Official Journal of
ARRL
The national association for AMATEUR RADIO

# QST

devoted entirely to
# AMATEUR RADIO

March 2001

## QST reviews

- Elecraft K1 QRP CW transceiver

## Build the "Warbler" PSK31 transceiver for 80 meters

## A portable RFI tracker

## Vintage Hallicrafters


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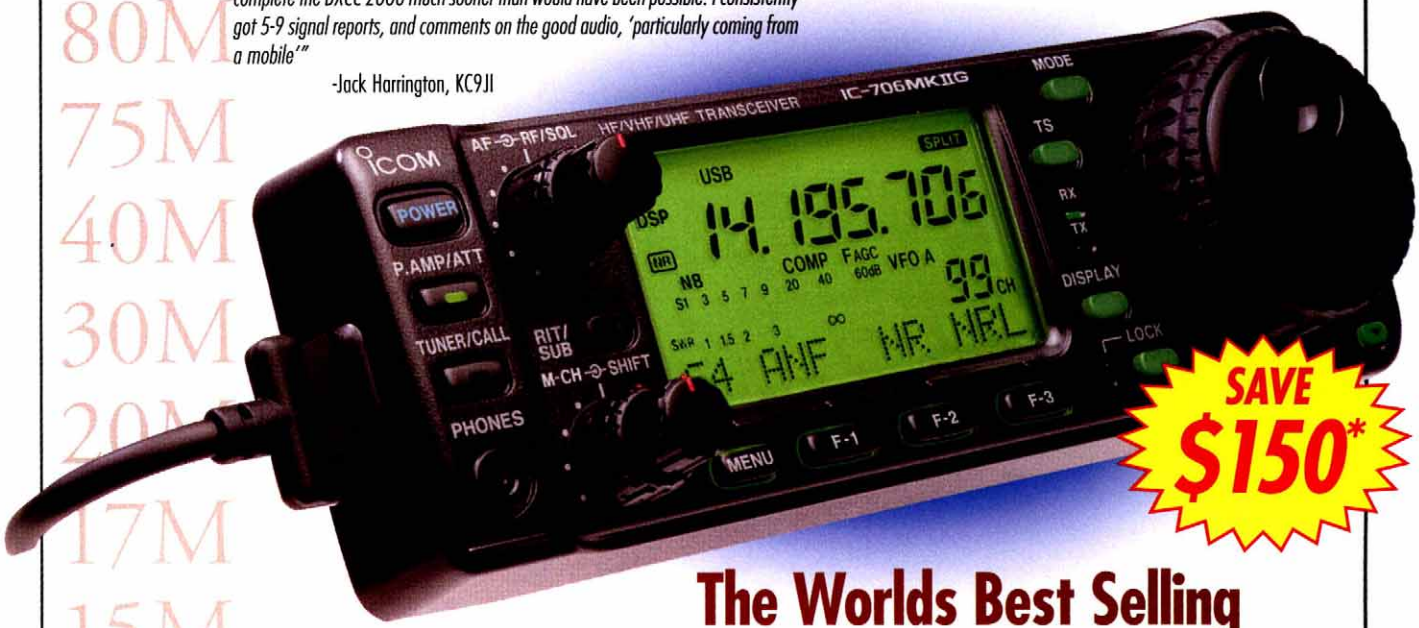


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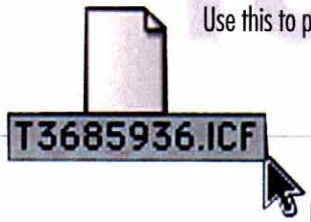


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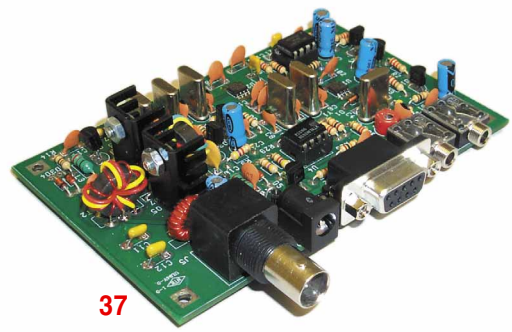

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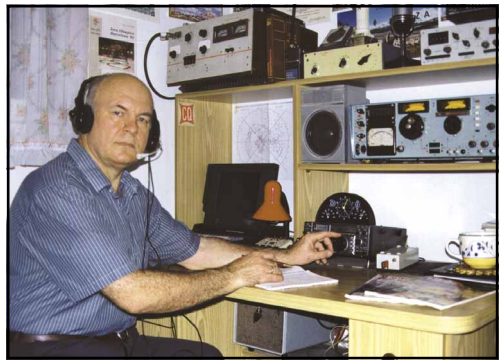

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**Our Cover:**
It's the 1940s all over again, when grand old transmitters such as the Hallicrafters HT-6 ruled the airwaves. Read the fascinating story of the HT-6, and its cousin, the HT-9, on page 48. (Mike O'Brien, K0MYW, provided the HT-6 shown in our cover photograph. The S43 receiver is from the collection of Joe Bottglieri, AA1GW. QSLs were from the estate of W5NW.)


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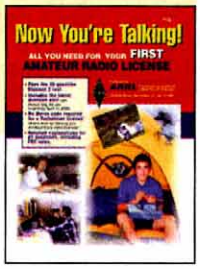


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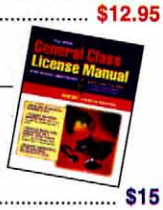


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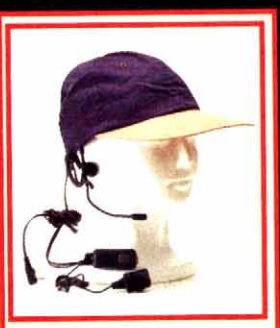

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ARRL Directors *really* don't like a dues increase. As volunteers they prefer dealing with happy rather than unhappy members. No one ever tells his or her Director, "Thank you for voting to raise my dues. I've been hoping for a long time that you would."

Still, costs generally go up over time and adjustments have to be made. Politicians get around this problem by setting taxes as a percentage of something that will increase over time, such as income, retail sales, or property values. With very few exceptions, talk of a "tax cut" refers to a cut in the rate, not in the amount actually collected from each taxpayer.

In 1981, the ARRL Board set the dues at $25. Had the Board instead said that the dues would be $25 adjusted annually for the change in the Consumer Price Index, the dues today would be more than $46! In other words, the actual increases in dues over the past two decades have not even begun to keep pace with inflation. Yet, through a combination of improved productivity, cost cutting, user fees, and other alternative sources of funding, the ARRL today is doing more than ever for Amateur Radio and its membership. For example, just in the past few months we have brought you a larger, full-color *QST* and an improved Web site.

Here are some other examples:

*Improved productivity:* We have invested in technology so our staff can work faster and better. This has allowed us to reduce staff in some areas and to add new programs and services without increasing overall staff size.

*Cost cutting:* We have greatly reduced the amount of paper we mail out to volunteers by shifting to electronic distribution, resulting in dramatic savings in printing and postage. The Board members themselves have helped by reducing the amount of travel that is required for the governance of League affairs through increased reliance on electronic mail and telephone conferencing. Today it would be impossible to function as a Board member without a computer, yet the Board members buy their own computers; they are not provided by the ARRL.

*User fees:* We have reduced the burden on membership dues of a number of membership services such as the Outgoing QSL Service by asking the users of those services to shoulder a larger share. Thanks to a change in the law we are now able to pass most of the cost of the ARRL Volunteer Examiner program along to the examinees who benefit from the program. The sale of pins and plaques has proved to be a popular way to recover some of the costs of our operating programs.

*Alternate funding:* Members have contributed generously to the Fund for the Defense of Amateur Radio Frequencies, permitting a necessary expansion of our advocacy efforts without our having to rob other programs. Thanks to the bequest of Ethel M. Smith, K4LMB, we were able to launch the Certification and Continuing Education Program without diverting resources from other needed activities. We have found outside sources of seed money for the ARRL Amateur Radio Education Project, described on this page last September.

As successful as these efforts have been in closing the gap between what needs to be done for Amateur Radio and the resources that are available to do the job, we must do more. When management reviewed our three-year budget plan with the Administration & Finance Committee last fall it was apparent that we faced growing deficits that cost-cutting alone could not bridge. The committee could not endorse such deficits, nor could it suggest abandoning the programs and initiatives that the Amateur Radio Service requires for a healthy future. Instead, the committee decided that what is needed is a serious commitment to the development of voluntary funding sources. The committee recommended, and in January the Board endorsed, the creation of a Development Department at ARRL Headquarters.

It will take some time—at least two or three years—for the new department to begin to succeed. Even then it would not be reasonable to look to alternative sources to fund programs that principally benefit individual members. These programs are properly funded by dues and user fees. Therefore, the committee also recommended to the Board a modest increase in membership dues effective July 1. There was considerable debate about the timing and the amount of the increase, particularly for the growing number of members eligible for the senior discount, but there was general agreement that authorizing a dues increase this year was the only responsible course of action. The Board settled on $39 per year as the regular rate and $34 as the senior rate. No changes were proposed to the youth, family or blind member rates.

Members who are concerned about the increase can lock in present rates by renewing early, any time before July 1. Even better, consider Life Membership! A two-year payment plan (with no interest charges) is available. The rules and application are available on the Web at **www.arrl.org/lmember.pdf** or by mail from the Circulation Department. Nearly 20,000 ARRL members have become Life Members as an expression of their commitment to the organization and as a hedge against future dues increases. There's no time like the present to join them!—*David Sumner, K1ZZ*

# We're At Your Service

ARRL Headquarters is open from 8 AM to 5 PM Eastern Time, Monday through Friday, except holidays. Call **toll free** to join the ARRL or order ARRL products: **1-888-277-5289** (US), M-F only, 8 AM to 8 PM Eastern Time.

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You can send e-mail to any ARRL Headquarters employee if you know his or her name or call sign. The second half of every Headquarters e-mail address is **@arrl.org**. To create the first half, simply use the person's call sign. If you don't know their call sign, use the first letter of their first name, followed by their complete last name. For example, to send a message to John Hennessee, N1KB, Regulatory Information Specialist, you could address it to **jhennessee@arrl.org** or **N1KB@arrl.org**.

If all else fails, send e-mail to **hq@arrl.org** and it will be routed to the right people or departments.

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We offer tours of Headquarters and W1AW at 9, 10 and 11 AM, and at 1, 2 and 3 PM, Monday to Friday (except holidays). Special tour times may be arranged in advance. Bring your license and you can operate W1AW anytime between 10 AM and noon, and 1 to 3:45 PM!

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We're always looking for new material of interest to hams. Send a self-addressed, stamped envelope (55¢ postage) and ask for a copy of the *Author's Guide*. (It's also available via the ARRL Info Server, and via the World Wide Web at **www.arrl.org/qst/aguide/**.)

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| *Northern Florida* | Rudy Hubbard, WA4PUP, PO Box 843, Milton, FL 32572-0843 (850-626-0620); **wa4pup@arrl.org** |
| *Southern Florida* | Phyllisan West, KA4FZI, 1410 Shelby Parkway, Cape Coral, FL 33904 (941-574-3467); **ka4fzi@arrl.org** |
| *Puerto Rico* | Victor Madera, KP4PQ, PO Box 191917, San Juan, PR 00919-1917 (787-789-4998); **kp4pq@arrl.org** |
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| *West Central Florida* | Dave Armbrust, AE4MR, 3024 Salem Ave, Sarasota, FL 34232 (941-378-1701); **ae4mr@arrl.org** |

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| | |
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| *Los Angeles* | Phineas J. Icenbice Jr, W6BF, 19323 Halsted St, Northridge, CA 91324 (818-349-3186); **w6bf@arrl.org** |
| *Orange* | Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (909-687-8394); **w6ubq@arrl.org** |
| *San Diego* | Tuck Miller, NZ6T, 3122 E 2nd St, National City, CA 91950 (619-475-7333); **nz6t@arrl.org** |
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| | |
|---|---|
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| *Oklahoma* | Charlie Calhoun, K5TTT, 16101 E 98th St N, Owasso, OK 74055 (918-272-9872); **k5ttt@arrl.org** |
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| *West Texas* | Clay Emert, K5TRW, 109 Pasodale Rd, El Paso, TX 79907-6009 (915-859-5502); **k5trw@arrl.org** |

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Wavelength: 1/4 wave • Length: 3" Flexible rubber • Conn: Male SMA • Max Pwr: 5W

NEW **SMA-503** • Dual-band 146/446MHz HT Antenna w/SMA Conn
Length: 8.75" • Conn: Male SMA • Max Pwr: 10W

* NEW **MH-510** • Tri-band 52/146/446MHz HT Antenna w/SMA Conn
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**SB-15** • Tri-band 52/146/446MHz w/fold-over
Wavelength: 52MHz 1/4 wave • 146MHz 6/8 wave • 446MHz 5/8 wave x 3 • Length: 58" • Conn: PL-259 • Max Pwr: 120W

**SBB-7** **SBB-7NMO** • Dual-band 146/446MHz w/fold-over **NEW BLACK COLOR**
Wavelength: 146MHz 6/8 wave • 446MHz 5/8 wave x 3 • Length: 58" • Conn: SBB-7 PL-259/SBB-7NMO NMO • Max Pwr: 70W

**SBB-5** **SBB-5NMO** • Dual-band 146/446MHz w/fold-over **NEW BLACK COLOR**
Wavelength: 146MHz 1/2 wave • 446MHz 5/8 wave x 2 • Length: 39" • Conn: SBB-5 PL-259/SBB-5NMO NMO • Max Pwr: 120W

THEFT **Z750** • Dual-band 146/446MHz w/fold-over • Includes COMET exclusive theft-resistant lock!
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THEFT **Z780** • Dual-band 146/446MHz w/fold-over • Includes COMET exclusive theft-resistant lock!
Wavelength: 146MHz 6/8 wave • 446MHz 5/8 wave x 3 • Length: 62" • Conn: Gold-plated PL-259 • Max Pwr: 150W

**B-20** **B-20NMO** • Dual-band 146/446MHz w/fold-over
Wavelength: 146MHz 1/2 wave • 446MHz 5/8 wave x 2 • Length: 30" •
Conn: B-20 PL-259/B-20NMO NMO • Max Pwr: 50W

**B-10** **B-10NMO** • Dual-band 146/446MHz cellular look-a-like •
Wavelength: 146MHz 1/4 wave • 446MHz 1/2 wave • Length: 12" •
Conn: B-10 PL-259/B-10NMO NMO • Max Pwr: 50W

**• The CA-UHV is a 6M/2M/70cm triband antenna. Add 2-3 of the stock or optional coils for 5-6 band operation.**
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NEW **CA-UHV** • HF/6M/2M/70cm Mobile Antenna40/*20/*17/15/10/6/2M/70cm **40M Thru 70cm!**
Wavelength: HF-6M 1/4 wave • 2M 5/8 wave • 70cm 1/2 wave • VSWR: HF 1.6:1 or less • 6M-70cm 1.5:1 or less • Length: 6'2" •
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* NEW **MSG-1000C** • Dual-band 146/446MHz w/spring whip and fold-over
Wavelength: 146MHz 1/2 wave • 446MHz 5/8 wave x 2 • Length: 39" • Conn: PL-259 • Max Pwr: 120W

* NEW **MSG-1100C** • Dual-band 146/446MHz w/spring whip and fold-over
Wavelength: 146MHz 1/2 wave • 446MHz 5/8 wave x 2 • Length: 43" • Conn: PL-259 • Max Pwr: 150W

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*for HF through Satellite Bands*


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| **LMR® 900** | **.870** | **Black PE** | **90** | **.29** | **.65** | **1.2** | **2.9** |
| **LMR® 600** | **.590** | **Black PE** | **90** | **.42** | **.95** | **1.7** | **4.3** |
| **LMR® 400** | **.405** | **Black PE** | **90** | **0.7** | **1.5** | **2.7** | **6.6** |
| Air Dielectric 9913 | .405 | PVC | 90 | 0.8 | 1.5 | 2.8 | 7.5 |
| 9914 | .403 | PVC | 90 | 1.0 | 2.1 | 3.8 | 8.7 |
| RG-214 | .425 | PVC-IIA | 60 | 1.2 | 2.8 | 5.1 | 13.7 |
| RG-213 | .405 | PVC-IIA | 40 | 1.2 | 2.8 | 5.1 | 13.7 |
| **LMR® 240** | **.240** | **Black PE** | **90** | **1.3** | **3.0** | **5.2** | **12.7** |
| RG-8/X | .242 | PVC | 40 | 2.0 | 4.5 | 8.1 | 21.6 |
| **LMR® 200** | **.195** | **Black PE** | **90** | **1.8** | **3.9** | **6.9** | **16.5** |
| **LMR® 195** | **.195** | **Black PE** | **90** | **2.0** | **4.4** | **7.7** | **18.6** |
| RG-58 | .195 | PVC-IIA | 40 | 2.5 | 6.1 | 10.4 | 35.0 |
| **LMR® 100A** | **.105** | **Black PVC** | **90** | **3.9** | **8.8** | **15.6** | **38.9** |
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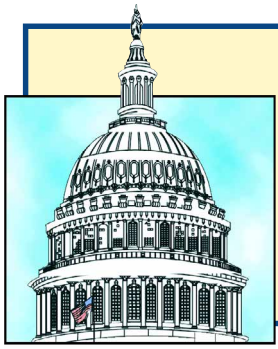


# DC Currents

**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.

## Board Approves New Legislative Positions

An organization that holds no well-defined beliefs about issues of the day is forced to reinvent itself every time new legislation comes down the pike. In an environment where about 10,000 bills are introduced during a given session, such an organization often is unable to act quickly and decisively. Why? Because if that organization stands for anything, it is usually a well-kept secret.

This is why, every two years, the ARRL Board of Directors approves a new set of "Legislative Positions" that reflect the Board's beliefs and objectives in what are believed to be the most important areas of federal telecommunications law for Amateur Radio, and areas that are most likely to show some sort of legislative action in Congress.

At its January meeting in Dallas, the ARRL Board of Directors approved legislative positions to guide our lobbying and informational activities on Capitol Hill during the 107th Congress. These positions, which appear in the minutes (see "Moved and Seconded" in this issue) reflect what the association stands for.

Throughout the 107th Congress, the positions will be posted on the ARRL Web site. They are also published in a pocket-sized booklet that is widely distributed to elected representatives and staff in Washington. These positions actually become the talking points we use when we meet with those representatives and staff.

Most of the ARRL Legislative Positions are simple refinements of positions from previous years. The only entirely new position approved by the board was an initiative asking Congress to support FCC efforts to clarify the Commission's limited preemption policy governing residential amateur radio antennas to include CC&Rs, perceived by many hams, and most of the board, to be among today's major issues. This is the first time ARRL will be formally seeking the assistance of Congress in addressing the thorny issue of CC&Rs, which we have previously attempted to deal with exclusively through the FCC. Of course, any forward motion may depend upon the willingness of a member of Congress to step forward as a sponsor.

Other positions included: a statement of support for federal preemption of telecommunications regulation, which amounts to a declaration of support for the FCC's continued promulgation and enforcement of telecommunications regulation; a position urging the total exemption of public service (including amateur) frequencies from potential spectrum auction, as well as a position actually carving out and protecting amateur spectrum like a technological "national park" and another position statutorily exempting Amateur Radio from license fees unless such fees provide additional services or benefits. The board approved a position requiring the FCC to adopt mandatory RFI standards for consumer electronic devices, a position opposing legislation that expands current restrictions against cellular and PCS eavesdropping, and a position urging Congress to support the Military Affiliate Radio Service (MARS) through legislation, funding or other measures.

## State Legislatures Still Top Heavy with "Driving While Cellular" Bills

● While waiting for the 107th Congress to complete its early session housekeeping and coordinate its agendas with the newly installed Bush administration, we turned our analytical eye on telecommunications legislation cropping up in state general assemblies around the country. Through the magic of computers, we did a quick national database search for the last session and the new session using about a dozen relevant key words like "radio," "cellular" and "antenna." The resulting sample below suggests that while states are taking a broad approach to the various issues of telecommunication, the issue of "driving while cellular" continues to pop up at fairly regular intervals and seems to dominate some agendas. (See April and September 2000 "DC Currents.") It also suggests that some states are becoming a bit more thoughtful and creative in their approach to this issue, and that in some states, several legislators are simultaneously leading the charge.

**Arizona SB.1005** would prohibit the use of cellular telephones or other electronic devices while driving. The bill exempts individuals possessing an Amateur Radio license.

**Connecticut HB.5067** would provide that it is a violation when a driver using a cellular telephone causes a motor vehicle accident.

**Illinois HB.4228** would authorize the county board of any county to regulate the placement, construction and modification of the facilities of a telecommunications carrier as provided in the federal Telecommunications Act of 1996.

**Illinois HB.4728** would forbid wearing headset receivers while driving, but exempts "single sided headset type receiving and transmitting equipment designed to be used in or on one ear which is used exclusively for providing two-way radio vocal communications by an individual in possession of a current and valid Novice class or higher Amateur Radio license issued by the FCC and an Amateur Radio special registration plate."

**Illinois HB.4733** would bar drivers from wearing headset receivers while driving. Also exempts individuals in possession of a current and valid Novice class or higher Amateur Radio license issued by the FCC and an Amateur Radio operator special registration plate. Essentially same as above.

**Illinois HB.4753** would reduce the additional fee for Amateur Radio license plates from $4 down to $3.

**Illinois SB.1522** would remove some restrictions against telecommunication carriers locating antennas, but mandates these companies to place fences, landscape and provide lighting around antenna structures.

**Michigan HB.5563** would require anyone seeking to construct a new cellular tower first to submit a proposal and receive approval from the Michigan Public Service Commission.

**Michigan HB.5862** would prohibit using a handheld cellular telephone that prevents both hands from being on the steering wheel, including in parking areas!

**Michigan HB.6012** would forbid equipping a vehicle with a radio

receiver, or possession in a vehicle a portable radio receiver that receives radio frequencies assigned by the FCC for police purposes. Amateur licensees are exempted.

**Michigan SB.1015** would make it a violation to use a handheld cellular telephone that prevents a driver from having both hands on the wheel of the vehicle.

**New Jersey AB.408** would ban the use of mobile phones while operating a motor vehicle.

**New Jersey AB.1593** Under current law, hams are permitted to display Amateur Radio call letters on license plates. This bill would permit the words "Amateur Radio" also to be displayed.

**New Jersey AB.1801** would forbid commercial communications tower facilities from being erected on any proposed site if that facility is to be located within 200 feet of a public or private school.

**New Jersey AB.1929** would make it unlawful for any person to operate a motor vehicle while using a cellular telephone.

**New Jersey AB.2487** would require the Division of Motor Vehicles to modify accident report forms it supplies to police departments to provide entries indicating whether a cellular telephone was in the vehicle and being used when the accident occurred.

**New Jersey SB.480** would require that a "driver shall not operate a telephone in a motor vehicle that is in motion."

**New Jersey SB.577** would require that all parties to a communication must consent prior to the communication being intercepted or taped.

**New Jersey SB.849** would establish a penalty for persons who use a cellular telephone while operating a motor vehicle. The bill would also require that motor vehicle accident reports note whether the operator of vehicle in the accident was using a cellular telephone.

**New Jersey SB.1341** Under the current law, an Amateur Radio operator is permitted to display Amateur Radio call letters on license plates. Under this bill, the words "Amateur Radio" also would be displayed on the license plates. The purpose of the bill is to enable the public to readily identify Amateur Radio operators, especially in times of emergency.

**New Jersey SB.1616** would make it a third or fourth degree offense to use electronic communications to commit harassment and/or stalking. Currently such offenses are considered petty crimes.

**New Jersey SB.1627** would bar tracking or speed monitoring of motor vehicles via cell phone signals.

**New Jersey SB.1867** would require the Commissioner of Transportation annually to compile and make available to the public information on the presence and use of cellular telephones in motor vehicle accidents.

**New Jersey SJR.21** would create a task force to study and make recommendations concerning driver distractions and their effects on highway safety, including requests to look at the effects of cellular telephones or similar equipment.

**New York AB.1435** would require the Governor's Traffic Safety Committee to study the effects of cellular telephone technology and other driver distractions on highway and traffic safety and reducing motor vehicle accidents related to the use of cellular telephones or similar equipment while driving.

**New York AB.4361** would prohibit the use of hand-held cellular phones by motor vehicle operators. Nothing in the bill would interfere with the use of a Citizen's Band radio.

**New York AB.9947** would prohibit political subdivisions from enacting ordinances, bylaws or orders that prohibit the construction of or use of an antenna structure by a federally licensed Amateur Radio operator.

**New York AB.11024** would require police to include information relating to the use of cellular telephones in accident reports.

**New York SB.6339** would ban the use of cellular phones while operating a motor vehicle. Use of citizen band radios by public safety officials is exempt.

**New York SB.6424** would require police motor vehicle accident reports to indicate whether cellular or digital PCS telephones were present in vehicles and whether the use of such telephones was a contributing factor.

**New York SB.6900** would require the Governor's Traffic Safety Committee to study the effects of cellular telephone technology and other driver distractions on highway and traffic safety.

**New York SB.7324** would prohibit political subdivisions from enacting ordinances, bylaws or orders which prohibit the construction of or use of an antenna structure by a federally licensed Amateur Radio operator.

**New York SB.7460** would prohibit the use of hand-held cellular phones by the operator of a motor vehicle. Nothing contained in the bill would interfere with the use of a Citizen's Band radio.

**New York SB.7840** would require the commissioner of motor vehicles to include in the department's annual summary of motor vehicle accidents information as to whether the use of a cellular phone by the vehicle operator contributed to the accident.

**Pennsylvania HB.2184** would bar the use of cellular phone operation in an unsafe manner while driving. Also permits designating certain roads as off limits for cellular phone use while driving.

**Pennsylvania HB.2301** would prohibit the use of hand-held communication devices while operating a motor vehicle.

**Pennsylvania HB.2841** would provide that "no driver with a junior license or learner's permit shall operate any motor vehicle on a highway of this Commonwealth, which shall include Federal, State and municipal highways, while using a cellular telephone, whether handheld or otherwise."

**Virginia HB.1629** would provide that, "no driver of a motor vehicle shall use any hand-held wireless communication device while turning his vehicle (i) from a location off the highway onto any highway or from any highway to a location off the highway, (ii) from one highway to another or (iii) on to or off of any highway on-ramp or off-ramp or any other entrance to or exit from any controlled access highway."

## Media Hits

● A full page in the *Rock Hill Herald* (South Carolina) observed how important Amateur Radio operators had been after flood waters swept through Rock Hill and hams mobilized to provide emergency communication. The article also gives a delightful glimpse of how some of those hams are having fun when they're away from their volunteer duties. Featured in the article were Marc Tarplee, N4UFP, Lee Harmon, W7LEE, Will McKain, KF4JMF, and brothers Richard, KC4ZJO, and David, KF4UWQ, Shepard.

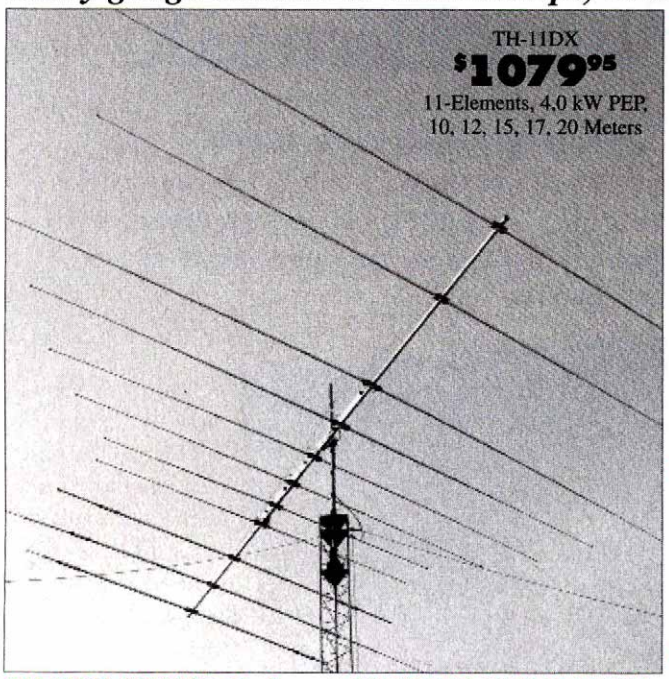
● *Trailer Life*, with a national circulation of more than 280,000, featured a fine article on how ham radio can put more zest, interest and convenience into the lives of RV enthusiasts on the road. Written by Gordon West, WB6NOA, the article not only outlines many of the benefits RVers can discover, but outlines the advantages of the various license classes and how to start earning that first ticket.

● Virginia based columnist Bill Wheaton was careful to differentiate ham radio from CB in a very informative piece in the *Alexandria Journal* and then goes on to present a very detailed analysis of the many pleasures of ham radio, as well as its many contributions to public safety. The article also included information on how to contact a local club to find out more. How did Wheaton learn so much about ham radio? That's easy. He's K4DER!

● Students at PS 101 Maritime Academy in the Bronx, New York, are talking to hams all over the world thanks to the efforts of teacher Anthony DeGennaro, AD1Y, who set up a radio station in the school. The story appears in *Bronx Times Reporter*.

# hy-gain HF BEAMS...

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




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

**The** choice of top DXers.

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

**Handles** 2000 Watts continuous, 4000 Watts PEP.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

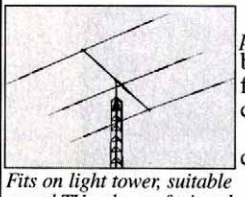
***BetaMATCH™*** provides DC ground to eliminate static. Includes BN-86 balun. Easily assembled.

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

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

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

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



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

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

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

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

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

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

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

**3. Thick-wall** *swaged* aluminum tubing

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

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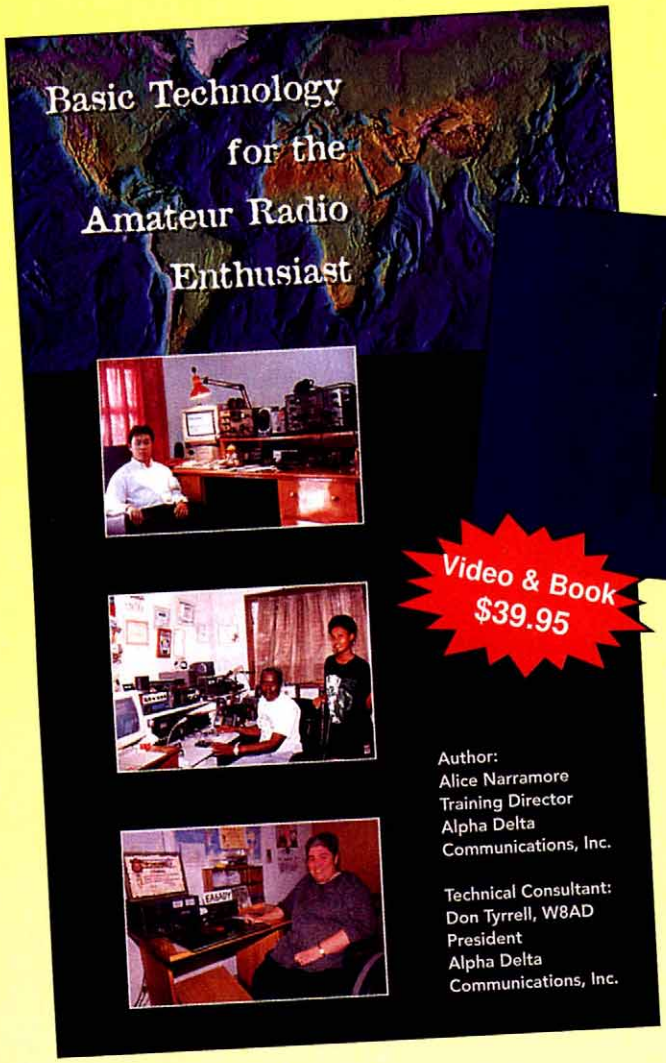
# Come With us On a Fascinating Journey to Explore the Excitement of Amateur Radio and the Mystery of Basic Electronics





**The Alpha Delta *video/book* production "Basic Technology for the Amateur Radio Enthusiast" is a simple straightforward program that takes you on this journey, explaining the wonderment of the hobby along the way.**

• The ***video*** shows how radio waves are formed and how electrons move to do work, and explains terms like voltage, current, power, resistance and other terms you'll hear relating to the hobby. You will even go with a miniature **"tour guide"** on a walk through a receiver printed circuit board. He will show you how amplification, power supplies, radio frequency and audio amplifiers and other parts of a radio work. He will also explain what "semiconductors" are all about. Neither the video nor the book get into math or formulas--**we've kept it simple**

• The ***book*** is designed for the non-technical person interested in joining the hobby or the amateur operator who would like to know more about "what's behind the dials", and explains the fascination of the hobby in detail. The book is ideal as a support tool for someone who is being mentored by an "Elmer", and for amateurs involved with **school system programs**. The program was designed by our Training Director who formerly did college course development and was director of training for a major electronics company.

