If you use larger diameter tubing, expect slight decreases in the required lengths.

Figure 4 shows one possible way to mount the elements. Basically, both elements mount to a plate that in turn mounts to a mast or stub. The plate in the sketch shows alternative lower shapes. If the stub is metal, use the larger size to space the mounting hardware for greater security. If the stub is (weather-protected) wood, it can extend into the upper area of the plate, and the more sharply triangular shape will secure all of the parts.

The plate makes up a right triangle, with the corners trimmed. It should be about 2 feet long vertically and at least 1 foot long horizontally. The material may be a plastic rated for strength and UV resistance, such as Lexan. You may also use 3/8-inch thick plywood rated for outdoor duty, so long as you provide good weather protection. Pay special attention to sealing the edges.

Figure 4 also shows the recommended balun, mounted according to its size and shape. The aluminum **L** is lighter—and probably cheaper—than the whip version. It also provides full 10-meter coverage with ease.

Wire

Both the whip and the tubing versions of the **L** allow you to orient the horizontal leg broadside to the greatest number of local stations using horizontal polarization. If the desired broadside directions happen to allow the horizontal element to align with the crest of a roof (see Figure 5), then you can make an even cheaper and lighter version of the antenna from wire.

The key to a wire version of the antenna is something to hold up the vertical section. After a long absence, bamboo is again becoming available at garden centers. A time-honored ham tradition is to use vinyl electrical tape to secure the wire to bamboo to make antenna elements. The technique still works effectively.

The horizontal element may be constructed in the same way, which would give you the option of orienting it away from the roof crest. However, you can also simply stretch the horizontal wires across the rooftop, using convenient supports. The higher the wire is from the roof, the better.

If the wire used is #14 AWG copper or similar, each element should be about 8-feet 5-inches long. The 2:1 SWR operating bandwidth will not extend to the band edges, though. The maximum 2:1 SWR operating bandwidth is about 1.5 MHz. For full band coverage, we need a "fatter" wire.

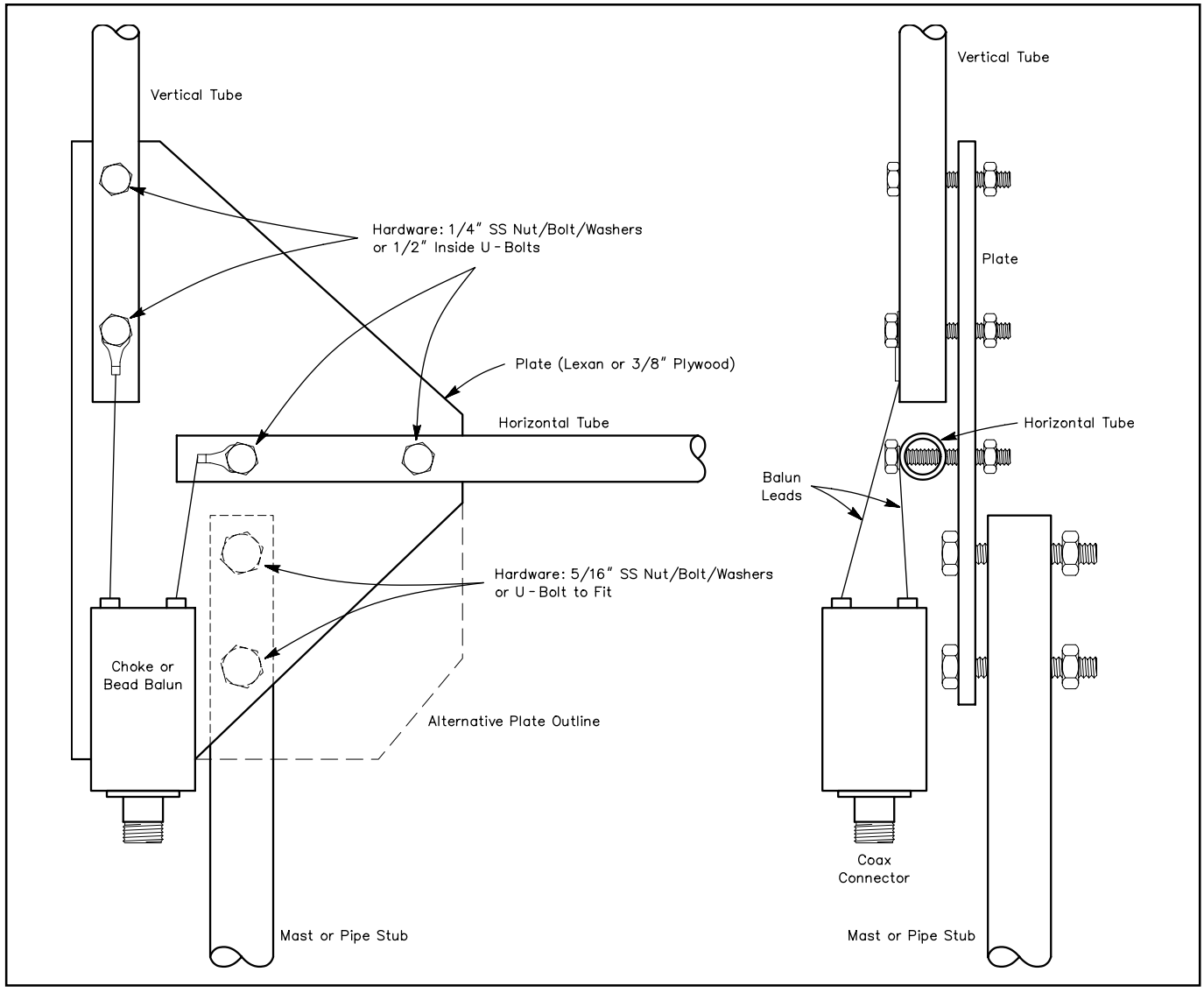


Figure 4—A method of mounting an L antenna using aluminum tubing elements.

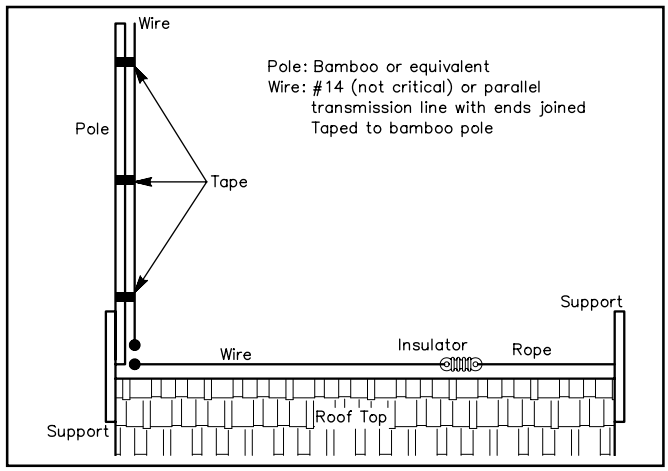


Figure 5—Some ideas for mounting a wire version of the L antenna.

To solve this problem, we can turn to another ham tradition. Instead of using a single wires, we can use a pair of wires, with each taped on opposite sides of the bamboo. Alternatively, we can use parallel transmission line as our antenna wire. Solder together the two wires at the center and at the far ends of each section to form a single "fat" wire. Be sure to choose a sturdier bamboo (or similar) support to handle the extra weight. Expect to prune the antenna to resonance, since the required lengths of the double wires will be a bit shorter than the single-wire version.

These construction ideas only sample the possibilities. I hope that they inspire you to create even better ways of making, not only the **L** antenna, but as well many antennas for other uses and other bands. As a start for full band, all-mode, and all-polarization coverage of 10 meters, the **L** antenna is a simple and flexible design for both the newcomer and the old-timer.

Notes

[1]See L. A. Moxon, *HF Antennas for All Locations*, 1st Ed, pp 154-56. Ralph Holland, VK1BRH, has produced a number of interesting modeling studies, published in *Amateur Radio*, the journal of the Wireless Institute of Australia. His studies can be found at his Web site: http://www2.dynamite.com.au/vk1brh/Antsim.htm.

[2]I described the basic properties of the **L** antenna in some detail in "The **L**-Antenna," *AntenneX*, July, 1998.

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By Richard F. Gillette, W9PE

Latitude and Longitude the Easy Way

You think you know where you are…but can you describe your location to others in exacting detail? To settle any future arguments once and for all, here's how to determine your location in space right down to the smallest nub!

If you're a typical ham you'll be asked for yours more than once. Your computer logging program wants it. Satellite orbit programs require it. Call sign servers are happy to have it. Your grid square depends on it. And if the federal government has its way your cell phone will transmit it in the background. I'm talking about latitude and longitude, of course!

The first time I had to find mine I went to the atlas and interpolated (guessed) how far I was between 42° and 43° north latitude and 88° and 89° west longitude. My guess was 42°11'28"N and 88°08'04"W.

Using the Internet I've found an easier way to get accurate latitude and longitude values. If you don't have net access, your public library or community college almost certainly will (and the friendly folks there will probably even help you with this simple process). It's a nice way to try the Net to see what it can do.

First, point your Web browser to **http://MapsOnUs.com**.

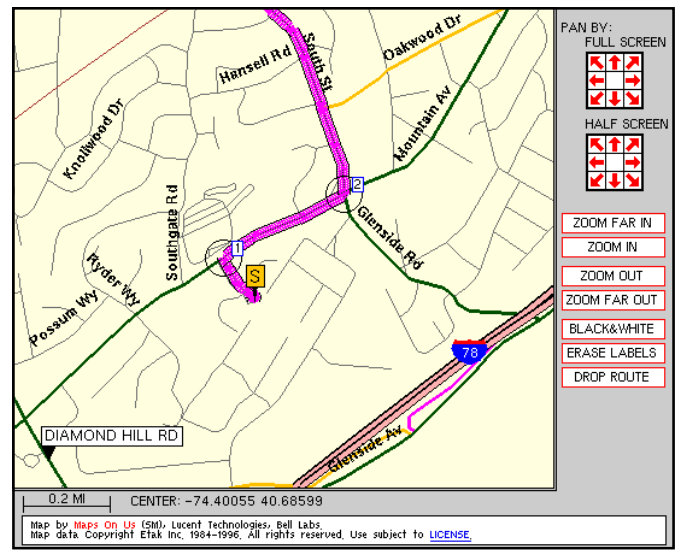
Note that upper and lower case letters, punctuation and spacing (no spaces) are important for most Web addresses, although this is an exception. When the page loads, start as a "GUEST" (click on "Maps"). Enter your address, then click "Draw Map" and you will be given a map. Zoom in on the map (click on the zoom in and/or direction arrows) until you find your property. Zoom in as far as you can. Then place the pointer on the spot seems to be closest to your antenna or the spot that you want to use as a GPS checkpoint. Click this point to center the map. The map will redraw and at the bottom it will show its center point (your chosen longitude and latitude) as a decimal. In my case, –88.115564 42.23384.

The decimal portion can be converted to minutes by multiplying by 60 (0.115564 × 60 = 6.9338 minutes). The decimal minutes also are converted to seconds by multiplying by 60 (0.9338 × 60 = 56.0304 minutes). The result is –88°06'56.0304", which rounds to –88°06'56", also written as 88°06'56"W. The Longitude converts the same way, which places me at 88°08'05"W 42°14'02"N, not the 88°08'04"W 42°11'28"N that I estimated using the atlas.

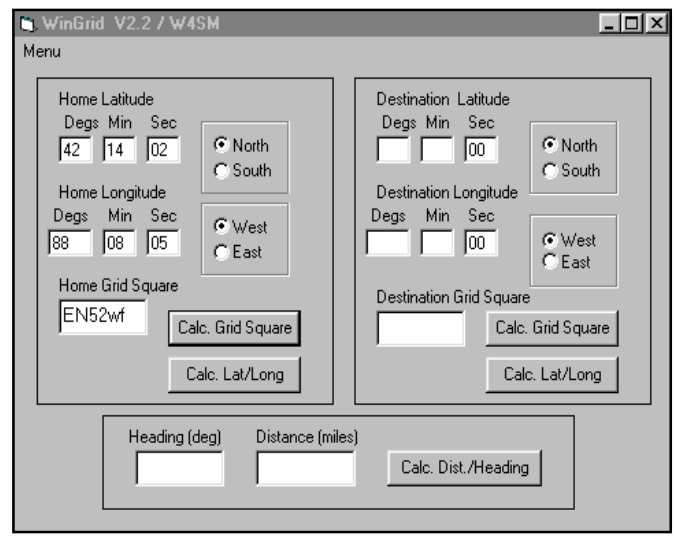
If you know your latitude and longitude it's easy to find your grid square. There are a number of programs available that will convert latitude and longitude to a grid square. If you run *Windows,* for example, try W4SM's *WinGrid* available for downloading at the AMSAT Web site at **http://www.amsat.org/amsat/ftpsoft.html#win-util**. Enter your longitude and latitude information and the program will return your six-character Maidenhead Grid Square. Mine is EN52wf. It's that simple! You can even calculate your grid square on the Web at **http://www.arrl.org/locate/grid.html**, or **http://www.amsat.org/cgi-bin/gridconv/**.



When you reach Maps On Us at http://MapsOnUs.com, try starting as a "guest" as shown in the left section.



A sample Maps On Us display. Zoom in as far as you can, then place the pointer on the spot that seems closest to your antenna, or the spot you want to use as a GPS checkpoint. Click this point to center the map.



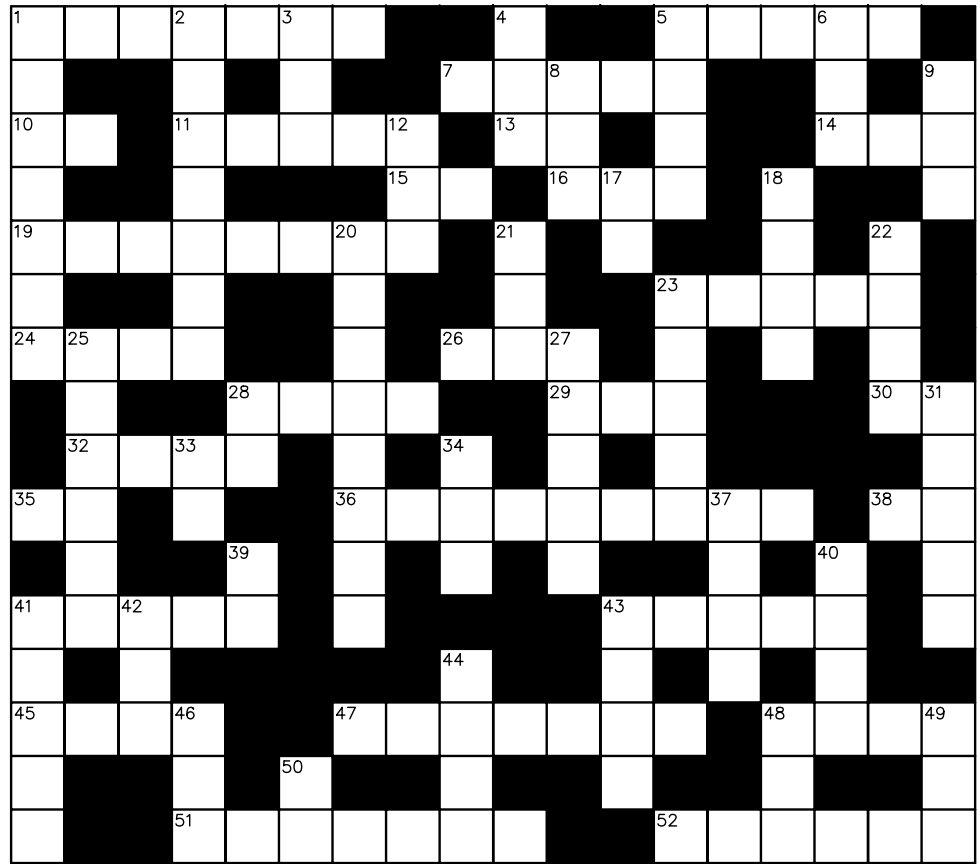
Once you have your latitude and longitude, you can use a simple piece of software such as *WinGrid* by W4SM to determine your grid square.

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By H. Ward Silver, N0AX

Test Your Knowledge!

A crossword of "founders and units."

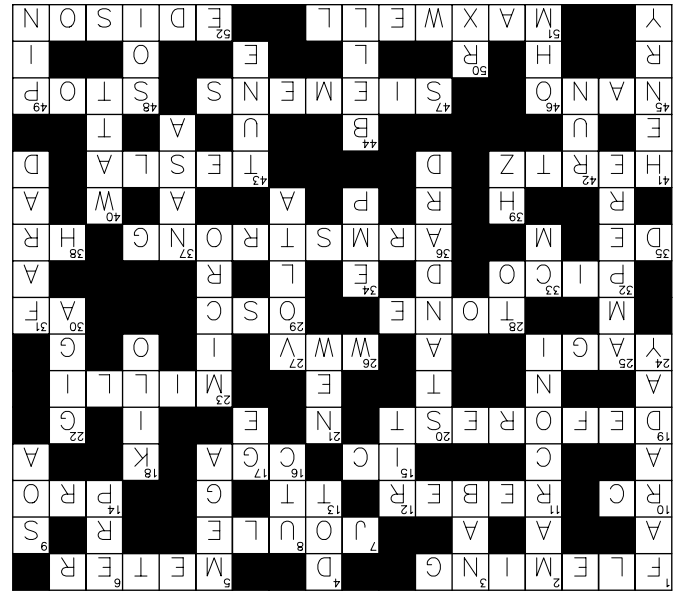


Across

1. Invented first diode tube.
5. Unit of length
7. Unit of energy
10. A type of circuit, not a cola
11. First radio astronomer and a ham
13. Teletype (abbreviation)
14. Hamarlund Super-_____
15. Chip (abbreviation)
16. First IBM PC color display (abbreviation)
19. Invented the triode
23. One-thousandth
24. Beam antenna inventor
26. Radio clock
28. Anagram and synonym for audio "note"
29. Oscillator (abbreviation)
30. Audio frequency (abbreviation)
32. Micro-micro
35. From (CW)
36. Invented the superhet receiver
38. Hours (abbreviation)
41. Discovered radio waves
43. Famous for his coils
45. One billionth
47. Unit of conductivity
48. Break
51. His laws define radio waves
52. Prolific American inventor

Down

1. Early experimenter with electricity
2. First to span the Atlantic with radio
3. National Association of Broadcasters (abbreviation)
4. Not a dash
5. Kilo-kilo
6. Effective radiated power (abbreviation)
8. WWV transmits this kind of time
9. Safe operating area (abbreviation)
12. Shifts receiver frequency (abbreviation)
17. Good evening (CW)
18. One thousand
20. Source of reference information
21. Right out of the box
22. Kilo-mega
23. Milli-milli
25. French experimenter associated with laws of current
27. Inventor of the battery
28. Opposite of from
31. Unit of capacitance
33. Metric unit of distance
34. Electromagnetic pulse (abbreviation)
37. US space agency (abbreviation)
39. Unit of frequency (abbreviation)
40. Unit of power
41. Unit of inductance
42. Faster than a walk
43. Adjust
44. Inventor of the telephone
46. Unit of resistance
48. Silicon-on-insulator (abbreviation)
49. Type of diode



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Vashon, WA 98070

Edited by **Joe Bottiglieri, AA1GW** • Assistant Technical Editor

The Yaesu FT-2600M VHF FM Mobile Transceiver

Reviewed by Joe Carcia, NJ1Q
W1AW Station Manager

From the moment ARRL Lab test engineer Michael Tracy, KC1SX, released Yaesu's FT-2600M into my custody, it became immediately apparent to me that this radio was one tough monkey.

Its rugged-looking textured faceplate, rubberized controls and smallish blank gray screen belied its user-friendly control layout—two knobs, four buttons. A front-firing speaker grill on the right side seemed just a little too eager to bark out some audio.

The chassis—a healthy chunk of unpainted cast aluminum bristling with cooling fins—made up most of the underbelly. A black sheet metal lid concealed the circuitry within.

I couldn't help but recall my past experiences with other members of its family—its grandfather, the FT-2400H, and its father, the FT-2500M (the first of its lineage to earn a military specification rating for toughness)—a couple of formidable, and talented, characters in their own right.

For the average Joe, it would have been difficult to pick this mutt out of a lineup based on model number alone—but it wouldn't for me—I had an encounter with its mother's clan, Yaesu's Vertex commercial arm, a few months back. The resemblance on her side of the family was uncanny.

I shoved the subject back into its box and shut the lid, locked the container in my truck and smugly thanked Mike for the hand-off. I returned to my desk at HQ, secretly hoping that once I got it home that evening, I would be able to muster the guts to haul it into the shack, tether it to an antenna cable, feed it some voltage and begin the interrogation process.

Modus Operandi

The FT-2600M possesses nearly all of the advanced features that we've come to expect in the modern FM mobile transceiver. These include a time-out-timer, automatic power off, automatic repeater shift, priority channel watch, CTCSS encode/decode, DTMF autodial memories and a scan system with programmable limits.

Some of the more notable highlights are a boatload of memories (175), 8-character alphanumeric memory naming, digital code squelch (*DCS*) encode and decode, and CTCSS and DCS scan. In addition, there's four power output settings (with 60 W out on high), 1200/9600 bits/s packet capabilities, a dc voltage readout and direct frequency/memory input (and user programmable soft keys) on the microphone keypad.

Yaesu has also tossed in a couple of the exclusive features that they've packed into all of their recent VHF and VHF/UHF transceivers. The FT-2600M has both the "Smart Search" and "Auto Range Transpond" systems. We'll dish out the skinny on these later.

Sizing Things Up

The width and depth dimensions on this new unit are about equal to those of its forefathers, but the height has been reduced considerably—down to a little over 1 1/2 inches. This transceiver is noticeably wider than most of the other currently available single band mobiles.

The volume control knob is located in the upper left hand corner of the front panel. The power switches on with a snap as you rotate the knob in the clockwise direction. Squelch adjustments are made using a menu setting. There's a 6-pin modular microphone jack just below the volume control.

The display window is offset towards the left side. Beneath the window is a row of four rubberized buttons. Surprisingly, these are the only four buttons on the entire chassis. Each has two labels, one above and the other on the surface of the button. These are **SET/MHz**, **LOW/REV**, **DW/A/N** and **MW/D/MR**. These front panel keys are not backlit. While there are some additional control buttons located on the microphone, most of the settings for functions that are not commonly needed for typical operations are contained in a 33-item menu. The menu selections are numbered and titled with up to 5 alphanumeric characters, making identification of their assignments fairly intuitive.

The size of the display window is relatively small, especially in comparison to the oversized screens on the '2400 and '2500, but the digits and alphanumeric character size is still more than adequate for easy viewing. The active LCD segments appear black on an amber field. The display brightness can be set to one of four levels or off.

The earlier units had a large amount of the screen area dedicated to an oversized S/RF meter. The '2600 employs a more conventional 12-segment horizontal bargraph meter that's positioned along the lower edge of the display. A row of icons along the top edge of the window indicates the state of several of the important functions.

The main encoder is located to the right of the display window. This puts it slightly to the right of the centerline of the front panel. Above this knob is a small green/red busy/transmit LED indicator. The area that makes up the remaining portion on the right side of the front panel contains the speaker grill.

The back panel supports three jacks and a dc power pigtail with a common T-type connector and a fuse holder. The supplied dc power cable is about 9 feet long and has ad-

The Bottom Line

The rugged good looks of the Yaesu FT-2600M project the image of simple, tough, no-nonsense communicator. Further investigation reveals a number of hidden talents and a level of performance that will undoubtedly earn it the respect of its peers. This rig's got moxie.

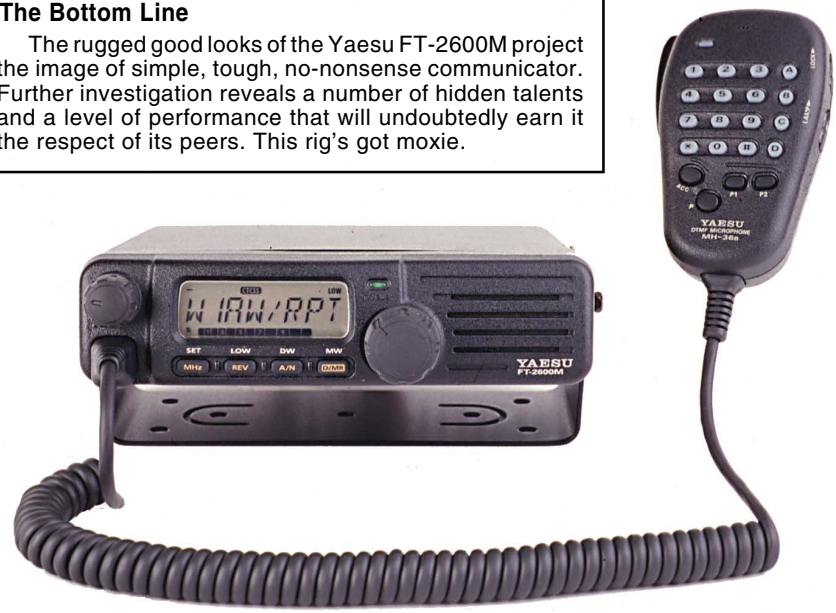


Table 1
Yaesu FT-2600M, serial number 9E010057

Manufacturer's Specifications	***Measured in ARRL Lab***
Frequency Coverage: Receive, 134-174 MHz; transmit, 144-148 MHz.	Receive and transmit, as specified.
Power requirements: 12.4-15.2 V dc; receive, 1.0 A; transmit, 10.0 A (high power).	Receive, 0.6 A (maximum volume, no signal); transmit, 9.2 A, tested at 13.8 V.
Size (hwd): 1.6×6.3×6.3 inches; weight, 2.9 pounds.	
Receiver	*Receiver Dynamic Testing*
Sensitivity: 12 dB SINAD, 0.2 μV.	FM, 12 dB SINAD: 0.12 μV.
Two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset from 146 MHz, 71 dB*, 10 MHz offset from 146 MHz, 101 dB;
Adjacent-channel rejection: Not specified.	20 kHz offset from 146 MHz, 71 dB;
Spurious response: 70 dB.	IF rejection: 112 dB, image rejection: 79 dB.
Squelch sensitivity: Not specified.	At threshold: 0.12 μV.
Audio output: 3.5 W at 10% THD into 4 Ω.	3.8 W at 10% THD into 4Ω.
Transmitter	*Transmitter Dynamic Testing*
Power Output: (H/L1/L2/L3): 60 / 25 / 10 / 5 W.	58 / 22 / 7.9 / 4.2 W.
Spurious signal and harmonic suppression: 60 dB.	75 dB. Meets FCC requirements for spectral purity.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal: 60 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	55 ms.
Bit-error rate (BER), 9600-baud: Not specified.	Receiver: BER at 12-dB SINAD, 1.8×10^{-3}; BER at 16 dB SINAD, 6.8×10^{-5}; BER at –50 dBm, $<1.0\times10^{-5}$; transmitter: BER at 12-dB SINAD, 9.3×10^{-3}; BER at 12-dB SINAD + 30 dB, 1.8×10^{-3}.

*Measurement was noise limited at the value indicated.

ditional fusing in both leads at the supply end. The antenna connector is mounted directly on the chassis. The two remaining jacks are a 1/8-inch external speaker jack and a female DB-9 receptacle for data connections.

The microphone provided with the FT-2600M is Yaesu's MH-36B. On the face of the mike is a familiar 16-digit DTMF keypad and four additional buttons labeled **ACC**, **P**, **P1** and **P2**. The assignments for the **ACC**, **P1** and **P2** buttons can be changed in menu settings. In their factory default configurations, they can be used to activate and vary the settings of the CTCSS and DCS systems; to initiate the CTCSS or DCS scan features; to open the squelch or to start the Smart Search. The **P** button allows you to step between the home channel, the VFO and the memory recall modes.

On the top of the microphone are **UP** and **DOWN** keys for moving through the memories and VFO frequencies or for starting a scan. On the right side are two slide switches, one to turn on the DTMF keypad backlighting and another that will disable all microphone buttons except for the PTT.

In addition to the usual DTMF autopatch and control applications, you can also use the buttons on the DTMF keypad to directly input frequencies or memory channel numbers. While not as full-featured as some of the microphone remote control arrangements currently available, the MH-36B offers a good measure of control capabilities and is still fairly easy to operate—even in a mobile environment.

Let's Pull His Jacket

It was time to do a little digging into the paperwork.

The included 6 × 8 inch 55-page *Operating Manual* is well organized and easy to follow. It starts out with a very complete *Contents* section, a general description of the unit's capabilities and a *Specifications* table. Next there's detailed numbered diagrams of the front and rear panel controls and connectors that includes specifics on the microphone and data connector pin outs. A diagram of the display with an explanation of the icons and graphics is also provided.

Seven pages are dedicated to the *Installation* section. This covers everything from coax selection and RF safety considerations to setting up for packet operation. Most of the remaining pages describe the actual transceiver operation. Advanced features are detailed in the later pages of this section. The last few pages have a summary table for the menu selections and an item by item quick reference guide for the various menu settings.

A separate 16 x 11 inch sheet with a complete and very legible schematic is also included.

Alright All Ready, Work Him Over

I twisted the power switch/volume control and fed him the juice. The display lit up and immediately spilled the beans on the voltage of my shack's dc supply—13.8 V. A second or so later this information was replaced by the operating frequency.

Display legibility is good, even from fairly extreme off-angles, but the shiny surface of the window can be subject to glare under the bright lights. You'll want to keep this in mind when choosing a permanent mounting location in your vehicle or shack.

A few calls on some local repeaters resulted in good reports all around. The transmit audio was typically described as "clear and clean." Receive audio from the unit's built in speaker was impressive—remarkably clear when considering the apparent physical speaker size limitations of this front-firing design. Even with the volume cranked up all the way, understanding the other station was not a problem (although that level of audio did ring the ears a bit!). With its ample audio output and the fact that the sound is more likely being directed toward the operating position, many may find it unnecessary to install an external speaker in all but the noisiest of applications.

I did notice that when operating at even 5 W (LOW 3) the heatsink got quite warm. Once I had it mounted in my truck I found that it got even warmer running at slightly higher power settings. Given that the bottom of the rig consists entirely of finned heatsink, the heating will probably be of little consequence. This should be considered when choosing a place to bolt it down. The manual includes a discussion on choosing an appropriate mounting location in the *Installation* section.

If you're pushing the limits of the transceiver's heat handling capabilities, a thermal protection sensor will activate a "TX PRTCT" message in the display. I never managed to reach the point where the '2600 cried "uncle."

As with most FM transceivers on the market today, the FT-2600M offers expanded receive frequency coverage—134 to 174 MHz. While this range allows you to listen in on a good variety of public service and commercial communications (not to mention NOAA weather, MARS, CAPS and the VHF marine frequencies) the AM aircraft band is

not covered. I tuned around a bit and eavesdropped on the radio chatter of some of my gumshoe pals.

Programming in frequencies, memory names and related information is pretty easy. Once you've got the memories loaded a few quick presses of the **D/MR** button lets you cycle between "home" (usually referred to as "call channel"), VFO and memory mode. When the radio is in the "home" channel mode, an "H" will appear on the right side of the display; in the memory mode, an "M" will appear. When the unit is in the VFO mode, no symbol appears.

If you are in the memory mode, a quick press of the **A/N** button will toggle you between a display of the actual operating frequency or the alphanumeric memory name that you have assigned to that particular memory. It's interesting to note that the frequency or memory name tag and the memory channel number are not displayed simultaneousy. You can bring up the memory channel number by pressing and holding the **D/MR** button for about 1 second. Let the radio automatically return you to the initial display though (it takes about 4 seconds). If you are not careful, you'll end up overwriting your memory name.

The FT-2600M comes equipped with CTCSS and DCS (*digital code squelch*) encode and decode. There are four configuration choices. You can set the radio for CTCSS encode; CTCSS encode *and* decode; DCS encode *and* decode; or off. While this shouldn't present any particular limitations for most operators, note that you cannot activate the decode modes independent of the encode modes. There are also no provisions for setting independent tones or codes for encode and decode on a single frequency or repeater pair. A menu setting for inverting the DCS codes is included.

I should warn you that if the menu is set for CTCSS encode only, the **CTCSS** icon will not appear in the display unless the radio is in transmit. This led to a bit of confusion when I was initially learning to program and operate the radio.

Tone and code scan is also included. The **ACC** button on the microphone (in its factory default setting) will initiate a scan for the tone or code. Once the system detects the tone or code in use, it will stop and allow receive audio to pass. Press and hold the **D/MR** button for one second, and the detected access information will be assigned to the appropriate setting in the menu.

The Packet Racket

The '2600M is capable of 1200 and 9600 baud packet. Yaesu has made TNC connection with this transceiver quite convenient. Many of the other rigs on the market today use either a 6-pin mini-DIN or the microphone jack for packet connections. This transceiver uses a standard female DB-9 jack mounted on the back panel. While the 6-pin mini-DIN connector appeared to be making headway as the "industry standard packet data connector," I've got to admit that the DB-9 seems to be an excellent alternative—they sure are easier to wire!

If you intend to use the radio for both data and voice communications, an obvious advantage of having a dedicated data connector is that it eliminates the need to swap between the mike and a TNC interconnect cable when changing between these modes. The microphone circuit is disabled during the packet transmissions, but there is a menu setting that would allow you to keep it available even during packet transmissions. Simultaneous voice and packet transmission, however, will result in interference to the transmitted data.

There is no need to manually toggle between baud rates. Separate pins in the DB-9 connector are assigned to 1200 and 9600 baud operation. The average packet operator should have no trouble setting this rig up for packet use.

I used the radio for a bit of APRS and local DX cluster operation at 1200 bits/s and found it worked quite well. I didn't have the opportunity to put it through its paces on 9600 bits/s. Lab numbers generated during BER testing (see Table 1) turned up numbers that indicate that the 9600 bits/s bit error rate on transmit is high. It's important to note that we've seen shortcomings in the 9600 bits/s operation of the majority of the recently released fm-only transceivers. If 9600 bits/s operation is your bag, see *"9600-Ready" Radios: Ready or Not?* by Jon Bloom, KE3Z, in the May 1995 issue of *QST*.

Special "Talents"

An interesting feature that Yaesu provides in the '2600M—and several of their other recently released VHF and VHF/UHF units—is their automatic range transponder system (*ARTS*). This function can automatically transmit a burst of DCS information that will alert other ARTS equipped operators that they have moved out of communications range. A CW ID can be programmed, and once activated will identify these automatic transmissions at 9-minute intervals. This system could be valuable for search and rescue or public service operations.

Another exclusive highlight is the Smart Search system. Once activated, the radio will sweep the entire band—or search between programmed band-scan limits—and store the active frequencies into a separate bank of 50 memory channels. The transceiver will make a single sweep between the frequency selected at the beginning of the operation and the top of its range or your selected upper band-scan limit. The resulting stored information will take a bit of sorting through though—you'll find several are loaded with various carriers and locally generated birdies, and strong nearby signals may appear wide enough to the system to end up in memories below and above the actual desired frequency. The system is definitely handy and useful though, and the collection of unwanted information is only a very minor annoyance. The collected information will be discarded when you turn off the power. If you find any interesting frequencies, you'll want to load these into the regular memory channels.

A neat characteristic worth mentioning is the distinct sound that is generated when you press any of the four front panel keys. Once you grow accustomed to their individual sound, it can be useful for mobile operation as verification that you've pressed the proper button. They may be helpful to the vision impaired as well. If the tones rattle you, you can deactivate them in a menu setting.

Yaesu offers an optional *Windows*-based programming kit, the ADMS-2E, that can make setting up this radio even easier. If you happen to encounter a second FT-2600M, you can also "clone" the programmed information from one into the other. This operation does not require a computer and is performed via interconnection of the two microphone jacks using a user-constructed cable.

Lab numbers for this transceiver are very good. If you refer back to previous product review columns and compare the measurements with the other single band VHF transceivers covered in recent years, you'll find the FT-2600M stands up to the competition quite well. The 0.12 µV FM sensitivity scores at the top of the class. The 10 MHz offset IMD, usually a good indicator of a unit's ability to fight off interference from strong, nearby VHF commercial communications, measures well above the running average. The IF and image rejection figures are also very respectable. These performance characteristics may be partially attributable to its commercial heritage.

Gripes

The FT-2600M offers very good performance, a good measure of features and durable construction. The only complaints that I can come up with are the lack of front panel button label lighting and a couple of digs that are related to the included microphone.

The fit and finish of the FT-2600M seems top notch. The only exception is the rubber boot that covers the connector on the radio end of the microphone cable. It's a loose slip fit over the plug and cable and makes that connection appear loose and sloppy. Although it probably doesn't accurately reflect the overall durability of the plug's connection, it is a bit annoying. The only other beef I have is with the microphone PTT button. The spring return tension is very light—I found myself accidentally activating the transmitter on a number of occasions.

The Last Words

The FT-2600M is a VHF FM transceiver with a healthy variety of the right stuff—very respectable features, performance, rugged good looks and uncomplicated operation. If you're looking to install a voice or voice and data transceiver in your shack or vehicle, the '2600M is just begging for you to initiate a more thorough private investigation. Let 'im have it.

Manufacturer: Yaesu USA, 17210 Edwards Rd, Cerritos, CA 90703; tel 562-404-2700, **http://www.yaesu.com**. Manufacturer's suggested retail price: FT-2600M, $289. Typical current street price, $240. ADMS-2E Windows programming kit, $38.

The Kenwood CS-4125 20 MHz Dual Trace Oscilloscope

Reviewed by Mike Gruber, W1MG
ARRL Technical Advisor

"*An oscilloscope measures voltage with respect to time*." Those scholarly words from a lecture by one of my electronics instructors—more years ago than I care to admit—seemed remarkably profound at the time. I didn't fully appreciate their significance until some time later—probably not until the course was over. My instructor's words stayed with me all these years however—which, I suppose, is a testament in itself. Despite modern advances in oscilloscope technology, that basic premise still remains unchanged.

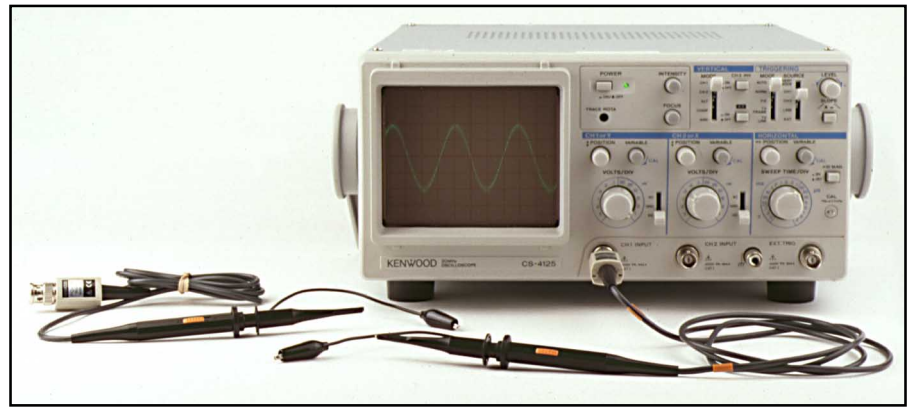
Here is a simple explanation of how an oscilloscope works. A focused beam of electrons strikes the phosphorus coating on the inside of the screen of a cathode ray tube (*CRT*). The phosphorous at the point that the beam strikes glows. Coils located on the neck of the CRT create a variable magnetic field that is used to deflect the beam. One set of coils is used to sweep the beam from left to right across the screen. This movement in the horizontal direction corresponds to the "time" in my instructor's quote. Simultaneously, the level of a particular input signal that you are sampling—an ac or dc voltage for example—is used to control the magnetic fields produced by a second set of coils that varies the deflection in the vertical direction. The greater the voltage, the greater the vertical deflection.

As the changing magnetic fields influence the position where the beam strikes the screen, a glowing phosphorous trace along the path of its motion creates a graphical representation of the voltage over time. Typically, the beam is blanked during its return to the left side of the screen. The process repeats itself when the 'scope's "triggering" circuitry senses the correct point on the waveform (set by the user) and initiates a new horizontal sweep. If properly triggered, the repeating sweeps render a steady image of the input signal's magnitude over a specific time period.

A classic example is the familiar sine wave shape that's formed by a properly sampled alternating current (ac) voltage.

While perhaps not as universal or indispensable as the venerable multi-meter, the 'scope can add some tremendous measurement capabilities to your test bench. As an electronics student, I found that the way information is shown on an oscilloscope's screen can be an invaluable aid in understanding what's actually going on in a circuit.

Should you be adding an oscilloscope to your test bench? Today's typical electronics hobbyist probably considers laboratory grade instruments way beyond his financial means. While there are some inexpensive hobby grade oscilloscopes on the market, they often lack important features, and the surplus units you'll see crowding the tables at the typical hamfest are typically those large, heavy vacuum tube versions of yesteryear.



A high quality dual trace oscilloscope that includes a good variety of the measurement capabilities commonly needed on the test bench is not always easy to find, especially at a price that won't break the budget. Is the Kenwood CS-4125 the exception? Let's take a look!

First Impressions

At first glance, the outward appearance of the CS-4125 reminded me of the laboratory grade oscilloscope in the ARRL lab. Even the color was similar. I was impressed with the quality of construction. I also thought that its size would be an ideal compromise for most hobbyists. The control panel labels; the screen; and the knobs and switches are large enough to easily read and operate—yet the instrument itself is small and light enough to find room on a small workbench or to allow for easy transportability. The unit measures roughly $6^1/_4 \times 13^1/_2 \times 16^3/_4$ inches. The screen is about $3^1/_2 \times 4^1/_4$ inches.

The controls and layout are so similar to other oscilloscopes that I've worked with that I decided to try performing a few simple measurements with the CS-4125 before I read the manual. Much to my surprise, I succeeded in observing numerous waveforms from my signal generator with ease. The waveform traces were clear, easy to read and very stable. While I wouldn't recommend that *you* dive right in without first reading the documentation, this should serve to illustrate the intelligent layout and intuitive operation of this instrument.

Features and Controls

The CS-4125 comes with two 1X/10X probes and a removable power cord. An outer transport case and a control panel cover are not included. There are no user changeable expansion modules or plug-ins either, but Kenwood does offer an optional accessory bag (MC-78). This bag attaches to the top of the oscilloscope and provides storage for the probes and the manual. This is the only available accessory.

The handle deserves mention. It not only serves as a convenient carrying point but also provides an adjustable prop for the unit. It locks in to several different positions, two of which are suitable for tilting the front panel up for easier viewing. You can also store it flush against the underside of the case, much like the bails common on HF transceivers. Four large plastic feet are attached to the bottom of the cabinet for setting it flat on a bench or shelf. The back panel has four projections molded into the corners that serve as legs—allowing you to securely stand the oscilloscope with the front panel facing upward. A recessed area on the back panel includes tabs for winding the power cord for storage.

The most prominent feature on the front panel is—of course—the screen, located on the left side. All front panel controls are positioned to the right of the screen and are grouped in six distinct sections.

In the upper left hand section is a set of four controls that include the **POWER** pushbutton switch (with an LED power-on indicator); **INTENSITY** and **FOCUS** controls; and a screwdriver adjustment control point for **TRACE ROT**ation.

Just to the right is a collection of controls labeled **VERTICAL**. These include a 5-position toggling **MODE** switch that selects which of the channels (or combinations thereof) is displayed, a **CH 2 INV**ert button and an **X-Y** button.

In the upper right hand corner there's a **TRIGGER** control group. You'll find two additional 5-position toggle switches labeled **MODE** and **SOURCE**, a trigger threshold **LEVEL** adjustment knob and a rising or falling signal **SLOPE** trigger push button.

The remaining three sections make up a second row of control groups. There are two identical groups labeled **CH1 or Y** and **CH2 or X**. These each contain a knob marked ↕**POSITION**, a second knob marked **VARIABLE**, a 12-position rotary switch for selecting the **VOLTS/DIV**ision and a 3-posi-

Bottom Line

The Kenwood CS-4125 offers the measurement precision and many of the expanded capabilities found on the high-end oscilloscopes at a price that's attractive to the electronics hobbyist.

Table 2

Kenwood CS-4125, serial number 2090695: accuracy

Frequency		*Voltage*	
Marconi Signal Generator	*CS-4125*	*Precision DC Reference*	*CS-4125*
10.0 kHz	9.93 kHz	10.0 mV	10.2 mV
20.0 kHz	19.9 kHz	20.0 mV	20.2 mV
50.0 kHz	49.8 kHz	50.0 mV	50.1 mV
100 kHz	99.1 kHz	100 mV	101 mV
200 kHz	201 kHz	200 mV	203 mV
500 kHz	506 kHz	500 mV	504 mV
1.00 MHz	1.01 MHz	1.00 V	1.01 V
2.00 MHz	2.02 MHz	2.00 V	2.04 V
5.00 MHz	5.04 MHz	5.00 V	5.04 V
10.0 MHz	10.1 MHz	10.0 V	10.2 V
20.0 MHz	19.9 MHz	20.0 V	20.0 V

Size (hwd): 6.25×13.5×16.75 inches; weight, 15.6 pounds.

tion **AC/GND/DC** toggle switch.

To the right of these is a section titled **HORIZONTAL**. Here you'll find a 20-position **SWEEP TIME/DIV**ision switch, a **VARIABLE** sweep time control, a ↔**POSITION** control and a **X10 MAG**nification push button. Also located within this group is a **CAL**ibrate output signal test point. The calibrating signal is set for 1 V peak to peak at 1 kHz.

Along the bottom of the faceplate are three BNC connectors. These provide 3 inputs—for channel 1 (or Y), for channel 2 (or X) and an additional input for external triggering. A binding post for a ground connection is also included.

On the back panel of the '4125 there are two additional BNC connectors; a **CH 1 OUTPUT** (5 V RMS maximum) and a **Z-AXIS INPUT** (42 V peak maximum)—more on these later.

The Manual

The *Instruction Manual* is a $6 \times 8^{1}/_{4}$ inch booklet and covers both the CS-4125 (20 MHz) and a CS-4135 (40 MHz) oscilloscope models. Only 32 pages—about half the manual—are in English and pertain directly to oscilloscope operation. The rest consists of instructions in Japanese and several pages of safety warnings in Japanese, German and English.

The manual contains the usual table of contents, explanation of features, control descriptions and initial control settings. In fact, it reminds me somewhat of the typical transceiver manual. The later part also details a handful of sample oscilloscope applications—including measuring the voltage difference between two points on a waveform, measuring times and frequencies, and measuring signals with high and low frequency components. While no doubt helpful, I believe most beginners would benefit from additional and supplemental material, such as that contained in chapter 26 of the new *2000 ARRL Handbook*.

Overall, I'd rate the manual as adequate—but there is some room for improvement. While clear and comprehensive with regard to most of the various functions of the CS-4125, it could be enhanced with a little more detail in some areas. The explanation of the trigger source control, for example, isn't as clear as it could be—it is, however, accurate as presented. There are also a number of typographical errors.

Features

The CS-4125 is equipped with nearly all of the features I would expect to find in a quality dual trace oscilloscope. If you're already familiar with oscilloscope operation, you'll recognize many of them. Some features are particularly notable—especially for a 'scope in this price range. I'll point them out as we take a closer look.

The unit displays two waveforms simultaneously by using either an "alternate" or "chop" process. The alternate setting automatically alternates between the channel 1 and channel 2 traces with each sweep. For two signals with a reasonably high sweep rate, this allows you to clearly view the two input waveforms on the screen at the same time. The chop setting rapidly switches (at about 150 kHz) between the two channels. This setting reduces the flickering that would occur when viewing two inputs that have slow repetition rates or relatively slow sweep rates.

I was very pleased to discover that the CS-4125 also includes an "add" capability. While this has many uses, the manual describes one in step-by-step detail. When used in conjunction with the **CH2 INV**ert feature, it can cancel an undesired signal from a displayed waveform. Simply feed a sample of the undesired signal to channel 2, invert it, then add it in to the desired plus undesired signal that is connected to channel 1. The resulting trace is a representation of the signal fed into channel 1 with the undesired channel 2 signal removed.

Both the vertical (voltage) axis and the sweep time accuracy are specified at ±3%. Variable fine adjustment controls for each axis are also included. These knobs have a slight detent as you rotate them into the **CAL**ibrate position.

The large aperture rectangular screen has a grid with ten horizontal and eight vertical divisions. Each division is 1 cm × 1 cm. Tick marks further divide both the vertical and horizontal lines of the "cross-hairs" into 5 segments per cm.

On the left edge of the screen there are convenient percent markings at 0, 10, 90 and 100% vertical scale—very handy for measuring rise times. The horizontal lines that correspond to the 10 and 90% values are also divided with five tick marks per centimeter.

One particularly nice aspect of the screen and scale arrangement is its "reduced parallax" feature. The lines that make up the measurement grid are etched onto the face of the CRT, significantly reducing the measurement errors that can result from viewing the screen from off angles. The display does not include scale illumination.

Another neat feature is the action of the intensity control. Unlike many oscilloscopes, an automatic focusing system helps maintain proper focus as you vary the trace intensity.

Speaking of intensity, there's a **Z. AXIS INPUT** jack that will vary the intensity of the trace relative to the connected voltage. A positive voltage fed into this input will decrease the intensity of the trace. TTL level intensity modulation is also possible.

Each probe has a **X1/X10** switch that effectively expands the range of the vertical axis. The **X10 MAG**nification button, located in the **HORIZONTAL** control group, can expand the horizontal axis.

An X-Y operating mode provides additional measurement capability. In this mode, the "Y" axis is not swept but rather controlled by the channel 1 input. The "X" axis is controlled by the input to channel 2. Using X-Y operation, you can determine phase differences and frequency relationships between the two signals with Lissajous patterns. A good example of an application for this is the generation of the "twin bananas" display of the "mark" and "space" signals of a properly tuned RTTY signal.

I find the **CH1 OUTPUT** jack, located on the back panel, to be a particularly notable inclusion. With it, a signal fed into the channel 1 input can be easily shared with another measurement instrument—a frequency counter for example. The channel 1 output level supplies 0.1-V for each vertical division of channel 1 trace that's shown on the display. This built-in circuitry affords a couple of advantages. The channel 1 input is high impedance and the channel 1 output is 50 Ω. This allows the oscilloscope to act as a signal buffer. Since the output is proportional to the size of the waveform on the display rather than the actual input voltage, you can use the channel 1 **VOLTS/DIV**ision and **VARIABLE** controls to amplify or attenuate the input signal before you feed it to the other device.

The maximum voltage that's available at the channel 1 output is 5 V. Note that with the 8 vertical divisions available on the display and the fixed 0.1-V/division scaling factor for this feature, a waveform that fills the display from top to bottom would result in an output of only 0.8 V. To get a higher output voltage, you would need to set the 'scope to display the waveform with some (or most) of it expanded beyond the viewing limit of the screen.

I also found some highlights in the CS-4125's triggering functions. Triggering sets the point at which a sweep begins on a waveform, and good triggering is particu-

larly important for display stability. As expected, there are the usual **AUTO**matic and **NORM**al triggering modes. These trigger a new sweep at a certain rising or falling voltage on the waveform. The normal mode initiates a sweep only when triggering occurs, while the automatic mode provides a free running sweep in the absence of a trigger.

While those two modes are pretty common, I was surprised to see three additional triggering options. There's a **FIX**ed setting that provides a fixed trigger level regardless of the trigger **LEVEL** control setting, a **TV-FRAME** setting that triggers on composite video vertical sync pulses and a **TV-LINE** setting that uses composite video horizontal sync pulses for triggering. The later two capabilities—obviously—are exceptionally handy when working with television and video signals.

Performance

We sent the CS-4125 to an independent metrology lab in the Boston area to verify its calibration accuracy "straight out of the box"—it met its accuracy specifications. The level of accuracy of this unit compares favorably in many areas with the analog laboratory grade instrument used in the ARRL lab. The ARRL oscilloscope's frequency response however, extends all the way to 100 MHz, while the CS-4125 is only rated up to 20 MHz. Table 2 shows the results of test measurement comparisons taken in the ARRL lab.

Above 20 MHz, although the waveform image may still be present, the displayed amplitude of the waveform will drop off quickly with rising frequency.

On the test bench, the CS-4125 performs a yeoman's job with a variety of signals from a number of sources. Triggering is easy to set, and once set, traces are stable and jitter-free. Even when I varied the frequency and amplitude, the CS-4125 seemed reluctant to loose trigger. Triggering in the fixed mode is also surprisingly stable over a very wide rage of levels. (Note: The triggering's **LEVEL** control is disabled in this mode.)

In Summary

The CS-4125 is a basic but quality oscilloscope with features not ordinarily expected in an instrument in this price class. It's compact size and light weight makes it a fine choice for both bench-top and portable use. The CS-4125 rates serious consideration by anyone who does not have a need for more advanced features—such as those afforded by a digital or storage scope. Performance-wise, the CS-4125 is ideal for home, shop and hobby uses, and could quite possibly fit the bill in many laboratory applications as well.

Manufacturer: Kenwood TMI Corporation, 16-2, Hakusan 1-chrome, Midori-ku, Yokohama-shi, 226 Japan. *US Importer*: Print Products International, 8931 Brookville Rd, Silver Spring MD 20910; 800-638-2020; fax 800-545-0058; **sales@prodintl.com**; **http://www.prodintl.com**.

Importer's suggested retail price: $595. Typical current street price: $395.

APRS Engineering's MIM Module

Reviewed by Stan Horzepa, WA1LOU
QST Contributing Editor

The MIM Module is a tiny circuit board that serves as a building block for a packet encoder and modulator for APRS position and telemetry reporting applications. It assembles data into APRS/AX.25-compatible packets for transmission at 1200-baud by a suitable transmitter. Note that the MIM Module is a transmit-only device; it cannot be used to demodulate and decode received packets.

It's capable of encoding for packet transmission Global Positioning System (GPS) position reports you provide to it in NMEA 0183 format, any telemetry information you supply to it via analog and digital inputs and beacon text that you have programmed in its EEPROM. It will also generate 20 WPM CW for station identification.

DOS-based software, *MIC107.EXE*, is bundled with the MIM and is used to program your call sign, digipeater paths, beacon text and for setting the unit's various operating parameters.

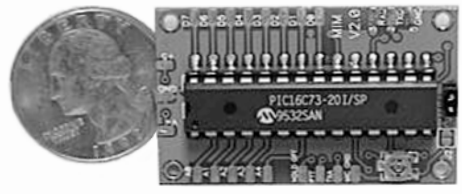
The module will accept power from a regulated 5 V dc source or an unregulated 6.5 to 40 V dc source. An on-board voltage regulator handles unregulated sources and provides a 5 V dc 100 mA output. Since the module requires less than 15 mA, the remaining regulated output may be used for other applications.

The unit is constructed on a 1 × 1.7-inch PC-board that contains surface mount components and a socket-mounted microcontroller (to facilitate firmware upgrades). Solder pads along the perimeter of the board provide the power, programming, telemetry, data and control connection points. These include the unregulated dc input, the regulated dc input/output, 5 analog inputs (0-5 V dc), 8 digital inputs, RS-232 received and transmitted data, TXA hold-off, PTT output, transmit audio, mike ground and chassis ground.

The MIM module is not plug and play. It's intended to be a subassembly for constructing a device for a desired application. Its small size makes it ideal where smaller is better.

Some possible examples for applications for the MIM Module are GPS trackers—where data provided from a connected GPS receiver would be encoded and transmitted, reporting the position of the station.

The telemetry inputs can be used to report the readings of nearly any sensor whose information can be represented by or converted to a voltage between 0 and 5 V dc or a high or low logic state. With a total of 13 inputs, there's a tremendous capacity for instrumentation of any system—this could serve as the interface between the sensors and the radio transmitter of a remote weather station for example. Couple these sensing capabilities with its light weight and compact size, and this makes the MIM Module an ideal subassembly for telemetry and/or position reporting for balloons or rockets.



Building a "Tracker"

I wanted to use the MIM module in a device that would test both its APRS position reporting ability and also touch on its telemetry applications. I decided on a simple battery-powered APRS tracker for connection to the mike jack of an FM transceiver. For tracking, I would feed the MIM position reports that were calculated by my GPS. For telemetry, I used a voltage divider (circuit details are included in the documentation) that allows me to monitor the voltage of the 9-V battery I used to power the module.

To build my device required the purchase of just a handful of parts. These included assorted connectors, resistors, a 9-V battery and snap on battery terminal and a 10-position DIP switch.

In order to build my tracker, I followed the directions for building a "MIC-Lite" that are provided with the MIM Module package. This unit would be very similar to the MIC-E—a TAPR kit that, like the MIM, can encode and transmit GPS position packets.

The MIM can be configured in either of two different modes—the "MIM" or the "MIC-E" mode. In the "MIM" mode, all 13 of the device's input pins are available for use as telemetry inputs. In the "MIC-E" mode, 10 of these pins are assigned to specific control functions that are controlled with external switches. The switches are used to set the digipeater path, to change the GPS position transmit rate, and to select one of the 7 preprogrammed APRS position comments. In this mode, only the remaining 3 inputs are available for telemetry information.

The plans include an internal microphone element and PTT switch, therefore eliminating the need for an external microphone. This makes it especially handy for H-T APRS applications. Since I planned to use my tracker for APRS position and telemetry only, I eliminated the microphone element and PTT switch circuitry from my final design.

I completed the tracker sans enclosure in one evening. Once I decide on what kind of enclosure to use, I imagine I will have to invest another evening in buttoning up the project.

In my verson, the 10-position DIP switch allows me to select one of eight "canned" APRS position comments ("Off Duty," "Enroute," "In Service," "Returning," "Committed," "Special," "Priority," or "Emergency"), that is transmitted with each position packet. The switch set also permits me to choose any digipeater paths and to select how often I want a position packet to be transmitted (typically "often" when my tracker is mobile and "not so often" when it is stationary). There's also a switch that toggles the battery power on and off.

Tracker Programming

With assembly completed, I connected the tracker's serial port connector to the serial port (COM 1) of my computer and started the *MIC107.EXE* software.

MIC107.EXE is simple, bare bones DOS software. When you start the program, it reads the current settings stored in the MIM's memory. It then displays those settings in the DOS window, along with a list of available commands and provides a command prompt for entering them.

Some of the commands are similar to those that you would use to program an AX.25-compatible TNC. MYC, for example, allows you to program your call sign and SSID. Other commands are unique to the MIM. If the function of a command is forgotten or not obvious, the software can provide help. Enter "H," a space, and the unfamiliar command (eg, "H TXDP") and the software will display a brief description of that command. This built-in assistance was a godsend—the documentation provided with the module does not include a description of all the available commands.

I selected the MIC-E mode, then programmed the various timing and identification parameters I would need. As a guideline, here is how I programmed the tracker for my application:

MODE MIC (selects the MIC-E mode)
PER 15 (sets the reference timing period to 15 seconds)
POS 2 (a multiple of PER, POS determines how often a position packet is transmitted)
B 30 (a multiple of POS, B determines how often the beacon is transmitted)
TELE 4 (a multiple of POS, TELE determines how often telemetry is transmitted)
TXD 22 (a multiple of 10 milliseconds, TXD determines the delay between when the transmitter is keyed and the packet data stream begins)
BT Tracker in a Rocket 88 (BT sets the contents of the beacon text)
MYC WA1LOU-8 (MYC sets the call sign and SSID of the tracker)
MYS /p (MYS selects the icon that will appear on APRS maps)

Note that I did not use the VIA command to select a digipeater path—I planned to test the tracker within the coverage area of my home APRS station, which is also an APRS digipeater (WA1LOU-15).

Once I set all the operating parameters, I invoked the PERM command to store my selections in the memory of the module.

Tracker Tracking

With programming completed, I quit *MIC107.EXE*. Then I disconnected the tracker from my computer's serial port and connected my GPS. I also plugged the radio port connector (an 8-pin mike connector in my case) into my mobile FM transceiver, powered everything up, and hit the streets.

I drove around downtown Wolcott, Connecticut for approximately 30 minutes. The only indication that anything was happening was when my FM transmitter's red transmit LED lit briefly every minute or so, presumably transmitting packets generated by my tracker. I returned to the Horzepa Homestead, but instead of powering everything off, I toggled a DIP switch to set the packet transmission rate to the "not-so-often" position, hopped out of the car and headed straight to the ham shack to see what had transpired.

On the computer screen of my home APRS station, I viewed the APRS map for downtown Wolcott. The map showed my tracker's icon in several positions along my route and the included telemetry data reported that my tracker's battery power was hovering around 9 V dc. All seemed to be working according to plans!

I left the tracker running overnight and checked the APRS map again in the morning. As expected, my tracker's icon was still in the same spot on the map and my tracker's battery voltage was still around 9 V dc.

Everything was working as expected. Now all I have to do is go shopping for a suitable enclosure to complete my tiny tracker.

What's Up, Docs?

My only real complaint with the MIM module is its documentation. It consists of seven text files that are stored on the *MIC107.EXE* diskette that accompanies the module and one additional file on their Web site. These files cover various aspects of the MIM.

Some of the information contained in the files is redundant, some of it is lacking and all of it seems a bit disorganized. As a result, I found myself spending an inordinate amount of time switching between files trying to locate needed information. Just when I thought I found a bit of information I was seeking in one file, I would discover related bits of information in a different file. I often found myself wondering, "Is this the information I need or is there more lurking elsewhere in some other file?"

I made things a little easier for myself by using a word processor to combine all the files into one large file. This allows me to use the word processor's search facilities to find information. However, this is only a stopgap solution. The MIM desperately needs a comprehensive, well-organized, indexed manual. As I wrote earlier, the MIM module is not "plug and play."

In Conclusion

Except for the documentation, the MIM module is an excellent product whose time has come. With APRS booming all over the Amateur Radio world, the MIM can be a key ingredient in the designs of tinkerers and experimenters who are trying to cram tracking and telemetry into nooks and crannies everywhere.

Manufacturer: APRS Engineering LLC, 115 Old Farm Ct, Glen Burnie, MD 21060; **wb4apr@amsat.org**; **http://www.toad.net/~wclement/mim2.htm**.

Price: $79 plus $4 shipping and handling.

New Products

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◊ Simply add a 12 V automotive or deep cycle marine battery—up to 125 A/h—and Cutting Edge's *PowerSafe 2000* will serve as a transportable source for your ac and dc power needs.

The $18 \times 10^{1}/_{2} \times 9^{1}/_{2}$ inch system consists of a vented battery enclosure with a 115 V ac inverter, rated at 600 W continuous (1200 W surge), attached to the lid. An on-board fully automatic charging system lets you replenish the system from an ac convenience outlet without fear of overcharging. An accessory cord is also provided that allows you to recharge the unit from the cigarette lighter jack in your car, boat or RV.

Power outputs include three conventional ac outlets and three cigarette lighter-style dc ports. Additional optional accessories, such as solar panels, lights and dc extension cords are also available.

The *PowerSafe 2000* is regularly priced at $369.95. It's currently on special—until December 31, 1999—for $299.95. For further information, contact Cutting Edge Enterprises, 1803 Mission Street, Suite 546, Santa Cruz, CA 95060; tel 800-206-0115; fax 831-426-0115; **cee@cruzio.com**.

Next New Product

Hints & Kinks

*Edited by **Bob Schetgen, KU7G** • Senior Assistant Technical Editor*

TWO HINTS FOR THE VA2ERY "CLOTHESLINE" ANTENNA

A Traveling Center Support

◊ I recently used this technique on the VA2ERY clothesline antenna,[1] but it can be adapted to any wire antenna where sag could be a problem.

When planning to erect an 80-meter λ/2 folded dipole, my only supports at the right separation were a pair of trees with a third tree between them. I could pass the wire through the middle tree, but I needed to prevent most of the sag typical in an antenna of this length to avoid extreme branch trimming. Since I needed to climb the trees anyway, I decided to use a suspension line to support the antenna at its feedpoint insulator.

This approach can be used on any long, wire antenna if sag is a problem, but with the clothesline, the support must be movable, as well. As VA2ERY suggests, a travelling pulley attached to the feedpoint insulator by a short cord can be arranged to ride on the upper wire of the folded dipole; this keeps the two wires more nearly parallel. My version has two pulleys: One rides on the suspension line and another is joined to the first by a rigid frame that carries the upper antenna wire across the top of the second pulley (see Figure 1). The second pulley is then tied to the feedpoint insulator by a short cord. The suspension line is a rope strung between the end-point trees, about three feet above the upper antenna wire.

When everything has been connected together, the suspension line forms a shallow V to the pulley attached to the feedpoint insulator (see Figure 2). By controlling the tension in the line, the amount of sag at this point can be reduced or eliminated. It also turns out that for feedpoint excursions within the center 50% of the antenna, the supported height of the feedpoint hardly varies at all.

It's my habit to mount my wire antennas with one end secured and the other end tensioned by a rope over a pulley to a log counterweight. This prevents wire breakage during windstorms. Here, it also allows me to mount a second pulley in the same tree, so the suspension line is tied off to the same counterweight. This way, when the trees sway in the wind, both antenna and suspension lines maintain unchanging tension, and they won't move relative to each other.

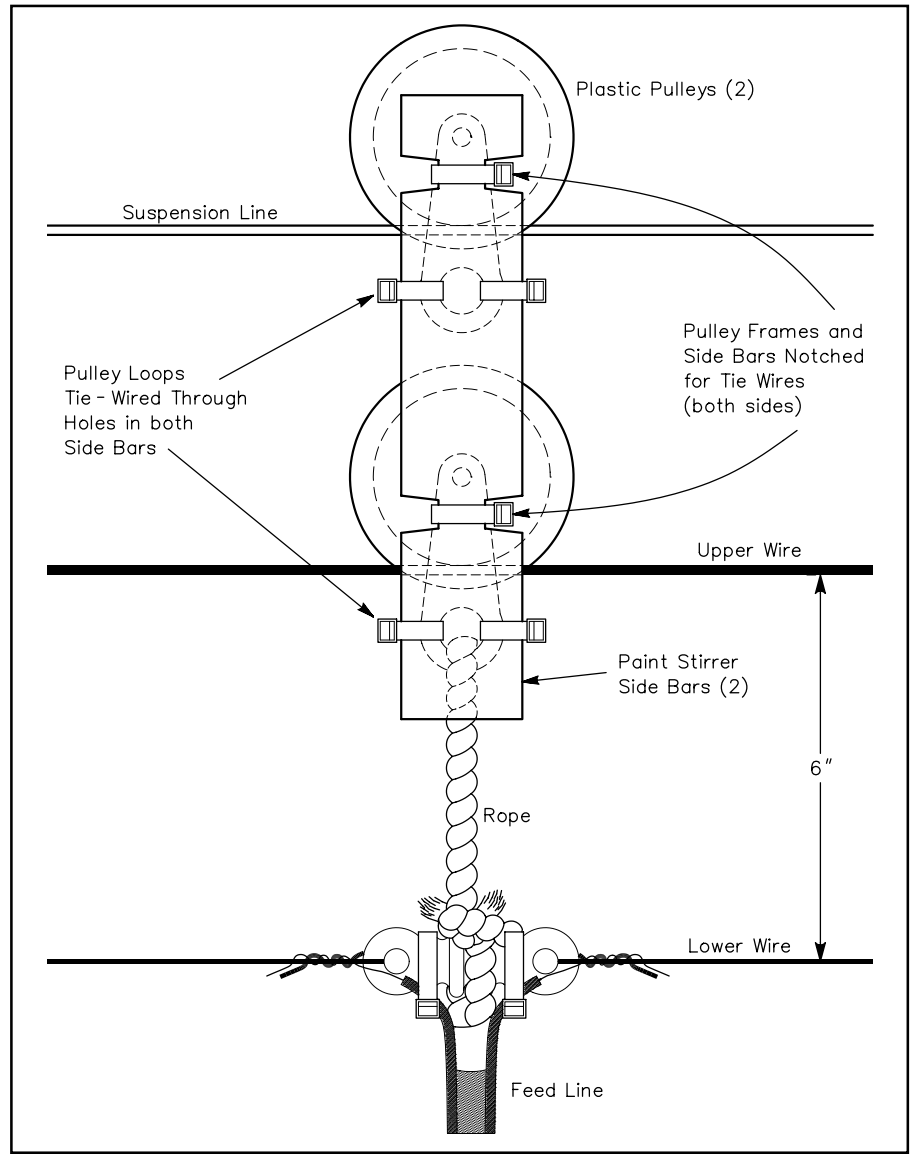


Figure 1—Details of AA2BF's traveling folded-dipole center support.

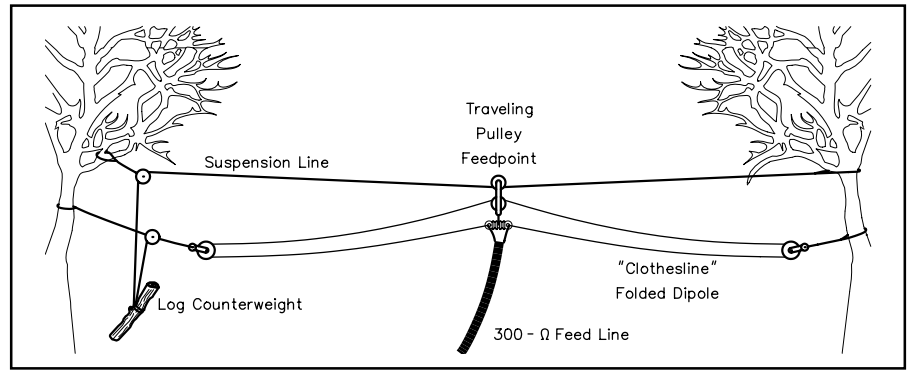


Figure 2—The clothesline antenna with suspension line support (sag exaggerated).

[1]R. Victor, VA2ERY, "The Clothesline Antenna," *QST*, July 1998, pp 56-58.

An Anti-Twist Device

While building my 80-meter λ/2 clothesline antenna, I had a construction problem the author evidently didn't have. My supports are a pair of trees, 165 feet apart. This required about 33 feet of rope to support the plastic end pulleys. Even using braided rope, the result of tensioning the antenna caused the rope to twist, spinning one or both pulleys. The folded dipole took up this twist, rendering it unusable. I needed an anti-twist device! Here is my solution.

I attached a pair of common 4-inch flat-iron reinforcing strips to one end of a 3-foot long, 3/8-inch-diameter dowel, sandwiching the dowel between them (see Figure 3A). This was facilitated by the zig-zag pattern of predrilled holes in each strip. I used three #10×3/4 inch flat-head bolts and nuts through the first three holes in the two strips, with the first and third bolts on one side of the dowel and the middle bolt on the other side. (It may be necessary to notch the dowel slightly where it passes each bolt to make it fit. I did so with a file.) This sandwich should leave the last hole in both strips clear and aligned with each other, to receive the molded plastic frame loop in the pulley used at the end of the antenna. After tightening these bolts, add a lock nut to each one and tighten it.

Tie the end of the support rope through the pulley-frame loop. Now bend the free ends of the reinforcing strips outward slightly, to allow the pulley frame loop (with the rope tied to it) to fit snugly between them (see Figure 3B). Use another #10×3/4-inch bolt, nut and lock nut to secure the pulley in place. This connection should not be very tight, but it must be secured with a lock nut. The pulley should be directed away from the dowel at a right angle (see Figure 4).

Near the other end of the dowel, drill a small hole to receive a cotter pin. Slip about three 1/2-inch steel nuts over this end of the dowel and install the cotter pin through the drilled hole to complete the anti-twist device. If a rope support is used at both ends of the clothesline antenna, use an anti-twist device at each end.

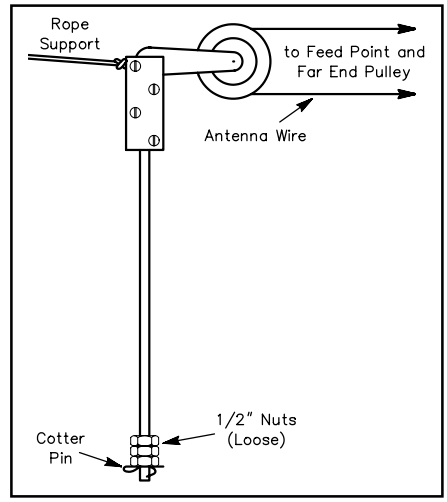


Figure 4—The completed anti-twist device in place on the antenna.

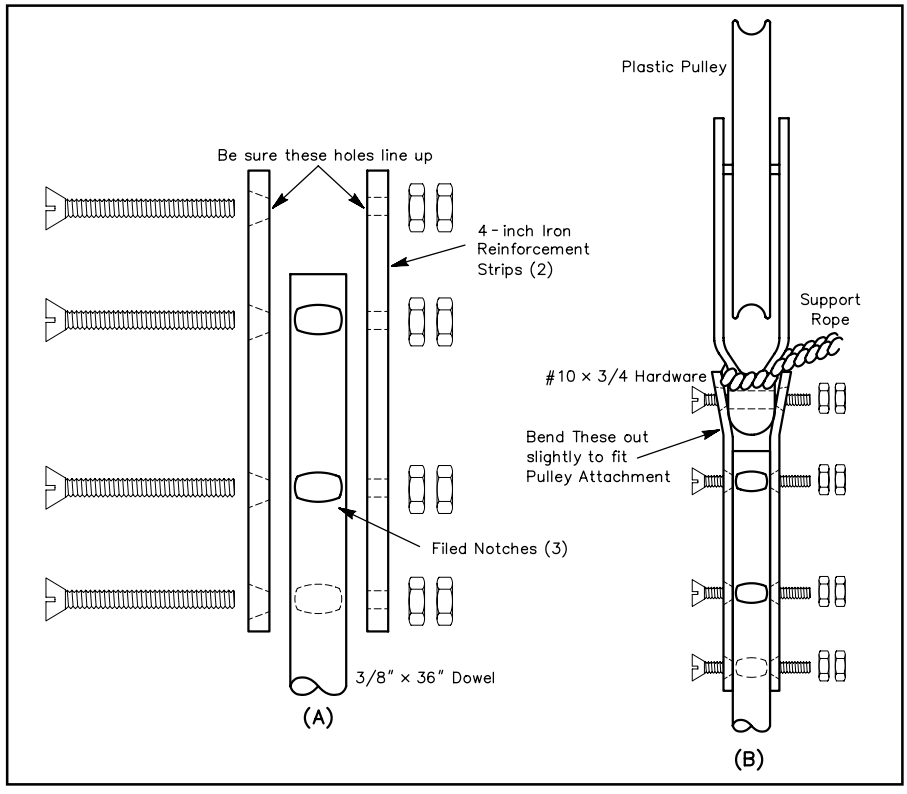


Figure 3—(A) Install flat mending straps on a 3/8-inch wooden dowel, leaving one pair of holes open. (B) Use the open pair of holes to attach the straps and dowel to the pulley bracket with the support rope in place.