This **video/book program** is not a study guide for a specific license class but bridges the gap between study guides and programs that go into technical detail with formulas, math, circuits and theory. In fact, it is a great support program for license study guides, and the **new FCC License restructuring. Every aspiring or existing amateur should have this wonderful program in his or her collection!**

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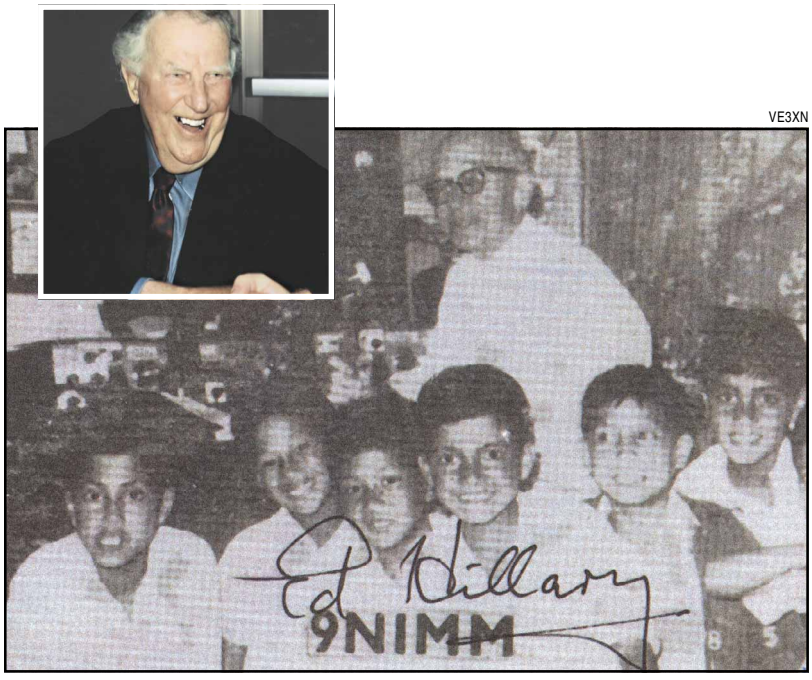
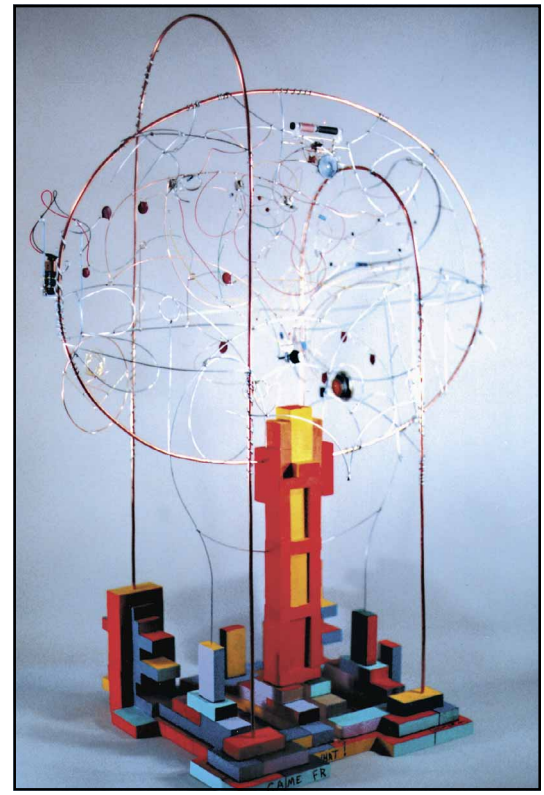


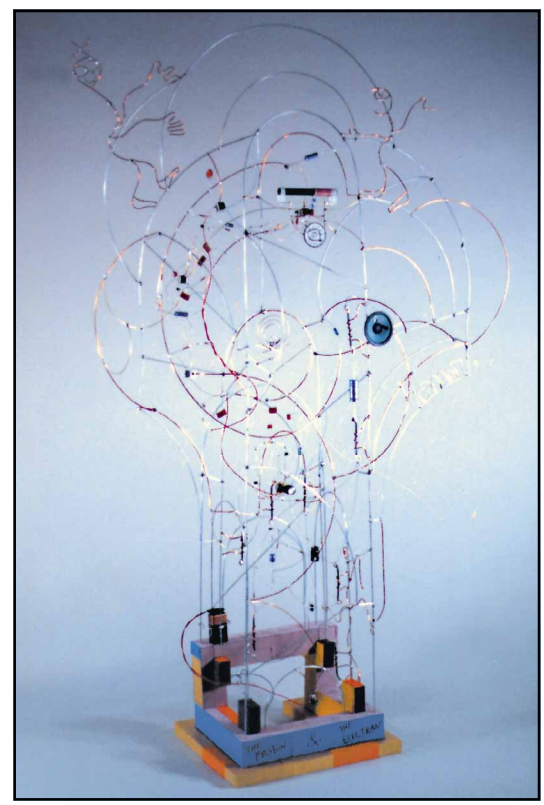

VE3XN

**The conqueror of Mt Everest.** When Garry Hammond, VE3XN, attended a Rotary Club fundraising event in Stratford, Ontario, he found himself face to face with Sir Edmund Hillary, the first person to reach the summit of Mt Everest (above, left). Garry asked the famous explorer if he had ever heard of Father Moran, 9N1MM (SK) while he was living and working in Nepal. Sir Edmund replied that he had known Father Moran personally, and that he was well aware of his work and of Amateur Radio. Garry produced a 9N1MM QSL, and Sir Edmund was honored to autograph it (above).

**Maxim Memorial Station W1AW received a new Yaesu Mark-V FT-1000MP transceiver, matching speaker unit and a Quadra VL-1000 linear amplifier under the holiday tree in December.** Executive Vice President for Engineering Mikio Maruya, WA6F (left), visited ARRL Headquarters to formally present the new gear on behalf of Jun Hasegawa, President and CEO of Yaesu's parent company, Vertex Standard Ltd (formerly Yaesu Musen). ARRL Executive Vice President David Sumner, K1ZZ (right), expressed the ARRL's deepest appreciation for the gift. The new equipment has been installed in W1AW's Studio 1 operating suite and is available for use by visitors to the station. The Mark-V is an updated version of the popular FT-1000MP transceiver. By the way, Mikio is an Honor Roll DXer who says he only needs North Korea to wrap up DXCC. His wife, Saeko, is WA6G; his daughter, Rika, is KC6JAM. The new Mark V and Quadra got its initial workout during the ARRL 160-Meter Contest.

RICK LINDQUIST, N1RL



**When science is magical and magic is art...** Jason Homer of Penn Valley, Pennsylvania isn't a ham (at least not yet), but he is an artist and lover of radio. These fantastic creations that he calls "electronic sculpture" are *working receivers*. Look closely and you can see the batteries, ferrite loopstick antennas and speakers. Both sculptures are AM broadcast radios. Jason says he is working on FM versions as well.


**Let me take you on a sea cruise.** Last November the Seven Seas Cruising Association met in Melbourne, Florida. There were many hams in attendance because Amateur Radio is a common activity among these pleasure sailors. *QST* author Sam Ulbing, N4UAU (left), chaired a seminar and met with Norma Stoffer, W8PZH and Steve Waterman, K4CJX (right). Steve operates a heavily used WinLink 2000 HF/Internet gateway system.

**Your antenna tuner is toast!** When Joe Novak, K4VK, needed an enclosure for his homebrew 500-W antenna tuner, his wife suggested an old toaster. Joe has been using his tuner toaster successfully on 80-10 meters for the last 2 years.

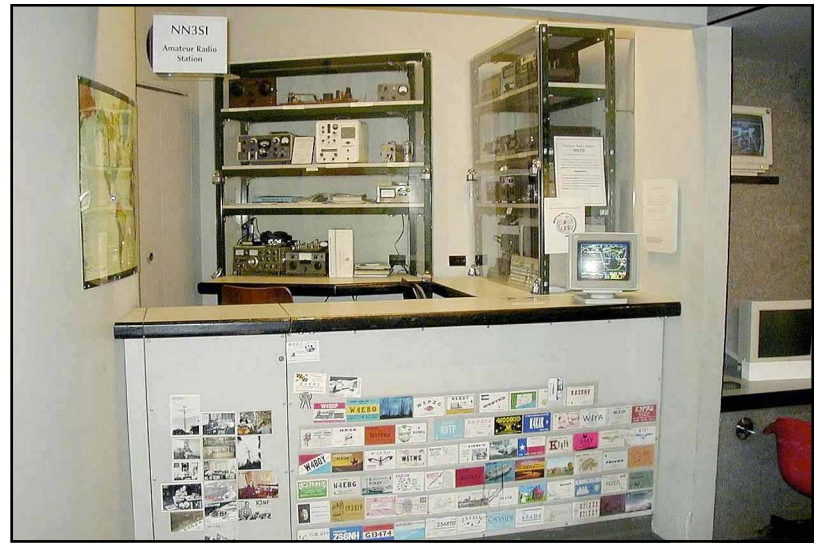
JOHN HAMM, KB9VCM


**A "Hamm" fort.** Andrew Hamm, KB9WNN, age 14, converted his childhood fort into an Amateur Radio antenna platform. He is on the air quite often—when he isn't busy with Civil Air Patrol duties.

**Look who's home...** Bill Jackson, W6HDP of Prescott Valley, Arizona (left) visited Preston Smith, N6SS, of Dewey, Arizona who was home on vacation from the island of Diego Garcia where he is a merchant marine radio officer. Preston may be better known to DXers as VQ9SS. His home antennas are impressive—such as this 160-meter top-loaded vertical.

**A gold-plated tower with a "rainbow loop."** Bob Johnson, K2SJ, grabbed this shot after a severe thunderstorm rumbled through the Westville, New Jersey area.


**It was just a matter of being in the right place at the right time, says Randy Shriver, KG3N, of Hanover, Pennsylvania.** He managed to snag the first "informal" contact with ISS Expedition 1 crew commander William "Shep" Shepherd, KD5GSL, on November 13, 2000. "I only had 20 seconds or so," said Shriver. Space Station Alpha was over Newfoundland at the time and had just completed an "engineering pass" contact with NN1SS at Goddard Space Flight Center in Maryland when Shriver dropped in a quick call, and Shepherd came back to him using his own call sign. "Well Randy, you are my first contact from the space station," Shepherd responded.




**Radio (and Amateur Radio) on display at the Smithsonian.** Perry Klein, W3PK, recently stopped by the Information Age exhibit at the Smithsonian Museum of American History in Washington, DC. No visit is complete without seeing NN3SI, the Smithsonian Club station (top). Other displays include "wireless telegraphy," which highlighted early Amateur Radio activities (left) and the involvement of hams in the development of commercial radio (right). For more information about the Smithsonian in general, see their Web site at **www.si.edu/**.


VHF/VHF UHF/UHF VHF/UHF

# A New Dual-Band Engineering Design Milestone:

## Introducing the Dual Band Mobile for the 21st Century's Active Ham!

The Yaesu Engineering Team has done it again! The exciting new FT-7100M Dual Band Mobile brings you the ruggedness and operating ease of our single-band mobiles, and the convenience of remote-head mounting capability (optional YSK-7100 Separation Kit required), in an all-new 144/430 MHz Dual Band design!

Providing 50 Watts of power output on 2 meters, and 35 Watts on 70 cm, the FT-7100M has power to spare when you're in a fringe area. For repeater access or selective simplex calling, you get built-in encoder-decoder circuits providing 50 CTCSS tones and 104 DCS (Digital Code Squelch) codes. And the FT-7100M's huge 262-channel Memory System lets you store up to six Alpha-Numeric characters, for easy channel identification.

Operation of the FT-7100M is simple and straightforward, with separate Volume and Squelch controls for each band during dual-band reception, and eight single-function front panel keys provide the easy feature access you need during mobile operation. What's more, you also get three user-definable keys on the microphone to use for important control functions.

Rugged, reliable, and versatile, the FT-7100M provides the highest cost-performance available among Dual Band FM Mobiles. See your Yaesu Dealer today for a test drive!

***FEATURES***

- Frequency Range: *TX* 144-148, 430-450 MHz. *RX* 108-137 MHz (AM), 137-180 MHz, 320-480 MHz, 810-999.99 MHz (Cellular blocked).
- VHF/UHF, VHF/VHF, and UHF/UHF Dual Receive operation.
- Channel Steps: 5/10/12.5/15/20/25/50 kHz/step.
- Power Output: 50 Watts (144 MHz), 35 Watts (430 MHz).
- Power Amplifier Type: 2SK3478 Power MOS FET.
- Efficient Cooling System: Direct-flow heat-sink and thermostatically-controlled fan.
- 262 Memory Channels: 120 "regular" memories, 5 pairs of band limit memories, and one "HOME" channel on each band.
- Alpha-Numeric Memory Labels: 6 Characters on lower display field, 5 Characters on upper.
- Smart Search™ Automatic Memory Loading System.
- 50 CTCSS Encode/Decode Tones.
- 104 DCS Encode/Decode Codes.
- CTCSS and DCS Search.
- ARTS™ (Auto-Range Transponder System).
- Automatic Repeater Shift (ARS).
- DTMF Microphone (U.S. version): Includes 16-memory Auto-dialer, and Direct Frequency Entry.
- Band Scanning, Band-Limit Scanning, and Memory Scanning.
- Three Priority Channel Modes: VFO, Memory, and Home Channel Priority.
- RF Squelch: Opens at user-defined signal level.
- Tx Time-Out Timer (TOT).
- Automatic Power-Off (APO).
- 1200/9600 bps Packet Compatible.
- Battery Voltage Meter.
- Compact Size: 5.8" x 1.9" x 6.9" WHD.
- Large (0.9" x 2.3") Liquid Crystal Display.
- Cloning Capability: To other FT-7100M Transceivers.
- Optional YSK-7100 Separation Kit.
- Optional CT-39A Packet Cable.

**144/430 MHz FM Dual Band Mobile Transceiver**

**FT-7100M**


Actual Size

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Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

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# Real Performance for the Real World!

**Today's elite-class operators demand the best RF weaponry available. Yaesu's exciting new MARK-V FT-1000MP answers the call, with an expanded array of receiver filtering, 200 Watts of power output, and Class-A SSB operation capability for the cleanest signal on the band. Enhanced front-panel ergonomics on the front panel save you seconds in a pile-up or a contest "run," and Yaesu's HF design and manufacturing know-how ensures that no short-cuts have been taken in our effort to bring you the best HF transceiver money can buy. For more QSOs in your log, and more awards on your wall, there is only one choice: the MARK-V FT-1000MP from Yaesu!**

### I. Interlocked Digital Bandwidth Tracking System (IDBT)

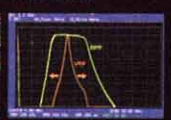
The IDBT feature greatly simplifies SSB operation by matching the bandwidth of the DSP (Digital Signal Processing) system to the net bandwidth of the 8.2 MHz and 455 kHz IF stages. The IDBT system accounts for the settings of the IF WIDTH and SHIFT controls, and automatically sets a DSP bandwidth which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

IDBT: A Breakthrough in Selectivity!

### II. Variable RF Front-End Filter (VRF)

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

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



VRF Typical Bandpass Response (3.5 MHz)

### III. 200 Watts of Transmitter Power Output

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

T-Configuration Heat Sink

### IV. Class-A SSB Operation

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

Class A 75 W PEP IMD

### V. Multi-Function Shuttle Jog Tuning/ Control Ring

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

Access VRF and IDBT Features via Shuttle Jog Dial

## Features

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


Photo shows optional MD-100A8X Deluxe Desk Microphone

HF 200 W All-Mode Transceiver

# MARK-V FT-1000MP

## EXPAND YOUR DX HORIZONS WITH THE FTV-1000 50 MHz TRANSVERTER!

- 50 MHz Transverter with 200 W PEP Power Output
- Class-A Bias Selection for Low TX IMD (PO: 50 W)
- High-Performance Receiver Front End
- Automatic, Effortless Operation with MARK-V FT-1000MP
- Upgrade to High Power with VL-1000 Linear Amplifier

**Specifications**

| | |
|---|---|
| Frequency Range: | 50-54 MHz |
| Antenna Impedance: | 50 Ohms |
| Power Output: | 200 Watts PEP |
| Spurious Emissions: | At least 60 dB down |
| Power Source: | DC 30 V and 13.8 V (supplied by FP-29 Power Supply of MARK-V) |
| Dimensions: | 9.6" x 5.4" x 13" WHD (243.5 x 136.5 x 331 mm) |

**FTV-1000**
200 W 50 MHz Transverter

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# CORRESPONDENCE

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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.

## DON'T RAISE THE BARRIERS

♦ Every month I read letters from hams expressing their dissatisfaction with restructuring and current testing procedures. I'm not sure what these amateurs want to accomplish with their proposed increases in both theory and code testing requirements. Every month *QST* prints at least a half page of Silent Keys. Each Silent Key represents a contact, station and person lost to our hobby—and they are not being replaced.

With all the other technical hobbies available today, this is not the time to press for more barriers to entry such as faster code speeds and more questions about arcane theory that most hams will never use. Now is the time to welcome everyone into this hobby, regardless of why radio interests them. If we keep turning people away from Amateur Radio, the hobby will almost certainly wither.—*Andrew D. Price, N3VST, Reading, Pennsylvania*

♦ I couldn't help but notice the negative vibes coming from the letter in the January 2001 *QST* written by Norman Osborne, AA7NP, titled "Beef Up the Exams." Throughout the past year when these sentiments were common in the wake of License Restructuring, I held my tongue. Now I feel compelled to respond.

I have always had an interest in radio and electronics, but it took me until I was 36 years old to finally become a ham. As many do, I found a local club that was sponsoring Technician license classes. I attended these and found to my surprise that all that electronic stuff wasn't all that hard to understand once you put your mind to it. I also found, much to my surprise, that I liked Morse code! In December 1996, I not only passed the written exam, but also passed the 5-WPM code test. It wasn't too long before I was happily banging away on 40 meters.

Not too long after that, I began studying for the General, and also worked to increase my code proficiency. It wasn't easy. I gained the most benefit from QSOs, and I had almost made it over the "10-WPM hump" when the announcement came about License Restructuring. As much as I enjoyed Morse, the toughest obstacle for me had always been the code, which suddenly became moot. I took and passed the General written exam, and have been happily hamming ever since.

No, Amateur Radio is not the only thing in my life. I don't get time to operate nearly enough, but I enjoy doing it and am currently studying for my Amateur Extra. The theory is way above me right now, but I'm learning, just as I did in the beginning.

It saddens me to see letters like Mr. Osborne's, that practically scream their disdain for less technically adept hams like me. I wonder why folks like Mr. Osborne feel as they do? It's almost as though they feel that the influx of new hams somehow threatens their "club." I think it is very sad that some people believe a ham license should be the equal of a four-year engineering degree.

I suppose the bottom line is that Amateur Radio exams are designed to demonstrate that you have mastered the knowledge necessary to operate an amateur station within the law. Acquiring a license is only the beginning. It's what happens afterward that counts.—*Don Burke, KC7TWS, Glendale, Arizona*

♦ *QST* publishes some amusing items now and then but the letter from AA7NP is downright ridiculous. I do not know what Mr. Osborne's background or education is, but it suggests advanced university degrees in electrical engineering. I think he should refresh his understanding of what the word "amateur" means.

One definition in *Webster's* is "…one lacking in experience and competence in an art or science." I think he will find that a large percentage of Amateur Radio operators the world over fit that definition to some degree.

If Mr. Osborne is angry because the FCC has downgraded the CW requirement for the Amateur Extra license, then he should consider his own status. If he prefers high-speed CW, I don't think he will find any regulations prohibiting it. There are probably a great many "old timers" around who have never laid hands on a microphone.

Whichever is the case, Mr. Osborne should come down to Earth and get real. People who deal in Thevenin's, superposition theorems and transient analysis are the ones in industry making the big bucks. I have been in the Amateur Radio "game" for over 52 years and have managed to do fairly well without technical calculus and analytic geometry.—*J.L. "Mac" McCoy, W0LQV, Overland Park, Kansas*

## HAMS MUST BE INFORMED HOME BUYERS

♦ Mr. Malatzky is correct in the center issue of restrictive covenants and their impact on Amateur Radio ("Correspondence," December 2000 *QST*). I agree with him, but feel the need to modify one part of what he states.

First, I have been dealing with restrictions since I first bought a house in a restricted community in 1986 near Austin, Texas. I was wise enough to insist on a copy before I would sign the contract, and even added language in the contract that said that at a future date, and subject to architectural approval, I could install modest antennas. This happened exactly as planned. When moving to the Dallas area, I enlisted the help of an ARRL volunteer counsel, Jim Eppright, and settled on a house where I could erect antennas. I never did, though. I am going through the same procedures again because I will be moving back to Austin soon.

My point is this: While it is very important to review the CC&Rs before inking the deal, sellers and their agents put up a substantial fight to keep them out of your hands. In my case this resistance prompted me to visit the county courthouse and dig them up myself. Many ham homebuyers would not know where to start, however. They usually do not have the experience to adequately navigate the bureaucracies.

When living in Cedar Park, Texas, I made certain that I was on our association's "Deed Restriction Committee," if only to protect my own selfish interests! In the first meeting of the committee, I was astonished at the lack of knowledge of even the *existence* of CC&Rs. The homeowners didn't realize that they had signed such an agreement. I barely remembered it myself—it was a nondescript document that simply stated that I agreed to abide by the terms and conditions as recorded in Volume X, etc, of the records of Williamson County Texas. *Gotcha!*

I can understand why hams would want CC&R relief from the feds, but this relief should not be provided after the

fact. You should be informed as a buyer. Having said this, I do feel that we need some relief to make these restrictions preemptable for the future, not necessarily the past ill-informed transactions.—*George J. Csahanin, W2DB, Colleyville, Texas*

## HR.2346

♦ I read with interest the discussion of the "CB Enforcement Bill," HR.2346, in the January *QST* "DC Currents." This bill gives local law enforcement authorities the jurisdiction to enforce legal CB operation in an effort to curb CB RFI, an area of communication law that was formerly enforceable only by the FCC. The reaction to this announcement on the Internet news-groups was stunning. Despite the fact that the bill specifically excludes those of us with legally issued licenses, 99% of the people who posted comments whined and complained about how they were going to be open to all sorts of police harassment simply because they have antennas that could be mistaken for CB installations.

Any time a law that has the potential to be wrongfully exploited against amateurs is introduced, the ham community goes into the fetal position and starts sucking their collective thumbs. What is wrong with you people? Aren't amateurs supposed to be helpful and responsible? Quit feeling sorry for yourselves and get active!

First, every Amateur Radio club in America needs to get a copy of this bill. They need to study it. Then they need to find simple ways for the nontechnically inclined to reliably determine the difference between legal and illegal radio equipment. This could include visual inspection rules. Perhaps inexpensive detection equipment like field strength meters and frequency counters can be considered.

Contact the members of your local law enforcement agencies. Talk to the police chief of your city and sheriff of your county and schedule seminars (if the five years I spent working with the police as a news photographer is any indication, they will be more than accommodating and pleased with the invitation). Have examples of both legal and illegal equipment on hand and show them the difference. Explain what "RF interference" is, and perhaps arrange some demonstrations (TVI would be the easiest to illustrate). Have workshops with station mock-ups for officers to try their hand at using their new knowledge to determine a legal and illegal station. Even hand out some Amateur Radio study material to get the officers familiar with our hobby. Taking it one step further, encourage them to become hams themselves.

Finally, make yourselves available for any further questions, or to even ride-along on station inspections. By becoming active and involved we not only help HR.2346 be the law it is intended to be, but hams everywhere will get a major boost in reputation with the local authorities.

This hobby requires involvement. Otherwise, we may as well be listening to scanners.—*Darren Zimmerman, KL0PE, Newark, Ohio*

## BRAVO, MFSK16!

♦ Thank you so much for "MFSK for the New Millennium" by Murray Greenman, ZL1BPU, in the January 2001 *QST*. I had been using PSK31 for about a week along with a RIGblaster interface, so I decided to try MFSK16 with the same setup. I downloaded the free *Stream* software and made my first contact within 15 minutes! Error-free text followed, even with interference and fading. Astonishing performance. Guess I am hooked on digital modes now!—*Efrem Acosta, AB2KJ, Yonkers, New York*

## MFSK16 VS. RTTY ON 14.080 MHz

♦ As many are probably aware, most HF digital contesting and DXing still takes place on RTTY. RTTY is most widely used between 14.080-14.095 MHz. Recently, MFSK16 has arrived on the digital scene. Its author, IZ8BLY, recommends that MFSK16 operate on or about 14.080 MHz USB. This presents a few conflicts:

(1) 14.080 MHz USB puts the MFSK16 signal at about 14082.2 MHz, well within the existing RTTY segment.

(2) Traditionally, 14.080 MHz is the transmit frequency for DXpeditions—the 14.195 MHz of the RTTY community, so to speak. I'm sure there will be many unhappy campers when a major DX operation shows up on RTTY and is covered up by an MFSK16 signal.

There seems to be an absence of the common courtesy of listening for a clear frequency when one digital mode doesn't decode the other. For example, if a RTTY QSO is already in progress on 14.081, it is not uncommon for a MFSK16 signal to start up right on top of the already-in-progress QSO.

In this Tower of Babel of digital modes, we all need to remember to listen for a clear frequency first. Just because one is not decoding the RF on frequency, doesn't give them the right to interfere with an existing QSO. Secondly, I respectfully request that 20-meter MFSK16 operators find another home, other than 14.080 MHz.—*Barry Kutner, W2UP, Newtown, Pennsylvania* QST

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**Hy-Gain rotators are the first choice of hams around the world!**
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*The last thing you want to fall apart is your rotator that's mounted on the top of your tower. You won't make any compromises when you buy and install high quality Hy-Gain rotators.*

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

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

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

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|---|---|---|---|---|
| Wind Load capacity (inside tower) | 20 sq. ft. | 15 sq. ft. | 8.5 sq. ft. | 3.0 sq. ft. |
| Wind Load (with mast adapter) | 10 sq. ft. | 7.5 sq. ft. | 5.0 sq. ft. | 1.5 sq. ft. |
| Turning Power (in pounds) | 1000 | 800 | 600 | 350 |
| Brake Power (in pounds) | 9000 | 5000 | 800 | 450 |
| Brake Construction | Electric wedge | Electric wedge | Disc brake | Disc brake |
| Bearing Assembly/How many | Tripl race/138 | Dual Race/96 | Dual race/48 | Dual race/12 |
| Mounting Hardware | Clamp plate | Clamp plate | Clamp plate | Clamp plate |
| Control Cable Conductors | 8 | 8 | 8 | 5 |
| Shipping Weight (pounds) | 28 | 24 | 22 | 14 |
| Effective Moment (in tower) | 3400 ft/lbs. | 2800 ft/lbs. | 1200 ft/lbs. | 300 ft/lbs. |

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By George Blahun Jr, KS1U

# Classic Kits—Unbuilt or Rebuilt

Assembling unbuilt Heathkits or EICOs can only be enjoyed by time travelers or the fortunate few…but rebuilding classic radio kits can be enjoyed by everyone. Here's how to get started!

"Ah, the good ol' days," is a lament that's heard frequently nowadays. And nowhere is this phrase more pointed than when a group of collectors gets together. Depending on the age of the participants, "the good ol' days" can mean anything from the 1920s to the 1980s. If the group collects cars, the collectors are probably talking about pre-catalytic converter exhausts, easy-to-repair eight-cylinder engines and car doors that could stop a bullet. If the collectors are hams who had their licenses before 1980, however, the conversation is invariably about the large American radio manufacturers and the days of the "classic kits." The "classic kit" was usually a tube-based transmitter, receiver or other radio accessory. Names such as Heathkit, EICO, Knight, Conar and others may even bring tears to the eyes of hams over the age of 40.

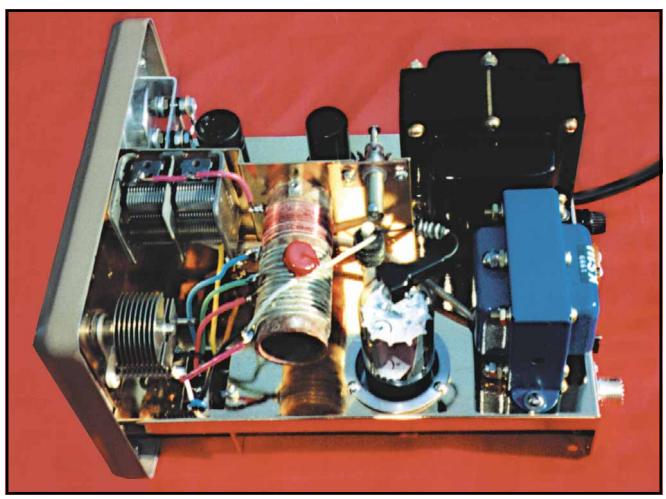
Thankfully, the advertising pages of *QST* are again listing kits, many of them offering exceptional performance. I intend no disrespect to modern manufacturers (they are filling an intense need in the amateur community)—but there is a special fondness for those old vacuum tube kits that can never be replaced.

As evidence of this, the prices people are willing to pay for rare unbuilt kits is truly phenomenal. It's not uncommon to see unbuilt Heathkits selling for thousands of dollars. Even simple unbuilt transmitters such as the EICO 723 sell for hundreds. The EICO 723 was a 60-W (input) CW transmitter that sold in kit form for $69.95 in 1965.

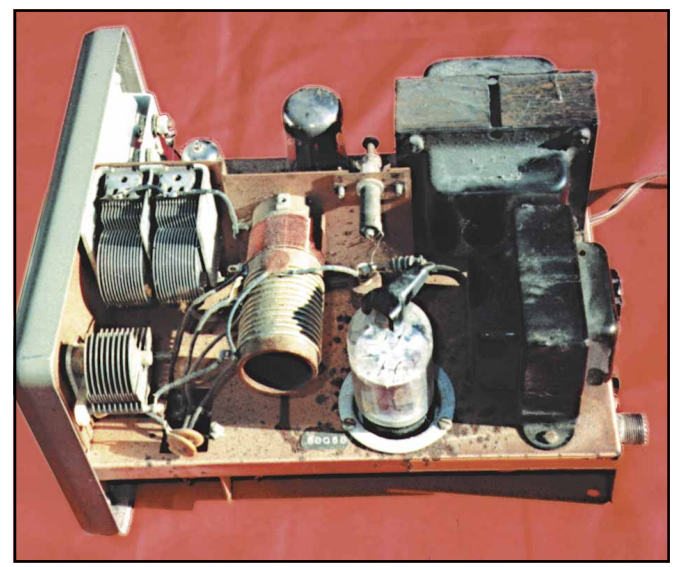
Should you come upon an unassembled kit at a yard sale or flea market, consider yourself truly fortunate. If you find a cache of unbuilt kits, call your accountant and plan on an early retirement—your ship has just come in! For most of us though, building one of those old kits is something we can only recall in our minds.

There is, however, a new approach for those who wish to partake in the construction of a classic kit, one I've now used and enjoyed many times. My method stems from the frustration I felt in the early 1990s. I would occasionally walk into my ham shack and long for the EICO 723 I built in '65. After a minor problem, I sold it at a Florida flea market in 1980. My nostalgia was so intense I even tried to track down the ham I sold it to. Unfortunately, there were just too many hams with the last name of Noble, so I resigned myself to accepting that the kit I built was gone forever. A replacement would have to do.

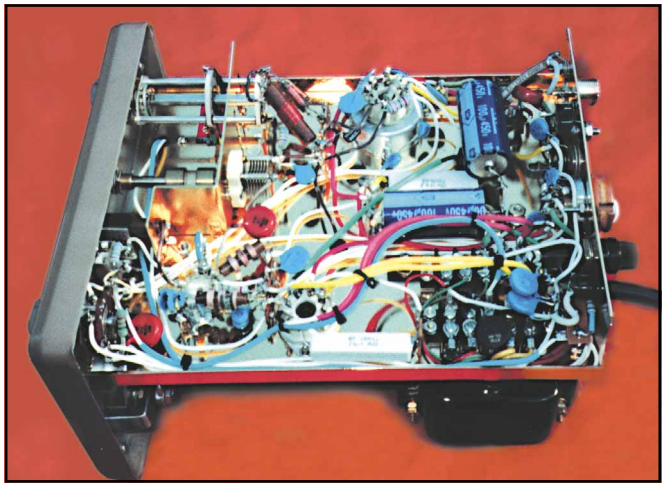
I remembered seeing a number of EICO 723s at flea markets and knew they



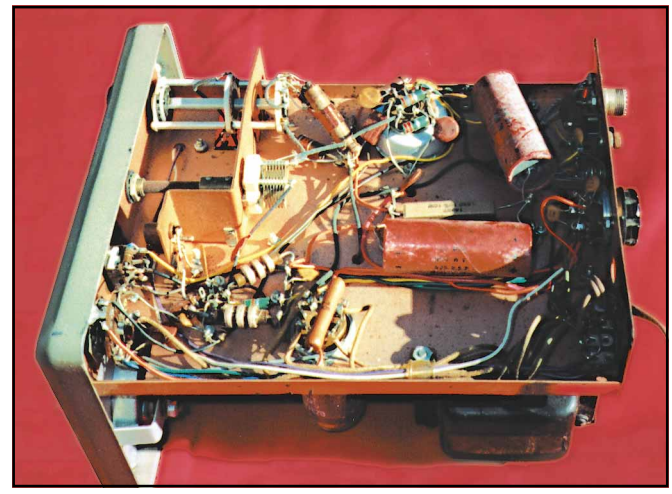
Top view of the rebuilt EICO 723 transmitter. Although these photos are not true before and after photos (they are of two separate kits), they demonstrate the difference attainable through a careful rebuild.



Top view of the original EICO 723 transmitter.



**Bottom view of the rebuilt EICO 723 transmitter.**



**Bottom view of the original EICO 723 transmitter.**

were available for between $20 and $70 depending on condition. For reasons I couldn't really justify, I purchased three 723s in poor to fair shape from several different sellers. As I sat in my basement looking at the oxidized chassis and cobwebs, I realized that none of them would quench my desire. This was someone else's work, much of it low quality. None of these transmitters could become part of my station.

Out of frustration sometimes comes inspiration. Why not use the concept of sweat equity, I asked myself? This approach is often used by people buying real estate or classic cars. I had always admired meticulously rebuilt cars at automobile shows. The owners of those old, mint-condition beauties often went to extraordinary lengths to get them looking so new. The one common starting place, regardless of make or model, was complete disassembly. This is also the approach used by the US military when overhauling equipment from submarines to B-52s.

I'm not going to tell you that it's an easy task, but if you're short on money and long on desire, doing a complete rebuild of one of these Classic Kits is a great way to satisfy the yearning. I have now finished a dozen kit rebuilds. My cash outlay has been minimal compared to unbuilt kits and, in many cases, because I used modern components, the kits perform better than their original counterparts. Most importantly, it's *my* work, not someone else's.

The following paragraphs will cover the procurement and rebuilding approach I've used over the past several years and will focus on kits I've actually worked on. Regardless of what you're building, the advice offered here can be applied to just about any ham kit. If you follow my approach you'll end up with a beautiful piece of functioning equipment and save big bucks in the process.

One word of caution before we begin: Most of these kits use high voltages. In this era when many hams have become accustomed to working on equipment with operating voltages under 50—and often under 14—even simple tube-type equipment can contain lethal voltages. If you're not familiar with vacuum tube construction, pick up a copy of any *ARRL Handbook* from the 1960s and study it before attempting high-voltage work.

Your first step is deciding on the kit you want to rework. Looking through ads in *QST* or on eBay is a good place to start. Nothing, however, beats a trip through a nearby flea market where you can handle the equipment and ask questions of the owner. Don't bother looking for a perfect specimen. That defeats the purpose of this approach. Ideally, look for a non-working but intact unit that isn't heavily damaged. But don't overlook those banged up units if the price is right. They can make good parts sources.

Make sure you find assembly and operating manuals—they're a necessity. You'll want to follow the assembly instructions, have a schematic available and use the troubleshooting and parts lists, which most kit manuals have. Fortunately, reasonably priced copies are readily available from many sources, including magazines and the Internet.

## Getting Down to Bare Metal

Don't skimp on the disassembly. Make sure you have a good-quality soldering iron, a desoldering tool (a solder sucker), pliers, wire snips and screwdrivers. A well-lit, clean area and a magnifier will be helpful. Take your time when removing parts. Place them in boxes or containers in an organized way. You may want to lightly clean the cabinet and chassis before disassembly, especially if the equipment has been stored in a garage, barn or basement. A bag of cleaning cloths and a little soapy water are all that's necessary at this point. The real cleaning will come later.

Begin by removing and storing the knobs. Some pull off and some have set screw(s). Be sure you know which you have. Set screws have small slotted, Phillips or allen-type heads. Some radios may have been modified or may have replacement parts. Don't assume everything is original.

Removing the case is next. Here's where a manual really helps. Remove and keep the old hardware. I usually replace the hardware with new stainless steel nuts, bolts and screws, but once in awhile an unusual piece has to be reused. Once the chassis is separated from the case, carefully remove the tubes with a cloth or soft glove by grasping the base of the tubes and lifting straight up. If a tube doesn't release easily, a slight rocking motion will usually help. In extra stubborn situations try a spritz of WD-40 from the underside of the chassis. Once the tubes are out, clean and catalog them. Don't rub off any markings if at all possible. I use new tubes during a rebuild, but some rare and expensive bulbs are worth keeping. It's also a good idea to have access to a tube tester, as there's no sense in keeping a bad tube or throwing away a good one. If the tube markings are difficult to read, refer to the manual and mark the base of the tube with a label made from a piece of tape. An old trick to read tube markings is to breathe

heavily on the tube envelope. The resulting condensation often enables you to read the "invisible" markings.

After the tubes are stored safely, remove the front and rear panels, controls, switches and sockets. Take care not to mark the panel when removing controls. Unless the cables leading to these controls are unique, just clip the wires an inch or so from the connections. Remove any brackets or support structures on the chassis or panels. At this point your hands should be getting dirty and you should have an idea of whether the original builder did a good job during the initial assembly. Many kits were built by first-timers, a fair number never worked and many performed poorly.

I've found the number one cause of all non-working kits to be poor solder connections. For this reason alone it's a good idea to buy non-working units. If you don't want to bother with a complete rebuild, reheating all the solder joints will often yield a working piece of equipment.

Once the structural components have been removed, look for delicate items on top of the chassis. Certain types of fragile capacitors and coils may be difficult to replace and should be removed prior to snipping out standard components. After all of the fragile items have been removed and cataloged, flip the chassis over and begin removing wires, resistors and capacitors. Be careful to clip transformer wires as far from the transformer as possible or the leads may not be long enough for easy reassembly. If necessary, unsolder wires rather than clipping them. Although it's difficult to generalize, the typical transmitter or receiver kit takes about an hour to disassemble. It's important not to rush at any stage, but be particularly careful while removing components. Damaging rare items can make you pull your hair out!

After the small components, binding posts and solder terminals have been removed and organized (I use small cardboard boxes), separate heavy transformers, tube sockets and brackets from the chassis. You should now have a completely disassembled kit.

The next stage is the most time consuming and labor intensive—cleaning the chassis and components and removing old solder connections. I like to begin with the chassis. If it's in good condition, a light cleaning with soap and water followed by a metal brightening product will suffice. I sometimes polish the chassis with a natural car wax, paying strict attention to areas that require good conductivity. You must carefully remove residue left by waxes and cleaners around grounding holes, solder terminal connections and tube sockets. A small piece of sandpaper or a Dremel-type tool will do this job easily.

**Several of the rebuilt kits completed by the author.**

If the chassis is heavily pitted or has worn and oxidized copper or silver plating, you'll need to go beyond a simple cleaning. My EICO 723s all had copper-plated chassis that were so pitted I had to use progressively finer grades of steel wool to get down to bright metal. Even if your chassis is aluminum and in great shape, spending some time with steel wool and a cloth buffer on a hand drill will really make the chassis sparkle.

This may sound fanatical, but when I had my EICO chassis clean there was very little copper left, so I decided to have it *gold plated*. My rationale was simply that copper would again oxidize over time and for $100 I would have a permanently bright and conductive chassis. So, I packed it up and sent it off to Santa Ana Plating in California. When I received the plated chassis I was truly awed by the beauty of the mirror-like finish. You may not want to go to these lengths, but if you really want the chassis to look new, you may have to spring for a replating job. One of the nice things about doing a rebuild is that you alone will determine the extent and budget of the project. I try to keep my rebuilds *reasonably* original, but unlike many collectors, I see nothing wrong with making modifications and improvements to the design and appearance.

The next step is to look at the switches and controls. Many switches and potentiometers can and *should* be replaced with modern devices. Make certain the value and power rating are the same or better than the original. Many older rotary switches can be completely disassembled, cleaned and lubricated. The key to getting the switches right is to remove and store the parts in order of their assembled positions. For this reason, make sure you work in an area where children, pets and spouses are unlikely to "rearrange" things for you. A light coating of WD-40 is a good idea, as is a touch of grease on the ball bearings. If you're not sure how a component works, it's best just to clean it with De-Oxit (or a similar product) and leave it as it is. This will prevent any potential problems. Handle switches with care. Phenolic and ceramic parts can crumble if only a little torque is applied in the wrong place. Taking switches apart is a lot of extra work, but really helps performance and eliminates intermittent problems. A clean, oxidation-free switch also adds to a mint-condition appearance. Follow this approach with variable capacitors while being careful not to damage the plates or their alignment.

## Improvements, Anyone?

Between work sessions you should compile a list of needed parts. I always upgrade whenever possible. Instead of 10% resistors I opt for 2%. Rather than $^1/_2$-W carbon composition resistors I use 1-W metal film. Be careful when replacing critical parts. Some resistors, for example, aren't suitable for RF circuits because of their added inductance. Be

sure you know the characteristics of the devices you're substituting.

I also like to upgrade capacitors (in voltage and tolerance). I know these replacement suggestions are probably making purists cringe, but I like to actually *use* the kits I rebuild and I see no reason to be limited by the component technology of the 1950s or '60s.

If you're going to reuse components or terminals, be sure to remove all of the old solder from the connections, file or sand the lead and clean the device with a cloth or paper towel. Many old capacitors and resistors will look okay, but be sure to test them before reusing them. Carbon composition resistors can gain 20% or more in value from heating effects and age. Plastic-cased capacitors will often have fine cracks and electrolytic caps will sometimes be dried out or completely disintegrated.

Nearly all kits will have power supplies of some sort. Many have transformers with multiple outlets. I like to disassemble transformers and paint them using high-temperature, ceramic-based engine paint. This is more for appearance than function, but it enables you to see if the transformer has overheated and damaged the wiring or insulation. Be careful when opening old transformers and capacitors—many contain hazardous chemicals such as PCBs. Use gloves and avoid breathing the fumes. Dispose of any suspected toxic material in accordance with local and Federal regulations. Most municipalities have programs to accept these materials.

Upgrade the power cord, preferably to a three-prong grounded plug rated for the necessary current. Make sure you observe the proper polarity, as some older radios have "hot chassis." If you're unsure about the exact connections, ask for advice from someone with experience or do some research. Another important upgrade for nearly every tube-type power supply is the addition of a current in-rush limiter (ICL). Years ago the voltage supplied by power companies ran about 110 to 115 Vac. It's now closer to 120 V. This extra voltage—along with the possible conversion of rectifier tubes to solid-state diodes—can dramatically shorten tube life. The limiter acts like a thermistor in that its resistance changes with temperature. The devices are rated in cold temperature ohms and current-handling capacity. The ICL will prevent tubes and components from getting hit with full voltage and current when the power is initially turned on. Although I run most of my older equipment through a variable voltage transformer (a Variac), current limiters provide extra insurance. They're easily installed in series with the hot ac power lead. To choose the appropriate one for your project you must first determine the current draw. Choose the limiter with the highest resistance for the required current.

You'll also want to add a fuse if there was none originally. Here again, I have no problem with carefully drilling a hole in the rear of the chassis and installing one. If you don't want to drill, wire a fuse in series with the hot lead of the power cord and tuck it under the chassis.

**Although it's not the most glamorous part of the kit, the power supply is extremely important overall. Without attention to the power supply the rest of the project may not perform satisfactorily.**

Although it's not the most glamorous part of the kit, the power supply is extremely important overall. Without attention to the power supply the rest of the project may not perform satisfactorily. One area of hot debate among collectors is replacing vacuum tube rectifiers and supporting circuitry with solid-state components. You can use plug-in devices that *look* like metal tubes or you can simply install diodes with a sufficient rating. I do this in all transmitters and other equipment with a high current draw. By eliminating the filament current drawn by the rectifier tubes the whole unit will run cooler. I also like the way CW notes sound when supplied by solid-state rectifiers. If you swap hollow-state for solid-state, the rectified dc voltages will likely increase, potentially causing aging tubes or components to fail.

Power supply filter capacitors almost always need upgrading. In the EICO 723, the original plans called for two 40-mfd, 450-V electrolytics. I upgraded the rating to 100 mfd. This produces cleaner dc and, therefore, a better CW note. But the sky is not the limit with respect to filtering. If you keep the rectifier tubes you'll want to know the maximum filter capacitance the tubes can safely handle. If you put in too much filtering, by the time the capacitors have charged the rectifier tube could be destroyed. For this reason alone it's a good idea to have an old tube data book on hand.

During reassembly—the really fun part—follow the directions in the kit's instruction manual and take your time. I like to limit myself to 90 minutes per session. If you work much longer than that you're more likely to make dumb mistakes. As I've mentioned, I like to use new stainless steel hardware and new ceramic tube sockets. Instead of regular hook-up wire I use Teflon-insulated wire that I can color code with heat-shrink tubing. In critical areas I opt for silver-bearing solder instead of tin-lead. In oscillator circuits I use NP0 capacitors and in RF sections, silver mica. The performance increase provided by modern components is truly amazing.

What if something goes wrong? Rest assured that almost every bad thing that *can* happen *can* be fixed. If you have a bad transformer, for example, you can buy a replacement or contact a company such as Antique Electronic Supply, which carries the Hammond transformer line. If you break a coil, consider rewinding it on the original form. If you look around you'll see that there are still plenty of old parts available for these kits—and nothing beats a parts rig. That's why, in retrospect, I'm glad I bought those three EICOs. As it turned out, I didn't need any additional parts, but if I ever do they'll be there. If you break a one-of-a-kind part, use the Internet to search for a replacement. Chances are good that if you're looking for a part, someone else has one for sale.

Prior to rebuilding, check to see if any modifications have been made to the original kit. Add grommets to all holes where wires pass through the chassis, and when repainting cabinets, search for paint that is as close to the original color and texture as possible. Don't be afraid to take weeks or months to complete your project.

My original 1965 EICO put out 40 W on 80 meters and 12 W on 10. The rebuilt transmitter puts out 48 W on 80 and 25 W on 10. There is no chirp and the oscillator is very stable. Most of the other rebuilds I've completed also perform better than they did originally. Remember, we are only caretakers of these devices for future generations. By rebuilding your kit with uncompromising detail, you will insure that your construction legacy will be around for decades or even centuries to come. Above all else you will have the satisfaction of knowing you have saved a piece of American electronic history from the dump—and you'll have a ton of fun using and looking at it, too!

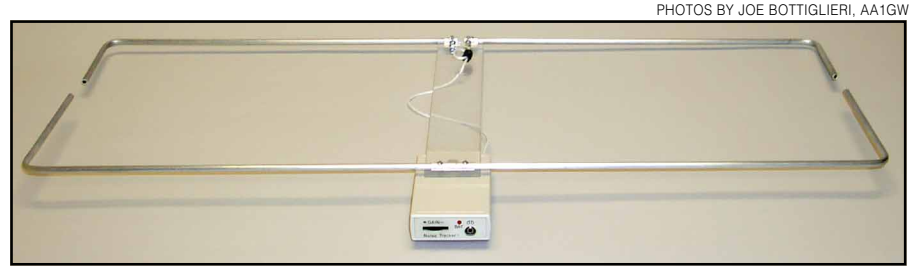
*You can contact the author at PO Box 17, Quaker Hill, CT 06375;* **ks1u@prodigy.net**.

By Rick Littlefield, K1BQT

# A Simple TRF Receiver for Tracking RFI

If the notion of a quiet band seems like a dream from the distant past, don't despair! This project can help you track down RFI and restore serenity to your shack.

PHOTOS BY JOE BOTTIGLIERI, AA1GW



The hum, buzz and whine we call *line noise* may come from electrical faults associated with local utility lines, or it may originate from customer-owned electrical and electronic equipment that has turned power lines and other wiring into antennas. Regardless of the source, RFI can be difficult to track at HF because it tends to travel long distances along wiring and evade localization. At VHF, however, noise-propagation distance is dramatically shorter and pinpointing trouble spots becomes correspondingly easier.

If unwanted noise is spoiling your operating fun, it's quite likely that a quick search with a VHF tracking receiver could easily pick up the offending racket within a few blocks of your home. From there, you may be able to locate a specific utility pole number, building, or equipment site and report it to the responsible party. Of course, local noise sometimes originates a little closer to home—in your utility room, office, workshop, VCR, dimmer switch or ham shack! No matter where the problem lurks, this receiver will help you sniff out noise and track it to the source.

## General Description

The project is a simple tuned-radio-frequency (TRF) receiver operating at about 136 MHz, in the upper portion of the aircraft band. I say "about" because TRF receivers have no local oscillator to establish a specific central operating frequency and no IF selectivity to provide narrow channel separation between individual stations. Instead, a TRF receiver covers a *frequency span*, which is determined solely by multiple sections of preselective filtering ahead of the detector (a form of direct conversion). If this approach sounds unsophisticated, remember that the real purpose of a noise receiver is to sample everything occurring in a broad range of frequencies rather than select individual signals. In fact, for noise investigation, the TRF is a better tool than its more complex counterpart, the superhet.

The package consists of a handheld receiver/antenna combination: You simply point the antenna in the direction of suspected noise sources. A Moxon Rectangle antenna attached to the receiver case delivers directivity. This miniature Yagi, originally described by Les Moxon and profiled extensively by L.B. Cebik, has a well-defined cardioid pattern.[1] The broad front lobe is useful for identifying the general direction of a noise source, and the pronounced backfield null can provide directivity rivaling that of a 5- or 6-element Yagi when you get in close. To use the null, simply turn the unit around in your hand and rotate it for minimum rather than maximum signal. To preserve the symmetry of the cardioid pattern, a current choke decouples the outer surface of the coax feed line from the antenna feedpoint.

## Circuit Description

The receiver schematic is shown in Figure 1. The selective elements that define the receiver's operating span include its resonant antenna, a two-pole Butterworth filter (L1, L2, C1 and C5) on the input side of RF preamp Q1 and a high-Q tuned-input circuit (L3) at the gate of the AM pulse detector Q2. Together, these selective circuits establish a −10-dB bandwidth of approximately 2 MHz and provide relatively deep passband skirts to keep out unwanted interference from strong TV and FM broadcast stations.

Q1 is a low-noise UHF bipolar device that delivers a gain of roughly 20 dB. Q2 is a high-transconductance FET configured as an infinite-impedance AM detector. Detected audio is recovered at the drain of Q2 and amplified to headphone level by dual op amp U1. The first audio stage, U1A, is set for near-maximum gain by feedback resistor R5. Output from this stage is coupled to U1B through attenuator R7, the **GAIN** control. U1B is set for a gain level consistent with stable operation by R11, with HF roll off provided by C14. U1B develops sufficient output to drive a pair of Walkman-type stereo headphones at modest volume. RFC1 and RFC2 isolate J1 from the receiver PC board, preventing headphone leads from acting as an antenna and interfering with the Moxon Rectangle. The unit's power switch is part of the attenuator pot R7, and an LED (DS1) serves as both a pilot

[1]Notes appear on page 36.

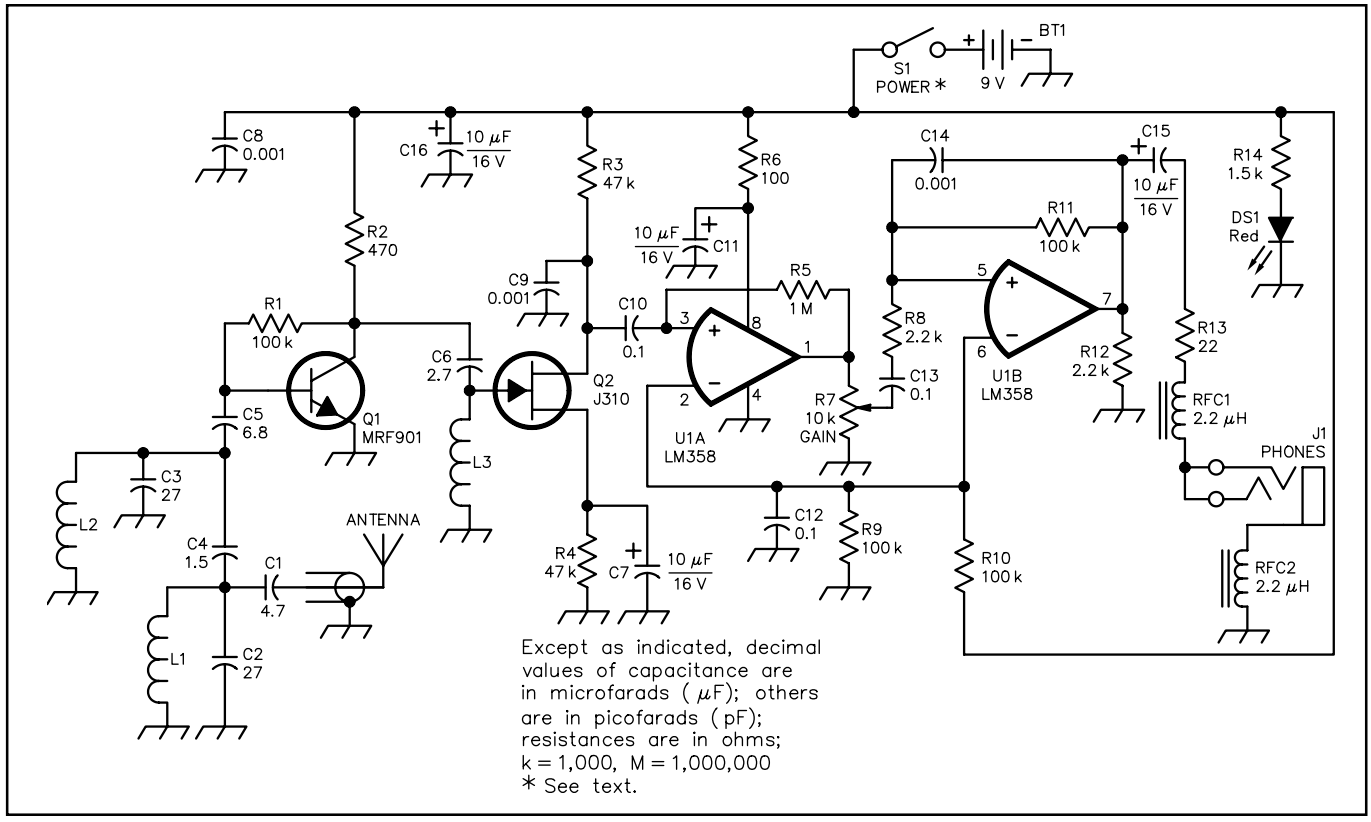



**Figure 1—Schematic of the TRF RFI receiver. Unless otherwise specified, resistors are 1/4-W, 5%-tolerance carbon-composition or metal-film units. Part numbers in parentheses are CS (Circuit Specialists, Inc, PO Box 3047, Scottsdale, AZ 85271-3047; tel 800-811-5208, 602-464-2485, fax 602-464-5824; www.cir.com); DS (Dan's Small Parts and Kits, Box 3634, Missoula, MT 59806-3634; tel and fax 406-258-2782; www.fix.net/dans.html); RS and RSU (RadioShack.com, PO Box 1981, Fort Worth, TX 76101-1981; tel 800-843-7422, fax 800-813-0087; www.radioshack.com); 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; www.mouser.com). Equivalent parts can be substituted; n.c. indicates no connection.**

**BT1—9-V battery**
**C1—4.7 pF disc ceramic (DS)**
**C2, C3—27 pF multilayer (ME 581-UEC270J1)**
**C4—1.5 pF disc ceramic (DS); a 2-pF capacitor may be used if a 1.5-pF unit is unavailable.**
**C5—6.8 pF disc ceramic (DS)**
**C6—2.7 pF disc ceramic (DS)**
**C7, C11, C15, C16—10 µF, 16 V electrolytic (RSU 11296852)**
**C8, C9, C14—0.001 µF (RS 272-126)**
**C10, C12, C13—0.1 µF (RS 272-135)**
**DS1—Red T1 3-mm LED (RS 276-026)**
**J1—3.5-mm three-circuit (stereo) mini jack (RS 274-246)**
**L1, L2—Air-wound inductor made of 5 turns #24 tinned wire formed on the threads of a #6-32 screw**
**L3—Air-wound inductor made of 11 turns #24 tinned wire formed on the threads of a #8-32 screw**
**Q1—MRF-901 (CS MRF901)**
**Q2—J310 N-channel FET (CS J310)**
**R1, R9-R11—100 kΩ (RS 271-1347)**
**R2—470 Ω (RS 271-1317)**
**R3, R4— 47 kΩ (RS 271-1342)**
**R5—1 MΩ (RS 271-1356)**
**R6—100 Ω (RS 271-1311)**
**R7—10 kΩ PC-mount pot with switch (ME 31XT401)**
**R8, R12—2.2 kΩ (RS 271-1325)**
**R13—22 Ω (RSU 11344579)**
**R14—1.5 kΩ (RSU 11344892)**
**RFC1, RFC2—2.2 µH molded choke (ME 434-22-2R2)**
**S1—SPST toggle (part of R7)**
**U1—LM358 dual op amp (CS LM358)**

light and battery condition indicator. Circuit current drain is approximately 12 mA, permitting several hours of operation from a single 9-V battery.

The notion of using a TRF design at VHF for noise detection was inspired by a simple UHF AM wideband-data receiver circuit described in *RF Design Magazine*.[2] However, for this particular application, I used commonly available experimenter parts and added an RF preamp to increase sensitivity. I also routed the output of Q2 to the lower-impedance inverting input of U1A to provide heavier detector loading. This change reduces a tendency toward AF instability, yielding a 10-dBm improvement in overall receiver performance.

Given its simplicity, the receiver is quite sensitive. On the bench, the detection threshold for a weak narrowband AM signal at the passband center measured −100 dBm. This level of receiver sensitivity, combined with the antenna's gain, enhances weak-signal reception. The receiver has no signal-strength metering system, nor does it need one. Relative signal strength is measured audibly—by listening to differences in loudness in the headphones. Gain is controllable over a wide signal range by the manual attenuator, R7, so even small amplitude changes are easy to detect. The lack of AGC in a receiver of this type could prove problematic, except that U1B has limited output capability. If an extremely strong signal suddenly appears at a high gain setting, U1B saturates at a sufficiently low level to protect your eardrums.

## Antenna Construction

Figure 2 shows the Moxon Rectangle antenna is constructed from four lengths of 1/4-inch OD aluminum tubing. The short sections of the driven and reflector elements are four and six inches long, respectively. The most difficult task is shaping the 90° element bends without crimping and breaking the tubing. Gently heating the tubing prior to bending will help. Use a small tubing bender (available at most Home Depot stores and other such outlets), or use the partially open jaws of a vise as a fulcrum to form

the bend progressively in four or five increments. Complete each bend and check it with a square *before* cutting the element section to length. Once formed, clamp the element sections to a 1/4×2×12-inch Plexiglas or plastic mounting plate.

Form the element-retainer clips from 0.032-inch aluminum hobby stock. To radius the clips, shape them over the shank of a 7/32-inch drill bit, then with the help of a vise, trim and bend each one to shape. The radius should be slightly undersized to exert clamping pressure on the 1/4-inch OD element. To prepare for mounting, drill aligning holes (#4-40 clearance) through each clip, element section and the antenna-mounting plate, as shown. Prepare short pigtails on the antenna end of the coaxial feed line and install spade lugs for attachment to the driven-element hardware. Loop the feed line through four FT37-43 beads to form the feed-line choke. Finally, pass the feed line through its guide hole to the underside of the plate entry into the receiver box. The antenna plate mounts on top of the receiver case using the two reflector-element-mounting screws. Use #6 flat washers or better yet, a small aluminum plate inside the plastic case to increase retention area and add strength to the antenna mount.

After mounting the elements, adjust the element tips for an air-gap of approximately 1 1/2 inch. Although some authors suggest installing insulators between the element tips to add rigidity, I don't recommend it. Range tests carried out at 150 MHz using a variety of nonconductive materials resulted in resonance shifts and degraded back-null performance. *NEC* plots representing the antenna pattern assume air gaps and fail to show this effect.

If you have access to a VHF antenna analyzer, test your antenna before mount-


**A close-up view of the receiver's front panel.**

**Table 1**
**Antenna Parts List**

| *Quantity* | *Item* |
|---|---|
| 2 | Reflector-element sections 1/4-inch OD 15 1/2 × 6-inch aluminum tubing; see text and Figure 2. |
| 2 | Driven-element sections 1/4-inch OD 15 1/2 × 4-inch aluminum tubing; see text and Figure 2. |
| 1 | Right-hand driven-element mounting clip; see text. |
| 1 | Left-hand driven-element mounting clip; see text. |
| 6 | #4-40 × 3/4-inch screws |
| 8 | #4-40 nuts with integral lock washers, or use separate items. |
| 2 | #4-40 flat washers |
| 2 | #6 spade lugs |
| 1 | 18-inch length of miniature 50-Ω coax (RG-174) |
| 4 | FT37-43 ferrite cores |

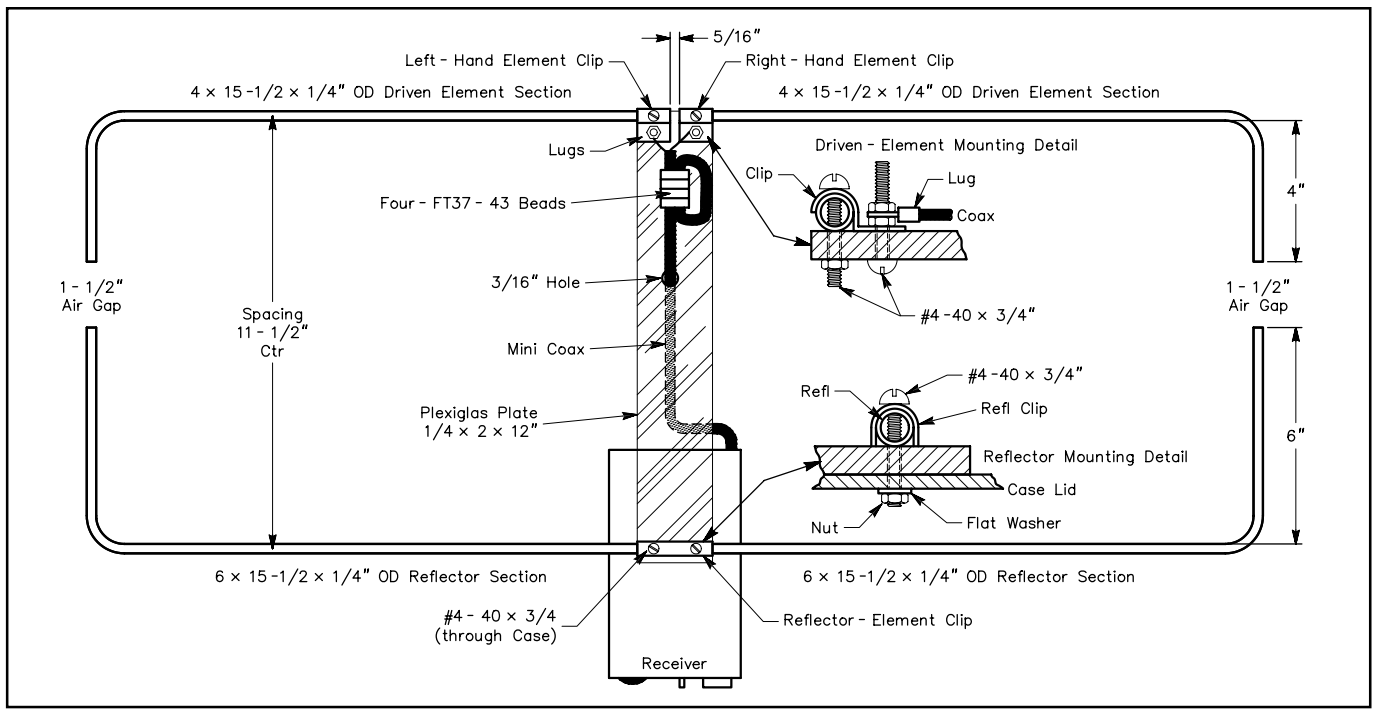


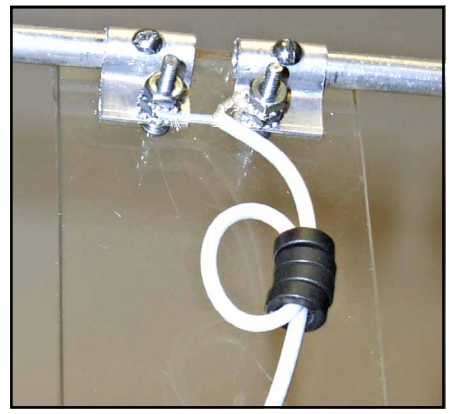

**Figure 2—Antenna assembly details. See Table 1 for a list of parts needed. The driven- and reflector-element clamps are made of 0.032-inch hobby aluminum stock.**


**An inside view of the neatly assembled TRF RFI receiver prototype.**

ing it on the receiver case; the SWR should be 1.2:1 or better at resonance. According to an HP8735E, my test antenna indicated a virtually flat response at 136.6 MHz. If the antenna resonance falls a little below or above the 136-MHz target frequency, there's no need to readjust the antenna. Simply note where minimum SWR occurs and peak your receiver for that particular frequency.