When the antenna is hoisted into place, the weighted end of the dowel hangs down from each end pulley and prevents the antenna from twisting. This arrangement may leave the end pulleys positioned horizontally, depending on the configuration of your pulley frames. If so, it does not matter. The folded dipole works just as well in either a horizontal or a vertical plane. With a lanyard arrangement of auxiliary pulleys and a nylon string loop, I can reel my feedpoint into position from the ground. The antenna does not twist or tangle, even in a strong wind.—*Herb Slade, AA2BF, 22 Mallory Cir, Fishersville, VA 22939;* **hfslade@juno.com**

REGARDING SAVE-A-BATTERY—SAVE $40

◊ In the April 1999 Hints and Kinks column,[2] K2PMA explained how to "save" a NiCd battery pack by replacing a cell. Here's a technique that I use and have taught to the Carroll County ARES club.

The cells in each pack are selected for similar charge/discharge characteristics, to within some given criteria. Because no two cells are identical, some cells will discharge before others and eventually receive a reverse charge. If we simply replace these bad cells with new ones, the new cells may not match the other cells in the pack closely, and the same problem can occur again, perhaps sooner than the last time.

Here's how you can *prevent* the weak cells from failing: If you can take the battery pack apart, do so every three or four months when it is new. Check the voltage of each cell after you have used the radio for awhile. Record the data from these tests.

The cells with the lower voltages are likely to fail first, and the data will indicate those cells. Do *not* let the pack fail or get to the point where this weak cell becomes reverse charged. Instead, charge the pack fully then remove any weak cells (still below the full charge voltage) and trickle charge each of them individually to the same voltage as the rest. You will soon find that you need to do this periodically. I normally process my packs once a year. This is more often than necessary, but it sure is easy to remember! With this treatment, some of my packs have lasted more than 10 years. Sealed packs (those I can't disassemble) typically last only three to four years.—*Phil Karras, KE3FL, AEC Carroll County Maryland, OES, ORS, VE, 3305 Hampton Ct, Mt Airy, MD;* **ke3fl@juno.com**

[2]B. Meyer, K2PMA, "Save-a-Battery, Save $40," *QST*, Apr 1999, p 80.

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.

Technical Correspondence

*Edited by **Paul Pagel, N1FB** • Senior Assistant Technical Editor*

ON KILLING "BIRDIES"

By Wilton Helm, WT6C, PO Box 6, Newbury Park, CA 91319;
whelm@compuserve.com

◊ In his August 1998 Technical Correspondence item,[1] Charles Lackey, W4QBE, comments, regarding interference from a satellite receiver, "One lesson I learned from this . . . is: Don't ever give up!" Here are a couple of other tips on curing interference.

Many pieces of electronic equipment now contain switching power supplies. These most often have operating frequencies in the range of 50 to 100 kHz. They are required to comply with Part 15 FCC interference specifications as class-B devices, which places limits on their radiated signals. Because satellite receivers acquire information about future programming (even when not in use) they are never truly off. The power **ON/OFF** switch generally shuts off a light or two, the audio and video outputs and might switch the antenna/cable input straight through to the RF output, but the power supply, and most—if not all—of the internal electronics continue to run.

Most of the techniques Mr Lackey used (such as the #43 ferrite rod) are effective for higher-frequency interference (such as that from CPUs and logic) but, unfortunately, provide little attenuation at the low frequencies used by switching power supplies. For those who don't want to tie up a 100-foot extension cord and a steel bar, here are some interference-squashing techniques used by designers of switching power supplies.

The simplest approach is to add capacitance across the power line. Typical values are 0.5 to 1.0 µF. Such capacitors must be rated for use *across the ac line*, and are typically identified with an X safety rating. One example of this capacitor type is the Panasonic ECQ series, such as Digi-Key P4614 (0.47 µF).[2]

The second line of defense is a common-mode choke. These are available in a variety of sizes and forms—a 10-mH unit is a good starting point. Be sure the choke is rated for the current drawn by the load. The Panasonic ELF series is typical of many such chokes. The Digi-Key PLK1093 is a 12-mH, 1.6-A version that works well in many applications. Digi-Key stocks a number of different inductance values and current ratings to meet specific situations.

If a common-mode choke doesn't suffice, placing an inductor in series with one side of the power line may help. (Again, a 10-mH inductor is a good starting point.) A choke used this way is called a *differential mode* choke; such chokes are expensive because the wire used in their assembly must handle the power-line current and the choke's core must handle it without saturating. The largest choke I could locate in Digi-Key's catalog is a J. W. Miller 5725 (Digi-Key M5725). This is an 8-mH choke rated at 1 A peak (0.7 A RMS if the converter is power-factor corrected, less in the more typical case where it is not). The choke costs $18. You can see why common-mode chokes are tried first.

Sometimes a combination of these techniques is required. The main point, though, is that it is necessary to use components that are effective at the fundamental frequency of the source, which is significantly lower than frequencies at which we hams generally solve RFI problems.

RF FRIES RELAY

By Tom Webb, W4YOK, 3533 Teakwood Ln, Plano, TX 75075

◊ In Kirk (NT0Z) Kleinschmidt's article, "HF Amplifiers versus Antennas—One Ham's Opinion,"[3] he suggests using a ladder-line-fed dipole and antenna tuner with a transceiver. Good idea—but don't make the mistake I did of placing the tuner atop the transceiver! The RF radiating from the ladder line fried the sugar-cube size antenna relay in my TS-440S. This happened *twice* before I figured out what caused the problem. Use six or eight feet of coax between the tuner and transceiver and keep the ladder line away from the transceiver.

TOOL TIP TWO

By Craig Kalley, N1ABY, 44 West St, Pepperell, MA 01463;
ckalley@net1plus.com

◊ T'he Unibit Tool Tip item in Technical Correspondence[4,5] prompted me to pass along a method I've used for drilling holes in aluminum.

I was in the process of building a linear amplifier and had to put several 1/2-inch holes in a 1/8-inch-thick aluminum panel for fuse holders. I went looking through my woodworking tools and found a set of brad-point wood drills and thought I'd give them a try. To make a long story short, they worked like a dream—perfectly round holes, right where I wanted them! The drill looks similar to a standard twist drill except for its point. The drills have a small conical point that lets you start the drill right on your center-punch mark, the rest of the point being two flat cutting lips at right angles to the length of the drill. The two lips do most of the cutting, but don't grab like a standard twist drill, while the point guides the drill through the work.

The set of drills I have is made of carbon steel, which is just fine for use on aluminum as long as you don't try to drill the hole too quickly. The drills will cut through steel in a pinch, but won't last very long unless you drill *really* slowly and use cutting oil. I have seen these drills in Home Depot's tool department.

Black and Decker markets a line of twist drills with what they call their Bullet Point, which is almost the same as a brad point. These drills are made from high-speed steel and are intended for metal cutting. I have used these drills on some fairly thick steel and found they do a nice accurate job. These drills are available at Wal-Mart and Home Depot.

"QRP BUDDY" DISPLAY

By Kenton Larson, KB0MEO, 10447 WCR 70, Windsor, CO 80050-3201;
KB0MEO@arrl.net

◊ After looking at Mike (N2HTT) Aiello's QRP Buddy,[6] it appears that you can make its display even easier to interpret. If you connect an LED and current-limiting resistor between pins 2 and 13, you then have only to see if the light is on to make sure your power supply is operating correctly. U1A pin 2 would still go low when the voltage was over the lower limit, and U1D would be high unless the voltage was over the high limit. The voltage differential might be enough to light the LED. I don't know much about comparators, but it might be worth a try.

(*Editor's note:* Kenton is 14 years old—and N2HTT verified that this tip works.)

[1]Charles R. Lackey, W4QBE, "Trying to Kill a 'Birdie,'" Technical Correspondence, *QST*, Aug 1998, pp 74-75.

[2]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**.

[3]Kirk A. Kleinschmidt, NT0Z, "HF Amplifiers versus Antennas—One Ham's Opinion," *QST*, Nov 1998, pp 54-56.

[4]Paul Pagel, N1FB, "Tool Tip," Technical Correspondence, *QST*, Dec 1998, pp 63-64.

[5]If you're looking for a Unibit and can't find them, contact Harry, N4CBR (**N4CBR@aol.com**). He runs Service Electronics Supply, Inc in Lexington, Kentucky, a distributor of B.E.S. Tool Manufacturing products (**SvcElect@aol.com**).

[6]Mike Aiello, N2HTT, "The QRP Buddy," *QST*, Apr 1999, pp 47-49.

HEATH EQUIPMENT REPLACEMENT PARTS

By Vincent S. W. Dymek, N2NIQ, 111 Huemmer Terr, Clifton, NJ 07013

◊ In the June 1999 Technical Correspondence column,[7] Art Pahr, K9XJ, expressed his concern about a source of drive belts for Heath equipment. There are two sources I know of that supply not only drive belts, but tires and idlers, also: Electronix Corporation, 1 Herald Sq, Fairborn, OH, 45324-5155, tel 937-878-1828; and Premium Parts+ Electronics Company, W9890 State Rd 59, PO Box 28, Whitewater, WI 53190-0028, tel 800-558-9572.

COHERENT CW AND GPS—MORE IDEAS

By Warren B. Bruene, W5OLY, 7805 Chattington Dr, Dallas, TX 75248-5307

◊ The ideas presented by William Alliston, W3ICB,[8] interest me because I, too, have often thought about ways to "improve" coherent CW. Trading ideas would be helpful—but first a tip about depending on atomic clocks to maintain synchronism. The path length of HF signals varies as the ionosphere moves up and down between day and night, causing a small amount of Doppler shift. Even a shift of 0.01 Hz would cause the received phase to rotate 360° in 100 seconds. (Data on the nature and magnitude of such shifts was published approximately 30 years ago. The information may have been distributed by NIST in Boulder, Colorado [the old Bureau of Standards] in a CCIR report, or in an IRE or IEEE publication.) As a result, I believe that some means of tracking the reference phase of the received signal, manually or automatically, will be essential much of the time. Incidentally, using GPS for transmit and receive frequency standards would make it practical for hams to determine the nature of this Doppler shift.

My thoughts have been more toward improving the signal-to-noise ratio (S/N) and reducing required bandwidth of coherent CW. Yes, it is possible to do both using machine detection and audio CW regeneration. A better S/N would enhance QRP operation and help to reduce RFI. Also, transmitter power loss would be less important, permitting use of somewhat inefficient, but very small directional antennas. This might even make space diversity practical. I agree that an option for more CW speeds is desirable, but not as many as suggested.

With so many options, many heads would be needed to help winnow them down to an optimal set of standards. I am willing to participate in a dialog to work toward this goal.

[7]Art Pahr, K9XJ, "Drive Belts for Heath Gear," Technical Correspondence, *QST*, Jun 1999, pp 77-78.

[8]William H. Alliston, W3ICB, "Coherent CW and GPS—Some Ideas," Technical Correspondence, *QST*, Jun 1999, p 78.

PORTABLE-GENERATOR SAFETY

By Don Bailey, W7SDE, 4860 Pembroke Dr, Reno, NV; **w7sde@gbis.com**

◊ As a retired Electrical and Electronics Engineer, I really enjoyed Kirk (NT0Z) Kleinschmidt's article on portable generators.[9] During my 75 years, I have had a little experience with the subject items. There is one area that I cannot but stick my nose into—the subject of grounding. I am a very firm believer in grounding as long as it is done in the interest of safety. Consider the grounding of the neutral wire as is recommended by some and required by others. First, the case of portable generators: *Without* the neutral grounded, you could maintain a firm grip on the hot wire while standing in water up to your neck and not get an electrical shock! It takes a return path for current to flow. If ground is eliminated as a return path, the danger from shock is reduced from some faulty electrical circuits at some place in the Field Day activity.

These faulty circuits could be as simple as a shorted line bypass capacitor in a piece of equipment. If this equipment were connected to your normal house power, it would blow a fuse or trip a breaker. Standing on damp earth at a Field Day location could be fatal to someone if the neutral was grounded at the generator. Static electricity should be drained off through a 1-MΩ, 1/2-W resistor connected from neutral wire to earth ground. Also, a pair or 0.1-µF, 600-V capacitors connected between each line to ground will shunt any RF picked up on the power cabling. A good earth ground is also the best lightning protection. (Lightning grounding is a discipline in itself). Building codes require secondary electrical systems to be grounded for safety. An example:

Back in the '50s, I was doing some repair work at a local laundry. A three-phase motor on a machine was overheating and I wanted to measure the line voltage. While making measurements, with the meter on the 500 V scale, the meter needle banged the stop when I probed from line to ground. Changing meter ranges, I discovered the potential to ground was 1200 V! I immediately called the local power utility and within a few minutes, an engineer confirmed my findings. A few minutes more and a crew of linemen was busy changing a transformer that supplied power to the laundry. Neither the transformer ground nor the building ground was functioning as it should. Leakage between the high-voltage primary and the secondary winding was to blame.

I have always been a safety nut and have analyzed many different situations from a safety standpoint. There can be insidious situations that may defy casual observation. Grounding the neutral of a portable power generator is one of them. I sincerely hope and pray everyone has happy and safe Field Days.

[9]Kirk Kleinschmidt, NT0Z, "How to Choose and Use a Portable Power Generator," *QST*, Jun 1999, pp 59-61.

Letters for this column may be sent to Technical Correspondence, ARRL, 225 Main St, Newington, CT 06111, or via e-mail to **ppagel@arrl.org**. Please include your name, call sign, complete mailing address, daytime telephone number and e-mail address on all correspondence. QST

Feedback

◊ In the October 1999 *QST*, the Web URL for Code Quick in footnote 4 on page 31 should have read: **http://www.cq2k.com**.

◊ In the November 1999 *QST* article by John Hansen, W2FS ("HamWeb: A New Approach to Mobile Data Services"), the ARRL Web address for the *HamWeb* software is incorrect. It should be: **http://www.arrl.org/files/qst-binaries/**. QST

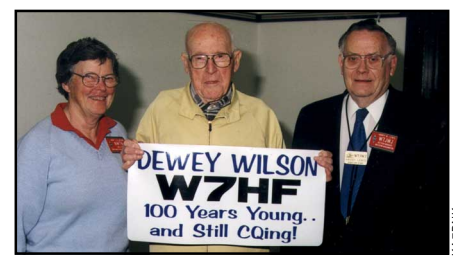
New Products

Y644 TETRODE FROM SVETLANA

◊ Svetlana Electron Devices Inc now offers the Y644, a version of the venerable 4CX250B. These tetrodes are plug compatible with the Y644 manufactured in the United States and are fully qualified by the British Ministry of Defense for use in their CGR1020 ground/air communications system. The Y644 is currently available from stocking Svetlana distributors worldwide.

For more information on Svetlana products, or to locate a distributor in your area, contact Svetlana Electron Devices, 8200 S Memorial Pkwy, Huntsville, AL 35802; tel 256-882-1344, fax 256-880-8077; **info@svetlana.com**; **http://www.svetlana.com**. QST

Strays



KA7DNK

THE ARRL's "SENIOR MEMBER"

◊ The League's oldest member, at 102 years, has recently been identified as being Dewey Wilson, W7HF of Aberdeen, Washington. Dewey was born November 1, 1897 and received his first call sign—7GW—in 1913. A member of the ARRL for nearly seven decades, Dewey was one of America's first licensed amateurs and is still active on the air daily. For nearly as long as he has enjoyed Amateur Radio, Dewey has also been active in the Masonic Lodge, Elks and Rotary International. In the above photo Dewey is shown holding his 100th birthday sign with Mary Lou Brown, NM7N (SK) and Harry Lewis, W7JWJ. *Thanks to: W7JWJ, KA7DNK and N0AX.*

Next Stray

Happenings

*Edited by **Rick Lindquist, N1RL** • Senior News Editor*

Phase 3D Accepted for "First Suitable" Ariane 5 Launch

AMSAT-DL



Arianespace and AMSAT-DL officials toast the signing of a launch contract for the Phase 3D Amateur Radio satellite. Left to right, C. Bardou and B. Eilertson, both of Arianespace, and Karl Meinzer, DJ4ZC, and Peter Gülzow, DB2OS both of AMSAT-DL.

The Phase 3D Amateur Radio satellite has been accepted as a payload for the "first suitable" Arianespace Ariane 5 vehicle launch. The announcement came October 8 from Phase 3D Project Leader and AMSAT-Germany President Karl Meinzer, DJ4ZC, who said a launch opportunity could come during the first half of next year.

In a prepared statement, Meinzer said Phase 3D would be a secondary payload on an Ariane 5 vehicle, which, he said, has been considered the preferred P3D launch vehicle from the very beginning.

"Our long history of success and mutual cooperation with both the European Space Agency and Arianespace, coupled with our need to lift P3D into a high geostationary transfer orbit, made the Ariane 5 the unanimous choice by AMSAT," he said.

Specific details of the launch agreement, signed October 5, were not released. Timing of the announcement could not have been more propitious, coming just as the AMSAT-NA Symposium and Annual Meeting convened in San Diego. AMSAT-NA President Keith Baker, KB1SF, read Meinzer's statement to those attending and said the news meant "lots of smiles around the conference room."

Once in orbit, Baker said, "the Phase 3D satellite will not only help us usher in the new Millennium, it will also signal the dawn of a brand new era for Amateur Radio."

Baker said he was pleased that AMSAT-DL's negotiations with Arianespace resulted in a launch contract for Phase 3D to fly on an Ariane vehicle. "Following the resounding success of Ariane Flight 503, the Ariane 5 has now proven itself to be a very capable launcher," he said. Arianespace "is very happy to have us as a payload," Baker said, and given past successes with ESA and Ariane, "I believe we now have an unbeatable combination."

ARRL Executive Vice President David Sumner, K1ZZ, welcomed the AMSAT announcement. "Congratulations to AMSAT's Phase 3D team on moving another important step closer to launch," Sumner said. "For those who have been putting off getting their stations ready for Phase 3D, the time for procrastination is just about over!" The League has been a major contributor to the Phase 3D project.

While both AMSAT presidents expressed optimism for an early launch, Meinzer cautioned that the wait for the "first suitable" flight still could turn out to be a long one. "While the launch of Phase 3D could come as early as the first half of the year 2000, we must remember that Ariane's launch manifests are continually being updated to accommodate market changes as well as the availability of other payloads," he explained. Meinzer said "one or more changes" to P3D's anticipated launch date as well as its specific Ariane 5 mission number "are a very real possibility before our satellite actually flies."

Baker characterized Phase 3D as "a standby passenger in every sense of the word" and said a specific launch date was "very uncertain."

The satellite already has undergone thermal-vacuum and vibration testing. Meinzer and the AMSAT-DL team visited the Integration Lab in Orlando during mid-October for a final "complete shakedown test." Phase 3D was slated to be delivered to the Guiana Space Center in Kourou, French Guiana, in late October. Once in French Guiana, the satellite will be available for quick integration when Arianespace identifies a specific Ariane 5 launch vehicle for P3D's ride into orbit.

The international Phase 3D project has depended on donated resources. In addition to AMSAT-DL and AMSAT-NA teams, AMSAT groups from Austria, Great Britain, Japan, Canada, Finland, Russia, Belgium, the Czech Republic, Slovenia, France, New Zealand and Hungary also have participated.

"AMSAT is very proud of its long tradition of excellence and the contributions it has made to the advancement of space communications, space education and the space sciences," the official AMSAT announcement said. "Phase 3D will be Amateur Radio's premier vehicle to continue the quest for new communications technologies for generations yet unborn."

VANITY APPLICATIONS, GRANTS OFF UNDER ULS

As Halloween approached, vanity call sign processing under the new Universal Licensing System still was far from routine, and the number of applications appeared down. Processing vanity applications submitted through August 4, the FCC granted about 90 vanity call signs during early October. But issuance of new vanity grants was halted October 7, leaving a sizeable backlog in the queue. The FCC's ULS Task Force said it did not plan to resume issuing vanity call signs until all the wrinkles were worked out of the system.

"We don't want to go any further until we are comfortable with how the system is processing vanity," a Task Force spokesperson said. The FCC had hoped to have routine vanity processing in place by October 1.

The number of vanity applications filed since the FCC deployed the ULS for Amateur Radio seems to have dropped sharply. In the pre-ULS era, it was not uncommon for the FCC to process more than 1000 vanity applications a month—most of them filed using the old electronic application on the Internet. Since the ULS went into effect for the Amateur Service in August, it appears that only about half that many vanity applications have been filed.

The difficulty of filing an application for a vanity call sign or any other purpose under the ULS has been another source of mounting frustration within the amateur community.

The reaction of Tony Whitmore, AB0IY, was typical. "The FCC really dropped the ball on this one," said Whitmore, who was awaiting a vanity call sign grant. While the FCC's previous on-line applications were accessible via the Web, an application filed via the ULS requires a dial-up connection to the FCC's wide area network plus the use of a particular Web browser—*Netscape* ver 4.5 or higher, and preferably 4.61. Right now the ULS does not support the Mac platform.

Jon Tinsley, KC5VH, was another unhappy camper. "Using the old system, I was able to renew my license in just a few minutes," he said. "Maybe the ULS has some merit, but it's certainly not user-friendly."

Others have complained about having spent hours on-line either downloading copies of *Netscape* or attempting to configure, then use, the dial-up connection to file an application. The ULS Task Force has indicated that Web access is on the horizon, but it's not likely to happen until sometime later next year.

Only a tiny percentage of amateurs has even registered for the ULS. Registration now is a prerequisite to filing an FCC application on-line or on paper. So far, the FCC says, approximately 3% of the 740,000 amateurs in the FCC's database have signed up.

ARRL BOARD APPROVES NEW WEST CENTRAL FLORIDA SECTION

Getting a clean sweep for the ARRL November Sweepstakes will get a little harder next year, but interacting with the ARRL promises to become easier for some Florida hams starting January 15, 2000. The ARRL Board of Directors has voted to approve a resolution to create a new West Central Florida Section. The vote was 14-0 with one abstention, ARRL Board Secretary David Sumner, K1ZZ, said.

The resolution approved called on ARRL Field Services Manager Rick Palm, K1CE, "to establish, at the earliest date consistent with a smooth transition, a West Central Florida Section consisting of the counties of Charlotte, DeSoto, Hardee, Highlands, Hillsborough, Manatee, Pinellas, Polk, and Sarasota." After consulting with Southeastern Division Director Frank Butler, W4RH, Southern Florida Section Manager Phyllisan West, KA4FZI, and West Central Florida Section Committee Chairman Paul Toth, K2SEC, Palm said that January 15 was determined to be the best date to formally bring the new section into existence. At press time, a recommendation on the appointment of a section manager for the new section was pending.

The nine Southern Florida counties involved voted overwhelmingly in favor of creating the new ARRL section, which will become the 71st. Ballots counted September 15 at ARRL Headquarters showed 920 ARRL members in the proposed new section favored the idea, while just 86 were opposed.

Filed last April, the proposal to create the West Central Florida Section was aimed at improving ARRL visibility, representation and services for members living in the affected counties. The proposed 8320 square-mile section is among the state's most densely populated and fastest-growing, and the petitioners said the plan will provide "improved, localized support for League members on local and regional issues" as well as better coordination with clubs. The committee's Web site at **http://www.qsl.net/wcfla** contains the full text of the petition and additional information.

The last new ARRL section created was Northern New York in 1996.

RICK PALM, K1CE, LEAVES ARRL HQ STAFF

Field Services Manager Rick Palm, K1CE, has concluded a 20-year career at ARRL Headquarters. Palm and his wife Joanne, W1GUN, have moved to Florida to be closer to her family.

"I'm leaving League Headquarters with nothing but good feelings and memories," said Palm, who met his wife at the League in 1980 when she worked as a secretary in the former Communications Department.

Palm, 45, characterized his move south as "semi-retirement" and said he looks forward to continuing to serve the League as a volunteer.

Palm came aboard as a Membership Services Assistant in 1979, moving up the ranks of Assistant Manager and Deputy Manager before becoming Acting Manager of the old Membership Services Department. When the department was dissolved in 1985 as part of a sweeping HQ reorganization, Palm was tapped to head the new Field Services Department. That department merged with the Educational Activities Department early this year to become Field and Educational Services.

Palm's career travel for the League took him to 40 states, including Alaska, as well as to Puerto Rico and the US Virgin Islands. He also has attended disaster communication conferences in several Caribbean nations for the Office of US Foreign Disaster Assistance. In 1991, he traveled to Leningrad (now St Petersburg) and Moscow in the USSR—prior to the coup in August of that year—to discuss emergency communications issues with the Soviets.

"It has been a privilege and a pleasure to serve the Field Organization of volunteers who perform the vast majority of the League's work," Palm said. "That work is performed on a daily and largely unsung basis with dedication and excellence."

Palm said his mission over the years has been to try to avoid the pitfall of the "ivory tower syndrome" and to empathize with field volunteers in meeting their needs. "My goal has been to bring a good measure of respect for our volunteers by the rest of the ARRL, the amateur community at large and the public they serve," he added.

Before he departed on November 10, Palm worked with Educational Services Manager Rosalie White, WA1STO, to ensure continuity of support for the Field Organization. White is a 17-year veteran of the Headquarters staff with a proven track record of working with ARRL volunteers and federal agencies, especially NASA on the SAREX and current International Space Station programs. In the late 1970s, she served as Club and Training Department Manager.

ROD STAFFORD, W6ROD



Rick Palm, K1CE, left, mugs with rock musician Joe Walsh, WB6ACU, at the Southwestern Division Convention in Los Angeles.

HAM CONVICTED OF FRAUD IN BOGUS EQUIPMENT OFFERS

A Florida ham has been ordered to spend most of the next five years in prison after pleading no contest to fraud charges involving offers to sell amateur and vintage gear. Michael T. Kirby, W5JBV (ex-K4VFY), of Panama City, Florida, had been arrested August 20 for scheming to defraud using the US mails. Kirby has a history of arrests and convictions for allegedly accepting payments for equipment he never delivered.

Panama City Police Detective Robert Luther said that Kirby pled no contest September 30 in Bay County Florida 14th Judicial Court, "which means he puts himself on the mercy of the court," Luther explained. Kirby will get 41 days credit for time served in the Bay County Jail following his arrest.

Luther said Kirby's fraudulent dealings were extensive. He said that while Kirby actually received somewhat less than $20,000 in proceeds from his fraudulent dealings, "the attempted fraud is well greater than that."

The court required Kirby to make restitution "to as many victims as I can identify," Luther said. Some victims already have received refunds. Luther said those defrauded by Kirby who have not already received a refund or been in contact with authorities should send him "original proof" that fraud occurred. He said this means original documentation, letters, correspondence and similar material as well as the amount of money and the dates involved.

Those believing they were victimized by Kirby can e-mail Luther for more information at **panamaone@aol.com** or call him at 850-872-3129.

FCC DISMISSES FOUR APPLICATIONS AS EXAM AUDIT CONTINUES

The FCC has dismissed four Amateur Radio applications resulting from an examination session in Yonkers, New York, last spring, but its investigation continues.

In July, FCC Legal Adviser for Enforcement Riley Hollingsworth wrote the four applicants seeking answers to specific questions about the May 2, 1999, session conducted by Metro 70 cm Network Amateur Radio Club Volunteer Examiners under the ARRL-VEC. All four were warned that failure to provide the requested information would lead to dismissal of their applications. On September 9, Hollingsworth wrote the same four applicants to dismiss their pending applications.

Dismissed were an Amateur Extra upgrade application from Keith Murphy, KB2YOI, of Spring Valley, New York; a Tech Plus upgrade application from Keith Jones, KC2EDT, of Brooklyn, New York; an Advanced upgrade application from Winston A. Tulloch, KC2ALN, of Paterson, New Jersey; and a Technician application from Claudies Anderson of Detroit, Michigan.

The FCC says Murphy, Jones, and Tulloch failed to respond to the initial inquiry, while Anderson told the FCC that the test papers the FCC questioned him about were not the ones he'd turned in at the exam session.

All four applicants were advised that "the issues surrounding the examination session" will have to be resolved before the FCC entertains another Amateur Radio application from any of them. Hollingsworth told the ARRL that the next step in the investigation would be to contact the Volunteer Examiners at the session.

In its initial inquiries to Murphy, Tulloch, and Anderson, the FCC questioned the appearance of blue markings next to most answers and asked which marks the applicants had placed on the answer sheets and if any marks were already on the sheets when they were handed out. The FCC similarly queried Jones about his Morse code answer sheet, asking if it was the only one he'd filled out on May 2 and if any of the answers were modified after he'd turned in the sheet; the others who took code tests were asked if they had written down any of their copy, and, if so, what they did with those notes.

Anderson also was asked if he was actually present at the test session and if he'd had access to an answer template before or during the test session. All four applicants also were asked to name the Volunteer Examiners who handed out their paperwork and to whom they gave their completed answer sheets, as well as any discussions they might have had with the examiners.

LEAGUE OPPOSES LA COUNTY 2.4 GHz PROPOSAL

The ARRL has asked the FCC to deny an experimental license application filed by Los Angeles County, California, to develop a public safety video system on the 2.4 GHz band. The LA County proposal, filed August 9, seeks FCC authorization to develop an experimental system using four 10-MHz channels to transmit video images from helicopter-borne cameras to five remote receiving sites with active tracking antennas. The signals then would be retransmitted via terrestrial links to the public safety agencies involved.

In its objection, filed September 23 with the FCC, the League called the LA County proposal a "foot in the door" toward gaining a permanent berth in the 2.4 GHz band. "It is obvious from the experimental proposal that the County wishes to construct the entire system and then simply stay there," the League said. The ARRL said the FCC should authorize nothing more than a single 10-MHz video channel for a single transmitter aboard a single helicopter, to allow interference studies to be conducted.

LA County already is licensed for video operations on a single 2.4 GHz channel but says it encounters operational conflicts with broadcasters. The proposal targets the 2402-2448 MHz band, characterizing it as "underutilized" and asserting that current occupants—including Amateur Radio and industrial, scientific and medical instrumentation—would not suffer harmful interference. Amateurs have a primary domestic al-

Radio Broadcasting Legend Jean Shepherd, K2ORS, SK

Jean Shepherd, K2ORS—the man once described by media critic Marshall McLuhan as "the first radio novelist" and by others as "Mark Twain for the radio"—died October 16 in a hospital near his home in Sanibel Island, Florida. He was 78.



Jean Shepherd, K2ORS, during his post-radio broadcasting days, circa 1982.

One of the original radio "talkers," Shepherd gained a loyal following of overnight listeners during his more than two-decade tenure at powerful WOR in New York during the 1950s, 60s and early 70s. First licensed as W9QWN in 1938, Shepherd served in the Army Signal Corps during World War II, then attended Indiana University before doing radio in Cincinnati and Philadelphia and finally New York.

On the air, "Shep" worked without a script or reliance on telephone callers, spinning yarns—typically with a sardonic edge—often based on his boyhood years in Hammond, Indiana and his time in the Army and occasionally mentioning ham radio. Among the characters he created was alter ego Ralphie Parker, who appeared in his 1983 film classic "A Christmas Story," which he wrote and narrated.

The banquet speaker at the 1985 Dayton Hamvention, Shepherd also provided the introductory narration to the Morse code instruction tape included with the League's *Tune in the World* license manual. Several hams wrote ARRL Headquarters to say that Shepherd had provided inspiration for their early interest in Amateur Radio. "I can truthfully say that I was first inspired by 'the magic of radio' while listening to Jean Shepherd's nightly talk show on WOR," said Tom Lussen, WA4ILH, a former New Jersey resident.

Peter Murricane, WB2SGT, of New York said Shepherd's show and stories prompted him to get his ticket. "The many stories he has told always ring in my mind," he said. "He will be missed."

Shepherd also penned numerous articles and several books, including *In God We Trust, All Others Pay Cash* in 1966 and *Wanda Hickey's Night of Golden Memories* in 1971. He sold out Carnegie Hall for his live appearances, did shows at clubs, and put on an annual concert at Princeton University for many years. He also produced the TV programs *Jean Shepherd's America* and *Shepherds's Pie* for PBS, as well as several PBS American Playhouse productions, including *The Phantom of the Open Hearth* and *The Great American Fourth of July and Other Disasters*.

In later life, Shepherd remained active on HF SSB and occasionally on 2-meter FM, sometimes operating from his boat in Florida. He also had an interest in classic automobiles.

Shepherd's last radio appearances were believed to be in 1998 on WFAN and WEVD in New York. After he moved into television and films, Shepherd was known to play down the significance of his radio broadcasting exploits in favor of his more recent works, sometimes to the dismay of his diehard radio fans.

His third wife, Leigh, died last year.

"He captivated a generation with his stories," said vintage radio buff John Dilks, K2TQN. "He is survived by Schwartz, Flick, Bruner and all of the other wonderful characters he created."

For detailed information on Jean Shepherd, visit **http://www.advanix.net/~jsadur/shep.htm** or **http://www.spacelab.net/~bkaye/Shep.html**.

location at 2402-2417 MHz.

Citing ATV repeaters and video links as well as proposed amateur satellite operation, the League said the 2.4 GHz band enjoys significant use by the LA area Amateur Radio community. The League said these systems, and those of other amateur users, would be "seriously degraded or displaced" by deployment of the proposed experimental system.

In a separate, but related, filing on September 1, Los Angeles County and the cities of Los Angeles, Long Beach and Burbank requested a declaratory ruling from the FCC to "clarify its rules to facilitate public safety operations on the 2450-2483 MHz band" and to explore other spectrum allocations "to accommodate the growing demand for public safety airborne operation."

HUMANITARIAN AWARD NOMINATIONS CLOSE DECEMBER 31

Nominations close December 31, 1999, for the 1999 ARRL International Humanitarian Award. The award is dedicated to those amateurs who, through Amateur Radio, are devoted to promoting the welfare of mankind. The prize goes each year to truly outstanding Amateur Radio operators in areas of international humanitarianism and the furtherance of peace.

Any radio amateur or group of amateurs worldwide who has provided extraordinary service through their Amateur Radio skills for the benefit of others in times of crisis or disaster is qualified to receive the award.

The ARRL International Humanitarian Award recognizes the hobby's international communication role and that hams regularly help people in need throughout the world. Amateur Radio is one of the few media where average people throughout the world can meet to talk to each other and spread goodwill across otherwise impenetrable political boundaries. The award is intended to promote positive efforts toward international understanding and peaceful communication.

The award recipient is selected by a committee appointed by the League's President. The committee will accept nominations from a licensed radio amateur or from a governmental or other organization that has received the benefits of the radio amateur's extraordinary service. Nominations must include a summary of the nominee's actions that qualify the recipient for the award and statements from at least two references—including names and addresses—for verification.

All nominations and supporting materials for the 1999 award must be submitted in writing in English to ARRL International Humanitarian Award, 225 Main St, Newington, CT 06111 USA. Nominations must be received by December 31, 1999. In the event that no nominations are received, the committee itself may determine possible recipients or decide to make no award.

The 1998 International Humanitarian Award went to the Radio Amateur du Quebec Inc, for its efforts during a devastating ice storm. For details, see June 1999 *QST*, page 52.—*Rick Palm, K1CE*

In Brief

• FCC sets sights on beefed-up 10-meter enforcement: FCC Legal Adviser for Enforcement Riley Hollingsworth says hams can expect more rigorous enforcement on 10 meter issues next year. Over the Labor Day weekend, Hollingsworth told visitors to the Shelby Hamfest in North Carolina that the next area of enforcement would be the encroachment of unlicensed individuals into the 10-meter band and a crackdown on illegal RF amplifiers. His announcement drew loud applause. Hollingsworth repeated his pledge during two subsequent West Coast convention appearances.

• FCC issues stern warning, sends tapes: The FCC has fired another warning shot over the bow of a New Mexico ham who has been the target of complaints. The Commission notified General licensee Sidney W. Mahan, K5BLB, of Estancia, New Mexico, on September 15 that if complaints about his operation continue, the FCC intends to designate his station license for a revocation hearing and his operator license for suspension. In November 1998, the FCC had sent Mahan a *Warning Notice* concerning his operation on 3.950 MHz that allegedly involved tapes played on the air as well as sound effects and deliberate interference. "We continue to receive complaints and monitoring information on the operation of your station, particularly regarding profanity, obscenity, broadcasting extreme racial slurs, deliberate interference and failure to properly identify," said FCC Adviser for Enforcement Riley Hollingsworth. In particular, Hollingsworth said, the complaints concerned alleged interference by Mahan to "a net that attempts to operate around 3.950 MHz on Saturday evenings"—an apparent reference to The Liberty Net. On September 30, the FCC forwarded what it said were tape recordings of K5BLB made August 13 on 3.950 MHz and requested "a full explanation" of their contents. Hollingsworth said Mahan's reply "will be used to determine what action to take in this matter."

• K7IJ user loses VHF privileges for 90 days: The FCC has notified a San Francisco ham that it was modifying his license to prohibit operation above 30 MHz for 90 days. FCC Legal Adviser for Enforcement Riley Hollingsworth wrote General licensee Danny A. Kenwood, WA6CNQ, on October 6, 1999, citing "numerous complaints regarding profanity, obscenity, deliberate interference with the K7IJ repeater and failure to properly identify" during the week of August 29 and on September 6, 1999. Hollingsworth told Kenwood that the FCC would not initiate license revocation proceedings unless it has evidence of continued violations. Kenwood has 30 days to protest the modification. Otherwise, the modification will expire January 5, 2000.

• New Southern Florida Section Manager: Phyllisan West, KA4FZI, of Cape Coral is the new Southern Florida SM, effective September 30. She takes over from Kevin Bunin, K4PG, who has resigned. Bunin had served since October 1998. Members may contact West at 1410 Shelby Pkwy, Cape Coral, FL 33904; tel 941-574-3467; e-mail **ka4fzi@arrl.org**.

• New ARRL FCC license data search engine: The ARRL now offers an FCC license data search engine. It's at **http://www.arrl.org/fcc/fcclook.php3**.

• *QST* Cover Plaque Award: The winner of the September *QST* Cover Plaque Award was Bob Larkin, W7PUA, for his contribution, "The DSP-10: An All-Mode 2-Meter Transceiver Using a DSP IF and PC-Controlled Front Panel." The winner of the October *QST* Cover Plaque Award was Eric P. Nichols, KL7AJ, for his article "The Smell of Radio." Congratulations, Bob and Eric!

• AMSAT-NA directors elected: AMSAT-NA has announced the results of its Board of Directors election. Chosen to serve two-year terms on the board were Dick Daniels, W4PUJ; Bill Tynan, W3XO; Robin Haighton, VE3FRH; and Barry Baines, WD4ASW. Mike Gilchrist, KF4FDJ, will serve as the alternate until the next election.—*AMSAT News Service*

• NFCC officers elected: The National Frequency Coordinators' Board has announced its election of officers to serve through August 31, 2000. National Frequency Coordinators' Council President: Owen Wormser, K6LEW; NFCC Vice President: Clay Freinwald, K7CR; NFCC Secretary: Dick Isely, W9GIG; NFCC Treasurer: Dave Shiplett, AC4MU; National Frequency Coordinators' Board Chairman: Owen Wormser, K6LEW; NFCB Vice Chairman: Clay Freinwald, K7CR.—*Dick Isely, W9GIG*

• Audio version of *QST* moves to cassette format: Starting in January 2000, the audio version of *QST* from the Library of Congress will move to audio cassette format. The audio version will continue to be offered free-of-charge to visually or physically handicapped readers in the US who are eligible for the Library of Congress audio/Braille magazine program. Call toll-free 800-424-8567.—*Library of Congress*

New Books

THE GIANT BOOK OF ELECTRONIC PROJECTS—VOLUME I

Copyright 1999 by MFJ Enterprises, MFJ Publishing, Starkville MS 39759.
Paperback 8½×5½ inches, 340 pages. Includes schematics and board layouts.
ISBN 1-891237-21-7. MFJ-3501, $19.95 plus $6 shipping and handling.

Reviewed by Paul Danzer, N1II
ARRL Technical Advisor

◊ Did you ever wonder what you get when you order a kit for $129? Is it hard to build? Do you need any special tools or test equipment? Or perhaps you were curious to know if you could build the gadget by yourself, without a kit, if only you could get a schematic?

MFJ has packaged the instruction manuals for the popular Vectronics line of kits in one book and aptly named it *The GIANT Book of Electronic Projects*. Each of the 24 chapters contains the construction information, schematic, board layout, parts list and alignment information for kits or sets of kits. A set of kits consists of one basic design, with variations. As an example, chapter 16 covers a set of 20, 30, 40 and 80-meter receiver kits.

Kits are an Amateur Radio institution. As the introduction to *The GIANT Book of Electronic Projects* states, many people began their interest in electronics (and Amateur Radio) by assembling kits. For a period of time, in the 1950s, three or four kit suppliers provided most of the hi-fi systems for discriminating listeners. Today, much of the unassembled furniture sold in discount stores have instruction manuals very reminiscent of the early loudspeaker enclosure kits once very popular.

A table of contents is conspicuously missing from *The GIANT Book of Electronic Projects*, although a complete listing of the kits included is on the back cover. In addition to several small amateur receivers and transmitters, the list includes audio filters, keyers, preamps and converters.

For those who enjoy nostalgia, there is even a crystal radio set. Unfortunately, in a bow to modern techniques, the coil is wound on a length of PVC pipe, instead of the toilet tissue center cardboard tube favored by generations of youngsters.

The book tries to be as helpful as possible. All parts listed in each kit are cross-referenced in the back by the parts values (shown on the schematic) to Vectronics part numbers, so if you have a problem you could contact Vectronics and see if the part is available there. There is a nice beginners guide to parts identification at the front of the book. Kits are rated on levels, from L1 (only simple construction tools needed) to L5 (oscilloscope and other test equipment may be needed).

Some kits are so cute you can hardly wait to build them. The *VK 101K Shortwave Converter* kit is a standard circuit using an NE602 chip, but with a minimum of parts and adjustable inductors chosen to allow you to pick two 1-MHz bands for conversion into a standard broadcast receiver, such as your car radio.

All kits are shown with both PC-board layout and parts placement. Many also show the mechanical details of a cabinet, when one is used. Unfortunately, it was not apparent if the PC-board layouts were full size. A few of the kits use special parts, such as pre-programmed PICs. In these cases it would be obviously necessary to buy the kit!

Each chapter of *The GIANT Book of Electronic Projects* is very complete, right down to "theory of operation " and explaining details such a how to make an antenna for the VHF kits and how to wire a plug for the keyers.

Many projects here are not original. Literally hundreds of keyers, converters, small transmitters and the like have been published in the ham magazines and various electronic hobby magazines. The advantage is the kits are current, so you will not be in the position of trying to build something from a magazine requiring a part that has not been available since 1977. You may also choose to buy the kit, after you price the individual parts and the effort of either breadboarding or making your own PC-board.

Kits offer other advantages, especially to the inexperienced builder or experimenter. All parts are provided, detailed construction and alignment information is included and finally there is a place to contact in case of difficulty.

If you are interested in one of the advertised Vectronics kits, looking for a new construction project, an idea for a circuit or even searching for an interesting club project, *The GIANT Book of Electronic Projects* may be exactly what you are looking for. QST

Next New Book



Holiday Greetings from the ARRL Staff and Contributing Editors!



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Chris Imlay, W3KD
Bob Inderbitzen, NQ1R
Walter Ireland, WB7CSL
Wayne Irwin, W1KI
Karen Isakson
Bart Jahnke, W9JJ
Debbie Jahnke
Bill Kennamer, K5FUV
Joel Kleinman, N1BKE
Linda Kleinschmidt
Kathy Kostek
Tammy Krauss, KB1CYN
Lisa Kustosik, KA1UFZ
Greg Kwasowski
Paul Lappen
Mary Lau, N7IAL
Zachary Lau, W1VT
Rose-Anne Lawrence
Monique Levesque
Steven Langlais
Robert Lincoln
Rick Lindquist, N1RL
Maryann Macdonald
Nonie Madone
Steve Mansfield, N1MZA
Bernie McClenny, W3UR
Dan Miller, K3UFG
Judy Miller
Bill Moore, NC1L
Jodi Morin, KA1JPA
Dennis Motschenbacher, K7BV
Kim Neff
Steffie Nelson, KA1IFB
Diane Ortiz, K2DO
Paul Pagel, N1FB
Rick Palm, K1CE
Dave Patton, NT1N
David Pingree, N1NAS
Ann-Marie Pinto
Emil Pocock, W3EP
John Proctor
Paul Rinaldo, W4RI
Kim Rochette
Eileen Sapko
Cathy Scharr
Bob Schetgen, KU7G
Rudy Severns, N6LF
Joe Shea
Andrew Shefrin
Barry Shelley, N1VXY
Jon Siverling, WB3ERA
Daniel Small
Doug Smith, KF6DX/7
Maria Somma
Cathy Stepina
Dean Straw, N6BV
Dave Sumner, K1ZZ
Sharon Taratula
Lisa Tardette
Paul Theodoratos
Mike Tracy, KC1SX
John Troster, W6ISQ
Ed Vibert
Pete Warner
Maty Weinberg, KB1EIB
Rosalie White, WA1STO
Mark Wilson, K1RO
Dan Wolfgang
Jean Wolfgang, WB3IOS
Larry Wolfgang, WR1B
Janice Wytas
Melissa Yrayta

Edited by **Bernie McClenny, W3UR**

Never Pay Airline Overweight Charges! Well, Almost Never

By Dan Brown, NA7DB

For those who have been (or are aspiring to go) on a DXpedition, one of the hardest things to do is getting all the equipment to your final destination with out breaking the piggy bank. This month Dan Brown, NA7DB, tells us his secrets. This item originally appeared in the July/August 1999 issue of DX Magazine. *The magazine is published bimonthly by Carl Smith, N4AA. You can find more details at* **http://www.dxpub.com**, *or by contacting DX Publishing, PO Box DX, Leicester, NC 28748-0249.*—W3UR

If you ask the right people in the right way, you should almost never have to pay overweight charges. If you follow the formula I'm about to describe, you'll be able to avoid paying those costly charges and have more money to spend on equipment. This formula works on both domestic and foreign airlines, and for large ones and small ones.

Find A Good Travel Agent

Not all travel agents are alike. When you find good ones that will help you plan your DXpedition travel, treat them well. If they get you great rates and go the extra mile to help you, reward them with cash, or a dinner for two and a DXpedition T-shirt. If they have saved you hundreds of dollars in airfares it is money well spent.

*3025 Hobbs Rd
Glenwood, MD 21738-9728
howsdx@dailydx.com

Have the travel agent initiate the request for your overweight waiver. Explain what you are doing, why you need to take all that baggage, and most importantly, that Amateur Radio is a not-for-profit service. If they are not sure what ham radio is all about, tell them we are the ones who are there providing communications after earthquakes, floods, and hurricanes and we do not charge for our services. The travel agent may be able to get your overweight waiver without any more work on your part.

If your travel agent gets the overweight waiver for you, make sure that it is a part of the computer record with your reservation. Ask them for a hardcopy of the reservation that shows your overweight waiver on it. If you can, get a written letter from the airline. This way, when you show up at the airline counter and the customer service agent tells you it isn't in her computer you can show them the paperwork. It is also a good idea to call your travel agent a few days before leaving and have them recheck the reservation and make sure your waiver is still in the computer.

Working With the Airlines

If your travel agent cannot get your overweight waiver, you will have to make your request to either the Station Manager for domestic carriers, or the Sales Manager for international carriers. Your travel agent will be able to get the phone numbers for you.

Before you call the Station or Sales manager think about what you will need for your trip. How many extra bags or cases? Common weight limits are 70 pounds per bag or box on large airlines, 20 pounds per bag or box on smaller planes. Call the reservation line to find out ahead of time what the weight limits are, how many bags are allowed per passenger (United Express only allows two bags while United Airlines allows three), and the length limits per bag or box (think antennas). Once you know how much of an overweight waiver you need, add a couple bags to that number and then call the Station/Sales manager.

When making your request emphasize the following:

1. That you are an Amateur Radio operator who is traveling to (fill in blank) location and bringing a lot of radio equipment. Because of the radio equipment you will have some extra bags. You need these extra bags to make the operation a success.

2. That Amateur Radio is a not-for-profit service. We are the people who set up the communications during earthquakes, floods, hurricanes, etc. In other words, you are not doing this for business.

3. That you are paying for the trip out of your own pocket. Or that you are paying a substantial portion of the trip expenses.

4. That part of Amateur Radio is building international goodwill and friendships, and you will be talking to other Amateur Radio operators around the world.

Offer to put the airline logo on your QSL card and Web site. Let them know that you will give them credit in any articles you write



DX isn't just for the guys! Here's Kay, WA0WOF and Nellie, XE1CI, at the New Orleans International DX Convention. Nellie was the first YL to operate from Pratas Island, BQ9P.



Recent activity from the UK Sovereign Bases on Cyprus club station ZC4ATC has been courtesy of (left to right) Mike, 5B4AGX, George, 5B4AGC and Alf, 5B4ALF. They have been showing up on the air on the second and fourth Wednesdays of each month after 1700Z.

or presentations you give. Most important is that you show genuine gratitude for their help in making the operation a success.

Follow up the call with a letter including all of the above and asking for a written confirmation of the overweight waiver. Fax or overnight the letter for maximum impact. Using this formula and including all the elements above has been 100% successful for us.

Other Considerations

In most cases your overweight waiver will state that the excess baggage is not covered by the airlines insurance. This is not a real big deal since your equipment is probably worth much more that what the airline's insurance would pay anyway. Ask your insurance representative what you can do to get it covered.

Another way to protect your equipment is to package it in rugged professional-grade cases. I protect my own Yaesu FT-1000MP transceiver and Alpha 76 amplifier with model 1654 padded Pelican cases. I use a separate Pelican case for the Alpha's transformer. These cases are nearly indestructible, waterproof, and can be locked with a small padlock. Proper padding of the electronics will make sure that nothing shifts and gets broken inside. More than once the amplifier has arrived with its tubes nearly jarred out of their sockets. Even so, it has never failed to work. On the 8Q7AA DXpedition we had one FT-1000MP arrive with the front-panel board cracked. It had not been properly padded and had jammed against the inside of the case.

The reason I believe in these professional cases is because throughout my extensive travels they have protected my gear perfectly. Everything has arrived undamaged and ready to work. Shop around to various dealers for the best price on Pelican cases.

If you are wondering about antennas, a Force 12 C-3 beam travels nicely in a Pelican 1600 case with four sections of 4-foot mast. I also like some of the hard-sided golf cases for packing antennas. Rich Chatelain, K7ZV, has one of these hard-sided golf cases and uses it for carrying verticals to the Maldives. He loaned it to us to use on the 1998 XZ1N trip. It worked very well and all the antennas arrived undamaged.

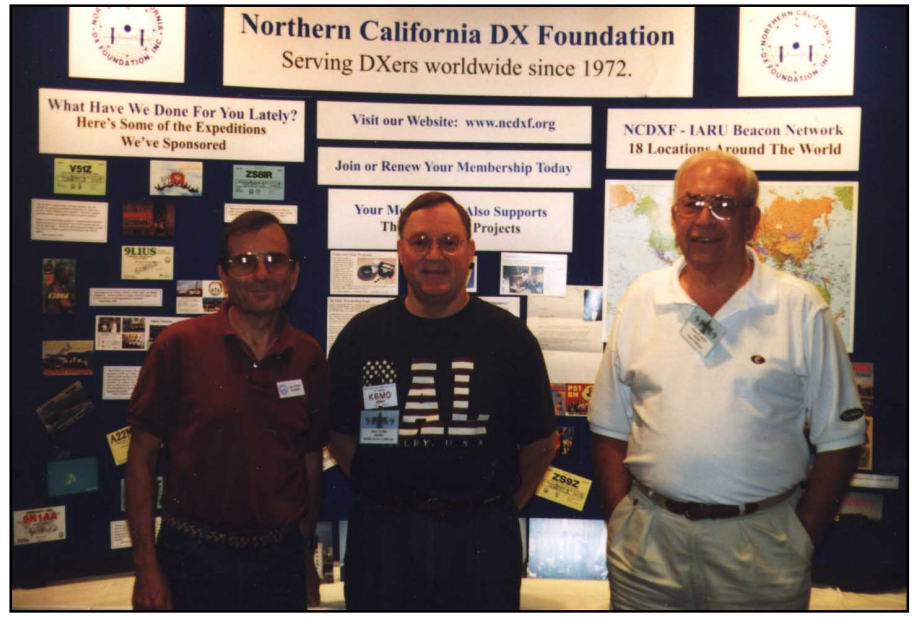
While some folks have used ski bags to haul antennas and have been successful, I worry about damage to the elements. When I arrive at my destination, I want to operate, not repair crushed aluminum. We have some other antennas we travel with in cardboard boxes. I have never had any crushed yet, but the boxes wear out after a couple of trips—especially trips to humid climates.

It's Amazing What You'll Get

It is truly amazing what you can get, if you only ask. I learned about the formula for getting overweight waivers from Warren Hill, K7WX, who is a master. He let me in on the secret just before I went with a group to ZK1. We had 13 people, 15 carryons, and 34 checked bags on Polynesian Airlines. Once there, we got Air Rarotonga to transfer our gear to another island on their small planes. We worked with them and sent the gear over on two different flights. On the XZ1N DXpedition in 1996 we flew Thai International with 12 people and took 38 checked bags to Yangon and came home with 42 bags. For the 8Q7AA operation from the Maldives, we flew Singapore Airlines with 13 people and 36 checked bags.

You do not have to travel with a large group to obtain a waiver, but it helps. The more you have going the more the airlines will allow. But even if there are just two people traveling and you need a few bags more than your allotment, you will more than likely get a "yes." I have managed to get excess baggage on domestic airlines for many trips. American, America West, Delta, Eastern, Reno Air, United Airlines (not to be confused with United Express), and others have always been cooperative. If you don't ask for help, you'll never get it.

Many thanks to Catherine Lai of Shangri La Holidays, you are a gem. Thanks also to our airline travel partners; we couldn't have done it without you. DX traveling can be affordable; you just have to know the right people and the right questions to ask.



The Northern California DX Foundation has been serving DXers since 1972. Just look at the sponsors for most major DXpeditions and you'll quickly realize how many operations they help put on the air. Left to right: Len, K6ANP, Jerry, K6MD and Bruce, W6OSP. For more information about NCDXF check out their Web page at **http://www.ncdxf.org/**.

QSL INFORMATION

I've recently received several requests for tips on how to find QSL information on line There are lots of sources on the World Wide Web. Here are some of the better ones I have found:

http://users.southeast.net/~rhicks/k4ute.htm
http://www.algonet.se/~sm5arl/qsladr.html
http://www.arrakis.es/~ea5eyj/
http://www.itis.net/golist/
http://www.dailydx.com/qslmanager.txt
http://www.ampr.spb.ru/multi/
http://www.itis.net/golist/

If you do not have Internet access, there are still a few possibilities. John Shelton, K1XN, is the editor of the *Golist*, which produces several different products that provide a wealth of QSL information. Monthly printed and diskette versions of *Golist* are available. For more information write the *Golist*, PO Box 3071, Paris, TN 38242.

JUAN FERNANDEZ ISLANDS

The Juan Fernandez Islands are actually three islands: Mas Afuera (Alejandro Selkirk), Más a Tierra (Isla Róbinson Crusoe) and Santa Clara (also called Goat Island). Explorer Juan Fernández discovered the islands on November 22, 1574. They are located in the South Pacific Ocean about 645 km west of Chile and occupy a total of about 181 square kilometers. In 1704 a Scottish sailor by the name of Alexander Selkirk was marooned there for four years. His story inspired Daniel Defoe to write *Robinson Crusoe*.

Starting January 6, 2000 a group from South America will be active from the islands. The multinational group will consist of Fil, CE6JOE; Mark, CE6TBN; Gustavo, XQ3SAI; Ed, HC5AI; and Mats, LU9AY. They'll be active on 6, 10, 12, 15, 17, 20, 40 and 80 meters using CW, SSB, RTTY, SSTV and satellite until January 16. A Web page has been setup in Spanish at **http://www.qsl.net/ce6tbn/ce0z.htm**. They plan to use the call sign CE0Z. QSL cards go to CE6TBN, PO Box 1234, Temuco, Chile.

WRAP UP

Thanks this month go to Dan, NA7DB, Carl, N4AA, John, K1XN and Mark, CE6TBN. Keep the pictures, stories and DX news coming. Seasons greetings to all readers and may each of you work lots of new ones in 2000. Remember: Keep tuning the bands. You never know who you'll find! Until next month, see you in the pileups!—*Bernie, W3UR*

Norway Hosts Region 1 Conference

The picturesque Olympic town of Lillehammer, Norway, was the site of the 1999 IARU Region 1 Conference which attracted delegates from IARU member societies in countries throughout Europe, Africa, and the Middle East and a handful of observers from other parts of the world. Among the more than 150 attendees at the September 19-24 meeting were 41 voting delegations carrying 12 additional proxies from other Region 1 societies that could not be present. Attending as special guests were ITU Radiocommunication Bureau Director Bob Jones, VE3CTM, Thormod Bøe, LA7OF, Head of the European Radiocommunications Office in Copenhagen, and IARU President Emeritus Richard Baldwin, W1RU. The ARRL was represented by two observers: President Rod Stafford, W6ROD, and Technical Relations Manager Paul Rinaldo, W4RI. Attending in their capacities as IARU officers were IARU President Larry Price, W4RA, Vice President David Wardlaw, VK3ADW, and Secretary David Sumner, K1ZZ. The members of the IARU Administrative Council from Regions 2 and 3 also participated.

Norsk Radio Relae Liga President Tom Victor Segalstad, LA4LN, welcomed the conferees to Norway. ARRL members will be interested to know that Tom Victor lived in Pennsylvania for several years and was involved in club activities around State College. Responding on behalf of the IARU, President Price noted the hard work facing the delegates during the coming week. In his remarks declaring the conference open, Bob Jones observed that he has used the IARU as an example of a non-commercial organization that is an effective representative in a forum that is dominated by commercial interests.

When the delegates got down to business it was apparent that financial concerns would dominate much of the conference. Region 1 assesses dues based on the number of licensed transmitting amateurs in each of its member societies. The number of such members has declined since the 1996 Conference in Tel-Aviv while the costs of effective advocacy have increased, straining the Region's reserves. The delegates ultimately agreed to a 16% dues increase coupled with new financial controls that are intended to stabilize future expenditures.

Three new faces were elected to the regional Executive Committee, replacing retiring members. Eliseè Bismuth, F6DRV, replaces Rossella Spadini, I1RYS, as Treasurer, and Ole Garpestad, LA2RR, and Karl Erhard Vögele, DK9HU, assume the seats of Vincent Magrou, F5JFT, and Hans-H. Ehlers, DF5UG. F6DRV and DK9HU are also the presidents of their respective national societies, REF-Union and DARC. Longtime Vice Chairman Wojciech Nietyksza, SP5FM, relinquished this position in favor of Mustafa Diop, 6W1KI, but remains a member of the Executive Committee and retains the important post of Chairman of the Region's External Relations Committee. Chairman Lou van de Nadort, PA0LOU, withstood a challenge by Gaston Bertels, ON4WF, to retain the leadership post he has held since 1975. Tim Hughes, G3GVV, was elected Secretary, a position in which he has served since the March 1999 death of John Allaway, G3FKM.

Space does not permit a detailed description of the conference proceedings, which are of interest primarily to amateurs in Region 1. The Region 1 Web site is under construction at **http://www.iaru-r1.org/** and eventually will contain more details of conference activity. The Lillehammer conferees left with a renewed commitment to work together to face the many challenges confronting Amateur Radio between now and the next Region 1 conference, which is scheduled to take place in San Marino in 2002.



Larry Price, W4RA, has been attending IARU conferences for 15 years, but this was his first as IARU President.



ERO Head of Office Thormod Bøe, LA7OF, good-naturedly served as emcee at the closing banquet.

IARU BRIEFS

• 9M2MAZ named UN Director for Outer Space Affairs: Malaysian amateurs are understandably proud that Mazlan Othman, 9M2MAZ, has been appointed United Nations Director for Outer Space Affairs. The position is a two-year appointment based in Vienna, Austria. Othman is the first woman from a developing country to be appointed to the post, which oversees UN space activities.

• G3OZF to be next RSGB president: Next year's Radio Society of Great Britain President will be Don Beattie, G3OZF. He was elected by Council, the governing body of the RSGB, at its July 24 meeting. Beattie is an avid DXer and contester. He chairs the RSGB's Management Committee and a new IARU Region 1 Financial Advisory Group. The current RSGB president is Hilary Claytonsmith, G4JKS.—*RSGB*

• Sweden joins slower-code countries: SSA, the IARU member society for Sweden, reports that the Swedish Telecommunication Authorities are moving toward deregulation. There are now two classes of amateur license in Sweden. Class 2 provides privileges above 30 MHz upon passing a written examination while Class 1 provides full privileges for the same written exam and a five word-per-minute (WPM) Morse code test. The characters are sent at 12 WPM with a longer space between each character, as is common in the US. The grading standards allow for just eight errors and one uncertainty in received text of approximately 190 characters, and two errors and five corrected errors in sent text of a similar length. SSA is permitted to issue training licenses for up to three years to prospective amateurs.–*SSA*

• New Caledonia applies for IARU admission: If approved by vote of the member societies, Association des Radio-Amateurs de Nouvelle-Caledonie will join the IARU on March 22, 2000.–*IARU*

Public Service

Rick Palm, K1CE • *Field Services Manager*

Operators Support Law Enforcement Event

By Cliff Ehry, AB7ZH

On April 10-11, 1999, law enforcement agencies from across the country gathered in Baker, California, to take part in the 15th annual Baker-to-Vegas Challenge Cup Relay Race. The 120-mile relay race starts 19 miles west of Baker, on Highway 127 in Death Valley. At the town of Shoshone, California, the road becomes Highway 372 to Pahrump, Nevada. At Pahrump it is Highway 160, which climbs over Mt. Potosi (8504 feet) and drops down into Las Vegas, ending at the Tropicana Hotel. The event is sponsored by the Los Angeles Police Department, Athletic and Gun Club.

Each agency paid a $1200 entry fee to defray the costs of special traffic control, insurance, permits, medical, and other expenses. In addition to the entry fee, each team had to provide for its own expenses.

The purpose of the race is to promote camaraderie, physical fitness, pride and teamwork in the national law enforcement community. It also seeks to paint a more positive image of law enforcement to the public.

At 10:00 AM, Saturday, April 10, teams started the 120-mile trek. Each team had a "follow vehicle" for safety and support. The duration of the event was about 20 to 23 hours.

Teams entered in the race were from Arizona, California, Canada, Minnesota, New York, Oregon, Texas and Utah. A diverse mixture of law enforcement groups participated, including the ATF, Border Patrol, Canadian Mounties, DEA, District Attorneys, FBI, Highway Patrol, Immigration, IRS, Jailers, Judges, Marshals, Park Rangers, Postal Inspectors, Secret Service, Sheriff's Transit Cops and various police departments.

Some 200 Amateur Radio operators from all over the country, but mostly from Arizona, California, Utah and Nevada, supported the race with radio communication. In addition, about 150 Good Sam RV members assisted.

Twenty stations along the route were staffed with amateur operator teams, in addition to the start and finish stations. I worked Station 16 with other members of the Nellis Amateur Radio Club of Las Vegas. There were eight of us in our group: Bud Blackburn, KC7IUK; Bonnie Blackburn; their son Cassidy Blackburn, KC7KDK; Scott Benedict, KC7VQV; Michelle Benedict, KC7KXM; Philip Waloski, N7YBD and myself. Bud, president of the Nellis Amateur Radio Club, was our team leader.

We arrived at our station, 6.7 miles on the Pahrump side of Mt. Potosi, by 10:00 PM, Saturday night, just before the first runner came through. The first team was 2 hours ahead of schedule. Luckily, we were in position and ready.

Scott and Michelle worked what they call the "Early Warning" point, approximately 2 miles out, to let us know that runners were on their way in. Each participant had his team number on the front of his/her chest for identification and they transmitted the numbers to us on simplex. Bud, in turn, called out the team number on his portable loudspeaker so that the next team member could be ready to receive the baton handoff.

I worked relief on various positions, especially the PA system. Beverly, N7YBD, called out the handoff time. Bonnie, KC7KDK, entered the time in the logbook. Philip, N7CFC, assisted Bud by calling out the numbers given him by early warning.

The weather was cold and windy, but we were bundled up in heavy clothing. Bud had a camp stove going and had hot coffee, chocolate and soup available to knock off the night chill. At times we could see a line of vehicle headlights that extended for several miles, as runners would come through in proximity to each other. At about 6:30 Sunday morning, the last runner passed through our station and we could finally pack up and go home.

A race director estimated that there were 10,000 people participating, including the teams, support personnel, Good Sam Rovers, Amateur Radio operators, medical teams and traffic controllers. The winning team was the Los Angeles Police Department's Red Team, with a time of 13 hours, 10 minutes and 39 seconds.

Event technical coordinator Chuck Folkes, W6KUE, reports a need for additional amateurs for next April's event. To offer assistance, contact Chuck via e-mail at: **Cfolkes@aol.com**

CLASS OF '99: NEW SECTION MANAGERS ATTEND WORKSHOP IN DENVER

New ARRL Section Managers from across the country descended on Denver, Colorado, this past September for a training and motivational seminar conducted by Field Services Manager Rick Palm, K1CE, and veteran New Mexico SM Joe Knight, W5PDY. Knight is the League's senior section leader in the nation.

The workshop indoctrinates new Section Managers into the administration of ARRL programs at the section level. These programs include emergency communications, traffic handling, government liaison, public relations, information management, club relations, and technical affairs.

Hosting Colorado Section Manager Tim Armagost, WB0TUB, and his wife Eileen, WD0DGL were on hand to welcome the "students," and took us to the best ribs joint in town on Saturday evening. (Always trust the locals for the best ribs!)

A long, formal session on Saturday was followed by an informal roundtable discussion Sunday. All attendees passed with flying colors!



Section Manager attendees at the Denver workshop. Back row, left to right: Armand Lambert, K1FLD, Rhode Island; Dale Bagley, K0KY, Missouri; Jeff Friedman, K3JF, Northern New Jersey; Don Mathis, KB5YAM, North Texas; Glenn Thomas, WB6W, Santa Clara Valley; and Charlie Calhoun, K5TTT, Oklahoma. Front row, left to right: Mel Parkes, N5UVP, Utah; Simone Lambert, KA1YVF, wife and assistant to the Rhode Island SM; Joe Knight, W5PDY, New Mexico; and Don Michalski, W9IXG, Wisconsin. QST

NTS Message Origination Award

Recognizing the needs of Amateur Radio operators new to the public service arena, ARRL Headquarters and the ARRL National Traffic System sponsor the National Traffic System Message Origination Award.

To qualify for this one-time award, you must show proof of *originating* at least four properly formatted NTS radiograms in a one-month period to your ARRL Section Manager (SM) or Section Traffic Manager (STM) to receive your award certificate.

How do you format and send a radiogram? Refer to this column in June and August, 1999, *QST* for details. You'll also find plenty of traffic-handling information and forms on the ARRL's Web Page. The address is **http://www.arrl.org/field/pubservice.html**.

The local radio amateur community and your section leadership officials are ready to help you get involved in traffic handling. To contact your section officials, see page 12 of *QST*. Also, the ARRL Web Page has this referral information and links to some individual section Web Pages. Log onto **http://www.arrl.org/field/org/smlist.html**.


National Traffic System
Message Origination Award

Presented to: _____

In recognition of having successfully originated the requisite number of ARRL National Traffic System—formatted messages in proper radiogram format, on behalf of third parties in the public interest and necessity.

ARRL Section Manager

ARRL Section Traffic Manager

The American Radio Relay League, Inc.

"Origination" in Traffic Handling

What does "origination" mean? When counting your traffic for the month (for awards and reports), you get points for each message (radiogram) you (1) *Send* to another station over the air, (2) *Receive* from another station over the air, and (3) *Deliver* to the third party (the addressee) off the air. A *delivery* must be coupled to a message *received* at your station (ie, to claim a delivery point, you must have *received* the message at your station in the first place).

You can get "extra credit" as an additional point for an "originated" message, one that you got from a third party (in the general public) for sending towards its destination. This off-the-air function is of great value in introducing the benefits of Amateur Radio to the general public.

Field Organization Reports

Public Service Honor Roll September 1999

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

363
K9RTB
353
KB8ZYY
320
W9RCW
283
K7BDU
259
N5JZ
WB8SIW
253
WA9VND
242
KA2ZNZ
219
W7TVA
205
W4CAC
202
KA4FZI
198
N5IKN
194
K7VVC
KK3F
193
N2OPJ

191
WB5NKC
N2JBA
190
W6DOB
185
W0OYH
KJ4N
184
WB2UVB
182
W5ZX
KE4OAV
180
N2LTC
179
WA4GQS
178
W6IVV
177
AF4GF
176
N2UTK
175
WB5ZED
174
WB4GM
NZ1D

172
W4EAT
KB2VRO
170
K6YR
N5NAV
169
KB2RTZ
K9FHI
168
KA2GJV
AD4DO
166
K4SCL
163
N2RPI
162
N2YJZ
161
WN0Y
N8FPN
159
KK1A
N7YSS
158
KF4VDW
W6QZ
KB2VVB
KD4GR

157
K4IWW
K0IBS
156
WA1JVV
154
KC2AHS
K4JSJ
K4RBR
153
NR2F
K2BTP
KA4UIV
K8GA
152
N5JGC
WO0A
WA1TBY
151
KF1L
W3YVQ
150
W7ZIW
149
W4ZJY
148
KI4YV
KC4TLG
N5OUJ
147
WA5I

AG9G
WA1FNM
KA5KLU
146
WA4QXT
WX8Y
145
NN7H
144
WA8EYQ
WB2ZCM
KC5OZT
143
N8FWA
KB5W
141
NN2H
N0KJ
WA4DOX
K5IQZ
N1LKJ
140
W0LAW
K5DPG
N9BNQ
139
W2MTA
WD4JJ
N9BDL
W5GKH

138
N5XGI
W3VK
AA3SB
W7GB
KT6A
WA6ODQ
137
WA2UKX
KB2KLH
W2RJL
136
N1VXP
KC4ZHF
135
K2DN
KE4PAP
K2UL
134
WD8MIO
N2XJ
W7NWP
133
KB2VVD
KA1GWE
W2EAG
132
K2BCL
KC8LYY
W9YCV
KD1LE
131
K3JL
K5VV
W9CBE
130
KE4JHJ
K6AGD
W1KX
AF4PU
KJ3E
W2AKT
KB5TCH
WU4C
129
NY2V
K5DMC
AF4NS
KA9KLZ
W7LG
128
WB2QIX
AD6HR
W0GCB
WA0TFC

127
KF4NFP
WB2GTG
126
W1ALE
W5CDX
KA4HHE
125
KE1AL
AA8SN
124
N2WDS
WB2FGL
W1PEX
123
N3ZKP
W2JHO
122
W7GHT
121
KF6OIF
KM5DT
N3WKE
KG5GE
120
KG2D
KC7ZZB
KO6RZ
W1JX
WB0ZNY
N3WK
K4MTX
AA2SV
119
W1QU
W3BBQ
K4FQU
118
KA2DBD
KD5P
KF5A
WX4H
W4CKS
W9ZY
W3OKN
WB2IIV
K0PIZ
K5MC
KB5YAM
K7GXZ
KE4IFD
K7MQF
117
W2FR
N1JBD
K0PY

116
W8GGA
KO4OL
KA2CQX
KC4VLW
K9LGU
115
AF2K
KB2ETO
W2PII
KO4A
WA2YBM
KC5QGI
114
KB0DTI
W5MEN
N5JUU
113
KE6MIW
KA1OTN
WD0GUF
W4RRX
112
AA3GV
N3WAV
110
WI2G
N8DD
KC7SRL
W7VSE
W2MTO
N9MN
KA4LRM
109
KC2EOT
KE4DNO
108
WA8SSI
KR4MU
KT4SJ
107
W1JTH
K5WOD
106
K3CSX
W4NTI
KJ9J
KE0K
105
WA2GUP
W4DGH
WA4EIC
104
W5XX
WB4TYV
K8VFZ

103
K4YVX
102
W4CC
K4BEH
101
W0UCE
W3CB
99
KB2VYZ
98
KJ7SI
96
KA2ZKM
95
KC4VNO
N2XOJ
N1LAH
94
WB2IJH
K2PB
KB0GUS
K4BW
KA0DBK
WA8DHB
93
AC4ZO
K4AIF
KC6SKK
W4XI
92
W2CS
KB2WII
K8LEN
91
KA9FVX
WA5FXQ
90
KC2FEM
KC8HTP
W4PIM
N7AIK
KE4WBI
89
KD1SM
KB2UQZ
AC5Z
N1IST
KC8GMT
88
WA1QAA
KC4PZA
87
W2CC
KE3OX

W4ZBA
86
AL7N
K2VX
WB9GIU
KD4HGU
KD6YJB
85
N5HK
84
AA2ED
AE4NW
N1SGL
83
W7EP
KC3Y
K1SEC
82
WA4EYU
KE3FL
81
N2AKZ
KD6IVF
80
W7CBN
WA4GLS
W7HH
WB4PAM
KA7TTY
79
W0WFF
KG4CHW
78
KL5T
KB4WBY
77
AB5RV
N4FNT
KB2GEK
K8SH
W7JMH
AA8PI
76
WB4ZNB
75
N4JAQ
N4MM
74
AB7ZQ
KU4IJ
73
KD4FUN
K5UCQ

The following station qualified for PSHR in August, 1999, but the results did not appear last month: KE4IFD 118, KD1SM 89, KE3FL 84.