## Receiver Construction

The receiver is built on a single-sided PC board with a generous ground plane and construction is straightforward.[3] Because this is a VHF project, be sure to keep all capacitor leads in the RF section as short as possible. L1, L2 and L3 are air-wound coils. Wind L1 and L2 on a #6-32 screw; form L3 using a #8-32 screw. When installing the MRF-901 preamp, note that the collector is the long-



**Loop the feed line through four FT37-43 beads to form the feed-line choke to decouple the outer surface of the feed line from the antenna feedpoint.**

est of the four leads. To mount pot R7, first remove its thumbwheel, then lay the control lugs flat on the top of the PC board. Secure each lug in place at its mounting hole using a short piece of wire (a discarded component-lead end will do). When mounting DS1, leave the leads nearly full length so the LED lens can protrude through its mounting hole near the top of the front panel (the shorter LED lead goes to the foil-side mounting hole).

For the receiver case, I used a Pan-Tec $1\times2^{3}/_{4}\times4^{5}/_{8}$-inch (HWD) project box (RadioShack 910-5006). To prepare the case, begin by clamping both halves together and drilling a $^{1}/_{8}$-inch hole in the rear panel to pass the feed line. Center this hole on the case split and not more than $^{3}/_{16}$ inch from the right-hand corner. The feed line, passing through this hole, is clamped in place when the box is assembled. Next, drill two #4-40 clearance holes in the top of the case approximately $1^{7}/_{8}$ inch forward of the back panel. These holes are used to mount the antenna assembly (use the antenna plate as a drilling template). Finally, prepare the removable front panel.[4] To cut the thumbwheel slot for R7, drill a line of small holes to rough out the opening, then carefully finish the hole with an X-acto knife and a small file. Panel lettering may be added using dry transfers, or using your PC and a program (such as MS *Draw*) to make a full-sized panel decal.

## Receiver Testing and Tune-Up

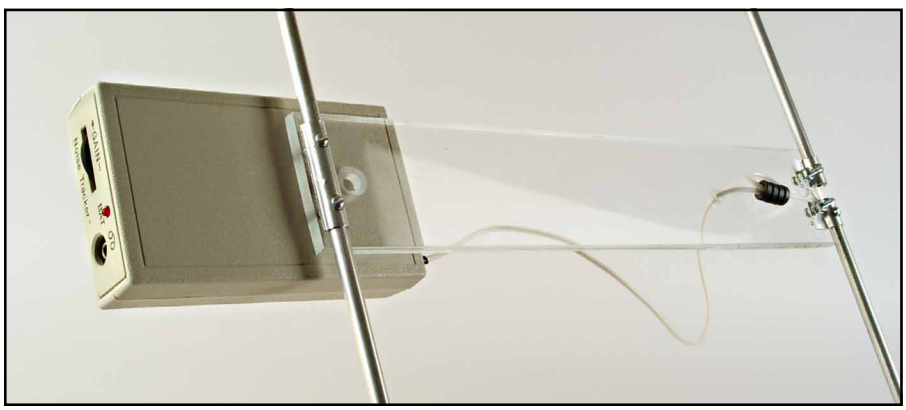
Testing and alignment is done with the receiver PC board out of the case. Install a fresh battery, plug in a pair of stereo headphones and turn the **GAIN** control to maximum. You should hear a background hiss that increases in both volume and high-frequency response with higher gain settings.

Alignment consists of tuning L1 through L3 for maximum sensitivity at the antenna's resonant frequency. If you have access to a modest calibrated signal generator (HP-8640B, Wave-Tek 3000, etc), tune-up will be a snap. Connect the receiver to the generator by a short length of temporary feed line. Set the generator for the desired frequency with 1-kHz AM modulation adjusted to 80-90% and output set at approximately –60 dBm (reduce the generator output as needed while tuning). Tune L1 through L3 by gently stretching or compressing windings using the tip of a plastic insulated tool. For a more precise tuning indication, attach a 'scope or sensitive ac voltmeter to R13. Repeat the tuning sequence until there's no further improvement. With L1-L3 fully peaked, a –90-dBm signal should be comfortably audible and you may detect audio down to –100 dBm or beyond.

If you don't have access to a calibrated generator, use a VHF antenna analyzer to produce a test signal. *Don't connect the antenna analyzer directly to the receiver*; you may damage the preamp and detector. Instead, terminate the receiver's antenna terminals temporarily with a 47-Ω resistor. Tune the analyzer to the antenna's resonant frequency and position it a suitable distance away to yield a noisy but usable signal level. Most analyzers have audible AM superimposed on the signal by internal processor or counter transients. *Don't attempt to optimize the receiver for maximum background noise without using a generator or calibrated signal source*. The TRF design must be peaked for maximum sensitivity *at the resonant frequency of the Moxon antenna* in order to take advantage of the antenna's characteristic cardioid pattern.

## Final Assembly

Once tuned, avoid moving L1-L3 while connecting the miniature feed line and installing the PC board in its case. To assemble the case, slip its end panel over the **GAIN** control and make sure the LED, DS1, protrudes through its open-



**A topside view of the tracking receiver and antenna. The receiver is attached to the antenna and Plexiglas strip by two screws.**

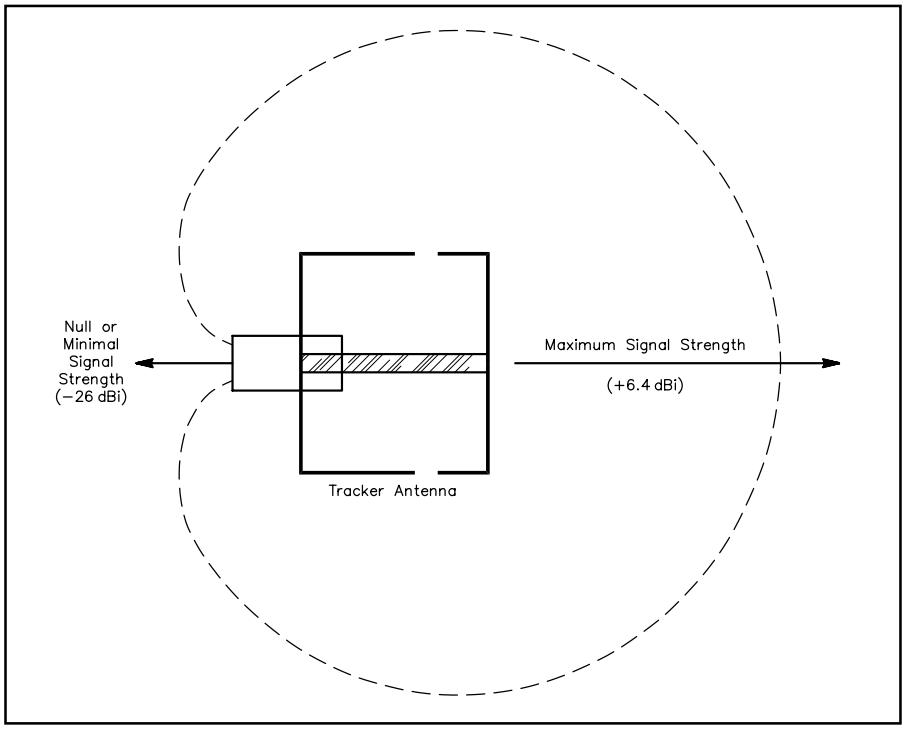



**Figure 3—A Moxon Rectangle antenna pattern. Note that the pattern null points toward the user.**

ing. Guide the end panel and PC board into the bottom half of the case and route the miniature coax over its exit groove. Route the battery clip out through the open battery compartment door. Attach the antenna assembly to the top half of the case by means of the antenna's reflector-mounting screws and secure it in place. Finally, sandwich the case together and install the assembly screws.

## Operation

To operate your receiver, simply turn it on and direct the antenna toward suspected noise sources. As a rule, the Moxon's broad forward lobe is best for identifying general locations and the sharper back null is best for pinpointing specific nearby sources (Figure 3). A word of caution: In the real world, multipath, polarity differences and many other anomalies may appear to muddy the antenna's ideal cardioid response pattern. Fortunately, you can shift polarity with a twist of the wrist, and shift location in terms of antenna wavelengths by moving only a few feet.

RFI comes from many sources, including ac power-line sparking, electric-fence arcing, motors and control circuitry, noisy lighting equipment, defective switching supplies, leaking computer networks and much more. Also, 136 MHz coincides with cable channel 16, so a strong buzzing sound may be the result of sync-pulse noise from TV-cable leakage rather than ac-line noise (the two sounds can be very difficult to distinguish). A quick check with an AM broadcast radio will usually resolve this question, since TV sync won't appear in the AM band while a strong ac line noise will.

There are many tricks and techniques for isolating RFI sources and for identifying the exact type of fault they represent—far too many to cover here. For the amateur noise hunter, two excellent resources are available. I strongly recommend *The ARRL RFI Book* prepared by ARRL Lab Supervisor, Ed Hare, W1RFI, his choice of call being no coincidence.[5] I also suggest obtaining the *Interference Handbook* by William R. Nelson, WA6FQG, which is also available from the ARRL and most ham-radio bookstores.[6] Both books are packed with useful information. Finally, see the ARRL's Technical Information Services RFI pages at **www.arrl.org/tis/info/rfigen.html**.

In many parts of the country, the frequencies about 136 MHz may be populated with air-band activity, so it's inevitable you'll pick up transmissions as you hunt for noise. For instance, here in the busy Northeast corridor, I regularly hear air-to-ground conversations, bursts of aircraft automated-reporting-system packet, and even an occasional weather satellite passing overhead. However, aircraft-band transmissions are normally very short and won't disrupt your search. Moreover, intermittent chatter provides reassurance that the receiver is working properly.

## Summary

RFI levels are increasing in most communities. The same interference that plagues Amateur Radio affects other services as well. For example, many municipal police and fire departments struggle with decreased handheld-portable coverage because of rising noise floors. Also, regional FM broadcasters now routinely install low-power translators to overcome degraded reception in noisy downtown areas. Excessive RFI is not just a ham problem; it's a community problem affecting everyone with an interest in communicating by radio!

FCC policy dictates that our licensed radio services need not tolerate excessive RFI levels. (See **www.arrl.org/tis/info/part15.html** for a comprehensive description of the applicable FCC rules.) However, Federal enforcement is stretched to the limit and local electrical inspectors usually lack the equipment and training to intervene. Thus, neighborhood RFI detection and reporting often falls to utility companies and radio amateurs like you and me. If you're tired of local noise invading our bands, why not join the cleanup and perform a public service at the same time? This simple hand-held project—plus a little legwork—may be all it takes to restore a cleaner spectrum for you and your neighbors!

### Notes

[1]L. B. Cebik, W4RNL, "Modeling and Understanding Small Beams, Part 2, VK2ABQ Squares and Moxon Rectangles," *Communications Quarterly*, Spring 1995, pp 55-70.

[2]Robert Friday and John Neder, "A Low-Cost UHF AM Receiver," *RF Design*, Nov 1991, pp 31-36.

[3]A parts kit including the PC board (but excluding case and antenna) is available from Rick Littlefield, K1BQT, PO Box 465, Barrington, NH 03825. Price: $29.95 plus $4 shipping and handling.

[4]A front-panel template/labeling guide and a PC-board part-placement pictorial are available from the ARRL ftp site at **www.arrl.org/files/qst-binaries/** in TRFRFI.ZIP.

[5]See **www.arrl.org/shop/**, order number 6834. Ed Hare, W1RFI, *The ARRL RFI Book* (Newington: ARRL, 1999, 1st ed).

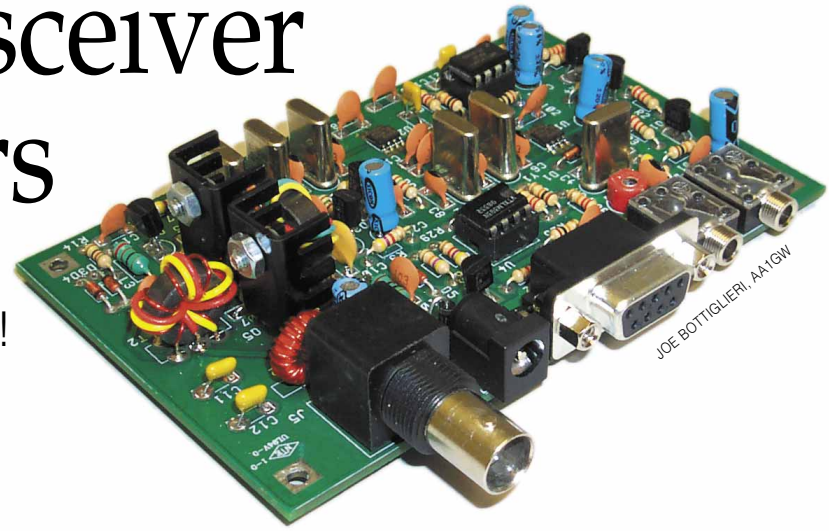
[6]See **www.arrl.org/shop/**, order number 6015. W. R. Nelson, WA6FQG, *Interference Handbook* (Lakewood, NJ: Radio Amateur Callbook, 1993).

*Rick Littlefield, K1BQT, is an Extra Class ham, first licensed at age 13 in 1957. An avid equipment designer and prolific writer, he has over 100 technical articles published in various journals worldwide and is a member of the ARCI QRP Hall of Fame. Rick's ham-radio resume includes work for familiar manufacturers such as MFJ Enterprises and Ten-Tec. He holds a master's degree from the University of New Hampshire and is currently employed in the engineering department of Cushcraft Corporation in Manchester, New Hampshire. You can contact Rick at 109A McDaniel Shore Dr, Barrington, NH 03825;* **k1bqt@aol.com**. QST

By Dave Benson, NN1G, and George Heron, N2APB

# The Warbler—A Simple PSK31 Transceiver for 80 Meters

## Small and inexpensive, this transceiver is packed with fun!



JOE BOTTIGLIERI, AA1GW

There's no doubt that PSK31 has taken the Amateur Radio community by storm! In fact, *tidal wave* might be a more fitting description! In this Internet age, the enjoyment and satisfaction of using your computer and an HF transceiver to communicate using this reliable and low-bandwidth digital mode goes beyond words. PSK31 has been rekindling the interest and excitement in hams of all ages, and is drawing new amateurs into the ranks because of its simplicity and the appeal of modern technology. Now, the low-cost entry and high success rate for those trying PSK31 for the first time has been enhanced by Dave (NN1G) Benson's inexpensive PSK31-ready transceivers, the latest of which is described here.[1, 2] When used in conjunction with innovative PC software such as *DigiPan*, hams can have solid contacts on any HF band.[3]

Even more astounding, PSK31 seems to be providing the means for a rebirth of an old way of communicating for us hams. We're not referring to the data modulation/demodulation techniques of SSB. Nor are we alluding to this mode's ability to pack dozens of active QSOs simultaneously into the same bandwidth as a single SSB QSO. What we're talking about is the *real use* of the spectrum. PSK31 is providing a way for hams of all ages to gather with record ease and efficiency around new watering holes to communicate as friends and club members.

### Warbler Opens 80 Meters to Low-Cost PSK31

The PSK-80 is the newest PSK-capable transceiver design of Dave Benson, NN1G. The New Jersey QRP Club, whose members are kitting the rig, dubbed it the "Warbler." This very low-cost 80-meter transceiver provides a way for friends, club members, schoolmates and ham relatives located within a 200-mile (or greater) radius to have solid, enjoyable, lively contacts on a regular basis. The natural propagation characteristics of 80 meters offers PSKers a way to have regular roundtable QSOs and club get-togethers on the air during the evening hours. You've probably heard of (and may have participated in) CW or SSB nets for traffic handling, weather tracking, used-equipment auctions and so on. The same net activities are now taking place using PSK31, building on the same strengths of this digital mode.

Pockets of 80-meter PSK31 activity have been springing up with increasing frequency throughout the country, due in great part to the popularity of the Warbler. Hams in Denver led by Rod Cerkoney, N0RC, have started some Rocky Mountain Warbler group-build sessions to help others get on the air with this mode. QRPers in northern California, led by Bill Jones, KD7S, and Doug Hendricks, KI6DS, started a Sunday evening weekly "ragchew" session called the Western Warbliers. New Jersey QRPers are on the air nightly with their Warblers and every Sunday night with a club meeting. QRPers in Atlanta are starting their own group-build of the 80-meter kit. Veteran PSKer Ken Hopper, N9VV, in Chicago, is one of the biggest on-the-air promoters of PSK31. We, the authors of this article, can be found most evenings operating around 3580.5 kHz.

### Warbler Activity

The map in Figure 1 shows the distribution of current 80-meter Warbler PSK31 activity throughout the country. The red circles indicate a 200-mile radius of solid contacts. As you can see, strong areas of PSK31 activity are in northern California, the Northeast, Chicago and Atlanta. Canada is also quickly coming on as a strong PSK31 player on 80 meters. The areas of heaviest overlap offer the highest density of PSK31 activity, hence the greatest possibility of success for newcomers to this mode. We know that there's been some success in attracting new blood to HF: Marc Ziegler, W6ZZZ, of Los Gatos, California, reported making his first-ever HF contact using a Warbler!

The 200-mile radius of solid copy 80-meter propagation, though, gets bigger during the winter months. KD7S in northern California has reported increasingly better contacts with Derry, VE7QK, of BC, Canada. Phil Wheeler, W7OX , in California, has been in regular contact with a station in Utah. Doug Hendricks, KI6DS, in Dos Palos, California, and co-leader of the immensely popular NorCal QRP Club, reports "I worked Bill, KD7S, in Sanger; Dave, AB5PC, in Fresno; Ben, NW7DX, near Seattle, and Ron, K7UV, in Brigham City, Utah." Phil, W7OX, in

[1]Notes appear on page 41.

Los Angeles, reports partial copy (including a complete call sign) of NN1G's signal from Connecticut.

Although the map represents only 80-meter PSK activity with the Warbler, there is an increasing amount of non-Warbler PSK31 activity springing up as well. It seems that many PSK31 operators using other hardware and software equipment up on the higher bands are moving down to play with the Warblers on 80 meters. These higher-band PSKers are seeing the proliferation of Warblers as fertile new territory for ragchews, contests, experiments and propagation-favorable local communications. At any given time during the evening, we see QSOs in progress outside the Warbler passband, showing us that Warblers are facilitating a growth in 80-meter activity.

## Local Communication Opens Again!

Remember when you had to go to your monthly radio club meeting to hear all the

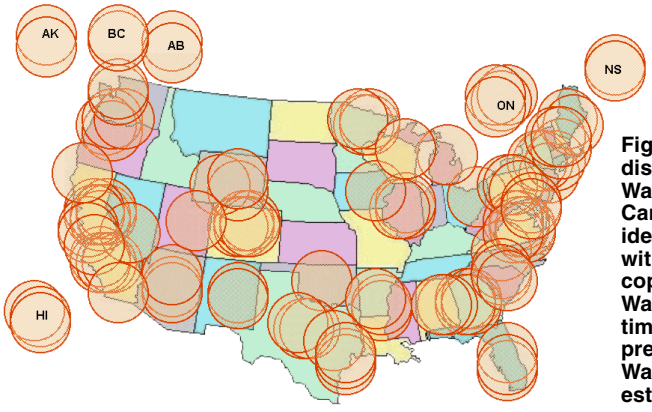



**Figure 1—Geographic distribution of PSK-80 Warblers in US and Canada. Each red circle identifies three Warblers within a 200-mile solid-copy area for each Warbler location. At the time this article was prepared, the current Warbler population was estimated at 500 and growing.**

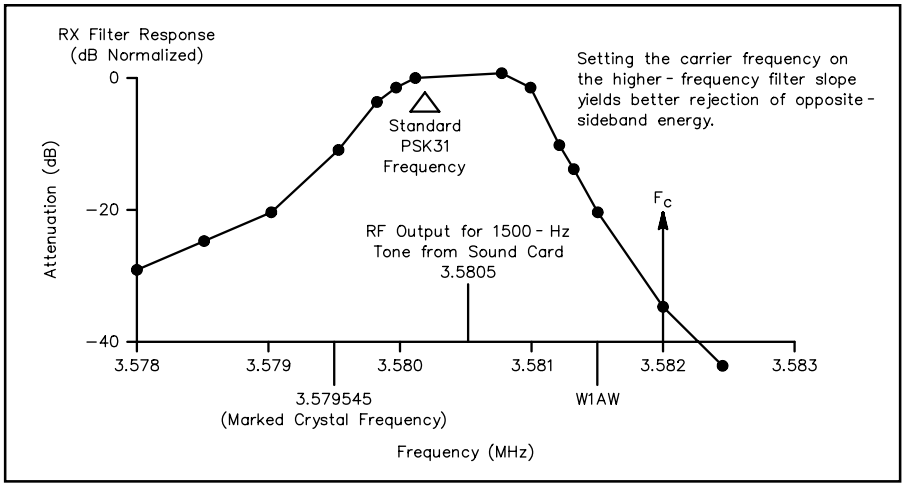



**Figure 2—Crystal-filter passband response.**

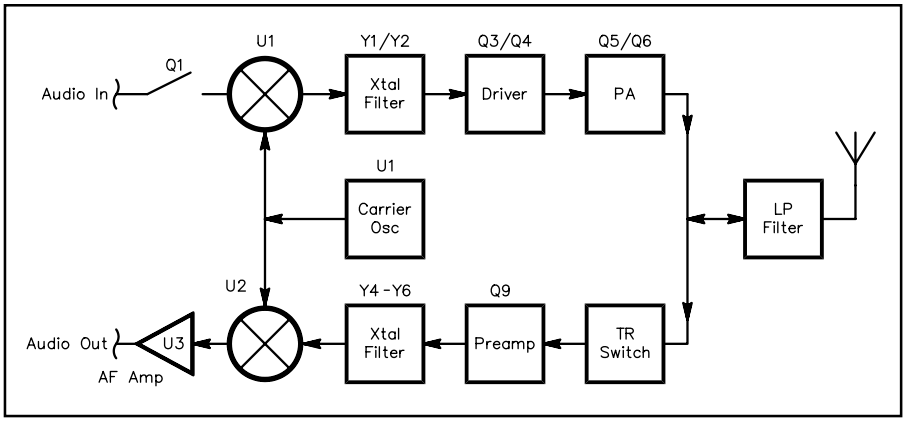
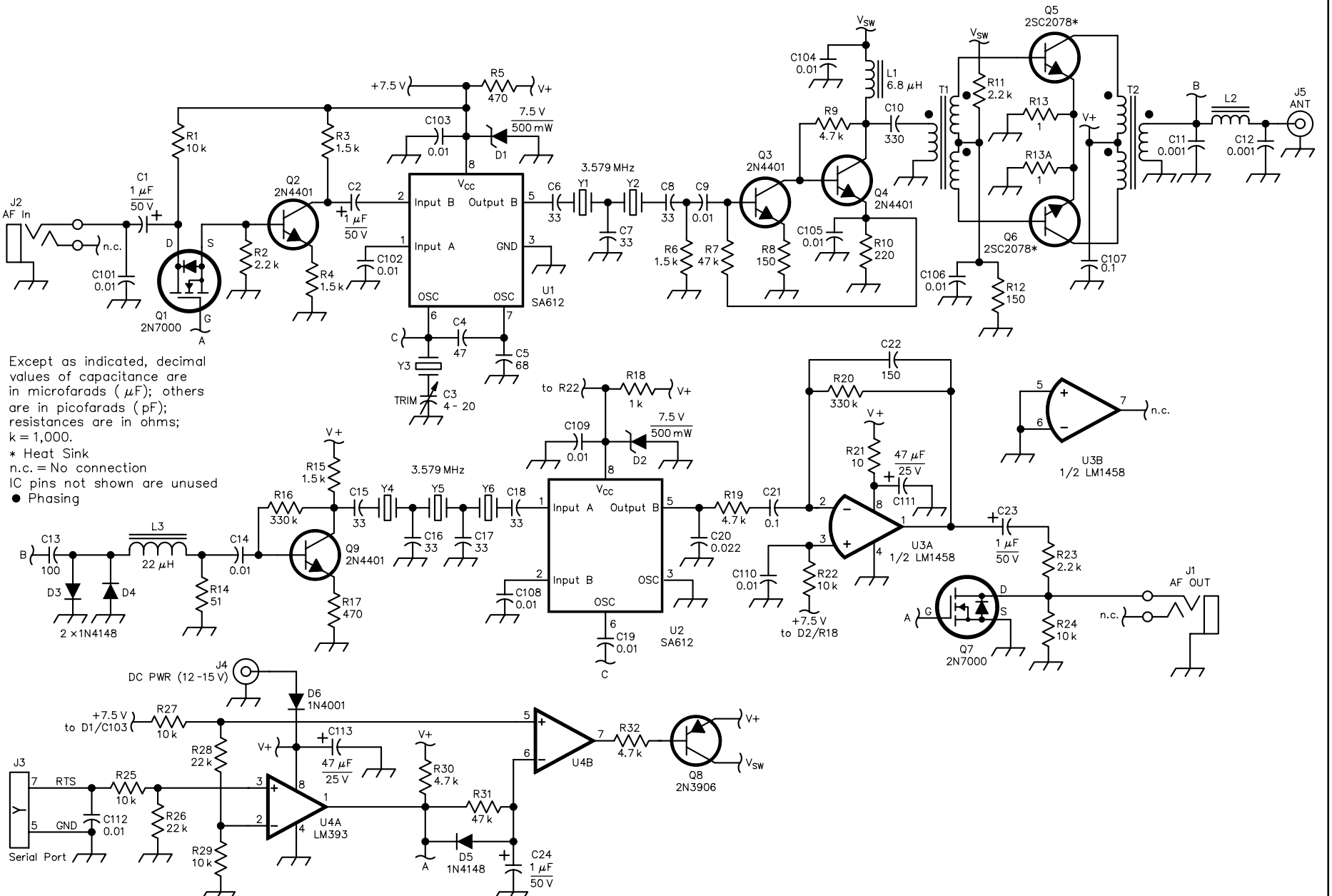



**Figure 3—Block diagram of the Warbler D-C transceiver.**

**Figure 4—Schematic of the Warbler 80-meter D-C transceiver. Unless otherwise specified, resistors are 1/4-W, 5%-tolerance carbon-composition or metal-film units. For part numbers in parentheses, DK = Digi-Key Corp, 701 Brooks Ave S, Thief River Falls, MN 56701-0677; tel 800-344-4539, 218-681-6674, fax 218-681-3380; www.digikey.com; 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; www.mouser.com; RF = RF Parts, 435 S Pacific St, San Marcos, CA 92069; tel 888-744-1943, 760-744-1943; www.rfparts.com; order@rfparts.com. Equivalent parts can be substituted; n.c. indicates no connection.**

**C1, C2, C23, C24—1 µF, 50 V electrolytic, radial leads (ME 140-XRL50V1.0)**
**C3—4-20 pF trimmer (DK SG20015)**
**C4—47 pF disc, 5% NP0/C0G (ME 140-50N5-470J)**
**C5—68 pF disc, 5% NP0/C0G (ME 140-100N5-680J)**
**C6-C8, C15-C18—33 pF disc, 5% NP0/C0G (ME 140-50N5-330J)**
**C9, C14, C101-C106, C108-110, C112—0.01 µF disc (ME 140-50Z5-103M)**
**C10—330 pF disc (ME 140-50S5-331J)**
**C11, C12—0.001 µF NP0/C0G monolithic (ME 581-UEC102J1)**
**C13—100 pF disc ceramic,5%**
**C20—0.022 µF monolithic (DK P4953)**
**C21, C107—0.1 µF monolithic (DK P4924)**
**C22—150 pF disc (ME 140-50S5-151J)**
**C111, C113—47 µF, 25 V electrolytic, radial leads (ME 140-XRL25V47)**
**D1, D2—7.5 V, 500 mW Zener, 1N5236B (DK 1N5236BDICT)**
**D3-D5—1N4148 (DK 1N4148DICT)**
**D6—1N4001 (DK 1N4001DICT)**
**J1, J2—3.5-mm 3-circuit jack, PC board mount (ME 161-3501)**
**J3—DB9, PC board mount (Jameco 104951)**
**J4—Dc power jack, 2.1×5.5 mm, PC board mount (ME 163-5004)**
**J5—BNC female, PC board mount (Jameco 146510)**
**L1—6.8-µH RF choke (ME 43LS686)**
**L2—23 turns #24 solid, insulated wire on a T37-2 core**
**L3—22-µH RF choke (ME 43LS225)**
**Q1, Q7—2N7000 N-channel enhancement-mode FET (DK 2N7000)**
**Q2-Q4—2N4401 NPN (DK 2N4401)**
**Q8—2N3906 PNP (DK 2N3906)**
**Q5, Q6—2SC2166 or 2SC2078 NPN RF power (RF)**
**T1—4 trifilar turns #24 solid insulated wire on an FT37-43 core**
**T2—Pri: 4 bifilar turns #24 solid insulated wire; sec: 8 turns, #24 enameled wire on an FT37-43 core**
**U1, U2—SA612A double-balanced mixer/oscillator**
**U3—LM1458N or MC4558N dual op amp (DK LM1458N)**
**U4—LM393N dual differential comparator (DK LM393N)**
**Y1-Y6—3.579-MHz crystal, series-resonant, HC-49/U holder (DK X011)**
**Misc: P1—2.1/ 5.5 mm power plug, heat sinks (DK HS106)**


Except as indicated, decimal values of capacitance are in microfarads ( μF); others are in picofarads ( pF); resistances are in ohms; k = 1,000.
* Heat Sink
n.c. = No connection
IC pins not shown are unused
● Phasing
J2 AF In
C1 1 μF 50 V
R1 10 k
R2 2.2 k
R3 1.5 k
R4 1.5 k
C101 0.01
Q1 2N7000
Q2 2N4401
+7.5 V
R5 470
V+
C103 0.01
7.5 V 500 mW
D1
C2 1 μF 50 V
C102 0.01
U1 SA612
Vcc
Input B
Output B
Input A
GND
OSC
C4 47
C5 68
Y3
TRIM C3 4 - 20
C6 33
Y1
Y2
3.579 MHz
C7 33
C8 33
C9 0.01
Q3 2N4401
Q4 2N4401
R6 1.5 k
R7 47 k
R8 150
R9 4.7 k
R10 220
C10 330
C104 0.01
C105 0.01
L1 6.8 μH
VSW
T1
T2
Q5 2SC2078*
Q6 2SC2078*
R11 2.2 k
R12 150
R13 1
R13A 1
C106 0.01
C107 0.1
B
L2
C11 0.001
C12 0.001
J5 ANT
R15 1.5 k
R16 330 k
C15 33
Y4
Y5
Y6
C16 33
C17 33
C18 33
Q9 2N4401
R17 470
C13 100
L3 22 μH
C14 0.01
D3
D4
2 ×1N4148
R14 51
to R22
R18 1 k
C109 0.01
D2
U2 SA612
C19 0.01
C20 0.022
R19 4.7 k
C21 0.1
C22 150
R20 330 k
R21 10
47 μF 25 V
C111
U3A 1/2 LM1458
C110 0.01
R22 10 k
+7.5 V to D2/R18
C23 1 μF 50 V
R23 2.2 k
R24 10 k
Q7 2N7000
J1 AF OUT
U3B 1/2 LM1458
n.c.
J4 DC PWR (12 -15 V)
D6 1N4001
+7.5 V to D1/C103
R27 10 k
C113 47 μF 25 V
R28 22 k
R29 10 k
R30 4.7 k
R31 47 k
R32 4.7 k
U4A LM393
U4B
Q8 2N3906
D5 1N4148
C24 1 μF 50 V
J3
RTS
GND
R25 10 k
R26 22 k
C112 0.01
Serial Port

latest info about new rigs, swap meets and things? The Internet now supplants a lot of that need, but the scale is so wide that you might as easily chat with someone in Spain about some parts you need, as opposed to someone in the next town. In some cases, this is fine, but the camaraderie of local club members can better be achieved through PSK31's local communications capabilities, and that's just what many folks are doing!

Perhaps leading the pack are the Western Warbliers in California. This group had a head start because kits were first distributed at a symposium hosted by the NorCal QRP club in October 2000. These operators are maximizing that 200-mile radius of solid communications to help bring others into the fold, to help find parts and just have some regular ragchews at QRP levels. They're contributing application notes, tips, techniques and circuit improvements for other PSKers around the country. The Internet, of course, has enabled this sharing of information, and these notes are maintained by the New Jersey QRP at their project Web site.[4]

Along with the Western Warbliers, the New Jersey QRP club members have shown that it doesn't take a full-blown 80-meter antenna farm to get out with this mode. Sure, "the bigger the better" usually applies, but reduced-size antennas can put you on 80 meters without requiring an acre-size backyard![5] The commercially available verticals also combine effective operation with a low footprint. Dave, NN1G, uses a dipole about 15 feet high for all the 80-meter PSK work he's done to date. Not bad!

## So, What's a Warbler?

Last winter, while preparing for a talk on PSK31, Dave was casting about for a low-parts-count means of handling a PSK31 signal. He noted that the PSK31 watering-hole frequency on 80 meters is at 3580.15 kHz, darn close to the color-burst frequency of 3579.545 kHz. After an intensive thirty minutes of cut-and-paste engineering, a schematic was born. Remarkably, this early schematic withstood further evaluations and refinements without much growth in the parts count. The hardware design started with an evaluation of simple filters using color-burst crystals. Figure 2 shows an example of a three-crystal filter and its measured passband response.

The asymmetric skirt response is typical of a crystal ladder (Cohn) filter—the upper-frequency slope is steeper. We take advantage of this by setting the carrier/BFO on the high side of the passband. This yields better rejection of W1AW signals and results in LSB operation. The filter uses series-resonant crystals. As a result, the passband is actually *above* the marked crystal frequency. The BFO is pulled to the high side of the passband using a small value of capacitance in series with the BFO crystal.

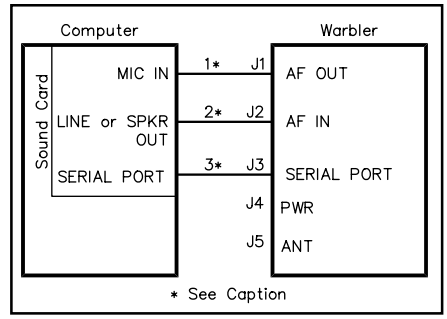



**Figure 5—Pictorial of the Warbler/computer interconnections. Use interconnecting cables that suit your equipment requirements. As shown here, three-conductor cables are used at 1 and 2; they are equipped with 3.5-mm stereo connectors at each end (RadioShack 42-2387). Serial port cable 3 has female DB9 connectors at each end (RadioShack 26-117 or Jameco 25700). Jameco Electron-ics, 1355 Shoreway Rd, Belmont, CA 94002; tel 650-592-8097, domestic fax, 800-237-6948, international fax, 650-592-2503; info@jameco.com; www.jameco.com; RadioShack.com, PO Box 1981, Fort Worth, TX 76101-1981; tel 800-843-7422; fax 800-813-0087; www.radioshack.com.**

So what do we do with a filter that works right at the operating frequency? Consider the Neophyte direct-conversion (D-C) receiver,[6] the epitome of simplicity: It consists of nothing more than a product detector/oscillator and an AF amp. Add a crystal filter to its front end, and it's still a D-C receiver, but its selectivity and its resistance to (out-of-passband) intermodulation distortion (IMD) are considerably improved. On transmit, adding such a filter to the output of a balanced modulator alters its output from a DSB signal to an SSB signal—right at the operating frequency. A block diagram of such a setup is shown in Figure 3. Pretty simple, eh? Naturally, reducing this simplicity to practice always seems to involve adding a few components, but it's still a D-C transceiver.

## Circuit Description

Figure 4 is the schematic of the Warbler. Let's start our discussion of the circuit with the transmitter. Audio from a computer's sound-card output (**LINE OUT**) is connected to J2. Q1 is conducting during transmit and passes audio and dc bias to Q2. Several hundred millivolts of audio are applied to mixer U1 to generate DSB energy at a (suppressed) carrier frequency of 3582 kHz. Y1 and Y2 and C6 through C8 remove the bulk of the unwanted sideband energy. Q3 and Q4 amplify the remaining SSB signal. The output of Q4 includes an L network (L1 and C10) that matches the driver output impedance to the PA, Q5 and Q6.

Things begin to look a little different around the PA—a push-pull stage. The two halves of the PA show equal gains on their respective half cycles of conduction; this balance pays off in rejecting second-harmonic energy. A trifilar-wound input transformer (T1) splits the driving signal into two out-of-phase signals fed to Q5 and Q6. Another multifilar winding (T2) combines the Q5 and Q6 outputs. T2's third winding is done separately and has a different turns count. It's set for a collector impedance of 12 Ω. In theory, an output power of up to 6 W should be available from this stage. In practice, though, the IR drop of R13/R13A and saturation effects of Q5 and Q6 limit the output to 4 or 5 W PEP.

As a result of the balance provided by the push-pull configuration and the improvement in second-harmonic performance, the output harmonic filter can be considerably simplified. In this design, it's a single-section network. Thanks to the 15 to 20 dB of second-harmonic suppression inherent in the push-pull PA configuration, the minimum harmonic rejection for this design is 33 dB, compliant with current FCC regulations.

C13, D3 and D4 and L3 act as a TR switch and provide a measure of front-end selectivity for the receiver. Q9, a preamplifier stage, provides a gain of 10 dB. In addition to providing gain, Q9 offers a flat 1.5-kΩ source impedance to the crystal filter. The initial Warbler design lacked this stage and the filter passband shape was poor. Y4 through Y6 and the associated capacitors deliver the passband selectivity shown in Figure 2. Mixer U2 converts the filter output to audio, where it's low-pass filtered and amplified by U3. R23, R24 and Q7 provide a muting function to prevent feedback during transmit; this subject is described in more detail in a recent *QST* article (see Note 1).

Comparators U4A and U4B and related components provide TR sequencing. The RTS signal of the computer's serial port is a negative voltage during receive and positive during transmit. A turn-on delay produced by R31 and C24 allows the dc voltages around Q2 to stabilize before the transmitter turns on. This minimizes the transient energy emitted during the transition to transmit. Catch diode D5 serves a similar function during the return to receive by shutting off

### The Considerate Operator's Guide to 3580 kHz

The Warbler operates over a fixed 1-kHz slice of 80 meters: 3580 to 3581 kHz. PSK31 users aren't the only inhabitants of this portion of the band. Most notably, the Glowbugs, a community using simple gear and experimenting with crystal-controlled CW rigs, uses and monitors 3578 kHz. PSK users should adhere to the published band plan for data operation (3580 kHz and up) to minimize interference to other users of the frequency. If your transceiver is set to LSB and the dial is set much below 3582 kHz, the chances for inadvertent interference are good.—*Dave Benson, NN1G*

the transmitter bias as soon as possible.

### Hookup and Alignment

The Warbler connects to your computer as shown in Figure 5. Sources for the interconnecting cables are shown. Necessary cables are available at most electronics retail outlets and other stores.

### Setup

You need software to use the transceiver. If you don't already have it, download and run *DigiPan 1.5*, the most recent version (see Note 3). Once *DigiPan* is running, initialize the frequency display to 3582 kHz and select **LSB**, which places 3582 kHz at the right edge of the display. Connect an antenna and dc power (12 to 15 V) to J5 and J4, respectively. Adjust the sound-card microphone volume-control slider (**CONFIGURE | WATERFALL DRIVE** in *DigiPan 1.5*). Set the level with this control to yield blue-to-yellow speckles on the screen. This should yield a band covering approximately one-third of the computer screen width when properly adjusted.

### Adjustment

There's only one adjustment on the transceiver board—trimmer cap C3. The ARRL was kind enough to furnish a calibration marker to adjust these rigs. During many of the afternoon and evening hours, W1AW is transmitting on 3581.5 kHz.[7] If you're located east of the Mississippi, you should have little trouble spotting W1AW's CW transmissions on-screen. Using a small screwdriver, simply adjust C3 until W1AW's signal is lined up under the 3581.5 tick mark of the *DigiPan* frequency display. Lacking W1AW's signal, adjust C3 to center the brightest portion of the display screen in the range of 3580.0 to 3581.0 kHz.

If you live close enough to W1AW so that its signal causes spurious traces on the display, and reducing the sound-card's microphone slide-control setting to cure this effect causes PSK31 signals to disappear into the noise, try this approach: Set the *DigiPan* start frequency to 3581.5 kHz and adjust C3 so that W1AW's signal is zero beat at the right extreme of the display. This takes advantage of the low-frequency rolloff characteristics of the receiver's audio amplifier to knock the signal down to manageable levels. Dave, NN1G, lives about two miles from W1AW and its signals are *very* strong there. Once this adjustment was performed though, Dave could copy PSK31 signals without difficulty.

### Transmit Adjustment

In *DigiPan*, select **Mode** and click on **Tune**. This places the transceiver in transmit mode with a 100% duty cycle. Click on the speaker icon in *Window*'s tray and advance the volume slider until the transmitter output power is set at 3 W. Although the Warbler's PA stage can be driven harder for more output, the additional power comes at the expense of poorer IMD performance. If you don't have a wattmeter, you can effectively accomplish the job using a 50-Ω resistive load and peak-voltage detector.[8]

### Operation

Clicking your computer's mouse cursor over the typical "railroad-track" PSK31 signal should cause text to begin appearing in *DigiPan*'s upper text window. Clicking on **T/R** in the *DigiPan* menu switches to transmit and your typed text in the lower window streams out on the air.

### Do It, Use it, Enjoy PSK31!

Just when it seemed to some that the flames of excitement in ham radio were dwindling to smoldering embers, along has come a new mode of communications to stoke us up again. Overwhelming evidence is showing us that folks all over the country are having *tons* of fun building and operating PSK radio equipment such as the Warbler!

QRPers and high-power operators alike are pulling others into this digital aspect of the hobby by conducting coordinated construction and instruction classes, forming statewide nets on 80 meters for club and special-interest support groups, and plain old ragchewing. There isn't a night that goes by here on the East Coast without having up to a half dozen QSOs going on at once throughout the evening hours.

The fun doesn't stop here! A number of experimenters are using DSP evaluation kits instead of the computer/sound-card approach, so we may see PSK31 terminals that cut the tether to the PC. This will enable an even more portable and lower-cost operation for PSK31.

Start enjoying PSK31! Get a local PSK31 ragchew net going in your state. Put on a demo for the local high school science class showing how much fun can be had communicating *without* using the Internet. Get a PSK31 transceiver group-build going with your ham club. No matter how you approach it, do it, use it and have fun with PSK31!


### Acknowledgements

Thanks to the New Jersey QRP Club, the Western Warbliers and many others for their enthusiastic support and contributions to this activity.


**Notes**

[1]Howard "Skip" Teller, KH6TY, and Dave Benson, NN1G, "A Panoramic Transceiving System for PSK31," *QST*, Jun 2000, pp 31-37.

[2]The New Jersey QRP Club offers a complete kit of parts including a PC board, all on-board components and assembly instructions. Price: $45, including shipping in the US and Canada; foreign orders add $5. Make your check or money order payable to George Heron, N2APB. Send your order to George Heron, N2APB, 2419 Feather Mae Ct, Forest Hill, MD 21050. Please allow two to four weeks for delivery. All sales proceeds benefit club-sponsored public activities.

[3]*DigiPan* is available for free from **members.home.com/hteller/digipan/**. The current version is 1.5. Links to additional software products may be found at **psk31.com**.

[4]Warbler project updates and errata are maintained at **www.njqrp.org/warbler/kitnotes.html**.

[5]Loaded verticals such as the PM-1 offered by Vernon Wright, W6MMA, is one example of a suitable compact antenna; **www.superantennas.com**. See also Robert Johns, W3JIP, "A Ground-Coupled Portable Antenna," *QST*, Jan 2001, pp 28-32.

[6]John Dillon, WA3RNC, "The Neophyte Receiver," *QST*, Feb 1988, pp 14-18.

[7]See the W1AW Operating Schedule in this issue.

[8]Chuck Hutchinson, K8CH, ed, *The ARRL 2001 Handbook* (Newington: ARRL, 2000), p 26-11.


*Dave Benson, NN1G, is well known to* QST *readers. His life has been captured on the installment plan in prior issues of this magazine. You can contact Dave at 80 E Robbins Ave, Newington, CT 06111;* **nn1g@arrl.net**.

*George Heron, N2APB, plays a lead role in the New Jersey QRP Club and has been active in the QRP community throughout the last decade. He organizes the annual Atlanticon QRP Forum for the NJQRP and edits and publishes the club's quarterly journal* QRP Homebrewer. *An inveterate homebrewer by nature, with strengths in software and digital design, N2APB's latest project is the design of a PC-less, single-board controller for portable operation using PSK31. Contact George at 2419 Feather Mae Ct, Forest Hill, MD 21050;* **n2apb@amsat.org**.

By Billy B. Johnson, WB5RYB

# The Great Paper Chase

Collecting catalogs, ads, brochures, spec sheets, company memos—any kind of Amateur Radio product literature—is an exciting and accessible way to experience our hobby's rich history. Here's how to get started.

Amateur Radio is a multifaceted hobby. If collecting interests you, there are many ways to satisfy your desires. I've been collecting, restoring and operating antique and classic radios for several years and, until recently, I've limited my collection mostly to Hammarlund receivers.

I recently became interested in old sales brochures, technical specification sheets, catalogs, manuals and related literature about Hammarlund receivers. I hadn't given much thought to collecting these items until I joined the Southeast Antique Radio Society of Atlanta. Several of the members have extensive literature collections covering various early radio manufacturers.

Those collections started me wondering about the Hammarlund literature that might be available. The search has taken me to dozens of hamfests, old bookstores, garage sales, antique shops, used book stores, thrift stores and on-line auction site eBay.

Buying collectible items via eBay has pluses and minuses. Rare items that are unavailable anywhere else are often offered for sale. The bidding process is convenient and doesn't involve any travel, search time or sleuthing. Unfortunately, prices are usually higher than "similar type and quality" items found at more traditional outlets. Also, buyers don't have an opportunity to physically examine items and must rely on pictures and the seller's description. Because it offers a large global audience, buying and selling collectibles (radio and otherwise) on the Internet will likely become more popular in the future.

After unsuccessfully bidding for several eBay items, I finally made my first literature purchase—a 1935 Hammarlund capacitor catalog. The catalog contained information on condensers, coil forms, sockets, transformers, chokes, shields and other Hammarlund components. The back page was devoted entirely to the Hammarlund "Comet Pro," a shortwave receiver sold in the 1930s. It also listed the addresses of 10 former sales offices in the US and Canada.

I was pleasantly surprised at the catalog's excellent condition. Printed 65 years ago, the catalog is older than any of my radios. This purchase hooked me, and my search for Hammarlund literature began in earnest. Since my first purchase I have picked up several additional quality documents and a few that are interesting but not pristine.

As a practical collector, I have to face the fact that there are some radios that I will probably never own. For example, very few Hammarlund Pro-310s were ever manufactured. I've never seen one for sale. Fortunately, I've been able to add an original Pro-310 sales brochure and spec sheet to my paper collection. This document may be as rare as the radio. Although I don't own the radio, I can still enjoy these items.

I'm not too proud to accept a copy of a


Hammarlund catalog No. 37. Note the Sun Radio Company stamp.


A 1927 advertising flyer for the Hammarlund "Midline" condenser.


**This flyer from 1957 touts the venerable HQ-140-XA receiver.**


**A Hammarlund promotional flyer for a legendary receiver: the HQ-100.**

document if the original isn't available. Copies have no value, but I think they're better than nothing at all. Besides, a good copy will reveal all the information available from the original. If the original document becomes available in the future, the copy can always be discarded.

Paper collecting offers an opportunity to connect with specific pieces of history. Collectors can also learn more about products offered by the manufacturer, the specifications of various parts and radios, and even gain some insight about how the various products were marketed.

## Secrets Revealed

Companies generate a tremendous amount of paper, most of which is never preserved. When a company such as Hammarlund ceases to exist, most of its records are destroyed. Through the study of sales brochures, catalogs and other documents, collectors can gain a considerable amount of company knowledge.

Sales literature often provides insight into how and where equipment was manufactured. One catalog in my collection contains a picture of Hammarlund's Mars Hill, North Carolina, manufacturing facility. From the age of the cars shown in the picture, the photograph was made in about 1960.

Documents sometimes reveal the names of individuals who worked on a particular radio. For example, the spec sheet for an HQ-180A receiver has a statement on the bottom of the last page that says, "These facts brought to you straight from the shoulder by the hams at Hammarlund." The names, call signs and signatures of 11 hams are listed across the page.

Sales literature often reveals a product's original selling price. A technical data sheet published by Hammarlund on the R-390A/URR, dated May of 1970, has the following note written across the bottom of the page, "Terms $1,000.00 COD or CIA while the supply lasts." When Hammarlund was owned by Electronic Assistance Corporation it manufactured hundreds of R390A receivers for the government.

In a copy of an internal memo dated June 4, 1968, written during the negotiations to sell Hammarlund to Electronic Assistance Corporation, Boris Pundick, Hammarlund's Division General Manager, encourages the employees to bring in new business, work efficiently, minimize errors and maintain quality standards during the critical period. Copies of this letter were sent to Edward J. Eggart, President of Geotel, Inc, and Robert Edwards, President of Electronic Assistance Corporation.

In July of 1971 the Cardwell Condenser Corporation acquired Hammarlund's Capacitor Division. I obtained a copy of a letter on Hammarlund letterhead that is signed by George E. Cardwell, Manager of Commercial Products for Cardwell, making this announcement.

***Sales literature often provides insight into how and where equipment was manufactured.***

In addition to catalogs and sales literature, I also collect old magazine and newspaper articles about Hammarlund. These are often more difficult to find, but just as interesting. Newspaper articles contain new product announcements and information about plant expansions, employee promotions, etc.

One newspaper article was written on the first anniversary of the opening of Hammarlund's plant in Mars Hill, North Carolina. To illustrate the plant's economic impact on Mars Hill and Marshall County, the payroll for that week was paid in silver dollars! More than 7000 silver dollars were passed out to some 155 employees. In the community those coins quickly become known as "Hammarlund Dollars."

Like most hams, I can't afford to display all of the radios I'd like to own. One solution is to collect pictures of old receivers. At hamfests I usually carry a camera. If something interesting shows up, I talk to the owner and ask for permission to photograph the radio. I've never been turned down.

Digital cameras, scanners and the Internet have made pictures of rare radios readily available. It's easy to print an image of an old radio from someone's Web page. Surprisingly, some of my better radio pictures have been copied from eBay auction photos!

Back issues of *QST*, *CQ* and *73* are also good photo and information sources. They contain product reviews, articles, advertisements and pictures of most amateur gear offered for sale.

After World War II, *QST* did an excellent series of articles titled, "Looking Over the Post-War Receivers." These articles offer a valuable resource for those interested in a particular radio.

The ads in back issues also provide interesting reading and often reflect the price of the radios at the time of publication. It's fun to look over the old ads and attempt to evaluate the various radios that were competing for Amateur Radio dollars.

I keep my collectible literature in plastic jackets bound in a large three-ring notebook. This allows documents to be handled without tearing or soiling the pages. What started as a casual interest has turned into an interesting and informative part of collecting vintage radios. It's amazing what's still out there in the way of literature for those who have the patience to join the paper chase.

*You can contact the author at 195 Royal Ridge Way, Fayetteville, GA 30215-2660;* **wb5ryb@hotmail.com**.

By Larry Scheff, W4QEJ

# How to Maximize Your Receiver's Effective Selectivity

*Part 2*—Minimizing or eliminating noise and interference during reception depends to a great degree on your knowing how to use your receiver's selectivity controls.

In Part 1,[1] my discussion focused on using the variable bandwidth tuning (VBT) feature of the Kenwood TS-940S to reduce or eliminate received noise and interference. This month, you'll see how passband tuning, as employed in the Kenwood TS-440S, can help do the same.

### Getting the Most from IF-Shift Filters

Let's examine how passband tuning (IF shift) performs when we apply the same philosophy of minimizing signal levels that reach the IF filter. For this graphic analysis, I use the SSB selectivity specifications of the Kenwood TS-440S, which are stated as 2.2 kHz at –6 dB and 4.4 kHz at –60 dB, providing a filter shape factor of 2 in this receiver, compared to a shape factor of 1.5 for the TS-940S. The larger shape-factor number tells you that the selectivity of the TS-440S is somewhat less than that of the TS-940S. With IF passband tuning, you don't have **HIGH CUT** or **LOW CUT** controls to reduce the filter bandwidth or to reshape its selectivity curve. You can, however, shift the entire passband of the filter a maximum of ±900 Hz from its center frequency (see Figures 3A through 3C).

Situation 4, using a TS-440S, involves two adjacent interfering signals and is illustrated in Figures 8A through 8D. Take a look at Figure 8A. This situation is exactly the same as Situation 1 except that the TS-440S employs IF shift instead of VBT. We are trying to receive an LSB signal that peaks 25 dB above the noise. There are two equally strong LSB signals, one 2 kHz above and one 2 kHz below the desired signal. Here (as in Figure 5A for the TS-940S) we assume that with the **ATT**enuator control of the TS-440S receiver set to 0 dB, and the **RF** gain control set at maximum, the noise level appears at the 40-dB level at the SSB IF filter in the receiver. In this case, however, we are using a passband-tuning filter with a passband width of about 3.58 kHz at the 40-dB level on the selectivity curve.

***IF shift filters can be used quite effectively to eliminate interference and noise...***

By comparing Figure 8A to Figure 5A, you can see that the selectivity curve of the TS-440S is about 0.430 kHz wider at the –40-dB level than that of the TS-940S, and we cannot decrease the bandwidth as we can with the VBT feature of the TS-940S. This means the TS-440S filter will pass more noise at these settings than would the TS-940S VBT filters. As illustrated in Figures 8B and 8C, we could shift the passband of the IF filter up or down in frequency, which would only reduce the interference from one of the two interfering signals while increasing the interference from the other interfering signal. Shifting the passband up or down in frequency makes no change in the amount of noise received.

However, you *can still eliminate both interfering signals and the noise.* You do this by adjusting the **ATT**enuator and **RF** gain controls to slide the signals and noise down the selectivity curve and setting the **IF SHIFT** control to about +360 Hz as shown in Figure 8D. Here also, you lose some of the desired-signal's higher audio frequencies, but you still have very acceptable communication-quality audio from the desired signal.

Situation 5 involves two extremely strong adjacent interfering signals and is illustrated in Figures 9A and 9B. What happens when our desired signal is sandwiched between two LSB signals, both 25 dB stronger that our desired signal, one 2 kHz up the band and one 2 kHz down the band and we are using passband tuning? See Figure 9A. Here (as in Figure 6A for the TS-940S) we assume that with the **ATT**enuator control of the TS-440S set to 0 dB, and the **RF** gain control set at maximum, the noise level appears at the –40-dB level of the receiver's SSB IF filter. As in Figure 6A, we are trying to receive an LSB signal that peaks 25 dB above the noise. The two interfering signals are strong enough that their peaks will blow by the IF. You simply cannot eliminate much interference from either signal by shifting the IF up or down.

Figure 9B shows that we can slide all

[1]Larry Scheff, W4QEJ, "How to Maximize Your Receiver's Effective Selectivity—*Part 1*," *QST*, Feb 2001, pp 42-48.

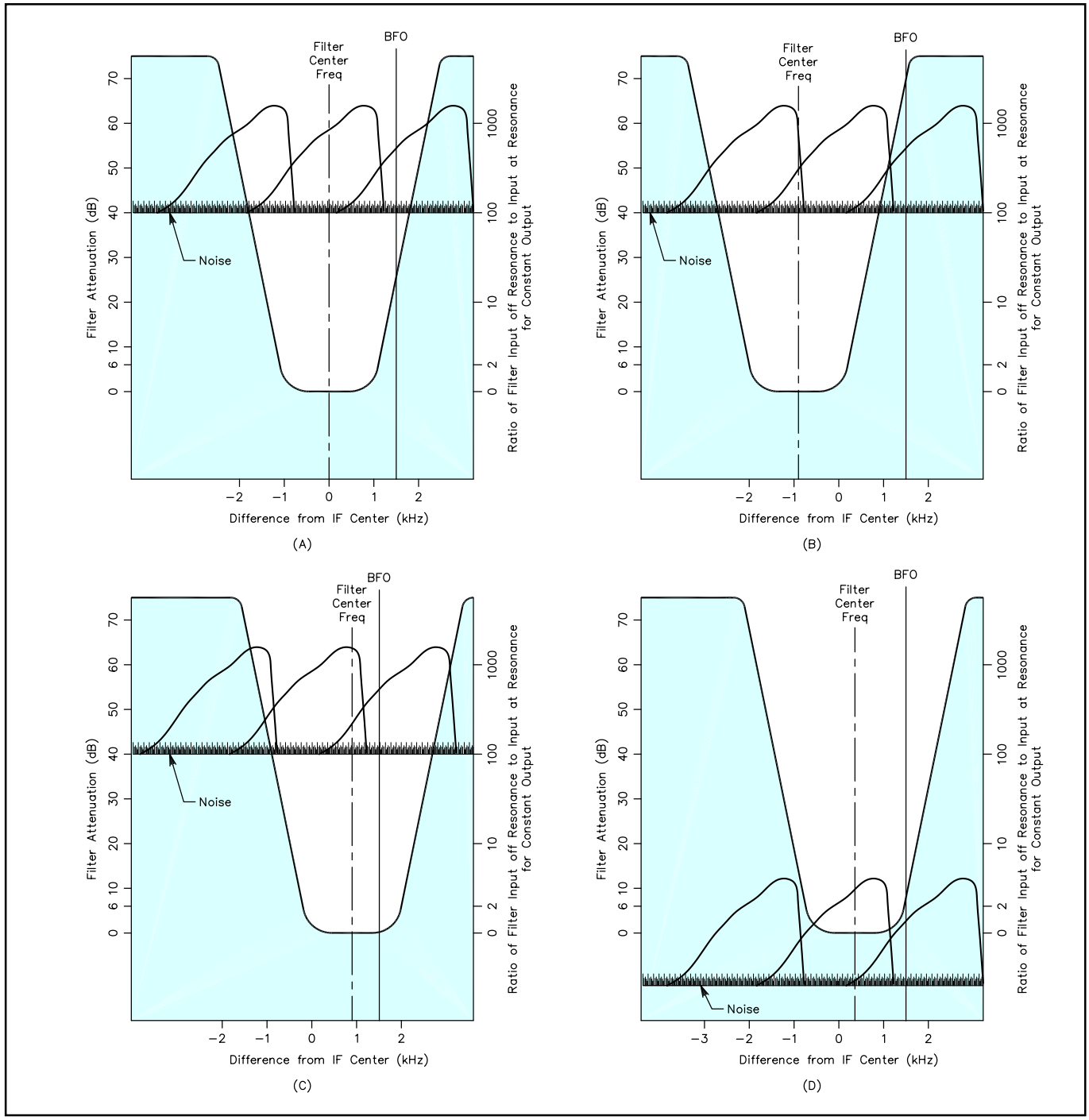



**Figure 8—Situation 4, using a TS-440S with passband tuning (IF shift). In each graph, there are two interfering signals, one 2 kHz above and another 2 kHz below the desired signal. All three signals are of equal strength, each peaking 25 dB above the noise. At A, the receiver ATTenuator and RF gain controls have not been adjusted to eliminate the interfering signals; the IF SHIFT control is set at zero. The interfering signals and noise are quite apparent. At B, the only control adjustment made was to set the IF SHIFT control to –900 Hz. As a result, interference from the signal up the band has mostly (not entirely) been eliminated, but interference from the down-band signal and noise is still severe. At C, the IF SHIFT control has been set to +900 Hz, no other control changes have been made. Now, interference from the signal down the band has partially been eliminated, but there's still severe interference from the undesired higher-frequency signal and the noise level is high. A dramatic difference is shown at D. Here, several controls have been used to eliminate the noise and the interference. The receiver ATTenuator and RF gain controls have been put to work, the IF SHIFT is set at about 360 Hz and the RIT has been adjusted to properly position the BFO in the passband to receive the desired signal.**

three signals and the noise down the selectivity curve to eliminate the noise and adjust the IF shift to eliminate interference from the strong signal up the band, but you can't eliminate all the interference from the strong signal down the band. Can you get rid of this remaining interference? Take a good look at Figure 9B. All of the remaining interference from the LSB signal would be heard as audio that is *higher in frequency* than that of the portion of the desired signal that has not been eliminated by the IF filter. This is because the RF components of this interfering signal must beat with the BFO to produce audio, and they are farther from the BFO frequency than the unfiltered components of the desired

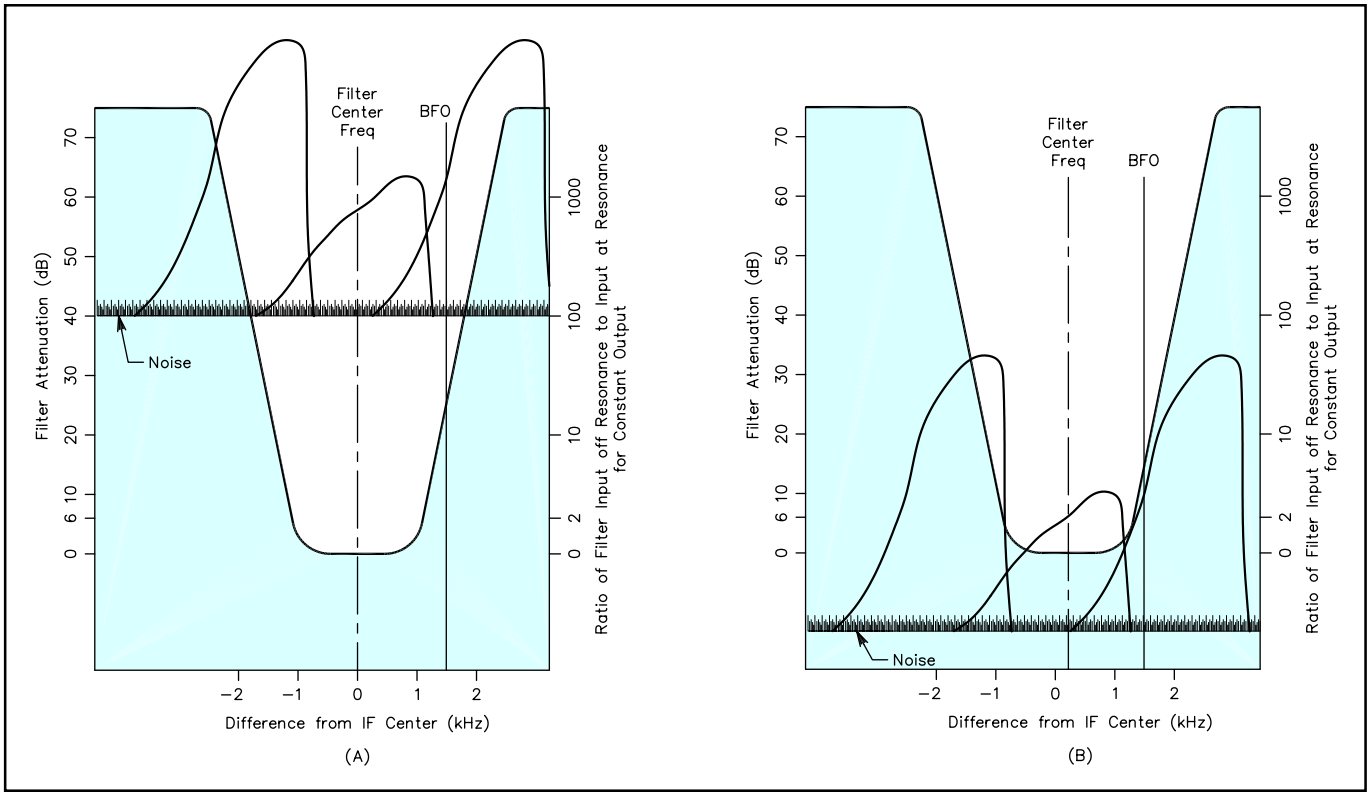



**Figure 9—Situation 5, using a TS-440S with passband tuning (IF shift). Again, there are two interfering signals, one 2 kHz above and one 2 kHz below the desired signal. The desired signal peaks 25 dB above the noise. Both interfering signals are 25 dB stronger than the desired signal. At A, the receiver ATTenuator and RF gain controls are wide open and the IF SHIFT is set at zero. As a consequence, the very strong interfering signals blow by the IF filters. None of the lower-intensity interference or noise is eliminated. At B, the input attenuator and RF gain controls have been adjusted to aid in minimizing the interfering signals. The IF SHIFT is set to +211 Hz and the RIT control has been adjusted to properly position the BFO in the passband to receive the desired signal. Although some interference from the lower-frequency interfering signal remains, interference from the up-band signal and the noise have been eliminated.**

signal. We should be able to use *external audio-frequency filtering* such as DSP to get rid of these interfering audio frequencies.