Section Traffic Manager Reports September 1999

The following ARRL section traffic managers reported: AL, AR, AZ, CT, CO, DE, EMA, ENY, EPA, EWA, GA, IA, ID, IL, KS, KY, LA, MDC, MI, MN, MO, MS, NC, NFL, NH, NLI, NNJ, NTX, NV, OH, OK, OR, ORG, SB, SC, SD, SDG, SFL, SNJ, STX, TN, VA, WI, WMA, WNY, WPA, WWA, WY.

Section Emergency Coordinator Reports September 1999

The following ARRL section emergency coordinators reported: AZ, CT, ENY, EWA, IN, KY, MDC, MI, MN, MO, NFL, NLI, NNJ, OH, VA, WV, SD, SFL, TN, WMA.

Brass Pounders League September 1999

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
WX4H	3	580	690	12	1285
K7BDU	66	584	505	49	1204
KK3F	16	940	134	58	1148
N2LTC	0	432	469	12	913
W1PEX	0	734	97	10	841
K9JPS	1	443	59	271	772
KT6A	0	383	355	0	738
W9RCW	0	402	32	260	694
K9RTB	0	389	94	204	688
KF5A	0	329	333	0	662
W9IHW	2	377	45	228	652
K7VVC	22	261	334	4	621
N5IKN	0	310	100	210	620
W6DOB	7	310	273	25	615
WA9VND	54	274	232	31	591
KA2ZNZ	19	235	176	85	575
KB8ZYY	69	218	225	5	517
W9YPY	0	256	257	0	513
W3KOD	2	275	229	1	507

BPL for 100 or more originations plus deliveries: KB5GBN 209, WB8SIW 125, N5JZ 121, W3HK 110.

The World Above 50 MHz

Emil Pocock, W3EP*

Thirty Years of VHF in Australia

For the past 30 years, Eric Jamieson, VK5LP, has chronicled activities on the bands above 50 MHz through the pages of "VHF/UHF—An Expanding World," which appears monthly in the Australian journal *Amateur Radio*. Eric's final contribution appears this December, after a long and distinguished career promoting and writing about the frontiers of Amateur Radio in the land down under.

Early Life in Radio

Eric was born 75 years ago at Gumeracha, South Australia. Like many budding radio amateurs, he got his start as an inquisitive 6-year old, fiddling with the controls of the family's 1923-vintage battery-operated set and asking his father endless questions about how it worked. Recognizing his emerging curiosity, his parents bought Eric an imposing book covering the basics of wireless, "the tome," as he called it. He referred to it often over the following years.

Eric constructed his first radio when he was 9 years old. Yes, it was a crystal set, with coils wound on a jam jar and the wire taps held in place with sealing wax, all mounted on a used tin kerosene box. After much scraping of the cat's whisker on the galena crystal, Eric was rewarded with his first DX when he heard 5CL, the National Station about 25 miles away. Eric says the little radio still works.

His father bought him a two-tube battery operated regenerative radio for his 10th birthday. After consulting the tome, Eric found it relatively easy to add an audio amplifier tube and convert the radio to the short wave bands, using plug-in coils. He then began picking up stations from all over the world and keeping notes of what he heard in an exercise book. By age 14, Eric was supplying the *Adelaide Advertiser* with a half column of short-wave listener notes, which appeared on the first page of each Saturday edition.

Writing also brought him greater rewards. He won a prize in an essay competition sponsored by *The Australasian Radio World* and saw his piece on the operation of battery operated sets published in the magazine. A year later, he won another prize for an essay on long-range ac receivers, but his career as a young writer was interrupted when he joined the Royal Australian Air Force in 1942.

Eric spent much of his time keeping transmitting stations on the air during the war years and learning about modern radio technology. On discharge in 1946, he built an elaborate communications receiver of his own design in order to continue short-wave listening. It too was battery powered, as his family home did not get electricity until 1950. Eric nearly sat for his Amateur Radio license, but his time was filled with repairing radios and by 1948, manufacturing radios for sale. He built 64 mantel sets during this period.

VHF at Last

During the early 1950s, a friend suggested that they should construct equipment for the 1-meter band (288 MHz). When Eric noted that they were not licensed, his friend replied, "So what? Nobody will hear us out here!" So the pair constructed identical super-regenerative tube receivers, modulated oscillator transmitters, and dipole antennas. They could easily talk over the 10 miles that separated their houses. The conversations continued for several years until Eric's friend moved away.

That sparked Eric's interest in VHF. As solar cycle 19 was approached in the late 1950s, Eric attached a Kingsley KC6 converter to his newly acquired AR7 war-surplus communications receiver in order to listen to 6 meters. The set up had a 6AK5 RF stage, tuning was accomplished by varying the inductance of the coils, and the antenna input was 300 Ω, perfect for connecting to a modified channel-2 TV antenna. The whole thing drifted like crazy, but a voltage regulator and careful selection of tubes (some drifted more than others) helped. With this relatively unstable set up, Eric copied 6-meter stations from Japan, Hawaii, the United States, New Zealand, New Guinea, and of course countless fellow Australians.

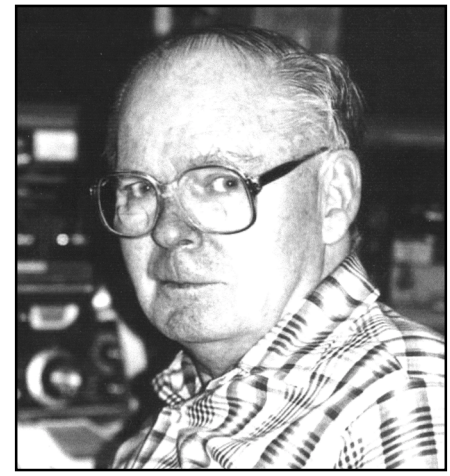
After some prodding from his friend Wally, Eric finally took and passed his Amateur Radio exams and was licensed in 1961. The pair kept in touch on 6 meters and then built equipment for 2 meters. Eric's 6-meter transmitter ran 100 W of AM, using two 807 tubes in the final modulated by two 809 tubes. By 1968, he had switched over to SSB gear and built his pride and joy, a 200-W amplifier with 811A tubes for 6 meters, which is still in use.

By the mid-1960s, Eric was also making portable VHF expeditions to the Adelaide Hills and other elevated spots, sometimes with VK5QZ and VK5ZCU (now VK5ZO). Over the years, Eric has counted 49 expeditions to 31 locations in South Australia and neighboring Victoria, adding 432 and 1296 to the basic 50 and 144 MHz stations over the years. Ultimately, Eric outfitted a Volkswagen van with portable stations and an alternator for short-notice operating.

An Expanding World

For some time, Eric had been supplying VHF notes on tape to be broadcast on Sunday morning over VK5WI, the official station of the Wireless Institute of Australia. This brought him to the attention of Geoff Taylor, VK5TY, the South Australia Federal Councilor, who suggested in 1969 that Eric ought to write VHF notes for the institute's journal, *Amateur Radio*. That began Eric's 30-year tenure as the author of "VHF/UHF—An Expanding World," Australia's leading voice for promoting VHF and UHF.

Eric was writing during the three decades of tremendous technological advances in VHF through microwave and a consequent expansion in activities. Just as he began the column, the transition from AM to SSB was taking place, prompted in part by the new solid-state SSB/CW transceivers that began



Eric Jamieson, VK5LP, of Meningie, South Australia.

This Month

December 14	Geminids meteor shower peaks
December 26	Excellent EME conditions

*Send reports to Emil Pocock, Box 100, Lebanon, CT 06249. Leave voice messages at 860-642-4347, or fax 860-594-0259 or e-mail w3ep@arrl.org.

appearing from the major Japanese manufacturers. Compact 2-meter FM transceivers became available about the same time, and Eric noted that many VHF operators deserted the low end of the band to operate FM through the repeaters that were rapidly being built across Australia.

Despite the desertions Eric observed in Australia, he continued to encourage SSB and CW activity through his column. Australia may be one of the most difficult places for VHF activity, as its area is nearly the size of the contiguous 48 United States, but its population is just 18 million, and most of that concentrated on the southeastern coasts. Beacons became vital to keeping up VHF activity, and one of Eric's great successes was the promotion of a beacon network, not just in his home state of South Australia (which had beacons as early as 1965), but across the entire country and on all bands through 10 GHz.

Eric encouraged other innovations and activities through his pages, including the use of amateur satellites, VHF contesting, Amateur Radio direction finding, and microwave DXing. Australians have made notable contributions in amateur satellite construction and progress in the microwaves. VK5NY and VK6KZ have held the world's record at 10 GHz since 1994, for example, and Australians are hoping to be on one end of a 2-meter record-breaking tropo distance across the Indian Ocean to Africa.

Eric Jamieson now lives with his wife in Meningie, South Australia, on the shores of Lake Albert. Since 1985, he has suffered from a progressive disease of the spinal column that has confined him to a wheel chair, but that has not slowed down his on-the-air activities or, obviously, his writing. Indeed, he notes that his writing has become more prolific since his affliction. In addition to writing "VHF/UHF—An Expanding World" for 30 years, Eric has written more than a dozen books, mostly about local history.

Eric has been a gracious and generous fellow column writer over the years. We have exchanged pre-publication versions of our columns and borrowed freely from each other to fill in news and activities from half way around the world. No doubt we will still be reading articles from Eric, despite his retirement. Beginning with the January 2000, Eric's long-time friend, David Minchin, VK5KK, will be writing on VHF topics for the Australian *Amateur Radio* magazine. Our best wishes to both of you.

ON THE BANDS

The geomagnetic field slipped in and out of minor storm levels during much of the month of September, creating several weak radio aurora events. The aurora of September 12-13 enlivened the VHF contest, but the unusual storm on the evening of September 22-23 was the big story of the month. In addition to the ordinary aurora contacts on the VHF bands, the F-layer MUF was briefly enhanced on the daylight side of the Earth. US stations worked into South America and Australia on 50 MHz, and unexpected DX was reported elsewhere across the Pacific.

Otherwise, 6-meter DX made little progress during the month, but little was expected. Other activity on the bands included brief 6-meter sporadic-E openings on September 1, 3, 5, 7, and 8 (mostly in the western states) and better-than-average tropospheric conditions over the Northeast on the evenings of September 2-3 and 4-5. Thanks to W1REZ, K7ICW, and many others for this synopsis. Dates and times are UTC in the summaries below.

September 22-23 Geomagnetic Storm

The geomagnetic storm of September 22 was not expected. At 1500 UTC, the planetary K index was just 3 (unsettled); three hours later it had jumped to 5 (minor storm), and by 2100, the K index was 7 (major storm). The planetary K index was still 6 at 0000 and 0300, then suddenly dropped back to 3 at 0600. The National Oceanic and Atmospheric Administration reported that the storm was triggered by interplanetary shock wave, which hit the Earth when the solar wind jumped from 360 to 630 kilometers per second (yes, that is an incredible 1.6-million miles an hour), accompanied by sharp increases in energetic ions. The solar source of this shock wave could not be determined, but its effect on the Earth was noticed immediately.

Strong radio aurora appeared over the entire northern United States by 2100. Six-meter signals from the Midwest were unusually strong into New England, providing stations running as little as 10 W into dipoles with aurora contacts. By 2230, the signals on some Midwestern stations had lost most of their aurora growl and became clear and strong, suggesting auroral E had begun to take over.

The strength and extent of the aurora was also evident on 144 MHz and higher. Mike King, KM0T (EN13) worked as far east as K1UHF (FN31) in Connecticut for a new state on 2 meters and heard WI7Z (DN06) in Oregon—that is nearly coast-to-coast auroral coverage. WI7Z worked W7XU/0 (EN13) and VE7BBG (CN88), and made it with NJ7A (DN30) on 222 MHz, despite having only 30 W and a 16-element Yagi. NJ7A made a number of 2-meter contacts, and added K7ND (CN87) on 222 and 432 MHz. Jason Baack, N1RWY (FN54), made 4 contacts on 222 MHz, including K4RTS (FM08) on both 222 and 432 MHz.

The aurora vanished just as suddenly by 0100, but there was more to come. Apparently, the solar shock wave also temporarily raised the F-layer MUF higher than 50 MHz over the entire sunlit side of the Earth. This effect has been observed in a more limited way after other auroras, when long-distance north-south contacts, such as the US to Argentina, suddenly appeared. This time was a little different. In addition to north-south contacts, much of the Midwest worked into the Pacific as far as Australia with very loud signals.

More than a dozen Australians in the northeastern state of Queensland, including VK4ABW, VK4APG, VK4BRG, VK4DMI, VK4DO, VK4FI, VK4FNQ, VK4GPS, VK4JH, VK4JSR VK4KK, VK4NW, VK4PU worked US stations scattered from New Mexico and Texas, north to South Dakota, and east to at least Illinois. The bulk of the contacts took place between 0045 and 0140. Signal reports were typically 59 both ways, but some stations were well over S9.

Midwesterners were astonished, but perhaps none more so than Mark Anthony, K9AM (EN52) in northern Illinois. He wrote, "I managed one 6-meter aurora contact into new grid EN76 about 0043 and then started filling out the QSL card. Then I heard a commotion on .125 and 'Golf Queen.' Hmm, don't recognize that suffix and he was not coming via aurora, but *something* was not right, so says my reptilian brain, and then bam! S 9 right on frequency I hear, 'Who was the K9? This is VK4KK in QC62, hisssssss.'"

"Holy mackerel, my jaw dropped and I almost didn't have the proper motor skills to reach for the mike. I viewed it as though looking at a slow motion movie. A glance at the rig's clock indicated 0053, and I saw my arm slowly reaching out towards the desk mike, the forgotten QSL fluttering down to the floor. I heard myself intoning, 'Kilowatt Nine Alpha Mike.' Fortunately, I had actually managed to depress the PTT button. Then, sweet music, 'Alpha Mike stand by, who was the KB9?' By then, I had recovered and then he called me. I got 5 by 9 and he was already fading down to 5 by 5. Then I heard a cacophony of signals, another 9 contact, then VK4KK asking were there any ones, then he's gone!"

Others were equally taken aback, but made the most of the opportunity. Cliff Kellam, N9BJG (EM57), worked VK4FNQ, VK4JH, and VK4DO between 0050 and 0105. VK4JH mentioned that he was hearing JA, PY, and LU stations at the same time. Chuck Van Hoorn, KG9N (EN50), exchanged 55 signal reports with VK4KK at 0106. Arlis Thompson, W7XU (EN13), ran an astonishing 11 Australians and his wife Holly, N0QJM, who shares the station, logged 13. Mike King, KM0T (also EN13), managed to get into the fun by working VK4DO, VK4KK, and VK4JSR. W5UWB (EL17) logged VK4DO and VK4BRG between 0058 and 0129, at the same time he was hearing Hawaiian stations. West Atchison, WA5TKU (EM13), managed a contact with VK4BRG around 0127. During the hour or so the opening lasted, the US grids the Australians contacts included DM65, DN65, EL08, 09, 17, 29, EM00, 13, 20, 21, 29, 48, EN13, 24, 40, 50, 52, 53, and 61.

The Australians were not the only ones coming through from the west. At 0050, N6XQ heard weak Hawaiian stations. Over the next 40 minutes, W5UWB, N5JEH (DM65), N5JHV (DM62), and others worked KH6IAA, KH7R, WH6O, and NH6YK. Finally, KB0PYO (EN24) heard ZL2TPY, and W0SD (EN13) reportedly worked at least one New Zealander.

An even greater portion of the US worked into Argentina, Uruguay, and Brazil at about the same time. Herb Spoonts, W3BO (FN20), was probably representative of what could be worked from the Northeast. He logged 3 LUs, 3 CXs, and PY5CC, but stations as far north as New Hampshire and New Brunswick heard the Argentines. At the same time, stations on the West Coast were also making it into South America. WI7Z (DN06) and W7FI (CN87), both in Oregon, worked PY5XX, PY2XB, PY5CC, CX4AAJ, and possibly others. VE7AGG reported PU3WPA. From southern California, both N6CA and N6XQ heard the Uruguayans. PY2XB made a dozen contacts with W4, 7, 8, and 9.

Nearly every part of the US was probably able to work some unusual DX for an hour or so after 0045. What a memorable evening that was! Such an incredible sequence of propagation events has rarely been chronicled on the VHF bands, yet there is no reason why it could not happen again.

Six Meter DX

US to South and Central America

There was a good deal more DX worldwide during the month. Stations across the southern tier of states, from Florida to Arizona (although Texans dominated the reports), worked South Americans via F-layer propagation on the late afternoons and evenings of September 8, 9, 12, 14, 16, 19, 23, and 24, at least. There were many Argentines and several Uruguayans in the US logs, along with HC5K, HC8GR, HC8N, and HK3YH. Backscatter probably made possible additional contacts with P40KX, TG9SO, TG9IKE, TI5KD, and YV5LIX.

Several US stations logged South Americans on the afternoon of September 12, but just as many

50-MHz Standings

We compile the 50-MHz annual standings each October 1 for publication in the December *QST*. There are two requirements for inclusion in this list: (1) You must have worked at least 50 DXCC entities, and (2) you must have submitted an activity report within the past two years. (You don't need to work additional stations to remain in the standings, but please confirm your continued interest.) You can send reports by e-mail to: **standings@arrl.org**, or by postal mail to: Steve Ford, WB8IMY, ARRL, 225 Main St, Newington, CT 06111. To request new reporting forms, please send an SASE to the same address.

Call sign	QTH	States	DXCC	Grids	Best DX (km)†
WA1OUB	NH	50	134	780	14982
K1TOL	ME	50	133	821	—
W1RA	MA	50	130	—	—
K1GPJ	ME	50	120	700	15056
W1JR	NH	50	116	565	14455
W3EP/1	CT	50	110	695	15750
KA1A	NH	50	107	—	14533
K1SG	MA	50	107	—	9688
W1AIM	VT	50	100	345	14928
K1CA	NH	50	100	—	—
K1TEO	CT	50	82	643	13890
NZ1D	MA	50	69	—	—
K2ZD	NJ	50	119	—	—
K2MUB	NY	50	117	—	—
WA2BPE	NY	50	109	—	15390
W2CNS	NY	50	104	517	15120
KA2RDO	NY	50	101	512	12115
K2YOF	NJ	50	99	331	12746
W2MPK	NY	50	94	—	—
K2OVS	NY	50	71	340	13124
N2WK	NY	50	70	468	15134
WA2BAH	NY	49	58	438	11040
KA2MCU	NY	49	50	386	11040
W3HHN	NY	48	51	427	6327
W3JO	PA	50	122	—	14929
W3BO	PA	50	111	514	12840
W3TC	PA	50	106	520	14945
AE3T	PA	50	91	—	14500
W3ZZ	MD	50	90	524	12700
WA3DMF	MD	50	75	519	11645
W4OO	FL	50	112	525	—
W4MW	NC	50	111	—	—
W4MOS	FL	50	110	—	—
K4IG	FL	50	109	—	15000
N4CH	VA	50	104	670	15000
N4MM	VA	50	101	676	—
K4ZOO	VA	50	85	580	13946
K4GOK	VA	50	83	—	—
K4RF	GA	50	69	375	16288
WB4JEM	FL	49	71	367	13585
W4WTA	GA	49	60	490	13550
N4TL	NC	49	60	100	15034
K4CKS	GA	—	123	642	—
W5FF*	NM	50	128	900	—
W5VY	TX	50	112	362	15060
W5HUQ	AR	50	108	280	15000
W5OZI	TX	50	107	775	15141
WA5IYX	TX	50	105	384	14592
WD5K	TX	50	103	838	14927
K5SW	OK	50	97	—	—
K5AM	NM	50	96	692	15744
WA5JCI	TX	50	91	624	—
W5SXD	TX	50	70	—	—
W5UWB	TX	50	55	—	—
W5ZN	AR	50	53	385	10550
K5TN	OK	50	50	400	13380
K5HUQ	AR	17	73	88	15000
W5AL	TX	—	64	531	—
K6QXY*	CA	50	108	—	15555
N6CA	CA	50	98	—	16683
WA6PEV*	CA	50	89	—	—
K6KLY	CA	50	72	—	—
K6UM	CA	50	57	425	15560
N6ZE	CA	49	75	—	—
W7RV	AZ	50	101	787	16165
W7HAH*	MT	50	56	632	—
N7DB	OR	50	52	450	13800
N8XA	OH	50	91	—	—
W8UV	OH	50	77	—	—
W8PAT	OH	50	73	227	13196
KU8Y	MI	50	51	538	13683
N8NQS	MI	50	50	473	13590
K8MD	MI	49	55	429	13199
KA9CFD	IL	50	81	474	14138
K9LCR	IL	50	72	450	—
W0UC	WI	50	65	566	—
KA9DZM	IN	47	50	280	—
N0LL	KS	50	94	744	14901
K0GJX	MN	50	90	309	13818
KM0A	MO	50	80	712	15313
W0JRP	MO	50	69	523	—
K0FF*	MO	50	68	546	14031
W0FY	MO	50	66	610	—
N0KE	CO	50	66	565	16700
K0CJ	MN	50	55	—	13328
VE9AA	NB	49	80	500	6096
PY5CC		48	161	569	18257
XE1GE		48	60	—	14078
VK4BRG		37	88	—	16997
GJ4ICD		36	164	747	17232
G0JHC		30	146	718	15395
SM7FJE		28	145	769	—
IK0FTA		13	113	471	15081
VK4DO		11	58	163	15684
ZP5ZR		2	58	—	—
G3WOS		—	155	625	—
PA3BFM		—	151	662	—
9H1PA		—	151	—	15549
IK2GSO		—	135	562	—
IK8DYD		—	126	—	—
ZS6AXT		—	95	—	—
GD0TEP		—	83	300	—
SM0KAK		—	76	255	15420

— Information not supplied
* Includes some EME (moonbounce) contacts
†Terrestrial

complained that contest QRM low in the band prevented them from completing contacts. Among the fortunate ones was John Butrovich, W5UWB (EL17), who snagged LU6DAV, CX1DDO, and LW5EJU between 2150 and 2220. Pat Dyer, WA5IYX (EL09), logged HK3YH during the same time period. Other Texans found HC5K and CX1CCC. KB2YVC (FN12) heard the Uruguayan in western New York around 2225, but could not complete the contact. Finally, TI5KD was reported in Arizona grids DM35 and DM43 around 2250. Thanks also to N0JK and K5SW for their contributions to these summaries.

South America

PY5CC and other Brazilians continued to make extraordinary contacts into southern Europe and the adjacent Middle East through September. Among their new and impressive catches were SV5BYR (Greece), 5B4FL (Cyprus), 4X1RF, 4X6ON, and 4Z5JA (Israel), and JY9NX (Jordan), along with 3C5I (Equatorial Guinea) in Africa. LW5EJU and other Argentines made it as far as France, Italy, Netherlands, and Germany. LU6DRV reported a host of Caribbean stations, including KG4AU (Guantanamo), TG9SO (Guatemala), TI2ALF and TI5KD (Costa Rica), V31PC (Belize), YV5LIX (Venezuela), and ZF1DC (Cayman Islands). Other Argentines added J78AB (Dominica). Stateside DXers should look out for these Caribbean-area stations on backscatter once the band opens to South America.

Europe

In addition to working South Americans, Europeans (especially in the Mediterranean countries) continued to make almost daily runs into southern Africa during September. Among the more interesting calls that went into European logs were 3C5I, A25/ZS6BTE (Botswana), C91RF (Mozambique), FR5DN (Reunion Island), Z23JOR (Zimbabwe), and ZD8VHF (Ascension Island)

Pacific

Early in the month, KV6J/KH6 worked 3D2TC (Fiji) and YJ8UU (Tonga), and heard VK8 and V7 beacons. V73AT reported NH6YK and KH6HI/b on September 12, about the same time K6QXY was running ZL stations. Japanese stations reported 9M6BG (Malaysia) and YC1MH (Indonesia) among their interesting catches for September.

Microwave Briefs

Paul Wilson, W4HHK, celebrated his 75th birthday on September 4 by working his son Steve, N4HHK on 24 GHz CW. The pair spanned 2.6 km across the Tennessee River in EM65. Steve had 50 mW output and Paul 100 mW; both used 12-inch dishes. This was Paul's first 24 GHz—best wishes for many more, Paul.

Ivo Chladek, ZS6AXT, made an EME QSO with OE9ERC on the 5.6 GHz band on September 25 and exchanged 559/549 signal reports. This was probably the first contact between Europe and Africa on that band, and certainly the first EME contact.

The 47 GHz distance record in the United Kingdom was extended to 161 km on September 12, during the third UK 24/47 GHz Contest, according to the September *Microwave Newsletter*. G7MRF and G8VZT set up stations on the summit of Cyrn y Brain in Wales, while G0HNW operated from Shap in Cumbria, in the north of England. G7MRF used a barefoot DB6NT transverter, 25 mW, and a 10-inch dish and believes this is about the limit for his station. In comparison, the North American 47 GHz record stands at 110 km and a group of French operators hold the world record of 193 km.

VHF/UHF/MICROWAVE NEWS

144 MHz DXCC Progress

Just nine stations world wide had earned a coveted 144 MHz DXCC certificate by July 1996 (see the listing in the June 1997 column). There was a hiatus of nearly three years until DL5MAE was awarded the tenth certificate this past June. Since then, PA0JMV (featured in last month's column) and Lance Collister, W7GJ, have tallied 100 countries and can be expected to join this elite group, once their applications have been processed. Lance worked TK5EP for his hundredth country in July and since added OM3RM and 3B8/PA3EPD (at 16,849 km, Lance's longest DX). Congratulations to all.

Thanks for All the Reports

Over the past several years, quite a number of readers have sent regular activity reports. These are much appreciated. All reports make important contributions to the monthly summaries, even if it is not always possible to mention everyone by name in each column. Among those who deserve special recognition are K1TOL, KB1DSG, W1LP, W1REZ, WA1OUB, WA1T, WA2FGK, WB2AMU, W3BO, AB4CR, K4QI, K4SUS, W4HHK, W4UDH, WA4LOX, WB4GCS, WB4WXE, K5IUA, K5SW, KI5GF, W5HUQ, W5LUA, W5UWB, W5ZN, WA5IYX, WA5QCP, K6QXY, N6CA, N6XQ, K7ICW, K7JA, W7GJ, W7XU, N8ZJN, W8RU, W8WN, N9BJG, KA9CFD, K0FF, K0MQS, KW0A, N0KQY, N0LL, N0JK, W0MTK, W0OHU, as well as CT3FT, G3FPK, G4UPS, JA1VOK, LU6DRV, LW5EJU, VE2PEP, VE9AA, VK5LP, and WP4O. Many thanks to you and everyone else who has helped make The "World Above 50 MHz" a success. QST

Prepared by **John C. Hennessee, N1KB** • Regulatory Information Specialist

How Are You Controlling Your Repeater?

Since 2-meters is the most popular amateur band, it isn't surprising that ARRL staff, directors and officers are often asked questions relating to the control and operation of repeaters. Many popular multiband VHF/UHF transceivers have the capability to operate as crossband repeaters. The rules for control and operation of repeaters are somewhat complex and sometimes misunderstood.

Q: How does the FCC define a repeater station?

A: A repeater station is defined by the FCC as "an amateur station that simultaneously retransmits the transmission of another amateur station on a different channel or channels [97.3(a)]." Only repeaters, some types of auxiliary stations, and space stations may automatically retransmit the radio signals of other amateur stations [97.113(f)]. A repeater normally consists of a receiver, a transmitter, an antenna, and a repeater controller (which controls the retransmission and various other functions). Many repeaters also use a duplexer that allows the use of a single antenna for simultaneous transmitting and receiving.

Q: What are the different types of control and how do they relate to the operation of repeaters?

A: Any station may be operated under *local* or *remote control* [97.109(b), (c)]. Only certain types of stations may be operated under *automatic control*, including repeaters [97.109(d)].

Q: What is local control?

A: Local control is used when the control operator is physically located at the repeater site and is actually monitoring and controlling the repeater's operation whenever it's on. This is the simplest form of control, and is typical where the repeater is located at the licensee's home or place of business. Local control is defined by the FCC as "the use of a control operator who directly manipulates the operating adjustments in the station to achieve compliance with FCC rules." It's not always practical for the repeater licensee to be at the control point of the repeater or other amateur station 100% of the time, so the FCC allows other types of control.

Q: How can repeaters operate under remote control?

A: Remote control (also known as"telecommand"), is used when the repeater is located away from the licensee, such as on a tall building, a tower or a mountain. The FCC defines it as "the use of a control operator who indirectly manipulates the operating adjustments in the station through a control link to achieve compliance with the FCC Rules [97.3(a)]." Under remote control, the licensee has implemented a means by which the repeater's control operator(s) can monitor and control its operation by some form of control link from one or more distant locations. They have been given access to the remote control system, and also been given the "secret" codes used to control the repeater's various functions.

Another FCC definition applies in remote control situations. Telecommand is defined by the FCC as "a one-way transmission to initiate, modify or terminate functions of a device at a distance [97.3(a)]." Remote control (telecommand) links can take any of three basic types:

(1) *A dedicated wireline from the remote control point(s) to the repeater site.* It is expensive to have a wireline link from one specific location to another, but it is very secure!

(2) *A nonpublished telephone line into the repeater site.* "Wrong numbers" can sometimes cause problems for the controller, however.

Note that in both cases above, the control link must be available 100% of the time! Therefore, a telephone control line can not also be used for an autopatch. This is because if the autopatch is in use, the telephone line is busy; in which case the control operator could not gain access to the repeater's control system if needed.

(3) *A radio control link using auxiliary stations, operated by designated control operators and transmitting on authorized auxiliary frequencies above 222.15 MHz.* As in the cases above, this control link must be available to the control operator(s) 100% of the time, so it cannot be used for any other purpose. The frequency and control codes should not be published and should be known only by the licensee and control operators. Only the area frequency coordinator should know the frequency.

Q: Aren't repeaters required to have a three minute time-out timer in the event of a repeater malfunction?

A: Yes, and that's where telecommand applies to remote control of a repeater.

The rules contain several requirements for remote control and telecommand operation:

(1) Provisions must be incorporated to limit transmissions to no more than three minutes if the control link fails. The three minute timer shuts off the repeater in the event of a malfunction to prevent possible damage to the transmitter and possible interference [97.213(b)].

(2) Safeguards must be in place to protect the station from unauthorized transmissions, whether deliberate or accidental. Some remote station licensees incorporate the use of DTMF tones or CTCSS systems to limit access to the control system to only those people who know the codes. You, as the licensee, are responsible for all transmissions from your remote station, just as you are responsible for your home station [97.213(c)].

(3) A photocopy of the station license and a label with the name, address, and telephone number of the station licensee and at least one designated control operator must be posted in a conspicuous place at the repeater station location [97.213(d)].

(4) Control (or telecommand) links may be wire (a telephone or fiber optic line, for example) or radio. The FCC says that if a radio link is used, the station where the control commands are performed is an auxiliary station [97.213(a)] and an auxiliary station is "an amateur station transmitting communications point-to-point within a system of cooperating amateur stations" [97.3(a)]. All auxiliary operations must be conducted on appropriate frequencies above 222.15 MHz.

Q: What is automatic control and does it mean that no repeater control operator is necessary?

A: Not entirely. Automatic control is used when no control operator is available to "babysit" the repeater. It is defined by the FCC as "the use of devices and procedures for control of a station when it is transmitting so that compliance with the FCC Rules is achieved without the control operator being present at a control point. [97.3(a)]." Repeaters must have a control link which allows the repeater to be disabled by remote control if necessary. Note that such a controller cannot detect and correct improper use of the repeater. *Although no control operator is required to be present at a control point while the repeater is operating under automatic control, it is still the station licensee's responsibility to see*

that the repeater operates properly at all times [97.103(a)].

Q: How can I make my station into a crossband repeater?

A: Modern dualband or triband VHF/UHF rigs often have the capability of crossband operation. When operating in this mode, the users may call them "crossband repeaters." Actually they are often "remote bases," such as when they are used to allow an operator with a hand-held radio to access a repeater from a location where he or she would normally not be able to do so.

A "crossband repeater" (or "portable remote base") operation is okay as long as several conditions are met:

(1) The user communicates with his crossband rig via the UHF side. Since this serves as the control and voice uplink, it is a form of auxiliary operation and must be conducted on authorized auxiliary frequencies above 222.15 MHz. Since the operator is the control operator, that person must actually be able to control the station! That person must be able to turn it off locally or remotely if a problem develops. If it can't be controlled, it's not legal [97.7, 97.201, 97.213]!

(2) If the control link fails, the remote station must shut down within three minutes, which means a 3-minute timer is required [97.213].

(3) The unattended station must be identified on *all* frequencies on which it transmits. Since this is a type of remote base, the users who identify over the UHF uplink to the dualband radio also serve to identify the VHF output of the mobile rig. In the other direction, however, there is no way for the control operator to identify the UHF downlink from the mobile remote base, so some form of automatic identification must be employed [97.119]. Unfortunately, few manufacturers include the capabilities listed above in their rigs. Hence, to be fully legal, some form of add-on controller may be necessary.

Another use for crossband operation is to link together two existing repeaters on different bands, usually done on a temporary basis during an emergency, a drill or a special event. The rules above apply.

In both examples cited above, the control requirement can be satisfied by having a control operator at the station, thus making it a locally controlled station. Although this may not always be convenient, it is a way to satisfy all of the station control requirements.

Q: Should I contact my frequency coordinator even if my crossband repeater is temporary?

A: Yes, because you might be transmitting on a repeater input (or a link or control frequency for some unknown repeater) and you could unknowingly cause interference. Contact your local frequency coordinator for a recommendation as to what frequencies to use. Many coordinators have set aside frequency pairs that are designated specifically for temporary, portable or emergency repeaters. For the name and address of your frequency coordinator, see the latest edition of *The ARRL Repeater Directory* or check the listing on the ARRL Web page at: **http://www.arrl.org/field/regulations/freqcoord.html**.

Q: What are ancillary functions?

A: They are user functions. The FCC makes a distinction between functions which the repeater users can perform on the repeater input (activating a crossband link, getting a weather or time-of-day report, or making a phone call via the autopatch, for example), and those primary control functions reserved exclusively for the control operators in effecting basic control of the station. The rules state that "*ancillary* (which also means "secondary") *functions"* of a repeater that are available to users on the input channel are not considered remotely controlled functions of the station" [97.205(e)]. These "user" functions are conducted on the repeater's input frequency. However, the *primary control functions* (turning the repeater on or off, for example) must be performed via the repeater's primary control system which is separate from the input frequency. By the way, there is nothing to prevent implementing some form of "emergency backup" means to shut down a repeater via its regular input frequency, as long as the turn-on function can only be performed via the primary control system.

Q: Are "closed" repeaters legal?

A: Yes. The FCC even says so in Part 97 in stating "…Limiting the use of a repeater to only certain users is permissible" [97.205(e)]. Just because a repeater may use some form of coded access, such as CTCSS, does not necessarily mean that it is a "closed" repeater. Many "open" repeaters employ coded access to eliminate or reduce various types of interference, *not* to restrict who is welcome to use the machine.

Also, there is no FCC rule that requires a repeater's licensee or sponsor to build a repeater or allow use by other operators. A repeater is *not* a public utility-you don't have a "right" to use it. If you use that station in a manner that the owner finds objectionable, for whatever reason, that person has every right to revoke your privilege of using it!

Q: What other Part 97 rules concerning repeaters should I be aware of?

A: Amateurs should know that:

(1) Novices can't operate as repeater stations [97.205(a)].

(2) Repeaters may operate on any frequency authorized to the Amateur Radio Service above 29.5 MHz except for 50.0 - 51.0, 144.0 – 144.5, 145.5 – 146.0, 222.0 - 222.15, 431 – 433 and 435 – 438 MHz [97.205(b)]. Note that these frequencies include *both* the input *and* output frequencies of all repeaters [97.205(b)].

(3) Two repeater licensees must work together to solve an interference problem between the repeaters, unless one repeater is coordinated and the other is not. The licensee of an uncoordinated repeater bears the primary responsibility for solving an interference problem. This is the FCC's way of recognizing and encouraging repeater sponsors' participation in local or regional frequency coordination programs [97.205(c)].

(4) If the control operator is someone other than the licensee, *both* are equally responsible for the proper operation of the station [97.103(a)].

(5) The licensee and control operator(s) of a repeater that inadvertently retransmits communications that violate the rules in Part 97 are not normally held accountable for the violative communications [97.205(g)]. However, they will be held accountable if they become aware of the illegal communications and allow them to continue, because they are no longer "inadvertent." They must make an effort to prevent such communications from continuing.

Q: Are the rules for simplex repeaters the same as duplex repeaters?

A: A "simplex repeater" is *not* a repeater according to the FCC. It does not *simultaneously* retransmit the signals of another station and it might not retransmit the signals on a *different* channel or channels, as specified in the FCC's definition of a repeater. Since it isn't a repeater, such a device *cannot* be operated under automatic control. If a control operator is present and controlling the device, either by local or remote control, then it can be used, but it cannot be left unattended! On the other hand, it is not limited by the other repeater rules, such as specific repeater frequency limitations. Auxiliary stations must control the simplex repeater and control must be conducted on frequencies authorized for auxiliary operation (above 222.15 MHz, except 431 to 433 and 435 to 438 MHz).

Special thanks to Gary Hendrickson, W3DTN, chairman of the Mid-Atlantic Repeater Council's Open Band Planning Committee, for his assistance with this column. As the TMARC coordinator for 25 years, Gary is a recognized expert in the field of repeater coordination and complex repeater operations. QST

Strays

RADIO REUNION

◊ A group of World War II Merchant Marine radio operators are holding their ninth annual reunion in May 2000 in San Diego, California. The group, composed of men who trained on Hoffman Island, New York in 1944-45, is named "The Hoffman Island Radio Association." Call Bill Yerger at 607-776-4965 for information or visit their Web page at **http://www.usmm.org/hoffman.html**.

Next Stray

Phase 3D is *Go* for Launch!

The news everyone was waiting for was announced last October at the 17th AMSAT-NA Space Symposium and Annual Meeting in San Diego: the Phase 3D "supersat" finally has a ticket to ride (to borrow a phrase from the Beatles). It will be soaring into orbit aboard an Ariane 5 rocket sometime next year. (See the full story in "Happenings" in this issue.) I'm optimistically betting that we'll have Phase 3D in orbit before Field Day 2000.

The satellite itself is good to go. It passed all of its thermal, vacuum and vibration tests marvelously. By the time you read this column, the Phase 3D teams will be decommissioning the Orlando integration facility and packaging the bird to travel to the ESA launch site in Guyana to await its journey.

I've had my 2.4 GHz dish and downconverter in mothballs at my station for nearly a year. Within a few months I'll have to drag it out, dust it off and make sure it is still working up to par. You might also consider a little pre-launch planning. This is a good time to begin sorting out your options and examining your Phase 3D hardware budget. Will you buy new equipment? Used? Start doing a little Phase 3D daydreaming now!



It's official. Phase 3D is scheduled to ride into space aboard an Ariane 5 rocket sometime next year.

On the Go in San Diego

The Phase 3D announcement almost stole the show in San Diego, but it wasn't the only point of interest. More than 200 people showed up at the Hanalei Hotel to take in the forums and camaraderie.

The Friday beginner's forum drew 40 satellite neophytes. The Saturday workshops were well-attended and nearly 180 satellite enthusiasts packed the Saturday evening banquet. Quite a few remained on Sunday for the tour of the Qualcomm facility.

According to early reports, the 2000 AMSAT-NA gathering will be held in Portland, Maine. With luck Phase 3D will be up and operating by then, providing plenty of conversation fodder for the meeting. The timing couldn't be better.

Thanks to Art Goddard, W6XD; Fried Heyn, WA6WZO; and Duane Naugle, KO6BT for their assistance in the preparation of this report.

THREE NEW SATELLITES BY CHRISTMAS?

Keep your ears to the airwaves. In late November or early December the Air Force is scheduled to launch a rocket from Vandenberg that will carry several satellites to orbit. Among these will be at least three new birds with Amateur Radio capability.

JAWSAT is a satellite/spaceframe combo developed by Weber State University. Once in orbit, JAWSAT will deploy four satellites. After the satellites are jettisoned, JAWSAT will remain in orbit to carry out research. It will provide a 2-meter/70-cm FM repeater and packet store-and-forward functions.

ASUSat-1 will be part of the satellite group deployed by JAWSAT. It is a 13-pound *nanosat* designed, built, tested and operated by students at Arizona State University. In addition to its science experiments, ASUSat-1 will feature some packet hardware and a 2-meter/70-cm FM voice repeater.

Also part of the JAWSAT "flock" will be OPAL—the Orbiting Picosat Automatic Launcher developed by Stanford University. Once it is clear of JAWSAT, OPAL will release up to three tiny *picosats*, each about the size of a paperback book. One of these picosats will be StenSat, the FM repeater satellite we discussed in this column last June.

FM repeater satellites have been very popular among new satellite operators. (Listen to an OSCAR 27 weekend pass.) If all goes as planned—never a sure bet in the space game—we will have three more birds with FM repeater capability. Now amateurs will have even more exciting uses for their dual-band FM rigs and H-Ts!

Digital Dimension

Stan Horzepa, WA1LOU*

Something New

I'm sitting in the Phoenix airport writing this column as I wait for the flight to take me home after attending the 18th ARRL and TAPR Digital Communications Conference (DCC). Throughout the weekend, folks outside the conference were celebrating something new. Their relatively new (2-year-old) baseball team, the Diamondbacks, clinched the National League Western Division championship. By the time you read this, the team's fate in the playoffs will be *fait accompli*, but as I write this, the team and its fans are optimistic regarding their chances.

Similar optimism was felt at the DCC. Throughout the weekend we heard about wonderful new things that are occurring in the amateur wireless digital dimension, and we all felt reinvigorated about the future of our service.

If you ever have any doubts about our future, you should attend a DCC. It's like Dayton on wheels—this year Phoenix, next year, Orlando—where the digital wing of the Ham Radio Nation eyeballs itself and discusses what's new and what they plan to do before the next eyeball session…and beyond.

Rich Moseson, W2VU, chairman of the ARRL Amateur Radio Technology Working Group, seemed to set the tone for the conference when he talked about the Group's goal to formulate a list of new goals for amateur wireless in the new century. The Group is accepting input from all hams with ideas and proposals for new technology and they will formulate their list from the best of your ideas. If you have some new ideas, send them via e-mail to **ttfinput @arrl.org**, via mail c/o Ed Hare, W1RFI, 225 Main St, Newington, CT 06111; or complete a form online at **http://www.arrl .org/news/ttf/**.

This is not a closed system. Your ideas are sought. (See the announcement in your November *QST*.) There may not be a repeater on Mars in 2001, but maybe later in the 21st century.

So, What *Is* New?

On the hardware side, Kenwood stole the show with a prototype of a dual-band mobile transceiver with built-in APRS functionality similar to its TH-D7 handheld. Unlike the TH-D7, the mobile radio supports digipeating (including the TRACEn-n and WIDEn-n protocols) and has a larger display for monitoring received packets. (See KB0THN's photo of the prototype at **http://www.jarviscomputer.com/jim/phoenix/MVC-155L.JPG**.)



Steve Bible, N7HPR (left) and Bob McGwier, N4HY (right), share a light moment at the Digital Communications Conference.

PHIL KARN, KA9Q



A prototype *vocoder* designed by Charles Brain, G4GUO.

Chuck Brain, G4GUO, showed a board he developed for digitally transceiving voice using the DVSINC AMBE1000+ speech *vocoder* (voice encoder) chip. His tests on HF have been promising and the board may be available stateside in the near future. For more, go to **http://www.chbrain.dircon .co.uk/dvhf.html**.

On the software side, Bob McGwier, N4HY, demonstrated his latest software wizardry: an HF modem based on Federal Standard 1052 (formerly, Military Standard 18-110A). The software runs under *Linux* with a sound card for computer I/O. It uses channel equalization to overcome the vagaries of HF propagation. Bob's demonstration was impressive, as the software pulled intelligent data out of what was only noise to the human ear.

As at past DCCs, new and improved versions of *APRS* were introduced. Rob Wittner, KZ5RW, showed *APRS/CE* for handheld computers running the *Windows CE* operating system. This version uses *Mac/Win/pocketAPRS* maps, so Rob does not have to completely reinvent that part of the wheel. *APRS/CE* should be ready by year's end.

Speaking of *pocketAPRS*, Mike Musick, N0QBF, announced that version 1.0 of *APRS* for the 3Com Palm III PDA would be released in conjunction with the DCC. Check out the *pocketAPRS* Web site at **http://www.pocketaprs.com/**.

Brent Hildebrand, KH2Z, demonstrated a new version of *APRS+SA*, which allows you to create custom maps and map overlays and supports the use of tactical call signs. Go to **http://www.tapr.org/~kh2z /aprsplus/** for more information.

Keith Sproul, WU2Z, announced that *XAPRS*, the *Linux* version of APRS, is getting closer to release and the beta is now available for the Red Hat version of *Linux* at **ftp://aprs.rutgers.edu/pub/hamradio/APRS/Xaprs/**. Keith and his brother Mark, KB2ICI, have also added support for National Weather System severe weather alerts in their new releases of *MacAPRS* and *WinAPRS* (available at **ftp://aprs.rutgers .edu/pub/hamradio/APRS/MacAPRS/** and **ftp://aprs.rutgers.edu/pub/hamradio /APRS/WinAPRS/**, respectively.

Another APRS news item is that the APRS Working Group released the preliminary draft of the APRS specification (on-the-air protocol). It is available for comment at **http://www.tapr.org**.

Audio from the DCC presentations may be heard at **http://www.tapr.org** and a printed copy of the DCC papers is available from the ARRL.

Dewayne Hendricks, WA8DZP, talked about ultra-wide-band (UWB) communications and its potential future role in Amateur Radio. Last year, the FCC started a Notice of Inquiry on UWB, which is a new means of sharing radio spectrum by large numbers of users.

See You Next Year!

It's that time of year again and the WA1LOU family (XYL Laurie, harmonic Hayley, faithful companion Q-T Pie, and OM Stan) extends holiday greetings to all Digital Dimension readers! QST

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The ARRL Web Extra for Members Only
http://www.arrl.org/members

YL News

Edited by **Diane P. Ortiz, K2DO***

Looking Back

This is the last YL column before the year 2000. By the time you read this,"millennium fever" will be in full swing. Most publications have done articles summarizing the past and speculating about what the future will bring. The October issue of *National Geographic* had a special section titled "Millennium Moments" listing scientific milestones from 1400 AD to the present. Two names familiar to the ham community were listed: Volta, who invented the electric battery and Faraday, who in 1831 demonstrated electromagnetic induction. In the 1900-to-present listing, however, there is no mention of the scientific accomplishments of women…an oversight I will have to bring to their attention!

Many YL clubs have jumped on the "Y2K/millennium fever" bandwagon as a way to publicize the emergency communications and public service aspects of ham radio. LARA, the Ladies' Amateur Radio Association of Orange County, California recently had a meeting program on the topic "Tips and Tricks for Solving Y2K". LARA and the Young Ladies Radio Club of Los Angeles cohosted the YLRL Convention in Long Beach, California last summer where many of the YLs discussed their plans for the millennium. The next YLRL convention will be in Cleveland, Ohio in 2001.

Gazing into the Crystal Ball

What will ham radio be like in 2000 and beyond? Will you be able to take your FCC license exam from the comfort of your own home via the Internet? Perhaps. There may even be a universal 90-foot unrestricted tower-height law on the books in every state! Also on the wish list would be legal requirements for the manufacture of "bullet-proof" telephones and other electronic devices that would not be affected by RFI.

All things are possible, and taking a step toward increasing awareness of the technological aspects of the hobby is one way to get started. A group of enterprising clubs in the northeastern US is sponsoring "Ham Radio University 2000" January 23 at the Babylon Town Hall Annex in North Babylon, New York. There will be technical forums on antenna/station design, QRP (low power) operation, APRS (automated position reporting system), contesting, ARES (Amateur Radio Emergency Service), YL issues and more (see **http://www.arrlhudson.org/nli/hru2000.htm** for a full list). The purpose of this event is to expose local hams and nonhams to the many different facets of our hobby. An auditorium will be set up with tables for the ham radio clubs and organizations to showcase their accomplishments and activities.



Kelley's Island, a jewel in set in the waters of Lake Erie off the Marblehead Peninsula.



The Buckeye Belles begin raising antennas on Kelley's Island to begin their mini-DXpedition.

Will there ever be a time when YL hams outnumber OMs? It could happen if every elementary or high school had an "Introduction to Ham Radio" course in its curriculum. Fred Usherson, N2EGQ, a teacher at the Queens Vocational Technical School in Long Island City, New York already has had a very successful first year running just such a program. His students, many of them young women, have put together a UHF repeater system, learned about the principles of radio and educated their parents, the school and local community of the value of Amateur Radio. In another area of New York City, Carole Perry, WB2MGP, has had a Novice course as part of the curriculum of her elementary school in Staten Island for many years. Carole also runs the Youth Forum at the Dayton Hamvention where young hams from all over the country get a chance to "strut their stuff."

Advancements in technology in this century have influenced every aspect of ham radio. There are still those who use a straight key, but many more send CW via a computer keyboard. At VHF/UHF the popular "mini" handi-talkies that fit in a pocket or purse are everywhere, and at Field Day events across the country many clubs have satellite stations. Most radio clubs and organizations have a presence on the Web—including many YL clubs around the world.

Mini DXpedition

No matter what the future holds, the simple pleasures of camping on a remote island using a 20-W QRP rig with a G5RV antenna in the trees is still an attraction for many YLs. Since 1996 a group from the Buckeye Belles, a YL club in Ohio has been going to Kelley's Island in Lake Erie for a few days of relaxation, camaraderie and ham radio. It started out when then-president Terri, WD8LQH and Nancy, KC4IYD, were trying to find an activity that they could do together. Kelley's Island, off the Marblehead Peninsula, with its glacial striations, stands of red cedar and underground caverns, fit the bill.

For this year's YL mini-DXpedition, September 10-12, they had two stations operating: a QRP station using a TAC-1 to a 40-meter tree-mounted groundplane antenna, and a Yaesu FT-757GX transceiver using an 80-meter halfwave dipole. Jean, KB8YHN, and other YLs who participated said they had a great time.

In the world of science, as well as Amateur Radio, women have contributed significantly to the advances made in this century. If we want to make sure that the number of female Amateur Radio operators increases in the next century, we must continue to encourage women of all ages to participate in both the technological and public service sides of the hobby. This will benefit the young women of today who enter the sciences…and maybe it will be a YL ham that wins the Nobel Prize in the next century.—*33 and Happy Holidays, Diane, K2DO*

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Strays

AM STEREO REFLECTOR

◊ There is now an e-mail list for fans of AM Stereo, and for those wanting to learn more about AM Stereo. To join simply get on the Web and go to: **http://amstereo.listbot.com**.

Next Stray

Silent Keys

By Kathy Capodicasa, N1GZO

It is with deep regret that we record the passing of these amateurs:

AA1HF, Richard J. Donahue, Tewksbury,MA
W1JD, Donald S. Winslow, Poland, ME
KB1NM, Richard E. Prospere, Canterbury, NH
*W1RWK, Joseph B. Matczak, Bloomfield, CT
*W2EEQ, J. R. Snedeker, Wappingers Falls, NY
W2HLY, Edward F. Reuther, Mauldin, SC
W2JOF, Harry R. Webb, Port Richey,FL
WB2LKP, Warren O. Nilsson, Red Bank, NJ
K2LM, Leroy H. Reeves, Queensbury, NY
N2MXG, John McMullin, Prescott, AZ
KF2NL, William R. Bedette, Clifton Springs, NY
K2ORS, Jean P. Shepherd, Sanibel, FL
KB2YAL, James E. Reinhardt, Amherst, NY
W3FOG, Austin K. Gutman, Wyncote, PA
KB3GW, William M. Montgomery, Las Craces, NM
W3GZT, Everett C. Waltman, Harrisburg, PA
*WA3IYA, Elbert R. Moses, Prescott, AZ
WB3M, James W. Lundberg, Mc Keesport, PA
W3SLD, J. H. Steinert, Sonora, CA
W3TD, P. W. Redcay, Bethesda, MD
WA3WJF, John B. Clutter, Prosperity, PA
KP4DJ, William Werner, Rio Piedras, PR
KF4EQF, Jonathan L. Lara, Piedmont, SC
N4EZU, William N. Lamb, Mary Esther, FL
W4FLW, Harry T. Chandler, Dresden, TN
KB4KLZ, Aaron H. Jackson, Angier, NC
KK4MJ, C. W. Redstone, Vero Beach, FL
NR4N, John S. Thomas, Stone Mountain, GA
KF4QEM, James P. McSweeney, Greensboro, NC
*W4UIO, R. W. Ingraham, Jonesborough, TN
WA4UQC, Calvin M. Dempsey, Wilson, NC
KA4UST, Joseph Williams, Dale City, VA
W4YIN, Otis K. Wolfe, Rose Hill, VA
KB5CAY, Ernest Steve, Austin, TX
KD5HN, Gordon L. Nelson, Alamogordo, NM
K5HQP, Marvin E. White, Oklahoma City, OK
W5MQT, Harry Mason, Albuquerque, NM
KA5OZE, Doyle L. Nichols, Houston, TX
K5RKL, Charlie Meyer, Clovis, NM
W5TLC, J. L. Whitfield, Casa, AR
W6AD, Ozzie Jaeger, Nixa, MO
*WA6AHF, Rubin L. Hughes, San Lorenzo, CA
KA6AHY, John W. Green, Tucson, AZ
W6BK, Ken E. Anthony, Fremont, CA
KE6BL, William Maron, Santa Clara, CA
KB6BXT, Lisa K. Hill-Schlonsky, Newhall, CA
KA6CIE, Roger A. Meng, Ridgecrest, CA
WD6CKP, Henry R. Bravin, Santa Rosa, CA
WH6CU, John M. Roper, Murfreesboro, TN
*W6ET, Richard N. Reimer, Los Angeles, CA
WD6EWP, Donald F. Westcott, Bakersfield, CA
N6FIG, Noble A. Fletcher, Cedar City, UT
*W6GBG, Charles H. Jackson, Greece
W6GIP, Russell Mc Cabe, Napa, CA
KV6G, Richard L. Rheinschild, Crescent City, CA
WD6GLQ, Donald E. Haffner, Eureka, CA
*WA6HET, George E. Roush, Saratoga, CA
WA6HWY, Thomas B. Downing, Newport Beach, CA
K6IMV, William N. Parkinson, Concord, CA
*W6IWS, Albert B. Steffens, Ben Lomond, CA
‡KH6JAW, Maynard V. Friend, Pahoa, HI
WA6JCF, Wilbur F. Grover, Atlantic, IA
W6JCG, Bill Perac, Willits, CA
W6JHJ, Robert R. Reiling, Mountain View, CA
W6KHM, Mildred M. Stine, Millbrae, CA
WA6KUA, John R. Killman, La Crescenta, CA
KB6KVI, Harry V. Strunk, Vallejo, CA
KE6LTV, Ned L. McMurry, San Bernardino, CA
KC6LVT, Tesibel E. Frey, Manteca, CA
K6MUP, Robert S. Hopkins, Sebastopol, CA
KA6NQJ, Jack D. Whittock, Benicia, CA
W6OK, George Torricelli, South Pasadena, CA
KB6ONI, Kathleen Willfong, Lodi, CA
KE6PEP, John P. Davis, San Luis Obispo, CA
W6PM, Rolf Lindenhayn, Forestville, CA
W6PXA, James M. Abbett, Paso Robles, CA
W6RAY, George E. Palmer, Pahrump, NV
WB6RHV, Jack W. Martens, San Francisco, CA
KC6SNR, Jack L. Hornback, Paradise, CA
AA6SX, Naola Van Orden, Sutter Creek, CA
K6TST, Earle K. Snider, Oakland, CA
W6TXJ, W. L. Sulzner, Santa Cruz, CA
KD6UQV, Gordon J. Dallas, Kernville, CA
KE6VCY, Leslie M. Scofield, Chico, CA
W6VFB, Frank A. Harrison, Victorville, CA
KA6VXI, Jerry Burens, Bakersfield, CA
WA6YOV, Dean E. Litts, Watsonville, CA
WA6Y, Jim Luxenberg, Millbrae, CA
KB6ZO, James L. Moody, Arnold, CA
KL7AMH, John B. Griffin, Everett Wa, WA
KD7BNI, Charles G. Stone, Fernley, NV
*W7BIF, Oscar A. Heinlein, Arlington, VA
NF7F, Donald E. Meyer, Arizona City, AZ
W7JOS, Charles B. Newcombe, Carson City, NV
W7MMW, Barkley V. Poorman, Oak Harbor, WA
K7NIJ, Eugene F. Aber, Idaho Falls, ID
WB7NNN, Victor J. Leonard, Eckert, CO
WA7PRD, Percy C. Kassner, Glendive, MT
WB7RFL, Thomas J. Buckner, Kent, WA
*N7RH, Richard H. Warren, Sparks, NV
W7YX, John C. Field, Frankfort, IN
WD8BZD, Don M. Ringler, St. Charles, IL
KB8CBV, Arthur J. Frei, West Milton, OH
N8CEX, Sylvan Rapaport, Huntington Woods, MI
KC8CSB, Andrew R. Sossa, Euclid, OH
K8CTI, Bernard Bacca, Centerville, OH
W8DHF, Gordon D. Stewart, Brunswick, OH
W8DHJ, David L. Marquette, Dayton, OH
N8FIZ, James C. Milgie, Bloomfield Hills, MI
W8HPD, Vincent P. Lutz, Medina, OH
W8HRL, William C. Kasson, Flushing, MI
W8LJU, John C. Biss, Brecksville, OH
W8MXM, Kenneth H. Good, Greenville, OH
W8VQI, Herman Freeder, Akron, OH
*WB9DFD, Laurence E. Vrooman, Muncie, IN
KV9G, Ernest L. Kaiser, Bethesda, MD
WA9HNA, Robert E. Mazur, Ottawa, IL
W9IVQ, Arthur W. Bradley, Indianapolis, IN
W9JIN, Arthur G. Olds, Auburn, IN
KA9JRU, Edward C. Morgan, Deer Park, TX
W9KH, Kenneth R. Hines, Hammond, IN
W9PEP, Roland A. Mitchell, Fort Wayne, IN
W9ROK, Ronald W. Asbill, Minier, IL
KB9UEE, Paul S. Schlachter, Fairview Heights, IL
KB9ZS, Robert E. Hill, Muncie, IN
W0AKL, Aubrey Keel, Kansas City, MO
W0FNO, Norman L. Le Blond, Leawood, KS
K0GUM, Carl H. Stamps, Platte City, MO
*W0MLY, George R. Mc Kercher, Rippey, IA
NU0M, Ronald Biorn, Zumbrota, MN
WB0WEC, Philip J. Wadas, Fort Collins, CO
*AJ0X, Joseph T. Wood, Laurel, MS
KB0ZX, Jack R. Owen, Hugo, CO
VE2LI, E. G. Elliott, Montreal, QC, Canada
VE7JK, John H. Brown, Blaine, WA
G3FKM, John Allaway, Birmingham, Great Britain

*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

75, 50 and 25 Years Ago

December 1924

◊ Clyde Darr, 8ZZ, provides cover art showing a prosperous gentleman with a copy of *QST* in his pocket as he shops for parts and books in a radio store. The editorial reports on the recent Washington Radio Conference, which "went on record as favoring the discontinuance of the amateur spark." The editorial goes on to urge the small number of spark amateurs remaining to close their spark stations voluntarily, before regulations force them to do so.

"Superheterodyne Transformers" discusses the attributes of the transformers used in intermediate-frequency amplifiers. "Antipodes Linked by Amateur Radio" reports that the New Zealand superstation z4AA has worked g2SZ and g2NM, with the 11,900-mile contact shattering all DX records. The article reports on other long-haul DX work, and shows the station of 6BCP, the first American ham to work New Zealand (z4AA). An article on "The Third National Radio Conference" reports that the "amateur bands [are] definitely confirmed, with some extensions and slight shifting." The new amateur allocations include bands from 150 to 200 meters to 4.7 to 5.3 meters.

"A New Hornless Loud Speaker" reports on a new loudspeaker concept that does not require a horn. F. Dawson Bliley, 8GU, describes "A Short Wave Wavemeter," which will help the ham ensure that he is operating at the correct wavelength. The "Amateur Radio Stations" column looks to the Southeast, describing the stations of 4IO in Atlanta, Georgia, and 4UA in Dundee, Florida.

December 1949

◊ The cover photo shows a Christmas gingerbread house—but wait! This one has a teeny beam on the roof and open-wire line coming in the "shack" window. The editorial discusses the recent informal conference of the FCC and amateurs, noting, with pride, the unity presented to the FCC by amateurs in the discussion of new amateur rules.

Walter Mayer, W8CVU, tells about using the new "Miniature Tubes in a Bandswitching Exciter." Because so many hams use wooden structures and homebrew wooden towers to support their antennas, Jay Antenen (an appropriate name for the subject at hand), W8SDQ, relates "Lumber Facts and Figures," telling how to get the most for your money at the lumber yard. To help the many hams who are still grappling with TVI problems, Mack Seybold, W2RYI, discusses "The Design of Low-Pass Filters" for HF operation. John Oberlies, W2NNK, describes "Installing a Practical 75-Meter Mobile Antenna" that uses a base-loading coil and variable capacitor to tune it to frequency.

"Happenings of the Month" presents details of the recent FCC meeting that was reported in the editorial. Robert Goshorn, W8DEU, tells about "A 53-foot Rotating Antenna Mast" that he built for less than $30 to support his 10-meter beam. "49 'FD' Tops Them All" reports that this year's Field Day was a huge success, with 495 portable stations and 4942 hams participating.

December 1974

◊ The cover photo shows a Christmas motif, with the words "Season's Greetings" spelled out using electronic components. The editorial, "Conference Preparations," tells of the work involved in preparing for the 1979 World Administrative Radio Conference.

Walt Maxwell, W2DU/W8KHK, takes "Another Look at Reflections, Part VI." Barry Boothe, W9UCW, tells about "The Minooka Special," a loaded antenna for use on 160 through 20 meters, with the emphasis on 160-meter performance. A version of the antenna for mobile use is also discussed. After his crank-up tower was badly bent by high winds, Julius Bernstein, W2EV, developed "The Tower-Guard System" to measure the wind speed and automatically lower the tower when it exceeds 35 mph. John Siau, WB2APU, discusses "A One-KW Linear Amplifier Using Four 811As." Joseph Reisert, W6FZJ/1, details his work on "VHF Antenna Arrays for High Performance." Ulrich Rohde, DJ2LR/W2, discusses "Some Ideas on Antenna Couplers."—*Al Brogdon, W1AB* QST

Special Events

Edited by ***George Fremin III, K5TR****

Auckland, NZ: Special Awards Group Auckland, ZL1AC, to 2359Z **Mar 1** (operation began September 30) to celebrate the America's Cup Yachting Regatta. 3.795 7.090 14.159 21.159. Certificate. SAGA, PO Box 15,122 Auckland, New Zealand 1007.

Annapolis, MD: W3ADO US Naval Academy, N5A, 1900Z **Dec 3** to 0100Z **Dec 4**, for the 100th anniversary of the Army-Navy Game. 7.240 14.250 21.350 28.450. Certificate. Michael Waranis, 422 Halsey Rd, Annapolis, MD, 21401.

Arecibo, PR: Arecibo Observatory Amateur Radio Club, KP4AO, 1600-2200Z **Dec 4**, operating from the Arecibo Radio Telescope during a maintenance shutdown. 28.385. Certificate. Arecibo Observatory ARC, HC-03 Box 53995, Arecibo, PR 00612.

Flamingo, FL: Everglades Amateur Radio Club, W4SVI, 1400Z **Dec 4** to 2200Z **Dec 5** for the anniversary of the dedication of Everglades National Park. 7.255, 14.255, 21.325, 28.345. Certificate. Everglades Amateur Radio Club, 31350 SW 192 Ave, Homestead, FL 33030.

Baltimore, MD: Historical Electronics Museum ARC, W2W, 1400Z **Dec 4** to 2200Z **Dec 5**, commemorating Pearl Harbor. 7.115 7.245 14.045 14.245. Certificate. Historical Electronics Museum, W3GR, MS 4015, PO Box 746, Baltimore, MD, 21203.

Youngstown, OH: Mahoning Valley Amateur Radio Association, W8QLY, 0000Z **Dec 5** to 0000Z **Dec 11**, celebrating the 80th anniversary of the MVARA. All bands all modes. QSL. Eugene Ruscello, KB8QXE, 182 Forest Garden Dr, Youngstown, OH, 44512.

Mesa, AZ: East Valley Amateur Radio Group, WA7USA, 1500-2400Z **Dec 7**, in memory of those who perished aboard the battleship USS *Arizona* at Pearl Harbor. 14.240 21.340 28.340. Certificate. EVARG, 3264 E. Carol Ave, Mesa, AZ 85204-3245.

*RR1, Box 322
Johnson City, TX 78636
k5tr@arrl.org

Bethlehem, IN: Clark County ARC, W9WWI, 1500Z **Dec 10** to 2200Z **Dec 11**, celebrating the Christmas season. 75 40 20 meters. Certificate. CCARC, W9WWI, 1805 E. 8th St, Jeffersonville, IN 47130.

Seneca, IL: Starved Rock Radio Club, W9MKS, 1400Z **Dec 11** to 0400Z **Dec 13**, for the 57th anniversary of the launch of the first "landing ship tank" from the Seneca Prairie Shipyard. 3.557 7.257 14.257 21.357. Certificate. SRRC, PO Box 198, Leonore, IL 61332.

St. Johnsbury, VT: St. Johnsbury Academy Wireless Club, W1SJA, 1400-2000Z **Dec 11**, celebrating high school ham radio clubs. 3.940 7.275 14.250 28.350. Certificate. Bruce Burk, St. Johnsbury Academy, 1000 Main Street, St. Johnsbury, VT 05819.

Baltimore, MD: USS *Torsk* ARC & Baltimore Maritime Museum, NK3ST, 1600-2359 **Dec 16** for the 55th anniversary of the commissioning of the submarine USS *Torsk*. 28.370 144.250. Certificate. David Kalb, 1209 Biddle Pl, Catonsville, MD, 21228.

Belen (Bethlehem), NM: Valencia County Amateur Radio Association, KC5OUR, 1400Z **Dec 18** to 2300Z **Dec 26**, celebrating Christmas from Bethlehem. 7.270 14.270 21.370 28.370 QSL. VCARA, PO Box 1076, Peralta, NM 87042.

Marion, IN: Grant County ARC, WA9SPT, 1400-2100Z **Dec 18**, for the Christmas City Walkway of Lights. 7.235 14.300 28.410 146.790. Certificate. L.B. Nickerson, KA6NQW, 517 N. Hendricks Ave, Marion, IN, 46952.

Nazareth, PA: Christmas City ARC/Delaware-Lehigh ARC, WX3MAS, 1300Z **Dec 18** to 0100Z **Dec 20**, with greetings from the Christmas cities of Nazareth and Bethlehem, Pennsylvania. 7.270 14.265 21.365 28.465. Certificate. Christmas City ARC/DLARC, Greystone Building- Gracedale Complex, RR8, Nazareth, PA, 18064.

Piney Creek, NC: Tri-State ARC, W4W, 0000Z **Dec 22** to 2359 **Jan 4**, celebrating the year 2000 in the Blue Ridge Mountains. 3.978 7.278 14.278 21.378. QSL. W4UU, PO Box 4, Piney Creek, NC 28663.

Dallas, TX: Number One Christmas Carol, N1CC, 1400-2100Z **Dec 24**, Number One Christmas Carol 20th annual Christmas Event. 28.475. QSL. Jim La Porta, 112 Woodruff Court, Lexington, SC, 29072.

Edisto Island, SC: Aiken Contest Club, AC4WW, 2100Z **Dec 26** to 0200Z **Dec 28**, celebrating the five-year reunion of "Islands on the Air" South Carolina style. 7.262 14.040 14.262 21.262. QSL. Doug Glass, 127 Trailwood Dr, Aiken, SC, 29803.

Rockford, IL: Rockford Amateur Radio Association, W1N, 1900-2300Z **Dec 31**, Rockford First Night New Year's Eve Celebration. 7.260 14.040 14.260 28.375. QSL. Jeffrey S. Anderson N9ZUT, 1014 Field Crest Dr, Rockford, IL, 61108.

Austin, TX: 3M Amateur Radio Club, W2T, 1100Z **Dec 31** to 2400Z **Jan 2**, for Y2K readiness. 7.230 14.340 21.410 28.350. Certificate. 3M ARC - W3ARC, A147-5S-03, 6801 Riverplace Blvd, Austin, TX 78726-9000.

Wichita, KS: Wichita Amateur Radio Club, W0SOE, 1800Z **Dec 31** to 1000Z **Jan 1**, tracking the arrival of the New Year and Y2K. 7.275 14.255. QSL. Barbara Foster KB0VHI, 1383 N. Park Place Rd, Milton, KS 67106-8011.

Anaconda, MT: Anaconda Amateur Radio Club, W7VNE, 2300Z **Dec 31** to 0700Z **Jan 1**, celebrating the New Year. 3.875 7.235 14.250. Certificate. AARC, Phil Watt, 1112 Heather Dr, Anaconda, MT 59711.

Dallas, TX: Dallas Amateur Radio Club, K2M, 1800Z **Dec 13** to 1800Z **Jan 1**, celebrating the year 2000. 3.885 7.225 14.225 21.325. Certificate. Dallas Amateur Radio Club, PO Box 744266, Dallas, TX, 75374.

Marion, IN: Grant County ARC, WA9SPT, 2300Z Dec **31** to 0700Z **Jan 1**, celebrating year 2000. 3.915 7.235 14.310 28.410. Certificate. L.B. Nickerson, KA6NQW, 517 N. Hendricks Ave, Marion, IN 46952. QST

Hamfest Calendar

Edited by ***Gail Iannone***
Convention Program Manager

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 **December 1** to be listed in the **February** 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.)

†**Alabama (Dothan)—Dec 4**; set up Friday noon, Saturday 6-8 AM; public 8 AM to 3 PM. *Spr:* Wiregrass ARC. Wiregrass Recreation Center, 6th Ave. Vendors, VE sessions (register 8-9 AM, exams start promptly at noon; send business SASE to George Stokes, WA4MZL, 507 Santolina Rd, Dothan, AL 36303), parking, refreshments. *TI:* 145.43. *Adm:* $3. Tables: $12 (6-ft, limited number with power; first-come, first-served basis; chairs provided; Brent Gourley, KE4MZ, 334-677-5439; **bgrly@ala.net**), $8 (without power). Percy Garrett, KF4DYV, c/o WARC, Box 958, Dothan, AL 36302; 334-692-3689; **http://www.qsl.net/warc/eflyer.htm**.

†**Arizona (Mesa)—Dec 4**, 6 AM to 2 PM. *Spr:* AR Council of Arizona. Mesa Community College; US 60 to Dobson Rd, NE corner. ARCA meeting (11 AM), VE sessions. *TI:* 147.12 (162.2 Hz), 449.6 (100 Hz). *Adm:* Free. Mark Kesauer, N7KKQ, 602-779-2722; **arcathill@aol.com**.

†**Florida (Ft Myers)—Jan 8-9**; set up Friday 5-9 PM, Saturday 7 AM; public Saturday 9 AM to 3 PM, Sunday 9 AM to 2 PM. *Spr:* Ft Myers ARC. Shady Oaks Community Center, 3280 Marion St, 1 block S of Rte 80; I-75 to Exit 25, go W, turn N on Palmetto Ave, turn W on Marion. Hamfest/Computer Show, vendors, dealers, computers, tailgating ($10 per spot), free parking, handicapped parking area next to building, refreshments. *TI:* 146.88, 147.345. *Adm:* $5 (good for both days), under 13 free with a paying adult. Tables: $15 (8-ft; booths (10×10, $30, tables $5 each, electricity $5). Doug Douglas, N8SAQ, c/o FMARC, Box 61183, Ft Myers, FL 33906; 941-542-4741; **douglas2@iline.com**.

†**Florida (Gainesville)—Jan 7-8;** set up Friday noon, Saturday 6 AM; public Friday 4-8 PM, Saturday 8 AM to 4 PM. *Spr:* Gainesville ARS. Alachua County Fairgrounds, located on SR-222 (3400 NE 39th Ave), 1/2 mile E of SR-24 (Waldo Rd). Hamfest/Computer Show, vendors, tailgating ($6, plus admission), overnight camping ($10 per night), VE sessions (Saturday 1:30 PM). *TI:* 146.82. *Adm:* $5, under 12 free. Tables: $7 (plus admission). Thom Scott, KF4I, 352-378-9711 (eves); **k4gnv@arrl.net**; **http://www.gars.net/hamfest/**.

†**Florida (Starkex)—Dec 4-5**; set up Saturday and Sunday 7-9 AM; public Saturday 9 AM to 5 PM, Sunday 9 AM to 4 PM. Spr: ARC-Bradford Area. Waldo Bluegrass Park, on US 301. Hamfest/Computer Show, tailgating ($4, includes power), VE sessions, refreshments. TI: 145.15. Adm: $4, under 13 free. Tables: $5 (every 4th table is free). John Bradley, KU4AY, 904-782-1185; **jbradley@techcomm.net**; **http://www.angelfire.com/fl/arcba/index.html**.

Illinois (Wheaton)—Nov 28. GMRS of Illinois, 815-436-7090 or 630-393-3937.

†**Indiana (South Bend)—Jan 9,** 8 AM to 3 PM. *Spr:* Michiana Valley Hamfest Assn. Century Center, US 33 N at Jefferson Blvd. *TI:* 145.29. *Adm:* advance $4, door $5. Bob Denniston, KA9WNR, 21970 Kern Rd, South Bend, IN 46614; 219-291-0252 (eves).

†**Wisconsin (Waukesha)—Jan 8,** 8 AM to 2 PM. *Spr:* West Allis RAC. Waukesha County Expo Center Forum, I-94 W to Exit 294 (Cty J), S to Cty FT, W to Expo Center. Ham Radio, Computer, and Electronics Swapfest; VE sessions (AMF Waukesha Lanes, across from Expo; bring your original license with photocopy, CSCEs with 2 photocopies, 2 IDs, 1 must be photo ID); refreshments. *Adm:* advance $4, door $5. Tables: advance $5 (per 4 ft), door $6 (if available); electrical outlet $12 (advance only). Send Business SASE by Dec 30 to WARAC Swapfest, Box 1072, Milwaukee, WI 53201. Phil Gural, W9NAW, 414-425-3649. QST

†ARRL Hamfest

Contest Corral

*Edited by **George Fremin III, K5TR****

Feedback

In the **1999 ARRL DX CW Contest K6RN** should have been listed as a single-band 15-meter-only entry. **WA3NKO** was listed as high power and should have been listed as QRP. This change places him in eighth place for W/VE QRP stations. **N6HK** should have been listed as single-band 20 meters.

In the **1999 ARRL DX Phone Contest** the multi-multi DX Plaque winner should have been listed as **J37VG**, as shown in the box scores. **OT9T** should have been listed as a single-band high-power entry rather than low power.

In the **1999 ARRL RTTY Roundup KG9X** should have been listed as low power instead of high power. **W7RY** was listed as a single op instead of a multi-op station. This change makes **W7NN** the winner of the Northwestern Division Plaque.

In the **1998 ARRL 10-Meter Contest KF6A** should have been listed as a low-power entry, making him the CW-Only Low-Power Single-Op winner in the SCV section..

In the **1998 ARRL November Phone Sweepstakes** the operator of **WB0O** should have been listed as **VE4XT.**

W1AW Qualifying Runs are 10 PM EDT Monday, December 6, and 9 AM EST Tuesday, December 16. The **West Coast Qualifying Run** will be at 9 PM PDT on Wednesday, December 1, and will offer runs at 10-40 WPM. Check the W1AW schedule for details.

December

3-5

ARRL 160-Meter Contest. See your November 1999 *QST*, page 104.

QRP ARCI Holiday Spirits Homebrew Sprint, CW, sponsored by QRP ARCI, 2000-2400Z December 5. CW only. Single band, all band, high band (20, 15, 10 and 6 meters) or low band (160, 80 and 40 meters). Work stations once per band. Exchange RST, state/province/DXCC country, and QRP ARCI number if member (nonmembers send power output). 1.810 3.560 3.710 7.040 7.110 14.060 21.060 21.110 28.060 28.110 50.060. Score 5 pts /QSO with ARCI member, 2 pts/QSO with nonmembers in the same continent and 4pts/QSO with nonmembers in different continents. Bonus points: add 2000 pts/band for each homebrew transmitter, 3000 pts/band for each homebrew receiver, and 5000 pts /band for each homebrew transceiver used. Final score is QSO points x states/provinces/DXCC countries worked per band x power multiplier (>5 W, ×1; <5 W, × 7; <1 W, × 10; <250 mW, ×15), plus bonus points. Send entries within 30 days to QRP ARCI Contest Manager, Joe Gervais AB7TT, ATTN: HB Sprint, PO Box 322, Peoria, AZ 85380-0322; **vole@primenet.com**; **http://www.qrparci.org/**.

TOPS Activity 3.5 MHz CW Contest, 1800Z Dec 4 until 1800Z Dec 5. 80 meters only, 3.510-3.560. Single operator, single operator QRP (<5 W), multioperator. Exchange RST and serial number; TOPS members also give membership number. Score 1 pt/QSO w/ own country (W/VE/VK/PY/JA/U call areas count as separate countries); 2 pts/QSO w/other countries in the same continent, 6 pts/QSO w/other continents or maritime mobile stations. Add 2 bonus pts/QSO w/TOPS member; 6 pts/QSO between TOPS members; and 10 pts/QSO w/GB6AQ. Multipliers are prefixes. Final score is QSO points + bonus points x multipliers. Awards. Send logs by Jan 31 to Helmut Klein, OE1TKW, Nauseagasse 24/26, A-1160 Wien, Austria; **helmut.klein@siemens.at**.

11-12

ARRL 10-Meter Contest. See your November 1999 *QST*, page 105.

*RR1, Box 322
Johnson City, TX 78636
k5tr@arrl.org

18-19

OK DX RTTY Contest, sponsored by Czech Radio Club. RTTY only, 80 40 20 15 10 meters. Categories: single op all bands, single op single band, multi-op all band and SWL. Exchange RST and CQ zone. Count 1 pt/QSO with your own continent, 2 pts/QSO outside of your continent on 10, 15, and 20 meters; 3 pts/QSO with your own continent, 6 pts/QSO outside your continent on 40 and 80 meters. Multipliers are DXCC countries and OK stations on each band. Final score is total QSO points × total DXCC countries on all bands x total OK stations on all bands. Awards. Send logs by Jan 15 to: Czech Radio Club, OK DX RTTY Contest, PO Box 69, 113 27 Praha 1, Czech Republic; **MILOS@TESTCOM.CZ**; **http://crk.mlp.cz/ENG/DXCONTE.HTM**.

Croatian CW Contest, sponsored by Hrvatski Radioamaterski Savez, 1400 UTC Dec 18 to 1400 UTC Dec 19. CW only. Categories, single operator all band and single band (high power, low power and QRP < 5w), multioperator and SWL. Stations must remain on a band for 10 minutes, but can change bands to work a new multiplier. Exchange is RST + Serial number. Scoring: 10 pts for contacts with 9A stations on 1.8/3.5/7 MHz; 6 points for contacts on 14/21/28 MHz; 6 points for contacts with other continents on 1.8/3.5/7 MHz; 3 points for contacts on 14/21/28 MHz; 2 points for contacts with station within your own continent on 1.8/3.5/7 MHz; 1 point for contacts on 14/21/28 MHz. Multipliers: DXCC countries plus WAE list on each band. Final score is the sum of QSO points from all bands × sum of multipliers from all bands. Awards. Mail logs within 30 days to: Hrvatski Radioamaterski Savez, Croatian CW Contest, Dalmatinska 12, 10000 Zagreb, Croatia; **hrs@hztk.tel.hr**; **http://ham2.irb.hr/9a4gl/9acw.html.**

Stew Perry Top Band Distance Challenge, sponsored by The Boring Amateur Radio Club, 1500Z Dec 18 until 1500Z Dec 19. 160 meters, CW only. Single operator, multi-operator single transmitter. Operate for a maximum of 14 hours. Off time is intended to be taken during your daylight hours. Only one break may be taken between your first and last QSOs, and must be at least 30 minutes in length. Exchange is your grid square. Count a minimum of one point per QSO and an additional point for every 500 kilometers distance. If your logging software does not support this scoring method, the sponsor will compute your score for you if you submit your log electronically. No additional distance given for long-path contacts. Final score is QSO points × power multiplier (>100 W, ×1; <100 W, ×x2; <5 W, ×4). Awards. Send log by Jan 28 to: Boring ARC, 15125 SE Bartell Rd, Boring, OR 97009; **tbdc@contesting.com**; **http://www.contesting.com/n6tr/topband/**.

RAC Winter Contest, sponsored by Radio Amateurs of Canada, 0000-2400Z Dec 19. CW and phone. 160, 80, 40, 20, 15, 10, 6 and 2 meters. Work stations once per band and mode. QSOs must be made in their respective subbands. No repeater QSOs. Single operator, single operator QRP (maximum 5 W output) all band or single band; single operator, all band low power (100 W); multi-operator. Send RS(T) and serial number. (VE stations exchange RS(T) and province or territory). CW—25 kHz up from the band edges; phone—1.850, 3.775, 14.175, 21.250, 28.500 MHz. Score 2pts /QSO outside VE; 10 pts/QSO with VE; and 10 pts /QSO with RAC official stations using "RAC" suffix (ie VE2RAC, VE6RAC, VY2RAC, etc). Multipliers are Canadian provinces and territories (maximum 12) per mode per band. Final score is QSO pts x multipliers. Awards. Send logs by Jan 31 to RAC Contest Committee, 720 Belfast Rd, #217, Ottawa ON K1G 0Z5, Canada. See the Winter Contest site at **http://www.rac.ca/CANWIN.htm**.

International Naval Contest, sponsored by the German Naval Amateur Radio Society, 1600Z Dec 18 to 1559Z Dec 19. CW and phone; 80, 40, 20, 15 and 10 meters. Categories: All band mixed mode; all band CW; all band SSB; all band SWL and Naval Club stations. Exchange: Naval Club members send RST, club and QSO number; nonmembers send RST and QSO number. Count 10 pts/QSO for Naval club members, 1 pts/QSO for nonmembers. Multipliers are each Naval Club member and each station counted only once. Score is QSO points × Multipliers. Awards. Send logs by Feb 1 to: Franz Fick DL1YO, Kiefernberg 19, D-21075 Hamburg, Germany.

31

ARRL Straight Key Night. See the announcement elsewhere in this issue.

Coming Conventions

*Edited by **Gail Iannone***
Convention Program Manager

1999
November 20-21
Florida State, Tampa*

2000
February 4-5
Mississippi State, Jackson

February 5-6
Southeastern Division, Miami, FL

February 11-13
Florida State, Orlando

***See November *QST* for details.**

Attention Hamfest and Convention Sponsors:

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You're encouraged to register your event with HQ as far in advance as your planning permits. Hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register. Registering dates with ARRL HQ doesn't constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

Strays

QSOs IN EVERY TIME ZONE

◊ The Kempische Amateur Radio Club, PI4KAR, in Bladel, Netherlands plans to celebrate the year 2000 *globally*. Throughout the month of December they will be operating special-event station PB6TIME. In addition, from December 18 at 1200Z until December 19 at 1200Z they will operate 24 hours continuously in an effort to contact amateurs in every world time zone. For more information: Kempische Amateur Radio Club, Stijn Streuvelslaan 6, 5531 VB Bladel, Netherlands; **bplaum@iaehv.nl**.

By **Dan Henderson, N1ND**
Contest Manager

1999 ARRL Field Day

Imagine Alex Trebek reading this as the Final Jeopardy answer: "It's the most popular operating event in Amateur Radio."

Of course, we all know that the correct question is "What is Field Day—the great American/Canadian operating event?" And what an event ARRL Field Day 1999 turned out to be! A record number of 2,108 logs were received from clubs and individuals across the US and Canada showing that another record total of 31,266 people participated at sites across our continent—and beyond. A total of 1,470,218 QSOs were completed—an increase of about 9% from 1998. Digital QSOs were down slightly, but CW QSOs broke the half-million mark (538,936) and phone QSOs totaled 926,872.

Remembering that Field Day is more an operating event testing emergency preparedness and less a contest, more than 90% of the entries again reported using emergency power. ARES/RACES groups, Red Cross affiliates, and clubs working with Emergency Management and other agencies were out in force in our annual attempt to educate the public on the role Amateur Radio plays in our communities.

While not a contest in the purest sense of the term, many clubs look at this event as a chance to put their names in the record books. In 1999 several groups set scoring records in different categories. The W3AO team, listed as Potomac Valley Radio Club Group 1, set a new mark in the 7A category with 26,224. This group of operators was the leading scorer for Field Day 1999. The Cherryville Repeater Association operating W2GD now holds the record for the 5A category with 20,520 points. In the 13A category, the

Field Day Entries by Class

1A	222	12A	1	1D	182
2A	585	13A	3	2D	16
3A	368	14A	2	3D	6
4A	152	20A	1	4D	2
5A	90	28A	1	9D	1
6A	32	1B1	106	1E	103
7A	18	2B1	2	2E	15
8A	15	1B2	65	3E	8
9A	5	2B2	33	4E	3
10A	5	1C	51	5E	2
11A	2	2C	4	6E	1

Top 10 Scores

Call Sign	*Score*	*Class*
W3AO	26,224	7 A
N1FD	24,358	28 A
W4IY	22,780	13 A
KK8M	20,920	20 A
W2GD	20,520	5 A
W0BU	15,536	3 A
W0CQC	15,355	2 A
K9RN	14,362	3 A
K4BFT	13,644	5 A
N6ME	13,564	5 A

KQ4VT



George, K4TFJ, discusses antenna theory with a local Boy Scout group at the K4BFT Field Day in Huntsville, Alabama



Mountain scenery makes a spectacular backdrop for the K7PJT Field Day operation, with Andrew, KF7BH, working on 20 meters at 5500-foot Gunsight Butte in Oregon.



Glenn, KC4LXV, and Tommy, K4BNP, handle the media at W4MOE, the Western Carolina ARS operation in Asheville, North Carolina. The building in the background is part of the campus of Asheville Buncombe Technical College.



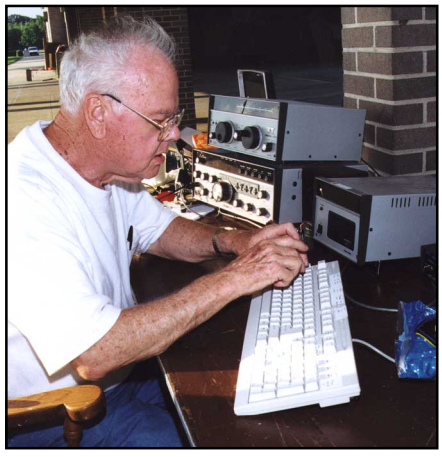
Boy Scout Venture Crew 73, K5BSA, at their Camp Whispering Cedars location in Dallas. ALCATEL USA of Richardson/Plano, Texas sponsors the Crew.



No, these aren't the YLs ready to set up the cover dish dinner for their OMs. These are the ops of the K0VA Ladies Amateur Radio Association of Orange County, California.



Jeff, KD7DKF, tries his hand at running stations at KC7YYM, the Tonto Amateur Radio Association site in Payson, Arizona.



"Bus" Ethridge, K4IX, logging a CW QSO for the K4IX "Buster's Beach Bums" in Norfolk, Virginia.

Woodbridge Wireless Association carved their call W4IY into the record book with their 22,780-point effort. The Nashua Area Radio Club broke new ground with a 24,358-point effort in the 28A category as N1FD.

N0UR now holds the 1B1 record with his 6,700-point effort from Minnesota. N4BP set a new 1B2 record from the SFL section with a score of 8,560. NA5TX finished with a flourish and set a new record in the 1D category with 5,800 points. Making big noise in the 2D category was the record 10,758 points posted by the Central Virginia Contest Club. N0NI set a 3E record with 12,480 points and W3PP finished out this year's record setting scores with a 10,504 performance in the 4E category. Congratulations to all of the groups and individuals who took their categories to the "next level."

The biggest hit in 1999 may have been the inaugural Field Day pins. Thousands of these attractive keepsakes were ordered. If your club hasn't ordered, there are a limited number left. Contact the Contest Branch if your group is still interested. There will be a new design for this popular item in 2000. Order yours early when the announcement appears in *QST* next spring.

Operating portable from 5500 feet on Gunsight Butte, Oregon is a challenge. So is setting up as an E-class station from the comfort of your back yard. Whichever route you choose, Field Day is always a place for new friends, and fun. Even noncontesters seem to get caught up in the excitement of Field Day, as was demonstrated by the numerous visitor logs and hundreds of photographs submitted to Headquarters. A very limited selection is offered with this report.

Field Day 2000 will be held June 24 –25. Start planning now for the last Field Day of the 20th century. New for FD2000 will be a new 100-bonus point category for setting up a demonstration of APRS, ATV or SSTV. To help get the Field Day spirit flowing, enjoy these selected comments from the Field Day operation of clubs from across the country. Remember: Field Day is always the fourth full weekend in June. Maybe Alex can use that as the Final Jeopardy answer one day!

The Calm After the Storm

The Clarksville (TN) Amateur Transmitting Society (CATS) had an active 1999 to say the least. Their efforts in response to the devastating tornado of January 22, 1999 have been well chronicled. But Field Day 1999 offered the opportunity for the town of Clarksville to officially offer its thanks for their efforts during those hectic days.

The CATS operated club call KF4L during Field Day as 8A and had their usual successful operation. They ran almost all modes, including SSTV, digital, SSB and CW. With over 70 club members and visitors in attendance, they showed the usual FD spirit. Almost everyone—member and visitor, ham and non-ham alike—got into the act by participating on the air. Activity was especially enjoyable on 10 and 6 meters, and for the first time, they even generated activity on 2 meter SSB. It was very encouraging for the VHF enthusiasts.

One of the highlights was the visit by the Mayor of Clarksville, the Honorable Johnny Piper. At the opening ceremony on Saturday, Mayor Piper read a proclamation designating the day as Amateur Radio Appreciation Day in Clarksville. He cited the continued contributions of the amateur community throughout the year, and especially recognized amateur efforts during the devastating tornado and their work in the aftermath. While touring the site, Mayor Piper also engaged in a QSO with VA3FIN on 6 meters.

From the grilled bratwurst and German potato salad at the Saturday night cookout to the over 1000 QSOs completed during the event, Field Day 1999 was the best yet in Clarksville. It was a great respite following the real-life needs earlier in the year.—*N3ORX*

A Dad's Gift To and From His Son

Since my club was not participating in Field Day, I decided to set up as 1E and invited the family to participate. My son Eric readily accepted my offer.

From the start, I explained that ham radio is a hobby, and there is no way that one can "mess-up" (from a practical standpoint, that is.) There are ways of doing things and there are better ways of doing things and that is just about it. I also told him if he got bored, he could go do other things and I would not be upset at all. With this, Eric was ready for the tedium, the excitement and the unexpected.

We made a 20-meter ground-plane vertical and an 80-meter dipole just for the event. Eric got his first taste of soldering as we connected the wire to the insulators. We used a slingshot to launch the line through some pine trees, then hoisted our "creation" into the air. Eric learned about "Murphy" when we encountered problems getting the feed line into the basement. Though we missed the 1800 UTC start, we were finally ready. I

knew my son had a competitive spirit, but was afraid to guess his reaction to a radio contest.

To say Eric enjoyed Field Day is an understatement. At first, he kept the dupe sheet while I operated and logged. I answered his questions as to the meaning of QSL and QRZ and 73 and such. After a couple of hours, Eric suggested we stay on one frequency and let stations come to us. The ensuing pile-up did prove a bit much for him, so we stopped running and went back to "search and pounce."

Once fully into the swing of things (and with some "cheat sheets" as to what to say), Eric started to make some contacts. His first was with W5SI—and judging from his reaction you would have thought he had just hit a grand slam or made a game-winning touchdown! The elation quickly turned "back to business" as he quickly turned the dial. A verbal "all right" accompanied each contact he completed. He was thrilled beyond belief.

After finishing our final log sheet page, my son summed up the past 24 hours when he commented "The magic has ended…" Maybe not. I am sure there will be a lot of other Field Days for my eleven year old son, but I can't imagine how any other can be as exhilarating as his first one. I know it made a lifetime of memories for both of us.—*K4OE*

How to be 1A from the Comfort of your Own Home

With respects and acknowledgement to my e-mail circle, here are eight helpful hints on how to live the 1A experience while operating as 1D.

- Get some ticks, mosquitoes and gnats and release them in your house.
- Turn off the air conditioner and sit under a heat lamp.
- Run your Lawn Boy at idle continuously by your operating position.
- Eat large amounts of charred hot dogs, stale chips and cookies while drinking warm soda and stale coffee.
- Wear week old musty clothes from the bottom of your hamper.
- Hose down your operating table and rig at least once.
- Invite a skunk or family of opossums to live in your rec room.
- Before starting to operate, carry 100 concrete blocks up to the roof of your house. When you are finished, carry them back down.—*WA5BDU*

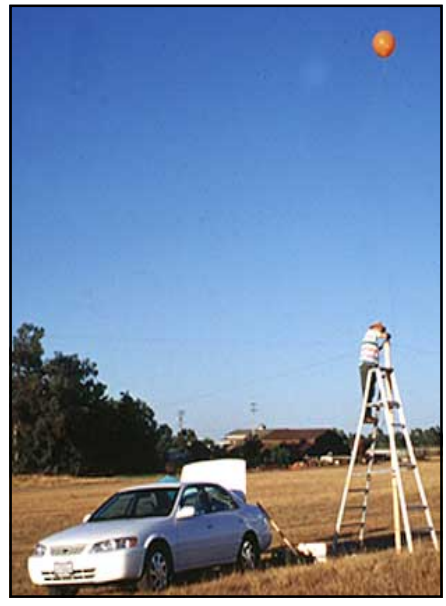
Maritime Mobile

Mark, N2LMD, Dave, WB2ZTY and I decided to try a maritime mobile from Mark's aptly named new boat the *Fine Business*. Our operating area would be the Atlantic Ocean and the Delaware Bay, just off the coast of the SNJ section.

The plan was to use a Kenwood 450s and an 80 through 10 vertical antenna with a custom mount (which had to be guyed so we could operate while in motion). Peering into the wheelhouse I saw the small space which would be our operating position for the 24 hours of Field Day. I hadn't been active for some time, but I purchased a pair of Bencher paddles and a keyer with which to ply my dormant CW skills.



That's Joe, KF4VLI, taking mobile antennas in a new direction—literally—while operating the "slush puppy mobile" on 2 meters at the Rhea County Amateur Radio Society. They used the special-event call sign K4D.



Peter, W6QEU, adjusts the balloon-supported 40-meter wire vertical at WR6WR.

DEBORAH KOEHLER



Keuka Lake (New York) ARA president Roy, KB2WXV, demonstrates ham radio to his son Kristopher (awaiting his license) and his friend Luke.

Boy was it hot! We sailed into Delaware Bay and headed to the Atlantic, positioning ourselves about four miles off Cape May. We were a little late getting on the air, but our first FD QSO happened on 40 meters with the *Fine Business* rolling in some pretty big swells.

After a couple of hours of 40 meter SSB, I wanted to try snagging some of those 2-point CW QSOs. But my stomach—aagh! We were all beginning to get a bit seasick. "Cap," I said, "let's head into the Bay, find a quiet place to operate and bed down there for the night. I want to light up the ether."

So, we spotted a floating irrigation pipe in some deep water just off the marshes at Bidwell's Basin. The pipe would protect us from other boats' wakes. The situation was beginning to remind me of Bogart and Hepburn in "The African Queen."

After operating all night—complete with bugs and iffy propagation—I finally crashed with Mark manning the radio. When I awoke a few hours later, those guys were fishing! Fishing, with only two hours remaining in Field Day? Exhausted, but knowing we had had a good time, we finally called it quits.

So what does maritime mobile mean? Sunburn, bugs, moonlight, "stay in the chair and on the air," wet your head with water to keep the CW ear alert, spend time with old friends, and fish when you are tired of the rig!—*N8LXR*

A "Titanic" First for Two Clubs

The Three Hills ARC (THARC) and the Central Alberta Radio League (CARL) decided to pool resources as they both participated in their very first Field Day operation. The cooperative efforts paid off in an exciting Field Day—Canadian style.

In spite of heavy rains dampening the grounds, the two clubs pushed ahead with the spirit that "emergencies don't wait for good weather." And improvisation was the watchword for the event. For example; after building a "potato gun" to string antenna supports, they discovered they had no potatoes! Dirt clods filled the void and soon the antennas were in place.

Starting with the "Welcome Sign" and Canadian flag that greeted visitors at the entrance to the site, the operation quickly took on the appearance of a bustling village. Signs directed members and visitors alike to their appropriate locations—from Operating Stations to the Culinary Station to the Sanitation Station. A total of 25 operators took turns at receiving and transmitting and numerous visitors logged into the site. Highlighting the visitor's experience was a replica of the Morse code key and log used aboard the HMS *Titanic* on that fateful night in April 1912. The joint operation was titanic in its planning and size. But it enjoyed a more favorable outcome than the ill-fated ship, as they cruised home to a successful weekend. —*VE6MWE, VE6PFV and VE6MIM*

Scores

Class A stations are clubs or groups operating with more than two operators. Score listings are grouped according to the number of transmitters in simultaneous operation. The listings show club or group name, call sign(s) used, total number of QSOs, number indicating power output used (5 is less than 5 W, 2 is less than 150 W; 1 is more than 150 W), number of participants and total score including bonus points and ARRL section. Scores are listed from highest to lowest in each class. Class B stations are portables manned by one or two operators. When there are two operators, the other operator's call is listed in parentheses, if it is known. Class C stations are mobiles. Class D stations are home stations using commercial power. Class E stations are home stations using emergency power.

1A Battery

East Tennessee Contesters
N4IR 835 5 5 8,850 TN

1A

Chew's Ridge Gang
K6MI 806 5 8 8,500 SCV
Tamiami ARC
W4AC 844 5 4 8,440 SFL
Caribbean Contest Consortium
W8TK 762 5 3 8,120 OH
Nature Boys
W1ECH 759 5 6 7,795 VT
Mama's Radio ARC
W7MR 2066 2 32 6,996 UT
Manti Contest Club
NC7X 628 5 3 6,780 UT
Chain Lakes ARA
W2BC 1437 2 4 6,048 WNY
Fort Wayne DXA
K9LA 1479 2 5 6,020 IN
Albuquerque DXA
W5UR 1703 2 13 5,976 NM
Flying Beers Int.
WS8D 639 5 3 5,915 MI
Radio Amateur Megacycle Society
W9DY 538 5 5 5,880 IL
Utah Contest Club
NC7J 1626 2 6 5,856 UT
Badger Mtn. ARC
W0CP 1550 2 4 5,800 CO
Harry Labs ARC
N3GM 1313 2 4 5,652 MDC
Metro DXC
W9TY 1525 2 8 5,534 IL
Bozo and the Lids
W9TG 1172 2 6 5,488 IN
Foothills Contest Club
NF6S 1068 2 5 5,444 SV
Radio Oregon
K7RO 1566 2 7 5,282 OR
Parma RC
K8EE 1155 2 3 5,118 OH
Dinosaur Valley DX Society
K5AB 1868 2 3 5,082 NTX
Candlewood ARA 2
W1QK 471 5 20 4,805 CT
McMinn County ARC
NA4K 1182 2 40 4,722 TN
Buster's Beach Bums
K4IX 1042 2 5 4,688 VA
Big Hill ARC
K0HP 946 2 7 4,482 SD
High Knob Hooters
N4ROA 404 5 4 4,340 VA
Raleigh ARS 2
W4D 998 2 6 4,292 NC
Central NC DX Chasers
N4OL 1000 2 10 4,200 NC
Corn Fed Ant. Farmers
KE9R 913 2 3 4,046 IN
Hams with an Altitude
AA7QU 393 5 3 4,030 CO
Beverly Contest Group
K1EO 1005 2 3 4,026 EMA
West Carleton ARC
VE3WCC 907 2 7 3,984 ON
ESL Radio Club
K6EI 396 5 6 3,965 SCV
Los Chupacabraneros
N5JO 404 5 6 3,965 STX
Bladen ARS
KS4S 1263 2 12 3,938 NC
Thibodaux ARC
W5YL 959 2 10 3,846 LA
Athens County ARA
NC8V 1114 2 7 3,790 OH
West Essex ARC
W2EF 402 5 12 3,775 NNJ
Non-Club Group
NK9A 337 5 3 3,670 IL
Non-Club Group
K4COG 361 5 10 3,595 NC
San Jose State Alums
W6YL 1196 2 4 3,556 EB
Case ARC
W8EDU 952 2 3 3,522 OH
Non-Club Group
WA5Y 375 5 7 3,515 NM
Dr Loomis Mem. Jr. Mechanics League
W3KDR 1151 2 10 3,496 MDC
Northern Ohio DXA
W8DXA 1121 2 20 3,492 OH
Charles County ARC
K3SMD 1229 2 18 3,478 MDC
NABRC
K4NAB 329 5 15 3,410 SC
Tar River ARC
W4DCG 1011 2 8 3,370 NC
Lake County ARC
W9LJ 851 2 20 3,354 IN
The Florida Boys
AF4Z 734 2 15 3,322 SFL
Valley Center ARC
N0NB 1220 2 13 3,274 KS
Albright Contest Group
AA2AD 860 2 4 2,898 WNY
Northrop Grumman ARC
N9EW 773 2 8 2,898 IL
Ampex Retirees' ARG
K6JV 238 5 3 2,880 SCV
WRECS
K8NI 907 2 10 2,862 OH
Hiawatha/Falls City ARC
WD0Y 405 5 23 2,790 NE
Laurens ARS
W4CHQ 579 2 12 2,776 SC
Bruce ARC
VE3RCR 753 2 13 2,682 ON
TMC ARC
KK9H 966 2 20 2,672 IL
Central Wisc RA
W9NN 628 2 10 2,668 WI
5 SPARKS/NFG
K0KI 632 2 5 2,540 CO
Sevan Springs Group
N4TG/9 956 2 3 2,526 IN
Ham Radio Fellowship
WK6O 221 5 3 2,410 ORG
West Texas ARC
WT5ARC 1017 2 10 2,398 WTX
Non-Club Group
W4IT 629 2 5 2,332 SC
Minnesota Wireless Association
W0AA 481 2 10 2,324 MN
South Lyon Area ARC
K8BX 601 2 12 2,324 MI
Gila ARS
N5S 744 2 13 2,312 NM
Ellijay ARS
W4HHH 800 2 11 2,300 GA
Ocotillo ARG
K7ORG 667 2 7 2,288 AZ
Stanly County ARC
K4OGB 702 2 23 2,268 NC
S.C.A.N
WA6P 1070 2 7 2,262 LAX
Non-Club Group
N9AU 1950 1 5 2,256 WI
Hunters Ridge Hams
K4BEH 462 2 10 2,206 GA
Blackstone Valley ARC
W1DDD 552 2 16 2,170 RI
CFMC/SRO
W9EJ 800 2 30 2,166 IL
Assoc. RA of Southern New England
W1AQ 709 2 15 2,152 RI
Club de Radio Amateur de Beauce
VE2CRB 711 2 12 2,144 QC
Dustbowl ARC
KY5C 763 2 14 2,088 OK
Frankford Radio Club
KS3F 818 2 3 2,082 VA
Spectrum First!
NU7B 549 2 4 2,082 AZ
Parma RC II
K8UZW 433 2 10 2,042 OH
Colorado River Amateur Bunch
W7MCF 386 5 4 2,030 NV
Kamloops ARC
VE7UT 394 2 5 2,026 BC
Thomson ARC
W9RCA 913 2 8 2,012 IN
SOBARA
W6ME 694 2 6 2,002 SCV
The Crashing Tower Group
KD2A 672 2 6 1,974 WNY
Louden Co. ARES/Ft. Louden Oper. Gr
W4FLO 660 2 16 1,954 TN
Ottawa ARC
VE3RC 525 2 15 1,926 ON
HI QRP Club & HI Chap 194 QCWA
KH6AN 121 5 8 1,910 PAC
Koolah ARC
KH6J 447 2 24 1,900 PAC
Northern Rhode Island RC
W1NRI 1078 1 11 1,895 RI
Non-Club Group
K4AT 702 2 3 1,872 KY
Sam Houston ARK
K5MV 435 2 31 1,866 STX
MIT Radio Society
W1MX 574 2 10 1,810 EMA
Brindlee Mt. ARA
KE4Y 1396 1 10 1,796 AL
Non-Club Group
K0AXU 1488 1 12 1,792 MO
Non-Club Group
WN0G 796 2 3 1,792 IA
The Hack Shack
NM1K 201 5 3 1,790 CT
Lanark County ARES Group
VE3LCA 406 2 7 1,778 ON
Ozone Pioneers
N0AR 180 5 5 1,755 MN
WPPS RC
KG7GK 350 2 4 1,734 ID
NCG
W0RC 443 2 3 1,710 ND
Candlewood ARA 1
W1QI 548 2 25 1,696 CT
Don Quixote QRP Club
N5HGN 129 5 5 1,690 MS
Hidden Valleys ARC
KC9KQ 414 2 16 1,672 WI
ARPS
W4EFK 397 2 10 1,660 SFL
FORCE
K3UAV 387 2 6 1,648 MDC
Non-Club Group
WB8NSL 415 2 9 1,646 WV
The 33'S
N0YL 215 5 3 1,630 MN
St. John ARC
KP2SJ 422 2 8 1,604 VI
Chalk Bluff AR Group
AB6LI 645 2 3 1,590 SCV
Scooter Trash ARS
WS4Y 372 2 3 1,588 NFL
Cal Poly SLO ARC
W6BHZ 630 2 12 1,588 SB
Hanover Area Hamming Assoc.
N3WD 542 2 13 1,560 MDC
Non-Club Group
N6PC 399 2 3 1,534 SB
Non-Club Group
W8CO 518 2 4 1,524 MI
Soper Hill ARC
NN7N 392 2 8 1,516 EWA
Butte ARC
W7FO 390 2 14 1,512 MT
Non-Club Group
W7FD 746 2 10 1,492 SJV
Looped Group
K0RK 727 2 8 1,454 SFL
W9FGH
W9FGH 477 2 5 1,454 IL
Sandbar Yacht Club
AA9QT 567 2 3 1,452 IL
Stratford ARC
W1ORS 679 2 9 1,424 CT
Kona Bug Catchers
NH6DR 362 2 17 1,406 PAC
Bawating ARC
VE3LSC 449 2 10 1,398 ON
Four Rivers ARC
K4HAO 462 2 8 1,392 GA
Middle Peninsula ARC
W4HZL 420 2 15 1,350 VA
Richardson Wireless Klub
K5RWK 413 2 18 1,334 NTX
The Chemeleons
W1MJ 340 2 4 1,332 NH
Lakeport ARC
W4TAW 507 2 6 1,332 SFL
Non-Club Group
VE6FT 653 1 8 1,331 AB
Shelby ARC
NC4NC 463 2 7 1,326 NC
ARA of the Southern Tier
W2ZJ 305 2 10 1,314 WNY
ESHARC
K4BW 321 2 16 1,314 VA
9-0-4 ARC
K9IM 192 2 9 1,302 IL
Non-Club Group
N5LS 383 2 3 1,296 NTX
Non-Club Group
AB7YB 453 2 4 1,294 ID
Merrymeeting ARA
KS1R 312 2 11 1,278 ME
Cement Ridge FD Group
KB7JVO 1077 1 7 1,277 WY
Lima Area ARC
W8EQ 355 2 6 1,262 OH
The No-Name Radio Gang
KE1C 302 2 10 1,242 CT
Lancaster County ARC
AK4N 252 2 20 1,238 SC
Tidelands ARS
K5BS 303 2 20 1,236 STX
Southwest Mississippi ARC
WB5ASP 389 2 11 1,214 MS
Stars RC
W9SRC 406 2 15 1,212 IL
Cuyamaca Lake Group
KR6BK 550 2 5 1,200 SDG
Murray State University ARC
K4MSU 398 2 10 1,200 KY
Flathead Valley ARC
K7LYY 338 2 12 1,176 MT
Bankhead ARC
N4IDX 538 2 9 1,176 AL
Non-Club Group
KG6HM 240 2 3 1,098 EB
Fishing Party
K8WZ 340 2 11 1,080 MI
Non-Club Group
WA2DFI 306 2 3 1,070 NM
CRA Contrecoeur
VE2CKC 237 2 20 1,048 QC
Salem Area ARA
K8BTP 195 2 27 1,040 OH
Last Mountain RC
VE5LM 264 2 3 1,008 SK
Big Island ARC
KH6EJ 476 1 30 1,006 PAC
Alii's
AH6AW 769 1 6 969 PAC
Westside ARC
W5ABD 228 2 13 956 LA
Terrace ARC
VE7RTK 134 5 3 955 BC
North Island ARS
VE7ARK 273 2 15 946 BC
Non-Club Group
N5SAM 370 2 4 940 OK
Boone County ARC
K1HG 262 2 12 926 IN
Presque Isle County ARC
WB8TQZ 182 2 10 910 MI
North Okanagan RC
VE7NOR 348 2 19 896 BC
Non-Club Group
AB4CZ 350 2 4 884 VA
Gulf Coast ARC
KK4VK 207 2 25 874 NFL
Picco Party Operators
WA3RNB 370 2 6 870 MDC
Issaquah ARC
W7RQT 335 2 15 870 WWA
Wake Tech ARC
WB4TOP 165 2 20 860 NC
Lake of the Woods ARS
VE3JJF 271 2 10 842 ON
Jamestown ARC
W0FX 208 2 13 828 ND
Sunset Empire ARC
W7BU 209 2 20 828 OR
Dakota Chapter 102 QCWA
W0DAK 189 2 5 822 SD
MATPARC
W4PME 249 2 9 818 GA
USS Jurassic ARC
KC8LEY 156 2 5 812 OH
Brazosport ARC
N5KV 252 2 25 804 STX
Edisto ARS
AD4U 254 2 22 740 SC
Lyndon State College Alumni ARC
AA1VT 194 2 6 722 VT
Placentia RACES
AC5MV 154 2 9 710 ORG
BSA Venturer Crew 73
K5BSA 305 2 14 710 NTX
Oconto Third Timers
W9ZMR 200 2 4 700 WI
Northern Saskatchewan ARC
VE5PA 148 2 17 698 SK
Anaconda ARC
W7VNE 191 2 3 682 MT
Tonto ARA
KC7YYM 187 2 12 674 AZ
ICARES
WB8VAV 129 2 10 666 MI
BBQ & Corn
K4AI 210 2 6 660 NFL
Manhattan Area ARS
KS0MAN (+N0PVU)
160 2 6 620 KS
Tuna Fish Group
WK0X 214 2 4 614 MN
Hastings ARC
W0WWV 273 2 20 576 NE
Sunrise ARA
KD1PT 119 2 3 576 ME
Non-Club Group
KB4DPF 238 2 4 576 VA
Boyscout Troop 244
KB7RTA 138 2 9 576 OR
Grand Island ARS
W0CUO 179 2 14 570 NE
Hilljerks Urban Radio League
KF4ZDC 169 2 8 544 WV
Sherbourne ARC
KB1WI 218 2 3 536 VT
Mariana Islands DXA
KH2D 74 2 6 536 PAC
Non-Club Group
KD5EGR 116 2 4 532 STX
Non-Club Group
K1ZUT 213 2 4 528 NH
White Water Valley ARC
N9JM 223 2 10 516 IN
Juneau ARC
KL7IG 106 2 20 514 AK
Great Lakes AR Rovers
KC8ELY 154 2 7 508 MI
Jasper County ARES
W9SPC 93 2 5 486 IN
WEARC
KC2DLP 123 2 10 482 NNJ
Murphy's Match
K0OJ 365 1 5 465 WY
San Lorenzo Valley ARC
K6XS 81 2 8 462 SCV
Non-Club Group
K0HCV 124 2 3 448 KS
Conneaut ARC
W8BHZ 170 2 30 440 OH
West Nebraska ARC
W0AFG 64 2 12 428 NE
Non-Club Group
W4EE 211 2 3 422 NFL
Butler Family Hams
WT7B 145 2 3 390 ID
Grundy-Hardin County ARES
KB0JUL 40 5 3 340 IA
Tipton ARS
KE4ZBI 133 2 6 266 TN
Watertown ARC
N9HR 57 2 10 250 WI
CRA Sorel-Tracy
VE2CBS 72 2 8 244 QC
WPA Field Day Assoc.
W3WGM 119 2 5 238 WPA
Columbus ARA
W8TO 18 2 3 236 OH
Sun Lakes ARC
W7EZ 27 2 4 154 AZ
Reunion Group
W8RTU 25 2 3 152 MI
ARA of Bremerton
W7VE 10 2 3 120 WWA
Non-Club Group
KI0JB 2 2 3 104 CO
Sassafras Valley Group
N7MI 43 2 5 86 WWA

2A

Colorado QRP Club
W0CQC (+KA5WET)
1745 5 15 15,355 CO
Radio Amateurs of Northern VT 2
W1NVT (+KA1VLH)
4450 2 15 12,194 VT
Federation of AR Operators
K9BGL (+WB9ZAK)
3778 2 9 11,294 IL
TCDXA
N0KK (+KB0KEL)
3609 2 15 11,072 MN
Mad River Radio Club
K8MAD 3367 2 8 10,568 OH
Motorola ARC
K9MOT (+K9SGR)
3185 2 25 9,732 IL
Falmouth ARA
K1RK (+W1HQH)
2845 2 30 9,334 EMA
Williamsburg Area ARC
K4RC (+WD4JYQ)
1123 5 15 9,130 VA
Montrose ARC
K0SX (+N0XMI)
2742 2 17 9,116 CO
Massanutten & Valley ARA
N4XU (+KD4FKT)
3004 2 65 8,976 VA
Hoosier Dxers & Contesters
N9NS 2969 2 10 8,762 IN
JPL ARC/Caltech ARC
W6VIO (+N0GSZ)
2732 2 23 8,716 LAX
Hattiesburg ARC
W5NA (+K5EME)
2793 2 25 8,658 MS
Mesilla Valley RC
N5BL (+KC5IEC)
1238 5 10 8,610 NM
Schaumburg ARC
N9RJV (+K9IIM)
2426 2 29 8,586 IL
Raytown ARC
K0GQ (+N0LBN)
2423 2 22 8,464 MO
Northwest ARS
W5NC (+W5IDX)
2733 2 79 8,292 STX
LEFROG
N9FH (+KA9WXN)
2826 2 20 8,254 WI
Runestone RC
AA0EV 2527 2 18 8,124 MN
Mid-MO ARC
N0SS (+WB0TPN)
2438 2 24 7,772 MO
ARATS Members
W2SEX 861 5 10 7,690 WNY
NCAARS/ BARC/ SCARS
K5UZ (+KD5ATN)
2267 2 20 7,414 AR
Eastern Arizona ARS
K7EAR 2302 2 12 7,312 AZ
Berger's Bandits
K3II 2245 2 14 7,308 EPA
Twin City FM Club
W0EF (+K0BSA)
2322 2 50 7,280 MN
Cape Fear ARS
K4MN (+N4EWG)
2371 2 50 7,274 NC
Meriden ARC
W1NRG (+K1TDO)
2027 2 34 7,236 CT
Green River Valley ARS
K9WM 2211 2 14 7,200 IL
Picker ARC
W8NL (+KC8CUK)
1962 2 8 7,196 OH
ARVARF
K5PXP (+KC5CVG)
2168 2 11 7,156 AR
Hughes/Raytheon ARC
W6HA (+KF6QIA)
1828 2 12 7,122 LAX
Norwood ARC
N1OP (+WA1ZJE)
2089 2 18 7,108 EMA
GARS/GARC/SFARC
W4SH (+KE4SLK)
2085 2 45 7,094 NFL
Elgin ARS
W9IKN (+KB9PLA)
2222 2 25 7,026 IL
St. Louis ARC
K0LIR (+KB0IEF)
2223 2 20 6,942 MO
Horned Toad Acres
K7OX (+K7ZWI)
2024 2 17 6,870 AZ
Lake Perris QRP Society
KR6LP 930 5 10 6,775 LAX
Motor City Radio Club
W8MRM (+KB8EXV)
2122 2 58 6,734 MI
Columbus ARC
W4WY (+K4ARK)
1840 2 25 6,730 GA
West Park Radiops
W8VM 814 5 26 6,705 OH

North Florida ARS
W4IZ (+KF4DMC/T)
2343 2 50 6,682 NFL
Stonewall Jackson ARA
K8DF 1989 2 10 6,602 WV
QCWA Chapter 17
W3GS (+KB3DEC)
1927 2 15 6,500 EPA
Southeastern DXC
W4NT 2035 2 6 6,318 GA
Morris RC
W2YD (+K2EMJ)
1646 2 19 6,144 NNJ
Randallstown ARC
N3IC 1862 2 11 6,122 MDC
Motorola ARC of AZ
W7MOT (+KC7FWO)
1899 2 21 6,106 AZ
Shelby Co. ARES/Honda Lifeline AEP
N8GF (+KC8ENE)
1725 2 13 6,008 OH
W/K ARC of Greater Milwaukee
N9AW (+N9XRO)
1575 2 10 5,996 WI
Greater Cincinnati ARA
W8DZ (+KC8DWR)
2033 2 17 5,976 OH
Fond du Lac ARC
W9EBV 1988 2 20 5,932 WI
Tucson IBM ARC
W7IBM (+N7OJT)
1819 2 17 5,826 AZ
Carroll County ARC
K3PZN (+N3JIA)
1728 2 24 5,744 MDC
Delta DXA
W5RU 1677 2 11 5,514 LA
Walton RA
W2LZ 508 5 14 5,500 WNY
Austin ARC
W5KA (+KD5ANC)
617 5 20 5,490 STX
Central VA Contest Club
W4ML 1535 2 8 5,402 VA
Blue Ridge ARC
W4YK 1453 2 21 5,394 NC
Fidelity ARC
WF1A (+W1AAB)
1717 2 18 5,288 RI
Sakonnet 49'ers
KD1MW 1510 2 15 5,258 RI
VPI Alumni RC
K4VPI 521 5 8 5,210 VA
Anderson ARC
N4AW (+WD4BUH)
1321 2 27 5,186 SC
Oklahoma City Autopatch Assoc.
W5MEL 1493 2 25 5,186 OK
Fullerton & Autonetics RC's
K6NX (+KB6CMO)
1515 2 30 5,148 ORG
VA DX Century Club
W4DZ 1463 2 13 5,074 VA
Coconino ARC & Northern AZ DXA
NN7A 1357 2 25 5,022 AZ
San Mateo RC
W6UQ 1647 2 18 5,012 SCV
Halifax ARC
VE1FO (+VE1MPC)
1504 2 50 4,994 MAR
Loveland RA
W0DZ (+N0RQV)
1786 2 32 4,952 CO
Montgomery ARC
W4AP (+N4WVW)
1246 2 46 4,824 AL
East Bay ARC
W6CUS (+KF6HEX)
1253 2 54 4,788 EB
Eastern MI ARC
K8EPV (+N8SVI)
1236 2 10 4,786 MI
Tri County ARC
W8YEK 1991 2 27 4,782 OH
OARS
N4CM (+KD4WSR)
1730 2 27 4,722 TN
Hewlett-Packard Andover RC
W1HP 1128 2 12 4,718 EMA
Redmond Top Key Contest Club
N7KE 1220 2 12 4,674 WWA
Tippecanoe RA
W9REG (+KB9JDA)
1255 2 25 4,664 IN
Vienna Wireless Society
K4HTA (+KF4LGR)
1002 2 21 4,662 VA
The Albemarle ARS
NO4Y (+KE4NBR)
1469 2 45 4,612 NC
Benton ARS
WJ5S 1419 2 16 4,594 AR
Buckhead Contest Club
W4KJ 1723 2 4 4,564 GA
Big Bend ARC
K5FD (+W5ATO)
1404 2 22 4,546 WTX
Yellowstone RC
K7EFA (+KC7QBY)
1351 2 20 4,476 MT
PART
KI3I (+KB3CBO)
1472 2 12 4,446 EPA
Heart of America RC
W0RR 1285 2 15 4,438 KS
Alford Memorial RC
W4BOC (+KC4CIM)
1365 2 31 4,398 GA
Amer. Red Cross Emer. Comm. Service
WB2QBP 1555 2 35 4,374 NLI
Clinton County ARC
W9PC (+K9FUE)
1088 2 20 4,366 IN
Radio Central ARC
W2RC (+WB2TOM)
1039 2 10 4,334 NLI
Mountain ARC & Pikes Peak RAA
WA0VTU (+N0ZPX)
1278 2 25 4,322 CO
Hannibal MO ARC
W0KEM 1138 2 16 4,306 MO
Delaware Valley RA
W2ZQ (+KB2SYB)
1302 2 30 4,288 SNJ
New Providence ARC
N2XJ 1236 2 27 4,276 NNJ
MZM
K8TV (+KC8MRI)
1261 2 25 4,266 OH
Hiawatha ARA
K8LOD 1405 2 30 4,252 MI
Dixie ARC
K7SG 1166 2 15 4,252 UT
Waldo County ARC
N1TN 1431 2 13 4,216 ME
Athens RC
N4ALE (+N4ZRA)
503 5 28 4,205 GA
ARES Calgary / Calgary DXC
VE6GR 980 2 17 4,162 AB
Old Post ARS
W9EOC 1378 2 16 4,158 IN
St. Peters ARC
KB0SWK (+KB0SIU)
1056 2 14 4,084 MO
Edmond ARS
N5OL 1188 2 10 4,072 OK
Upper Valley ARC
W8MK 1184 2 17 4,064 OH
Canadian Police College ARC
VE3CPC 1286 2 20 4,060 ON
Palo Alto ARA
K6YT (+KD6KYT)
1265 2 30 4,054 SCV
Paso Robles ARC
W6LKF (+KF6VIL)
1106 2 54 4,042 SB
North Shore RC
N9WM (+KB9PJS)
1626 2150 4,040 IL
SAWS
KT8J (+KB8KPI)
1644 2 20 4,014 WV
Mile High DXA
K0AB 1328 2 12 4,008 WY
NCSU Student ARS
W4ATC (+KF4RDN)
1187 2 11 3,938 NC
Cedar Valley ARC
W0GQ (+KC0CLD)
1194 2 40 3,910 IA
Len & John Beer Co.
WF2V 1013 2 10 3,898 WNY
North ARC
K1NCR 990 2 12 3,886 NH
Massillon ARC
W8NP 1052 2 47 3,844 OH
Miami Valley FM Assoc.
N8UR (+KC8GAB)
981 2 10 3,832 OH
AR Communications Support Group
K3FT 990 2 11 3,822 MDC
Canton ARC
W8AL (+N8OKK)
1100 2 33 3,816 OH
Straits Area ARC
W8GQN (+KC8FAR)
1067 2 17 3,806 MI
West Virginia AR Inc.
WV8AR 1080 2 28 3,790 WV
Burley ARC
W7JQ (+KC7BBP)
1236 2 25 3,756 WWA
SWLARC
W5BII (+KC5NAD)
1574 2 48 3,720 LA
North Shenandoah DX Assoc
NS4DX 1298 2 3 3,678 WV
Tri-County ARC
WB7S (+KC7EMT)
1109 2 16 3,678 WY
Charlestown ARS
WA4USN (+KE4KUR)
1115 2 55 3,678 SC
Non-Club Group
K7PJT 346 5 4 3,660 OR
Independent ARC
W0CXX 975 2 11 3,652 IA
Non-Club Group
N0CZX 1622 2 5 3,644 MN
Ft. Madison ARC
WF0RT (+KA0HAE)
1040 2 14 3,638 IA
RF Burns and the 5 Amigos
K0YO (+KC0CTJ)
408 5 6 3,590 CO
CRBB & LBBBS
KN6OX 2344 1 10 3,546 SV
Southwest Dallas County ARC
W5AUY (+KB5TMD)
1088 2 19 3,536 NTX
Northern California Contest Club 2
W7DR 2622 1 3 3,486 NV
Mound ARA
W8DYY 979 2 15 3,484 OH
Mecklenburg ARS
W4BFB 961 2 25 3,452 NC
NJ QRP Club
WQ2RP 319 5 10 3,450 SNJ
Three Generations of Hams
AC3V (+N3XXP)
461 5 6 3,420 EPA
Trojan ARC
W0WOB (+KB0LGX)
1024 2 12 3,406 KS
Mercer Co. ARC
W3LIF 1091 2 30 3,402 WPA
Midwest Jambalaya ARC
K0KMO 310 5 2 3,400 MO
Sterling Park ARC & Dulles ARG
W4RW (+KF4PJS)
954 2 25 3,386 VA
MARC
W5EJK 1327 2 15 3,382 OK
Brandon ARS
K4TN (+KF4CIJ)
830 2 20 3,382 SFL
Suburban RC
W0DCW (+N0PFF)
1009 2 60 3,382 MO
Ham Assoc. of Mesquite
WJ5J (+KD5CBG)
1254 2 40 3,308 NTX
Radio Adventurers
K1RA 898 2 5 3,300 VA
Santa Barbara ARC
K6TZ (+KF6IKO)
1253 2 47 3,270 SB
Clinton County ARA
W8GO 803 2 10 3,258 OH
Eli Lilly Company ARC
W9ELI 976 2 8 3,220 IN
Fresno ARC
W6TO 821 2 17 3,214 SJV
Algoma ARC
VE3SOO 985 2 23 3,186 ON
Gallatin Ham RC
W7ED 860 2 17 3,182 MT
Forx ARC
KE0A (+KB0YRK)
844 2 14 3,180 ND
St. Clair County IL ARC
K9GXU (+KB8HYY)
1018 2 15 3,174 IL
North Franklin ARS
NF2AR 899 2 4 3,168 NNY
Lakeland ARC
K4LKL (+KF4KSN)
812 2 40 3,162 SFL
Richmond ARC
VE7RAR 732 2 22 3,124 BC
Santa Fe Trail ARC
KS0KS 946 2 27 3,120 KS
Kent County ARC
W3HZW 819 2 32 3,114 DE
Drake ARC
K8UU (+N8NQG)
853 2 10 3,114 OH
Green Bay Mike & Key Club
K9EAM (+K9GEM)
1967 1 25 3,106 WI
Bullitt ARS
KY4KY (+KA4TEV)
818 2 75 3,098 KY
North Shore RA
KX1N (+N1UEC)
796 2 28 3,082 EMA
Butler County VHF Assoc.
W8CCI (+KB9SVG)
948 2 29 3,082 OH
Ashland Area ARC
W8OD 845 2 15 3,066 OH
Polk Ham Club
W4TJM (+KO4BGY)
597 2 18 3,048 SFL
Rochester ARC
W0MXW 1580 1 35 3,046 MN
Palos Verdes ARC
K6JW 966 2 23 3,034 LAX
Non-Club Group
K5QQ (+KC5YXB)
761 2 9 3,032 NM
Vernon RACES/ARES
W2VER (+WA2TLF)
982 2 23 2,976 NNJ
Downey ARC
W6TOI 1165 2 25 2,958 LAX
San Angelo ARC
W5QX (+N5WJN)
1216 2 20 2,932 WTX
Parkersburg ARK
N8NBL 756 2 28 2,914 WV
Atchafalaya Amateur DXA
WA5MC 815 2 10 2,908 LA
Decatur ARC
W4ATD (+KB4CAY)
962 2 19 2,886 AL
West Allis RAC
W9FK (+KB9TZB)
1202 2 15 2,882 WI
MN QRP Society
WQ0RP (+N0PPF)
272 5 13 2,875 MN
N1SF RC
N1SF (+WD9HRU)
909 2 27 2,868 IL
WAARCI
W0AU 1122 2 20 2,848 MO
Royal Gorge ARC
NC0A 700 2 20 2,846 CO
Penn Mar RC
W3MUM 779 2 20 2,822 EPA
Garden City ARC
K8GC (+KA8UZE)
877 2 56 2,816 MI
Racine Megacycle Club
W9UDU 873 2 40 2,796 WI
St. Albans ARC
K2KI (+KB1DSO)
804 2 25 2,792 VT
CKARC
W0CY (+N0XRS)
767 2 21 2,784 KS
Bluff City ARC
N5KDA (+N5ZMZ)
920 2 8 2,770 MS
Rockwall County ARES
K5RN 962 2 18 2,770 NTX
OSARG
K1OS (+N1SMK)
1125 2 20 2,732 RI
New River Valley ARC
WB3S 597 2 12 2,728 VA
Johnson City ARA
W4ABR 810 2 10 2,720 TN
RATTS
N4RS (+K4PAM)
698 2 61 2,700 NC
Mohawk ARC
N1WW 1001 2 16 2,698 EMA
Maui ARC
KH6RS 1097 2 19 2,694 PAC
Metropolitan ARC
AE5AA (+KC5NLK)
723 2 16 2,694 AR
Tri County Repeater Association
K9FYZ 1086 2 10 2,672 WI
Laurel ARC
KB5IXI (+KC5QZW)
899 2 10 2,670 MS
North Kitsap ARC
KC7Z (+KC7DAT)
525 2 31 2,666 WWA
Ocowee County ARS
W4EEE 772 2 10 2,662 GA
Tri-State ARS
W9OG 817 2 15 2,642 IN
UMS
VE2UMS 731 2 68 2,638 QC
Tamaqua Area ARA
W3SX 705 2 8 2,636 EPA
Newington ARL
W1OKY 1007 2 16 2,628 CT
Tampa ARC
W4DUG (+KC4JQH)
737 2 37 2,622 SFL
Baltimore ARC
W3FT (+N4LHU)
697 2 20 2,622 MDC
Bay Area Wireless Association
N9KI 1489 1 8 2,616 WI
Green Mountain Wireless Society
WG1Q (+N1XOA)
925 2 16 2,606 VT
Ashtabula ARC
K8CY (+WD2PVB)
883 2 17 2,590 OH
Camden County ARS
WW9Z (+KE4KAK)
628 2 14 2,588 GA
Bloomington ARC/ Indiana Univ. ARC
W9INL (+N9PTG)
744 2 55 2,580 IN
Shelby County& ARC
W4SHL (+KC4TMR)
757 2 40 2,578 AL
South Towns ARS
WB2ELW 807 2 35 2,572 WNY
Albuquerque ARC/ AR Caravan Club
N5VA 547 2 68 2,568 NM
Historical Electronics Museum ARC
W3GR (+KB3CPV)
662 2 13 2,554 MDC
Nevada Co. ARC
W6DD 638 2 18 2,552 SV
Northwest QRP Club
K7QF 203 5 8 2,550 WWA
Choctaw ARC
K5CAR (+K5ENQ)
393 5 12 2,550 OK
BEARONS
W7FLY 601 2 23 2,542 WWA
Bishop ARC
N6OV 648 2 22 2,534 ORG
York RC
W9PCS 606 2 19 2,528 IL
Eastern PA QRP Club
N3EPA 318 5 8 2,525 EPA
Non-Club Group
WY5I 737 2 15 2,518 SFL
Kishioqukee ARC
WA9CJN (+W9ICU)
547 2 25 2,514 IL
Non-Club Group
K3WJV 751 2 10 2,500 EPA
Pine State ARC
N1ME (+N1UMG)
682 2 23 2,488 ME
Hampden County RA
W1NY 1014 2 20 2,486 WMA
Milford ARC
W8SDL (+KB8DDH)
944 2 11 2,480 OH
Lewis & Clark RC
K9HAM 538 2 17 2,456 IL
Aroostook ARA
K1FS (+KB1EBH)
785 2 17 2,456 ME
Johnson County ARC
AA5XN 661 2 14 2,430 NTX
3M Club ARC
W0JH (+KA0ZIA)
664 2 23 2,424 MN
Hamfesters RC
W9AA (+K9RFY)9002 30 2,420 IL
Hewlett Packard Club
N0HP 906 2 8 2,414 CO
Calumet ARES
KN9P (+KA9OJN)
712 2 10 2,388 WI
Club Radio Amateur Du Madawaska
VE9CRM 499 2 12 2,376 MAR
Garland ARC
K5QHD 677 2 85 2,374 NTX
County Line ARA
W2GZJ (+KC2EEQ)
494 2 15 2,370 NNJ
VHF-UHF AC of Montreal
VE2SH 810 2 4 2,364 QC
Mason County RC
K8DXF 536 2 26 2,350 MI
Narraguagus Bay Area ARC
KB1CEJ 662 2 15 2,348 ME
Kings Co. ARC
VE1LD 618 2 12 2,346 MAR
Xerox ARC
WD6CZH (+KC6LVZ)
667 2 18 2,346 LAX
Dawson Springs ARC
KF4CWK (+KC4YIT)
843 2 15 2,338 KY
BARA
W8MAI (+KC8ISH)
694 2 25 2,338 MI
Hancock ARC
W9ATG 583 2 30 2,328 IN
Non-Club Group
VE2CVR (+VE2CWZ)
808 2 15 2,316 QC
Jayhawk ARS
W0LB 568 2 10 2,304 KS
Plateau ARC
W4CV (+W4EKG)
640 2 23 2,298 TN
BARC
W0DK 543 2 25 2,258 CO
RF Parts ARC
W6NQ (+K6NDG)
871 2 4 2,242 SDG
Iowa City ARC
W0JV 626 2 25 2,238 IA
Knightlites QRP Ass'n
WQ4RP 203 5 4 2,230 VA
Tioga Co. Ares
K2QR 631 2 10 2,214 WNY
Tech ARA
KC5ORO 564 2 8 2,212 NM
Copper Country RAA
W8CDZ (+N8WAV)
585 2 10 2,208 MI
KE7LE Repeater Useres Group
KE7LE (+N7RHV)
598 2 15 2,202 WWA
Non-Club Group
K6DIG 655 2 60 2,180 LAX
Chaparral ARS
W6MV 661 2 9 2,170 SB
NBARA
K6LI 559 2 12 2,164 EB
Non-Club Group
AE4UK 633 2 10 2,144 KY
Southern Iowa FDG
N0WK (+KA0RHZ)
584 2 16 2,134 IA
St. Paul RC
N0BM 751 2 30 2,128 MN
The Twenty Four Gang
KN5I (+W5TIT)
681 2 27 2,120 NTX
Radio Active Camp & Contest Club
K5RAC (+KC5ZRA)
302 5 13 2,120 NTX
Eastern Panhandle ARC
WV8E (+W4LFO)
787 2 12 2,120 WV
Los Alamos & Northern New Mexico AR
W5PDO 617 2 11 2,116 NM
Genesis ARS
WF1M 408 2 12 2,110 EMA
Tahoe ARA
NX6W 776 2 33 2,084 SCV
Brightleaf ARC
W1VOA (+KG4CCZ)
507 2 35 2,084 NC
London Bridge ARA
AE6N 201 5 33 2,075 AZ
Albert Lea ARC
NX0C 535 2 10 2,062 MN
Englewood ARS
K0ONV 542 2 12 2,052 SFL
Non-Club Group
N0TU 183 5 3 2,025 CO
Suncoast ARC
WA4T 682 2 24 2,016 NFL
Quad Sounds ARC
VO1GO 548 2 7 2,014 NL
Willits ARS
W6MMM 642 2 10 2,006 SF
Midland ARC
K5RS 535 2 32 2,004 WTX
Jefferson County ARC
W5SSV 554 2 10 2,002 STX
Coastside ARC
WA6TOW 549 2 12 2,000 SCV
Arlington ARC
K5SLD (+KD5FFX)
603 2 35 1,990 NTX
Garden Grove Elks/Anaheim Am. Ass'n
K6SYU 455 2 21 1,954 ORG
Adams County ARC
W8EKG 470 2 5 1,950 OH
Harrisburg RAC
W3UU 668 2 30 1,928 EPA
Pittsburg Repeater Organization
K0PRO 568 2 10 1,924 KS
Rainbow Canyons ARC
N7BO 581 2 15 1,922 UT
BGMRC
K4SEX 364 2 12 1,920 GA
Cherokee County ARC
W4CCA 678 2 17 1,918 AL
Campbell River ARC
VE7CRC 543 2 15 1,916 BC
Club RA de Qubec
VE2OCP 658 2 10 1,916 QC
RACC
N8WB (+KA8QCU)
957 2 25 1,914 MI
Sumter ARA
W4GL (+KC4ZTC)
590 2 18 1,906 SC
Islip ARES Group
W2TOI 477 2 20 1,900 NLI

Blue Ridge ARS
ND4N (+WD4DYH)
645 2 25 1,898 NC
CVFMA
AA1PK (+KA1III)
364 2 15 1,896 VT
Non-Club Group
K4TLH 1184 1 3 1,896 NFL
Cres ARC
W8ZPF 655 2 13 1,894 OH
Spirit of 76 Radio Brigade
AA1PL (+N1VSX)
584 2 9 1,874 RI
Wantagh ARC
W2VA 475 2 16 1,862 NLI
North Georgia QRP Club
AE4GX 158 5 4 1,860 GA
Liebert ARC
K8SV 775 2 8 1,850 OH
Brockville ARC
VA3BRC 429 2 20 1,848 ON
Sun Parlour ARC
VE3SPR 733 2 10 1,822 ON
Snohomish County Hams Club
WA7LAW 517 2 25 1,818 WWA
Manistique Gnat Swatters
KD8DD 531 2 5 1,814 MI
Non-Club Group
W1LM 509 2 15 1,812 EMA
Hellgate ARC
W7PX (+N7WKR)
595 2 30 1,808 MT
Univ. ARC
N7UW (+KB7UQV)
597 2 15 1,808 WY
David Sarnoff RC
N2RE 417 2 20 1,802 SNJ
Kent ARS (KARS)
N3TF 465 2 8 1,800 MDC
Sandhills ARC
W0MI 596 2 28 1,792 KS
Ole Virginia Hams
N4SN 568 2 15 1,786 VA
Non-Club Group
N4OKX (+KB9THR)
979 1 3 1,775 KY
Moreno Valley ARA
AB6PA (+KC6FJC)
468 2 38 1,770 ORG
Whitley County ARC
W9SMQ (+N9KXL)
425 2 11 1,768 IN
Thomasville ARC
W4UCJ/KK4RP (+KE4FGF)
476 2 45 1,762 GA
Headwaters ARC
KB3CCI 533 2 9 1,756 WPA
Fayette ARA
N8EMZ (+N8XSV)
511 2 10 1,756 OH
Raytheon System Company
W1AEL 507 2 5 1,740 VA
The Radio Forum
KD3RR 619 2 16 1,738 WPA
Lodi ARC
N6SJV (+KD6TDD)
244 5 12 1,735 SJV
Douglas County FD Group
AF4KP (+N4YDV)
421 2 18 1,730 GA
Georgian Bay ARC
VE3OST 563 2 20 1,726 ON
Blue Mountain ARC
VE3MTR 483 2 20 1,718 ON
Albemarle ARC
WA4TFZ (+KE4UKZ)
494 2 35 1,718 VA
Waterbury ARC
W1LAS 1170 1 10 1,708 CT
Twin Lakes ARC
KC5RBO 284 2 16 1,706 AR
Thumb ARC
W8AX 478 2 5 1,700 MI
Small Town ARS
N5TSL 508 2 27 1,694 AR
SARES
W6YPE 408 2 32 1,692 SCV
Montreal ARC
VE2ARC 645 2 12 1,692 QC
Non-Club Group
N1PP 350 2 13 1,684 NH
Sandusky REL
W8LBZ 639 2 20 1,678 OH
Novi ARC
W8RS 335 2 13 1,672 MI
Alameta County RACES
KE6WCQ (+KE6NCX)
450 2 11 1,668 EB
Travis County ARES
W5TQ 344 2 10 1,666 STX
Hammers
W2UB 604 2 11 1,662 WNY
Clark Co. ARC
W9WWI (+N9RMR)
548 2 65 1,660 IN
Mountain ARC
W6BW 560 2 17 1,644 SJV
Bill Williams Mt.RC
K7NAZ 509 2 10 1,640 AZ
Benzie Amateur Radio Friends
N8EV (+K8BTE)504 2 19 1,636 MI
Columbia ARS
WB4JEM (+KE4BQI)
377 2 24 1,628 NFL
Metuchen RC
K2YNT 400 2 9 1,626 NNJ
Ft Smith Area ARC
W5ANR (+N5RIC)
613 2 24 1,626 AR
Forsyth ARC
W4NC 370 2 24 1,622 NC

Theodore Roosevelt ARC
K0ND (+N0QAU)
456 2 31 1,614 ND
Sun City ARC
K5WPH (+KB5KYN)
525 2 55 1,606 WTX
CRA de MTL
VE2CLM 351 2 20 1,606 QC
The Left Outs
NR0C 499 2 4 1,600 IA
Western Tidewater RA
N4SWS 366 2 10 1,600 VA
St. John Valley ARS
KW1C 450 2 10 1,598 ME
Hospital Disaster Support
K6EW 497 2 18 1,594 ORG
Palestine/Anderson Co. ARC
KC5ONH 495 2 15 1,590 NTX
Hamilton County ARES Club
KB9FVJ (+KB9SWR)
428 2 15 1,586 IN
Northwest Wireless Assoc.
W7NWA 557 2 12 1,586 WWA
Calvert ARA
KR3A (+N3IPN)
563 2 15 1,580 MDC
Upper Kittitas County ARC
AA7YY 489 2 18 1,578 EWA
Non-Club Group
N0WE (+KC0CTH)
452 2 18 1,574 MN
Campbell County ARC
W7CW 310 2 10 1,566 WY
3 Club FD
K8UTT (+N8OZV)
582 2 32 1,564 MI
Worldradio Staff ARC
WR6WR 536 2 8 1,558 SV
Bellevue ARC
W0WYV (+KB0URX)
424 2 12 1,556 NE
Nanaimo ARA
VE7NA 348 2 10 1,556 BC
Bellbrook ARC
W8DGN 398 2 10 1,554 OH
ARC of Branford
KU4AY (+KG4BAH)
455 2 12 1,554 NFL
Nortel Networks ARC
NT5NT 512 2 12 1,550 NTX
Mahaska ARC
K0TX 410 2 17 1,544 IA
Oakland RCA
W6LL 472 2 20 1,544 EB
Disaster Comm. Repeater Assoc.
KF6ODU 560 2 6 1,540 SJV
Townshippers RAC
VE2CLD 611 2 9 1,536 QC
Tesaro
W1IM 366 2 4 1,530 NH
Huntingdon Co. ARC
W3VI 501 2 12 1,510 WPA
Olympia ARS
NT7H 1002 1 27 1,502 WWA
Eagle Lake ARC
WC2T 749 2 4 1,498 EPA
Laurel ARC
W3LRC 348 2 17 1,496 MDC
U of Idaho ARC
W7UQ (+KB7QFU)
141 5 6 1,495 ID
Gaston County ARS
N4GAS 377 2 26 1,490 NC
Tyler ARC
K5TYR 526 2 12 1,488 NTX
Tri-States ARC
W4GTA (+KF4WYP)
594 2 40 1,488 GA
Tri-County ARC
KU4RK 482 2 15 1,464 VA
Prarie Dog ARC
W0OJY 437 2 13 1,456 SD
WRECS
W8RD 613 2 25 1,452 OH
Winchester Pioneer ARC
AC4YD 572 2 10 1,444 KY
Lake Isabella ARA
KV6LI 371 2 8 1,444 SJV
Hoosier Lakes RC
N9AR 322 2 15 1,440 IN
Glynn ARA
K4TVE 324 2 15 1,434 GA
Neptune ARC
N2GT (+N2WAY)
286 2 24 1,426 NNJ
Boeing Employees ARS
KC0AHN 298 2 16 1,420 KS
Truro ARC
VE1AO 436 2 17 1,416 MAR
Non-Club Group
K4JMN 190 5 6 1,415 KY
Temple ARC
W5LM (+KD5GDB)
504 2 35 1,414 NTX
Bartlesville ARC
W5NS 331 2 13 1,412 OK
Franklin County ARC
KE4ZIM 338 2 18 1,410 AL
Lake Ozark ARC
W0NA 438 2 23 1,396 MO
Fayette County Repeater Assoc
WI4R (+KB4YTR)
447 2 60 1,394 GA
Moosehorn ARC
AL7LE 375 2 12 1,392 AK
HOTARC
W5ZDN 311 2 15 1,390 NTX
Toronto ARC
VE3TNC 494 2 24 1,390 ON
Reno County Knsas ARA
W0WR (+KC0ABN)
392 2 25 1,384 KS