Figure 10 presents Situation 6, which involves interfering signals at the same frequency, or very close to same frequency as that of the desired signal, but somewhat weaker than the desired signal. Looking back at the preceding examples and graphs, you'll see that, in all cases, we have eliminated the noise by using the **ATT**enuator and the **RF** gain control to slide the noise below the flat bottom of the selectivity curve. Comparing Figure 10 to Figure 7 you will see that we can use the same approach to eliminate interfering signals that are weaker than the desired signal and on, or very near, the desired-signal frequency. A slight adjustment of the **IF SHIFT** control will also make a slight improvement in the received audio. As we found with the TS-940S, the audio of the on-frequency interfering signal would sound perfectly normal; all components of the off-frequency interfering signal would beat with the BFO, sound 1 kHz higher than normal and be unintelligible and annoying.

These graphs clearly verify that VBT IF filters are somewhat more effective than IF shift filters, but IF shift filters can often still be used quite effectively to eliminate interference and noise—*if* you know how to use them effectively.

## What's the Bottom Line?

Take another good look at Figures 5B, 6B, 7, 8D, 9B and 10. What do they all have in common? Simple! These figures all show how interference and noise have been eliminated or at least reduced by using receiver **ATT**enuator and **RF** gain controls to slide the desired signal, the interference and the noise to the bottom of the receiver IF-filter selectivity curves. This allows the filters to do their best in eliminating noise and interference. With practice, you'll learn approximately where the receiver front-end controls should be set for optimum receiver performance on each band. Then you can set them as you change bands and almost forget about changing them as you tune a band because you probably won't even hear some of the interference and noise that you have suffered with until now. Keep in mind, however, that changing band conditions may affect your initial control settings.

***If your transceiver has no provision for turning off the AGC, you'll probably get better results by using fast AGC instead of slow AGC.***

## What Does AGC Have to Do with Selectivity?

Refer to Figures 2 and 3. If a strong interfering signal manages to exceed the filters' estimated 75-dB maximum attenuation level, it may blow by them, causing interference to the desired signal and undesired AGC action. If you have the AGC turned off, the AGC will not respond to the strong interfering signal. If your transceiver (such as a TS-440S) has no provision for turning off the AGC, you'll probably get better results by using fast AGC instead of slow AGC.

### But My S Meter...

Some of you might say: "My S meter doesn't work when I operate the receiver as you describe!" Don't be concerned. Except for making momentary *comparative* signal readings in the absence of fading, S-meter readings are virtually meaningless. If you research S-meter circuits and use, you'll soon discover that you might be able to trust your S-meter's calibration *on one band*, but not over the entire tuning range of your receiver. S-meter calibration varies from receiver to receiver. As a receiver ages, component values may change, affecting S-meter calibration. Antenna location and type, feedline loss, impedance mismatches, band conditions, signal fading and other factors affect S-meter readings. I suggest you forget the S meter. Your primary interest should be minimizing interference.

***Forget the S meter. Your primary interest should be minimizing interference.***

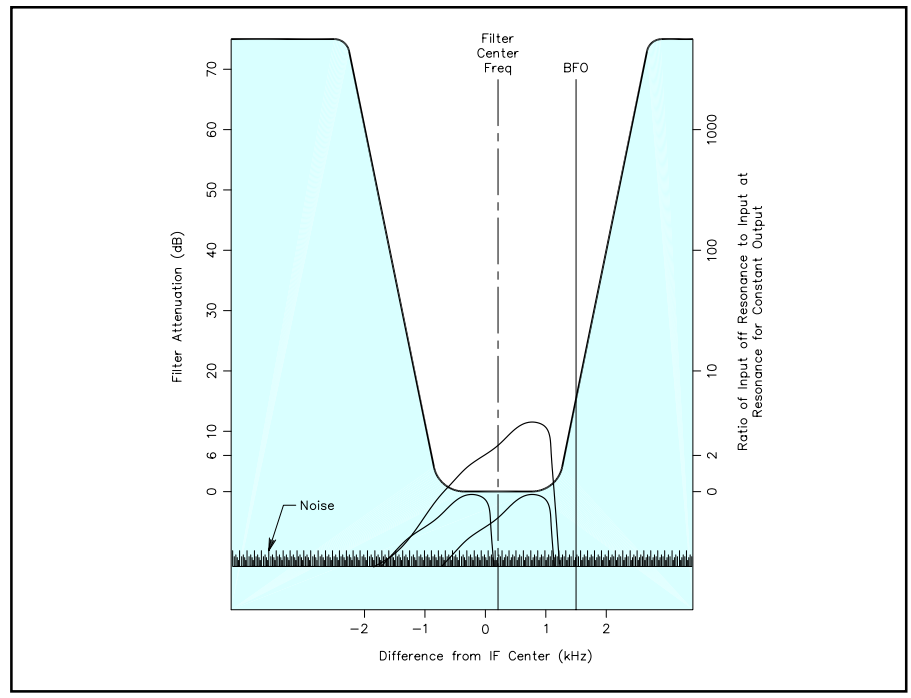



**Figure 10—Situation 6, using a TS-440S with passband tuning (IF shift). The desired signal peaks 25 dB above the noise level. One interfering signal is on the same frequency as the desired signal, another is 1 kHz below the desired signal. Both interfering signals peak 12.5 dB above the noise level. Here, the IF SHIFT control is at zero, but the receiver ATTenuator and RF gain controls have been adjusted to eliminate the interfering signals and noise.**

### How Does the Graphic Analysis Compare with Actual Operating Experience?

The TS-940S performance shown in Figures 5, 6 and 7 is entirely consistent with the actual performance experienced here at W4QEJ on 75 meters under crowded band conditions when the atmospheric noise level is high. On higher bands, the received noise level is lower and the receiver exhibits less apparent overall front-end internal gain. This is typical of receivers in general. Usually, on the higher HF bands, little or no receiver input attenuation is needed to place signals near or below the filter attenuation curve –6-dB points and more RF gain may be used without causing deterioration of the usable selectivity indicated in the graphs. Pete, W4EHM, who uses a TS-930S, has replaced the original VBT filters with others similar to those in a TS-940S and says his modified TS-930S performs as described.

Warner, W4WAF, and Holt, W4AHA, who both use a TS-440S, say that the performance described reflects their experience when using the receiving techniques presented here. My thanks to W4AHA, W4EHM and W4WAF for the information they provided about their transceivers, and for their comments and advice, all of which were valuable in preparing this article.

Try the approaches I've discussed. I'm sure you, too, will find that they result in interference- and noise-free reception even under crowded band conditions when others are complaining about interference and noise.

*You can contact the author at 679 Creek View Dr, Lawrenceville, GA 30044-3770.*

# NEW PRODUCTS

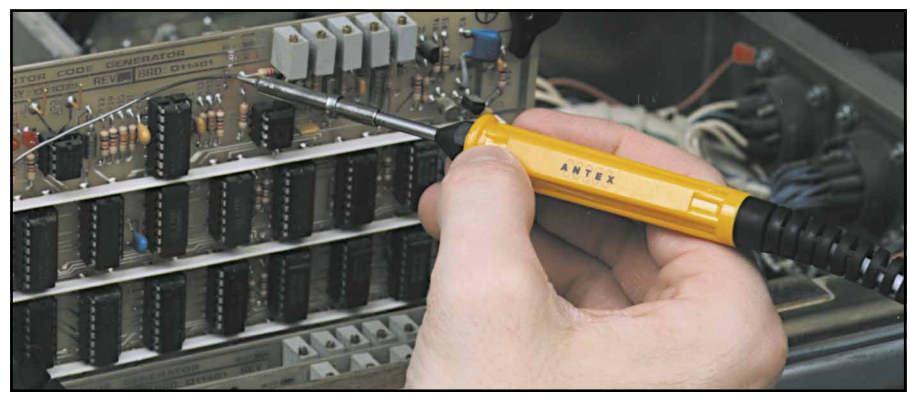
### ANTEX MINIATURE SOLDERING IRON

◊ M.M. Newman Corp now offers a precision miniature soldering iron.

The tip of the Antex Model M/3U is said reach 650° F in under 45 seconds. The compact soldering iron measures just 8 inches in length and has a plastic handle that remains cool. The heating element is located just under the tip.

The M3/U operates on 115 V ac and has a 3-wire grounded cord. A wide variety of iron-plated slide-on tips, including chisel, cone, spade and pyramid styles, are sold separately.

The list price for the Antex M3/U is $23.18. The tips are priced at around $4.25 each. For additional information contact M. M. Newman Corp, 24 Tioga Way, Marblehead, MA 01945; tel 800-777-6309/718-631-7100; fax 718-631-8887; **mmn@mmnewman.com**; **www.mmnewman.com**. Next New Products



By Mike O'Brien, K0MYW

# Hallicrafters' Chevy, Buick and Cadillac

As the Great Depression gave way to the pre-war era, Hallicrafters had radios to fit every budget. Here's an intimate conversation with the engineer who designed Hallicrafters' first several transmitters—Bob Samuelson, briefly licensed as W9RAD.

Some of the earliest successful factory-built Amateur Radio transmitters grew out of a business philosophy that might've been expressed as: "What's good for General Motors is good for Hallicrafters." Just like the giant automaker, Hallicrafters set out to provide models for wallets both thick and thin.

In the late 1930s, Hallicrafters was leading all American manufacturers in sales of high-quality shortwave receivers. Founder Bill Halligan wanted to convince hams that store-bought transmitters were a good idea as well.

In the spring of 1938, Halligan lured young engineering whiz Bob Samuelson away from the Collins Radio Company in Cedar Rapids, Iowa, to head up Hallicrafters' transmitter development in Chicago.

Samuelson promptly produced the HT-1, a 100-W CW, 50-W AM phone rig that could be configured for three bands between 160 and 10 meters. He followed up with the 400-W HT-4, later to become legendary as the BC-610, the US military's HF workhorse during World War II.

A shrewd businessman and an enthusiastic ham, Halligan wasn't satisfied. He wanted another transmitter.

"Bill's marketing approach took its cue from the automobile industry," Samuelson recalled in an interview at his Phoenix, Arizona, home in 1992. "Bill wanted a lineup of models that fit the pocketbook and needs of every ham. And he wanted to bring out new models to make use of the latest components and techniques."

The HT-1 was priced at $195. A CW-only version, the HT-2, went for $175.

The Hallicrafters HT-6.

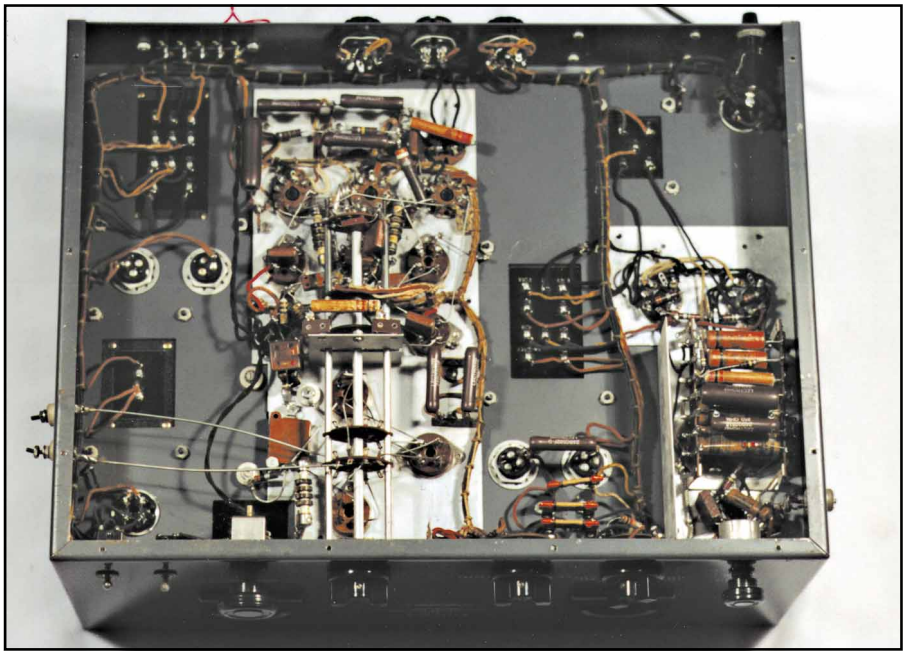
An HT-4 equipped with the HT-5 speech amplifier and AT-2 antenna tuner rang up at $800. Even with the Depression easing in the late '30s, those prices were beyond the reach of most hams. (By the way, if you're keeping count, the HT-3 wasn't a ham rig but rather a marine-band "radio-telephone" aimed at well-heeled yachtsmen who could shell out $400.)

## A Low-Price Leader

The Hallicrafters marketing department had a good idea of what amateurs could afford in 1939, measured by sales of their popular receivers. The S-20R Sky Champion ($49) and the SX-24 Skyrider Defiant ($69) were far outselling the more sophisticated SX-17 Super Skyrider ($140) and the innovative and stylish SX-23 ($120).

"An obvious conclusion was that the transmitter line needed a low-price leader to go with those lower-priced receivers," remembered Samuelson. "I said: 'Let's shoot for $100.' Bill came back with: '$99 sounds better.'"

Thus was born the HT-6. If the



An under-chassis view of the Hallicrafters HT-6.

Bob Samuelson in his chief engineer's office at Hallicrafters' Chicago headquarters in the early 1940s.

***"Art was a genius," said Samuelson. "He'd accept orders to do all sorts of crazy things, and somehow we'd manage to get most of them done. Art gave us quite a bit of freedom—but he didn't hesitate to get his nose right into the middle of what we were doing. "***

washing-machine-size HT-4 was Hallicrafters' "Cadillac" transmitter in 1939, the suitcase-size HT-6 would be its "Chevy."

Samuelson was given virtual free reign in his design work at Hallicrafters, in some contrast to his three years in Cedar Rapids where he'd labored in the formidable shadow of the legendary Art Collins.

"Art was a genius," said Samuelson. "He'd accept orders to do all sorts of crazy things, and somehow we'd manage to get most of them done. Art gave us quite a bit of freedom—but he didn't hesitate to get his nose right into the middle of what we were doing. If we were having a problem, he'd look it over and then say something like: 'Let's try a condenser at this point here.' And quite often he was right."

Bill Halligan, on the other hand, "was more interested in the appearance of his products," according to Samuelson. "Of course, he demanded good performance. He was a ham (then W9WZE, formerly 1AEH and 1UL and later W4AK) and he knew what the radios ought to do. But he pretty much left it up to the engineers to figure out how to make the radios do it."

Halligan concentrated his efforts on business matters outside the plant, Samuelson said. "There were many days when Bill didn't come in 'til noon because he'd been out in the bars on Rush Street with customers the night before. And he treated suppliers really well, too, so we usually got first crack at new components as they were developed."

Up-to-date components were Samuelson's first priority when he began to sketch circuitry for the HT-6: "I had been intrigued with the new 807 beam power tetrode, along with its cousin the 6L6. Calculations showed that I could count on the 807 to deliver a clean carrier output of 25 watts, with clean 100-percent modulation from a pair of 6L6s in class AB. For grid excitation, a single 6L6 tuned crystal oscillator was adequate, at least down to the 20-meter band."

Unfortunately, a transmitter covering 160 through 20 meters fulfilled neither the design aims nor the sales goals. Despite the agreed-upon price constraints, Samuelson and Halligan wanted a true "all-band" rig, one that would tune up to the then-burgeoning 5-meter band (56-60 MHz).

"To be on solid ground in designing for the higher frequencies, I set up a breadboard test circuit with a 6L6 driving the grid of an 807," Samuelson said. "Tests confirmed that the 6L6 wired as a conventional crystal oscillator was a bit tricky with a 10-meter crystal. With a simple addition to the input crystal coil set, however, the 6L6 was wired as a 'tri-tet' oscillator, with a 20-meter crystal doubling in the plate. This worked fine for 10 meters, but a similar test with a 10-meter crystal doubling to 5 meters again was too tricky. So I made provision in the coil set for extra contacts to add a 6J5 as a 10-meter crystal oscillator doubling in the 6L6 for 5-meter operations only."

A 6F5 microphone amplifier, a 6J5 audio amplifier and two 5Z3 rectifiers completed the tube lineup.

Convenient band-switching was a Hallicrafters hallmark, but the HT-6's modest price tag imposed limits. Samuelson settled upon a scheme whereby coils for three bands could be plugged into chassis sockets and then selected by a rotary switch on the front panel. Each ceramic coil form sprouted braided leads used to tap an integral pickup coil for antenna matching.

The output circuit was designed to match resistive loads from 10 to 600 ohms. A pair of insulated feed-through terminals on the side of the chassis served as antenna feed-line connections.

A cabinet 20 inches wide, 9 inches high and 15 inches deep would be required to house the assembly. The exterior was painted in gray enamel. Three hefty Stancor transformers helped boost the weight to 65 pounds.

An ammeter (0-200 mA) was switched to monitor plate current on the oscillator, modulator and final amplifier tubes or grid current on the final. Other front-panel features included an audio gain control; a phone/CW switch; a knob and logging dial to adjust the variable capacitor used to resonate the final tank circuit; and power on/off and transmit/receive toggle switches.

"The first ad for the HT-6 appeared in the May 1939 *QST*," Samuelson noted.

"We must have done something right, because the ad in the August issue four months later boasted that production of the HT-6 was in its fourth release (production run)."

True to Halligan's target, the price was listed as $99 (although soon thereafter it rose to $110). Again as in automobile marketing, there were extra-cost options.

For example, coils weren't included in the base price. Coils for 160, 80, 40 and 20 meters were available at $4.95 each. The special coil sets for 10 and 5 meters cost $6.95 each.

Although the HT-6 was designed for crystal control, Hallicrafters ads also spoke of "electron coupled oscillator units" that allowed the transmit frequency to be shifted with the twist of a knob. ECOs were listed for 160, 80, 40 and 20 meters at $3.85 each. Perhaps ahead of their time, Samuelson doesn't believe Hallicrafters actually sold many ECOs.

"I let a young engineer named Norm Foot play around with an HT-6 and he came up with the ECO," Samuelson said. "All it really was, basically, was a trimmer in a can. I know we made some, but I think most hams used crystals. Just because the ECOs were mentioned in the ads didn't mean they were being produced in great quantity. We wouldn't allow something to be put into an ad unless we knew it was possible to do—but we may not have actually done it yet."

HT-6s still were being manufactured as late as 1945. No official production totals are available, but Samuelson was certain that "at least several hundred" of the sturdy little transmitters were built.

Not long after completing the HT-6, Samuelson turned his attention back to his first creation for Hallicrafters, the HT-1.

"Somewhere along the way—probably back at Collins—the idea had been drummed into me that good engineering was a matter of taking something that works and making it better. The HT-1 developed a good following with hams. It was a great value and had an attractive cabinet design that was acceptable in many households. As soon as it was in production, however, I began to see changes that could offer improvements."

Although Samuelson was licensed for a while as W9RAD, he was not active on the ham bands. He worked long hours, and when he did manage to get time away from the plant, he preferred to devote his attention to his wife, Marcy, and their daughters. Nonetheless, Samuelson frequently heard from operators who were using his creations. "I took their input seriously," he said, "and their comments often proved useful."

But when suggestions from hams and Samuelson's own observations began to jell into proposed improvements for the HT-1, Samuelson initially was told by Halligan "in no uncertain terms that I was not to interfere with production" of the company's popular first transmitter.

So, Samuelson said, "I retreated to my notebook with ideas for simpler circuits, newer tubes, better plug-in tuned circuits, and so on, and waited for a proper time for a new, modernized model."

The "proper time" came on the eve of the new decade.

"The war began in Europe and it was obvious that the best radios possible would be needed in an emergency," Samuelson said. "Bill finally agreed with me that a modernized HT-1, to be named the HT-9, would be our new 100-watt leader."

**A Hallicrafters HT-9 (foreground) in the process of being restored, with its little brother, the HT-6, in the background.**

## The HT-9

Positioned between the HT-4 "Cadillac" and HT-6 "Chevy," the HT-9 became Hallicrafters' "Buick." (Again, if you're counting, the HT-7 was a frequency standard, and the HT-8 was another marine transmitter-receiver combo.)

In the HT-9, Samuelson discarded the HT-1's RK47 final amplifier tube in favor of the newer, more efficient 814 beam power tube. A pair of 6L6s replaced the 6A6 driver tubes.

Most of the HT-1's power supply and audio circuitry was retained, including the four 6L6 modulators connected in push-pull parallel. Fourteen tubes were employed altogether in the HT-9, including a 6SJ5 first speech amplifier, a 6J5 second speech amplifier and five rectifier tubes—two 5Z3s, two 866s and one 80.

***A good share of that weight was concentrated in the half-dozen transformers mounted on the HT-9 chassis. But even they weren't sufficient to supply all of the necessary power.***

At Halligan's insistence, the HT-1's band switch included all tuned circuits, including the high-voltage final tank circuit. Careless switching while RF was flowing meant burned contacts and a costly repair job. Samuelson successfully lobbied for a simplified band-switching scheme. Thus the HT-9's five-position band switch selected low-voltage oscillator and exciter circuits, but the final tank circuit employed plug-in coils.

As in the smaller HT-6, antenna matching in the HT-9 was accomplished by tapping a coupling coil that was wound around the final tank coil. Coils were available for any frequency between 1.5 and 18 MHz, plus the 10-meter band.

The HT-9 abandoned the HT-1's rounded art deco styling and chrome trim in favor of a no-nonsense rectangular cabinet. The transmitter's dimensions remained substantial for a tabletop rig, however. The radio was 30 inches wide, a foot tall and 20 inches deep—about the size of a footlocker—and weighed a hefty 120 pounds.

A good share of that weight was concentrated in the half-dozen trans-

formers mounted on the HT-9 chassis. But even they weren't sufficient to supply all of the necessary power. A 45-V dry-cell battery also was required.

"That was the easiest way to get good grid bias on the 814 and really clean keying," Samuelson explained. "We keyed the oscillator and had to keep constant bias on the final, and a battery was the simple way to go." A two-year life was predicted for the battery.

The HT-9's front panel featured an impressive lineup of three milliammeters. Two constantly monitored the 814's grid and plate current while the third measured cathode current in the exciter and modulator stages.

The HT-9 was announced in early 1940 at an introductory price of $199.50. Coils were extra, at $6.65 to $8.95 each.

When America entered World War II the next year, the military put many HT-9s to use. The Army Signal Corps called the rig the T-173/FR.

Production continued throughout the war years. In the 1942 edition of the *ARRL Handbook for Radio Amateurs*, Hallicrafters advertised the price of the HT-9 as $225.

Hallicrafters stopped manufacturing the HT-9 in 1945, but surplus units continued to be marketed by Hallicrafters for another three years as "a real ham rig with medium power and maximum flexibility." The advertised price in 1947 was $250, and by 1948 it had climbed to $350.

Into the early 1950s, Leo Meyerson's World Radio Labs catalog and other ham gear dealers still listed new-in-the-crate HT-9s. By then, however, Hallicrafters was promoting its new HT-20 for the 100-W market, touting the HT-20's more modern tube lineup and the suddenly-necessary extensive TVI shielding.

By this time, Samuelson was long-gone from Hallicrafters. He resigned his post as engineering vice president in 1946. His impressive list of credits had grown to include the HT-11 and HT-12 marine radio-telephone units. He also had a hand in Hallicrafters receiver development, including design of the gear drivetrain for the venerable SX-28.

"I left Hallicrafters to fulfill a promise I'd made to myself years earlier that I'd continue my education to get at least a master's degree," Samuelson explained. By 1950, he'd earned a master's degree *and* a Ph.D. in electrical engineering from Northwestern University.

He then signed on with Motorola's government electronics division, quickly rising to the post of chief engineer and, by the time he retired in 1976, division director for research and development.

Samuelson described his time with Hallicrafters as "the best experience a young radio engineer could've had in that era…I cherish the memories of those years."

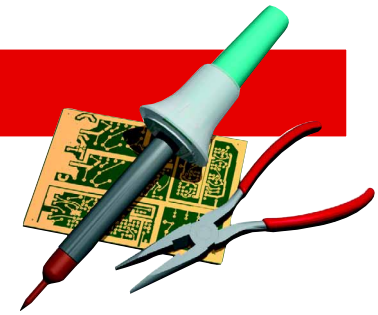
Samuelson also fondly remembered the HT-6 and HT-9 as "two of my favorite brain-children." He was surprised and pleased to know examples still are around in ham shacks and occasionally on the air more than a half-century after he penned the circuits.

"I never dreamed they'd last this long," he admitted. "I guess we *really* must've done something right."

Note: This article was originally published in the June 1992 issue of *Electric Radio*. For more information contact: *Electric Radio*, 14643 County Road G, Cortez, CO 81321-9575; tel 970-564-9185; **er@frontier.net**.

*You can contact the author at 1031 E. University, Springfield, MO 65807;* **k0myw@att.net**.


**The HT-9 appears in this Hallicrafters advertisement in the April 1940 *QST*.**



# The Doctor is IN

**Q Lou, KB6JLI, asks, "While reading an advertisement for a vertical antenna, I noticed the ad mentioned that no radials are needed, but it also says that you need to use an 80-foot counterpoise. Please clarify for me the difference between a radial and counterpoise. Aren't they basically the same?"**

A The difference between the terms "radial" and "counterpoise" is subtle, but significant. Radials usually consist of multiple bare wires either buried in, or laid upon, the ground and are not tuned to a specific frequency. Such wires don't really show a resonance because they are coupled so heavily to the lossy Earth. Their purpose is solely to reduce ground losses (very good information on this topic can be found in the 19th edition of *The ARRL Antenna Book*, starting on page 6-24).

A counterpoise is a wire or group of wires mounted close to ground, but insulated from ground, to form a low-impedance, high-capacitance path to ground. The purpose of a counterpoise is to provide an RF ground for the antenna.

**Q John, KD5JUP, asks, "I'm a new ham and I was wondering if you could suggest some active HF bands that I might monitor to get a sense of what goes on there. I presently hold a Technician license, but I can listen with my TS-430S transceiver. Can you suggest a few HF 'hot spots'?"**

A A frequency chart is a good tool for new hams. One is available for download and printing from the ARRLWeb at www.arrl.org/field/regulations/bands.html. Or, you may request one by sending an SASE to:

ARRL
Field and Education Services
225 Main St
Newington, CT 06111
…and ask for the US Amateur Band Chart.

The key to capturing hams on the air is knowing which bands are open, and therefore in use, at what times of the day and year.

For the most part, 20 meters (14.000-14.350 MHz) is open from early morning to late evening all year around and is a "round-the-world" band—the best place to hear DX (foreign) stations. You should be able to turn your radio on and tune between 14.000 and 14.060 MHz and hear CW; and 14.150 and 14.350 and hear SSB just about any time from 8 AM to 8 PM Local, almost 365 days a year.

Eighty meters is a "local" band and is populated in the early morning (before folks go to work) and early to late evening, but the band is more active in the winter than in the summer. Summer produces electrical storms that emit static that can be heard for hundreds of miles. The upper portion of the phone sub-band (3.850-4.000 MHz) is densely populated with conversations on all sorts of topics. A plus is that on this band you can almost always hear both sides of the conversation.

Forty meters is a 24-hour-a-day band. It is good out to about 300 miles during the day and worldwide at night. CW is fun all the time on this band, but foreign broadcast stations start to creep into the phone portion in late afternoon and into wee hours of the morning.

Fifteen meters often has activity in the daytime, but it tends to fall off in the evening. The same is true of 17 meters.

Ten meters is a different animal. It is greatly affected by the solar cycle. A good place to look for activity is in the phone portion between 28.400 and 28.500 MHz. Since we're presently at the peak of a solar cycle, 10 meters will open almost every day from early morning to evening. At the bottom of the cycle (probably around the year 2005), 10-meter band openings will not be as common.

**Q Juan, KB3CJG, asks, "I have a problem with my dual-band (VHF/UHF) mobile FM transceiver, a Yaesu FT-8100. When I install it in my car I cannot transmit. The voltage of my car battery appears to be a bit low (around 12 V, as reported by the rig's built-in voltmeter) and the FT-8100 manual recommends 13.8 V. I have no problem operating at home using a 13.8 V power supply. How can I solve this problem?"**

A It sounds like you have a bad battery, voltage regulator or alternator, or a "partial short" (a low resistance that shouldn't be there) in your automotive electrical system.

Take your car to a mechanic and have your battery system checked with your rig disconnected. If there is a problem, such as the battery not holding a charge, or a faulty alternator, get it fixed. My guess is that the mechanic will find a problem.

However, if everything is okay, then disconnect the automobile cables from the fully charged battery. Connect your rig to the battery and see if it operates. This will tell you if you have a "partial short" in the car.

If all of the above are good, then make sure that you have a good *direct* connection from your rig to the battery (no substitutes such as the fuse block or cigarette lighter!).

**Q I have a Cushcraft AR-270 Dual Band (2-meter/70-cm) Ringo antenna mounted on the side of my house. I changed its location the other day and checked the SWR after installing coax. It now reads 5:1. I changed coax, checked it again and the SWR is still 5:1. I have checked all connections and everything seems in good shape. What's next?**

A By any chance, when you relocated the antenna, did you mount it near (within 6 feet or so) anything metal of a significant size? If so, the Ringo is probably "coupling" to this and changing the antenna's resonance as a result. If not, there may have been something internal to the antenna that broke when you moved it.

**Q I have always worked CW, until I went mobile. Because I drive a stick shift, it is hard to do CW while driving the hills of Pennsylvania (although it can be done). I thought that I would give SSB a chance, but I am having trouble tuning the signals for clarity. I think I am not tuning properly because I have difficulty getting a signal that I can understand, and when I do, I turn out to be way off their receive frequency. Can you give me some pointers?**

A The best tuning of an SSB signal is accomplished by tuning from the high pitch to the low. I'll explain.

As you know, on 160, 80, and 40 meters, lower sideband is used and on the higher bands, upper sideband is the norm. Let's use 20 meters as an example.

Set your rig for 20-meters and upper sideband. Tune down to the lower end of the 20-meter phone band (14.150 MHz) and slowly tune up in frequency. You will soon hear a high-pitched squeaky voice. Keep tuning slowly and you will hear the pitch become lower and lower. Soon it will become intelligible, but still too high. Keep on tuning up and the voice will eventually sound natural. There, you've done it!