Radio Amateurs of Northern VT 1
W1KOO (+N1PDL)
448 2 5 1,382 VT
UHF Associates
WB6ZOD 373 2 6 1,374 ORG
Androscoggin ARC
W1NPP 343 2 30 1,368 ME
CVARC
W2UXC 331 2 30 1,364 NNY
Poway ARS
N6PWY 387 2 12 1,362 SDG
York County RA
WJ1L 164 5 9 1,350 ME
ARC of Augusta
W4DV (+KA3BIS)
373 2 24 1,350 GA
Hou Texins ARC
W5TI (+KD5GZL)
422 2 10 1,344 STX
Azalea Coast ARC
AC4RC (+KG4BUK)
311 2 30 1,342 NC
Non-Club Group
NJ1M 207 2 5 1,328 EMA
Mountain Valley ARC
WA2AEA (+KC2AIQ)
340 2 18 1,328 NNY
Seaway Valley ARC
VE3VSW 289 2 7 1,326 ON
Land of Lakes ARC
K9HD 426 2 10 1,322 IN
RESPOND of Arkansas
KC5TEL (+N5TKN)
355 2 31 1,314 AR
Transylvania County ARC
K4HXZ 365 2 10 1,310 NC
Wells County ARC
W9SR 300 2 12 1,306 IN
Independent RAI
K8KTY 326 2 17 1,304 OH
Rolla Regional ARS
W0GS 493 2 13 1,304 MO
Foothills ARC
W3LWW (+KA3NZH)
447 2 20 1,302 WPA
Penn-Ohio DXS
AA8QQ 323 2 4 1,302 OH
Central Dakota ARC
W0ZRT 650 2 25 1,300 ND
Ham Operators Group
K7HOG (+KC7YRL)
692 1 5 1,292 OR
Lapeer County ARA
W8LAP 446 2 12 1,292 MI
Chain O Lakes ARC
K8ZO 294 2 29 1,284 MI
Warren County ARES
WC8EMA (+KB8UOO)
392 2 10 1,284 OH
Sabine Valley ARA
W5A 217 2 21 1,280 NTX
Milford ARC
W8YDK (+K8PLW)
362 2 15 1,276 MI
Mich-A-Con & Iron Range ARC
WB8RFB 270 2 12 1,268 MI
Rhea County ARS
K4D (+KF4VLI)
275 2 30 1,264 TN
Non-Club Group
K9MAL 478 2 4 1,256 WI
Danville ARS
KQ4I 476 2 4 1,252 VA
Thunder Bay ARC
K8PA 574 2 10 1,248 MI
Powderhouse FD Group
AA1TF 391 2 6 1,248 ME
SEMARG
W1CG 482 2 9 1,246 RI
The Classic Bud Net
WA3KEY 338 2 6 1,246 EPA
Northrop Grumman RC
W6JR 421 2 15 1,242 LAX
Alamunce ARC
K4EG 209 2 8 1,236 NC
Stephen F. Austin RC
W5SFA 373 2 5 1,236 STX
Linn County ARES
WS0WA 610 2 18 1,230 KS
Grayson County ARC & Texoma ARC
KC5OLI (+KC5HRA)
287 2 18 1,224 NTX
Centralina ARC
K1BO 137 2 16 1,224 NC
Central Carolina ARS
WR4E 362 2 22 1,224 NC
Cape Ann ARA
W1RK 274 2 14 1,212 EMA
Olive Branch ARC
KN4Z 245 2 10 1,194 MS
Surrey ARC
VE7SAR (+VE7SSD)
394 2 9 1,192 BC
CARG
KR4IP 348 2 10 1,186 GA
Central Ontario ARC
VA3FIN 436 2 6 1,182 ON
Madison Cty ARC
W9VCF 319 2 10 1,180 IN
Juniata Valley ARC
K3DNA 297 2 13 1,178 WPA
Gastonia Area ARC
K4GNC 207 2 15 1,174 NC
South Hills ARC
KS3R 326 2 10 1,172 WPA
St. Peter ARC
WB0KGN 273 2 12 1,170 MN
Princeton ARS
AD4CM 226 2 15 1,166 KY
Georgia Radio Engineers and Techs.
N4VU 577 2 5 1,154 GA
PARS
K4DMW 340 2 14 1,154 KY

Circle M Radio Club
W5MOT 295 2 8 1,148 STX
Four Amigos FDG
W4IM (+N4EFK)
402 2 4 1,146 VA
Cass-Hubbard ARC
WF0Q 73 5 4 1,140 MN
Black Hills ARC
W0BLK 258 2 11 1,136 SD
Ontario RG
N2XV 468 2 4 1,136 WNY
Chesterfield ARES
AD4TM 277 2 31 1,130 VA
Champaign-Logan County ARC
W8EBG 248 2 7 1,120 OH
U. of M. ARC/ARROW Comm. Ass.
W8UM 310 2 9 1,116 MI
SEL
N7CE 130 5 8 1,115 ID
Tarsands ARC
VE6TRC 237 2 10 1,102 AB
Staten Island ARA
W2CWW 252 2 11 1,102 NLI
Hilltop Trans. Soc. & Keystone VHF
AD3E 400 2 7 1,100 EPA
Adams Co. ARC
W9DU 160 2 12 1,100 WI
EMC ARC
W1EMC (+KA1NLX)
289 2 9 1,096 EMA
Cheboygan County ARA
W8IDQ 447 2 5 1,094 MI
Macedonia ARC
W8ABZ (+N8CKG)
233 2 7 1,092 OH
FORM
WB6W 355 2 21 1,090 SCV
Bristol County Repeater Ass'n
W1ACT 329 2 5 1,086 EMA
Coos County RC
K7CCH 204 2 20 1,084 OR
Midland ARC
W8KEA (+N8NGQ)
283 2 26 1,084 MI
Meridian ARC
W5FQ 181 2 50 1,070 MS
Non-Club Group
AB7HP 233 2 12 1,066 ID
ARES Half Moon Bay
WR6HMB 303 2 6 1,066 SCV
MCRA Group
KB9AG 408 2 10 1,066 IN
Cross County ARA/Forrest City ARA
AC5EM 132 2 8 1,064 AR
Drumlins ARC
WA2AAZ 230 2 9 1,060 WNY
Fulton County ARC
K9ILS 328 2 14 1,056 IL
Irving ARC
N5BB 183 2 10 1,054 NTX
Kinston ARS
W4OIX (+KC4WVV)
325 2 10 1,050 NC
Finest Kind RA Operators
N7JRP 288 2 3 1,048 AZ
Barrie ARC
VE3GCB 369 2 11 1,044 ON
Grand Rapids ARA
W8DC 304 2 25 1,044 MI
Non-Club Group
W4VQB 306 2 7 1,044 SFL
Escondido ARC
N6WB 270 2 5 1,028 SDG
Oldham County ARC
K4EF 295 2 18 1,028 KY
North Mason ARES
NM7E 137 2 15 1,026 WWA
Sunshine Coast ARC
VE7SCA 206 2 18 1,018 BC
Huntington Beach RACES
K6RUB 158 2 25 1,016 ORG
Kettering Medical Center ARA
W8KMC (+KB8INH)
187 2 15 1,012 OH
Huntington Co. ARS
K9HC 252 2 20 1,004 IN
Eastern Upper Peninsula ARC
W8EUP 154 2 10 994 MI
So. Sierra ARS
W6QHD 149 2 12 984 SJV
Hermiston ARC
KK7RF 342 2 14 984 OR
Holiday City ARC
W2HC 160 2 10 962 SNJ
Squaw Island ARC
K2BWK 228 2 2 960 WNY
Columbia ARA
N3AC 277 2 12 946 MDC
Huron ARC
W0NOZ 222 2 13 944 SD
Interlake ARC
VE4IAR 198 2 11 936 MB
Coppell/DFW ARC
KJ5QQ 263 2 18 932 NTX
Yucaipa Valley ARC
KF6LLS 327 1 8 927 ORG
Valley ARA
N1RA 273 2 20 922 CT
Piqua ARC
W8SWS 153 2 14 906 OH
N2HLT Contest Team
NS9E 265 2 5 904 WNY
Kings ARC
KA6Q 252 2 20 904 SJV
Tri-Lakes ARC
WA2RP 242 2 10 904 NNY
Mt. Pleasant ARC
W0MME 330 2 9 896 IA
High Point ARC
W4UA 253 2 24 894 NC
Sooland ARA 1
KB0SYB 185 2 10 888 IA

Starkew AM Club
W9JOZ 305 2 5 884 IN
Hualapai ARC
WB6RER 242 2 15 884 AZ
Non-Club Group
KC9IL 328 2 3 876 IL
Renegades
N5NSC 146 2 5 872 STX
Coachella Valley ARC
K6BSC 236 2 7 872 ORG
Smoky Mtns. ART
KU4HA (+KF4LJV)
233 2 10 868 NC
SHBP&M
KB3BUE 259 2 6 860 WPA
Monroe ARC
WB4UFT 215 2 8 856 AL
Fort Pierce ARC
K4RS (+N4XEO)
219 2 20 844 SFL
Missouri Valley AR
W0NH 271 2 21 842 MO
Lea County Red Cross
KD5EWX 169 2 5 838 NM
Mountaineer ARA
W8SP 538 1 16 838 WV
Tech-Ni-Chat & Sedgwick RACES
WA0RJE 200 2 12 832 KS
Non-Club Group
KC7NFZ 156 2 3 816 EWA
Katy ARS
N5GR 80 2 20 810 STX
Area ARO
W9YPS 199 2 20 798 IL
Desert Dawgs
AC6RM 213 2 5 794 ORG
Carter County ARES Assoc.
KF4ZQA 186 2 15 792 TN
WPA Satern
W3SAT 178 2 13 780 WPA
Victoria ARC & Port Lavaca ARC
W5DSC 135 2 8 770 STX
Amador County ARC
K6ARC 202 2 26 768 SV
Clallam County ARC
W7FEL (+N7JAN)
134 2 34 746 WWA
Greater Collegedale Adventist RC
KM4VI 218 2 10 736 TN
Charlotte ARC
W4CQ 313 2 15 726 NC
Non-Club Group
KC8MKI 525 1 10 725 OH
Ellis County ARC
WD5DDH (+KD5AIA)2772 31 722
NTX
Susquehanna Valley ARC
W3VPJ 194 2 17 720 EPA
ROARS
AA6EE 291 2 17 708 SDG
North Country ARC
W2LCA 199 2 10 692 NNY
Ray-Clay ARC
K0ESM (+KB0QHW)
145 2 20 690 MO
Parry Sound ARC
VE3PSH 609 1 16 688 ON
Non-Club Group
KD0CL 386 1 10 688 MN
Washington ACC
WA3COM 232 2 22 686 WPA
Black Hollow ARA
W4CBM 252 2 10 684 VA
Sunday Creek AR Federation
KC8AAV 128 2 9 656 OH
Los Banos ARC
AD6AA 76 2 5 652 SJV
ECHO
WA1VUG 226 2 7 652 NFL
Hollywood ARC
WB4TON 112 2 26 648 SFL
Quality ARK
K7VIT 68 2 10 636 OR
Central Maryland ARC
KB3BLR 72 2 14 620 MDC
Franklin Co. RACES/ERRS Group
AB7GO 138 2 36 616 ID
Medina County ARC
KD5BFV 106 2 18 612 STX
Wedixie ARC
WB4MZO 55 2 4 610 GA
Border ARF
KB1BRN 186 2 5 606 VT
Woodford County ARC
KF4INN 51 2 12 604 KY
South Canadian ARS
W5OU (+KC5ABI)
284 2 27 594 OK
Chesco ARA
K3BKG 130 2 10 594 EPA
Non-Club Group
W6ALT 391 1 3 594 SJV
Kingston ARC
VE3UEL 97 2 12 594 ON
Wall Ridge Group
KD7DGX 193 2 5 586 EWA
Tennessee Tech ARS
WA4UCE 94 2 3 570 TN
Panorama Land ARC
K7JAR 108 2 5 568 EWA
Motorola ARC West Div.
W6MOT 182 2 4 564 SDG
Jasper ARS
KE9DK 276 2 3 552 IL
Creston Valley ARC
VE7RCA 69 5 7 545 BC
Neshoba ARC
AC5PC 113 2 19 526 MS
Delta Co. ARS
K8ZAS 163 2 6 526 MI
VA Digital Emergency Net ARC
K4VDN 10 2 2 520 VA

Cabarrus ARS
KT4GG 160 2 5 518 NC
Yellowknife ARS
VE8YK 100 2 3 500 NWT
Liverpool Amateur Repeater Club
W2CM 142 2 10 500 WNY
Field Day's Finest
WA9PYH 146 2 2 498 IN
CPD C5V's
KN6KH 198 2 16 496 ORG
Club de RA Outaouais
VE2CRO 243 2 30 486 QC
Natchaug 2 ARC
N1HUY 43 2 12 486 CT
Grand Mesa Contesters
W0AJ 126 2 4 452 CO
Our Gang AR Group
KO7G 118 2 3 436 NV
Macon ARC
W4BKM 215 2 6 430 GA
RAATLPC
KD6DAE 113 2 5 430 LAX
Non-Club Group
WB2UYR 206 1 6 408 ENY
Stanford ARC
W6YX 97 2 7 394 SCV
Desoto ARC
W4MIN 35 2 9 370 SFL
Chippewa ARC/ Brecksville VAMC
W8BAA (+KC8MMW)
62 2 5 348 OH
N.E. Kansas City ARC
KB0SYC (+KB0RQE)
72 2 8 344 MO
Cascade ARS
W8JXN 158 2 20 316 MI
Mississippi Coast ARA
AC5QJ 142 2 6 284 MS
Cassel ARC
WA6IOQ 101 1 2 219 SV
Yadkin Valley ARC
N4AAD 65 2 2 130 NC

3A

Twin Cities Repeater Club
W0BU (+K0ZDA)
4806 2 57 15,536 MN
McHenry County Wireless Assoc.
K9RN (+N9KTL)
5213 2 45 14,362 IL
Hudson Valley Contesters & Dxers
W2MU (+KB2HZI)
4527 2 14 13,162 ENY
Rochester (NY) DXA
W2RDX (+N2TWI)
3900 2 23 12,750 WNY
Sussex County ARC
W2LV (+KB2LHH)
3978 2 36 12,642 NNJ
Pikes Peak DX Group
W0GG (+KC0EDJ)
3976 2 19 12,548 CO
Cary ARC
N4NC (+W4FAL)
3400 2 29 11,634 NC
Radio Free Italy
W2RA 3613 2 14 11,586 WNY
Poughkeepsie ARC
N2YL (+KB2SSS)
3596 2 24 11,530 ENY
Southern Pennsylvania Comm. Group
K3AE (+N3ZQM)
5119 2 35 11,024 EPA
Summit ARA
K3ZZ (+N3DPB)
1597 5 12 10,970 MDC
OCARS
W8TNO (+KB8POD)
3869 2 40 10,650 MI
Southwest Missouri ARC
N0EA (+KC0DYP)
3324 2 45 10,548 MO
Power Alley DXA
NC9T 3443 2 15 10,350 IL
Billerica ARS
W1DC 2542 2 32 9,578 EMA
Framingham ARA
W1FY (+N1LOO)
2946 2 30 9,434 EMA
Delaware ARA
K8MP (+KC8LXU)
2302 2 20 8,998 OH
Capeway RC
W1AA (+KA1KTL)
2664 2 20 8,610 EMA
Providence Radio Assoc.
W1OP 2849 2 12 8,552 RI
Vicksburg ARC
W5XX (+K5NRK)
2713 2 35 8,274 MS
Southwest Idaho CG
NA7ID (+N7TOQ)
2719 2 9 7,880 ID
Garden State ARA
W2GSA 2629 2 50 7,846 NNJ
Anne Arundel RC
W3VPR (+KB3DQK)
812 5 38 7,720 MDC
Magnolia DXA
K5MDX (+N2PKW)
2139 2 20 7,614 MS
Scott County ARESC
N4TY (+KF4SKG)
2293 2 24 7,444 KY
Aironet ARC
WA8RCN 1835 2 10 7,336 OH
Roanoke Valley ARC
W4CA (+KF4PHW)
2417 2 37 7,274 VA
Loudoun ARG
K4LRG 1969 2 40 7,264 VA
Western Washington DXC
W7DX (+KD7FWQ)
2216 2 17 7,036 WWA
MURGAS ARC
K3YTL (+N3XIH)
2113 2 30 6,806 EPA
OH-KY-IN ARS
K8SCH (+KC8HQS)
2392 2 25 6,758 OH
Sarasota Emergency RC
WB4NJV (+KF4LQG)
1848 2 26 6,746 SFL
Redwood Empire DXA
W6KB 2263 2 10 6,736 SF
AR for Youth
W0YH 2860 2 6 6,660 CO
Lynchburg ARC
K4CQ (+KG4DEZ)
2309 2 75 6,568 VA
SOVARC
WT1B 2497 2 30 6,446 VT
Clairemont RA & Boeing ARC
W6VLD (+KC6ZOW)
2037 2 55 6,440 ORG
Baton Rouge ARC
W5GIX (+KD5HFF)
1743 2 47 6,430 LA
ARC of Parker County (TX)
W5PC (+N5ONE)
1695 2 25 6,362 NTX
Antelope Valley ARC
K6OX (+KF6UQI)
1974 2 60 6,306 LAX
Rappahannock Valley ARC
K4TS (+KF4BAN)
1445 2 15 6,230 VA
South Orange ARA
K6SOA (+KF6TIR)
2063 2 53 6,176 ORG
Central Oregon DXC
K7ZM 1861 2 9 6,100 OR
Radio Operadores del Este
WP4Q (+NP3EF)
1913 2 15 6,062 PR
L'Anse Creuse ARC
K8AYZ (+N8WXE)
1857 2 30 5,856 MI
Wilkes University ARC
K7SZ 664 5 4 5,840 EPA
Zamora ARC
W4ZHR 1522 2 42 5,820 AL
Franklin County ARC
AC1L (+N1XWZ)
1483 2 36 5,810 WMA
Geezer Natomas ARC
N0RM 1540 2 19 5,754 SV
Aiken Contest Club
N2ZZ 1523 2 5 5,616 SC
Reading RC
W3BN (+N3TLY)
1718 2115 5,592 EPA
Non-Club Group
N9DD 1233 2 3 5,542 IN
Port City ARC & Great Bay RA
W1WQM (+N1WBD)
1744 2 31 5,536 NH
Regina ARA
VE5NN 1495 2 18 5,490 SK
North Shore ARC
VE7NSR 1652 2 60 5,382 BC
Peninsula ARC
W4MT (+KF4POD)
1861 2 48 5,378 VA
Twin City Hams
W5EA (+K5JMR)
1675 2 30 5,252 LA
Amateur Radio Trans. Society
W4CN (+KD4EWU)
1500 2 39 5,180 KY
South Georgia ARC
W4B (+KF4NAT)
1613 2 15 5,132 GA
Pioneers ARC
W9DA 488 5 5 5,045 IL
Great Falls Area ARC
W7ECA (+K7LRF)
1363 2 26 4,972 MT
MMARC
W3CU (+N3LRP)
1423 2 37 4,960 MDC
ARA of Southwest FL
K4YHB (+WA3TIH)
1923 2 11 4,960 SFL
McKinney ARC
W5MRC (+N5ZLC)
1829 2 19 4,940 NTX
St. Louis QRP Society
NF0R 448 5 20 4,870 MO
Pocono ARK
W3PRK 502 5 20 4,860 EPA
Fannin Amateur Contest Team
N5YA (+N5IUA)
1666 2 15 4,842 NTX
Smoky Mountain ARC
W4OLB 1635 2 30 4,814 TN
Nittany ARC
W3YA 1464 2 15 4,738 WPA
Ski County ARC
K0RV 1752 2 21 4,726 CO
Orange County ARC
W6ZE (+KD6BWH)
2031 2 12 4,718 ORG
CMARC
W8MAA (+KC8CAJ)
1127 2 30 4,696 MI
Springhill ARC
N5II 1488 2 10 4,690 LA
Riverside County ARA
W6TJ (+KD6UVT)
1399 2 80 4,688 ORG
Jefferson County ARC
W7JCR (+KC7SUF)
1108 2 10 4,668 WWA
Lake County RACES/ARES Group
K9KM (+KB9DOD)
1385 2 25 4,626 IL
West Branch ARA
W3AVK (+KB3DRW)
1272 2 6 4,606 EPA
Livingston ARK
N8AP (+KB8ZRC)
1538 2 18 4,588 MI
East Alabama & Auburn Univ. ARC's
K4RY 1178 2 30 4,558 AL
HF Ops of Southwestern Ohio
KU8O 1440 2 15 4,508 OH
Stu Rockafellow ARS
W8NJH (+KA8NDI)
1630 2 32 4,484 MI
Franklin County ARC
W4FCR 1123 2 13 4,472 VA
Michiana ARC
W9AB (+KD6RXT)
1197 2 10 4,400 IN
Greater Norwalk ARC
W1NLK (+KA1TZR)
1467 2 45 4,326 CT
Lincoln County ARC
K1LX 1428 2 17 4,324 ME
Utah ARC
W7SP 1265 2150 4,318 UT
Nashville ARC
K4CPO (+KC4TMV)
1259 2 43 4,130 TN
Indian River ARC
W4NLX 334 5 16 4,100 SFL
TEAC
W5SI 1236 2 59 4,078 STX
Brazos Valley ARC
W5DPA (+KC5OIG)
843 2 35 4,010 STX
Foothills AR Society
K6YA (+KC6PUN)
1098 2 38 3,996 SCV
Non-Club Group
N7CR 991 2 3 3,968 LA
Radio Club of Tacoma
W7DK (+KC7VUQ)
1260 2 45 3,950 WWA
North Penn ARC
W3BTN 414 5 4 3,945 EPA
Peconic ARC (PARC)
W2AMC (+KB2YSM)
1250 2 47 3,942 NLI
Xerox ARC
W2XRX 1028 2 11 3,904 WNY
Nutley ARS
W2GLQ 1004 2 13 3,886 NNJ
Reservoir ARA
K8QYL (+N8OSE)
1137 2 26 3,872 OH
Kilocycle Club of Fort Worth
W5SH 1003 2 10 3,836 NTX
BFG Thunder ARC
WA9GWM (+KB9LJX)
1119 2 25 3,804 IL
Colo. QRP Club Aloha Site
AB0CD 406 5 17 3,775 CO
Magic Net
K9KE 693 5 6 3,765 IL
SBARA
KU6S (+KF6QAK)
1099 2 75 3,760 EB
Harvard Repeater
W1DVC 1107 2 20 3,752 WMA
Rip Van Winkle ARS
WD2K 1221 2 36 3,746 ENY
Fauquier ARA
W4FAU (+KG4DGM)
1001 2 16 3,736 VA
Larkfield ARC
WA2PNU 877 2 36 3,718 NLI
Carolinas CW Ops.
N5BI 341 5 4 3,710 NC
Puerto Rico ARL
KP4ES (+WP4LJG)
1145 2 25 3,692 PR
Monroe Co. Comm. Assoc.
W8DWL 1067 2 13 3,682 MI
Champaign Amateur Net
K8VOR 1516 2 37 3,654 OH
Chicago Suburban RA
AA9F (+KC9UMR)
1141 2 28 3,580 IL
DeKalb County ARC
K4AKC 501 5 16 3,565 AL
Tri-Town ARC
W9VT 1294 2 30 3,532 IL
Twin City ARC & Champaign Co ARES
K9CW 1314 2 20 3,526 IL
Pecos Valley ARC
W5ZU 964 2 35 3,524 NM
Santa Clara County ARA
W6UW 885 2 25 3,514 SCV
Chattanooga ARC
W4AM (+KB4QBO)
1051 2 49 3,502 TN
Green Valley ARC
N7GV 852 2 11 3,486 AZ
Bill Hoehl Mem. FDG
W4UOT (+KE4LPL)
1070 2 26 3,464 TN
WIARC
VE2CWI 1155 2 13 3,460 QC
Western Illinois ARC
W9AWE 1091 2 40 3,448 IL
Goddard ARC
WA3NAN (+KA3ZYX)
861 2 12 3,426 MDC
The 440 Group
WU9Z (+KB9JEL)
985 2 22 3,356 IN
Fallbrook ARC/Fallbrook HS RC
N6AT (+KD6AKT)
2 20 3,314 SDG
North Ottawa ARC
N8N (+KB8ODB)
1007 2 53 3,298 MI
Thin Air Radio Society
K0UE 1125 2 3 3,274 CO
DLARC
W3OK (+KB3CLQ)
1110 2 30 3,224 EPA
Endless Mts. ARC
N3EP (+N3MUV)
1138 2 11 3,216 EPA
Verde Valley ARA
W7EI 1254 2 54 3,202 AZ
Indiana County ARC
W3BMD (+N3JXR)
943 2 30 3,158 WPA
Troy ARA
N2TY (+KB2KFV)
984 2 45 3,136 ENY
Eastern New Mexico ARC
KC5TBT 1008 2 34 3,124 NM
Oak Ridge ARC
W4SKH 782 2 30 3,106 TN
Serious Hams ARC
K4PNS 926 2 12 3,094 NFL
Keowee Toxaway ARC
K4WD (+KE4ZWD)
1095 2 25 3,088 SC
OTVARC
W7OTV (+WA0BRU)
876 2 30 3,084 OR
Bristol TN/VA ARC
W4UD 1088 2 68 3,054 TN
Citrus Belt ARC
W6JBT (+KF6FZY)
786 2 50 3,054 ORG
Mt. Baker ARC
K7ZC 893 2 48 3,028 WWA
Kaw Valley ARC
W0CET (+KC0ADP)
1113 2 15 3,026 KS
Souris Valley ARC
K0AJW 891 2 20 2,994 ND
Punxsutawney Area ARC
K3HWJ 686 2 12 2,992 WPA
BARC Juniors
KI0NR (+KC0FGF)
850 2 47 2,980 CO
Greensboro ARA
W4GSO (+KG4AXV)
885 2 75 2,922 NC
Pasadena RC
W6KA (+KF6DSA)
1041 2 56 2,910 LAX
Ocean Monmouth ARC
N2MO 668 2 15 2,856 NNJ
Yonkers ARC
W2YRC (+N2ROD)
601 2 43 2,848 ENY
Mid-Atlantic ARC
W3NWA 1008 2 50 2,810 EPA
Matagorda County ARC
WA5SNL 641 2 8 2,804 STX
Yorba Linda RACES
KJ6FO 1030 2 12 2,760 ORG
Corona/Norco ARC
W6PWT 826 2 10 2,754 ORG
Non-Club Group
AA8RP 882 2 13 2,746 MI
Tamaqua Wireless Association
W3CMA 579 2 10 2,734 EPA
MARA
W8USA 726 2 30 2,726 MI
Tri County Radio Assoc. Inc.
W2LI 687 2 10 2,712 NNJ
York Region ARC
VE3YRA 836 2 32 2,712 ON
Jackson ARC
W5PFC (+KD5EDV)
815 2 28 2,680 MS
Winnipeg ARC
VE4BB 681 2 16 2,674 MB
Leslie Co. ARS
KF4TLT 654 2 14 2,656 KY
Kennehoochee ARC
W4BTI 700 2 24 2,648 GA
NMSU ARC
W5GB (+KC5VHQ)
863 2 10 2,628 NM
CHAT-HAMS
NE4T 960 2 17 2,620 NC
CCDX
AD1T 907 2 18 2,590 NH
Mt. Vernon ARC
K8EEN 634 2 20 2,586 OH
Disney Emergency ARS
W3GU 701 2 12 2,584 NFL
Non-Club Group
AC4Q 678 2 3 2,580 NC
RACK
W4BBB 591 2 50 2,536 TN
Arapahoe County ARES
N0AUS (+KB0HRX)
782 2 33 2,516 CO
Spokane County ARES/RACES
W7GBU 612 2 15 2,510 EWA
Wabash Valley ARA
W9UUU (+KB9RQH)
581 2 37 2,496 IN
Naval Postgraduate School ARC
K6LY (+KE6VNN)
667 2 34 2,472 SCV
San Fernando Valley ARC
W6SD 667 2 75 2,466 LAX
Covey Hill ARC
VE2CYH 591 2 12 2,434 QC
Metro/Wormhole/Scout Sertoma
W4ABC (+W4BNC)
797 2 27 2,432 SFL
District 13 ARES
N4S 855 2 15 2,410 VA
Santa Clarita ARC
W6JW (+N6ZYJ)
1479 1 58 2,407 LAX
Anthracite Repeater Association
W3SJI 681 2 10 2,406 EPA
Cedar Mountain ARC
KI7W 652 2 20 2,396 WY
South Baldwin ARC
W4INU (+KF4ZRE)
643 2 40 2,386 AL
Nacogdoches ARC
W5NAC 568 2 10 2,366 NTX
Cross County Simplex Group
KG9IY 793 2 15 2,346 IL
Barstow ARC
WA6TST (+KC6IIH)
589 2 30 2,340 ORG
Boy Scout Troop 775
N6MBR 366 5 40 2,330 LAX
Alamo Area RO
KC5NTN 492 2 31 2,328 STX
CMRA
K0SI 501 2 11 2,312 MO
Southern Pennsylvania RC
K3IR 698 2 32 2,302 EPA
Middle Georgia RA
WR4MG 739 2 60 2,278 GA
DeForest ARC
K8GE 630 2 30 2,256 OH
Northeast Missouri ARC
W0CBL (+KC0BGT)
674 2 18 2,254 MO
Treasure Valley RA
K7OJI 672 2 25 2,252 ID
Marin ARC
W6SG (+KD6WYE)
521 2 15 2,238 SF
Victoria Haliburton ARA
VE3LNZ 761 2 21 2,232 ON
Portsmouth ARC
W4POX 609 2 25 2,224 VA
Davenport RAC
W0BXR (+N0RWS)
657 2 25 2,214 IA
AF4LL Contest Group
AF4LL 903 2 12 2,206 KY
Lunienburg Co. ARC
VE1LUN 787 2 14 2,174 MAR
Non-Club Group
K2BJ 1042 1 7 2,166 WNY
PHDARA
W0TE 604 2 25 2,138 MO
Grand Strand ARC
W4GS 711 2 25 2,136 SC
A.B. Normal Group
AF8ET 309 5 3 2,135 OH
Hernando County ARA
WB4NOD 466 2 25 2,120 NFL
Sun Country ARS
N4KIM 258 5 5 2,120 NFL
Playground ARC
W4ZBB 503 2 24 2,102 NFL
Boston ARC
W1BOS 382 2 25 2,096 EMA
South Brevard ARC
N4MIR (+KD4JRJ)
423 2 11 2,094 SFL
Tri-City ARC
W7VPA 542 2 24 2,072 EWA
RA of Skagit County
KG7B 436 2 15 2,066 WWA
Pioneers of Telephone ARC
VE2CPT 569 2 9 2,050 QC
Gratiot County ARA
NO8V 641 2 8 2,044 MI
Elecraft/Sierra RA
N6KR 272 5 15 2,025 SCV
CCARS
W4YMI (+KF4GID)
689 2 20 2,010 NC
BDTRS
KE6F 608 2 18 1,988 SV
Jones County ARC
NN0L 760 2 11 1,986 IA
Humboldt ARC
W6ZZK 649 2 12 1,982 SF
LVSRA + AARG
K3LV (+KB3API)
629 2 36 1,976 EPA
Hull Neck ARC
K4AAB 735 2 15 1,964 VA
Charlotte ARS
W4OQ 475 2 24 1,940 SFL
Kansas Nebraska RC
KQK5N 435 2 30 1,936 KS
Northside ARC
AA0NC (+N0QVO)
618 2 20 1,926 MO
St. Charles ARC
NF0Q (+N0PTN)
392 2 22 1,922 MO
Horseshoe ARC & Dividing Ridge ARC
W3QZF 468 2 52 1,910 WPA
Monessen ARC
W3CSL 499 2 52 1,896 WPA
Bluff ARC/Dexter ARC
N0GK 464 2 21 1,888 MO
Ladies ARA
K0VA 363 2 21 1,880 ORG
CIRAS/TARS
WB0RMT 671 2 10 1,872 IA
Pymatuning ARC
N3PY (+W3NNW)
631 2 8 1,862 WPA
North Shore ARC
VE3NSR 610 2 25 1,856 ON
Lake Area Radio Klub
W0WTN 453 2 10 1,850 SD
Orange County RACES
AB6E 473 2 25 1,842 ORG
MITRE Bedford ARC
W1ON 410 2 13 1,818 EMA
Club Radio Amateur de Quebec
VE2CQ 462 2125 1,818 QC
Portand AWA
W1KVI 678 2 15 1,788 ME
Satellite ARC
W6AB (+KA6YRJ)
622 2 10 1,786 SB

Scranton Pocono ARK
K3CSG (+KA3IRP)
555 2 14 1,786 EPA
Peace Country ARC
VE6BLK 511 2 40 1,780 AB
Non-Club Group
W7TCK 537 2 33 1,774 MT
Southern Alberta ARC
VE6RAC 408 2 65 1,764 AB
Walla Walla Valley ARC
W7DP (+KD7FMQ)
361 2 23 1,760 EWA
Irvine Disaster Emergency Comm.
N6IPD 434 2 50 1,758 ORG
Mid-Island ARC
NY2MI (+KC2CGX)
443 2 21 1,746 NLI
SONRA DX Group
VO1AA 386 2 12 1,744 NL
Linn County ARC
N0LC (+KB0VWT)
515 2 15 1,730 MO
Rahway Office of Emergency Manageme
N3HTZ 711 2 9 1,722 NNJ
Rowan ARS
W4EXU 444 2 15 1,718 NC
Bloomfield ARC
W1CWA 426 2 12 1,716 CT
Nestle ARC
WF6W 317 2 16 1,700 LAX
West Morris WS and Roxbury OEM
WG2J 747 2 10 1,694 NNJ
Seneca RC
W8ID 333 2 15 1,690 OH
Chaparral ARC
K5USN 330 2 25 1,674 STX
Sumter County ARC
KE4ROA 630 2 14 1,672 AL
Non-Club Group
W7AQ 530 2 12 1,670 EWA
Mountain State Transmitters
K8VNQ 392 2 20 1,658 WV
BARK
W0FS (+N0NEQ)
378 2 10 1,654 IA
Okaw Valley ARC
W9JF 523 2 10 1,646 IL
Orchard City ARC
VE7OGO 316 2 10 1,626 BC
Utah Box Elder Thiokol ARC
K7UB 492 2 30 1,622 UT
Tristate ARA
W8VA (+KB8EHJ)
358 2 20 1,618 WV
Red River Valley ARC
WB5RDD 407 2 14 1,618 NTX
Naval Research Lab ARC
W3EW 377 2 9 1,604 MDC
Hendricks Co. ARS
N5CEC 464 2 40 1,600 IN
Kaskaskia Valley ARC
KB9TMS (+N9LVZ)
483 2 5 1,566 IL
Peoria Area ARC
W9UVI (+N9HHU)
446 2 25 1,554 IL
Sheridan RA League
W7GUX 353 2 5 1,550 WY
West Georgia ARS
W4FWD (+KD4YDA)
466 2 9 1,532 GA
Tri-City ARC (CT)
W1QV 274 2 28 1,516 CT
Teagarden ARS
N9XRH 500 2 4 1,500 IN
Hub City ARC
WB0JZZ (+N9TDE/0)
381 2 12 1,486 SD
Lincoln County Volunteer Comm.
NC4LC 491 2 27 1,482 NC
Umpqua ARC
KK7SF 461 2 28 1,482 OR
McPherson ARC
W0TWU 479 2 10 1,470 KS
Non-Club Group
K6VWL 111 5 5 1,465 SDG
Pamlico ARC
K4BCH 292 2 20 1,440 NC
Mid State ARC
K9XV 468 2 38 1,440 IN
Denver RC
W0TX 352 2 11 1,440 CO
Valley of the Moon ARC
W6AJF 432 2 20 1,438 SF
Shenandoah Valley ARC
W4RKC 335 2 15 1,434 VA
Amateur Radio and Youth
WA8RAY 406 2 30 1,434 MI
Wayne ARC
KB8LNP (+K8FXE)
364 2 30 1,428 OH
Cherokee Capital ARS
KF4WOC 224 2 20 1,424 GA
Cape May County ARC
N2CMC 275 2 15 1,406 SNJ
Crawford ARS
W3MIE 342 2 25 1,400 WPA
Mountain ARC
W3YMW 327 2 15 1,394 MDC
Mason County ARC
N7SK 239 2 22 1,390 WWA
Highland Lakes ARC
N5KU (+N6RRJ)
323 2 20 1,388 STX
Non-Club Group
W7UJ 438 2 3 1,386 EWA
NASA Glenn ARC
NA8SA 453 2 25 1,384 OH
Pen Bay ARC
W1PBR 343 2 20 1,376 ME
Non-Club Group
KB9NSD 387 2 11 1,374 IN
Fir Lawn ARC
W2NPT 421 2 18 1,372 NNJ
Hill Country ARC
N5HR 334 2 22 1,368 STX
Newport County Radio Club
W1SYE 676 2 13 1,364 RI
Shuswap ARC
VE7RAW 276 2 21 1,336 BC
Tri-State ARA of West VA
N8ZMO 312 2 10 1,334 WV
Non-Club Group
WA5BXO 365 2 10 1,332 STX
Aero ARC
W3PGA 403 2 12 1,328 MDC
Skyline ARC
K2IWR 308 2 21 1,324 WNY
Sema-Gema-Wema RACES-ARES
KB1CDL 260 2 16 1,320 WMA
Ericsson Triangle ARC
W4EUS 402 2 10 1,304 NC
Randolph ARC
WD4EXK (+KE4BKW)
369 2 11 1,298 NC
Casper ARC
W7UNJ (+KD7EFQ)
338 2 20 1,290 WY
ARC of Savannah
W4HBB 334 2 19 1,284 GA
Burlington County RC
K2TD 306 2 23 1,282 SNJ
Key West ARC
W4LLO 197 2 12 1,274 SFL
Dubois Co. EMA
AA9WD 335 2 22 1,270 IN
Union City ARES/RACES
N6ZIP (+KC6IPO)
296 2 15 1,262 EB
LAARC
KB9LBR (+KB9QLN)
354 2 30 1,256 WI
SPEARS
KD5GMG (+K5S)
246 2 15 1,248 STX
Marquette County ARES
KG9OG 268 2 6 1,244 WI
High Desert Hams
AB7VL 270 2 8 1,242 NV
Yarmouth ARC
VE1GX 314 2 16 1,240 MAR
Puget ARS
K7PAR 318 2 20 1,236 WWA
Greers Ferry ARC
W5GFC 261 2 22 1,230 AR
Fleet ARC
W5II 459 2 10 1,226 STX
PEARS
WZ4DX 412 2 6 1,224 VA
Greenwood ARS
W4GWD 310 2 12 1,222 SC
Greene County ARA
KB3AAG 164 5 10 1,220 WPA
Cumberland Valley ARC
W3ACH 343 2 21 1,218 WPA
Mission/Abbotsford ARES
VE7IBJ 298 2 23 1,212 BC
Non-Club Group
N0STR (+KB0MPN)
355 2 55 1,210 MO
Non-Club Group
VY0O 698 1 10 1,203 NWT
Thornhill RAC
VE3RAT 334 2 12 1,202 ON
Brattleboro ARC
W1FPS (+N1UOR)
290 2 7 1,180 VT
Boyer Valley ARC
KB0PEM 382 2 17 1,164 IA
Non-Club Group
KC0DIV 240 2 11 1,134 KS
Chehalis Valley ARS
WA7UHD (+KC7QHJ)
303 2 30 1,126 WWA
Whidbey Island ARC
W7PN 106 2 7 1,120 WWA
Pike County ARC
W9UL 158 2 13 1,116 IN
Pyro-Prosser Youth Radio Org.
KC7QHH 297 2 8 1,098 EWA
Northern California Chaverim ARC
W6ZG 164 2 15 1,070 SCV
Buffalo/Lebanon ARC's
K0LH (+KB0YCA)
232 2 25 1,064 MO
Rural ARA
N7R 209 2 8 1,064 NV
Holmesburg ARC
W3P 156 2 25 1,052 EPA
Missing Keys ARC
KZ5RW 353 2 7 1,040 AZ
Brantford ARC
VE3BA 363 2 8 1,026 ON
Elgin ARS
VE3RSE 302 2 20 1,016 ON
Siloam Springs ARC
KC5YZI 306 2 11 1,012 AR
FYI ARC
W4FYI 260 2 7 1,012 KY
Indy Mid-Town ARC
NE9T 230 2 9 980 IN
Elkhorn Valley ARC
W0OFK 172 2 14 944 NE
Eastland County Radio Group
KB5WB 166 2 10 932 NTX
Corning ARA
N2IED (+N2YQL)
163 2 9 926 WNY
Sooke Hams
VE7RO 260 2 5 920 BC
Metropolitan ARC
K8NOW 306 2 7 912 MI
Bootheel ARC
KB0UFL 70 2 6 888 MO
Eastern Ozarks ARC
AF0J 387 2 15 878 MO
Wireless Assoc. of South Hills
N3SH 358 2 25 846 WPA
Foothills ARS
VE6HRA 156 2 25 812 AB
Wolseley Repeater Group
VE5WRG 112 2 8 792 SK
Peninsula Radio Operators Society
KY3S 205 2 18 752 MDC
Hurst ARC
K5JR 164 2 8 728 NTX
Montcalm Area ARC
N8MA 213 2 15 726 MI
Lower Columbia ARA
W7DG 168 2 12 724 WWA
Wexaukee ARC
K8CAD 204 2 12 708 MI
Menomonee Falls ARC
K9RHH 247 2 9 694 WI
SCARE
KM7P 186 2 7 672 OR
Disney Ears
WD6MM 134 2 12 668 LAX
Big Sandy ARC
K4PGA 440 1 8 640 KY
Bluestone ARC
N8NUI 68 2 15 636 WV
Sugar Creek Repeater Assoc.
WA9AYK 100 2 9 600 IN
Athens ARC
AA5TI 165 2 22 538 NTX
Brookings Radio Research Club
W0BXO 162 2 12 524 SD
Pine Log Mtn. Repeater Group
K4PLM 85 2 12 470 GA
Maple Ridge ARC
VE7CML 252 1 10 398 BC
CW Group Digital Wireless Assoc.
N8CWG 145 2 5 374 OH
Concordia University ARC
VE2CUA 172 2 3 344 QC
Non-Club Group
KC7VFX 71 2 12 180 MT
Cold Lake ARA
CF6CL 158 1 8 163 AB

4A

Kettle Moraine Radio Amateurs
N9KS (+KA5QGR)
4372 2 20 12,888 WI
Twin State RC
W1FN 3917 2 26 11,772 NH
Scottsdale ARC
K7TR (+KB7YEB)
3524 2 30 10,494 AZ
WECA
N2SF 3277 2 10 10,480 ENY
Portland ARC
W7LT 1204 5 40 10,145 OR
Sturdy Mem. Hospital ARC
W1SMH (+KB5TBB)
3086 2 28 9,720 EMA
Pentucket RA
K1RX (+N1VDX)
2567 2 30 9,098 EMA
Ozaukee RC
W9LO (+N9QQA)
2554 2 42 8,580 WI
Boeing Employees' ARS
W0MA 2471 2 27 8,450 MO
Two Rivers ARC
W3OC (+KB3ROX)
2406 2 41 8,428 WPA
Stones River ARC
K4FUN (+WB4BLY)
2274 2 65 8,318 TN
Old Barney ARC
N2OB (+N2IRM)
2684 2 30 8,204 SNJ
Dickson County ARC
NY4N (+KC4FMU)
882 5 15 7,530 TN
Montachusett ARA
W1GZ 771 5 17 7,510 WMA
Peel ARC
VE3XR 2647 2 54 7,440 ON
Zuni Loop Mountain Exp. Force
K6ZNI 769 5 7 7,420 LAX
Boca Ratan AR Cooperative
K4LM 2301 2 45 7,208 SFL
CRA Laval Laurentides
VE2CRL 2282 2 17 7,174 QC
Non-Club Group
N3SD (+N3OJL)
2237 2 16 6,630 WPA
Cherryland ARC
W8TCM (+K8OTA)
2655 2 41 6,524 MI
Nassau ARC
K2VN (+N2RDB)
1891 2 40 6,370 NLI
Lake Monroe ARS
N4EH (+KE4BEZ)
1633 2 57 6,328 NFL
Virginia Beach ARC
W4UG (+KA4PMD)
1906 2 30 6,030 VA
Sioux Empire ARC
W0ZWY (+N0IHX)
1972 2 25 5,872 SD
Van Wert ARC
W8FY 1983 2 26 5,700 OH
Butler County AR Public Service
K3PSG (+WA3KOI)
1734 2 30 5,460 WPA
Columbia Montour ARC
WC3A (+KB3CXP)
1671 2 21 5,342 EPA
Albany ARA
K2CT (+WB2AJS)
1490 2 62 5,146 ENY
Orange Park ARC
K4BT 1631 2 22 5,134 NFL
Nevada Bad Boys
K7NBB (+N7BUZ)
1355 2 17 5,058 NV
Long Island Mobile ARC
W2VL 1462 2112 5,004 NLI
Contoocok Valley RC
K1BKE (+WA1VKO)
1927 2 10 4,814 NH
Six Meter Club of Chicago
K9ONA 1367 2 25 4,766 IL
Grapevine ARC
NF5W 1495 2 11 4,726 NTX
Greater Vancouver Radio Group
VE7FYY 1618 2 27 4,716 BC
Delta ARC
W4BS (+KD4TJO)
1272 2 40 4,468 TN
Westark Radio Council
K5A (+KB5PWK)
1472 2 26 4,344 AR
Key City ARC
N0TX (+KC5FFD)
1171 2 28 4,166 WTX
Non-Club Group
AA5MT 1306 2 12 4,130 MS
FMARC
W4LX (+KE4HXP)
1243 2 30 4,130 SFL
Maury ARC
W4GGM (+KE4VBG)
1279 2 50 4,126 TN
Hamilton ARC
VE3DC 1398 2 22 4,110 ON
Piscataway & Rutgers ARC
K2VOA (+WA2NPP)
1616 2 25 4,110 NNJ
ARC of Anderson/Shasta Cascade ARS
NC6I (+KF6FEI)
1335 2 60 3,906 SV
Lockheed Martin ARC
W5IU (+N5SLX)
2758 1 30 3,798 NTX
Golden Triangle ARC
ND6N 1161 2 25 3,788 ORG
Delco, Marple, Mobile Siters ARC's
K3MN (+N3KWQ)
908 2 57 3,670 EPA
Columbia AR Project
N7GR 866 2 8 3,660 WWA
Plateau ARA & Black Diamond ARC
NM8T (+KC8GGF)
1545 2 24 3,648 WV
SCATS
WB6LRU (+KF6ICD)
1171 2 25 3,518 LAX
Island County (WA) ARC
W7AVM 667 2 63 3,468 WWA
Johnson County RAC
W0ERH (+KC0EMZ)
846 2 20 3,428 KS
Alliance ARC
W8LKY 830 2 19 3,324 OH
Chester County ARES RACES
W3EOC 814 2 18 3,314 EPA
San Gabriel Valley RC
W6FU (+N6HOH)
825 2 27 3,262 LAX
San Jose ARES/RACES
K6VIP 910 2 32 3,260 SCV
RA of Western NY
W2PE 778 2 15 3,200 WNY
Simi Settlers ARC
W6SVS (+KD6UQB)
942 2 40 3,172 SB
Victor Valley ARC
K6QWR 1176 2 45 3,156 ORG
Chesapeake Bay RA
KA4W 745 2 30 3,126 MDC
Butler County ARA
W3UDX 894 2 10 3,112 WPA
Ramapo Mountain ARC
WA2SNA 861 2 10 3,084 NNJ
Brockport ARK
K2BRK 320 5 11 3,065 WNY
Burnaby + New Westminster ARC
VE7BAR 910 2 30 3,050 BC
Silvercreek ARA
N8CD (+KC8DKG)
1077 2 15 3,046 OH
Federal Way ARC
KD7DPL 817 2 20 3,036 WWA
West Jersey DX Group
W2CG 683 2 8 2,904 NNJ
Arizona ARC
W7IO 912 2 20 2,840 AZ
South Berkshire ARC
W1BAA 670 2 15 2,796 CT
Pioneer AR Fellowship
KB8ZAM 884 2 24 2,752 OH
Tri-County CW ARC
KB3CMW 748 2 19 2,690 WPA
Pawtuxet Valley ARC
KE1BY (+N1RPV)
683 2 8 2,680 RI
Lincoln ARC
K0KKV 830 2 30 2,652 NE
Garlic Valley ARC
W6GGF 744 2 17 2,650 SCV
South Bay ARS
K6QM 549 2 23 2,646 SDG
Beloit AR. RC
W9JSN 1021 2 6 2,642 IL
Golden Empire ARS
W6RHC (+KF6LOP)
878 2 45 2,626 SV
Genesee County RC
W8ACW 564 2 10 2,594 MI
Lockheed Martin RC
W4LMA 669 2 32 2,572 GA
Pinery Road ARC
N9TD (+K9UJH)
553 2 13 2,532 WI
Milledgeville ARC
W4PCF 787 2 31 2,506 GA
Des Moines RAA
W0AK 664 2 33 2,456 IA
Campbell Cty ARC
AC4YA (+KB4ZCL)
863 2 38 2,428 TN
Waterville Area Wireless Assoc.
WA1WA 621 2 12 2,414 ME
Pilot Knob ARC
AA0LV (+KC0CLX)
690 2 15 2,382 KS
Palisades ARC
W9BPT 735 2 22 2,366 IL
Broward County ARES/RACES
N4CU 511 2 32 2,350 SFL
Watauga ARC
K4PC (+KF4JNP)
599 2 22 2,334 NC
Southborough Rod & Gun ARC
W1SRG 694 2 8 2,334 WMA
Fredericton ARC
VE9ND 597 2 18 2,294 MAR
North Shores ARC
K6HAI 565 2 22 2,288 SDG
Massasoit ARA
W1MV 666 2 19 2,274 EMA
Lincoln County ARC
K7AM 707 2 13 2,272 OR
QCWA 162 WI
K9AKG 205 5 11 2,250 WI
Natchaug 1 ARC
N1EI 255 5 20 2,210 CT
Tompkins County ARC
KC2EOS 870 2 23 2,168 WNY
Central CT ARC
K1HEJ (+N1IWT)
361 2 20 2,114 CT
Clearwater ARS/St. Pete ARC
K4JMH 635 2 50 2,110 SFL
First State ARC
K3QBD 915 1 19 2,110 DE
Southern Counties ARA
K2BR 511 2 25 2,070 SNJ
Kawartha ARG
VE3KRG 418 2 20 2,052 ON
NBC ARC
N2EW 691 2 5 2,046 LAX
Disaster & Comm. Team of TX
KK5CA (+WB5TJV)
554 2 12 1,962 STX
Central Massachusetts ARA
W1BIM 499 2 10 1,960 WMA
Blount Co. ARC
W4BLT (+KE4SKI)
546 2 37 1,918 AL
WR4PKZ Foothills ARC
KO4MZ 638 2 7 1,914 SC
Sweetwater County ARC
WY7U 368 2 11 1,896 WY
Ottawa Valley Mobile RC
VE3RAM 427 2 20 1,860 ON
20/9 ARC
K8TKA 414 2 24 1,860 OH
St. Croix Valley ARC
VE1IE 391 2 12 1,860 MAR
Norwesco ARC
K9LX 429 2 21 1,858 WI
Bears of Manchester
W1BRS 566 2 10 1,858 CT
Titusville ARC
W4CEL 508 2 20 1,830 SFL
Intercity ARC
W8WE 375 2 25 1,830 OH
Southwest Metro ARTS
N0EN 476 2 41 1,806 MN
Lagunatics
K6PD 402 2 5 1,804 SDG
Beach Cities Wireless Society
K6WO 499 2 16 1,770 ORG
Sierra Foothills ARC
W6RFF 442 2 23 1,754 SV
Illinois Valley RA
K9AVE 500 2 10 1,742 IL
LaGrange ARC
AE4YZ (+KD4HJD)
530 2 25 1,740 GA
Okeechobee ARC
KF4BPX 658 2 12 1,726 SFL
Starved Rock RC
W9MKS (+KB9IDW)
457 2 20 1,716 IL
SARA/ So. IL Univ. ARC
W9UIH (+KB9APC)
482 2 42 1,664 IL
JARC & 4SARC
W0IN 442 2 18 1,648 MO
Honeywell Hams
KJ7QO 620 2 38 1,644 AZ
Stubblefield
KY4E 436 2 17 1,638 KY
Manatee ARES & ARC
K4GG 340 2 19 1,558 SFL
The Bazooka Group
AA9UF 355 2 6 1,556 IL
Diamond Bar ARS/Tri-County ARC
K6EOC 358 2 21 1,556 LAX
Hall of Science ARC
WB2JSM 259 2 15 1,470 NLI
Russell County ARC
KK4MW 373 2 12 1,446 VA
Schoharie County ARA
WA2ZWM 318 2 18 1,436 NNY
River City ARCS
N6NA (+WB6YLK)
340 2 30 1,384 SV
Lassen ARC
K6LRC 301 2 22 1,378 SV
McMinnville ARC
K7FM 464 2 25 1,364 OR
Buckhorn Field Day Group
K7YJ 374 2 8 1,362 CO
Alexander County ARS
AE4GA 264 2 25 1,336 NC
Sacramento ARC
W6AK 254 2 15 1,250 SV

Chenango Valley ARA
AA2YG 267 2 20 1,216 WNY
Ventura County ARC
K6MEP (+KD6PQF)
238 2 17 1,176 SB
Ada ARC
WT5X 271 2 20 1,158 OK
Madison-Oneida ARC
W2MO 219 2 25 1,140 WNY
Clark County ARC
W7AIA 191 2 10 1,130 WWA
Inter. Assoc.for Astro. Studies
KB0UAA 308 2 20 1,116 CO
Saint John ARC
VE9SJA 235 2 19 1,070 MAR
Radio Amateurs of the Gorge
KC7KLB 136 2 6 974 OR
Rockland Wireless RC
KB2UYH 235 2 9 942 ENY
Blue Springs ARC
KB0VBN 261 2 5 922 MO
Orange County ARC
W2HO (+W2WHO)
110 2 15 856 ENY
Englewood ARA
W2RJ (+W2IUI)
141 2 8 788 NNJ
50MHz and Up Group
KK6MK 39 5 12 695 SCV
Quaboag Valley ARC
W1NP 251 2 10 502 WMA

5A

Cherryville Repeater Assn.
W2GD (+K2YSY)
6566 2 42 20,520 NNJ
Huntsville ARC
K4BFT (+KD4FGL)
4450 2 75 13,644 AL
Western ARA
N6ME 4288 2 28 13,564 ORG
Durham Region QRP Club
VE3QOR 1241 5 12 12,155 ON
The Udder Club
W1MOO 4056 2 46 11,700 VT
Red Cedar/Red Ryder
W8MJ 3664 2 19 11,248 MI
Ak-Sar-Ben ARC
K0USA 3956 2 46 10,686 NE
RF Hill ARC
W3AI 2881 2 35 9,344 EPA
Hoodview ARC
W7Q 2759 2 43 8,648 OR
Cuyahoga Falls ARC
W8VPV (+KC8JYU)
3079 2 40 8,578 OH
Palomar ARC
W6NWG (+KF6NMA)
2827 2 49 8,376 SDG
Pocatello ARC
N7PI (+KC7ESB)
2537 2 16 7,880 ID
Eastern CT. ARA
K1MUJ 2315 2 12 7,542 CT
Hazel Park ARC
W8HP (+N8TMQ)
2434 2 60 7,366 MI
Mt. Diablo ARC
W6CX 2405 2 28 7,048 EB
Orange County RA
W4EZ (+KG4BHW)
850 5 25 7,025 NC
San Andreas Faultline Survivors
W6SW 2265 2 10 6,866 SJV
United Radio AC
K6AA (+KF6BFW)
2432 2 30 6,746 LAX
Phil-Mont Mobile RC
W3EM 1743 2 27 6,250 EPA
Schenectady ARA
K2AE 1630 2 10 6,160 ENY
Boeing Employees ARS
K7NWS (+N7YKH)
1563 2 55 6,010 WWA
Penn Wireless Assoc
W3SK 1461 2 19 5,594 EPA
DuPAGE ARC
W9DUP 1620 2 20 5,450 IL
Mount Tom ARA
W1TOM 2059 2 24 5,230 WMA
Cuyahoga ARS
K8ZFR 1391 2 25 5,230 OH
Raleigh ARS 1
W4DW 1904 2 28 5,092 NC
Winston-Salem Courteous Ops. Club
W4WS 1588 2 7 4,942 VA
Kokomo ARC
W9GO (+N9XLZ)
1299 2 18 4,796 IN
Valley Radio Club of Oregon
W7PXL 1206 2 35 4,288 OR
London ARC
VE3LON 1303 2 25 4,162 ON
Radio Assoc of Erie
W3GV 1107 2 11 4,138 WPA
Bergen ARA
K2BAR 1280 2 23 4,130 NNJ
Frontier ARS
N7W (+N7PLF)
1088 2107 4,030 NV
ARECComm
KA9IMX 1088 2 25 3,978 IL
Arenac Bay Tuscola Field Day Group
N8ZE 1110 2 36 3,920 MI
Warren ARA
W8VTD 863 2 7 3,850 OH
Grunman ARC & Suffolk County RC
WA2LQO (+N2ZDH)
981 2 35 3,836 NLI
Great South Bay ARC & Babylon ARES
W2GSB (+KB2ZGS)
1185 2 43 3,680 NLI
Western Carolina ARS
W4MOE 1176 2 75 3,676 NC
Catalina RC
W7SA (+N6KIV)
1062 2 20 3,376 AZ
Illinois Valley ARC/Jacksonville AR
W9HUX (+KB9KHU)
804 2 20 3,340 IL
Cambridge ARA
W8VP 878 2 19 3,340 OH
South Central & Anchorage ARC
KL7G 1547 1 60 3,238 AK
Southern Michigan ARS
W8DF 907 2 65 3,020 MI
South Bay ARC
W5ATT (+KA6ZTO)
771 2 26 2,990 LAX
Cambridge ARC
VE3SWA 931 2 5 2,978 ON
McDowell ARA
W4HOG (+KG4DSQ)
933 2 18 2,976 NC
Icom EARS
N7IH 823 2 15 2,902 WWA
Whitman ARC
WA1NPO 738 2 23 2,856 EMA
Shoreline ARC
W1BCG 828 2 30 2,830 CT
M-STARS
K7UN (+KD7BCC)
881 2 35 2,720 OR
Southern California Japanese HC
K6JP (+KA6PUW)
715 2 15 2,708 LAX
Markham ESDA/AREA Repeater Club
W9YPC 764 2 15 2,628 IL
North Coast ARC
N8NC 344 5 22 2,620 OH
Hi 5 Wireless Society
KQ6AR 692 2 10 2,606 SCV
Big Rapids Area ARC
K8N 797 2 30 2,590 MI
Michiana ARG
NI9A (+KB9GKB)
667 2 36 2,518 IN
Sandusky Valley ARC
W8NCK 441 2 18 2,406 OH
Everglades ARC
W4SVI 597 2 45 2,374 SFL
Kimberling ARC
K0EI 444 2 25 2,292 MO
Greene Co. ARA
KB9HIK 789 2 15 2,278 IN
Mystic Valley ARG
N1MV 438 2 14 2,278 EMA
North Hills ARC
N3EXW (+N3WJL)
452 2 51 2,202 WPA
Hood County ARC
KC5ORS (+N5YXO)
787 2 20 2,174 NTX
Arlington Communication League
KD9XR 711 2 10 2,122 IL
Orlando ARC
W4PLB 545 2 80 2,056 NFL
Inland Empire ARC
W6IER 407 2 30 1,974 ORG
Iriquois-Ford ARS
W9NKX 669 2 5 1,956 IL
Sun Parlour Retirees ARC
VE3WRC 522 2 15 1,918 ON
Central Oregon Radio Amateurs
N7TYO 228 5 14 1,860 OR
East River ARC
W8MOP 361 2 35 1,848 VA
Wisconsin Valley RA
W9SM 593 2 20 1,838 WI
Tri-County ARC
NC4AR 487 2 18 1,804 NC
Durham Frequency Modulation Assoc.
WR4AGC 397 2 10 1,772 NC
Highlands County ARC
W4F (+KF4XJ)
323 2 10 1,770 SFL
Middlesex ARS
W1EDH 372 2 22 1,756 CT
ICARES
K6YV 531 2 20 1,662 SJV
Ft. Armstrong Wireless Assoc.
N3VA 512 2 21 1,626 WPA
Eastern Ontario ARC
VE3SAU 445 2 13 1,590 ON
Hayward RC
K6EAG 356 2 11 1,474 EB
Granville ARC
KR4WU 303 2 11 1,414 NC
Radio Operators of South Texas
W5ROS 348 2 9 1,396 STX
Calaveras ARS
WA6YGA 298 2 27 1,396 SJV
Roane County ARC
AJ4B 299 2 19 1,334 TN
Wilton ES & Saratoga RACES
WA2UMX 488 2 20 1,308 ENY
Kings County RA ARC
WA2ZWP 336 2 38 1,272 NLI
Toledo Mobile RA
W8HHF 261 2 30 1,222 OH
Radio Amateur Educational Society
VE6RES 118 2 11 1,100 AB
Foundations ARS
W4FBC 139 2 20 1,078 NC
Cascade ARS
KE7BK 145 2 25 998 OR

6A

Mike and Key ARC
K7LED (+K7RIC)
3060 2 80 9,710 WWA
South Jersey RA
K2AA 3035 2 25 8,746 SNJ
Fox River Radio League
W9CEQ (+KB9KFE)
2218 2 30 7,052 IL
Tri-City ARC & Explorer Post 30
KC0M 1295 2 18 5,476 MO
Santa Cruz County ARC
K6BJ (+W6EXT)
1757 2 15 5,432 SCV
Monongolia WA
W8MWA 1593 2 50 5,112 WV
Kitchener-Waterloo ARC
VE3IC 1503 2 17 4,674 ON
Bolingbrook ARS
K9NZ 1724 2 26 4,482 IL
Lancaster & Fairfield Co. ARC
K8QIK 1016 2 32 4,030 OH
Clearlake ARC
K5HOU (+KC5YOV)
964 2100 3,884 STX
Big Bear ARC
K6BB 1029 2 38 3,740 ORG
North Fulton ARL
KR4TG 1028 2 30 3,298 GA
North Hills RC
K6IS (+KC6PSZ)
807 2 11 3,206 SV
Antietam RA
W3CWC 721 2 11 3,190 MDC
Villages ARC
K4VRC 503 2 10 2,542 NFL
Guelph ARC
VE3ZM 882 2 16 2,364 ON
Broken Arrow ARC
W5BBS 748 2 15 2,360 OK
Rock River Radio Club
W9TCH 613 2 22 2,360 WI
ICARS
KC4MJC 942 2 30 2,350 NC
San Antonio RC
W5SC 516 2 25 2,224 STX
Millbrae ARC
KB6TR 487 2 10 2,200 SCV
Hoosier Hills Ham Club
W9QYQ 481 2 11 2,068 IN
Muskegan Area ARC
W8ZHO 496 2 45 1,964 MI
Portage ARC
KJ3O (+KB8VJL)
441 2 10 1,886 OH
UWF & Five Flags ARC
K4UWF 581 2 30 1,854 NFL
Quannapowitt RA
W1EKT (+KB1CCI)
451 1 10 1,602 EMA
Kings County RC
W2RAK 328 2 10 1,400 NLI
ARA of Long Beach
W6RO 672 2 42 1,390 LAX
Skywide ARC
VA3SKY 282 2 21 1,366 ON
Ellwood City ARA
N3EC 497 2 24 1,224 WPA
Hams at Medtronic
KF0FX 139 2 8 1,090 MN
Clockamag Co. ARC
K7OUS 88 2 16 1,076 OR

7A

PVRC 1
W3AO (+W3AMY)
9163 2 17 26,224 MDC
W6TRW ARC
W6TRW (+KE6GJI)
3970 2100 10,956 LAX
Mt. Vernon ARC
K4US 2757 2 41 8,194 VA
Hams Having Fun in Kentucky
AA4NJ (+KE4WHY)
1725 2 15 5,732 KY
ARC of El Cajon
WA6BGS 1940 2 79 5,448 SDG
Kalamazoo ARC
W8VY (+KC8DEI)
1408 2 60 5,094 MI
Central New Hampshire ARC
W1JY 1262 2 30 4,628 NH
Dayton ARA
W8BI 951 2 10 4,146 OH
Stanislaus ARA
W6ERE (+W6UHF)
1211 2 35 4,138 SJV
Plattsmouth ARC
KB0SMX (+KB0WIC)
784 2 26 3,644 NE
KARS
KB5TX (+KC5FSP)
865 2 20 3,442 STX
Fulton Cty ARC
K8BXQ 679 2 20 2,938 OH
Keuka Lake ARA
KV2W 596 2 16 2,832 WNY
Strangers and Pilgrims AR Kindred
N3SWH 618 2 65 2,538 EPA
Rockford ARA
W9AXD 484 2 15 2,506 IL
Yolo ARS
NX6L 314 2 25 1,692 SV
Non-Club Group
VE6QE 338 2 22 976 AB
Ebonaire ARS
K2EAR 439 1 60 641 NLI

8A

Wheaton Comm. Radio Amateurs
W9CCU (+N9KJU)
3797 2 65 11,170 IL
FLARC
W9JZ 2821 2 40 9,772 WI
Alameda County RC
N6WG (+KE6QJT)
1232 5 25 9,650 SF
Gwinnett ARS
W4GR (+KF4HLH)
2531 2 90 7,662 GA
Sangamon Valley RC
W9DUA 2078 2 25 6,408 IL
Scarborough ARC
VE3WE 765 5 25 5,965 ON
Tulsa ARC
W5OK 1560 2 38 5,790 OK
Sudbury ARC
VE3US 1122 2 12 4,512 ON
Poinsettia ARC
WA6BMH 1020 2 16 3,984 SB
Clarksville ATS
KF4L (+KF4OAZ)
1043 2 35 3,618 TN
Mahoning Valley ARA
W8QLY 801 2 46 3,478 OH
Delta ARS
VE7SUN 709 2 19 2,874 BC
RS of Tucson
K7RST 672 2 22 2,506 AZ
Bears
N8DXR (+KB8YGR)
675 2 12 2,392 MI
SEMARC
W0CGM 581 2 15 2,380 MN

9A

Gloucester County ARC
W2MMD 2816 2 26 10,860 SNJ
Lake County ARA
N8BC (+N8GAK)
2842 2 16 10,672 OH
Nortown ARC
VE3NAR 2365 2 23 7,072 ON
APA Digital Communications Network
W6APA 554 5 23 4,685 LAX
Eau Claire ARC
W9EAU 922 2 34 3,494 WI

10A

South Pickering ARC
VE3SPC 3213 2 40 11,544 ON
1070 Repeater Ass'n
N2SE 1705 2 38 7,156 NNJ
Triple A ARA
AC3J 1518 2 55 4,856 WPA
Tulane County ARC
WA6BAI 372 2 11 2,362 SJV
Mississauga ARC
VE3MIS 803 2 17 1,854 ON

11A

West Coast ARC
W6WC (+KD6MWZ)
1596 2 45 6,430 ORG
Kern County Central Valley ARC
W6LIE 752 2 25 3,078 SJV

12A

West Valley ARA
W6PIY (+KF6UTE)
2869 2 59 9,882 SCV

13A

Woodbridge Wireless
W4IY 7329 2 65 22,780 VA
Conejo Valley ARC
AA6CV 1142 5 30 9,880 SB
NOMADS/WRAY ARC
N0TM (+N5LHW)
956 2 14 4,454 CO

14A

Eldorado County ARC
AG6AU 1257 2 23 5,144 SV
Holland ARC
K8DAA 751 2 35 3,466 MI

20A

USECA
KK8M (+KB8TAS)
2527 5176 20,920 MI

28A

Nashua Area RC
N1FD (+KB1AWE)
7902 2 96 24,358 NH

1B-1 Op

N0UR 680 5 1 6,700 MN
K0MF 614 5 1 6,145 CO
KW8N 1436 2 1 5,568 OH
WB9COY 530 5 1 5,125 ORG
K3ONW 468 5 1 4,880 EPA
N0AT 1050 2 1 4,410 MN
W3TS 371 5 1 4,010 EPA
W9NJP 407 5 1 3,815 IL
K4GU 666 2 1 3,136 AL
WU0L 278 5 1 2,980 CO
W3CB 198 5 1 2,480 MDC
N7OU 233 5 1 2,220 ORG
KI0II 192 5 1 2,085 CO
W2HLI 176 5 1 2,060 NLI
W6DBM 550 2 2 2,056 SCV
K9QVB 503 2 1 2,012 IL
K0VSV 160 5 1 1,800 WY
N5FC 170 5 1 1,800 STX
WC7F 162 5 1 1,795 ID
W7CV 145 5 1 1,750 AZ
AE4EC 143 5 1 1,730 NC
KB9IVB 321 5 1 1,705 IN
KF8PS 519 2 1 1,686 OH
K4BV 493 2 1 1,686 SFL
W5RQ/0 475 2 1 1,642 NE
N7DLV 455 2 1 1,510 WWA
WB4UOK 299 2 1 1,496 NFL
A4XO 128 5 2 1,480 VA
KT9W 472 2 1 1,464 WI
AF7O 902 1 1 1,446 UT
K7IA 114 5 1 1,440 AR
N8IA 411 2 1 1,432 MI
WA0NLK 122 5 1 1,420 CO
K4RDU 130 5 1 1,400 VA
NT9B 364 2 1 1,392 WI
N2TO 192 5 2 1,385 ENY
WD7Y 103 5 1 1,230 NV
KD6RDO 111 5 1 1,210 SB
W2WC 290 2 1 1,160 ENY
K8XD 62 5 1 1,140 MI
K4JSI 100 5 1 1,100 MDC
WB9KZY 95 5 1 1,050 WI
K4RET 162 5 1 1,020 VA
K9FOH 100 5 1 970 IN
N0GSM 338 2 2 962 NE
K8SWD (+W9VFC)
425 2 1 950 MI
K8SWD 425 2 1 950 MI
WB8RTJ 211 2 1 944 OH
KE7DX 244 2 2 924 AZ
W8EO 90 5 1 900 MI
WA9STI/6 375 2 1 856 SB
AB2AN 65 5 1 850 NNJ
VE2ABO 65 5 1 850 QC
WA4HLV 61 5 1 810 TN
W0JRP 105 5 2 780 MO
NX5M 100 5 1 725 STX
WB2DLA 52 5 1 720 NLI
KA0CW 49 5 1 690 CO
WB0T 47 5 2 670 IA
KE4QZB 67 5 1 670 NC
N8XA 70 5 1 665 OH
WD0K 69 5 1 655 MN
NJ7A 159 2 3 644 UT
WD6DX 53 5 1 630 SCV
KG2IP 103 5 1 615 WNY
N7CVW 139 2 1 578 EWA
WB7D 214 2 2 528 KY
W6QV 192 2 1 524 SDG
N5MZX 210 2 3 520 MS
W8LXE 106 1 6 506 MI
N4IY 68 5 1 500 IN
W0CZ 70 2 1 480 MN
W0AS 107 2 1 474 CO
VE3ZY 62 2 2 448 ON
KE5TC 36 5 1 430 OK
KD5LX 65 5 1 425 CO
WB6VIC 108 2 1 416 LAX
KK7GB 40 5 1 400 ID
AB7QG 143 2 1 396 UT
W1XX 75 1 1 375 VT
KA5IJH 125 2 1 350 NTX
N0IW 85 2 1 330 WY
N2TMT 163 2 1 326 ENY
KV2X 103 2 1 326 WNY
N4EUK 23 5 1 315 VA
N3WAV 53 2 1 306 WPA
WD9DJD 150 2 1 300 IL
KJ6RR 39 5 1 295 LAX
N2JPR 26 5 1 290 NLI
N0DLS 84 2 1 268 MN
W9TQV 26 2 1 252 WI
WB1DMK 27 5 1 235 CT
VE5JZ 17 5 1 230 SK
VE2LHP 15 2 1 230 QC
N6DQW 26 5 1 230 ORG
AA9NA 103 2 1 206 IL
WB6FDY 102 2 1 204 UT
W7YS/VE7 45 2 1 180 BC
KB9NKM 34 5 2 170 IN
N1NBQ 11 2 1 136 EMA
W3MWY 2 5 1 120 MDC
KB2YHZ 2 5 1 110 WNY
KF6UCG 2 5 1 110 SCV
WB8PBP 54 2 2 108 OH
KO6TS 4 2 1 108 LAX
WA4RDH 47 2 2 94 GA

2B-1 Op

WO8R 181 5 1 2,165 OH
N8BWB 88 2 2 530 MI

1B-2 Op

N4BP 799 5 2 8,560 SFL
AB7E 633 5 2 6,530 AZ
NN7S 1085 2 4 4,468 MT
W7EL 399 5 2 4,290 OR
K8RYU 995 2 2 4,226 OH
K2WNY 376 5 2 3,855 WNY
W0FD 1631 2 2 3,706 CO
VE3SMA 328 5 2 3,480 ON
K5LN 303 5 2 3,330 STX
W4QO 315 5 2 3,250 GA
N2JGU 307 5 2 3,075 WNY
W7TAO 260 5 2 3,000 AZ
KB1H 366 5 2 2,915 CT
AE6C 306 5 2 2,855 SV
KA8IFC 995 2 2 2,740 OH
KA5CJJ 366 5 2 2,720 NTX
KY0Q 1008 2 2 2,572 IL
N7QT 572 2 2 2,424 WWA
K6BUM 971 2 2 2,342 LAX
WB6TIK 804 2 2 2,272 LAX
N2MN 180 5 2 2,150 NNJ
W5RIF 171 5 2 2,010 NTX
N8VV 499 2 2 1,814 OH
NY1S 404 2 2 1,814 ME
WA6MSE 660 2 2 1,750 CO
NV0P 779 2 2 1,658 MN
W9XU 414 2 2 1,510 WI
W0EAN 450 2 2 1,480 IA
N5CW 502 2 2 1,468 MS
VE3EQP 251 5 2 1,455 ON
AK2S 345 2 2 1,380 EPA
VE3SRS 311 2 2 1,340 ON
NR0T 327 2 2 1,224 MN
N4EDE 160 5 2 1,190 VA
K6YS 147 5 2 1,170 EB
K5ZP 148 5 2 1,140 STX
W1XV 119 5 2 1,135 ME
KA2BEO 273 2 2 1,120 SNJ
AA7IH 82 5 2 1,110 OR
KA7PNH 551 2 2 1,102 WY
WX7G 245 2 2 1,006 NV
KA8EZT 55 5 2 920 OH
NT5O 360 2 3 832 STX
N3MCY 208 2 2 816 WV
N7IHI 343 2 2 786 AZ
VE3ESN 286 2 2 772 ON
W4JAN 47 5 2 735 NLI
NT1M 45 5 2 735 EMA
WB0TCZ 188 1 2 688 CO
N7DOE 183 2 2 666 WWA
N4TVC 77 5 4 650 MO
KE4RED 72 5 2 640 GA
WA6NGH 166 2 2 632 SB