If you continue tuning up, the voice will become lower and lower until it sounds like a 45 RPM record played at 33 RPM, then it will become unintelligible again.

On the bands that use lower sideband, the process is reversed. You start at the *upper* portion of the band and tune *down* slowly. The voices will go from the squeaky down to intelligible speech.

**Q Ray, K4YDI, asks, "I have just put up a used vertical antenna. I'm not getting the SWR I want (1.5:1 or less). Would an antenna tuner improve the match and make the antenna work better?"**

A Unfortunately, you did not mention what SWR you are seeing now. An antenna tuner may bring your SWR down to 1:1, but if your SWR is already under 2:1, it is not necessary.

Remember that an antenna tuner doesn't tune the antenna—it only matches the impedance shown at the station end of the coax to that of the transceiver. Your transceiver is probably capable of delivering its full output at the 2:1 SWR, so a sufficient portion of your RF output is already reaching the antenna.

Whether your antenna radiates most of that power depends on the physical characteristics of the antenna and its associated ground system, not the impedance seen by the transmitter.

To improve the radiation of a vertical, make sure you have a good ground/radial system. Don't rely on a single ground rod driven into the soil. Try stringing out as many radial wires as you can by just laying the wires directly on the ground—the more the better—and connecting them together at your antenna's ground point. Your SWR may not be reduced (it may even rise), but I'm willing to bet that your antenna will "play" better. If you find this to be the case, *then* you can worry about burying the wires to keep them out of harm's way.

**Q Craig, KC8POE, asks, "I am a new ham and I am studying for my General license. When shopping for radios, I keep seeing the terms WARC and MARS. Can you elaborate? What are they, and do I use them when using my radios?"**

A WARC stands for World Administrative Radio Conference. These are the folks (meeting in Geneva, Switzerland) who allocate radio frequencies. At the 1979 WARC they gave Amateur Radio three additional HF bands:

30-meters: 10,100-10,150 kHz
17-meters: 18,068-18,168 kHz
12-meters: 24,890-24,990 kHz

To this day, many hams call them the WARC bands.

Amateur radio gear made before 1979 was not capable of operating in these new bands. Almost all modern radios, however, offer these bands as standard features.

MARS stands for Military Affiliate Radio System. This is an organization that runs traffic nets on designated frequencies just above or below most Amateur Radio bands. MARS stations also run phone patches from troops overseas. This was very popular during the Viet Nam and Gulf Wars. Most MARS members are volunteers that make their time and stations available, although there are some MARS stations on US military bases.

Most radios in the past were manufactured so that the tuning circuits would work slightly above and below the amateur bands, allowing them to run on MARS frequencies.

Today's solid state transceivers are capable of operating across the whole HF spectrum and are locked out by the microprocessor from operating outside the amateur bands. A procedure must be performed to "open up" the MARS frequencies. Military personnel at a military installation may operate using only the MARS license, but civilian volunteers must have an Amateur Radio license and a MARS authorization and special call sign for use on MARS frequencies.

**Q I've been using a G5RV antenna for years. It was damaged in a windstorm recently. It broke where the ladder line connects to the dipole. Can this be easily repaired, or should I just break down and buy another antenna?**

A This is a minor repair. Clean the areas to be reconnected using sandpaper, emery cloth or steel wool until the metal is shiny. Make a good mechanical connection depending on where the break is and how it connects. If there is an eye for the wire to go through, loop the wire and twist it tight. If you are connecting wire to wire, twist the wires together so that they make a strong connection. Solder the connection using rosin flux solder.

Soldering outdoors can be difficult because any cool breeze keeps the connection from getting hot enough to melt the solder. Either use a torch, or bring the antenna indoors for this repair.

**Q Clayton, KE4RTM, asks, "I have a simple question regarding a 5-V Lambda power supply. On the output side there are –S and –V, ground, and +S and +V terminals. The V terminals are reading +5 volts. What are the S terminals for?"**

A On a power supply with +/–V and +/–S terminals, the S terminals are very likely "sense" inputs. In circumstances where the current draw might cause a significant voltage drop in the cable you are using to connect the power supply to the load, you would connect the sense terminals to the load via separate wires. The sense terminals would read the voltage at the load and relay that information back to the regulator circuit. If the voltage at the load drops, the sense circuit detects this and adjusts the output of the supply to a higher voltage so that the voltage on the load comes back up to the proper supply voltage.

Because there is very little current draw in the sense circuit itself, the wires connecting the S terminals to the load can be small gauge, even if the wires that supply power from the V terminals are quite large.

For many applications, the voltage drop is not so critical, so the manufacturer often includes shorting bars that connect the V and S terminals together at the supply.

---

**Do you have a question or a problem? Ask the doctor! Send your questions (no telephone calls, please) to: "The Doctor," ARRL, 225 Main St, Newington, CT 06111; doctor@arrl.org; www.arrl.org/tis/.** QST

# STRAYS

### I would like to get in touch with...

◊…any ham who has operated from Nigeria within the last 20 years. Please contact Ade Talabi, M1ETW, PO Box 19464, London E4 6FP, United Kingdom, or e-mail **adetalabi@ hotmail.com**.

◊…fellow owners of Collins 204F-1 HF amplifiers. Please e-mail Steve Hajducek at **n2ckh@cybercomm.net**.

Next Strays

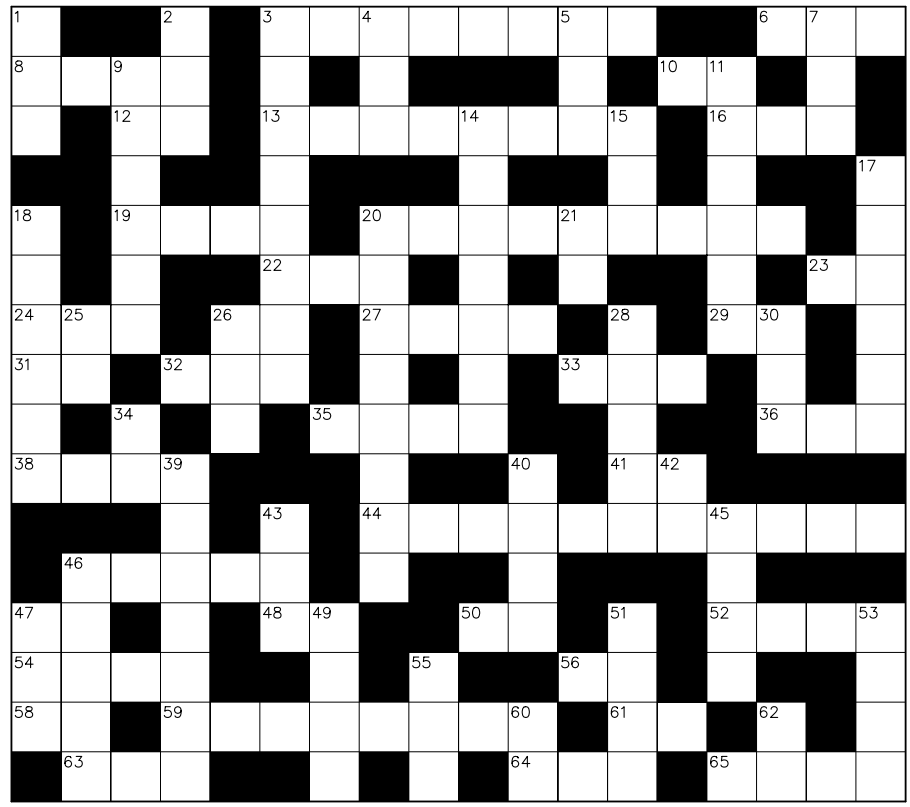
By H. Ward Silver, N0AX

# Test Your Knowledge!

## QSLs and awards are flip sides of the same coin. Fill in the blanks and "win" your own personal prize.

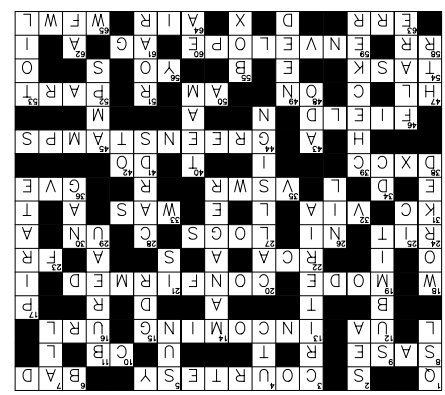
**Across**

3. The final _____ of a QSO
6. If the K-index is high, conditions are…
8. Send one of these with your QSL
10. Band just below 10 meters
12. Russian prefix
13. Keep envelopes at the _____ bureau if they require them.
16. Web site address (abbreviation)
19. CW, SSB or digital
20. When you get the QSL, the QSO is _____
22. Radio company—_____ Victor (abbreviation)
23. Reunion Island prefix
24. Receiver incremental tuning (abbreviation)
26. Nickel (chemical symbol)
27. DXpeditions bring these home
29. United Nations
31. Old abbreviation for frequency
32. QSL ____ the bureau
33. Most popular American award
35. Indicates degree of mismatch
36. CW abbreviation for "give"
38. The second oldest DX award
41. Just _____ it
44. Put these in the envelope with the QSL
46. Local card checkers
47. Korean prefix
48. You have to be _____ the air to make the QSOs
50. Amplitude modulation
52. A portion
54. A job
56. Rocky's favorite country (prefix)
58. Railroad (abbreviation)
59. What the post office sees
61. Silver (chemical symbol)
63. Mistake
64. Fastest type of mail
65. When in doubt



**Down**

1. Confirms a QSO
2. For a good signal, set up by the _____
3. These must be satisfied to get an award
4. World time (abbreviation)
5. Propagation depends on this heavenly body
7. A #1 Honor Rollee has worked them _____
9. To send for checking
11. Handles QSLs
14. Person who answers QSLs
15. The old East Germany (abbreviation)
17. A slim
18. In the log
20. Your on-the-air identity
21. DX _____
25. Integrated circuit (abbreviation)
26. A bad surprise (abbreviation)
28. QSL _____
30. Remind
34. Direct current (abbreviation)
39. A person who examines cards
40. Group effort
42. Old timer
43. Much about nothing
45. Big signals come from these
46. Bad news from the sun
47. Heater (abbreviation)
49. Something you haven't worked, you _____
51. Sound of a pileup
53. Hard work
55. 88 is the number in Moscow
60. Spanish prefix
62. Africa (abbreviation)



**22916 107th Ave SW**
**Vashon, WA 98070**

By Charles "Chuck" Duey, KI0AG

# Tricks, Hints and Tips for the Portable Satellite Operator

Working the ham satellites from tropical islands, mountaintops or your backyard is easy and fun—if you have the right equipment and a little specialized know-how. Come and get it!

Working Amateur Radio satellites from remote or otherwise interesting locations can provide a rewarding experience for travelers and contacted stations. Working other stations as part of a vacation or business travel changes the very nature of the excursion. There are a few tricks to making predictable, solid contacts, but with a few items added to your briefcase or suitcase, it's easy to work even the lowest of passes.

For successful contacts, you must hear the satellite and the satellite must hear you. Most stations that have difficulty making contacts have problems hearing the satellite. Because "propagation is always good in space," if you can hear the bird loud and clear, making a contact is usually just a matter of finding the right transmit frequency and using the right QSO timing. To reverse the old saying: "If you can hear 'em you can work 'em." That's especially true for satellites!

Some ops transmit through satellites they can't even hear. These stations are known as "Alligators"—they're all mouth and no ears. To avoid earning this unflattering label for yourself, you must be able to hear your transmitted signal in the satellite's downlink. Once you hear your own signals coming down from the bird, you know you're making a round-trip instead of a one-way.

On most passes in view of populated areas there are a large number of stations trying to work the satellite simultaneously. This can make it difficult or impossible for a portable, low-power station to get through. Weekends and holidays require extra patience! Working passes that are low on the horizon (with fewer active stations) usually generates more log entries for portable ops.

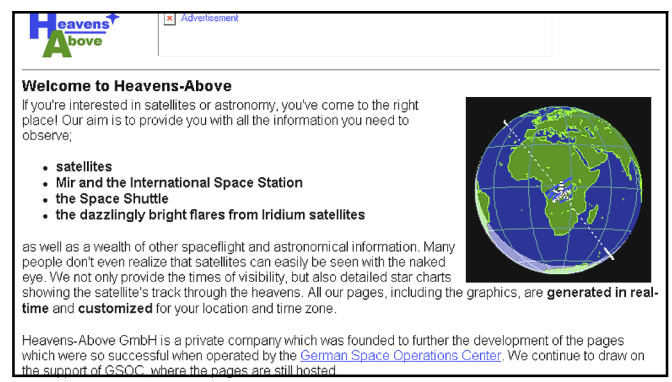
Test your portable satellite techniques using the easiest birds: the FM repeater satellites, OSCARs 14, 27 and 35. Of course, you'll need some way to predict when the satellites will be soaring overhead. Satellite software from sources such as AMSAT (**www.amsat.org**) make this relatively straightforward. You can also obtain pass predictions up to 24 hours in advance on the Web at **www.heavens-above.com**.

## Working with H-T Antennas

Although most hand-held antennas don't have enough gain to hear much of a satellite pass, a few are usable on parts of a pass. In years past it was difficult to hear AO-27, but UO-14 and SO-35 have much stronger downlink signals.

Higher-gain antennas are better, of course, and this means that longer H-T antennas usually work better than short, stubby whips. SO-35 has a 2-meter downlink which, for the same antenna gain, has a much lower path loss than 70 cm. Unfortunately, this means that the SO-35 uplink will suffer from the same loss as the AO-27 and UO-14 downlinks. On UO-14 and AO-27—with H-T antennas—the 70-cm frequency is the one to concentrate on.


**The author makes a satellite QSO using the "rental car" technique.**




**Satellite pass predictions are available on the Web at www.heavens-above.com.**

AO-27 and UO-14 have 70-cm downlinks, which makes receiving more difficult. To hear these two satellites, local objects and terrain can be used to boost the signals. One of the most common tricks is to turn your hand-held upside down. With the radio inverted, signals from ground reflections help boost the signal. Using headphones, the radio can be moved up and down to find the best position.

This works well on receive, but transmitting without a remote microphone is difficult. The upside-down radio works best for passes that are 10° to 30° above the horizon. For overhead passes, holding the radio about four inches above a vehicle roof or hood often works well.

If you can suffer the stares of those passing by, there is actually a procedure that works well with Diamond RH77CA (or equivalent) whip antennas and a typical rental car! Park the car in a north-south direction with the hood facing the direction in which the satellite will first appear above the horizon. At the start of the pass, hold the antenna about four inches from the front of the hood. A good reflection at the start of the pass can often be found there. When the satellite reaches about 15° elevation, there is a sweet spot between the hood and the windshield. Holding the radio vertically with the antenna connector at roof level works for overhead and some medium-elevation passes. Toward the end of the pass, move to the trunk area, where good reflections can usually be found. The "rental car" technique works well on UO-14 but is marginal on AO-27.

On UO-14 and AO-27, using a rubber duck or whip antenna is quite a disadvantage during crowded passes. Although AO-27 can usually be worked with 100 mW and a rubber duck, the FM capture effect "captures" the strongest signal and "ignores" weaker signals in the same part of the transponder.

You can easily hear SO-35 on a rubber duck, but transmitting is a bit trickier. The transmit frequency must be adjusted for the Doppler shift or it will be impossible to work other stations. Headphones and full-duplex operation are suggested. The following table of frequency adjustments should help you work the popular FM satellites (see Table 1).

Although you can hear SO-35 while in a hotel room or basement with a rubber duck antenna, the 70-cm uplink (SO-35) and downlink (AO-27 and UO-14) connections are nearly impossible. Most commercial buildings are made with metal wall studs or metal reinforced concrete. If getting out in the open isn't possible, a window or a balcony (better) will do. Several contacts have been made using balcony railing reflectors.

## The Arrow Satellite Antenna

With two lightweight antennas on one boom, the Arrow antenna is perfect for portable satellite operation. To make a similar antenna from commercial parts, mount a three-element 2-meter Yagi and a seven-element 70-cm Yagi at right angles on the same boom. Although this can be "quick rigged" with most commercial antennas, the Arrow's ease of assembly is what makes it so portable.

The Arrow's orthogonal antennas don't usually pose a problem, but if the satellites were ground-based and their antennas were of the same polarity, the crossed Yagi design *would* be a problem. Because the signals from the satellites pass through the ionosphere, they change polarity because of Faraday rotation.[1] By the time the signals reach the surface of the Earth the original polarization has been "scrambled." If the 2-meter and 70-cm link signals happen to be of the same polarity, a slight twist of the antenna (twist of the wrist) will even things out. It's az-el Armstrong rotation at its finest!

On AO-27 the Arrow's seven elements on 70 cm allow operation down to the horizon with no obstructions. UO-14 has a stronger downlink, so contacts can be made even with some obstructions. SO-35 can be worked horizon to horizon with 3 W as long as there are no other stations transmitting at the same time. The antenna also works for FO-20/29, although it adds more complexity to the operation. At perigee AO-10 can be worked with the Arrow, but for safety reasons do not hold the antenna when operating with more than 10 W.

Low passes are where the Arrow antenna really shines. These produce the best DX and are typically less crowded. As the satellite skims the horizon, hold the antenna close to the ground. The SWR *is* affected, but the orientation captures beneficial ground reflections as well, which can boost the signal just before loss of signal (LOS). This technique allows a station in Barrow, Alaska, to contact stations in the lower 48 with ease. The flat tundra makes for ideal reflections. Mountaintops have a good horizon, but they do not have good reflecting surfaces. The peaks tend to produce severe picket fencing.

When using *any* antenna it's important to look at the surrounding terrain and sky. Watch the sky for thunderstorms. A good rule of thumb is, "no thunderclouds overhead, no strikes within five miles." Look up to see if there are power lines or trees in the way. Power lines tend to interfere and can be dangerous. Also look on top of local buildings and mountaintops for antennas. Finally, look around and mentally trace the satellite pass. With just a little planning, even urban settings can provide near horizon-to-horizon visibility.

To work any of the satellites with a linear antenna, start with the antenna pointed toward the spot where the satellite will initially appear above the horizon. On FM, once the satellite is visible the receiver will start to "quiet"—but don't transmit yet. Twist your wrist slightly to peak the signal polarity, then peak the signal by moving the antenna back and forth a bit. As the satellite rises above the horizon the signal should come in clear.

On crowded passes, the first part of the pass often yields more contacts than when the bird is overhead. As the satellite moves up in the sky, slowly track it by once again peaking the signal—first with polarity then with position. While overhead, AO-27 tends to have a weak-signal zone just after zenith. If the signal suddenly drops, twist the antenna and search in the area of the sky it was just occupying. UO-14 has similar fades, but they're more random and are usually shorter lived. SO-35, with its strong downlink, usually has no fading problems.

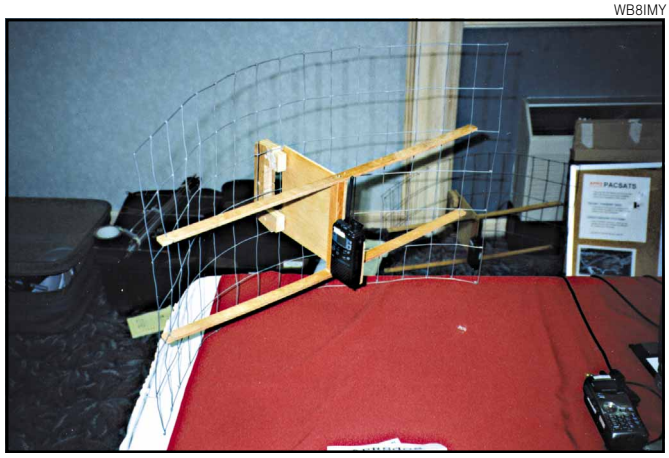
If the horizon is uncluttered toward the end of the pass, don't be surprised if there is some ground enhancement as the satellite sets. The signal will come out of the noise for about 30 seconds and then suddenly stop when the satellite moves below the horizon.

[1]Notes appear on page 57.

**Table 1**

| Satellite | AO-27 | | UO-14 | | SO-35 | |
|---|---|---|---|---|---|---|
| *Time* | *Transmit* | *Receive* | *Transmit* | *Receive* | *Transmit* | *Receive* |
| AOS (start) | 145.850 | 436.805 | 145.975 | 435.080 | 436.280 | 145.830 |
| AOS+3 Minutes | 145.850 | 436.800 | 145.975 | 435.075 | 436.285 | 145.830 |
| Zenith (maximum) | 145.850 | 436.795 | 145.975 | 435.070 | 436.290 | 145.825 |
| Zenith+1 Minute | 145.855 | 436.790 | 145.980 | 435.065 | 436.295 | 145.825 |
| LOS–3 Minutes | 145.855 | 436.785 | 145.980 | 435.060 | 436.300 | 145.825 |

WB8IMY



**Bob Bruninga, WB4APR, devised this clever homebrew reflector for H-T satellite operating. If all you have is an H-T and a rubber duck, you might as well use a parabolic reflector to focus the energy at the radio!**

Working through SO-35 with the Arrow Antenna is more difficult than on AO-27 and UO-14. There are three elements on 2 meters and seven elements on 70 cm, which causes the beam widths of the two frequencies to be quite different. It takes a bit more practice to maximize the signal strength on both bands simultaneously. Once the 2-meter signal is peaked and it's okay to transmit, be ready to make some adjustments. Because the polarity of the 70-cm antenna is not yet adjusted, a quick twist of the wrist might be needed at the start of each transmission.

## Portable Sats on SSB

The 2-meter and 70-cm SSB satellites can also be worked portable. Although there are no suitable 2-meter/70-cm dual-band SSB H-Ts, there are several usable radios. The Yaesu FT-847 and the ICOM IC-821 are both small enough and light enough to fit in a backpack or suitcase. If a vehicle is available, use a properly fused power cable with jumper cable clips to connect directly to the battery. The cigarette lighter socket usually doesn't have the capacity to run the radio at full power.

If a convenient vehicle isn't available, a good 18-A/h gel cell battery works well. Although sealed batteries are more expensive and slightly heavier, spilling acid in your backpack is not recommended, so don't substitute a traditional lead-acid battery! When using larger mobile radios, your Arrow Antenna may require a tripod.

Working the SSB satellites is a bit more difficult than the FM birds. The frequency must be adjusted almost continuously for Doppler shift. Also, finding the satellite can be difficult because there's no FM carrier to monitor. To start the pass it's best to have the initial Doppler shift programmed into the radio's memory. Although an antenna tripod helps by freeing up a hand, the antenna still needs to be adjusted. As the pass starts and ends, the antenna can stay in one place for two to four minutes. In the middle of the pass you'll probably have to move the antenna quickly to keep the signal peaked. It's common to lose track of the satellite as it transits overhead.

## Interference

Although it's not always an option, it's best to stay away from cities and high-power RF sources. Before working a pass, take a quick listen to see if there is any interference. Of the three types of interference—receiver overload, intermodulation products and harmonic interference—receiver overload is the easiest to understand. The radio's first amplifier receives unwanted signals that prevent reception of the much-weaker satellite signals. On 70 cm, common offenders are 450-MHz business and public-safety repeaters and TV channel 14. Some hamfests have ATV stations on 70 cm. Intermodulation products can come from nearby sources or from stations several miles away. Harmonic interference comes from nearby sources or transmitter splatter. All of these types of interference can be heard in most major cities and in the vicinity of major broadcasting sites.

To overcome receiver overload, reduce the offending signal by pointing the antenna away from the source or by using a filter. Par Electronics makes a nice notch filter for 152 MHz. (Notch filters work if you know the frequency of the source signal.) Interdigital band-pass filters such as the one in the *ARRL UHF/Microwave Projects Manual* also make excellent interference blockers.[2] Although filters help reduce the interference, there is always an insertion loss that attenuates desired signals as well.

Intermodulation interference is caused by receiver overload or the mixing of two other sources. Remember that when signals *f1* and *f2* are mixed, first-order harmonics are produced at *f1–f2* and *f1+f2*. Most radios have a band-pass filter and a mixer where the local oscillator is mixed with received signals to generate the intermediate frequency (IF). One common problem with the Yaesu FT-530, for example, is that the 2-meter IF is 15.25 MHz. A repeater at 147.300 MHz and NOAA Weather at 162.550 MHz mix to generate 15.25 MHz. This causes problems when both transmitters are in range. To fix this problem, one of the two signals needs to be blocked. Because 147.300 MHz is in a ham band, it's easiest to notch out 162.550 MHz with the Par Electronics filter.

Harmonic interference can usually only be fixed at the source. Although pointing the antenna away from the source helps, it usually doesn't reduce the problem enough to work a good pass. A hamfest station at 145.6 MHz, for example, will have some third-harmonic output at 436.800 MHz. Other than asking the operator to hold off during the satellite pass, there's not a lot that can be done. It's common to have –60 dB third harmonic energy from a nearby transmitter swamp the weak satellite downlink signal. On the other hand, a commercial transmitter that was splattering all over the 440-MHz band was fixed immediately, clearing the way for operation the next day.

Again, the best way to eliminate all interference is to move away from the source.

## Conclusion

There are many ways and methods to enjoy portable satellite operation. Just remember: Amidst the din of interference and high-powered stations—have a little fun!

Catch ya' on the birds!

### Sources

- Arrow Antenna, 1803 S Greeley Hwy #B, Cheyenne, WY 82007; **hometown.aol.com/arrow146/index.html**.
- Digi-Key, 701 Brooks Ave S, Thief River Falls, MN 56701; **www.digikey.com**.
- Par Electronics, PO Box 645, Glenville, NC 28736-0645; tel 828-743-1338; **www.rf-filters.com/**.

### Notes

[1] *Antennas and Propagation for Wireless Communications Systems*, by Simon R. Sauders, Wiley and Sons, LTD, 1999.

[2] See *The ARRL UHF/Microwave Projects Manual*, pp 6-1 and 6-2, "Interdigital Bandpass Filters for Amateur VHF/UHF Applications," by Reed E. Fisher, W2CQH.

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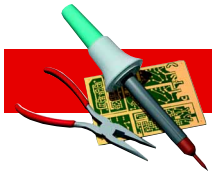
**Westminster, CO 80020**
**ki0ag@amsat.org**



# HINTS & KINKS

## MORE ON DECAL PANEL LABELS

◊ A discussion of panel-labeling methods appeared in the September 2000 column.[1] Since then, I've received more information about decal paper for ink-jet printers. Here is an edited excerpt from a marketing e-mail on the subject:

At the time, we carried paper that could be used only with a laser printer or run through a color copier. That was then, this is now.

Bel Inc[2] is proud to announce the introduction of our new line of specialty papers specially formulated to be used with your ink-jet printer. This paper along with your printer and software will allow you to create the most spectacular decals you can image and then place them on plastic, metal, ceramic, candles, soap, wood and so on. You can order on-line from our Web page at **www.beldecal.com**. The prices for 8.5×11 sheets are as follows: 25 sheets, $31.25; 50 sheets, $57.50; 75 sheets, $78.75; 100 sheets, $100. Shipping and handling was $5 at the time of publication.—*Bob Schetgen, KU7G, Hints and Kinks Editor*

## ADDING A TRICKLE-CHARGE MODE TO KENWOOD'S WALL-TRANSFORMER CHARGER

◊ Kenwood TH-215 and TH-26 H-Ts come with wall-transformer 45-mA battery chargers that recharge the 500-mAh battery pack in about 14 hours. The manufacturer cautions against prolonged overcharging at this rate.

Sometimes, however, an H-T must be kept on trickle charge to guarantee that the batteries are always fully charged for use in an emergency. In addition, you sometimes don't know the state of your batteries' charge and would like to "top them up" without endangering them.

[1]J. Bandy, W0UT, "Decal Labels Made Easy," *QST*, Sep 2000, p 69.
[2]BEL Inc, 6080 NW 84th Ave, Miami, FL 33166; tel 305-593-0911, fax 305-593-1011; **beldecal@bellsouth.net**;

### The Math is Easy!

It's simple to calculate the resistor value. From the wall wart's rated current ($I_{out}$) and output voltage ($E_{out}$), compute the resistance of the battery being charged ($R_b$):

Then compute a new battery resistance ($R1+R_b$) that would pass the desired charge rate, $I_{trickle}$.

The nearest standard-value resistor should be fine for *R1*. There's one more thing to consider: *R1* turns the charger's extra output into heat as $I_{trickle}^2 \times R1$ watts. R1 should be rated for at least twice the calculated wattage.—*Bob Schetgen, KU7G, Hints and Kinks Editor*

A safe trickle-charge rate for a NiCd battery is about *C*/30 mA, where *C* is the capacity in milliampere hours. At this rate, a full charge would take days, but the charger can be left connected indefinitely without overheating the batteries. The batteries should still be cycled occasionally—that is, discharged and then recharged at the normal 14-hour rate—to prevent loss of capacity.

Adding a trickle-charge mode to Kenwood's "wall wart" is remarkably simple—put a 330-Ω resistor (R1) in series with the charger. (That's a 1/4-W resistor—*Ed*) If you add a switch, too, you can bypass the resistor for normal 14-hour charging (see Figure 1). I built the switch and resistor into a 35-mm film can. The LED on the Kenwood charger glows when charging at the normal rate but not at the reduced rate.

Other chargers can be modified similarly; you can find the appropriate resistance by experiment or as shown in the "The Math is Easy!" sidebar. For example, I've modified the charger for my Skil Twist power screwdriver so that it delivers a 20-mA trickle. Because the screwdriver is only used occasionally for brief periods, keeping it constantly "topped up" is much more important than obtaining maximum battery performance.—*Michael A. Covington, N4TMI, 285 St George Dr, Athens, GA 30606*

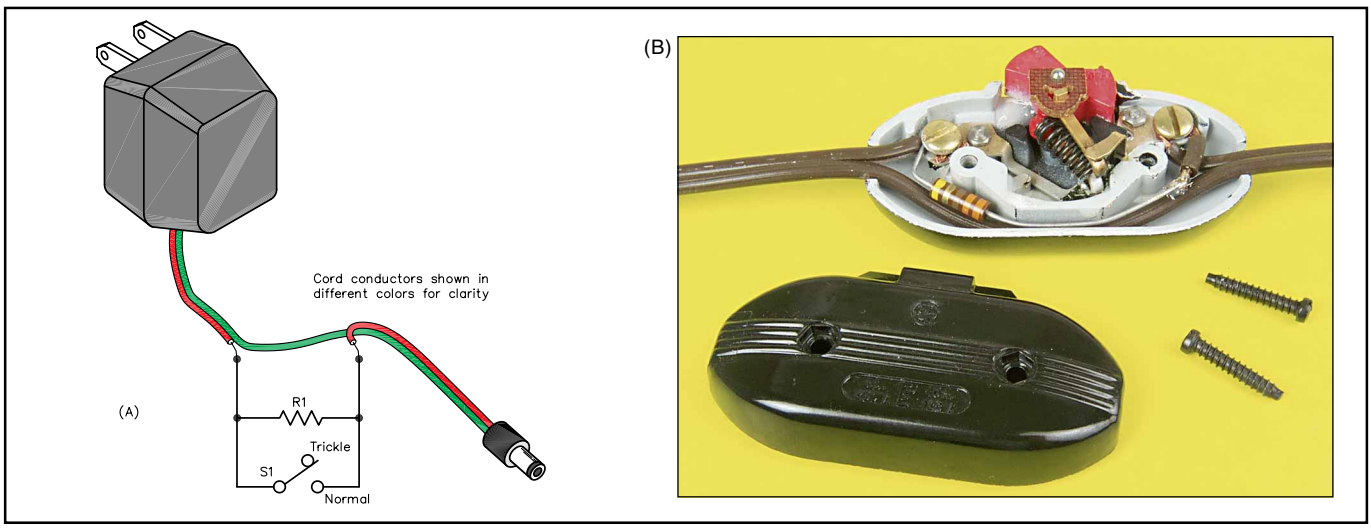



**Figure 1—Details of N4TMI's wall-wart modification. (A) shows the schematic. (B) shows a 1/2-W resistor installed in an after-market lamp-cord switch.**

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor

## AUDIO RFI AND THE TS-850

◊ After upgrading to the Kenwood TS-850, I began to experience RF feedback in my microphone audio. Several hours of trial and elimination indicated the problem was in the Heil Pro headset. A quick call to Heil Sound had Donna talking me through the "usual" fixes for the problem. After the "usual" fixes were unsuccessful, Bob Heil came on the line. Bob related a problem with a floating ground that appears in many TS-450 and TS-850 radios. Since the problem did not happen with another desk mic that has a **HI/LO** impedance switch, I decided to try isolating the Heil Pro microphone from the rig input with a 1:1 audio transformer (RadioShack 273-1374 or equivalent, see Figure 2).