VE3CG	96	5	2	600	ON
WB6AXW	189	2	2	578	SDG
W0YSE	131	2	2	562	UT
W0PTU	219	2	2	538	CO
N4TII	200	2	2	500	GA
WB6HII	174	2	2	466	SF
KQ6ES	22	5	2	420	ORG
KB7RJF	138	2	2	376	NV
KD4NEM	135	2	2	370	VA
KI7N	44	2	2	322	OR
W9IB	89	2	2	290	IL
WD8MQN	34	2	2	68	VA

2B-2 Op

K3MD	1428	2	2	4,992	WPA
K7CAR	682	5	2	4,010	WWA
K6ZS	306	5	2	3,040	EB
KI8AK	772	2	2	2,472	OH
WR4F	980	2	2	2,260	KY
N4KH (+KS4LU)					
	813	2	2	2,002	AL
N6MBY	250	5	2	1,970	SB
WO9K	498	2	3	1,864	IL
N0FKC	273	2	2	1,632	MN
K1PTF	131	5	2	1,610	NH
K8VA	513	2	2	1,608	MI
N2ZT	125	5	2	1,520	ENY
AD6GG	237	5	2	1,485	LAX
K7YDL	265	2	2	1,456	OR
KE6GFF	158	5	2	1,390	ORG
K7FU	278	2	2	1,308	OR
KV6A	442	2	2	1,296	SF
NR7RR	492	2	2	1,184	WWA
W6BIV	221	2	2	1,046	LAX
KD4GHQ	204	2	2	1,008	NC
AA5BI	66	5	2	930	AR
KG2KW	284	2	2	920	SNJ
VE3OIL	245	2	2	888	ON
WD6CLZ	57	5	2	870	SCV
VE6ZC	55	5	2	750	AB
KB5AZN	213	2	2	726	NTX
KF6SCD	35	5	2	585	SDG
KD6CML	177	2	2	554	LAX
K2NDR	158	2	2	544	SNJ
KM6UH	152	2	2	504	ENY
KB9JLF	3	2	2	406	IN
KD4EVB	20	2	2	140	KY
WA9LKZ	32	2	3	64	IL

Mobile Stations

1C

W3TB	336	5	2	3,360	RI
AA6DP	1008	2	5	3,190	LAX
K1DC/MM	600	2	1	2,082	RI
KH6DX	420	2	1	1,680	LAX
W4ZW	327	2	2	1,516	SFL
WB2ZTY	467	2	3	1,414	SNJ
N0SX	480	2	4	1,232	MN
K2NV/VE3	306	2	1	1,224	ON
AC6FR	266	2	4	990	SF
FRC					
K5KG	281	2	1	876	IN
VE6FI	676	1	3	676	AB
KB8U	68	5	1	665	MI
VE2AWR	180	2	1	590	QC
N6MD	164	2	1	482	LAX
K7CN	47	5	1	470	OR
K9PIG	230	2	1	460	WY
WD9CNX	198	2	4	396	UT
N8COQ	175	2	2	350	MI
K5VHH	156	2	1	312	STX
AB5UA	51	2	1	304	OK
WB4ZFO	148	2	1	296	KY
W3DYA	67	2	1	268	NTX
N0CQI	129	2	2	258	NE
W7ON	118	2	2	236	AZ
K0PFV	117	2	1	234	NE
K3SWJ	110	2	1	220	STX
KB2ZHJ	103	2	2	218	NNJ
W6ZQ	105	2	1	210	ORG
AJ6T	104	2	2	208	SCV
WB2WZC	95	2	2	202	NNJ
KF8YC	100	2	1	200	MI
W9IEI	76	2	2	152	WI
KG0ZZ	70	2	1	140	KS
K8TL	56	2	2	112	OH
K5XY	54	2	1	108	NM
KB9LIE	38	2	1	76	WI
KB7YSY	15	5	1	75	UT
WA0ZCN	37	2	2	74	NE
KC6NLX	37	2	1	74	VA
N3II	29	2	1	58	OH
K7BLI	27	2	1	54	OR
WA4MA	26	2	1	52	SC
K7VVV	26	2	1	52	WWA
KB2PLW	14	2	1	46	WNY
WA4CHJ	11	2	1	44	VA
W8CSX	17	2	1	34	MI
W9KI	15	2	1	30	SC
KF6IIU	5	5	1	25	SCV
N7CFO	4	5	1	20	MDC
N2DLG	9	2	1	18	WNY
KA6ASV	1	2	1	2	EPA

2C

W7CD	251	5	2	1,870	WWA
N6DD	684	2	7	1,462	NV
KO6DF	169	2	2	338	SV
WB5LFO/M	35	5	1	175	EMA

Home Stations Commercial Power

1D

NA5TX	1450	2	1	5,800	STX
N8OO	829	2	1	3,060	LA
N2NB	1505	2	1	3,032	NLI
K5OT	734	2	1	2,936	NTX
W8UE	579	2	1	2,094	MI
AB5YY	647	2	7	1,964	MS
W4YE/7	471	2	1	1,884	WY
WT8P	466	2	1	1,864	OH
K5XR	911	1	1	1,822	STX
AA9KH	164	5	1	1,640	IL
W8/G4BUE	755	1	1	1,510	MI
K8CI	377	2	1	1,508	OH
AB4RE	373	2	1	1,492	AL
W7OM	955	1	1	1,492	WWA
K5CCC	368	2	10	1,472	NTX
NQ7X	137	5	1	1,370	AZ
NG3K	324	2	1	1,292	MDC
W3GIS	357	2	1	1,180	MDC
KB3CBW	1143	1	1	1,143	MDC
W3DP	350	2	1	1,132	EPA
AC4ZD	320	2	1	1,100	TN
K4MJ	259	2	1	1,036	GA
N6SR	239	2	1	954	SB
W4NTI	267	2	1	940	AL
W6GPM	234	2	1	934	EB
KA8ZPE	292	2	1	926	OH
KS4YX	294	2	1	882	SC
WA2VQV	220	2	1	880	SNJ
KD5BVK	417	2	4	844	NTX
NP2DJ	421	2	5	842	VI
KC8GMT	230	2	1	832	MI
K3GHH	208	2	1	832	NNY
N4AU	208	2	1	832	AL
NU7V	202	2	1	808	AZ
W4CU	200	2	1	800	NFL
W3DOV	302	2	3	744	DE
NB4J	182	2	1	728	WPA
KG4BJO	281	2	2	720	NFL
ND5S	251	2	1	696	MI
K2VL	164	2	1	656	AL
WB2JIU	219	2	2	656	NNJ
N6GG	186	2	1	610	SV
W8PIF	241	2	8	608	WI
KD3WC	302	2	1	604	MI
N5REO	589	1	1	589	NTX
K7GJ	385	1	1	581	NV
WB4IHI	145	2	1	580	NFL
K6AQL	154	2	2	576	LAX
W2EZ	139	2	1	556	WNY
N8KZG	274	2	1	548	MI
WA2BQI	54	5	1	540	WNY
K1BTD	54	5	1	540	CT
KE8GG	537	1	1	537	MI
KD8SQ	265	2	3	530	OH
K9HOQ	120	2	1	480	IL
WA6RND	120	2	1	480	ORG
WA3HR	235	2	1	470	EPA
AB7HD	207	2	1	456	AZ
W0CEM	223	2	1	446	KS
VE2ATL	110	2	1	440	QC
W7SRB	218	2	1	436	AZ
W8ZCQ	108	2	1	432	OH
AD6EN	124	2	1	414	SF
KG2FH	204	2	1	408	EPA
N1XT	194	2	3	406	ME
VE3BUC	180	2	1	360	ON
N9ZWY	178	2	1	358	WI
K9MMS	89	2	1	356	IL
N0MJ	120	2	1	350	MN
W9EC	102	2	1	344	SB
AD0H	113	2	1	340	IA
WA0RAC	166	2	3	332	SFL
W4CRC	331	1	10	331	SFL
N7FO	322	1	1	322	AZ
WA7YNU	132	2	1	308	MT
KB4XE	150	2	1	300	SFL
KA8WQL	147	2	6	294	OH
W0EDI	142	2	1	288	ORG
N2LQQ	139	2	1	278	WNY
W1WIU	203	1	1	277	RI
WA8MJY	137	2	1	274	MI
AC5OY	136	2	1	272	NTX
KB7SDE	134	2	1	268	MT
WO3T	134	2	4	268	WPA
W6TPQ	65	2	1	260	LAX
KZ2G	68	2	1	260	NLI
WC9C	71	2	1	260	IN
W6MTS	65	2	2	260	SF
KO8S	84	2	1	250	MI
KG9HG	106	2	1	250	IN
W6PRI	81	2	1	244	SCV
N0KWA	122	2	1	244	LA
N5BF	155	1	1	242	LAX
WS2N	100	2	1	230	NLI
NO3PU	112	2	1	224	WPA
N1ABY	112	2	1	224	EMA
VE3FME	88	2	2	218	ON
KE6TQZ	108	2	1	216	KY
K4OOO	209	1	1	209	TN
KD4CSW	101	2	1	202	KY
KC5AC	100	2	1	200	AZ
W2LRO	61	2	1	182	NNJ
K6JG	68	2	1	180	SB
KF6PKG	79	2	1	158	EB
N1YQI	76	2	1	152	EMA
K8VFR	37	2	1	148	MI
KG9CA	70	2	1	140	WI
WY3F	67	2	1	134	EPA
VE2HLW	66	2	1	132	QC
WE8P	131	1	1	131	PAC
N8MZJ	65	2	1	130	OH
KJ6JO	60	2	1	128	ORG
PY2NY	40	2	1	126	PY
KA1DSQ	123	1	1	123	CT
N0LL	60	2	1	120	KS
WA2BKN	59	2	1	118	NNJ
K3ESS	116	1	1	116	NV
WD9IYT	57	2	1	114	IL
KD6REC	56	2	1	112	VA
W4HWT	27	2	1	108	NC
W1AF	67	1	1	100	EMA
KR6AB	50	2	1	100	ORG
K9UQN	25	2	1	100	IL
KA1VY	50	2	1	100	EMA
AC5PJ	43	2	1	90	STX
ND9G	24	2	1	88	IL
K3NJ	43	2	2	86	MDC
KE4VEK	35	2	1	82	SFL
W4SEA	20	2	1	80	NC
N9LAG	76	1	1	76	IL
AG5T	38	2	1	76	STX
VE5CMA	76	1	1	76	SK
KB4BYH	36	2	1	72	TN
WB0MIT	34	2	1	68	KS
WP4LNY	34	2	1	68	PR
WP4KOE	34	2	1	68	PR
WP4MYD	34	2	1	68	PR
W6ERO	32	2	2	64	ORG
KC8MMW	15	2	1	60	OH
KR4EP	14	2	1	56	TN
K7FD	54	1	1	54	OR
N3VM	27	2	1	54	SJV
KC0DBO	26	2	12	52	IA
WA3GQU	25	2	1	50	WPA
VE2FFE	25	1	1	50	QC
KM6IS	25	2	1	50	ORG
W2JPM	24	2	1	48	WNY
N3JNX	23	2	1	46	EPA
AK4U	23	2	2	46	KY
KA3KSP	22	2	2	44	WPA
N3RB	22	2	1	44	NNJ
N8TW	21	2	1	42	OH
KG6F	20	2	1	40	SJV
W6IL	10	2	1	40	SCV
WB5OSD	10	2	1	40	LA
KC8KVZ	19	2	1	38	MI
K4IJK	18	2	1	36	NC
W9RXJ	34	1	1	34	MN
KC0FDK	17	2	1	34	ND
KK5VK	17	2	1	34	STX
KE3FL	8	2	1	32	MDC
KC2DLA	29	1	1	32	NNJ
W5QZ	15	2	1	30	STX
N3CZB	7	2	1	28	EPA
KF4MKU	13	2	2	26	NFL
WA7JQE	12	2	1	24	ID
WB2VXS	12	2	2	24	ENY
WA7VHF	12	2	3	24	AZ
N7SG	21	1	1	21	OR
KN5TTN	10	2	2	20	OK
KD6MOG	9	2	1	18	SCV
KC5MDP	9	2	1	18	OK
KC2BGQ	4	2	1	16	WNY
N9WDV	7	2	1	14	IL
KC2DGM	7	2	1	14	ENY
AJ3M	6	2	1	12	VA
W2PKJ	6	2	1	12	NNJ
KB4CJS	6	2	1	12	TN
KC5OZT	5	2	1	10	NTX
WA3OHI	5	2	1	10	MDC
N0UIH	3	2	1	6	MO
KO6YG	3	2	1	6	SCV

2D

W4MYA	4019	2	14	10,758	VA
W6ANN	896	2	2	2,988	ORG
W6AT	509	2	9	1,502	ORG
K5IX	465	2	2	1,490	STX
KS4ID	625	2	18	1,384	NFL
W4QQ	1313	1	4	1,348	GA
N1EM	459	2	11	1,344	EMA
KE4QCY	556	2	7	1,184	AL
W8TNX	271	2	8	784	OH
W0AIX	189	2	7	650	IA
W7EK	173	2	3	578	WWA
W4RYZ	271	2	10	542	NFL
N8CPA	139	2	5	504	OH
N7GT	451	1	21	451	WY
VE2AQP	150	2	14	300	QC
WX0U	46	2	7	98	KS

3D

W1AW	1223	2	25	2,978	CT
K2BNL	788	2	15	2,446	NLI
WB8LLY	328	2	6	1,030	OH
K3IEC	274	2	12	584	EPA
KF4HAY	89	2	10	178	IN
W4WVP	125	1	6	126	VA

4D

K6ZM	903	2	9	3,124	EB
K4GSO	73	1	20	73	NFL

9D

W4XI	2780	2	10	5,662	AL

Home Stations Emergency Power

1E

CADXA					
KN7Y	730	5	1	7,300	AZ
NU4W	1366	5	1	6,830	KY
K6LL	2214	2	7	6,466	AZ
W6JTI	640	5	1	6,400	SF
AA3B	1324	2	1	5,296	EPA
AA4G	1472	2	4	4,578	SFL
W5ZR	1050	2	3	4,200	LA
W8CAR	1025	2	1	3,942	OH
K4RO	1308	2	1	3,626	TN
VE7TMA	342	5	3	3,420	BC
NT2W	239	5	1	2,390	NNY
N6ZZ	749	2	1	2,366	NM
K4YTZ	873	2	14	2,354	SC
K8CV	234	5	1	2,340	MI
WF3M	545	2	1	2,180	EPA
W6AQ	229	5	1	2,085	LAX
WD5ICQ	207	5	2	2,070	NTX
K5MC	500	2	1	2,000	LA
K9DC	655	2	1	1,910	IN
AA1O	191	5	1	1,860	EMA
W1KX	556	2	2	1,830	ME
NK1I	483	2	2	1,738	ME
KD9GY	854	2	1	1,708	IL
WR4I	170	5	1	1,700	VA
KI0E	427	2	1	1,676	ND
WB4NUS	177	5	1	1,590	NC
K4OAQ	387	2	1	1,548	VA
KV0E	453	2	2	1,538	IA
W5CS	701	2	23	1,526	AR
N6HEW	756	2	2	1,520	SJV
W6IBD	403	2	1	1,512	EB
N3GWZ	188	5	1	1,500	MDC
W3GN	351	2	1	1,404	MDC
N3WK	389	2	2	1,394	MDC
AC7A	128	5	1	1,280	AZ
K1EEE	300	2	2	1,200	NH
WO4O	449	2	1	1,160	TN
KE3PL	576	2	1	1,152	NNJ
K4NR	399	2	1	1,106	STX
N8CS	278	2	1	1,084	OH
WD3A	397	2	1	1,068	MDC
KM6WO	201	5	2	1,005	SJV
WA2KCL	468	2	1	936	ENY
K6UF	274	2	1	880	SCV
K3IVO	375	2	7	862	MDC
K2ZR	215	2	1	860	WNY
KB9RNO	408	2	1	850	WI
W9SUL	84	5	1	840	MN
N3FJP	410	2	3	832	MDC
N4PE	410	2	4	820	NC
N9QEX	162	5	3	815	IN
KB4DJR	386	2	1	808	KY
KG9JP	380	2	1	760	IL
N5EL	69	5	1	690	NTX
W7GB	150	2	1	600	EWA
W1OHM	292	2	1	594	EMA
K4OE	292	2	2	584	AL
N4UZ	282	2	3	564	SC
K4PMT	55	5	1	550	NFL
KI5FJ	236	2	1	522	NM
W3PHS	225	2	4	506	MDC
AC6TU	50	5	1	500	LAX
K3CHP	76	5	1	490	MDC
N9OBL	473	1	1	473	IN
W1JN	154	2	3	470	CT
N2MTG	235	2	1	470	ENY
WO8L	138	2	1	442	NC
W6TLK	221	2	2	442	SF
K5DMC	109	2	1	434	MS
W3RT	139	2	1	428	EPA
KK6IF	205	2	1	410	AZ
W6FM	293	1	1	375	SB
AB8DF	36	5	1	360	MI
KB9JIF	175	2	1	350	WI
K0FPC	110	2	2	348	KS
WA9AW	129	2	2	290	IL
KB5CNG	143	2	1	286	OK
W1CZD	71	2	1	284	RI
NE3I	87	2	1	274	EPA
W1BGM	68	2	1	272	RI
KC7MZT	106	2	1	264	MT
KS4KP	52	5	1	260	NFL
KG0ZP	125	2	1	250	MO
W8ILH	113	2	1	226	OH
N0CZH	110	2	1	220	MN
W9LM	107	2	2	214	IL
AA8IV	21	5	1	210	OH
WB0SNL	96	2	1	192	IA
KU6T	117	1	1	188	LAX
W4NAV	93	2	1	186	SFL
K3DG	50	2	1	160	SFL
KC1WD	15	5	1	150	EMA
KB9GMC	30	5	1	150	IN
KG4AWJ	72	2	1	144	TN
KE6QCB	24	5	1	120	ORG
W0AP	12	5	1	120	NE
WA2HDL	52	2	1	104	SFL
KF3BN	42	2	1	84	MDC
KK7QJ	39	2	1	78	MT
K2HT	27	2	1	58	MO
W4FVQ	22	2	1	44	KY
VE5HZ	19	2	1	38	SK
N0HMN	18	2	1	36	MO

2E

K2QMF	2763	2	4	7,910	NLI
N5XM (at N5ZS)					
	2861	2	5	7,766	AR
NJ4U	1583	2	2	4,338	GA
W5ROK	1425	2	9	3,650	NTX
K4JNY	1712	2	2	3,424	TN
K9YHB	408	5	6	3,280	IL
KI4RO	692	2	10	2,448	VA
W0SV	856	2	30	1,732	MN
K6VB	330	2	2	660	LAX
K1PQ	308	2	7	648	ME
KA8MID	266	2	16	532	OH
AA5OB	189	2	3	404	LA
K6TY	112	2	2	224	LAX
VE7FB	167	1	2	167	BC
KB1DGY	29	2	1	78	CT

3E

N0NI	4421	2	6	12,480	IA
W7GG	3734	1	7	5,371	OR
K8AJR	2186	2	7	5,288	OH
W3KWH	1364	2	18	4,492	WPA
W4UFO	820	2	4	1,640	NC
KG8NJ	764	2	4	1,528	MI
N6IP	58	2	4	232	SCV
KE6FIN	59	2	2	118	SV

4E

W3PP	3720	2	8	10,504	DE
K5DX	2873	2	10	7,944	STX
W8LRC	430	2	15	868	MI

5E

N0LM	1355	2	20	3,874	CO
N5MYH	1298	2	6	2,704	LA

6E

W4UEA	772	2	5	1,742	NFL

QST

VHF/UHF Century Club Awards

The ARRL VUCC numbered certificate is awarded to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators (indicated in *italics*) for each band listing. The numbers preceding the call signs indicate total grid squares claimed. The numbers following the call signs indicate the claimed endorsement levels. The totals shown are for credits given from August 3 to September 30, 1999. The VUCC application form, field sheets and complete list of VHF Awards Managers can be found on the Web at **http://www.arrl.org/awards/vucc/**. Please send an SASE if you cannot download the forms online. If you have questions relating to VUCC, send an e-mail to **vucc@arrl.org**.

Compiled By Bill Moore, NC1L, Century Club Manager

50 MHz

100

1026	WA1MKE
1027	KC2DLD
1028	N8VEA
1029	KM5TY
1030	KA5TJI
1031	VE7VDX
1032	N3LRP
1033	WO9S
1034	KC6IPF
1035	N9JR
1036	KB0LGB
1037	VE3AJY
NE0P	125
K0CS	350
WA1ECF	275
WB2WEO	125
K3HZO	300
W3HHN	325
N4CH	650
W4GLV	325
WA5KBH	125
W5OZI	775
WA5VKS	200
AA5XE	300
W5FF	925

144 MHz

100

568	WD9BGA
K1TEO	200
K3HZO	150
N5BA	125

222 MHz

50

102	K3HZO

432 MHz

50

278	WA8RJF
K3HZO	80
AA5C	100
W7HAH	175

902 MHz

25

27	WA0BWE

2.3 GHz

10

62	K8TQK
AA5C	20

3.4 GHz

5

57	K1TEO
AA5C	15

5.7 GHz

5

39	WA0QII
40	WA0BWE
41	NE8I

10 GHz

5

101	WA1HOG

Satellite

100

91	VE3AJY
K5OE	200
WA5VKS	150
N5JGK	225
KC7QFS	325
N7SFI	575

QST

By **Dan Henderson, N1ND**
Contest Manager

2000 ARRL International DX Contest Rules

1. Object:

1.1. W/VE amateurs work as many amateur stations in as many DXCC countries of the world as possible on 160, 80, 40, 20, 15, and 10 meter bands.

1.2. Foreign amateurs (also including KH6, KL7, CY9, and CY0) work as many W/VE stations in as many of the 48 contiguous states and provinces as possible.

2. Date and Contest Period:

2.1. **CW:** Third full weekend in February (**February 19-20, 2000**).

2.2. **Phone:** First full weekend in March (**March 4-5, 2000**).

2.3. Contest Period: 48 hours each mode (separate contests). Starts 0000 UTC Saturday; ends 2400 UTC Sunday.

3. Entry Categories:

3.1. Single Operator:

3.1.1. All Band:

3.1.1.1. QRP.

3.1.1.2. Low Power.

3.1.1.3. High Power.

3.1.2. Single Band (one only). Single-band entrants who make contacts on other bands should submit logs of those contacts for checking purposes.

3.1.3. Single Operator Assisted.

3.2. Multioperator:

3.2.1. Single Transmitter.

3.2.2. Two Transmitter.

3.2.3. Multi-transmitter.

4. Contest Exchange:

4.1. W/VE stations in the 48 contiguous United States and Canada (except in the islands of St Paul and Sable) send signal report and state or province.

4.2. DX stations send signal report and power (number indicating approximate transmitter output power).

5. Scoring:

5.1. QSO Points—W/VE stations count three points per DX QSO. DX stations count three points per W/VE QSO.

5.2. Multiplier—W/VE stations: Sum of DXCC entities (except US and Canada) worked per band. DX stations: Sum of US states (except KH6/KL7), District of Columbia (DC), and Canadian provinces/territories NB (VE1, 9), NS (VE1), QC (VE2), ON (VE3), MB (VE4), SK (VE5), AB (VE6), BC (VE7), NT (VE8), NF (VO1), LB (VO2), YT (VY1), **Nunavut (VY0)**, PE (VY2) worked per band. Maximum of 63 per band.

5.3. Final Score: QSO points × multipliers = Final score.

6. Miscellaneous:

6.1. Your call sign must indicate your DXCC station location (KH6XYZ/W1 in Maine, KG4/W1INF at Guantanamo Bay, etc).

6.2. The same station may be worked only once per band: no cross-mode or repeater contacts.

6.3. Aeronautical and maritime mobile stations outside the US and Canada may be worked by W/VE stations for QSO credit only.

7. Submission:

7.1. Entries for the CW competition must be e-mailed or postmarked by March 21, 2000.

7.2. Entries for the Phone competition must be e-mailed of postmarked by April 4, 2000.

7.3. Electronic entries for the CW competition must be e-mailed to DXCW@arrl.org

7.4. Electronic entries for the Phone competition must be e-mailed to DXPhone @arrl.org.

7.5. Any submission which is created electronically must include a summary sheet and log file in acceptable ARRL file format. Paper copies of electronic logs are *not* acceptable substitutes for electronic data files.

7.5.1. Guidelines for the acceptable ARRL electronic file format may be found in the "General Rules for all ARRL Contests" in the November 1999 *QST*.

7.5.2. Entries may also be submitted on a 3.5-inch diskette to: ARRL International DX Contest, 225 Main St, Newington, CT 06111.

7.6. Hand-written paper entries or diskettes should be marked on the envelope as either DX Phone or DX CW entries and mailed to: ARRL, 225 Main St, Newington, CT 06111.

7.6.1. Entries for the CW and Phone portions of the competition are considered separate contests and should be submitted in separate emails or envelopes to the appropriate contest address.

7.7. Forms for all ARRL contests may be downloaded from the Contest Home Page at: **http://www.arrl.org/contests**

7.8. Contest forms and rules may be requested from the ARRL InfoServer by sending an e-mail to INFO@arrl.org with the following text:

Send DXCW.frm
Send DXPhone.frm
Send DX.rls

8. Awards:

8.1. Plaques (if sponsored) will be awarded in the following categories for both the CW and phone contests.

8.1.1. Top W/VE scorer in each entry category—single-operator all-band QRP, single-operator all-band low power, single-operator all-band high power, single-operator single-band (160-10 Meters), single-operator assisted, multi-operator single transmitter, multioperator two transmitter and multi-operator multi-transmitter.

8.1.2. Top scorer in the single-operator all-band category worldwide, and on each continent. In addition, worldwide leaders in the single-operator all-band QRP, single-operator all-band low power, single-operator single-band, single-operator assisted, multioperator single transmitter, multioperator two transmitter and multioperator multi transmitter categories will receive plaques.

8.1.3. Additional special plaques will be awarded as sponsored.

8.2. Certificates will be awarded to:

8.2.1. Top single-operator all-band entries (QRP, low power, and high power) from each DXCC entity and ARRL/RAC Section

8.2.2. top single-band entries in each US call area and each DXCC entity

8.2.3. top single operator assisted entries in each DXCC entity, US call area and in Canada

8.2.4. top multi-operator entries (single, two and multi-transmitter) in each DXCC entity, US call area and in Canada.

8.2.5. DX entrants making more than 500 QSOs on either mode will receive certificates.

8.2.6. Additional single-band and multi-operator certificates will be awarded if significant effort or competition is displayed.

9. Other:

9.1. See "General Rules for All ARRL Contests," page 101, and "General Rules for ARRL Contests on bands below 30 MHz," page 103, in the November 1999 *QST* .

9.2. For contest information contact **N1ND @arrl.org,** or call 860-594-0232. QST

ARRL Straight Key Night

Are you looking for a unique way to usher in the year 2000?

Sometimes the "old fashioned" ways may still be the best. Why not work your way through the "millennium crisis" with a dose of real brass pounding. All you have to do is participate in **ARRL Straight Key Night 2000.** This annual on-the-air event is your opportunity to get away from high-tech hamming and return to the basics of radio. **SKN 2000** is designed to allow anyone—from the high-speed superstar to the Novice beginner— the chance to get on the air in an enjoyable operating environment.

The object of this friendly on-air gathering is to enjoy the art of conversation using "straight" CW hand keys—no electronic keyers allowed! **SKN 2000 begins at 7:00 PM EST December 31 and runs for 24 hours through 7:00 PM EST January 1 (0000—2359 UTC January 1, 2000).**

When participating in SKN 2000, instead of sending RST before sending the signal report send the letters SKN to indicate your participation (and to clue in any listeners). Following SKN, send the Contest Branch a list of stations worked, plus your vote for the best fist you heard (it doesn't have to be one you worked). Also, include your vote for the most interesting QSO you had or monitored, as well as any other comments you may have for the SKN 2000 write-up. **Entries may be e-mailed to the Contest Branch at StraightKey@arrl.org, or may be sent via postal mail to: SKN, ARRL, 225 Main St, Newington, CT 06111.**

Entries for SKN 2000 must be received by January 31, 2000. Votes for "Best Fist" and "Most Interesting QSO" will be tabulated and included in the April 2000 issue of *QST*. So when your computer suddenly dies and your cable company crashes because of the Y2K bug, dig out the old brass keys and pound out some fun for the New Year's celebration. QST

By **Dan Henderson, N1ND**
Contest Manager

2000 ARRL RTTY Round-Up Rules

1. Object: Amateurs worldwide contact and exchange QSO information with other amateurs using digital modes (Baudot RTTY, ASCII, AMTOR, PSK31, and Packet—attended operation only) on 80, 40, 20, 15, and 10 meter bands. Any station may work any other station.

2. Date and Contest Period: First full weekend of January, but never on January 1. Begins 1800 UTC Saturday, ends 2400 UTC Sunday (**January 8-9, 2000**).

2.1. Operate no more than 24 hours.

2.2. Two rest periods (for a combined total of at least 6 hours) must be taken in two single blocks of time, clearly marked in the log.

3. Entry Categories:

3.1. Single Operator:

3.1.1. Low Power.

3.1.2. High Power.

3.2. Multioperator, Single Transmitter:

3.2.1. Low Power

3.2.2. High Power

3.2.3. Stations are allowed only one transmitted signal at any given time. Includes those single operators that use any form of spotting assistance such as from nets or packet.

3.2.4. Includes those that receive assistance with logging or relief operators, etc.

3.2.5. Limited to 6 band changes (maximum) in any clock hour.

3.2.6. The clock hour is from zero through 59 minutes.

3.2.7. Band changes are defined so that, for example, a change from 20 meters to 15 meters and then back to 20 meters constitutes two band changes.

4. Exchange:

4.1. United States: Signal report and State.

4.2. Canada: Signal report and Province.

4.3. DX: Signal report and serial number, starting with 001.

5. Scoring:

5.1. QSO Points: Count one point for each completed QSO.

5.2. Multipliers: Each US state (except KH6 and KL7), each VE province (plus VE8, **VY0** and VY1) and each DXCC country. KH6 and KL7 count only as separate DXCC entities.

5.2.1. Count only once (not once per band).

5.2.2. The US and Canada do not count as DXCC entities.

6. Reporting:

6.1. All entries must be postmarked or e-mailed by February 8, 2000.

6.2. Entries in electronic format may be submitted to RTTYRU@arrl.org or submitted on 3.5-inch diskette to RTTY Round-Up, ARRL, 225 Main St, Newington, CT 06111.

6.3. All logs created electronically must be submitted in ARRL format. A print out of an electronically generated log is not an acceptable substitute.

6.4. Electronic entries must include a summary sheet which clearly shows all required information.

6.5. Hand-logged entries may be submitted to RTTY Round-Up, ARRL, 225 Main St, Newington, CT 06111.

7. Miscellaneous:

7.1. Packet radio contacts made through digipeaters or gateways are not permitted.

7.2. All ARRL Contest rules and forms may be downloaded from the ARRL Contest web page at: http://www.arrl.org/contests

7.3. Forms may be requested from the ARRL InfoServer by sending the following message (with no additional text) to info@arrl.org

send RTTY.frm

send RTTY.rls

7.4. For contest information contact N1ND@arrl.org or (860) 594-0232

8. Awards:

8.1. Certificates will be awarded to:

8.1.1. Top high power and low power Single Operator and Multioperator scorers in each ARRL/RAC Section.

8.1.2. Top high power and low power Single Operator and Multioperator scorers in each DXCC country (other than W/VE).

8.1.3. Each Novice and Technician Plus entrant.

8.1.4. Each entrant who makes at least 50 QSOs.

8.2. Plaques, if sponsored, will be awarded to the top scoring low and high power entrant in each category overall, each ARRL Division, and Canada.

8.2.1. Unsponsored plaques may be purchased from the ARRL.

9. Other: See "General Rules for All ARRL Contests," page 101, and "General Rules for ARRL Contests on bands below 30 MHz," page 103, in the November 1999 *QST*.

Recommended HF Digital Operating Frequencies (MHz)

North and South America	*Europe/Africa*
3.590 RTTY DX	3.580-3.620
3.605-3.645	
7.040 RTTY DX	7.035-7.045
7.080-7.100[1]	
14.070-14.099.5	14.080-14.099
21.070-21.100	
21.080-21.120	
28.050-28.150	

[1]Digital operators should avoid interfering with hams outside the continental US who have phone privileges in this portion of 40 meters.

Recommended Novice/Technician Plus Digital Operating Frequencies (MHz)

28.100-28.150*
Suggested simplex packet-radio frequencies:
28.102.3
28.104.3
*Authorized power output 200 W maximum for Novice/Technician Plus licensees in the 10-meter subband.

RTTY Round-Up Plaques

Plaques are available for Division or overall winners in their entry categories. These attractive plaques may be ordered for previous RTTY Round-Up victories, or sponsored for the upcoming event at a cost of $60. Sponsors for the previous year are given the first chance to continue sponsorship for the coming year. Contact N1ND at 860-594-0232 or **n1nd@arrl.org** for information on participating in the plaque program.

The QST *Editors PSK31 Plaque*

The editors of *QST* are sponsoring a special PSK31 plaque for the 2000 ARRL RTTY Round-Up to encourage participation in this exciting mode! PSK31 software is available for free downloading on the Web at **http://home.att.net/~wb8imy/ham.html** or **http://aintel.bi.ehu.es/psk31.html**.

If you use PSK31 during this year's RTTY Round-Up, keep track of those QSOs and multipliers. After calculating your entire score and submitting it in the proper file format at the correct ARRL e-mail or postal address (see the rules announcement for information), calculate a *second* summary sheet of *just your PSK31 QSOs and multipliers*. Mark "PSK31 Entry" clearly at the top of the second summary. There is no need to submit a second log file of PSK31-only contacts.

Send your PSK31 summary sheet via e-mail to **PSK31plaque@arrl.org**, or mail it in a separate envelope to: PSK31 Plaque Contest, ARRL, 225 Main St, Newington, CT 06111 by the contest deadline. The winner will be the station that posts the highest PSK31 score.

You can operate other modes as well as PSK31 (RTTY, PACTOR, etc) for your master entry and still submit a second PSK31-only score as described above. If you choose to participate in the contest using only PSK31, you should submit a summary sheet and log file as required under the rules *and* a second summary sheet as described.

By **Dan Henderson, N1ND**
Contest Manager

2000 ARRL January VHF Sweepstakes Rules

1. Object: To work as many amateur stations in as many different 2 degrees × 1 degree grid squares as possible using authorized frequencies above 50 MHz. Foreign stations work W/VE amateurs only.

2. Date and Contest Period: The weekend before the NFL Super Bowl. **(Begins 1900 UTC Saturday, ends 0400 UTC Monday January 22—24, 2000).**

3. Entry Categories:

3.1. Single Operator. (See "General Rules for all ARRL Contests above 50 MHz" page 106 in the November 1999 issue of *QST* for new rules for this category.)

3.1.1. Low Power

3.1.2. High Power

3.2. Single Operator, QRP Portable.

3.3. Rover.

3.4. Multioperator.

3.5. Limited Multioperator.

4. Exchange: Grid-square locator (see April 1994 *QST*, p 86).

4.1. Exchange of signal report is optional.

5. Scoring:

5.1. QSO points:

5.1.1. Count one point for each complete 50- or 144-MHz QSO.

5.1.2. Count two points for each 222- or 432-MHz QSO.

5.1.3. Count four points for each 902- or 1296-MHz QSO.

5.1.4. Count eight points for each 2.3 GHz (or higher) QSO.

5.2. Multiplier: The total number of different grid squares worked per band. Each 2° ×1° grid square counts as one multiplier on each band it is worked.

5.3. Final score: Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score.

5.4. Rovers only: The final score consists of the total number of QSO points from all bands times the sum of unique multipliers (grid squares) worked per band (regardless of which grid square they were made in), plus one additional multiplier for every grid square from which they successfully completed a contact.

5.4.1. Rovers are listed in the contest score listings under the Division from which the most QSOs were made.

6. Reporting:

6.1. Electronic submissions may be emailed to JanuaryVHF@arrl.org and hand written paper logs or diskettes mailed to January VHF, ARRL, 225 Main St, Newington, CT 06111.

6.2. Entries that have been electronically generated must submit their log file in acceptable ARRL file format. Paper print outs of electronic files are not acceptable substitutes.

6.3. Entries must be emailed or postmarked no later than February 23, 2000.

6.4. Rovers who submit scores for the club competition must submit a second log and summary sheet indicating QSOs and score *if they make any contacts from outside of the club territory*. Indicate clearly on the summary sheet and in log if the log is the total entry or that portion to be counted for the club score.

7. Miscellaneous:

7.1. Stations may be worked for credit only once per band from any given grid square, regardless of mode. This does not prohibit working a station from more than one grid square with the same call sign (such as a Rover).

7.2. Only permitted one signal per band (6, 2, 1¼, etc) at any given time is permitted, regardless of mode.

7.3. Multi-operator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station (transmitter, receiver and antenna) must exist for each QSO made under these conditions.

8. Awards: Certificates will be awarded in the following categories:

8.1. Single operator.

8.1.1. Top single operator in each ARRL/RAC Section.

8.1.2. Top single operator on each band (50, 144, 222, 432, 902, 1296 and 2304-and-up categories) in each ARRL/RAC Section where significant effort or competition is evident. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band endorsements.) For example, if W1INF has the highest single-operator all-band score in the CT Section and his 50- and 222-MHz scores are higher than any other CT single operator's, he will earn a certificate for being the single-operator Section leader and endorsements for 50 and 222 MHz.

8.2. Top single-operator, QRP portable in each ARRL/RAC Section where significant effort or competition is evident. (Single-operator, QRP portable entries are not eligible for single-band awards.)

8.3. Top rover in each ARRL Division and Canada where significant effort or competition is evident. (Rover entries are not eligible for single-band awards.)

8.4. Top multi-operator score in each ARRL/RAC Section where significant effort or competition is evident. (Multioperator entries are not eligible for single-band awards.)

8.5. Top limited multioperator in each ARRL/RAC Section where significant effort or competition is evident. (Limited multioperator entries are not eligible for single-band awards.)

9. Other:

9.1. See "General Rules for All ARRL Contests," page 101, and "General Rules for ARRL Contests on bands above 50 MHz," page 106, in the November 1999 *QST*.

For more information contact at **N1ND@arrl.org**, or 860-594-0232. QST

New Books

LADDER CRYSTAL FILTERS

By John Pivnichny, N2DCH
Published by MFJ Publishing Inc, Starkville, MS 39759 2647. Telephone 1-800-647-1800. First edition, first printing, 1999, 136 pages, paperback, 6 × 9 inches, B&W illustrations. ISBN 1-891237-20-9, $14.95.

Reviewed by Paul Danzer, N1II
ARRL Technical Advisor

◊ Well, another mystery bites the dust! Did you ever wonder those very simple looking crystal filters, consisting of several crystals in a ladder configuration, really work? N2DCH decided to show us how they work, based on a list of 40 published articles and design notes. More than that, *Ladder Crystal Filters* assumes you want to "roll your own," so he begins by discussing crystal characteristics and how to select a crystal.

This may be your first surprise, because most hams believe a crystal "has a high *Q*," and just leave it at that. The book points out a crystal Qs vary, and any crystal should be selected based on the type of filter and the final filter Q.

The next logical question is "Okay, if I need a certain Q, how do I know if a crystal has this Q?" Logically, chapter 2 of *Ladder Crystal Filters* goes through crystal measurements, the accompanying equations, and calculations based on the measurements you can make in your own shack.

Chapter 3 and 4 cover *Lower Sideband Filters* and *Upper Sideband Filters*. It took me a few minutes to figure out what this meant; it turns out that many filters have the bandpass shape on one side much steeper than the other. If the steeper side is at the upper end of the crystal filter bypass curve, the book calls this a *lower sideband filter* presumably since the carrier of a SSB would be just above the steep slope side. Naturally, if the steep attenuation slope is on the lower end of the bandpass curve, the carrier would be just below this point and this is an *upper sideband filter*.

In both cases the designs are explained, and the design equations require no more than substituting values in a simple algebraic expression. Recognizing that most inexpensive crystals are not exactly matched, the designs include trimming components.

If a filter is used in an SSB application, complementary filters, having the carrier frequency between the upper and lower filters, may be needed. Chapter 5 discusses this problem. Again the assumption is that you are going to build the filter, and instead of requiring custom crystals the example uses a stock microprocessor crystal, available from DigiKey Corporation. Thank you, N2DCH!

While most of us assume a crystal filter operates only at a fixed frequency, this is not necessarily true. Although many hams don't think twice about varying the frequency of a crystal controlled oscillator (a VCXO), often found in small QRP rigs, rarely do people think about varying the center frequency and bandwidth of a crystal filter. One chapter of *Ladder Crystal Filters* is devoted to this topic, and here is a case where many readers will want a few more examples.

CW operators are not forgotten. Unfortunately, the characteristics needed for a good, narrow, nonringing crystal filter often lead to a need for custom crystals. In addition, the match for several crystals will further complicate the problem of buying parts. However, if you do want to examine this topic, both equations and examples are included, as is a brief discussion of lattice filters with a listing of a few commercially available units.

At the back of *Ladder Crystal Filters* are several pages of *BASIC* program listings for designing several filters discussed in the text. I hope the publisher or the author will make them available electronically to save others the work of keying them in manually (and finding the resulting typos!).

Several appendices are thoughtfully printed, including names and addresses of crystal suppliers and a listing of 40 reference articles (a really nice library research job).

In summary, if you ever thought about rolling your own crystal filter you no longer have any excuse not to try it. The equations, the suppliers, the tips and the ideas are at your fingertips in *Ladder Crystal Filters*. QST

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Complied by Monique Levesque and Joe Bottiglieri, AA1GW

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Edited by **Steve Ewald, WV1X** • Assistant Field Services Manager

The ARRL Field Organization Forum

Field Organization Abbreviations	
ACC	Affiliated Club Coordinator
ARES	Amateur Radio Emergency Service
ASM	Assistant Section Manager
BM	Bulletin Manager
BPL	Brass Pounders League
DEC	District Emergency Coordinator
DXFR	DX Field Representative
EC	Emergency Coordinator
LGL	Local Government Liaison
NCS	Net Control Station
NM	Net Manager
NTS	National Traffic System
OBS	Official Bulletin Station
OES	Official Emergency Station
ORS	Official Relay Station
OO	Official Observer
OOC	Official Observer Coordinator
PBBS	Packet Bulletin Board Station
PIC	Public Information Coordinator
PIO	Public Information Officer
PSHR	Public Service Honor Roll
SGL	State Government Liaison
SEC	Section Emergency Coordinator
SM	Section Manager
STM	Section Traffic Manager
TCC	Transcontinental Corps
TA	Technical Advisor
TC	Technical Coordinator
TS	Technical Specialist
VC	Volunteer Counsel
VCE	Volunteer Consulting Engineer
VE	Volunteer Examiner

ATLANTIC DIVISION

DELAWARE: SM, Randall Carlson, WB0JJX—Much has been written as of late about the fact that local repeaters are not as "friendly" as they once were nor as active. Accounts of hams who are stranded with car trouble or in need of directions and not able to raise any one on a repeater are all too commonplace. Whether this is reality or perception is of course up to debate. But regardless, we all can do a better job of reaching out to visitors on our repeaters and to keep an ear out for our fellow hams that might need directions or are having problem on the road. Sure a lot of folks have cell phones these days, but when bad weather rolls in, just knowing there is someone on the other end of the radio who knows the area can be a great comfort. I know, I have been there. If we each spend a little more time monitoring our local repeaters, especially during bad weather, and provide assistance when needed, we may dispel the perception and prevent it from becoming a reality. Traffic (Sept): DTN QNI 167 QIC 10 in 22 sessions; DEPN QBI 28 QTC 3 in 4 sessions. K3JL 32. 73 Randall.

EASTERN PENNSYLVANIA: SM, Allen R. Breiner, W3TI—SEC: Eric Olena, WB3FPL. ACC: Steve Maslin, N3ORG. OOC: Alan Maslin, N3EA. PIC: E. Max Peters, KI6NJ. STM: Harry Thomas, W3KOD. TC: Cully Phillips, N3HTZ. SGL: Allen Breiner, W3ZRQ. ASMs: WB3YGA, WY3K K3TX N3KYZ, WB3FQY. KA3TUG has been added as Official Observer. KB3CVO, W3DAB, N3ZXE are ORS and W3JRY as OES. N3ONG and K3CWH upgraded to Advanced class. Officers for the reactivated Carbon Amateur Radio Club are N3CR president, K3PP vice president, K3PH secretary, and W3MF treasurer. They plan to continue holding their monthly fox hunts. Southern Pennsylvania ARC members AA3C, N3CXY, N3XPB,WB3FQY, N3XPA, N3LOM, N3ABC, KI6NJ, K3KSA, KB3BGS, and N3XOY completed a SKYWARN refresher training program. N3XXH was presented a certificate of Emergency Communications Commendation for his actions, quick thinking heroism, and performance during the height of a tornado in Sullivan Co last July. Eight members of the section level staff attended the biannual meeting of the Section Manager's cabinet held October 3. The following are a few highlights from that session. For the past year, your SM had been looking for an Assistant SM to fill a void in order to cover the northeast corner of the section. Cabinet members recommended WB3YGA for his past record, excellent work and accomplishments and was appointed Assistant SM. SEC WB3FPL reviewed the results of the recent EC evaluation which was taken from 56% of those ECs who returned the questionnaire. Using this a reference, the greater percent of ECs have an excellent training program and are prepared in case the Y2K glitch requires their assistance on New Year's Eve. Max, KI6NJ and SM W3TI reviewed the OBS appointment and noted there have no new Bulletin Station appointments made within the past 5 years because bulletins are now easily available via e-mail. Therefore, the necessity for a Bulletin Manager is not required. Each OBS shall retain their present appointment for life or unless they cease membership in the League. The project of ASM Dave, K3TX, is keeping track of our Amateur call letter license plates in Harrisburg. All the old blue on yellow and yellow on blue call letter places will be replaced FREE. If you experience any difficulty, contact him: Dave Heller, PO Box 224, Morrisville, PA 19067. You should supply him with your phone number, copies of your current registration, insurance name and policy number and drivers license. At no time should anyone contact the department at Harrisburg because that could cause problems and more delays. The official body of your EPA section cabinet and SM take this opportunity to wish a joyous holiday season and a happy and prosperous New Year. Tfc: W3KOD 507, W3HK 222, N3DRM 220, W3IVS 152, N3EFW 120, N3YSI 59, W3BNR 53, W3UAQ 42, WA3EHD 35, N3HR 26, KA3KMH 21, W3ZQN 18, W3TWV 17, N3IRN 16, AD3X 15, KB3BBR 14, K3AEB 13, NR9K 13, N3SIN 12, N3KYZ 11, N3AT 10, KA3LVP 10, W8TI 8, W3DP 7, K3AAR 4, N3AS 3, N3DCG 3. Net reports EPA 187, EPAEP&T 176, HBSN 80, PFN 61, PTTN 50, MARCTN 30, D3ARES 16, SEPTN 10, WARCE 6 EPAS 1 MCOES 1 D4ARES 1.

MARYLAND/DC: SM, Bill Howard, WB3V (**wb3v@erols.com**)—When Hurricane Floyd visited our area we were all relieved that it turned away. Nonetheless, there was considerable flooding and many lengthy power outages throughout the area. My thanks to all those who gave their time and effort to help during this most difficult time. WICO EC WB2MJR reports operators serving during the Hurricane Floyd activation: WA4GGH N3PXT KD3NW KD3NX N3YMC KA2HZJ and WB2MJR. HOWA RO WA1QAA reports that shortly after noon on Thursday, the 16th, Howard County Emergency Management notified RACES that the EOC would be activated at 1230 hours. WA3WZX W3CCI W1TRT and W3GJN volunteered to support EOC or shelter operations, as needed. KENT EC WA6LHQ reports emergency net operators: WA6LHQ WA3UJE N3WGC WA3RER N3TF KB3ARR N3DOU and N3JYH. FRED EC N8AAY reports 4 FRED ARES Net sessions on 147,06, and 1 public service event, the MS Tour De Vine bike ride. ANAR EC N3QXW reports 37 members, an increase of two since last report period, 4 ANAR ARES Net sessions on 147.805 with liaison to EPA, NCAC, MEPN, WVA, BTN, and MDD, 1 training session and 1 drill. ANAR ARES supported the diabetes walk and continuously manned the EOC and two ARC shelters 9/16-17; OES reports received from: N3QXW KO4A and W4ATB. Our ASM/RACES W3YVQ reports he served as NCS for (emergency sessions) MEPN during Hurricane Floyd. I wish all a happy holiday season and a safe new-year. Thank you for your support throughout the past year. I would also like to thank the ARRL Headquarters staff for their support of our section and wish Rick Palm well upon his departure from HQ. He will be sorely missed. 73- Bill. With the nets - NET/NET MGR/QND/QTC/QNI: MSN/KC3Y/30/57/290, MEPN/N3WKE/31/57/509, MDD/WJ3K/58/227/1064, MDD TOP BRASS//KJ3E/310/AA3GV/133/AA3SB/139, BTN/AA3LN/30/45/366, SMN/KE3OX/4/4/6, AUGUST BTN/AA3LN/31/41/351. Tfc: KK3F 1148, KJ3E 225, N3WKE 99, AA3SB 99, W3YVQ 62, N3KGM 58, AA3GV 55, KE3OX 48, W3CB 48, N3WK 46, KC3Y 44, K3CSX 43, KO4A 37, N3DE 33, N3EGF 18, N3ZKP 16, W3VK 16, WA1QAA 13, WA3GYW 5, KE3FL 2. (Aug) KE3FL 12. PSHR: KK3F/194, W3YVQ 151, W3VK 138, AA3SB 138, KJ3E 130, N3ZKP 123, N3WKE 121, N3WK 120, KO4A 115, AA3GV 112, K3CSX 106, W3CB 101, WA1QAA 88, KE3OX 87, KC3Y 83, KE3FL 81. (Aug) KE3FL 84.

SOUTHERN NEW JERSEY: SM: Jean Priestley, KA2YKN—(@K2AA) e-mail: ka2ykn@arrl.org ASM: W2BE K2WB W2OB N2OO. SEC: N2SRO STM: WB2UVB. ACC: KB2ADL. SGL: W2CAM. OOC: K2PSC. PIC: N2YAJ. TC: W2EKB. TS: W2PAU. W2BE WB2MNF KD4HZW WB3IJB N2QNX N2XFM WA2NBL AA2BN. New WEB Site: **http //www.jrjsolutions.com.~dvrc/** is Delaware Valley Ragchew's info site. As 1999 and the century ends, Thanks for visiting our club table at hamfests and supporting our section in many ways. Some visible, many unsung. Thankyou. Now approved for next year is Hamfest by the Shore in Bayville. This year's Bayville Hamfest, a huge success and I look forward to next year. I urge NTS net managers to collect traffic reports and send them to WB2UVB for inclusion in this column and QST traffic reports. PSHR, weekly and monthly reports must be received by Gene Bond by 5th of each month. Traffic reports for Sept. 99: NJ Net Late QNI 189 QTC 70, Jersey Slow Net QNI 157 QTC 12, Jersey Net Early QNI 237 QTC 95, South Jersey VHF Net QNI 279 QTC 49. WB2UVB 184 AA2SV 69 KB2RTZ 67 K2UL-4 61 K2UL 56, N2VQA 22, W2AZ 19, KB2VYZ 10, KA2CQX 7, N2WFN, WA2JSG 6, KB2YBM 5, N2FHJ, KB2CDB, KB2VSD 3, N2AYK, KB2YJD 2, N2SOE, KB2HJJ, N2FNK, KB2VSR KB2ETU 1. Your continuing support is appreciated.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA —Well gang, this is it — one of my last Western New York columns for you faithful readers. Starting in January, please send all required reports for activities to Scott W2LC (**w2lc@ix.netcom.com**). I want to thank all the radio clubs for sending me their newsletters. For those sent electronically, please continue since I'm still interested. But if they're sent by mail then please forward to W2LC, who will also appreciate receiving them. W2MTA will continue as NTS 2RN Manager, so come join up, we'll be glad to have your public service traffic handling. My hearty thanks to our NTS VHF Local nets -CNYTN, OCTEN, STAR, and WDN; and to Jennie, WB2OFU, with Black River Valley Service Net (BRVSN) and Frank, WB2IJZ, with Early Bird Net (EBN) for their daily service and faithful reporting over the many years. CLUB OFFICERS: Orleans County ARC N2LVW K2ZUT KB2RMD KA2BCF. To all of you who serve the public, especially all Field Organization appointees, my sincere thanks for your contributions to Amateur Radio. APPOINTEES: (ASM) WB2EFU for Livingston & Monroe Counties, W2AC for Chemung, Schuyler & Steuben Cos; (DEC) N2OJM; (ORS) N2UTK. (Sept) BPL: N2LTC KA2ZNZ; DATALINK: K2DN RX2/TX1; KA2GJV RX32/TX2; N2LTC RX226/TX160; NY2V RX3/TX5. SILENT KEY: Ed, AI2W, will be sorely missed by the Allegany Highlanders and many others.

Net/Mgr	QNI	QSP	QND
EBN/WB2IJZ	458	000	21
NYSEMO/N2AGO	070	008	04
NYSCN/W2MTA	014	004	04
#NYS-M/KA2GJV	197	098	30
CHN/W2EAG	183	035	30
#WDN-M/KB2VVD	657	083	30
#NYPHONE/N2LTC	243	341	30
#NYPON/N2YJZ	286	086	30
ESS/W2WSS	341	100	30
NYSPTEN/KD2V	386	050	30
#OCTEN-E/KA2ZNZ	1330	229	30
OMEN/K2DYB	015	001	02

Net	QNI	QSP	QND
#STAR/N2NCB	394	018	29
#WDN-E?N2JRS	600	065	30
#NYS-E WB2QIX	359	171	30
OARCN/N2KPR	030	005	04
THIN/KB2UQZ	019	000	01
TIGARDS/W2MTA	023	003	04
BRVSN/WB2OFU	301	007	30
STTHN/N2WDS	053	012	08
#CNYTN/WA2PUU	357	071	30
#OCTEN-L/KA2ZNA	640	226	30
#WDN-L/KB2UQZ	601	056	30
#NYS-L/W2YGW	267	192	30

Denotes NTS net. * Denote Public Service Honor Roll. Traffic (Sept.) N2LTC*919, KA2ZNZ*575, KF1L*346, KA2GJV*345, W2MTA*300, W2PII*240, WB2IJH*220, K2BCL *203, NN2H*189, W2FR*137, WI2G*133, WB2QIX *119, N2UTK*84, KB2VVD*63, NY2V*62, AF2K*51, KA2DBD*48, KG2D*47, KB2UQZ*38, KC2EOT*35, KB2ETO*24, KC2FEM*23, K2DN*19, WA2UKX*17, WA2GUP*16, N2WDS*15, AA2ED*11, W2RH 9, KA2QIX 4, KB2WII*4. (Aug.) KA2QIK 1. Seasons Greetings and a Happy New Year 2000 to all es 73. **w2mta@juno.com**

WESTERN PENNSYLVANIA: SM, Bill Edgar, N3LLR—ASM: N3MSE. ACC: open. ASM-ARES: WB3KGT. SEC: N3SRJ. ASM-Packet: KE3ED. ASM-Youth & Education: KE3EE. PIC: W3CG. STM: N3WAV. TC/OOC: WR4W. DEC-SO: KD3OH. DEC-N1: N3QCR. DEC-N2: KA3UVC. DEC-S1: KA3HUK. DEC-S1: N3HJY. DEC-Rapid Response: N3HJY. I would like to take this time to personally thank each of the WPA Section Field appointees for volunteering their help and time in serving the Amateur Radio community and making it a better place during 1999. These people have served in various appointments such as: Official Relay Station, Official Emergency Station, Official Bulletin Station, Public Information Officer, Technical Specialist, Official Observer, Local Interference Committee members, Emergency Coordinator, Net Manager, District Emergency Coordinator, Affiliated Club Coordinator, Bulletin Manager, Public Information Coordinator, Technical Coordinator, Official Observer Coordinator, Section Emergency Coordinator, Section Traffic Manager and the Assistant Section Managers. THANKS for a great job done this year—it couldn't have been without you!!! With the New Year right around the corner and the Y2K bug looking at us, don't forget to check-in with your ARES/RACES/Satern groups to offer communications assistance in the event ham radio communications becomes necessary. This could be another way to let the public know why it is important that we have these valuable frequencies, and what we do with them. Best wishes to you and your family for a safe and happy Christmas or Hanukkah!

CENTRAL DIVISION

ILLINOIS: SM, Bruce Boston, KD9UL—SEC: W9QBH. ACC: N9KP. STM: K9CNP. PIC: N9EWA. TC: N9RF. OOC: KB9FBI. DEC-Central N9FNP. The Wheaton Community Radio Amateurs have been officially renewed as an ARRL Special Service Club. Gordon West, WB6NOA, was the featured speaker at the annual Sangamon Valley RC dinner August 15 in Springfield. West shared his insights on Amateur Radio and ended the evening with his famous spark-gap pickle demonstration. He spoke the following night at a meeting hosted by the Rockford ARA. RARA President KB9SH wrote in the club's *Ham Rag* newsletter

Continued on page 116.

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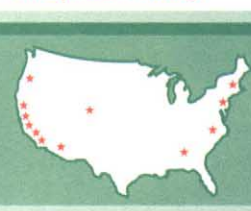
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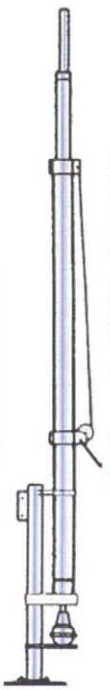


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- Complete w/fast charger

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DJ-S41T/DJ-S11T

440 Tiny HT 2Mtr Tiny HT

- 340 mw
- 21 memories
- Uses 3 "AA" Batteries
- Encode built-in
- Pivot antenna
- Less than 5" high and 2 1/4" wide (DJ-S41T)

(DJ-S41T shown)



DX-70TH HF Transceiver

- 100W 160-10 Mtrs • 100W 6M, Gencov. Rx
- Full QSK, 100 Mems. • Compact, Remotable
- Dual VFO, 12VDC • 6.2 lbs.

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SMA-501 Dual Band

Dual band "Miracle Baby" style antenna, with a male SMA connector.

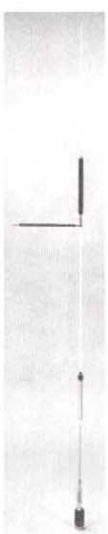
Shown on the popular FT-50R by Yaesu. The antenna is only 1.75 inches tall, and exhibits surprising performance.



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40M-70cm Mobile Antenna



40/*20/*17/15/10/6/2M/70cm
* optional coils

A 6M/2M/70cm whip that accepts 1,2 or 3 HF coils for 1 to 6 band operation. Simply screw on any combination of HF coils you choose.

Standard PL-259 connector allows easy mounting. Convenient fold-over hinge for entering garages, parking structures, etc...

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MSG Series

2M/70cm Mobile Antennas with spring-loaded whip to absorb impacts. Fold-over hinge included as well.

MSG-1000C	MSG-1100C
Length: 39 inches	Length: 43 inches
Max Pwr: 150W	Max Pwr: 150w
Conn: PL-259	Conn: PL-259

NEW!

MH-510

6/2M/70cm HT Antenna w/SMA Connector

The first aftermarket gain antenna for the YAESU VX-5 and the ICOM T8A.

A dramatic improvement over the stock antenna. 20.75 inches of TRIBAND performance.

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- APRS Compatible
- DX Packet Cluster Monitor
- 200 Mems., CTCSS
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TM-D700A NEW!

2M/440 Dualband
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- Receives 118-1300 mHz (cell blocked)
- Remote Head Inst. only (kit included)
- 200 Memories
- Built In 1200/9600 baud TNC
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- TS-50S - World's smallest HF trans.
- 100W out, (90W TS-60S, 50MHz only)
- SSB, CW, AM, FM, • 12V Gen. Cov. RX,
- 6.4 lbs., 7.16 x 2.4 x 9.32"
- 105 db dynamic range, 100 Mems.
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TS-870S HF Transceiver

- DSP in I.F. Stage! • 100W, 12V DC
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TM-V7A 2M/440Mhz

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- 50W + Mid and Low • Mil-Spec
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- Optional 3rd band available • Back-lit mic
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- 2m/440 Dual Band HT
- 200 Mems • PC Programmable
- 6w 2m, 5.5w UHF @13.8 VDC
- Alphanumeric Display
- CTCSS Built It • Backlit Keypad

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5w High Power Also Avail.



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TH-22AT

- Ultra Compact
- 2M HT, 5W optional
- 40 memories
- Encode Built-In



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- 100w HF, (100w on 6M TS-570SG only)
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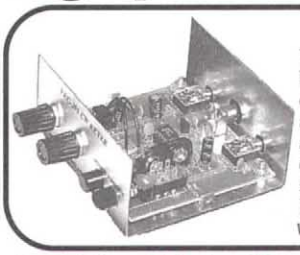
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VEC-201K shown in optional case (vinyl cover top not shown), VEC-201KC, $14.95



Aircraft Receiver Kit tunes entire voice aircraft band 118-136 MHz. Picks up air traffic 100 miles away. Track progress of incoming/outgoing traffic in your area, gain advanced weather information, and discover how the National Air Traffic System really works. Great way to learn about aviation. Use 9V battery. Drives external speaker/phones. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-131K, $29.95.**



20/30/40/80 Meter Receiver Kits give high performance! Covers entire band or tailor to cover desired portion. Copy CW/SSB/AM. NE602/ 612 mixer-oscillator, LM386 high gain audio amplifier. 1¾x4¾x 5¼ in. *Moderate skill level.* Order **VEC-1120K** (20 Meters),**VEC-1130K**(30 Meters),**VEC-1140K** (40 Meters), **VEC-1180K** (80 Meters), **$29.95 ea.**



20/30/40/80 Meter QRP CW transmitter Kits have variable crystal oscillator tuning, front panel switch selects 1 of 2 crystals. 1 crystal included. Transmit and Receive switch. Connect receiver. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-1220K** (20 Meters), **VEC-1230K** (30 Meters), **VEC-1240K** (40 Meters), **VEC-1280K** (80 Meters), **$29.95 ea.**



Tunable SSB/CW Audio Filter Kit has sharp *four* pole peak and notch filters. Zero in with frequency control & adjust bandwidth for best response. Tune frequency from 300-3000 Hz. Notch is an outstanding 50 dB. 1 Watt amplifier. Speaker/Phone jacks. 12 VDC at 300 mA. 1¾x4¾x5¼ in. *Intermediate skill level.* Order **VEC-841K, $34.95.**

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Super CW filter/amplifier Kit has powerful 1 watt audio amplifier to drive speaker. 8 poles active IC filtering uses cascaded low-Q stages. 3 bandwidths: 80,110, 180 Hz. Center frequency: 750 Hz. Up to 15 dB. Use 9-18VDC, 300 mA max. 1¾x4 x3½ in. *Simple skill level.* Order **VEC-821K, $29.95.**



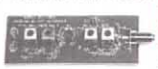
Super SSB Audio Filter Kit improves readability with 8 poles, optimizes audio bandwidth, reduces SSB splatter, low, hi-pitched interference, hiss, static crashes, background noise. Use 9V battery. 1¾x4x 3½ in. *Simple skill level.* Order **VEC-830K, $19.95.**



144/220/440 MHz Low-Noise Preamp Kits soup up your antenna system. Helps pull in weak signals. Works wonders for scanner or ham-band receiver. Gives great low-noise performance and immunity from damaging electrostatic discharge. 1x1½ in. *Simple skill level.* Order **VEC-1402K** (144 MHz),**VEC-1422K** (220 MHz), **VEC-1444K** (440 MHz), **$17.95.**



CW Memory Keyer Kit stores 512 characters in four 128 character non-volatile EEPROM message memories. *Carry on entire QSOs by just pressing memory message buttons.* True sinewave sidetone with soft rise and fall time eliminates harsh keyclicks. Has all features of VEC-201K CW Keyer Kit. 1¾x 6¼x5¼ in. *Simple skill level.* Order **VEC-221K, $69.95.**



High-performance 2 Meter Preamp Kit pulls weak signals out of noise. Solves three reception problems -- boosts signals using a 1-dB noise figure microwave transistor, provides razor-sharp bandpass filtering, eliminates unwanted electrical noises with built-in balun. Uses 9-14 volts DC. Tiny 1½x3x1 in. fits in any size box. *Intermediate skill level.* Order **VEC-1402DK, $59.95.**



2/6/10 Meter FM Receiver Kits let you tune into the world of ham radio. Catch all the action! Each covers the entire FM sub-band and runs off your 9 volt battery. Plug in speaker or headphones for loud clear reception. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-1002K** (2 Meters), **VEC-1006K** (6 Meters), **VEC-1010K** (10 Meters), **$34.95 each.**



2 Meter Monitor Kit receives 144-148 MHz. Low noise, high gain RF preamp gives you excellent 0.1 uV sensitivity. Air variable tuning capacitor has 8:1 reduction. Dual conversion superhet provides selectivity and stability. Automatically eliminates squelch tails. Built-in speaker, squelch, tone, volume controls. 19¼ in. telescopic whip. 9V battery. 2x4¼x4 in. *Intermediate skill level.* Order **VEC-104K, $79.95.**



5 Watt 2 Meter FM transmitter Kit lets you transmit voice and data -- AFSK data (up to 1200 baud) and FSK data (up to 9600 baud). Jumper select reactance or direct FM modulators. Reliable Motorola NBFM transmitter IC and PA transistor. Crystal controlled (x8 frequency multiplication). -60 dBc spurs and harmonics. Use 12-14 VDC, 1.5 amps. 5-pin DIN microphone jack. 1¾x4¾x5¼ in. *Difficult skill level.* Order **VEC-1202K, $99.95.**



Ni-Cad/Ni-MH Battery Charger Kit safely quick charges expensive batteries -- no overcharging -- many in less than an hour. HTs, cell phones, camcorders, lap top computers. Handles 1 to 12 cells. Charging status LEDs. Discharge before charge function reconditions batteries. Also removes memory effect. Runs on 12-15 VDC. 1¾x4¾x5¼ inches. *Moderate skill level.* Order **VEC-412K,$49.95.**



Shortwave Converter Kit converts AM or AM/FM radios to shortwave receivers at a push of a button. Choose two 1 MHz bands between 3 and 22 MHz. Popular 13, 16, 19, 25, 31, 41, 49 and 60 Meters international broadcast bands. On/off bypass, NE-602/612 mixer-oscillator IC and tuned input circuit. Use 9 V battery. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-101K, $27.95.**



Crystal radio set Kit lets you relive the experience of early radio pioneers. This baby really works! Wind your own inductor, wire up the earliest radio circuit without soldering a thing and listen to the magic of radio that needs no power. Put up an antenna, connect a ground. Stations come in amazingly loud and clear. Includes antenna wire, sensitive earphone. 1¾x5x6½ in. *Simple skill level.* Order **VEC-121K, $19.95.**



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TX-472	72'	22'8"	4	1040	12 1/2"	21 5/8"
TX-472MDP*	72'	22'8"	4	1210	12 1/2"	21 5/8"
TX-489	89'	23'4"	5	1590	12 1/2"	25 5/8"
TX-489MDPL*	89'	23'4"	5	1800	12 1/2"	25 5/8"

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HDX-538	38'	21'6"	2	600	15"	18"
HDX-555	55'	22'	3	870	15"	21 5/8"
HDX-572	72'	22'8"	4	1420	15"	25 5/8"
HDX-572MDPL*	72'	22'8"	4	1600	15"	25 5/8"
HDX-589MDPL*	89'	23'8"	5	2440	15"	30 5/8"
HDX-689MDPL*	89'	23'8"	5	3450	18"	37 1/8"
HDX-5106MDPL*	106'	24'8"	6	3700	15"	37 1/8"

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TMM-433SS*	33'	11'4"	4	315	10"	18"
TMM-433HD*	33'	11'4"	4	400	12 1/2"	20 7/8"
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* Rotators must be top mounted

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about a balloon chase she participated in last August. The balloon was launched in LaValle, WI, and carried GPS, APRS and ATV equipment. The balloon reached an altitude of nearly 98,000 feet before bursting. It sounds like everyone involved had a great adventure. STARS has replaced their two-meter repeater antenna and are getting good signal reports. Williamson Co EC WA9APQ spent several weeks during the summer in Colorado. While there, he assisted with communications on a number of community events including the annual burro race and the Leadville 100. The Kishwaukee ARC received a letter from the DeKalb Public Library thanking them for providing an exhibit. KARC was making plans to help with the DuPage/Kane County Bike-a-thon. According to the Fox River Relay League newsletter *Arc Over*, the membership has voted to accept a transfer of assets from the Aurora FM Amateur Repeater, Inc. (AFAR). The AFAR group operates two wide-area repeaters in the Aurora area. Members of both organizations will work together over the next two years to assure a smooth ownership transition, after which AFAR plans to dissolve. Both repeaters will remain in operation, and the FRRL encourages amateurs to continue using them. Hamfesters RC is looking into the idea of helping a local Boy Scout troop earn their Amateur Radio badge. HRC members who participated in Field Day can purchase a special pin from the club. Contact KB9CYL for details. Schaumburg ARC has named N9MYC to their emergency preparedness committee. SARC is also gearing up for kit-building season and making plans for their holiday party. Congratulations to K9QZ on being named a life member of the Peoria Area ARC. September traffic: W9HLX 92, N9DT 34, WB9TVD 33, NC9T 22, WA9RUM 6, W9FIF 6. D9RN 1 and 2 SEP 99 sessions 54, QTC 139, IL QNI 54, QTR 727 min. Average 2.6, rate 0.20, percent 16, IL QTC 43. ISN report QNI 188, QTC 80, sessions 28. Ninth region C4 report—tfc 197, sessions 60, time 355 min, avg 3.28, rate .554, percent rep 95%, QNI ILN K9CNP, KF9ME, NS9F. W9VEY Memorial Net de K9AXS 6 with 194 check-ins.

INDIANA: SM, Peggy Coulter, W9JUJ – SEC: K9ZBM. ASEC: WA9ZCE. STM: N9ZZD. OOC: KA9RNY. SGL: WA9VQO. TC: W9MWY. BM: KA9QWC. ACC: N9RG. Sympathy extended to the families and friends of Silent Keys: 9/17, Malcolm "Mike" R. Holland, KA9ISH, Upland and 9/20, Richard W. Alexander, WA9MVX, Muncie. They will be missed. Announcing a new staff member, STM, Roger Mitchell, N9ZZD. Thank you Roger for accepting this position. It is appreciated. If you handle any traffic and not an ORS, send Roger a message asking for an application. You only need to be an ARRL member and handle a little traffic. Sept. was a busy month for the Porter Co. ARC/ARES/SKYWARN. They provided communication support for a Girl Scout Bike Rally, for a Popcorn Parade with KA9OV, N9PA, KB9OLY, WA9TSQ, W9NNK, WB9CAO, KB9PUY, N9RKY, W9WQA, KB9JRY, W9KFW, KB9OCE and WB9AOU. Also for the Calumet Crank Club Bike-A-Thon by W9NNK, WB9CAO, WA9TSQ, KB9PUY, KB9UCT, KC9IU and KF8EY. By the records supplied to our SEC, Porter Co hams provided 2,200 man-hours of Public Service Activity support during Sept. This seems to be typical of this busy and active club/ARES group in Porter Co. We would like to commend Gary Kletz, KB9OLZ for taking the time and effort to document and report this activity. A new EC has been appointed for Johnson Co: KB9RRN. The Bethlehem Special Event Station will be held on Dec 10 and 11. We have a new ICN net manager K8LEN. Check in and wish him good luck maybe even trying net control. Wishing everyone a Happy Thanksgiving. Don't eat too much turkey. NM's ITN/W9ZY, QIN/N9PF, ICN/K8LEN, WN/AB9AA, VHF/N9ZZD.

Net	*Freq*	*Time/Daily/UTC*	*QNI*	*QTC*	*QTR*	*Sess*
ITN	3910	1330/2130/2300	2964	455	1464	90
QIN	3656	1430/0000	102	63	268	22
ICN	3705	2315	34	4	203	13
IWN	3910	1310	2206	–	300	30
IWN VHF Bloomington			483	–	450	30
IWN VHF Kokomo			711	–	150	30
IWN VHF Northeast			1058	–	600	30
Hoosier VHF nets (10 nets)			747	34	1503	61

D9RN Total QTC 139 in 54 sessions IN represented by WB9QPA, K9GBR, W9UEM, KB9NPU, N9ZZD and K9PUI. 9RN Total QTC 197 in 60 sessions IN represented by KO9D, KJ9J, K9PUI, AA9HN, N9PF, WA9QCF, WB9UYU and W9FC. Tfc: W9FC 257, N9ZZD 133, W9ZY 109, N9WNH 80, WB9QPA 78, W9UEM 74, KJ9J 68, AB9AA 59, K9GBR 56, W9JUJ 56, K9PUI 49, KB9NPU 44, N9PF 24, W9EHY 21, KA9EIV 18, WA9QCF 18, AA9HN 14, KA9QWC 12, KA9DIG 10, W9KT 9, AB9A 9, K9DIY 7, WB9NCE 5, K9RPZ 4, K8LEN 4, K9OUP 3, N9JAI 1.

WISCONSIN: SM, Don Michalski, W9IXG—BWN 3985 0600 W9RCW. BEN 3985 1200 KE9VU. WSBN 3985 1730 WB9WHQ. WNN 3723 1800 KB9OCZ. WSSN 3645 1830 N9BDL. WIN-E 3662 1900 WB9ICH. WIN-L 3662 2200 W9UW. WSBN will start at 5:15 P.M. November 1. The WNA has elected Ron, W9UW, as president; Gene, K9UTQ, as treasurer and Bette, KF9ZU, replaces Art, KA9KLZ, as secretary. Thanks, Art, for a fine job! It is with deep regret that I inform you of the passing of three hams: Joseph Jackson Jr., W9IDQ, age 82. Also, Lorraine McCurdy, N9TXT. Lorraine was a member of Green Fox ARC. Also, Charles Kindt, W9MPP, age 77. Chuck was a member of the Rock River Radio Club. A reminder that hams must register with the FCC using the ULS system for any renewals, vanity, or modifications. Form 610 is now a SK! Go to **www.fcc.gov/wtb/uls/** to register or call (800) 418-3676 for a 605 form. Get your spouse or significant-other involved in the hobby. Invite them to attend a no-code technician class! AES, HVARC, and UW Space Place offer regular classes. Contact me, if interested in signing up. Holiday parties are being organized so support your club by attending! It is the time of year when officers are needed to fill positions in your club. Get involved by becoming an officer or board member! Congratulations to Jim, KB9REO, for upgrade to Advanced. Also, W9IXG, to Extra (I know that guy!). BSSS has a new Website in work. Go to **www.bsss.org** and see what Jim, K9ZZ, is doing to bring the future news to the State hams. More and more hams are being requested to help during Y2K. Contact your EC. There are several ARRL awards available. Check them out at **www.arrl.org/ead**

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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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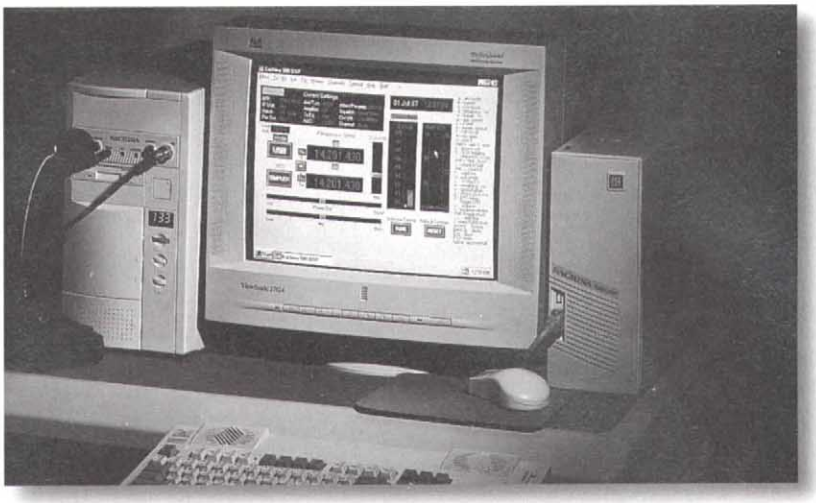



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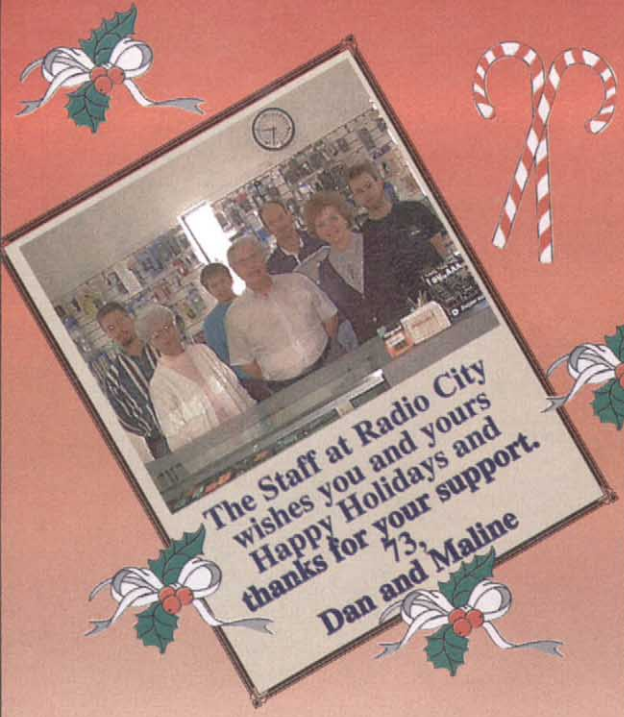
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RX Sensitivity (SSB-2.4 kHz, 10 dB S/N, preampon	.18µV	< .20µV (1.705-30 MHz)	25µV	.16µV (1.8-30 MHz, filter not specified) ✔
RX IF Rejection	> 80dB ✔	>70 dB (1.8-30 MHz)	>80 dB ✔ (1.8-30 MHz)	>70 dB
RX Audio Output (4Ω)	4 Watts ✔	1.5 Watts (8Ω)	2 Watts	2.6 Watts (8Ω)
TX Carrier Suppression	> 55 dB ✔	> 50 dB	> 40 dB	> 40 dB
TX Unwanted Sideband Suppression (1KHz mod.)	> 55 dB ✔	> 50 dB	> 50 dB	> 55 dB ✔
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/awards and submit your nominations to me by January 31. Keep the news flowing! 73, Don. Tfc: K9JPS 772, W9RCW 694, K9RTB 688, W9IHW 652, W9YPY 513, K9GU 275, W9CBE 158, AG9G 148, KE9VU 90, N9BDL 88, KA9FVX 55, N9CK 53, KA9KLZ 51 W9UW 50, W9YCV 48, K9LGU 46, K9FHI 43, W9BHL 30, K9HDF 29, AA9BB 28, KG9B 26, W9ODV 25, WB9ICH 21, N9JIY 18, K9UTQ 4, W9PVD 3.

DAKOTA DIVISION

MINNESOTA: SM, Randy "Max" Wendel, N0FKU—The MN Dept of Emergency Management (DEM) has asked MN ARES to supplement emergency comms for them on Dec.31/Jan 1. The plan is to have "hubs" in MN regions that will report to St Paul on HF. The hubs will be on VHF/UHF to take reports from their regions and you are being asked to participate. You don't have to be an ARES member. The DEM wants any Y2K reports that they need to be aware of. What Y2K events those are...we can only wait and see. However, this is a great opportunity to participate with DEM on behalf of a public service to an important state agency. Any individuals, radio clubs and members, etc, are hereby asked to join in the New Years Eve event. I will try to have more info in Jan *QST*, but the official details are available on our weekly MN ARES HF Net held every Sunday on 3875 kc at 5:30 PM CST. You may also e-mail **n0zod@arrl .net** for info. This is chance to "test" our ability to formulate a state network as a foundation for possible future needs as it necessitates. Most of all, it's a chance for YOU to be part of an ARES effort without having to be an ARES member. I would like to acknowledge our Minnesota ARES State EC, Gary Peterson, N0ZOD, for his efforts in meeting with DEM and traveling around the state in October drumming up the awareness to construct this network effort! After being back on the air for one year, Rod Vlach, WA0QMP, of Willmar, is WAS, WAC, DXCC, CP-20, VE, OO, and Extra Class! Dale Cary, WD0AKO, steps down after 12 yrs as RRRA newsletter editor...a job well done, Dale! 73 from n0fku@arrl.org. Tfc: KB0AII, WA0TFC, W0LAW, W0GRW, W0HPD, W7HH, K0PIZ, KB0AIJ, KN9U, W0GCB, WO0A, W3FAF, W0WVO, K0WPK, K0PSH, KA0IZA, K0OGI, WD0GUF, N0JP, KB0OHI.

NORTH DAKOTA: SM, Bill Kurt, WC0M—I'm sorry to report that W0GZD is a Silent Key. Paul was very active in the Grand Forks area for about 50 years. He was noted for his expertise in antenna design & knowledge. He also had the rating with the FAA to design the pattern for low frequency ranges that were the forerunners of the Ors. The FORX Hamfest was a success even though attendance was down which seems to be the trend most everywhere. The group is working on ways to increase attendance for next year. Fargo Hams have been bust this summer again with The CROP walk then a MS walk followed by a Boy Scout food drive, MS Bike tour, Alzheimer's walk moving the 76 repeater and installing the new repeater at Grandin. Thanks to WD0AKO for publishing the RRRA newsletter for the last 12 years Dale has done a great job & left some big shoes to fill. Bismarck Hams held their Sep meeting in Fraine Barracks & received a tour of the heart of ND emergency communications located. Tfc: N0RDJ 6. Sess/QNI/QTC Mgr: Goose River, 1895 kc 8:30 AM Sun 3/25 /0 KE0XT; DATA 3937 kc 6:30 PM Daily 25/501/12 KE0XT; WX Nets 3937 kc 8:30 AM 12:30 PM 24/702/30 KE0XT. Storm Net 3937 kc, continuous as needed during storms.

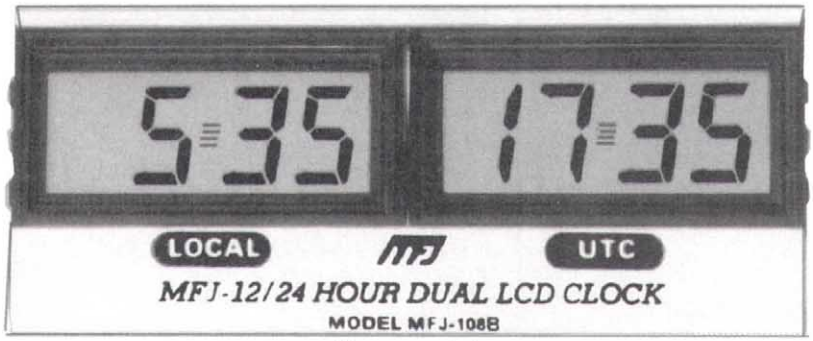
SOUTH DAKOTA: SM, R. L. Cory, W0YMB—Sioux Empire ARC at Sioux Falls reported their 1999 Field Day score was 5972. KA0VME and KA0HKL made 720 contacts on HF phone. With the exception of a few days, the nice fall weather has slowed the return of ham activities from the busy summer outdoor activities. By the time you read this, the propagation conditions should have improved. The Watertown autopatch association has 14 members. The 1999 Dakota Division Convention hidden transmitter hunt was won by WA0WRI, a ham from Lincoln, Nebraska. Black Hills ARC had their annual picnic and election September 12 and re-elected all of their officers. At Rapid City, NU0F and KA0SEZ have a license class with 8 students. Please send me anything you would like to have in this column. Total traffic reported for September was 403. Merry Christmas and Happy New Year.

DELTA DIVISION

ARKANSAS: SM, Roger Gray, N5QS, e-mail n5qs @arrl.org—This month, I enjoyed attending the CAREN hamfest and visiting with old friends and making a few new ones while there. It appears to be growing again and hopefully next year will be still bigger. I have been preparing for the upcoming JOTA for the past several weeks, and it will be this weekend as I write this. This year, the SET will coincide with it. Everyone plan to participate in the Y2K net planned for Jan 1. There will be a statewide "Y2K Net" beginning on Jan 1 at 9 AM on 3987.5 (80 M). The plan is for check-ins only unless there is real traffic to be passed. The SEC would like to have at least one check-in from each county in the state. They expect the net should only take up a half-hour to an hour or so. It would be nice to also have a 2 meter net connected to the HF check-in in each county. Arkansas Section traffic and net reports for September. Tfc: K5BOC 64, K7ZQR 52, AB5AU 17, W9YCE 12, KO5E 10, KA5MGL 8, KK5QS 6, W5HDN 4, APN 15, AMBN 14, ARN 77, OZK 5.

LOUISIANA: SM, Lionel A "Al" Oubre, K5DPG, e-mail **k5dpg@arrl.org** Web Page **www.aisp.net/k5dpg** ASM: KB5CX, K5MC. ACC: KA5IJU. BM: K5ARH. TC: KE5FZ. SEC: N5MYH. OOC: WB5CXJ. PRC: KB5QVI. STM: KG5GE. NM LTN: WB5ZED. NM LCW: W4DLZ. Bert, W5ZR, of New Iberia, has been accepted into the prestigious First Class Operators Club (FOC). Congrats, Bert. The SWLaRC in the Lake Charles area is trying to develop a UHF link that would link from Houston TX to Baton Rouge LA. Contact Kirby, KI5EE, e-mail **ki5ee@juno.com** for more informa-tion on how you, your club or group can become involved. The link can be expanded to other areas if there is an interest. The SELaARC of Hammond provided communications for the annual Bike Tour. The Iberia ARC provided communications for the LA Sugar Cane Festival parades. The Springhill ARC participated in the annual Lumberjack Festival. Up coming Hamfests: Monroe November 6, Minden December 4, Hammond January 15, Rayne March 11-12. Go out and support our area hamfest

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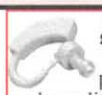
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Drive Power: 120 watts for 1,500 watts output
Tubes: Amperex or Triton 3-500Z triode (2)
QSK: Standard Feature (Vacuum Relay)
Transformer: 32 lb. Heavy Duty Hypersil
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Drive Power: 50 watts for 1,500 watts output
Tube: Svetlana 4CX800A Tetrode (2)
QSK: Standard Feature
Line Voltage Requirement: 200/240V, 50/60Hz
Cabinet Size: 20"w x 19"d x 8"h
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Drive Power: 70-90 watts for 3,500 watts output
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T/R Switching: 40 Amp Open Frame Relay
Voltage Requirement: 200/240V, 50/60Hz, 30 Amps
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events. Louisiana Section Net schedule: LTN 6:30 PM, 3910 kHz nightly, WB5ZED Mgr. LCW 6:45 PM, 3673 kHz nightly, W4DLZ Mgr. Reports for Sept 1999: LTN QNI 289 QTC 67 in 30 Sessions LCW QNI 156 QTC 35 in 27 Sessions. DRN5 LA Rep 100 % by WB5ZED, K5IQZ, K5WOD, W5BKM, W5CDX, N0KWA, WA5LHL, K5DPG. PSHR: WA5WBZ 63, K5WOD 107, K5MC 118, KG5GE 121, W5CDX 126, K5DPG 140, K5IQZ 141, WB5ZED 175. Tfc: K5WOD 8, WA5WBZ 10, K5DPG 27, KG5GE 33, K5MC 82, K5IQZ 98, W5CDX 133, WB5ZED 442.

MISSISSIPPI: SM, Malcolm Keown, W5XX—ASM: AB5YY, N5EZX. ACC: N5JGK. BM: W5EPW. STM: KD5P. KC5LIO had a great write up in the West Point Times Leader on the new Clay County ARC repeater at Prestage Farms. The SET was a resounding success with over 300 hams participating on HF and VHF. N5XGI and WB5OCD even managed the get some TV and press coverage on the Coast and in Meridian. The Vicksburg ARC provided communications for the annual "Run Across the (Mississippi River) Bridge." Chairman KC5DNY reports that those helping were N5EZX, K5IMT, N5JGK, N5KWT, WB5OWY, N5QDE, and W5XX. Congratulations to W4KGJ for reaching his 50th year as an ARRL member and W5UBG for completing the OO Training/Certification Course. EC Report: KD5CKP, K5DMC, WB5OCD, N5XGI, N5ZNT. MSPN 31/2619/70, MTN 30/208/65, MSN 30/1045/11, PBRA 30/813/31, Jackson Co ARES/RACES 30/630/33, MSSN 21/73/4, Hancock Co ARES 13/105/8, MAEN 5/84/6, MLEN 5/108/9, MBHN 4/24/0, Stone Co ARES 4/55/1, MCARAN 4/40/0, Lowndes Co 4/56/0. PSHR: N5JCG 152, KB5W 143, N5XGI 138, K5VV 131, K5DMC 129, KM5DT 121, KD5P 118, W5XX 104. Traffic: KB5W 259, N5JCG 80, N5XGI 53, KM5DT 51, KD5P 44, K5DMC 30, K5VV 29, W5XX 9.

TENNESSEE: SM, O.D. Keaton, WA4GLS. ACC: WA4GLS. ASM: WB4DYJ. PIC: W4TYU. SEC: WD4JJ. STM: WA4HKU. OOC: AD4LO. TC: KB4LJV. RACK members did some good public service and got some well deserved publicity for the club by assisting in the phone call campaign for Public TV fund raising. KARC/BARC members who participated in the county-wide disaster drill recently were: Gary Churchwell, Bill Cartmel, Bud Dickens, Angie Brooks, Charlie Yeats, Robert Gillis and Lee Britt. WA4WMN, KF4MVS and W4NPL, VE team for BSFARC had successful testing session Aug 11. According to MARC News, the club has new officers: Terry, KD4CXE, pres; Cliff, WA0JTW, vp; Alison and Russell, sec/treas; Bill, K4BX, newsletter editor. I shall miss seeing former president Gail, KE5YBS,' smiling face on the front page of MARC News, but we all know that Terry will be a good president. BMRC Storm Chasers & severe weather spotters have agreed to use 146.550 MHz as a single nationwide frequency during severe weather events. For more info, contact Steve Miller's, KC4TRR, Web site at: http://www.hamsnet.net/kcttrr. It certainly was good to hear from UCARS this month. JCARA will be placing an ARRL Handbook in the public library in honor of Russell Ingraham, W4UIO, who recently became a Silent Key. Thanks to DEC K1KY, ECs KF4BMH, WD4ICI, N1EMP, AECs KF4VOW, KD4VWN, KE4DFC, PIO WB4OFM and others N4PQV, KF4MCD, KE4DFC, KF4OAO, N0NQC, WB4UDD, KF4WMH and visitors WB4LHO, KC4TCR, AC9R, KG4AKG & KF4WME for a great job assisting with the Smyrna airshow. DRN-5 rpt 60 sess, 601 mess, TN rep 70% by WB4GIJ, W4OGG, KE4GYR and K4WWQ. Net sess/QTC/QNI: TMPN 30/22/2178; TEMPN 222/26/968; TEPN 23/44/1922; TSCWN 16/5/63; TCWN 24/33/207. Tfc: N4PU 56, WA4HKU 43, W4SQE 24, W4SYE 19, WD4JJ 8, WB4DYJ 6, WA4GLS 5, W4PSN 4.

GREAT LAKES DIVISION

KENTUCKY: SM, Bill Uschan, K4MIS—ASM: Tom Lykins, K4LID. SEC: Ron Dodson, KA4MAP. SGL: Bill Burger, WB4KY. STM: John Farler, K4AVX. BM: Ernie Farmer, KC4VIG. ACC: Todd Schrader, KF4WFZ. PIC: Steve McCallum, W2ZBY. TC: Scotty Thompson, KI4AT. Mark your calendars, November 6, 1999, is the Hazard Hamfest held in Hazard, Kentucky. My plans are to attend, weather permitting. I noticed that in parts of the North snow has started. It is winter, and we all must remember our correct driving habits for that nasty slippery stuff. It's a good time to check all your batteries to make sure they are in working order. Also Y2K is drawing closer and closer. Also this is a good time to wish everyone and their families a very Merry Christmas and a Happy New Year. If you drink on New Year's eve, let someone else do the driving. Not much to write about this month. The Louisville (held in Bullet County) Hamfest was a good one. The new sight is easy to get to and there was a good crowd. It is with deep regret that we mention that Kermit Cootz, KC4JOM, became a Silent Key on September 9, 1999. Usually the first of January is the time that some clubs install new officers. Send the results to me at **k4mis@arrl.org** so we can publish them in the Section News. Nets QNI/QTC/sess/NM: KRN 661/22/22/N4AFP. MKPN 1070/32/29/K4LID. KTN 1265/47/32/K4LID. KSN 241/30/99/KO4OL. 7ARES 66/1/5/WD4PBF. 4ARES 475/30/30/WA4RRR. Tfc: KF4RBK 153, AE4NW 80, KO4OL 55, K4AVX 40, KC0CEG 26, N4GD 24, W4ET 8, WB4ZDU 8, K4YKI 5.

MICHIGAN: SM, Dick Mondro, W8FQT (**w8fqt@arrl.org**)—ASM: Roger Edwards, WB8WJV (**wb8wjv@centuryinter.net**). ASM: John Freeman, N8ZE (**n8ze@arrl.net**). SEC: Deborah Kirkbride, KA8YKK (**ka8ykk@concentric.net**). STM: James Wades, WB8SIW (**wb8siw@arrl.net**). ACC: Sandra Mondro, KG8HM (**kg8hm@arrl.net**). OOC: Donald Sefcik, N8NJE (**n8nje@arrl.net**). PIC/SNE: David Colangelo, KB8RJI (**dcolangelo@ameritech.net**) SGL: Ed Hude, WA8QJE (**edhude@juno.com**); TC: Dave Smith (**DSmith@smithassoc.com**). Youth Activities: Carl Hillaker (**carln8zdw2@juno.com**). I would like to take this opportunity to welcome a new addition to our Section Staff. Carl Hillaker has graciously offered to accept the appointment as Youth Coordinator effective October 6th. Carl comes to us highly recommended and I'm sure he will continue the fine liaison we have enjoyed with youth groups in the Section. Carl can be reached at the email address shown above. Congratulations Carl, and thank you for offering your time. I am saddened to report that Mike Pearsall, N8MP, has resigned as editor of our popular QRV Bulletin. Mike is now living in Florida, and I ask all of you to send him a note at **n8mp@arrl.net** thanking him for his many years

MFJ Contest Voice Keyer

Brand New design . . . Microprocessor controlled

Transformer-coupled -- No RFI, hum or feedback . . . 75 seconds total, 5-messages . . . Can be computer-controlled by CT, NA, etc . . . Records received audio . . .

Let this *new* microprocessor controlled MFJ *Contest Voice Keyer*™ call CQ, send your call and do contest exchanges for you in your own voice!

Store frequently used phrases like "CQ Contest this is AA5MT", "You're 59" . . . "Qth is Mississippi" and more! Contest by pressing a few buttons and save your voice.

You can record and play back five natural sounding messages in a total of 75 seconds. EEPROM technology keeps messages stored for up to 100 years -- no battery backup needed.

Repeat messages continuously and vary the repeat delay from 3 to 500 seconds. Makes calling CQ so easy and it's also a great voice beacon.

A receive audio jack lets you record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "*Please repeat*".

A playing message can be halted by pressing the *Stop Button*, your PTT mic button or by your



VOX PTT line. A closure to ground via remote control or computer can also halt messages.

MFJ-434 **$179.95** plus s&h

Has jack for remote or computer control (using CT, NA or other program and its interface). Lets you select, play and cancel messages.

The MFJ-434 is transparent to your microphone -- your mic's audio characteristics do not change when your MFJ-434 is installed. Dual controls make it easy to tailor audio level to match your voice.

All audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

It's easy to use -- just plug in your 8 pin microphone cable and plug the MFJ-434 shielded cable into your transceiver's mic connector. Internal jumpers let you customize it to Kenwood, Icom, Yaesu, Alinco or Radio Shack rigs. Use your station or built-in microphone for recording.

Built-in speaker-amplifier lets you monitor stored messages. 3.5 mm speaker/headphone jack. SMT technology. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312B, $14.95. 6½Wx2½Hx6½D inches.

MFJ-73, $29.95. Remote Control Head with cable for MFJ-434.

MFJ *Professional grade* Boom Mic Headphones

For marathon contesting, DXing, traffic nets, ragchewing . . . These lightweight, fully padded Boom Mic Headphones make operating superbly comfortable! Flexible gooseneck microphone boom and speech frequency tailored microphone cuts through noise and QRM!

This *professional grade* MFJ Boom-Mic Headphones set is designed for contesting, DXing and traffic nets. Features *total comfort* design with leatherette padding for operating long hours.

Superb 3/4 inch thick padding on each ear and headband lets you wear your headset all day long! So super lightweight, you won't even know they're there! Headband adjusts for a perfect fit to keep out external noise.

The headphones' frequency response is enhnanced for communications to bring out speech fidelity that you never knew existed. Signals never sounded so crystal clear.

The flexible microphone boom lets you position the mic comfortably at an optimum distance to minimize silibant sounds.

MFJ's frequency tailored microphone element lets you bust through noise and QRM!



Extra-long 9⅔ feet of cable lets you move about your ham shack!

Has standard 1/4 inch jack for headphones and 3.5 mm jack for microphone. Build your own adaptor or use MFJ's pre-wired adaptors to match your transceiver. **Order** MFJ-5396 Y/K/I (YAESU, KENWOOD, ICOM respectively). $15.95 each.

Even casual operators will appreciate the advantages of MFJ's superbly crafted Boom-Mic headphones for *hands-free* operating at an incredibly low price.

MFJ-392, $19.95. Communication Headphones only. Great for ham radio, shortwave listening -- all modes, SSB/FM/AM/ Data/CW.

Each phone has individual volume and speech enhancement control. Superb leatherette padding.

Both MFJ-392 and MFJ-396 have MFJ *No Matter What*™ one year limited warranty.

MFJ Communications Speaker

MFJ-281 **$12.95** Ship Code A

SSB, FM, AM, and CW never sounded so crystal clear! Plug in this MFJ-281 *ClearTone*™ speaker and bring out communication speech fidelity that you never knew existed. Restores the smooth sinewave sound that CW naturally generates and makes copying easier. It was carefully designed to improve intelligibility of speech in the frequency range of 600 to 4000 Hz while reducing undesirable noise, static and hum. A top grade 3" Mylar cone speaker is mounted in a well designed baffle. Its fine mesh metal grille allows sound to radiate without muffling. 8 Watts, 8 Ohms. Six foot cord. 3.5 mm mono plug. 3¾x3x2¼ inches.



MFJ 12/24 Hour DXers Watch



MFJ-181 **$39.95** plus $6 s&h

This *MFJ DXers Watch* lets you quickly check 12 hour local time and 24 hour time in time zones around the world. By noting day and night areas around its rotatable bezel, you can estimate which bands are open each hour to different parts of the world. You can even estimate best times of gray line propagation. It features a highly accurate *Japanese* quartz movement. Turn out the lights . . . *NiteGlo*™ hour, minute and second hands show up in the dark! Has date display. Well-known world cities encircle it's attractive world map face to indicate time zones. A durable stainless steel band adjusts to fit. Attractive giftbox has felt padding. A great gift!!!

MFJ 12/24 Hour LCD Clock



MFJ-108B **$19.95** plus $6 s&h

Dual Clock with separate 24 hour UTC and 12 hour local time displays. Large 5/8 inch LCD numerals, heavy brushed aluminum frame, sloped face, battery included. Synchronizable to WWV. 4½x1x2 in.

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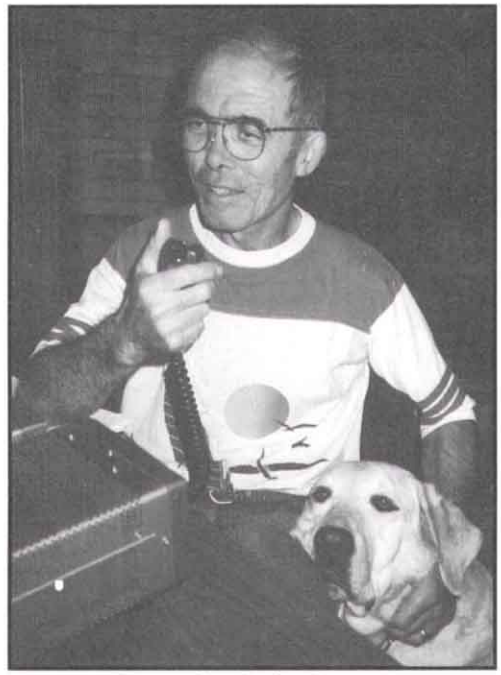
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Are you radioACTIVE?

Jerry Kloss, NØVOE, sure is!

"I was hooked the moment I first saw ham radio. Since I am visually impaired and have great difficulty reading, passing the FCC exam seemed like an insurmountable obstacle. A friend suggested the **Courage HANDI-HAM System**. In a matter of a few days I was listening to the voice of Tony Tretter, WØKVO, as he read ARRL's "Now You're Talking." I attended Radio Camp, learned code, and worked on upgrades using taped study materials."



Jerry and guide dog, Kerwin.

The **HANDI-HAM System** is a non-profit international organization dedicated to Amateur Radio education for persons with physical disabilities. We can help you gain your license. We welcome volunteers, too! Your tax-deductible gifts of financial support and amateur radio or computer equipment will help us do this work.

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MODEL	MHz	BOOM	WGT	AREA	TURN R	ELMTS	PRICE
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T7	18-33	18 FT	30#	6.2 FT	16.6 FT	7	$495
T8	13-32	18 FT	36#	7.8 FT	21.0 FT	8	$565
T10	13-33	24 FT	46#	10.0 FT	22.0 FT	10	$695
T11	13-55	24 FT	43#	9.1 FT	22.0 FT	11	$695
T12	13-33	30 FT	56#	12.0 FT	23.8 FT	12	$875
T20	50-500	12 FT	17#	2.4 FT	7.5 FT	20	$295
T31	50-1300	12 FT	15#	3.0 FT	7.5 FT	31	$350

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of service to our Section. If anyone would like to offer to continue publishing this fine bulletin, please let me know. Congratulations to the following new officers of the Motor City Radio Club: Bruce Moyer, KI8GR, President; Bill Riley WD8KZP, VP; Gloria Harland KC8FVS, Secretary and Dale Poblenz, WA8FRD, Treasurer. Congratulations also go out to the following new officers of the Big Rapids Amateur Radio Club: Tom Behler, KB8TYJ, President; Gary Atteberry WB8WIA, VP; Fritz Pins, KI8IJ, Secretary and Sue Behler, KC8IFP, Treasurer. I would also like to thank the members of the Big Rapids ARC for the fine hospitality I received at their October Meeting. Please remember to get your club annual report in to ARRL HQ. This is an important report and your response is important to us. If you have misplaced your form or have questions, please contact your Affiliated Clubs Coordinator Sandy Mondro, KG8HM, at the above email address. I would like to thank everyone that participated in SET this year and especially to Roger, WB8WJV, Debbie, KA8YKK, Jim WB8SIW, and Curt, K8AI, for staffing the State EOC. Let us be mindful of others during this Holiday Season and try harder to help where help is needed. Happy Holiday wishes and Peace to all from Sandy & I. 73, Dick, W8FQT. Traffic reports for September 1999: KB8ZYY 230, K8GA 216, N8FPN 123, K8LJG 94, WX8Y 65, AA8SN 62, W8RTN 62, AA8PI 55, WI8K 45, W8RNQ 40, K8KV 32, K8UPE 31, KC8GMT 29, W8YIQ 29, K3UWO 27, WR8F 21, K8AI 21, WA8DHB 20, KC8MWV 18, KB8EIW 18, N8OSC 16, N8JGS 13, K8JN 12, K8ZJU 8, N8TDE 8, KI8GR 5, W8YZ 5, WD8OEP 3. (Reports by 5th of the month please.)

OHIO: SM, Joe Phillips, K8QOE, Fairfield, (to contact me, see page 12)—ASM-NE Ohio: Bob Winston, W2THU, Cleveland, **w2thu@nacs.net.** ASM-NW Ohio: Ron Griffin, N8AEH, Findlay, **griffin@ohio.tds.net**. ASM-Central Ohio: Mary Carpenter, N8AOM, Columbus, **n8oam@iwaynet.net.** ASM-SW Ohio: John Haungs, W8STX, Cincinnati, **w8stx@aol.com.** ASM-SE Ohio: Connie Hamilton, WD8MIO, Marietta, **wd8mio@arrl.net.** SEC: Larry Solak, WD8MPV, Mantua 330-274-8240. STM: Jack Wagoner, WB8FSV, Hilliard, **fsv@netwalk.com**. ACC: Joanne Solak, KJ3O, Mantua, 330-274-8240. TC: Mike Brown, W8DJY, Middletown, **w8djy@arrl.net**. PIC: (appointment pending). OOC: Carl Morgan, K8CM, Middletown, **k8cm@arrl.net**. SGL: Jeff Ferriell, K8ZDA, Columbus, **jferriell@law.capital.edu**. At long last, we can report on a most successful Ohio Section Conference at the Ohio EMA Facility in Columbus. Those 71 who attended toured the Governor's War Room, saw two technical demonstrations, heard reports from other Ohio ham organizations and lunched on pizza for good measure. And watch the Hamchatter newsletter of the Newark ARC win the 8th annual Ohio Ham Radio Newsletter Award. Second place went to the Pioneer Radiator of the Pioneer Amateur Radio Fellowship (Akron), and third was won by The Ragchewer of Lancaster ARC. Congratulations to these newsletters and to Findlay (Signal Report), Oh-Ky-In ARS (The Q-Fiver), Triple-States ARC (The TSRAC News Bulletin) and Portage County ARC (Portage ARC Newsletter) for pulling to within one point of third place. Complete scores are in the Ohio Section Journal (post conference issue in October). Improvement of all Ohio Ham Radio Newsletters is the point of this competition and we are happy that 1999 results demonstrated this once again. During this Holiday season, most Ohio ham clubs have dues due now. Support your club; make ham radio stronger. Placing ham radio in public places such as malls or museums enhances our image. For all newsletter editors or club database managers - please make sure your addresses for the SM, your area ASM, PIC, ACC are all up to date and correct. All of us should be receiving your newsletters and club activities. It is to your advantage to spread the news around. OHIO SECTION CONGRATS (A) To Alliance ARC's new officers, KG8RN, pres; KE8VE, veep; W8UKQ, sect; KB8IVS, treas; and trustees, K8LTG, N8XTJ, and KA8GRC (B) To Jim Powell, N8NLE, Toledo, for his defense of CW in the Aug. 2 Toledo Daily Blade newspaper. (C) To Ohio Ham Radio Newsletters who have done a masterful job in explaining Universal Licensing and our obligations under the new law. Another major reason to join and support your local ham radio club and (D) To George Wilson, W4OYI, who isn't from Ohio but was a friend of the Ohio Section while serving as Division Director and ARRL National President. He is reportedly recovering and will be up and around soon. One last Holiday season thought - during the past two years many of us have been involved in emergency disaster relief. If there is a non-profit relief agency who impressed you, why not right now send that agency a donation in the spirit of the Holiday of Giving and Holiday of Renewal. Now for our September traffic reports.

Net	*QNI*	*QTC*	*QTR*	*Sess*	*Time*	*Freq*	*Mgr*
BN (E)	124	48	250	30	1845	3.577	WD8KFN
BN (L)	180	67	342	30	2200	3.577	NY8V
BNR	85	33	803	30	1800	3.605	W8LDQ
OSN	159	46	733	30	1810	3.708	WB8KQJ
OSSBN	1811	499	2350	90	1030,1615,1845	3.9725	KF8DO
OH Section ARES Net					1700 Sun	3.875	WD8MPV

Sept Tfc: N8IXF 181, WD8KFN 160, KF8DO 152, WD8MIO 110, N8FWA 96, WA8SSI 87, KD8HB 83, N8DD 69, N8TNV 68, NS8C 64, N8YWX 63, W8PBX 58, N8RRB 57, N8RRB 43, KI8IF 43, K8WOQ 36, WA8EYQ 30, W8LDQ 30, WD8KBW 29, K8OUA 28, N8CW 27, W9GGA 24, KI8O 22, WB8FSV 22, KD9K 21, N8ZBW 21, KC8HTP 20, W8RG 20, KC8FWU 18, N8GOB 15, KB8TIA 14, KC8KYT 13, W8BO 10, AA8XS 9, KI8GW 8, N8GP 8, KB8SBK 8, N8DBY 7, KC8HFV 7, W8GAC 6, N8OKI 5, N8RAK 4, K8WC 4, K8QIP 2, KE8FK 1, KA8YIT 1, KE8FK 1. (Aug) KA8OQF 0.

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 (September 1999) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 27/6 CDN 305/100 CGESN 39/0 ESS 341/200 HVN 539/209 NYPHONE 347/688 NYPON 286/180 NYS/E 359/360 NYS/M 197/206

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!



Call your favorite dealer for your best price!

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.

How good is the MFJ-259B?

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.

MFJ-209, $139.95. Like MFJ-249B but reads SWR only on meter and has no LCD or frequency counter.



MFJ-219B, $99.95. UHF *SWR Analyzer*™ covers 420-450 MHz. Jack for external frequency counter. 7½x2½x2¼ inches. Use two 9 volt batteries or 110 VAC with MFJ-1312B, $12.95. *Free* "N" to SO-239 adapter.

SWR Analyzer Accessories

Dip Meter Adapter



MFJ-66, $19.95. Plug a dip meter coupling coil into your MFJ *SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter. Save time and take the guesswork out of winding coils and determining resonant frequency of tuned circuits and Q of coils. Set of two coils cover 1.8-170 MHz depending on your *SWR Analyzer*™.

Genuine MFJ Carrying Case



MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this *genuine* MFJ custom carrying case. Has back pocket with security cover for carrying dip coils, adaptors and accessories.

Made of special foam-filled fabric, the MFJ-29C cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Wear it around your waist, over your shoulder, or clip it onto the tower while you work -- the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

Has clear protective window for frequency display and cutouts for knobs and connectors so you can use your MFJ *SWR Analyzer*™ without taking it out of your case. *Look for the MFJ logo for genuine authenticity!*

MFJ-99, $54.85. Accessory Package for MFJ-259/B/249/B/209. Includes *genuine* MFJ-29C carrying case, MFJ-66 dip meter adapter, MFJ-1315 110 VAC adapter. *Save $5!*

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MFJ will repair or replace (at our option) your MFJ *SWR Analyzer*™ for one full year.

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MFJ-224 **$159.95**

MFJ 2 Meter *FM SignalAnalyzer*™

Measure signal strength over 60 dB range, check and set FM deviation, measure antenna gain, beamwidth, front-to-back ratio, sidelobes, feedline loss in dB. Plot field strength patterns, position antennas, measure preamp gain, detect feedline faults, track down hidden transmitters, tune transmitters and filters. Plug in scope to analyze modulation wave forms, measure audio distortion, noise and instantaneous peak deviation. Covers 143.5 to 148.5 MHz. Headphone jack, battery check function. Uses 9V battery. 4x2½x6¾ in.

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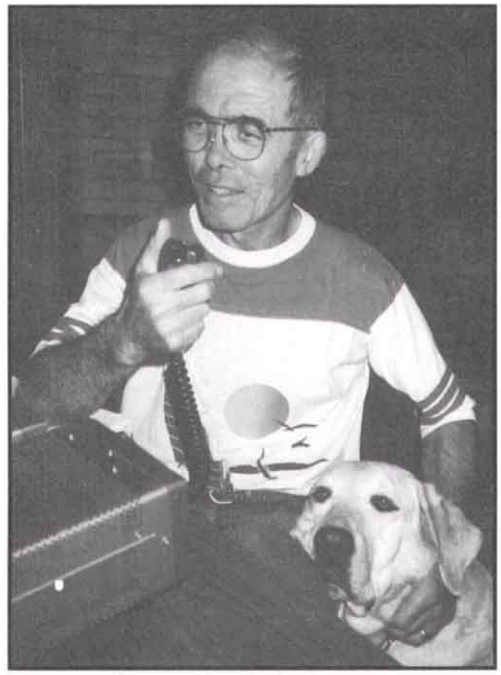
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More hams use MFJ SWR Analyzers™ than any others in the world!

Are you radioACTIVE?

Jerry Kloss, NØVOE, sure is!

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Jerry and guide dog, Kerwin.

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WHERE ABILITIES AND DISABILITIES
BECOME POSSIBILITIES

LOG-PERIODIC ANTENNAS

THE **INTELLIGENT** CHOICE

MODEL	MHz	BOOM	WGT	AREA	TURN R	ELMTS	PRICE
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T12	13-33	30 FT	56#	12.0 FT	23.8 FT	12	$875
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T31	50-1300	12 FT	15#	3.0 FT	7.5 FT	31	$350

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of service to our Section. If anyone would like to offer to continue publishing this fine bulletin, please let me know. Congratulations to the following new officers of the Motor City Radio Club: Bruce Moyer, KI8GR, President; Bill Riley WD8KZP, VP; Gloria Harland KC8FVS, Secretary and Dale Poblenz, WA8FRD, Treasurer. Congratulations also go out to the following new officers of the Big Rapids Amateur Radio Club: Tom Behler, KB8TYJ, President; Gary Atteberry WB8WIA, VP; Fritz Pins, KI8IJ, Secretary and Sue Behler, KC8IFP, Treasurer. I would also like to thank the members of the Big Rapids ARC for the fine hospitality I received at their October Meeting. Please remember to get your club annual report in to ARRL HQ. This is an important report and your response is important to us. If you have misplaced your form or have questions, please contact your Affiliated Clubs Coordinator Sandy Mondro, KG8HM, at the above email address. I would like to thank everyone that participated in SET this year and especially to Roger, WB8WJV, Debbie, KA8YKK, Jim WB8SIW, and Curt, K8AI, for staffing the State EOC. Let us be mindful of others during this Holiday Season and try harder to help where help is needed. Happy Holiday wishes and Peace to all from Sandy & I. 73, Dick, W8FQT. Traffic reports for September 1999: KB8ZYY 230, K8GA 216, N8FPN 123, K8LJG 94, WX8Y 65, AA8SN 62, W8RTN 62, AA8PI 55, WI8K 45, W8RNQ 40, K8KV 32, K8UPE 31, KC8GMT 29, W8YIQ 29, K3UWO 27, WR8F 21, K8AI 21, WA8DHB 20, KC8MWV 18, KB8EIW 18, N8OSC 16, N8JGS 13, K8JN 12, K8ZJU 8, N8TDE 8, KI8GR 5, W8YZ 5, WD8OEP 3. (Reports by 5th of the month please.)

OHIO: SM, Joe Phillips, K8QOE, Fairfield, (to contact me, see page 12)—ASM-NE Ohio: Bob Winston, W2THU, Cleveland, **w2thu@nacs.net.** ASM-NW Ohio: Ron Griffin, N8AEH, Findlay, **griffin@ohio.tds.net**. ASM-Central Ohio: Mary Carpenter, N8AOM, Columbus, **n8oam@iwaynet.net.** ASM-SW Ohio: John Haungs, W8STX, Cincinnati, **w8stx@aol.com.** ASM-SE Ohio: Connie Hamilton, WD8MIO, Marietta, **wd8mio@arrl.net.** SEC: Larry Solak, WD8MPV, Mantua 330-274-8240. STM: Jack Wagoner, WB8FSV, Hilliard, **fsv@netwalk.com**. ACC: Joanne Solak, KJ3O, Mantua, 330-274-8240. TC: Mike Brown, W8DJY, Middletown, **w8djy@arrl.net**. PIC: (appointment pending). OOC: Carl Morgan, K8CM, Middletown, **k8cm@arrl.net**. SGL: Jeff Ferriell, K8ZDA, Columbus, **jferriell@law.capital.edu**. At long last, we can report on a most successful Ohio Section Conference at the Ohio EMA Facility in Columbus. Those 71 who attended toured the Governor's War Room, saw two technical demonstrations, heard reports from other Ohio ham organizations and lunched on pizza for good measure. And watch the Hamchatter newsletter of the Newark ARC win the 8th annual Ohio Ham Radio Newsletter Award. Second place went to the Pioneer Radiator of the Pioneer Amateur Radio Fellowship (Akron), and third was won by The Ragchewer of Lancaster ARC. Congratulations to these newsletters and to Findlay (Signal Report), Oh-Ky-In ARS (The Q-Fiver), Triple-States ARC (The TSRAC News Bulletin) and Portage County ARC (Portage ARC Newsletter) for pulling to within one point of third place. Complete scores are in the Ohio Section Journal (post conference issue in October). Improvement of all Ohio Ham Radio Newsletters is the point of this competition and we are happy that 1999 results demonstrated this once again. During this Holiday season, most Ohio ham clubs have dues due now. Support your club; make ham radio stronger. Placing ham radio in public places such as malls or museums enhances our image. For all newsletter editors or club database managers - please make sure your addresses for the SM, your area ASM, PIC, ACC are all up to date and correct. All of us should be receiving your newsletters and club activities. It is to your advantage to spread the news around. OHIO SECTION CONGRATS (A) To Alliance ARC's new officers, KG8RN, pres; KE8VE, veep; W8UKQ, sect; KB8IVS, treas; and trustees, K8LTG, N8XTJ, and KA8GRC (B) To Jim Powell, N8NLE, Toledo, for his defense of CW in the Aug. 2 Toledo Daily Blade newspaper. (C) To Ohio Ham Radio Newsletters who have done a masterful job in explaining Universal Licensing and our obligations under the new law. Another major reason to join and support your local ham radio club and (D) To George Wilson, W4OYI, who isn't from Ohio but was a friend of the Ohio Section while serving as Division Director and ARRL National President. He is reportedly recovering and will be up and around soon. One last Holiday season thought - during the past two years many of us have been involved in emergency disaster relief. If there is a non-profit relief agency who impressed you, why not right now send that agency a donation in the spirit of the Holiday of Giving and Holiday of Renewal. Now for our September traffic reports.

Net	*QNI*	*QTC*	*QTR*	*Sess*	*Time*	*Freq*	*Mgr*
BN (E)	124	48	250	30	1845	3.577	WD8KFN
BN (L)	180	67	342	30	2200	3.577	NY8V
BNR	85	33	803	30	1800	3.605	W8LDQ
OSN	159	46	733	30	1810	3.708	WB8KQJ
OSSBN	1811	499	2350	90	1030,1615,1845	3.9725	KF8DO
OH Section ARES Net					1700 Sun	3.875	WD8MPV

Sept Tfc: N8IXF 181, WD8KFN 160, KF8DO 152, WD8MIO 110, N8FWA 96, WA8SSI 87, KD8HB 83, N8DD 69, N8TNV 68, NS8C 64, N8YWX 63, W8PBX 58, N8RRB 57, N8RRB 43, KI8IF 43, K8WOQ 36, WA8EYQ 30, W8LDQ 30, WD8KBW 29, K8OUA 28, N8CW 27, W9GGA 24, KI8O 22, WB8FSV 22, KD9K 21, N8ZBW 21, KC8HTP 20, W8RG 20, KC8FWU 18, N8GOB 15, KB8TIA 14, KC8KYT 13, W8BO 10, AA8XS 9, KI8GW 8, N8GP 8, KB8SBK 8, N8DBY 7, KC8HFV 7, W8GAC 6, N8OKI 5, N8RAK 4, K8WC 4, K8QIP 2, KE8FK 1, KA8YIT 1, KE8FK 1. (Aug) KA8OQF 0.

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 (September 1999) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 27/6 CDN 305/100 CGESN 39/0 ESS 341/200 HVN 539/209 NYPHONE 347/688 NYPON 286/180 NYS/E 359/360 NYS/M 197/206

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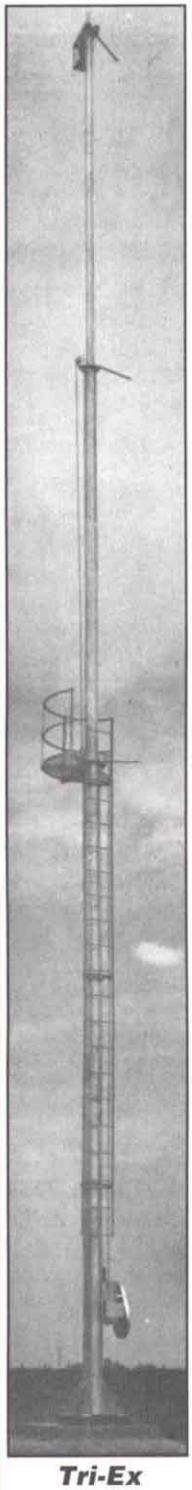
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$140 in 1971-72. A good deal? You bet! It still is one of the best deals in ham radio. 73. Newsletters were received from TSARCN, DMRAA, IIARC, SEITS, OARC, NIARC, EIDXA, CVARC, FMARC. Traffic: W0SS 66, N0JL 18, WB0B 16.

KANSAS: SM, Orlan Cook, W0OYH—ASM/ACC/OCC: Robert Summers, K0BXF. SEC: Joseph Plankinton, WD0DMV. SGL: Marshall Reese, AA0GL. Hi gang, 1999 SET msgs to SEC from ARES were DEC KA0RID ECs: KB0WEQ N0LJR AEC: N0APJ WK0GZL and NTS/ORSs N0ZIZ, W0WWR, W0TQ, WB0ZNY, K0PY, and many more participants too numerous to list. Our KPN & KSBN NM N0KFS with net members did a great job giving us 3 nets each day. Had our ARES people needed "HF" nets to outside their 2 2-meter nets, they were there. Thanks everyone. FB job. Ron, KB0DTI, is on e-mail @arrl.org. See our "KAR" Web site for the upcoming QSO party. Doug, N0LKK, is our new DEC for D1 Z13B. Larry, N0UXG, is moving. TNX & GL Larry. Two new ECs, Ken, KB0RPV, & John, WW0H. WA0KS has accepted the TS, OES & OBS appointments. We now have a TC, Frank, N8FN. Our past SM of 30+ yrs, Bob, K0BXF, is Wyandotte County EC. Aug Kansas Nets: sessions/QNI/QTC, KSBN31/941/99 KPN22/ 260/11 KMWN31/816/517 KWN31/624/533 CSTN 26/1684/82 QKS 52/236/71 QKS-SS 6/15/1 JCA2/8/0 SEC 48/931/25 QNS DMV. KB0AMY, WD0DDG, AA0HJ, AA0IQ LJR KF4LM PBV KB0PQP UXG TEN 231 msgs Ks 60% W/ AA0FO KX0I K0PY NB0Z WB0ZNY, W0SS mgr. DTRN 62/ 594/364 Ks100% W/AA0OM W0WWR N0KFS KF0WS W0FCL KB0AMY N0KJ Mgr. BBS reports: W1AW Bul/Per/ NTS AA0HJ 5/ 552/4 N0OBM 29/237/2 Ks Stns tfc N0KJ 436, K0PY 76, W0OYH 73, WB0ZNY 68, KX0I 39, K0RY 36, NB0Z 31, KB0DTI 30, W0WWR 36, KB0GUS 10, KB0NTD 10, N0ENO 8, N0ZIZ 6, K0BJ 1.

MISSOURI: SM, Dale Bagley, K0KY—ASM: Tom Housworth, KI0JO. ASM: John Seals, WR0R. ACC: Keith Haye, WE0G. OOC: Mike Musick, N0QBF. PIC: Dennis McCarthy, AA0A. SEC: Fred Langeneckert, WA0US. SGL: E.B. DeCamp, KD0UD. STM: Tom Housworth, KI0JO. TC: Wayland McKenzie, K4CHS. Web Pages: **http://www.qsl.net/arrl-mo/** and **http://www.qsl.net/k0ky/** Both of these pages are still under construction, but are still useful to MO Section members. MO Traffic nets; SSB 3.963 MHz at 5:45 PM CW 3.585 MHz 7:00 PM & 9:45 PM. Amateurs were very active providing communication for this year's MS 150 cross-state bike ride to fund MS research. There were many K.C.-area amateurs and St Louis amateurs that worked with amateurs from Warrensburg, Sedalia, Jefferson City, and many other communities. There were over 200 operators helping with this important event. The 1999 Central Missouri Hamfest in Columbia, MO, was much improved because of the work of Chairman Bruce Odle, K0ZY, Nathan Odle, KB0NNV, and the other members of CMRA. A thank you to Charlie Calhoun, K5TTT, OK Section Manager for his work to eliminate a problem impacting the Joplin, MO, Amateur Radio operators. This year's Warrensburg Hamfest was excellent even with the rain. Keith Haye, WE0G, hamfest chairman and the committee did a great job. Later in October, the Southside ARC and the St Louis Halloween Hamfest will be held. It is my wish that everyone have a great Holiday Season and that the year 2000 will be an outstanding year for Amateur Radio. Nets: Paul Revere4/ 368/0/N0IWA. HAMBUTCHERS 22/782/36/KD4NK. WAARCI 4/109/0 KB0VZP. MOTN 30/557/81/K0IPM. HARC 5/248/0 N0YLF. QCWA#35 5/127/0 N0UYN 7. MON: 54/159/36 W0WFF. AUDRAIN ARC 5/2/5 WB0SEN. JCARES 3/17/0 K0UAA. CARL 3/28/0 K0EZB. ROLLABILLBOARD 30/285/2 NA0V. Tfc: KE0K 127, N9TMI 79, W0WFF 33. PSHR: W0WFF 79, KE0K 106.

NEBRASKA: SM, Bill McCollum, KE0XQ—ASMs: W0KVM, N0MT, WB0ULH, WY0F & WB0YWO. It is with deep regret to inform you that Dick Bowman, W0WZR, of Alliance is a Silent Key. WD0HDV, Delores Joynt, has been appointed Public Information Officer of the Hastings ARC. WB0GWR has been appointed Net Manager of the South Central Nebraska/North Central Kansas 2 Meter Net. The Hastings ARC recently received publicity regarding the club's storm spotting activities in the Minden Courier. Ray Pohl, K0RPC, was the feature story in the September 25 issue of the Hastings Tribune. Art Mc Intire, K0AEM, has assumed the duties of EC for Custer & Dawson Counties. This is in addition to his duties of NM, OOC, OO and EC of Logan County. Thank you for your dedication, Art! Nominations are being taken for "Nebraska Ham of the Year." Please submit them before January 31, 2000. The Nebraska State Convention will be on March 10 & 11. This event will be once again held in Norfolk. Net Reports: L/L ARES: QNI 127, QTC 2 & 14 sessions. NMPN: QNI 1452, QTC 7 & 29 sessions. WNE NET: QNI 1609, QTC 163 & 26 sessions. NESN: QNI 718, QTC 17 & 30 sessions. W0IRZ: QNI 15, QTC 1 & 1 session. MID NE ARES: QNI 348, QTC 1 & 30 sessions. NCHN: QNI 309, QTC 12 & 26 sessions. Tfc: K0PTK 124, KE0XQ 36, W0AP 21, WY0F 6, W0HXL 4, K0AEM 2, W0EXK 2, WC0O 2, PSHR: KA0DBK 94, KB0YTM 29, KB0YTO 49.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Betsey Doane, K1EIC—Hope you all had as much fun as I did at the CT State convention. In spite of the rain, those who attended seemed to enjoy themselves. A BIG thank you to members of The Meriden ARC and the Middlesex ARS for their arduous work on our behalf. If you have never planned an event of this size, you would be amazed at the incredible detail that goes into making the day come out right. The Southern Berkshire ARC participated in JOTA by operating W1BAA at The Boy Scout Camporee at Mt Washington State Forest in Mt Washington, MA. A couple of weeks later, Frank, N1ZCV gave the Club a tour of the WATR Radio station including the antenna array on Meriden Mountain. The Stamford ARA handled the communications for The Stamford Denmark Friendship Race sponsored by The Stamford Yacht Club at which 13 operators were involved. The event went off smoothly; 175 boats participated on 2 courses. Of course, the pleasant breeze helped! Jeanine, KY1Q, the Club Public Services Committee chair coordinated SARC's effort; net controls were N1AWJ and WA1VUU. The Fairfield ARA participated in The international Lighthouse/Lightship event by setting up a station in the radio room of the decommissioned Lightship Nantucket located at Captain's cove

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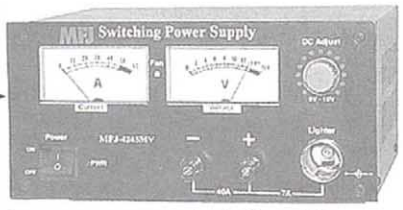
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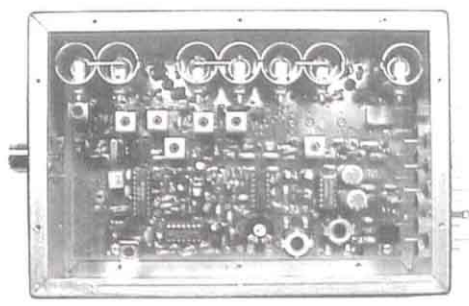
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Marina in Bridgeport. Over 120 contacts were made, some with other lighthouses and lightships. Special QSL cards were made with a picture of The Nantucket along with a picture of the original radio and beacon equipment used on the vessel. Happy Holidays to you all! Net Sess/QNI/QTC/NM: WESCON 30/350/103/KA1GWE; ECTN 30/311/60/WA4QXT; NVTN 26/170/51/K1STM. CPN 30/250/63/N1DIO; CN 24/85/30/N1AEH. Bears of Manchester 35/384/423/NM1K. Tfc: WA4QXT 164, KA1GWE 158, K1STM 139, KE1AI 137, N1VXP 70.

EASTERN MASSACHUSETTS: The following information was submitted by STM Jim Hatherley, WA1TBY—

Net	*Sess*	*QTC*	*QNI*	*QTR*	*NM*
EMRI	60	137	202	457	K1SEC
EMRIPN	30	90	170	461	WA1FNM
EM2MN	30	98	330	393	N1LKJ
HHTN	30	35	249	280	N1IST
CITN	30	61	314	521	N1SGL
WARPSN	4	8	47	NA	K1BZD
CHN	30	35	183	346	W2EAG
OSTN	26	17	42	107	KA1JXH

Tfc: NZ1D 190, W2EAG 181, WA1TBY 177, WA1FNM 85, K1SEC 63, N1LAH 44, N1SGL 38, N1AJJ 35, K8SH 28, KD1LE 24, N1IST 22, N1BNG 21, N1TPU 18, WA1LPM 16, N1TDF 15, K1BZD 14, KB1EB 13, N1OBL 10.

MAINE: SM, Bill Woodhead, N1KAT—ASMs: WA1YNZ, KA1TKS. STM: NX1A. BM: W1JTH. SGL: W1AO. ACC: KA1RFD. OOC: KA1WRC. PIC: KD1OW. SEC: N1KGS. Asst Dirs: W1KX, KA1TKS. K1NIT. Web Site: N1WFO. With the holidays only weeks away, I will extend the best of holiday wishes to all of you, regardless of how you celebrate the season. Be sure to spread a friendly spirit while operating on the bands. The new year will be very, very busy, with OpSail 2000. The Family Motor Coach Association will be bringing in 200,000 people into Brunswick for their annual reunion, and a plethora of special events. It may be a good time to leave the stats from late July to Sept. (Hi, Hi!) The Androscoggin ARRC will be offering scholarships to students in the State of Maine, who are furthering their education and who have a valid amateur license. For an application, visit Maine ARRL.net. September Traffic: W1KX 129, KA1RFD 87, N1JBD 48, W1QU 45, W1JX 44, AF1L 35, W1JTH 28, KA2ZKM 20, WA1YNZ 7.

NEW HAMPSHIRE: SM, Mike Graham, K7CTW—ASMs: WW1Y, W1NH, N1KIM. TC: WA1HOG. STM: WA1JVV. PIC: KA1GOZ. OOC: W1GTA. SGL: K1KM. BM: KH6GR. ACC: AA1QD. SEC (acting): WW1Y. Seasons Greetings all. Summer's gone by the time you read this so is Fall. Great weekend at Hosstraders. A little rain, but otherwise good fun. I even bought a toy. So did Mort, KH6GR. First new rig in a light year! VE Session went well with 40 exams resulting in 10 NC Techs, 1 Tech+, and 3 Extra. Congrats to all, especially Louise Shaw, XYL of N1ZGK, on her Tech. Stew, you better buy her a rig for Christmas. Woodsheds get cold this time of year! GBARA breakfast was super - but wet. Great coffee and chat. Next Hosstraders is May 13, 2000. October NHARA meeting was very successful and lots of planning going on. Maybe an emergency van in the works? Several club visits forthcoming. Goffstown Mountain View Middle School radio classes appear to be cranking up. Spent two evenings talking to parents and students. CNHARC participated in Mt Washington Bike Climb and the 2-day MS Granite State Cyclescape. Nice goin', folks. Still no sponsorship from our Congressmen on HR 783 (Spectrum Protection). Can you believe that? Oh well, elections are coming! For now, Happy Holidays and best 73 de K7CTW. Net Sess/QNI/QTC: GSFM 31/234/30; GSPN 31/105/28/; TSEN 5/54/6; VTNH 30/172/154. Tfc: W1PEX 841, W1FYR 310, K1TQY 207, WA1JVV 127, N1NH 70, KA1OTN 53, W1ALE 33, K1ZO 29, N1CPX 7.

RHODE ISLAND: SM, Armand Lambert, K1FLD—ASM: W1YRC. ACC: WA1RI. PIC: WB1P. STM: KA1JXH. BM: KA1BNO. TC: K1DFT. SGL: NN1K. OOC: W1AOM. The NCRC has the W1SYE repeater up and running once again and booming into Woonsocket. Great job from the guys. Many thanks also on good participation in emergency communications, y2k drill and Hurricane Floyd where many hams from throughout Rhode Island participated with enthusiasm and dedication. It is with sad tidings that we record the passing of W1PTF, Joseph Giorgianni. His contributions to the art of radio pioneering are still appreciated today. The September SM conference/work shop hosted by Rick Palm, K1CE, proved more informational than one could expect providing insight into ARRL operations and programs to benefit the Amateur Radio community. Great weather, terrific sites. The NRI radio club has firmed up it's meeting schedule and is thriving. If your radio club is not sending a newsletter to me, please include my address on your mailing list. Thanks again. ARES and SKYWARN nets continue regularly under the direction of Martin N1JMA, check in on Wednesday at 8:00 PM. The repeater frequency for the net is announced on Saturday at 9:00 AM on the Swap and Sell Net held on the 146.70 repeater. While you're browsing, check out the RI Section Website, **http://www.ri.arrl.org,** maintained by Bill, WA1RI. Many thanks to Bill. In closing, wishing everyone a pleasant holiday season with great DX and a healthy and prosperous New Y2K Year. 73, K1FLD.

VERMONT: SM, Bob DeVarney, WE1U—I just got in from almost 2 weeks spent in North Carolina working with the Red Cross as a communications worker. First, let me say that the people of North Carolina have an amazing amount of spirit, to be able to pick up the pieces from Hurricane Floyd. At one point, one of my teammates told me that he had been in the same place 2 years before for Hurricane Fran. Amazing..Anyhow, I got to play with some pretty amazing technology, anywhere from fax machines to satellite phones, and some pretty cool radio technology in between. We set up our own repeater, and put together a system of nets for all the different functions, such as Mass Care, Logistics, etc. I also got to spend some time driving National's Hummer which beats any mobile setup I've ever seen!! We had everything from HF right up through UHF, 4 cell phones, an Inmarsat C phone, and fax capability. I encourage anyone with time and talent to spare, to contact your local Red Cross chapter. 73 de WE1U.

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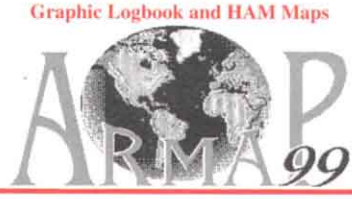
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WESTERN MASSACHUSETTS: SM, William C. Voedisch, W1UD, w1ud@arrl.org—ASM: N1LZC. ASM (digital) KD1SM. STM: W1SJV. SEC: K1VSG. OOC: WT1W. The kids are back to school, summer has come to an end and we're all settling down to a fall and winter season of great hamming. DXpeditions to all areas of the world are taking place. The bands are very active. 20 meter activity is extending into evening hours. The Mohawk Club had its flea market. It was a great success even though the weather was not in full cooperation. They have acquired an ambulance that will be converted to a communications vehicle. We did it again. Our SET was great with all areas activated. The figures are not in yet, but it looks like we did as well this year as we did last year. Remember, we were the best section in New England. During an emergency, remember to monitor 3943 kHz as well as your local 2-meter repeater. That freq is the EMA/WMA coordinated emergency call-in frequency for both sections. Each Sunday morning at 8:30 local, the WMA emergency net meets on 3937/3942 kHz. Your attendance will be much appreciated. Tfc: W1ZPB 141, W1SJV 8, KD1SM 16, W1UD 197.

NORTHWESTERN DIVISION

ALASKA: SM, David Stevens, KL7EB—OOC: KL7IKX. SEC: NL7DL. DEC: WL7JBV. DEC: WL7GK. TC: AL7CE. TS: KL7CC. ASM: KL5T. Snipers Net 3920 daily 1900 AST, Bush Net 7087 daily 2000 AST, Motley Group 3933 daily 2100 AST, and Alaska Pacific Net 14.292 M-F 0830 AST. Congratulations to Billy Connor, AL7FQ; Terry Preston, WL7TY; and Benny Benevento, NL7XH; who did a fine job installing the Nanana repeater (147.06+ 103.5). Within hours after the repeater was up an emergency call was made that saved lives in a serious accident. As we attend our Christmas parties, remember the reason for the season. NTS messages can be sent by calling Ed's (AL7N) message phone 907-479-9633. PSHR: AL7N 86. KL5T 78.

EASTERN WASHINGTON: SM, Kyle Pugh, KA7CSP—(October Report) A Statewide 24-hour Simulated Emergency Test was conducted on Oct 2-3 by Spokane EC Gordon Grove, WA7LNC. Participating counties and communities were: Bonnor Co, Sandpoint, ID; Clark Co, Vancouver, WA; Island Co, Oak Harbor, WA; Skagit Co, Mt. Vernon, WA; Whitman Co, Colfax, WA; Okanogan Co, Omak, WA. In Spokane Co, portable stations were located at Airway Heights, Foothills, Nine Mile Falls, and Mead. OES station K7VOT handled HF SSB traffic, and ORS station K7BFL handled HF CW traffic with Harvey Marsh, K7GXZ, as the primary CW op. Lots of folks seemed to get additional training, which is good. Activity was reported from 9 out of 12 OO stations. Net activity (for September): WSN: QNI 716, tfc 301; Noontime Net: QNI 8517, tfc 288; WARTS: QNI 3257, tfc 143. Tfc: W7GB 286, K7GXZ 197, KA7EKL 87, KK7T 36, K7BFL 16, W7UVP 4. PSHR: W7GB 138, K7GXZ 118, W7UVP 50. HAPPY NEW YEAR 2000 from your SM!

IDAHO: SM, M.P. Elliott, KF7ZQ — OOC: N7GHV. SEC: AA7VR. STM: W7GHT. W7JMH has been newly appointed as ORS. CW activities continued at the State Historical Society on Sept. 25th. A display and demo was held. REMINDER!!! Y2K preparations - New Year's Eve the FARM Net will monitor 3937 MHz and the IBDS will have Section EC's monitor 3990 MHz. These nets will pass emergency traffic should a Y2K event occur. Idaho's SET exercise was held on Oct. 3rd. Messages were passed to County ECs and back to IBDS. IBDS hopes to start an HF net soon - more on this later. Here's hoping that Santa brings each of you a new ham radio toy for Xmas! 73 — Mike, KF7ZQ. Tfc: W7GHT 226, KB7GZU 68, WB7VYH 49, and N7MPS 19. PSHR: W7GHT 122, W7JMH 77, WB7VYH 60, and N7MPS 58. Net (SESS/QNI/QTC/Mgr): FARM-30/2087/32/W7WJH; NWTN-30/1307/96/KC7RNT; IDACD-22/492/15/K7UBC; IMN-30/393/110/N7MPS.

MONTANA: SM, Darrell Thomas, N7KOR—As fall progresses, many of the clubs in the section are busy preparing their repeater systems for winter before the mountain tops become inaccessible. The Great Falls Club has moved their 147.12 repeater to a site on the continental divide west of Great Falls. This machine is now providing good coverage along the route through the mountains. Many hams in Montana will be on standby at Emergency Operating Centers around the State in support of Disaster and Emergency Services plans in case of need if the Y2K bug hits anyone during the New Years changeover. Speaking of holidays I would like to pass along my best wishes for a safe and happy holiday season. Net/QNI/QTC/NM MSN 104/0 W7OW; MTN 1634/37 N7AIK; IMN 393/110 N7MPS. PSHR: N7AIK 90.

OREGON: SM: Bill Sawders, K7ZM—ASM: KK7CW, ASM: KG7OK. SEC: WB7NML. STM: W7IZ. SGL: N7QQU. OOC: NB7J. STC: AB7HB. ACC: K7SQ. Y2K is soon going to be history, and we'll all find out if it is going to be "real" or just a "hype." Either way, it's going to be a pleasure to drop that phrase from our vocabulary! I wish to take this opportunity to thank all of my Oregon Section appointees for the great job their doing! This past year went very smoothly, with everybody doing their job, perfectly. Thanks a million! Another Rickreall swap meet is just around the corner (February). In Oregon, this is the "grand daddy" of them all. I hope many of you can make it! With the holidays approaching, I wish everyone a very Merry Christmas...and enjoy your New Years' celebrations! Keep in touch. NTS traffic totals for September: KK1A 159, K6AGD 130, KC7ZZB 120, KC7SRL 110, W7VSE 110, W7CBN 80, AB7ZQ 74.

WESTERN WASHINGTON: SM, Harry Lewis, W7JWJ—WWA SEC Ed Bruette writes, "I saw Y2K as a wonderful recruiting tool. It had the potential to be a wide spread disaster and we knew when it was going to happen. While many groups used Y2K to increase preparedness, the membership numbers didn't swell very much if at all. Volunteerism seems to be down. Part 97 of the FCC rules, Subpart A lists the first principal of the Amateur Radio service as "Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications." We who are already involved know that, but how many of our fellow Hams do? Let's re-double our efforts to recruit and train quality hams. The day of the disaster is not the time to train the first or even the second team. SUPPORT YOUR COMMUNITY,

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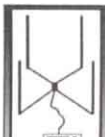
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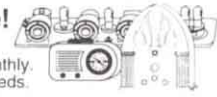
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BE AN EMERGENCY COMMUNICATOR! 73 Ed." The fall SET found several Western Washington county Amateur Radio people participating under the direction of Spokane as headquarters. Those WWA ops assisting were KJ7SI, K7YFJ, W7ZIW, W7VR, K7NTW, WB7EDP, N7GC and others. In the world of NTS traffic, George, W7DBU, leads the pack again with a total of 1204. Other totals N7AJ 53, W7LG 91, KC4LZN 9, W7NWP 155, K7MQF 124, KJ7SI 28, K7SUQ 16, KA7TTY 3, W7TVA 248,N7YSS 71, and W7ZIW 154. QNI for nets shows CCAIN 103, NWSSB 103, NTN 8517, WARTS 3257 and WSN 716. Don't forget the Washington State Emergency Net Monday evenings 6:30 PM on 3987 kHz. Search dogs? That was the subject of a recent Clark County ARES training session. This ARES team also provided communications for the Diabetes Walk held in Vancouver. 73.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASM: KF6RCO. SEC: KE6NVU. DECs: WA6TGF/Alameda County, KO6JR/Contra Costa County, WA7IND/Napa County, K6HEW/Solano County, N6UOW/Training, KE6HCI/Administration, W6CPO/Technical Services, KQ6TM/Section Plans and Administration. STM: K6APW. OOC: W6NKF. TS: KF6NY. Check out the EB WWW Page at **http://www.pdarrl.org/ebsec/**. Webmaster is KB6MP. Welcome to new OES, KE6NCX. EBARC welcomes new member KF6WXD. VVRC members participating in a Fire Watch Exercise were: KD6JSB, K6HEW, KF6KFQ, N6ZGB, WH6AB, KF6PQV, KF6ACG, KF6PQX, KF6KFP, K6ZU, and NI6V, with KF6VBJ held in reserve. LARK mourns the loss of long-time member WA6OHB. Leona operated as VR6HB (Pitcairn Island) in 1986. AD6X was the recipient of their coveted Klutz Award. HRC welcomes new members KE6HBM, WB6LRI, KC6V, KE6VFU and Jay (awaiting his call). MDARC welcomed new members W6HUY, KD6YDZ, KF6QYE, Phil Morrison (call pending), KF6SIO, KF6VSG and KF6OGC. Club membership now stands at 406. SARS welcomes all to attend their meetings held on the 3rd Tuesday of each month, 7 PM, at the Veteran's Home in Yountville. Talk-in on W6CO, 147.180 (151.4) and 441.800. Sep tfc: W6DOB/615, WB6UZX/24. PSHR: W6DOB. BPL: W6DOB. Tfc nets: NCN1/3630/7PM; NCN2-SLOW SESSION/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, Bob Davis, K7IY—ASM: Jan Welsh, NK7N. SEC: N7JEH. TC: NW7O. ACC: N7FFP. STM/SGL: N7CPP. PIC: WW7E. OOC: N7ELV. Greetings to the Nevada Section. Hard to imagine that in just the next few weeks, many of the clubs and organizations will already be holding their annual holiday party and festivities. Most clubs have committees that plan these events all year long, be sure to let them know that you appreciate it. The northern stretch of the Section has experienced a relatively mild Fall and has allowed for the completion of several mountain-top projects earlier than expected. Reports are in regarding many ARES/RACES groups planned involvement with the Y2K preparations at local, state and federal levels, and several are still in need of additional Hams. A few more section appointments are forthcoming, probably just after the first of the year. Hope that the winter weather, the shortened daylight hours and the good band conditions will allow many of you to spend more time on the HF bands. Remember to check in on the Nevada Section HF ARES Net on Saturday mornings at 8:30 AM, 3965, following the RARA net at 7:30 AM. Hello to LaVern, N7SJG. Thanks and 73, Bob, K7IY. Tfc: N7CPP 9, K7OK 6.

PACIFIC: SM, Ron Phillips, AH6HN—ASMs: Harry Nishiyama, KH6FKG; Lee Wical, KH6BZF; Jim Reid, KH7M. George Heloca Sr., KH6ANA; Mel Fukunaga KH6H. SEC: Dennis Carvalho, KH7H. TC: Chuck Cartwright, AH7Y. PIC: Russ Roberts, KH6JRM. ACC: Bob Schneider, AH6J. Bob, AH6J. ACC and I will be attending the Hamfest on Oahu, 23 Oct 1999. This is a good opportunity to meet more hams and listen to Section concerns. Lee Wical, KH6BZF, reports Jesse, KH7TL, 13-yrs old, recently upgraded to ADVANCE class exam and in the same sitting took and passed his EXTRA class written. Jesse is now studying his 20 WPM. Jesse's Mom is an EXTRA class too. Good show Jesse. Thanks Lee for the info. Warren Munroe, KH6WM, reports that John (KH6CU) passed away on June 28th. He had returned to Murfreesboro, Tennessee, on May 22 due to his illness. *QST* has been notified. Congratulations to Stuart Johnston, NH6DR and Bill Cullen, WH6DQ, who are new ECs on the Big Island. Bill was appointed EC for Kau last month. Stuart was appointed EC for South Kona earlier this month. Thank you, Bill, and Stuart for your dedication and support for ARES! Good choice, Dennis. Thanks. Please keep *QST* delivery data coming. Aloha & 73.

SACRAMENTO VALLEY: SM Jettie Hill, W6RFF—As winter approaches, I hope the fire season cools down and we don't have any floods. As this will be in the Dec *QST*, I want to wish you happy holidays and good fortune in year 2000!! My pen will have to be Y2K compliant. Your local clubs will be looking for committee chairmen and members, so do your part and put some effort back into the club. Jim Maxwell, W6CF, Division Director-elect gave a talk on the history of communications and Morse Code at the El Dorado County ARC. Several clubs held "White Elephant" auctions and raised money for the clubs treasury. WA6EWV has been busy getting the Tahoe ARA's repeaters in order before the onset of winter. Paul has been president of TARA for many years. Several clubs and ARES/RACES groups were active in the Calif. hospital drill for Y2K compliance. Reports that it went without too many problems. Thanks to all that participated! Lassen ARC reports W6EXP and K6ZLM became Silent Keys. LARC meets the 3rd Sat/mo. In Susanville. The Calif QSO party is over - will one of the SV clubs be the winner - stay tuned. New members for GEARS: KE6AGD, K6BSB, KF6UDF, KF6UDG. GEARS held their annual "Steak Bake" at Woodson Bridge. K6KAY placed 2nd, low power 28 MHz CQWW and 3rd in ARRL 10 Meter low power. Congratulations, Kay. Thanks to all who voted for me. 73, Jettie.

SAN FRANCISCO: SM, John Wallack, W6TLK—ASM: N6KM. SEC: WB6TMS. TC: N1AL. WA6TVQ, DEC, reports that 17 Humboldt County ARES/RACES members participated in the Sept 16th MedNet comm exercise linking the 5 county hospitals and 2 clinics with County OES. VHF packet

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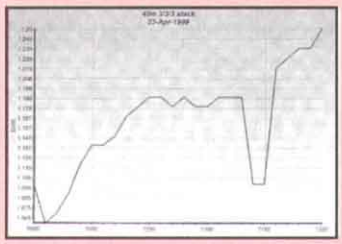
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and VHF voice were used for County comm and HF was used to comm with Contra Costa County. An excellent job well done by all. KE6WHH, DEC, reports that 5 Del Norte County hams participated in the Sept 16th Sutter Hospital Y2K drill. KE6WC in Gualala has organized and is net control on a new weekly emergency net for the Northern Sonoma and Southern Mendocino coast area on 3915 MHz LSB. The first net included 18 hams from throughout Mendocino and Sonoma Counties. A fine idea and job well done by KE6WC. San Francisco ACS members were busy during Fleet Week festivities at Fisherman's Wharf on the weekend of Oct 9-10 for 7 hours each day sharing an informational booth with SFOES which was an excellent time to get their word out.

SAN JOAQUIN VALLEY: SM, Donald Costello, W7WN—ASMs: Mike Siegel, KI6PR, John Lee, K6YK, Pat Fennacy, W6YEP. SEC:- Kent LeBarts, K6IN. A.C.C. Charles McConnel - O.O.C. Victor Magana — I would like to welcome to the San Joaquin Valley Section Staff Mark Spencer, WA8SME who, will be the Emergency Coordinator for Mono County. Congratulations are in order for James Hill, K6UR, who, in October, worked his 100th country on the 160 meter band. Jim works 160 shunt loaded on his 89ft crank-up tower, listening on another antenna on a city lot measuring 75' X130'. Jim was first licensed in 1958 and was a Radio Officer aboard ships of varying shipping lines for fifteen years with many trips to the Persian Gulf. One trip to The Gulf was aboard a re-flagged Kuwaiti ship and served on ships carrying military shipments in 1991. Jim also is the sysop of the K6UR DX spotting node in Hanford. I am sorry to report that Rick Palm, K1CE, will be resigning his post, effective November 10, as Head of Field Services at HQ in Newington. I had an opportunity to meet Rick in Denver for a Section Manager Seminar in September of this year and was very impressed with his expertise and commitment to Amateur Radio. Rick has been an asset to the League for many years and will be moving to Florida to be closer to family. Good luck, good dx and thanks, Rick, for your many years of dedicated service to Amateur Radio. John Lee, K6YK, reports that working the satellites is easier than ever and many in SJV Section can be heard working the "birds." Hope to hear your call sign beaming back from space.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: KM6GE. BM: WB6MRQ. TC: WA6PWW. OOC: KB6FPW. ARES/RACES participated in a statewide Y2K hospital drill in San Mateo, Santa Clara and Santa Cruz counties. Thanks to all who participated. Santa Clara County ARES/RACES held a packet radio drill and also an all-up drill in preparation for the county-wide Loma Prieta 10 year anniversary drill schedule for next month. A great deal was learned. The San Lorenzo Valley Amateur Radio Club (SLVARC) contributed 125 hours in support of the Fire Cracker 50 Horseback Endurance Ride and an additional 60 hours in support of the Race through the Redwoods. The Saratoga ARA group is active with many public service activities, including a city parade and planning for the usual Halloween activity. Their net meets every Tuesday at 7:30 PM on 28.4 MHz (SSB) and 146.655- (114.8 pl). The Garlic Valley ARC usually meets at 8 AM on the LAST Saturday of each month, at the Gavilan Restaurant in Gilroy on Monterey Avenue. PAARA heard from Pacific Division Director-elect Jim Maxwell, W6CF. The Palo Alto ARA meets the first Friday at 7:30 PM in the Menlo Park Recreation Center, 700 Alma Street, Menlo Park. The Santa Cruz ARC meets at 7:30 PM on the third Friday in the Education building of Dominican Hospital. The San Lorenzo Valley Amateur Radio Club (SLVARC) set up a small demonstration station as a Field Day demonstration in a public park in Felton. Members contributed 185 hours in support of events. The San Lorenzo Valley Amateur Radio Club meets on the first Friday of each month at the Zayante Fire Station in Felton, starting at 7:30 PM (tnx to N6FW for the report). The Santa Clara County ARA has been looking for a new site for their club radio station. Their meeting included a talk by Dan Dietz ,WM6M, on the care and feeding of batteries. SCCARA meets second Mondays at 7:30 PM at HP Oak Room, contact Clark, KE6KXO, at 408-262-9334 for more info. Other clubs and contacts (tnx to PAARAgraphs for these) are: EMARC (FARS), 4th Friday, 7:30 PM, contact Sheldon Edelman 650-858-2176; South County ARES, 3rd Thursday, 7:30 PM at San Carlos City Hall; West Valley ARC, 3rd Wednesday, contact Glen Lokke, KE6NBO, 408-971-8626; 73 de Glenn, WB6W. Tfc: W6PRI 1.

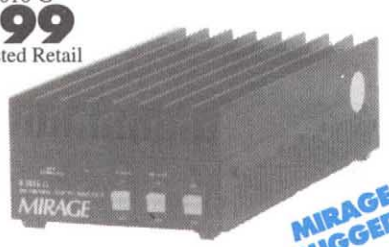
ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W—SEC: KE4JHJ. STM: K4IWW. TC: K4ITL. SGL: KI4AN. OOC: W4ZRA. PIC: KN4AQ. ACC: W4CC. BM: KD4YTU. **http://www.ncarrl.org.** ARES was placed on alert Sep 13. State and county EOCs were activated Sep 15 as Hurricane Floyd came ashore. The Tar Heel Emergency Net (HF) began continuous operation, and did not resume its regular schedule until Sep 26. Record flooding in central and eastern North Carolina made this the state's worst natural disaster. There were 50 confirmed and 5 presumed dead and hundreds were rescued from flooded homes and vehicles. Over one billion dollars in just agricultural and structural loses were reported. This was also North Carolina's largest sheltering operation with 233 shelters open, housing more than 37,000 people. Most of these shelters had Amateurs to provide backup communications. Some shelters and mobile feeding units remained open for several weeks. There were many cases of exceptional individual efforts: flood victims taking their rigs to shelters, emergency medication requested via radio, relief supplies for shelters requested and coordinated by Amateurs. For almost a week Amateur Radio was the only communications available for Edgecombe county officials. Volunteers from North Carolina, South Carolina, and Virginia traveled to the affected areas to relieve local Amateurs. These operators and their travel was coordinated by the DECs and Asst. SECs. Hurricane Floyd was probably our largest ARES operation. I am proud to report that it was also one of our smoothest and best-coordinated efforts. Thanks to all who participated. Thanks also to previous SECs (K4MPJ, WB4SGA, and N4MYB) and DECs who deserve credit for their role in creating an ARES organization that could respond to the challenge created by Floyd. Their emphasis on exercises and especially the ARRL Simulated Emergency Test (SET)

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

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

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

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100 Watts for 2 Meter HTs

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Power Curve -- typical B-310-G output power							
Watts Out	25	50	75	95	100	100+	100+
Watts In	¼	½	1	2	4	6	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*
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- *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
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Power Curve -- typical B-34-G output power								
Watts Out	18	30	33	35+	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7	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*
- *One year MIRAGE warranty*

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



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BD-35
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Power Curve -- typical BD-35 output power							
Watts Out (2Meters)	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/35W on 440 MHz*
- *Auto Band Selection* • *Auto T/R switch*
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- *Reverse polarity protection*
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- *One year MIRAGE warranty*

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6 Meter Amplifier

FCC Type Accepted



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70cm 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).

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Repeater Amps

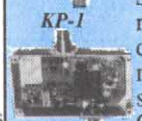


11 models -- continuous duty all modeFM/SSB/CW repeater amps for 6, 2, 1 1/4 Meters, 70cm, 450 MHz ATV.

Low noise GaAsFET preamps



KP-1





KP-2

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

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144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

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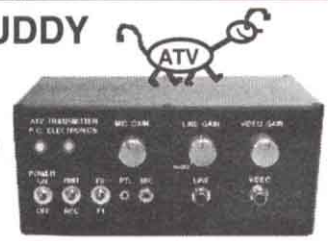
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Tom (W6ORG) & Mary Ann (WB6YSS)

really paid off. Sorry to announce that the Greensboro Hamfest has been canceled this year! Traffic (Sep): W4EAT 463, AB4E 310, KF4VDW 190, N4AF 179, K4IWW 127, W0UCE 124, KI4YV 104, AC4DV 96, W2CS 70, KE4JHJ 69, W3HL 54, W4IRE 45, AB4W 43, KE4AHC 32, WD4MRD 19, W4CC 18, WA4SRD 18, AC4ZO 15, KR4ZJ 11, KT4CD 11, KF4OZF 10, KF4PAK 10, NT4K 10, K4AIF 7, KE4YMA 5, KF4YHG 5, N2JLE 4, KB8VCZ 3.

SOUTH CAROLINA: SM, Les Shattuck, K4NK—Season's Greetings from your section manager. Another year has passed, and we have been happy to serve you again. Joyce and I are always happy to see every one at the hamfest where we set up. As for happenings, Joyce and I attended the Virginia Beach hamfest and ARRL convention. We had a good time highlighted by having Riley Hollingsworth and his wife join us for dinner. For those interested, Riley will be speaking at the Fort Mill Municipal Center on Dec3 at 7 PM. For directions, contact Joe Smith, KI4DG, at **ki4dg @vnet**.net or 803-548-2732. Changes in Amateur Radio are in store for the next millennium. What will the next decade bring? Just look at an old *QST* from the 50's and then at a new one...what a difference. Consider a new challenge, QRP, Digital, or maybe weak signal VHF/UHF. And finally a big thank you to all the field service volunteers with your effort the section is a great place for Ham Radio. Traffic: KT4SJ 138, KA4LRM 83, KA4UIV 67, W4DRF 50, WA4UGD 25, WD4BUH 24, W4CQB 17, K4JMF 6. PSHR for Sept: KA4UIV 153 (wow), KA4LRM 110, KT4SJ 108.

VIRGINIA: SM Lynn Gahagan, AF4CD—ASM: W4TLM. SEC: K4EC. SGL: KK4IY. TC: W4IN. OOC: KR4UQ. PIC: W2MG. STM: ACC: AF4CD. A very special thanks to each and everyone who helped with the Hurricane Floyd Level III activation. I am very honored to have a dedicated group of Amateurs who are willing to give countless hours of their time, not to mention the expense you went to, stepping-up and volunteering your communication skills when our communities needed them. There where many Hams who had contacted me prepared to monitor the HF frequencies, just in case the Section HF emergency nets where activated. Although 3.910 was being monitored by the VEOC in Richmond, the HF nets where never brought up. Not that we did not want to use our HF resources, your Section leadership chose to keep it in reserve as this was a localized event. We did not see the need for bringing up the nets and having people waiting on the frequencies, with little or nothing to do. On the other hand, if Floyd had taken a path through Central and Western Virginia, HF would have been our main communications link to the VEOC from SWVA. We were very fortunate to have the KB4ZIN 146.760 tactical repeater for "Area A" in Williamsburg, which provided communications from the Eastern Shore, Tidewater, and to the Franklin and Southampton affected areas. Also not to forget the Franklin repeater, K4SPS 147.300 for the very important role in providing us communications directly in the flooded areas. Digital operations played a key role for getting NWS WX reports, Red Cross, H&W traffic, and numerous messages to and from the VEOC and the local EOC's. Special thanks to the SYSOPS of; N4WFU, (Franklin, Rocky Mt. NC) KE4CVY, near Williamsburg, KR4MA, Yorktown, and W4ZA in Richmond. Floyd demonstrated just how well Virginia ARES/RACES operates when we follow our training classes, and pull together versus, operating on our own. The State and local governments now know, without a shadow of a doubt, that ARES/RACES gets the traffic through when other services can't. Virginia ARES/RACES and the Section works as a team - let's keep it that way, and continue to shine in what Hams have done better than anyone else, for 75+ years - provide the emergency communications Part 97 calls for! Very 73 de AF4CD. Tfc: K4MTX 220, W3BBQ 160, K0IBS 140, WA4DOX 116, W4CAC 114, KR4MU 103, KD4FUN 64, KE4PAP 53, AF4CD 52, WB4ZNB 38, WD4MIS 36, AA4AT 34, K4YVX 32, N4ABM 30, W4YE 21, K4IX 17, W5TZC 17, WA8AHV 16, WB4UHC 9, KE4NYY 8, KB4CAU 7, W4HDW 6, W4JLS 6, K4JM 5, W4MWC 2, N4FNT 2.

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. We are all saddened to learn that former Dist 16 EC Jim, N0BIB has become a Silent Key. A fixture in and around the Cañon City area, Jim will be will be missed. 18 hams participated in the ARRL 10GHz and Up contest on the Colorado Front Range from four mountains and a multitude of eastern plains sites. 24 GHz was activated for the first time in the contest and local scoring and contact records were broken. Participants were: Bill, K0OXU, Bill, K0RZ, Russ, KA0ULN, Dave KB0LP, Chuck, KC0DGP, Mike, KD6HNQ, Gerry KD0GS, Bob, N0DQD, Ron, N0IVN, Don, N0UGY (+24 GHz), Mike, W5VSI, Phil W6HCC (24 GHz), Dave, W6OAL, Bill, W0GVT, Jim, W0KJY, Bruce, WA8HGX (+24 GHz), Pete, WB0DRL, and John WD4MUO/0. Doug, (formerly KB0KQH) has a new call: N0DAJ. Since his is the primary packet node in the Pikes Peak area, packet users need to be aware. East Slope DEC Larry, K0ANI, ran a good EC meeting at the Longmont swap which again focused on Y2K issues. There will be widespread use of hams throughout the state on New Year's Eve. Farewell and best of luck to Rick Palm, K1CE, ARRL Field Services Manager. A frequent visitor to Colorado, Rick is leaving HQ after 20 years to be closer to family in Florida. We wish him well. Season's Greetings to all, and the very best for 2000. If you have items for this column, e-mail them to me at **n0wpa @arrl.net.** 73, de N0WPA. NTS traffic: AD0A 116, K0TER 62, N0UOD 22.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS & N5ART. SEC: K6YEJ. STM: N7OIM. NMs: WA5UNO & W5UWY. TC: W8GY. ACC: N5ART. New Mexico Roadrunner Net handled 117 msgs with 1017 checkins. New Mexico Breakfast Club handled 251 msgs with 1019 checkins. Yucca Net handled 30 msgs with 760 checkins. Caravan Club Net handled 8 msgs with 69 checkins. SCAT Net handled 15 msgs with 587 checkins. Four Corners Net handled 22 msgs with 307 checkins. GARS Net handled 4 msgs with 38 checkins. Rusty's Net handled 82 msgs with

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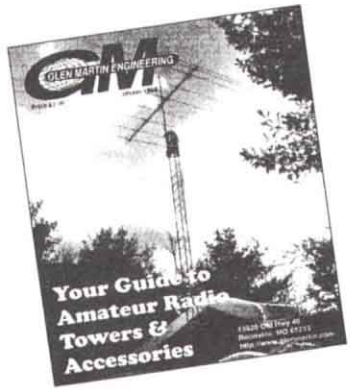
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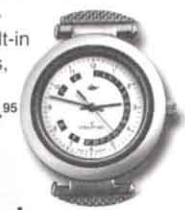
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696 checkins. Valencia Co Net handled 11 msgs with 48 checkins. Congratulations to Toby Cross, KK5GX, who was selected as NM Ham of the Year. Toby has been the driving force behind the Veteran's Administration Amateur Station (N5VA) and had made it possible for the Duke City Hamfest to acquire an excellent PA system. He is so helpful to all that he associates with. Congratulations, Toby! The International Hamfiesta was certainly nice. Ten new ARRL Section Managers were in training in Denver last week, and it was my honor to meet the new SMs from all over the US. Riley Hollingsworth, K4ZDH, has made a few more contacts in NM and has certainly made his point! Riley plans to be at the Socorro Hamfest November 13. Sorry to see the bill in Congress that would affect our dealings with the National Weather Service. Hope you will contact your representative in Congress and tell them to oppose this measure – HR 1553! Very sorry to report the passing of ex-W5ER. Best 73, Joe, W5PDY.

UTAH: SM, Mel Parkes, N5UVP—Happy Holidays! I would like to wish everyone the very best for the holidays, and express my thanks to everyone for helping make Amateur Radio the success it is in Utah. Where has 1999 gone? Get ready for 2000. Make your ham radio resolutions now! By now some of you may know that one of our fellow hams Jim Dalley, W0NAP, has moved to Idaho. Jim has taught and Elmered many amateurs in Utah. We will certainly miss him. Good luck, Jim! Speaking of Elmer, have any of you recently taken a new ham under your wing and shared some of those neat ideas and practices we all talk about and wish the new guys knew and understood? Those of us who have been around owe it to the newer hams to teach and share with them what we know. Enjoy the holidays and get on the air for some fun QSOs. 73.

WYOMING: SM, Bob Williams, N7LKH—ASMs: Jerry Pyle, WB7S, and Christine Reigert, KC7MJI. It was suggested that additional ASMs be appointed to take account of the wide geographical spread of WY Section and Christine Reigert is the first in addition to Jerry. Jerry, WB7S, will focus on the Section emergency communication support area. He will try to establish coordination between the activities of ARES, RACES, WEMA and the WEMA County Emergency Coordinators. The recent Y2K exercises have demonstrated a need for better communications of the exercise plan and schedule to the general membership of the Section and this can be enhanced by going through the clubs and the club newsletters. It is hoped that Jerry will be able to produce an organization chart that shows the organization of each emergency group as well as how they relate to each other. It would be the best of all possible worlds if the chart could include pertinent addresses and phone numbers. In addition to this mission impossible, Jerry will try to find volunteers to fill the gaps in the ARES organization. Sep traffic: NN7H 215, Sep PSHR: NN7H 145.

SOUTHEASTERN DIVISION

ALABAMA: SM, Bill Cleveland, KR4TZ—ASMs: W4XI, KT4XA, KD4PDQ. SEC: AF4HE. STM: WB4GM. BM: KA4ZXL. OOC: WB4GM. SGL: KU4PY. ACC: K4LI. TC: W4OZK. PIC: KA4MGE. I want to wish everybody happy holidays. In December, I can't help but to reflect on all that has happened this year. I'm proud of the work done by ALL of the Section Field Appointees. As January 1, 2000, inches closer, I am sure everybody is anxious to see what will happen in the new millennium. Walter, Gene, Chris, and I will ring in the new year on the Alabama Emergency Net on 3.965 MHz. Please join us, we plan to have an informal net, and if something happens, everybody will be there to handle any emergency traffic. Until then, I hope to see everybody at the Wiregrass ARC Hamfest in Dothan Alabama on December 4. The hamfest will be at the Wiregrass Recreation Center on Sixth Avenue in Dothan, Alabama. The doors open at 8:00AM. Admission is $3.00 per person. For more information you can contact Percy Garrett (KF4DYV) at 334-692-3689 or check out the Wiregrass ARC Website at **www.qsl.net/warc**. 73 and God Bless, Bill, KR4TZ. Tfc: WB4GM 268, W4ZJY 129, W4PIM 106, W4CKS 85, WA4GQS 57, K4JSJ 55, W4ZBA 40, WB4TVY 32, KC4VNO 25, KC4TLG 21, W4XI 13, W4DGH 12, KU4IJ 8, W4NTI 4, KE4OLE 3.

GEORGIA: SM, Sandy Donahue, W4RU—ASM/So Ga: Marshall Thigpen, W4IS. ASM/Legal: Jim Altman, W4UCK. SEC: Tom Rogers, KR4OL. STM: Jim Hanna, AF4NS. SGL: Charles Griffin, WB4UVW. TC: Fred Runkle, K4KAC. ACC: Bob Lear, K4SZ. OOC: Monroe Gaines, KF4NXD. Merry Christmas! Last month in this space, I said we were gearing up for a possible visit from Hurricane Floyd, and I hoped he would stay away. Well, as you know, the storm bypassed Georgia and slammed into North Carolina unleashing torrents of rain that caused widespread flooding. However, Floyd came close enough to us to trigger an alert on 3975 kHz that continued for 2 days. We had mass evacuation from the coast with hundreds of thousands coming into middle and north Georgia and filling up every motel and shelter in the state. ARES members manned shelters and county EOCs, providing much needed communications when the commercial channels became overloaded. If Floyd had come ashore on our coast, amateurs were ready to work as long as needed, as did our counterparts in North Carolina, who provided vital communications for weeks after the storm passed. Georgia ARES is under the fantastic leadership of Tom Rogers, KR4OL. Changing the subject, I am pleased to appoint Fred Runkle, K4KAZ, as the new Technical Coordinator. Fred has worked for giant companies like Collins Radio, Martin Marietta, and Scientific Atlanta. He is an active VHF and UHFer. Fred and his staff of Technical Specialists are ready to solve your technical problems. E-mail him at **runkle@gw.total-web.net**. I regret to report the death of Charlie Royal, WD4EIK, Albany. Charlie's smiling face will be missed when I next attend the Albany hamfest. Also SK is Jay Johnson, KF4NBH, Conyers, who passed away too young at 41. Ga Section condolences go to both families. 73, Sandy. Tfc (Aug): WU4C 100, AF4NS 83, WB4GGS 54, K4BEH 48, KA4HHE 41, KU4WJ 35, WB2NYM 30, K4JNL 10, K4BAI 3.

NORTHERN FLORIDA: SM, Rudy Hubbard, WA4PUP—ASM E Central: AC4PF. ASM W Panhandle, KO4TT. ASM-APRS: WY8O. ACC: WA4B, BM: N4GMU. OOC: AF4EW. PIC: KF4HFC. SEC: WA4NDA. SGL: KC4N. STM: WX4H. TC: KO4TT. Packet: N4GMU. Hurricane Floyd caused the

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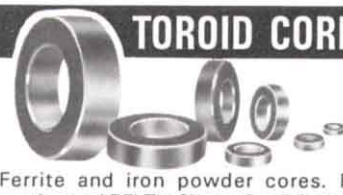
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biggest evacuation in Florida history. Over 1.3 million were evaluated from the East Coast. Hotel rooms were extremely hard to find, and in fact some people went west as far as Miss. Two of the Section's Districts, namely, E Central with counties of Seminole, Flagler, Lake, and Orange; and the Florida Crown District with counties of Baker, Bradford, Duval, Jax Beaches, Clay, Nassau, Putnam, and St Johns were involved with the hurricane. There were over 300 amateurs participating in operating at the EOCs, shelters, hospitals, and gateways. The ARRL-issued bulletin listed some of the counties in E Central District, but didn't recognize the counties in the Florida Crown District which were also involved with the hurricane. Situation reports from the Northern Florida Section were forwarded immediately to the SEOC in Tallahassee, and ARRL Headquarters. The radio amateurs in the Crown District were faced with the brunt of the storm even though the hurricane did not make landfall in Florida. During Hurricane Floyd, I contacted ARRL HQ for assistance in securing FCC-guarded frequencies for use by emergency-related nets in Florida. League HQ was most cooperative in getting the FCC to honor my request. On the advise of the Northern Florida STM, 7242 kHz was chosen for 40 meters. This frequency happened to be close to an NTS Eastern Area Net that regularly meets on 7243 kHz and thus raised objections over assigning Voluntary Communication Emergency frequencies used by the NTS traffic nets. 73, Rudy. Tfc: WX4H 1285, KE4DNO 307, KE4OAV 225, NR2F 174, AF4GF 117, W5MEN 105, AF4PU 92, KF4NFP 64, AD4DO 64, WB2FGL 59, KF4TM 57, N4JAQ 47, K4JTD 36, AD4DO 31, K1JPG 30, KF4DRS 28, KB4DCR 28, W4KIX 26, N9MN 24, AB4PG 23, WB9GIU 22, KJ4HS 18, KM4WC 16, N4ORZ 9, WB2IMO 8, KE4HIY 6, WA4EYU 6, KF4YHK 4, WX4J 4, NZ4O 4, W8IM 3, WD4LIF 3.

SOUTHERN FLORIDA: SM, Phyllisan West, KA4FZI—The SFL Section is in a state of transition at this writing. New appointments will be listed as they are made. I regret having to report that Kevin "KB" Bunin, K4PG, resigned as SM at the end of September. Unforeseen changes in work schedule, family obligations, auto accidents and health problems made his continuing as SM impossible. We will miss the always friendly smile and lively forums "KB" hosted. Our best wishes to you, Kevin; we hope to see more of you again soon. KD4GR (DEC Broward) reports 7 special sessions of SFAN (SFL ARES net) in connection with Hurricane Floyd and Tropical Storm Harvey. ECs, AECs, and OES stations were called to man the many EOCs, Red Cross shelters and special care units that served several thousand people. AJ4Y (EC Polk) and AD4RZ (EC Okeechobee) arranged full support of local Red Cross activities, shelters, and the EOC in their counties during the two storms. Fortunately the Polk ARES staff had just recently installed a vhf base station antenna at the County American Red Cross Chapter. KJ4N and WA8PXL (Lee) operated from the K2BR special event station at the Miss America Pageant (NJ) in September. They originated messages for the participants and public, provided parade communications, and presented an exciting glimpse of Amateur Radio to the large crowds. Congratulations are due the members of the new TURTLE NET in the Lakeland area, KT4TD (manager), and AB4XK (mentor). Their reports evidence a healthy, growing traffic net. Watch *QST* for the list of upcoming hamfests in SFL. A special section appointee meeting is in the planning stages for Saturday of the Miami Hamboree. Traffic: WA9VND 591, KA4FZI 376, KB4WBY 281, K4SCL 246, W7AMM 230, KC4ZHF 225, AB4XK 214, KJ4N 184, KD4GR 177, WB4PAM 143, KD4HGU 139, KE4IFD 122, WA4EIC 94, AA4BN 71, K4RBR 57, W8SZU 48, W4DWN 45, KG4CHW 42, K4FQU 42, KT4XK 42, W4AUN 35, AD4IH 34, KE4UOF 30, W4WYR 20, KT4PM 20, AF4NR 18, KE4WBI 16, KE4VBA 12, W3JI 11, K4LKL (club) 11, KF4KSN 5, KT4TD 4, KF4UTH 1. 73, de KA4FZI.

VIRGIN ISLANDS: SM, John Ellis, NP2B, St Croix-ASM: Drew, NP2E, St Thomas. ASM: Mal, NP2L, St John. SEC: Vic, WP2P, St Croix. PIC: Lou, KV4JC, St Croix. ACC: Debbie, NP2DJ, St Thomas. NM: Bob VP2VI/W0DX, Tortola. Looks like storm season has passed, 147.25 machine will soon have its "non-hurricane antenna" back up. Each year during "season" the larger antenna is removed and replaced by a bulletproof 5/8 wave whip. Welcome to Pete (WB9W) and XYL Carol who are looking after Lou, KV4JC's, place while Lou gets some R&R up in St. Louis. Sorry to hear about Rick, K1CE, leaving the League. Rick helped me as SM very much. Good luck, Rick. Sorry to see you go. Plans still on for the Xmas party put on by St Croix ARC St Croix ARES net Tuesday evening at 6:15 PM on 147.25, St Thomas/St John ARES net at 6:30 PM, same night on 146.81. Local repeaters 146.63 St John, 146.81 St Thomas, 146.73 Tortola BVI, 147.25 and 146.91 St Croix. Go simplex on the repeater output frequency if repeater is down. That's it from the tropics this month. 73, John, NP2B.

SOUTHWESTERN DIVISION

ARIZONA: SM, Clifford Hauser, KD6XH—The last two months have been very busy. First was the Kingman hamfest, next was the business travel, and then came the ARRL SW convention. The convention was very good because of the many presentations on various topics: APRS, FM Repeater practice, Digi-repeaters, DXing 101, etc. Then Mr Hollingsworth, from the FCC, talked on enforcement. You really had to choose which seminar you were going to attend. Back to FCC enforcement. The answer to the real question is that the FCC enforcement for Amateur Radio violations will continue. In the past, he has concentrated on only HF, but he will also start in on VHF and UHF illegal activity. That is good news. Now that the SW convention is over with for this year, please provide feedback on the good, the bad, and ugly of the convention. It is time to plan for next years event where it will be in Scottsdale at the Ramada Inn, and Walt would like to incorporate any changes necessary to make it a great convention. Yes, the year 2000 Southwest Division Convention will be held in the Phoenix area. If your club or even you as an individual would like to help in the planning process, and working at the convention, please let me know and I will show you how to contact Walt. He does need additional help. During the month of October, CARA had their hamfest in Sierra Vista, and OPRC had their hamfest in Tucson. Both events appeared

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DFK-7B	22' cable kit; TM-733A	59.95	**SC-41**	Soft case; PB-32	9.95
DTU-2	Digital paging; TM-541A	19.95	**SC-43**	Soft case; TH-79/PB-33/34	9.95
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ME-1	Mem. expand;TH-28A,TM-251A	9.95	**YK-88CN**	270Hz CW filter; R-5000	69.95
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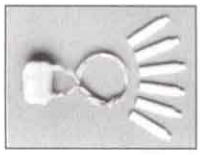


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to be a success. Now for upcoming events. The East Valley Amateur Radio Group will have a special event station to commemorate the Battleship, USS Arizona, on December 7, 1999. This special event station will be from 1500Z to 2400Z on 14.240 MHz, 21.340 MHz, and 28.340 MHz. Stations contacted may request a certificate by sending a QSL card and a 9x12 SASE to EVARG, 3264 E Carol Ave, Mesa, AZ 85204-3245. There will be a fall hamfest at Mesa community college. The date will Dec 4, 1999. 73, Clifford Hauser, KD6XH. Net report: ATEN 759 QNI; 76 QTC; 30 sess. Tfc: K7VVC 621, W7EP 82, W3FZV 5.

LOS ANGELES: SM, Phineas J. Icenbice, Jr, W6BF – The Big ARRL Convention on the Queen Mary is over, and it was just great. All of the volunteers should be congratulated for their effort. My personal enjoyment was in talking and seeing all of you fine folks again. The ideal weather was a big plus. As the moderator of the FCC/OO meeting; most of us feel that FCC action is taking place across the Country and real action should reach our area very soon. The requirements for submitting "OO information is now less stringent," especially the need for less usable tape and fewer typewritten pages as established by the FCC. - Barry, AD6HR, still needs SCN help please e-mail him at **bgeipel @primenet .com**, his SCN report for Sept is: QTC 35/QTR 226 & QNI 81. (21 sessions) – Bob Heil, K9EID, of Heil Microphone FAME, did an outstanding job of playing the electronic organ at the Convention Banquet. Several music critics gave him a 10 (big 10) rating for his great music. Bob also put on a one-hour audio program of show and tell. Bob used microphones and radios to show phasing characteristics of two microphones as well as how to equalize your microphone with one of his equalizers. If you missed this high-speed demo, put it on your list as a MUST at the next convention. I gave Bob a 10+ for this demo. – The Braille Institute needs help at the downtown Ham station. If you live anywhere near Melrose & Vermont, please call Carlye Rudkin, at 323 663 1111 for more details. They have a rather complete ham station with antennas, but very little technical help. According to AB6DU, Dave Nelson, from TRW, all levels of service are needed at the Braille Institute. This should be a very fun and rewarding experience for any Ham who lives in the area. The Red Line station is about an 8 minute walk to the Braille Institute. So don't delay. Your services will be appreciated! N4KEL/ Mobile, just checked in from Alabama. Sy is back from designing the Palm Computer Systems in the Pacific Northwest. (This is almost, "The Dick Tracy TV watch" that you have been waiting for.) 73 de W6BF, Phineas.

SAN DIEGO: SM, Tuck Miller, K6ZEC, 619-475-7333—Many thanks go out to Rick Palm, K1CE, Field Services Manager at HQ. Rick recently announced his "retirement" after 20 years of dedicated service to Amateur Radio. I first had the pleasure of meeting Rick at many Southwestern Division Conventions, and then after being elected SM from this great section was able to attend an SM workshop in Denver. Rick has always been very organized, and is ready to help anyone at a moment's notice. Congrats, once again, Rick. Thanks for all your help. You will be greatly missed. Christmas is almost here. Let's see, how many shopping days till the big day? A Yaesu FT1000D sure would be great. I'm sure that will have to wait a bit. Being the holiday season means there will be a lot of holiday parties. Please be very careful, and most important be safe. December is also the month where many clubs elect officers for the coming year. Please keep me informed of contact folks for your club. If you are an affiliated or special service club, make sure you file your yearly reports. The I Love a Clean San Diego group will once again have a beach cleanup on December 11. Check the Web site out for beaches that are open and that you can volunteer for. Public service is what it is all about. Frank Ratty, WA6YWC, is new CDF liaison replacing Ken, WA6BCC, after many years of service. Thanks, Ken!! Remember to check out periodically the section Website at **www.qsl.net/sdgarrl**. We try to keep it up to date. Send pictures, either by e-mail or snail mail, and we will try to get it on the net. Merry Christmas! For traffic KT6A 738, WA6ODQ 158, KD6YJB 153, KD6IVF 28, KO6BU 2, WA6IIK 1. BPL: KT6A 738. PSHR: KT6A 141 WA6ODQ 138 KD6YJB 86 KD6IVF 81 Please try to use ham radio as much as possible, packet, voice, and yes, even cw. Keep ham radio ALIVE!! Until next month... Remember, Helping Others...Always Worthwhile!! 73, Tuck, K6ZEC.

SANTA BARBARA: SM & STM: Rob Griffin, K6YR, 805-543-3346 & k6yr@arrl.org—SEC: Jack Hunter, KD6HHG. ACC: Michael Atmore, KE6DKU. OOC: Howard Coleman, W6HQA. PIC: Jeff Reinhardt, AA6JR. TC: Warren Glenn, KM6RZ. ASM, Ventura: Don Milbury, W6YN. ASM-Internet: Jack Bankson, AD6AD. DECs: SB-Dave Lamb, WA6BRW; SLO-Bill Peirce, KE6FKS, & Ven-Dave Gilmore, AA6VH. Official Emergency Station Appointments: WA6NGH, KD4OSO, KN6KA, KQ6XL & KE6NYT. Congrats & welcome! The SWD Convention was a fine event, & I appreciate the participation of KD6HHG, AA6VH, AD6AD, W6YN, KD4OSO, W6HQA, AA6JR, N6XD, N6KB, KE6DKU, W6TTX & WB6QKF. If I missed anyone, my apologies. A special thanks to the convention host clubs & to the Chairman, Nate, K6OSC! It is not too early to begin planning for SWD Convention in 2000! October 6-8 in Scottsdale, AZ at the Ramada Inn Valley Ho. Contact: the Chairman, Walt, N7IZM at 480-735-3988 or **n7izm@arrl.net**, your Section Manager, or the SB Section Web Site for details. These ARRL-sponsored events are worth it! SB Sec Web: **wwww .qsl.net/arrlsb**. Also remember our Section traffic nets: SCN slow speed NTS Net, M thru F at 7:15 PM on 3598 kHz & SCN/SB at 2100 local on 147.000+ (131.8), 224.90-(131.8) & 448.875- (100). PSHR/Tfc: K6YR 170/111, KF6OIF 121/73, KE6MIW 113/40 & W6VIF -/20. That's 30. 73, Rob, K6YR.

WEST GULF DIVISION

NORTH TEXAS: SM, Don Mathis, KB5YAM—SEC: K5UPN. STM: KC5OZT. BM: KB5YAM. SGL: N5GAR. OOC: WB5UDA. ACC: WN5PFI. ASMs, KX5K, K5RE, W5FB, 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. If you would like to be on the Section Newsletter mailing, send me an e-mail: dmathis@lsic.net. I would like to welcome a new ASM, Gary Hall, and KB5LWZ. Gary will be on

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RG8/U STRD BC FOAM 95% BRAID UV RESISTANT JKT 0.9dB/1350WATTS @ 30MHz..	.34/FT	.32/FT	.30/FT
RG8 MINI(X)95% BRAID UV RESISTANT JACKET 2.0dB/875 WATTS @ 30MHz	.15/FT	.13/FT	.12/FT
RG58/U 95% BRAID UV RESISTANT JACKET 2.5dB/400 WATTS@ 30MHz	.15/FT	.13/FT	.11/FT
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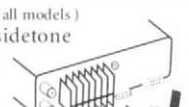
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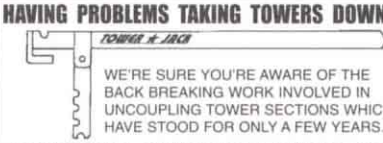
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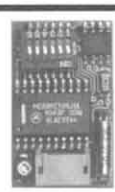
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special projects. His first job will be to help coordinate the section ARES training. More details on that later. Jack Sims, KX5K, has agreed to take on the additional duties as my regional ASM for the South West Region. More details on that later. I would like to thank Fred Loosen for his service as Technical Coordinator. I will be filling that position myself until a replacement can be found. We will be forming a Technical Team for the section. Contact me if interested in serving on that team. As this article hits the press, we will be in the final stages of the Y2K planning. We expect that nothing major will occur, but we will be ready to serve should that be required. The results of the Current State Drill will be reported in the next issue. We will be making up our meeting schedule for the next year shortly. If you would like a visit with one of the Section Staff Members or myself, please contact me or them to see what we can arrange. We will try to make as many of the club and hamfests as possible this next year. Tfc (Sept) N5JZ 254, KC5OZT 188, KC5VLW 140, KC5EIV 107, N9BNQ 72, KB5TCH 71, WA5I 56, K5MXQ 46, KC5QGI 44, AC5Z 17, KB5YAM 7, AC5PO 2, N8QVT 1. N5JZ has qualified for BPL with 121 orig/deliveries. May you all have a safe and happy holiday season. 73, Don, KB5YAM.

OKLAHOMA: SM, Charlie Calhoun, K5TTT—ASMs: N6CL, W6CL. SEC: W5ZTN. STM: AB5RV. ACC: KB5BOB. PIC: WA9AFM. OOC: K5WG. SGL: W5NZS. TC: K5KXL. Well it's that time of the season and the Enid ARC will be kicking it off by providing communications for the Enid Lights Up the Plains event. OKDXA elected Larry Shima, W0PAN, President and Onis Cox, K5COX, Secretary / Treasurer. Congratulations to Nelson Derks, KC5QVV, who was named 'The OKDXA Ham of the Year'. A new club has formed to promoting weak signal communications above 50 MHz. The Ultra Highs Weak Signal Society, W5VHF, has been meeting about every other month. Contact me or check the Web for more info. HC8 and HC2 were heard in EM25 in early Nov on 6 m. Bands ought to be cooking by now. In Tulsa, the hospital disaster net will be formally activated at 1800 local time 12-31-99 and will remain activated until after 0000 1-1-2000. 146.880, KB5VDB, for more info. Oklahoma Repeater Society is looking for board members from SE, SW, and NW Oklahoma, contact Merlin, WB5OSM, **megriffin@ionet.net**. I would like to take this opportunity to express my thanks and appreciation to Pat, WB5NKD, and Arley, WB5NKC, for all their efforts in promoting traffic handling and slow speed CW to new operators. They are at it every day trying to promote the NTS and training new amateurs. If you are interested in joining them, let me know and I'll get you the net information. I hope you all have a very blessed holiday season, and we all make it through Y2K! 73, Charlie. Tfc: KF5A 662, N5IKN 620, KB6GBN 466, WB5NKC 332, KI5LQ 100, WA5OUV 76, WB5NKD 52, KE5JE 43, AB5RV 41, W5REC 28.

SOUTH TEXAS: SM, Ray Taylor, N5NAV—ASMs: NR5ED, N5WSW, W5GKH, K5DG, N5LYG, WA5UZB, KK5CA, WA5TUM, KB5AWM, WA5JYK, K5PFE, K5PNV, and K5SBU. STM: W5GKH. SEC: K5DG. ACC: N5WSW. PIC: KA5WSS. TC: KJ5YN. BM: W5KLV. OOC: W5JAM. SGL: K5PNV. The end of 1999 is here and we soon start the year of 2000. What are you, as a ham radio operator, going to do in the new millennium to help mankind. Are you going to think only of yourself or are you going to help our youth get involved in the hobby. There are so many things like spread spectrum, that is here for the hams to work with. Most of our clubs are helping young people learn enough to get their license, but so few are teaching kit building. They may go on to be great engineers as a result of your help. We have a new EC of Comal County, Harold Karn, N5HK. I want to thank Todd Covinton, N5IJR, for a job well done. Todd stepped down due to a promotion on the job. We wish you well on your new assignment. Clif Maloney, KM5HY, as SGL, due to job responsibilities. Our thanks for a job well done. Jim Robinson, K5PNV, will be replacing Clif. Jim has been in state government-related work for several years. Jim helped on the Texas Tower Bill. Jim will also be one of my new ASMs with SKYWARN and gulf disturbances being his main duties. The Texas ARES net has been reactivated. The new net time is the first and third Monday of each month, on 3.873 kHz at 7:30 PM following the Texas Traffic Net. Bob Ehrhardt, W5ZX, is the new net manager. Bob is looking for an assistant from each Section in Texas. Since Garland, K5VY's, father passed away, he had to step down as manager of The Texas Traffic Net, to take care of family matters. We do want to thank him for a fine job and wish him well. The new net manager is Jeff Salmons, N5ECP, with Bob, W5ZX, as assistant. We wish them the best in their new assignments. We have had a few changes in South Texas and speaking of changes, there have been two retire at ARRL HQ. Jo-Ann Arel and Rick Palm. We wish them well, they have done a great service at ARRL for Amateur Radio. Don't forget the big celebration of the Austin Amateur Radio Club with 80 years affiliation with ARRL on December 14. There have been lots of plans for Y2K ham radio involvement. Let's remember the true meaning of Christmas this year. Remember that it's more blessed to give than to receive. Until next month, 73. Tfc: W5SEG 182, KA5KLU 181, W5KLV 161, W4RRX 85, WA5FXQ 69, W5ZX 63, N5NAV 49, W5GKH 32, N5OUJ 22, K5UCQ 19, W5ZIN 18, N5JUU 7, W5OYY 7, N5HK 4.

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. Yearly field contest between Big Bend and San Angelo ARCs resumed this year with the loser having to accept the "boat anchor" award. Big Bend beat them. New officers of El Paso SCARC are Pres-Mike Olsen/ KB5JYF, VP-Larry Springsteen/WB8LBZ, Sec-Albert Ortiz/KB5GZZ, Treas-Martin Rue/WB5LJO. My long-time friend, Bobbye O'Rear, is now a ham-KD5III. Welcome Bobbye! Emergency exercise by TX DPS went well; tnxs for all that checked in. The numbers were overwhelming. New ARRL affiliated club-Lubbock Contest Club. Tnxs fellows-we appreciate each and every affiliated club member! El Paso Ham Fiesta and Odessa's Hamfest were a resounding success. Hope everyone survived Turkey Day. Best wishes for a Merry Xmas and a Happy New Millenium. Rick Palm, K1CE, has retired from ARRL after 20 yrs. Our best wishes go with you. SMs will miss Rick; he was our right arm. 73 de Charlie, WB5T.

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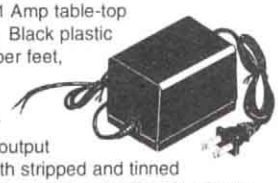


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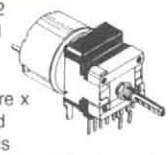


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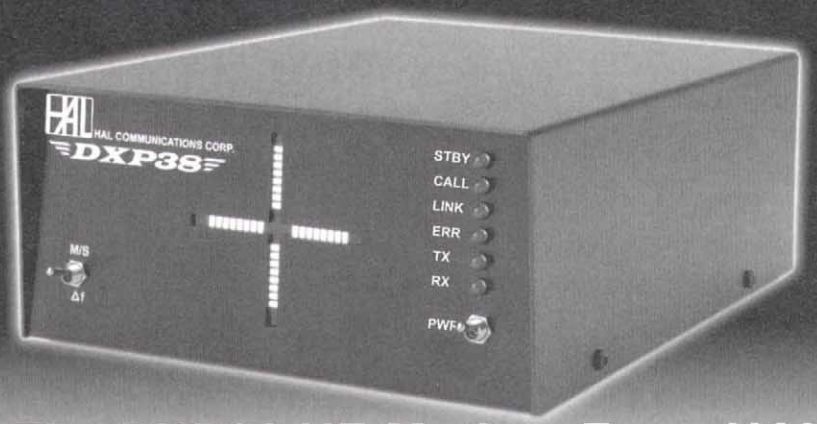
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j. Percent Paid and/or Requested Circulation (15c. divided by 15g. times 100)		99.14%	99.29%

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Editor — September 29, 1999

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PS Form **3526**, October 1999 *(Reverse)*

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Model	Bands	Traps	Length	Price
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D-56	10/15/20/40/80	6	82'	125.95
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* Feedline can be buried if desired
* End Fed
* Permanent or Portable Use

ALL TRAP ANTENNAS are Ready to Use - Coax Fed - Factory Assembled - Commercial Quality - Handles 600 Watts - Comes complete with: Deluxe Traps, Deluxe Center Connector, 14 ga. Stranded Antenna Wire and End Insulators. Automatic Band Switching - Tuner usually never required - For All Transmitters, Receivers, & Transceivers - For All Class Amateurs - One Feedline works All Bands - Instructions included.

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D-20	20	33'	19.95	24.95
D-40	40	66'	24.95	28.95
D-80	80/75	130'	29.95	33.95
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Model	Band	Length	Price
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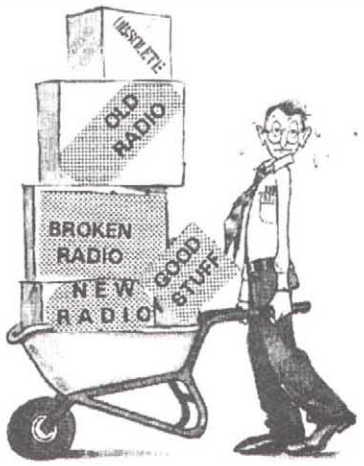
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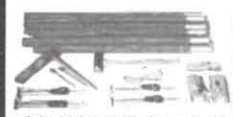
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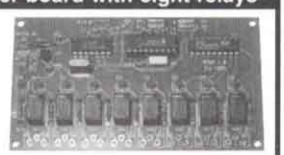
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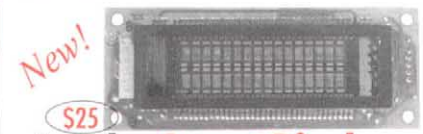


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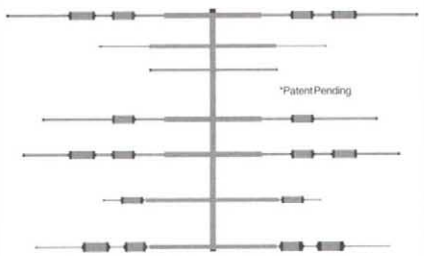
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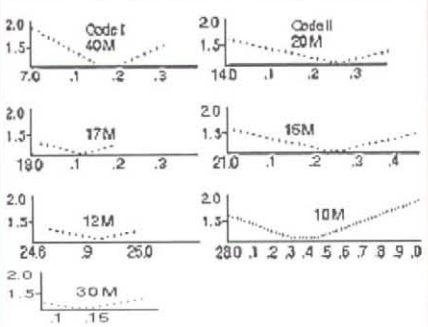


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Band	Gain	F/B	Elements per Band
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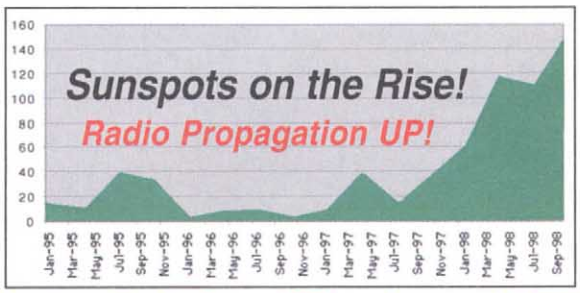
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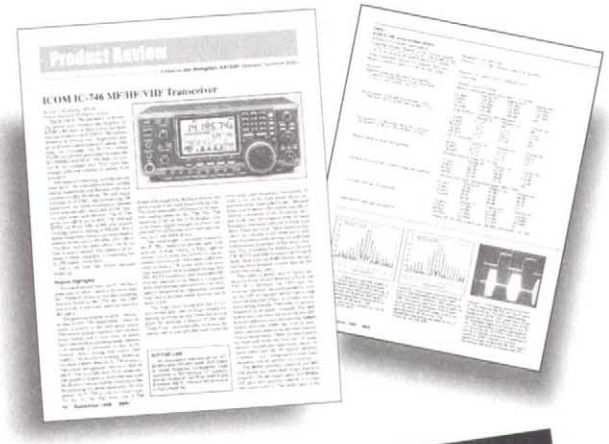
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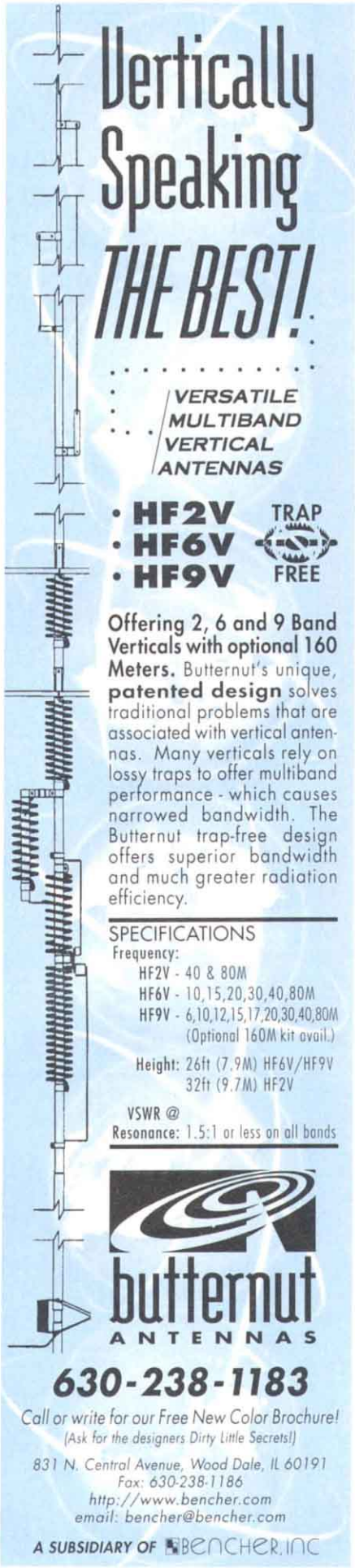
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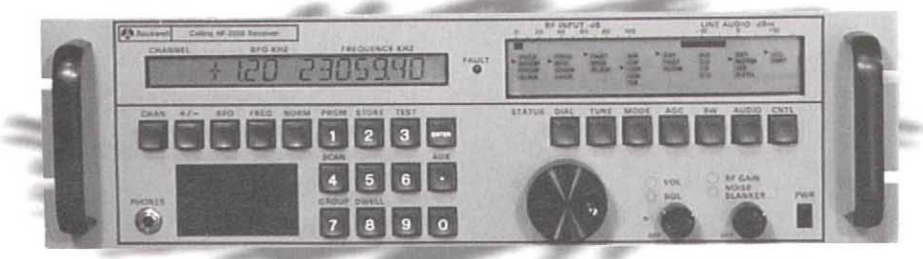
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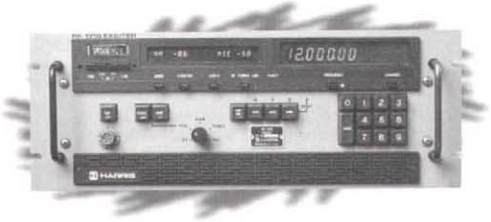
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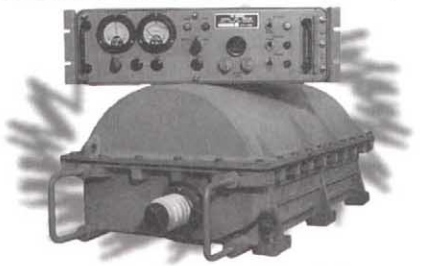
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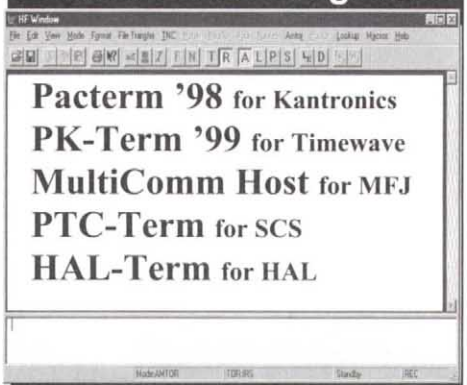
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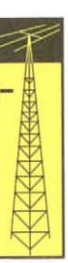
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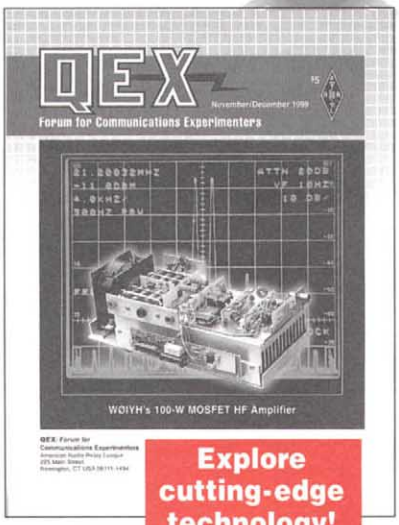
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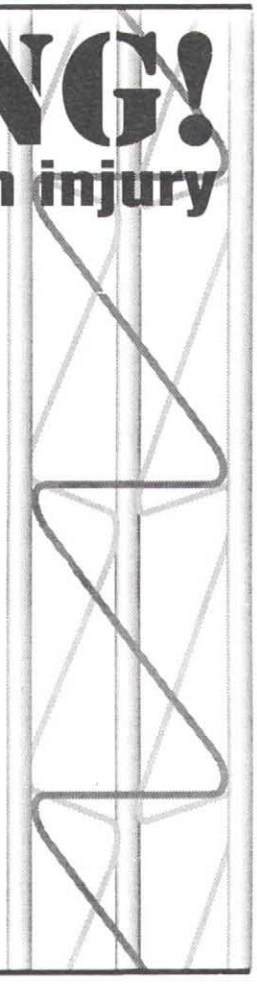
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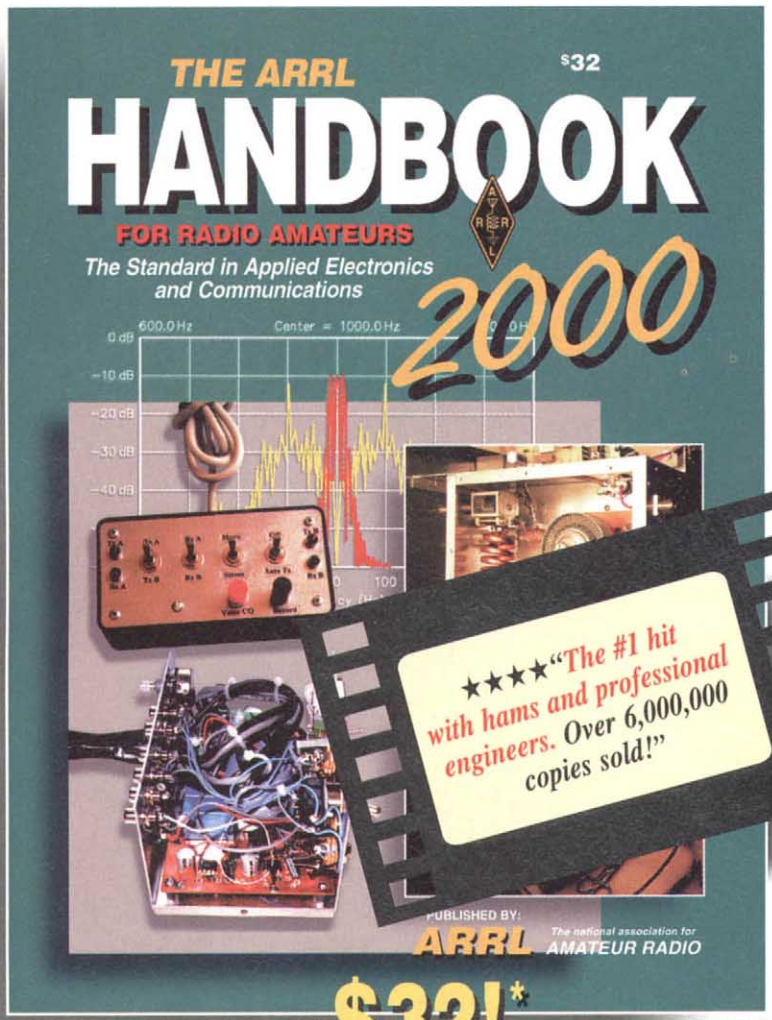


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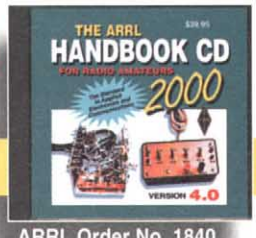


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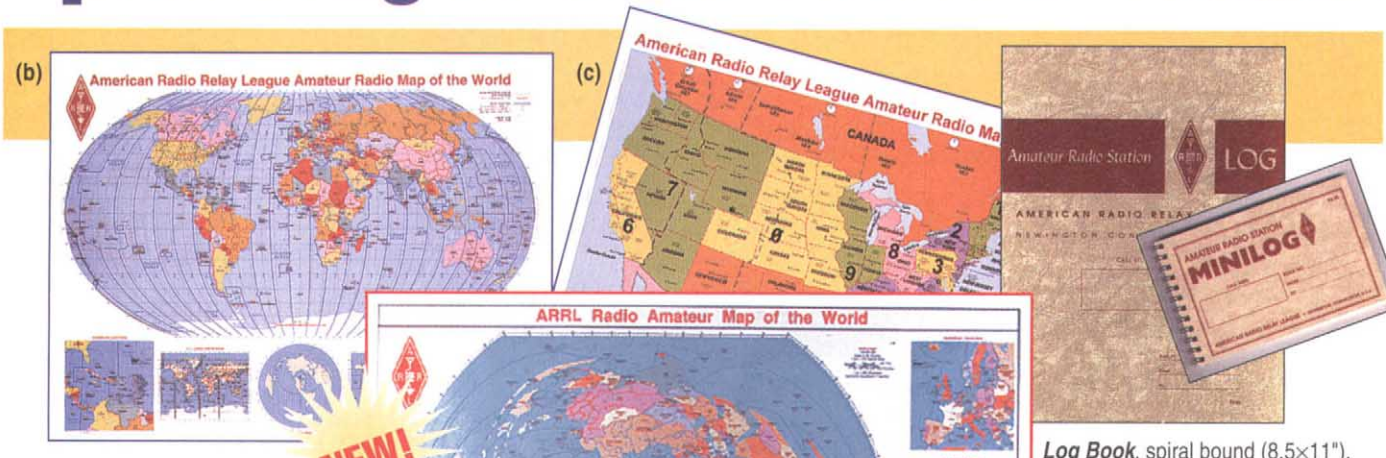
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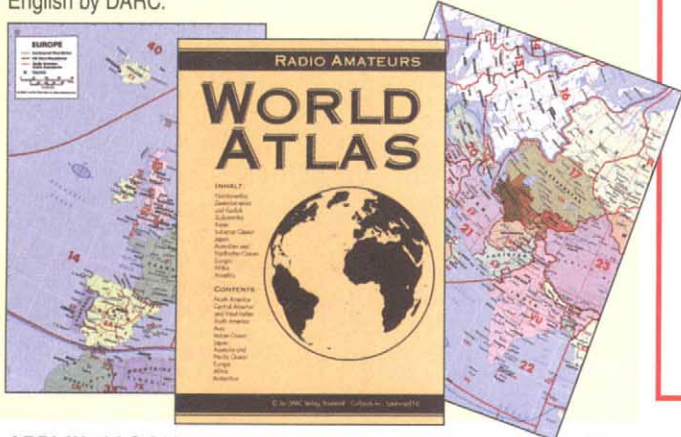
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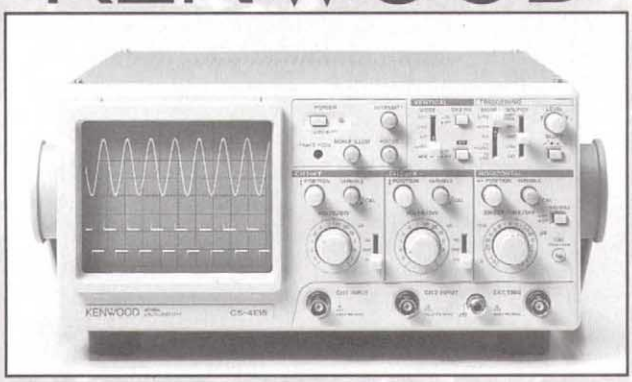
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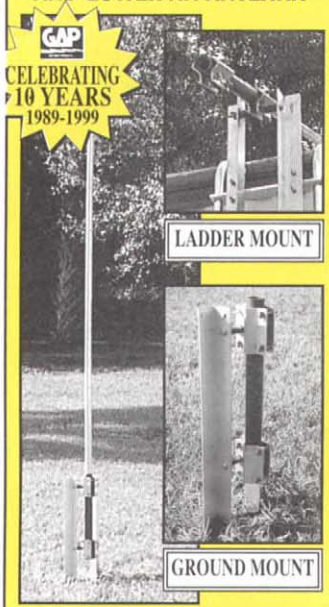
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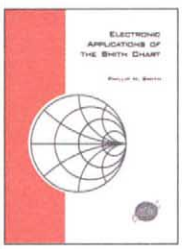
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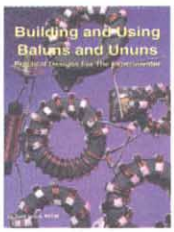
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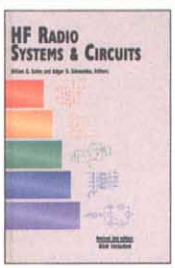
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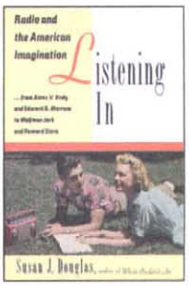
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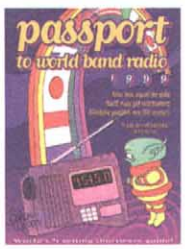
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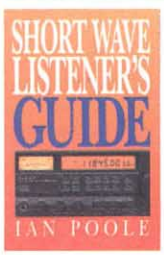
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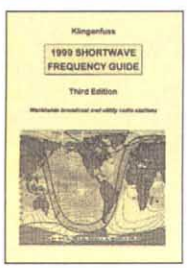
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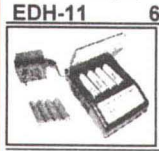
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The Icom IC-746 is an all mode transceiver covering HF/6m/2m. The radio features digital signal processing, 100 watt RF output on all bands, twin PBT, a 4.9"multifunction LCD display with band scope, automatic antenna tuner, and more. Supplied with a hand mic and DC power cord.

IC-756 ..... New Lower Price!

The Icom IC-756 is an all mode HF/6m transceiver featuring digital signal processing, automatic antenna tuner, 100 watts RF output, twin PBT, a 4.9" multifunction LCD display with band scope, and more. Supplied with hand mic and DC power cord.



FT-1000MP ..... In Stock!

The Yaesu FT-1000MP is a competition class HF transceiver featuring advanced DSP, automatic antenna tuner, built-in power supply, RS-232 interface, and more!

FT-1000 / FT-1000D ..... In Stock!

The FT-1000 is a competition class HF transceiver featuring true dual RX, automatic antenna tuner, 200 watts RF output, and a huge bank of crystal IF filters.

Quadra System ... Lower Price!

Solid state amplifier featuring 1 kW output, high power antenna tuner, and more!



FT-847 ... $200 Yaesu Coupon!

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 memory channels, and more. Supplied with up/down hand mic and DC power cord.



IC-706MK2G ..... Now In Stock!

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-707 ..... Entry Level Price!

The Icom IC-707 is an all mode HF transceiver featuring a front panel mounted speaker, AGC, 20 dB attenuator, 32 memory channels, multiple scanning modes, noise blanker, RIT, and more.



IC-2800H ..... Now In Stock

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-821H ..... In Stock

The Icom IC-821H is an all mode 2m/70cm dual band transceiver. Great for satellite use, the radio offers dual RX, dual frequency display, tone encode, 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-100 ..... In Stock!

The Yaesu FT-100 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 ..... Tiny HT, Tiny Price!
IC-T7A ..... Great Low Price!
IC-T8A ..... Triband HT!
IC-T81A ..... New QuadBand HT!
IC-T2A ..... Amazing Low Price!



IC-207H ..... New Lower 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-2100H ..... Great Low Price!

The Icom IC-2100H is a rugged 2m mobile transceiver featuring CTCSS tone encode/decode/scan, DTMF paging/squelch, 113 memory channels, switchable display color, multiple scan modes and more. Supplied with a back-lit DTMF hand mic, mounting bracket, and a DC power cord.



G-2800SDX $1069

Heavy duty antenna rotator handles 34 square feet of antenna load, and features 450° rotation, preset and variable speed.

G-1000SDX $479
G-800S/SDX $319/399
G-450A $239
G-5500 ..... $499
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, and more.

FT-50RD ..... New Lower Price!
FT-51RH ..... Yaesu Special!
VX-1R ..... Yaesu Special!

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FT-50RD
This durable, multi-featured 5 Watt Dual Bander is manufactured to rigid MIL-810 standards. Featuring wideband frequency coverage,* CTCSS/DCS operation, Dual Watch, 112 memory channels, and Digital Voice Storage.

FT-51R
This full-featured 5 Watt Dual-Band Handheld includes dual receive, 120 memory channels (80 if Alphanumeric), Auto Tone Search, Spectra Scope, and V/V, U/U and V/U operation.

VX-1R
The pocket-sized VX-1R is small in size only. Featuring Smart Search,™ DCS/CTCSS, Dual Watch, ARTS,™ wide-band coverage (76–999* MHz plus AM BC). The VX-1R provides 291 memory channels, and puts out ½ Watt (1 Watt w/optional E-DC-15 DC Adapter).

* Cellular Blocked

FT-11R
This compact 2M Handheld features 150 memory channels (75 if Alphanumeric), 10-memory DTMF Autodialer, Automatic Battery Saver (TX/RX), backlit Keypad, and are available in 1.5 Watt and 5 Watt versions.

FT-411E
The affordable FT-411E is compact and durable. This 5 Watt VHF FM Handheld features a die-cast case, 40 memory channels, 10 DTMF memories, built-in VOX, CTCSS, and multiple scan modes.

FT-23/33R
These ultra-compact, 5 Watt VHF FM Handhelds feature rugged die-cast aluminum cases, 10 memory channels, optional CTCSS, and multiple scan modes. The FT-23R (2M) and the FT-33R (222 MHz) are easy to operate, and give outstanding performance.

FT-10/40R
These single-band handhelds are manufactured to MIL STD 810 specifications, featuring either 30 or 99 memories, CTCSS/DCS operation, Dual Watch, and are available in 2.5 Watt or 5 Watt versions, with four keypad options.

VR-500
This miniature Handheld Receiver provides FM, AM, SSB and CW reception on 100 kHz–1300 MHz, with 1091 memory channels, Smart Search,™ versatile Dot Matrix display, Band Scope, and Dual Watch.

VX-5R
Although Yaesu's newest Tri-Band Handheld Transceiver is the world's smallest, it offers the performance of a full-size unit. The VX-5R operates on the 50 MHz, 144 MHz and 430 MHz bands with 5 Watts of power output, along with ultra-wide receive coverage of the VHF and UHF spectrum, plus AM medium- and short-wave broadcast reception. The VX-5R is military rated, so its durable, lightweight design allows you to take it anywhere. It is equally suited to walking through the concrete jungle as it is to forging the raging rivers of a real one. Along with a temperature display, the optional barometer pressure sensor unit gives a read-out of barometric pressure and altitude.

TOUGH GUYS.

When you're small, you get picked on. Isn't that how it goes? Well not in Yaesu territory, because not only do we design compact handhelds for efficiency, but we give these clever little guys plenty of muscle. Yaesu handheld transceivers have earned the bragging rights for being the smallest handhelds with the most durable water resistant casings ever created. And packed inside the brawn are engineering accomplishments in performance that are unmatched in the industry. Our high-tech handheld transceivers provide clean power output on the VHF and UHF bands and offer revolutionary features that allows these tough guys to continually outperform the competition. Learn more about Yaesu products on the web at www.yaesu.com

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A Handful Of Power And Performance

Kenwood HT's have outstanding audio and excellent IMD rejection. Easy to use and dependable!

The Kenwood Tradition Continues...

KENWOOD has been known for high performance products since 1946. Kenwood has a long heritage of handheld transceiver performance dating back 20 years. The TR-2400 was the first microprocessor controlled handheld, and the TH-21AT the first compact handheld of its kind ever produced. Today, Kenwood is known for its handheld models in the Amateur radio service as well as commercial radios for business/industry, police and fire depts. The new TH-D7A Data Communicator with built-in TNC and APRS™ software, is a clear example of Kenwood's leadership in technology and design, with outstanding audio and intermodulation rejection!



Hat styles may vary due to availability.

***FREE** Operating Manuals via the FTP site



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TH-D7A

- 144/440 MHz Operation
- Built-In 1200/9600 TNC
- APRS™ Operating Software
- PC Programmable*
- Mil Spec 810 C/D/E
- Simultaneous Voice & Data



$279

TH-G71A

- 144/440 MHz Operation
- PC Programmable*
- Mil Spec 810E, Water & Shock
- Wide Range Receiver
- Backlit Keypad



$379

TH-79AKSS

- 144/440 MHz Operation
- Long Battery Life
- Built-In Operators Manual
- Alphanumeric Dot-Matrix Display



$99

UBZ-LF14

- 14 FRS Channels
- Built-In CTCSS
- 2 Mile Range (Max)
- Flip Up Antenna
- Scramble Mode



$199

TH-22AT

- 144 MHz Operation
- Compact Design
- Luminescent Keypad
- Long Battery Life
- Easy To Use



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VC-H1

- SSTV Visual Communicator
- Use with any VHF/UHF/HF/UBZ

(The above prices are estimated street prices, actual selling price may vary)

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