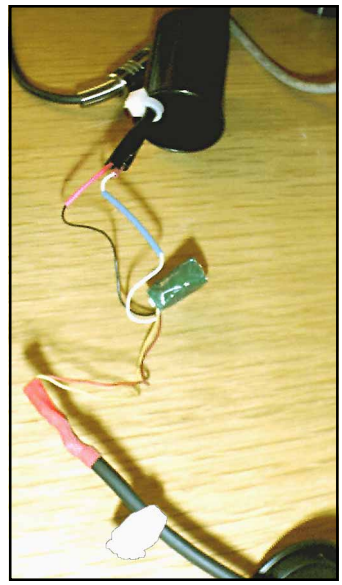


**Figure 2—A 1:1 audio transformer cures audio RFI in a TS-850. See text for details.**

To avoid cutting the headset cables, I used 3.5-mm mono jack and plug set to insert the transformer in the line. The worst part was trying to decide how to package the unit. While looking around my shack, I noticed an old 35-mm film container. The shielded cables enter the container through holes drilled in each end. Inside, they are soldered the leads to the 1:1 transformer (see Figure 3). Hoping for the best, I fired up the rig and amplifier, then called "CQ." I listened to the monitor with an amazed look on my face (at least that's what my wife called it!). The audio is clear, with no trace of RF. If you experience a similar problem, give this a try!—*Tom Branch, K4NR, 8559 Athenian, Universal City, TX 71848;* **k4nr@arrl.net.**

**Figure 3—K4NR housed the isolation transformer in a film can with the connections made through two-conductor plugs and jacks on "pigtails."**

## MORE ON D-104 MODS FROM W1AW

◊ In Steven Fraasch's, K0SF, article "Adapting the Astatic D-104 Microphone for Use with Modern Transceivers," (*QST*, Aug 1999, pp 34-36) he suggests that an Archer TLC274 op amp can be used in place of the LPC662AIM.

Here at W1AW, I have an Astatic D-104 (with the UG8 base) and decided to modify it for use with our Kenwood radios.

Because I couldn't find the LPC662AIM chip locally, I opted to use an Archer TLC274 single-supply quad op amp. Unlike the 8-pin LPC662AIM, the TLC 274 is a 14-pin DIP. The pin locations for the first op amp in this package almost match, except for ground and $V_{dd}$. On the TLC274, pin 4 is $V_{dd}$ and pin 11 is ground. The TLC274 is a quad op amp, so the other three op amps are unused in this application. I tied the unused op amps together in the same fashion as the unused one (U1B) in the LPC662AIM circuit.

Since the original three-conductor (with ground) mic cable I had was rather old, I replaced it with a new four-conductor (with ground) cable. This allowed me to pull +8 V dc from the Kenwood microphone connector without using the dc power insertion circuit as shown in the article.

I didn't want to produce a printed circuit board, so I decided to fuse a 14-pin wire-wrap socket and perfboard for the circuit. Even with this high-profile socket, the board fit nicely in the UG8 base.

I wired up an eight-pin mic plug for our Kenwood TS-950 and tuned to 20 meters. Although I did need crank the mic gain down a bit, on-the air tests proved quite favorable.

The Astatic D-104 is a nice addition to the equipment complement here at the station. This microphone now sits proudly in one of our W1AW visitor-operating studios.—*Joe Carcia, NJ1Q, ARRL Staff*

## PROTECTING COAX CONNECTIONS

◊ Over the years I have used various methods to protect exposed coax conductors at their attachment to the antenna. When a coax connector is used, one can protect from the weather with coax sealer, however when the center conductor and the braid are directly connected to the antenna, this does not work very well.

While getting some boating equipment last fall at a West Marine (marine supplies) store, I ran across a product called Liquid Electrical Tape.[3] I have used this on my coax with good results. It comes in a small can with an applicator brush attached to the cap. When it is applied to the braid of the coax it soaks in and makes a good seal. It is flexible also. I use it on the center conductor and dielectric and on the soldered connections. Since it fills the spaces in the braid and between the braid and the insulation, it prevents water from infiltrating and causing the coax to deteriorate.

This material could also be used to apply to coax connectors.

Liquid Electrical Tape comes in black and in white. I have used the black. I use a generous amount and when it hardens, I apply a second coat. After it dries it is not sticky or messy.—*Hugh Inness-Brown, W2IB, 5351 State Hwy 37, Ogcensburg, NY 13669;* **w2ib@sric.com**

[3]The maker is PDI Inc (Plastic Dip International), 3760 Flowerfield Rd, PO Box 130, Circle Pines, MN 55014-0130; tel 763-785-2156, 800-969-5432, fax 763-785-2058; **www.plastidip.com/liqtape.html**. They make Liquid Electrical Tape in red, green, black and white. PDI products are sold at many home-improvement and hardware stores.

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

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

# STRAYS

## LOOKING FOR A SPECIFIC PRODUCTS RECEIVER MANUAL

◊ I need a manual for a Specific Products Los Angeles WWVC receiver. It is double conversion with 16 miniature tubes plus a CRT and Collins mechanical filter. It covers WWV from 2.5 to 20 MHz. I'm also interested in spare boards or extender boards for a Norlin SR-2090 VHF/UHF receiver. E-mail Hank, WD5JFR, at **wd5jfr@oklahoma.net**.

Previous • Next Strays

By Dave Patton, NT1N

# The 2001 Annual Board Meeting

## Tough issues and tough decisions make for a transition.

Ed Metzger, W9PRN, missed another Presidential Inauguration. As George W. Bush was being sworn in as the 43rd President of the US, Ed wryly lamented the fact that once again he missed a ceremony because he was doing what he loved—working for the betterment of Amateur Radio at an ARRL Board meeting. At age 88, Ed, one of the ARRL's most well known and universally respected Amateurs, could have been home in Springfield, Illinois, instead of in Dallas at the meeting. In elections held last fall, Ed, the longtime incumbent Central Division Director, was unseated by Dick Isely, W9GIG. Nevertheless, after 44 years of service to ARRL there wasn't much chance of Ed staying home—nor did the Board want him to. Ed's first duty at the meeting was to contribute $50,000 from the ARRL Foundation (of which he is President) to the ARRL—seed money to add to the $85,000 already raised for the ARRL Education Project, aka The Big Project. But they didn't just want "his money." Throughout the meeting, Board members and Officers fondly commented on their past interactions with Ed, and spoke respectfully of his advice and guidance over the years. Just before noon on Saturday, to the clamor of a standing ovation, Ed Metzger became the newest Honorary Vice President of the League (see Minute 55).

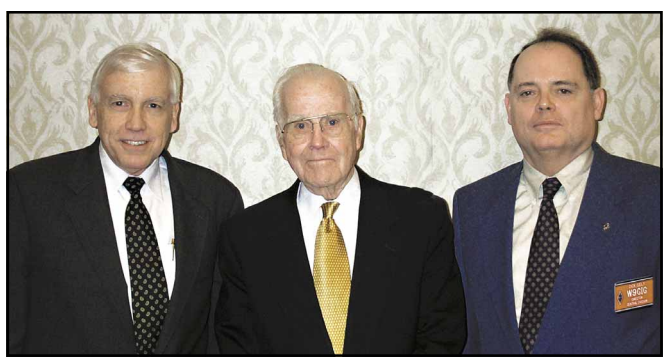
Chairing his second full meeting at the helm of the world's largest Amateur Radio association, Jim Haynie, W5JBP, had a full plate of contentious, difficult, and time-consuming issues. The members' elected representatives were ready to rumble—including the newest ones, Rev Morton, WS7W, Vice Director for the Rocky Mountain Division from Wyoming, and as mentioned earlier, Director Isely, W9GIG from St Charles, Illinois. Steve Mendelsohn, W2ML, was back as Hudson Division Vice Director after spending 17 years in ARRL service—most recently as First Vice President. The issues on the table spanned the encyclopedia of Amateur Radio and the League, including spectrum strategies, the future of Morse code, membership dues, Headquarters management, honoring the Dayton Hamvention, 160 meters, Part 15 devices, the future of QSLing, the International Humanitarian Award, Club 2000 Achievement Awards, the 107th Congress and the ARRL's legislative agenda, studying the field organization, and the refarming of the HF Novice bands.

### The Spectrum

For radio amateurs, spectrum is pretty important. We wouldn't have much fun or be of much service without spectrum, and one of the primary jobs of the ARRL and the Board of Directors is to work tirelessly to defend it, study it, obtain more of it, and use it. While there were no Board directives regarding 40 meters at this meeting, there was a lot of discussion about the mechanics and politics involved with securing a 300 kHz, exclusive worldwide amateur allocation at 40 meters. The Board anticipates that the World Radiocommunication Conference in 2003 will be the meeting at which 40 meters will be "fixed" or ignored for the foreseeable future. Thus the sentiment of the Board was that the ARRL should pull out all the stops to achieve the 300 kHz, exclusive 40 meter band for the world's amateurs.

The 160 meter band was also a subject for discussion as the Board decided to form an *ad hoc* committee to solicit member input regarding the ARRL band plan here. The Board also ordered a study of the possibilities for obtaining FCC permission for a limited number of narrow bandwidth beacons to operate on 160 meters (adhering to the ARRL band plan of course) for the purpose of studying propagation (see Minutes 68, 69).

The *ad hoc* Spectrum Strategy Commit-



The Central Division "transition" team: (l-r) Vice Director Howie Huntington, K9KM; Honorary Vice President Ed Metzger, W9PRN; and Director Dick Isely, W9GIG.

PHOTO BY ROD STAFFORD, W6ROD

Discussing Morse code during a break in the Meeting are; (l-r) Dakota Division Director Jay Bellows, K0QB; Delta Divison Director Rick Roderick, K5UR; and Northwestern Division Director Greg Milnes, W7OZ.

**Summary of Major Board Actions**

| *Minute* | *Purpose* | *Action* |
|---|---|---|
| **Elections** | | |
| 9 | Executive Committee | Elected |
| 10 | Foundation Directors | Elected |
| 55 | Honorary Vice President Metzger | Elected |
| **Organizational** | | |
| 18 | Minimum requirements to host ARRL National Convention | Established |
| 38 | Committee Appointments | Conveyed |
| 40 | *Ad Hoc* Spectrum Strategy Committee | Retained |
| 41 | Study impact of Part 15 devices on Amateur Frequencies | Approved |
| 42 | Study of aggregate noise levels | Approved |
| 45 | Development of high-speed digital networks technology | Approved |
| 46 | Development of software defined radio technology | Approved |
| 56-60 | Management reorganization | Approved |
| 61-64 | Dues increase | Approved |
| 65 | ARRL position on Morse code | Approved |
| 66 | ARRL position on HF Novice band refarming | Approved |
| 67 | Study reorganization of the Field organization | Approved |
| 68 | Create *Ad Hoc* Committee to solicit membership input regarding the ARRL 160 meter band plan | President |
| 69 | Study licensing of low power 160 meter beacons | Approved |

**The Rocky Mountain Division leaders: Vice Director Rev Morton, WS7W, and Director Walt Stinson, W0CP.**

tee delivered a report on its work studying the impact of unlicensed Part 15 devices that share Amateur Radio spectrum above 30 MHz. The report talks about the possibilities for, and use of, noise level studies over time (noise from Part 15 devices and other sources) and how Amateurs can participate in the studies. The Board asked the committee to continue its work, including a study of the impact of similar unlicensed devices on Amateur spectrum below 30 MHz (see Minutes 39, 40, 41, 42 and 43). As part of the 2001 budget, the Board approved the hiring of an additional lab engineer to concentrate on electromagnetic compatibility issues.

The Board also decided to tackle its post-restructuring study about refarming the HF Novice bands. The ARRL had submitted a refarming proposal with its original pre-restructuring petition to the FCC in 1998, but the FCC in its Report and Order declined to act on any refarming issues until the effects of restructuring on the Amateur bands were known. To prepare for this upcoming event, the Board established an *ad hoc* committee that will solicit membership input to update the ARRL's position on refarming the HF Novice bands. The five-member panel will be named by President Haynie and will report to the Board in one year (see Minute 66).

## The Dues

Working on spectrum issues is just one of the many things that the League does which requires funding. Membership in ARRL means far more than a subscription to *QST*, the best Amateur Radio publication in the world. As Executive Vice President Sumner wrote in February's "It Seems to Us" in *QST*, the dues partially fund international work with the IARU and the ITU; a significant presence in Washington, and performing advocacy for Amateur Radio there; a large and important field organization; awards programs and contest programs; QSL bureaus; call sign administration functions and the volunteer examination department, and many other programs. With the high demand for new programs, postal increases, increases in printing and paper costs, the Board, led by the recommendations of the Administration and Finance committee, voted to increase dues beginning in July 2001 (the last increase was in July 1997). Regular memberships will go to $39/year and senior citizen dues will be $34/year. The A&F Committee presented an extensive analysis of the League's finances, and the dues increase is just a part of the League's "financial transition plan" for the future. It was clear to the Board that raising the dues is imperative to the future operation of the League (see Minutes 61, 62, 63 and 64).

## The Management

In addition to raising dues, the Board concluded that the League's activities can no longer be fully funded with dues and publication revenues, and that there must be an increasing reliance on voluntary contributions to make up the difference. As part of a top level management reorganization, the Board approved the creation of a Development Department which will professionalize the way the League approaches voluntary contributions. According to Executive Vice President Dave Sumner, K1ZZ, "If this strategy is successful, there will be a significant source of alternative revenue available to support ARRL activities and initiatives." The Board also agreed to adjust the management structure at Headquarters which included increasing the duties of Executive Vice President Sumner to include those of Chief Executive Officer. Publications Manager and *QST* Editor, Mark Wilson, K1RO, will serve as the ARRL's Chief Operating Officer where he will oversee sales and marketing, publications, field volunteer and membership services, the ARRL Lab, and other day-to-day Headquarters activities (See Minutes 56, 57, 58, 59 and 60).

## The Morse Code

After months of deliberation, considering opinions from constituents, and soul searching, ARRL's Board revised its position on whether Morse code proficiency should continue to be an international licensing requirement for operation below 30 MHz. The Board approved a resolution that "recognizes and accepts" that the Morse requirement likely will be dropped from Article S25 of the international *Radio Regulations* at the 2003 World Radiocommunication Conference (WRC-03). But while the Board acknowledged that Morse will disappear as an international requirement, it held the line on retaining a domestic Morse requirement, saying that each country should be allowed to determine for itself whether it wants to have a Morse code requirement.

The Board's Morse code resolution, which did not receive unanimous approval, declared that deletion of the Article S25 international requirement at WRC-03 "should not automatically or immediately mean a similar removal of the Morse code from Part 97 of the FCC rules." Morse code, the Board affirmed, deserves continued support as an important operating mode as well as in terms of spectrum and "should be retained as a testing element in the US" although that question will not arise until sometime after 2003. The resolution also called on ARRL Headquarters staff to "develop a program designed to promote the use of Morse."

The resolution supersedes all previous Board policy statements regarding Morse code and Article S25. It means the ARRL will not oppose proposals at the IARU

Region 2 Conference next October or at WRC-03 that might call for elimination of the Morse requirement from the international *Radio Regulations* (see Minute 65).

## The Awards

Amateur Radio was featured prominently in the news in 2000. Fourteen of those stories were nominated for the 2000 Bill Leonard, W2SKE, Professional Media Award. The winner chosen by the ARRL Public Relations Committee was Marjorie Wertz, a staff writer at the *Standard Observer* in Irwin, Pennsylvania, for her article "There's More to This Hobby Than Meets the Eye." Ms Wertz will receive $500 and an engraved plaque for her story (see Minute 48).

The ARRL initiated a terrific series of award competitions for affiliated clubs in 2000 and these contests were hard fought. The Club 2000 Achievement Awards is an incentive program aimed at recognizing clubs that are growing, thriving, and developing positive community relations. Clubs are evaluated on a points system in such activities as emergency and public service participation, public relations and recruitment, ARRL member recruitment, volunteer examination participation, educational and instructional innovation, and field organization volunteerism. Each winning club will receive an award of $1000 from the ARRL Foundation!

There are four categories of clubs for competition purposes. The first, for clubs with more than 100 members, was won by the 10-70 Repeater Association of Wanaque, New Jersey, for their activities in support of Amateur Radio recruitment and education, public service and technical achievement. In the 25–100 member club category, the winner is the Big Rapids Area Amateur Radio Club of Big Rapids, Michigan, who are providing public service for their community, public relations for Amateur Radio, and technical advancement opportunities for their clubs, while keeping a family-oriented focus for their members. In the small clubs category, less than 25 members, the winner is the Peninsula Electronics Amateur Radio Society of Hampton, Virginia, for their dedication to the promoting of Amateur Radio in their community. And finally, the School Club category award was given to the Central Bible College Amateur Radio Club of Springfield, Missouri, for their efforts in promoting Amateur Radio and its services within their college community (see Minutes 20, 21, 22 and 23).

The 2000 ARRL International Humanitarian Award was awarded to the members and participants of the Hurricane Watch Net and its manager Jerry Herman, N3BDW, for their continuing efforts over the years to provide advisories and extraordinary service for the benefit of the international community in times of threat of hurricane.

PHOTO BY ROD STAFFORD, W6ROD

**Our neighbors to the south and the north helping to cement excellent relations in the Americas: Pedro Mucharraz, XE1PM, President of the Federacion Mexicana de Radio Experimentadores (FMRE), and Ken Oelke, VE6AFO, President of the Radio Amateurs of Canada.**

### Committee Reports Available

Copies of the reports of the Standing Committees of the Board, *Ad Hoc* Committees, and Advisory Committees are available on the ARRLWeb site, and are also available in hard copy form to members for the cost of reproduction and mailing. Here's a list of these reports, as presented at the 2001 Annual Meeting, with the number of pages and cost of each. Please order by document number and include your remittance with your order. Send orders to Secretary, ARRL.

| *Committee* | *Doc. #* | *Pages* | *Cost ($)* |
|---|---|---|---|
| Membership Services | 19 | 20 | 2 |
| Volunteer Resources | 20 | 6 | 1 |
| Admin and Finance | 21 | 8 | 1 |
| Enforcement | 24 | 1 | 1 |
| Tech Task Force | 26 | 14 | 2 |
| SAREX/ARISS | 25 | 4 | 1 |
| RFI | 28 | 8 | 1 |
| RF Safety | 29 | 6 | 1 |
| Public Relations | 30 | 1 | 1 |
| Historical | 35 | 24 | 3 |
| Industry Advisory | 31 | 1 | 1 |
| Pres. Roundtable | 32 | 1 | 1 |
| Nat'l Convention | 33 | 1 | 1 |
| Spectrum Strategy | 34 | 30 | 3 |
| CAC | 37 | 1 | 1 |
| DXAC | 38 | 1 | 1 |

## The Best of the Rest

There were so many things happening at this Board meeting that it isn't possible to include them all in this article! Be sure to check the table "Summary of Major Board Actions" to help you find other items and then navigate through the Minutes on the following pages (see Minute 19).

Can you believe that the Dayton Hamvention is 50 years old this year? The Board recognized this historic occasion with a salute to the Dayton Amateur Radio Association and the many committee members who make this legendary event with "the world's largest Amateur Radio flea market" the success that it is (see Minute 53).

With the nation unveiling new political leaders and the new 107th Congress, the Board adopted seven positions that will constitute the ARRL's official legislative program. These positions include a resolution urging Congressional support to clarify the FCC's limited preemption policy PRB-1 governing Amateur Radio antennas to incorporate private land-use preclusions such as deed restrictions and restrictive covenants (see Minute 51).

The transition continued into the 21st Century as the Board continued to plow forward in its work to offer an alternative to cumbersome award application processes and QSLing. The time-honored and still highly popular traditional form of QSLing with cards, is on the verge of having competition as the staff reported progress with its "Logbook of the World" concept. Logbook of the World is envisioned to be a system that will be integrated into existing and proposed Headquarters systems, using applied security methods, to provide various electronic benefits including award updates, QSO confirmation, image product creation, scientific and research material, and other member benefits through an interactive Web-based interface. Eventually the system will allow users who have submitted their log data to be able to find automatically-confirmed QSOs from within the data; automatically apply for all ARRL awards (picture yourself not having to fill in awards applications by hand!); view their own DXCC, WAS, WAC, and VUCC data on-line; and see near-real-time updates of the DXCC standings. As postage and general overall QSLing costs continue to rise, such a system represents a modern alternative to the QSL card. The word "alternative" is important. When Logbook of the World is fully operational, traditional QSL cards will continue to be accepted for all ARRL awards programs (see Minute 16).

There is a heavy agenda of work ahead for both the ARRL and all amateurs. Everything the League does, including work in Washington, working with industry to monitor Part 15 devices, studying band plans, battling for a primary 300-kHz allocation at 40 meters, creating Logbook of the World, and indeed protecting Amateur Radio are for all hams everywhere. But, the Board needs your help. We need each and every member's support both financially and figuratively to reach these objectives. We can do it together. QST

# MOVED & SECONDED

## 2001 ANNUAL MEETING OF THE ARRL BOARD OF DIRECTORS

### January 19-20, 2001

*Summary Agenda*

*1. Roll Call*
*2. Moment of Silence*
*3. Consideration of the Agenda for the meeting*
*4. Approval of the Minutes of the 2000 Second Meeting*
*5. Election of Executive Committee*
*6. Election of ARRL Foundation Directors*
*7. Reports by the Officers*
*8. Receive Reports and consider recommendations of the committees*
*9. Directors' motions*

1. Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in annual session at the Dallas/Fort Worth Airport Marriott Hotel, in Irving, Texas, on Friday, January 19, and Saturday, January 20, 2001. The meeting was called to order at 8:30 AM CST, January 19, with President Jim Haynie, W5JBP, in the Chair and the following Directors present:

Bernie Fuller, N3EFN, Atlantic Division; George R. Isely, W9GIG, Central Division; Jay Bellows, K0QB, Dakota Division; Rick Roderick, K5UR, Delta Division; George Race, WB8BGY, Great Lakes Division; Frank Fallon, N2FF, Hudson Division; Wade Walstrom, W0EJ, Midwest Division; Tom Frenaye, K1KI, New England Division; Greg Milnes, W7OZ, Northwestern Division; James Maxwell, W6CF, Pacific Division; C. Dennis Bodson, W4PWF, Roanoke Division; Walt Stinson, W0CP, Rocky Mountain Division; Frank M. Butler, W4RH, Southeastern Division; Fried Heyn, WA6WZO, Southwestern Division; Coy Day, N5OK, West Gulf Division

Also present without vote were Joel M. Harrison, W5ZN, First Vice President; Kay C. Craigie, WT3P, Vice President; John C. Kanode, N4MM, Vice President; Rodney J. Stafford, W6ROD, International Affairs Vice President; James McCobb, W1LLU, Treasurer; David Sumner, K1ZZ, Executive Vice President and Secretary. Chief Financial Officer Barry J. Shelley, N1VXY, was present in his capacity as an officer of the Corporation.

Also in attendance at the invitation of the Board as observers were the following Vice Directors: William Edgar, N3LLR, Atlantic Division; Howard Huntington, K9KM, Central Division; Twila Greenheck, N0JPH, Dakota Division; Henry Leggette, WD4Q, Delta Division; Gary Johnston, KI4LA, Great Lakes Division; Stephen A. Mendelsohn, W2ML, Hudson Division; Bruce Frahm, K0BJ, Midwest Division; Mike Raisbeck, K1TWF, New England Division; Jim Fenstermaker, K9JF, Northwestern Division; Robert Vallio, W6RGG, Pacific Division; Les Shattuck, K4NK, Roanoke Division; Rev Morton, WS7W, Rocky Mountain Division; Evelyn Gauzens, W4WYR, Southeastern Division; Art Goddard, W6XD, Southwestern Division; and David Woolweaver, K5RAV, West Gulf Division. Also present were ARRL Foundation President Edmond A. Metzger, W9PRN; General Counsel Christopher D. Imlay, W3KD; Publications Manager Mark Wilson, K1RO; Membership Services Manager Wayne Mills, N7NG; Field and Educational Services Manager Rosalie White, K1STO; Technical Relations Manager Paul Rinaldo, W4RI; Technical Relations Specialist Jon Siverling, WB3ERA, and Special Assistant to the Executive Vice President David Patton, NT1N. Also present as guests of the Board were Radio Amateurs of Canada (RAC) President Ken Oelke, VE6AFO, and Federacion Mexicana de Radio Experimentadores (FMRE) President Pedro Mucharraz Gonzales, XE1PM.

2. The assembly observed a moment of silence in recollection of Radio Amateurs who have passed away since the previous Board meeting, especially Steven C. Affens, K3SA; Alf Almedal, LA5QK; Carlos Caceres, KD4SYB; Joseph J. Carr, K4IPV; Wilber "Bill" Dearing, W5QN; Bradford M. Erickson, N1SGL; Jack D. Gant, W5GM; William R. Gary, K8CSG; Peter J. Gellert, W2WSS; W. Scudder Georgia, KD3P; Millard L. "Gib" Gibson, W7JIE; Jim Gray, W1XU; James W. Hatherley, WA1TBY; Dean Haworth, AC0S; Aubrey Hawkins, KC5USI; Jim Knochenhauer, K6ITL; Paul Kokoszyna, KA1TRF; Deborah Wayne Lucero, KC6UEJ; Alfredo Luciano, LU6DJX; Val Marshall, K5WOD; Gerald W. Mason, W1KRF; Lorraine S. Matthew, N4ZCF; Darlana D. Mayo, N2DB; Lew "Mac" McCoy, W1ICP; J.W. McLeland, W9ATK; Sue Miller, W9YL; Piero Moroni, I5TDJ; John Perrone, NI0A; Colin Richards, VK6BPU/9M2CR; Guillermo Schwarz, KP3S and wife Hildelisa; Pero Simundza, 9A4SP; Lew E. Tepfer, W6FVV; Dr. Marvin S. Weinreb, KE6WPH; Thomas White, K0VZR; Winifred Dow Williams, ex-7FG; Norman Young, W1HX and Tisha Young, W1NUO.

3. On motion of Mr. Race, seconded by Mr. Bodson, it was VOTED unanimously to approve the agenda for the meeting.

4. On motion of Mr. Heyn, seconded by Mr. Frenaye, the Minutes of the 2000 Second Meeting were ADOPTED.

5. Mr. Oelke conveyed the greetings of the Radio Amateurs of Canada, Inc., and thanked the Board for its continuing support. He noted his pleasure in being able to meet Mr. Mucharraz, President of FMRE.

6. Mr. Mucharraz conveyed the greetings of Federacion Mexicana de Radio Experimentadores (FMRE) and expressed his appreciation for the opportunity to attend this Board meeting in what will be the first of many opportunities to cooperate with his neighbors to the north.

7. Mr. Metzger conveyed the greetings of the ARRL Foundation, and reported that the Foundation is healthy and is receiving increased numbers of applications for each of the many scholarships available.

8. At this point, new and returning members of the assembly were introduced: Mr. Isely from the Central Division, Mr. Morton from the Rocky Mountain Division, and Mr. Mendelsohn from the Hudson Division.

9. The Chair opened nominations for Director members of the Executive Committee for one-year terms. Mr. Butler nominated Mr. Frenaye, Mr. Maxwell nominated Mr. Heyn, Mr. Heyn nominated Mr. Butler, and Mr. Frenaye nominated Mr. Fallon. On motion of Mr. Race, seconded by Mr. Bodson, it was VOTED unanimously to close nominations, whereupon the Chair declared Mr. Frenaye, Mr. Heyn, Mr. Butler, and Mr. Fallon elected as Executive Committee members. (Applause).

10. At this time Mr. Bellows was invited to offer nominations for Directors of the ARRL Foundation. Mr. Bellows nominated Mr. Butler, Mr. Fallon, and Mr. Metzger for three-year terms. On motion of Mr. Bellows, seconded by Mr. Heyn, it was VOTED unanimously that nominations are closed and Messrs. Butler, Fallon, and Metzger are elected as Directors of the ARRL Foundation. (Applause)

11. At this point, the officers reported on their activities during the second half of 2000. President Haynie began his report with comments about the beginning of the ARRL Education Project in Dallas, where seven schools are participating in a pilot program. The great enthusiasm among the kids spread to their parents and resulted in a separate Amateur Radio class for the adults. Outside donations and the work of staff have progressed nicely toward the creation of the Education Project. President Haynie completed 25 trips on behalf of ARRL during the year, and he plans to continue with an ambitious travel schedule in 2001 that includes at least one trip to each division. Relations with the FCC have improved, while stronger relationships between ARRL and the Society of Broadcast Engineers, National Association of Radio and Telecommunication Engineers, and REACT International, were all forged through individual Memoranda of Understanding. First Vice President Harrison related his opinions on the nature of the Morse Code testing debate raging throughout Amateur Radio. He also commented on the entirely different issue, as compared to the CW debate, of the worldwide need for the harmonization of the 40 meter band. Vice President Craigie thanked the Board and staff for their support in both service and contributions during the first stages of the creation of the ARRL Education project. She also expressed her appreciation for the excellent *QST* articles covering the newer digital modes that spurred renewed interest in on-the-air activities. Vice President Kanode relayed his serious concerns over the ever increasing illegal activities in the Amateur bands from both domestic and foreign intruders. International Affairs Vice President Stafford described the importance of displaying unity and cohesiveness within the IARU Region 2 societies in order to have a successful outcome on 40 meter realignment. He also commented on the upcoming Region 2 meeting in Guatemala which will require ARRL to vote on the controversial S25 International Morse Code testing issue, and that the Board needs to carefully consider how it will vote. At the end of Mr. Stafford's report the Board recessed from 9:54 until 10:21 AM.

12. Mr. McCobb, as Treasurer, reported on stock market activity, and the effects of the market's downturn on League investments over the last year. He also reported on the sale of certain stocks to protect the League's position and reported that ARRL's holdings were 53 percent in stocks and the rest in cash and fixed income securities.

13. Chief Financial Officer Shelley's report included descriptions of the positive outcome of FCC Amateur license restructuring on ARRL's financial results—especially in the first half of 2000. Several necessary capital improvements were made to ARRL Headquarters including a new telephone system, new flooring in the Circulation and Publication Sales Department, and a new roof on the rear half of the building. The ARRL.net email forwarding service has proven popular with over 43,000 members using the service. Mr. Shelley also noted that there are no other "big events" like restructuring on the horizon that are likely to boost revenues.

14. General Counsel Imlay supplemented his extensive written report with a description of the status of the 219-220 MHz band to which the Amateur Service has limited access. This access may be further limited if the primary services expand their operations. Mr. Imlay then continued his report by describing changes at the FCC, various spectrum allocation issues, and non-spectrum issues including spread spectrum rule changes, and antenna and RFI cases.

15. Technical Relations Manager Rinaldo described the most important work ongoing in his office which involves preparations for WRC-2003 including issues of 7 MHz realignment; commercial broadcast desires for additional HF spectrum; modification of Article S25 and consequential changes to Article S1; possible call sign structural

changes, synthetic aperture radars seeking an allocation in the band 420-470 MHz and general defense of the Amateur Radio spectrum. At the end of Mr. Rinaldo's presentation the assembly recessed for lunch at 12:07 PM. A group photo session followed lunch.

16. The Chair reconvened the meeting at 1:26 PM with all persons hereinbefore mentioned present, whereupon Mr. Roderick, as Chairman, presented the report of the Membership Services Committee. He reported that the DXCC program enjoyed a 23 percent increase in activity in 2000, and that the DeSoto Cup has been designed and the DXCC Challenge is well under way. The DXCC Card Checker program has been successful, with over 1000 field-checked applications submitted in 2000. Mr. Roderick updated the Board with regard to the ARRL's Logbook of the World project, the name given to HQ's electronic confirmation initiative. He said the project is moving along well with final specifications due from consultants shortly. Logbook of the World, using applied security methods, is intended to be integrated into existing and proposed HQ systems to provide various electronic benefits including award updates, QSO confirmation, image product creation, scientific and research material, and other member benefits through an interactive Web-based interface.

17. Executive Vice President Sumner's report began with a description of the important happenings during 2000 including the tremendous media coverage of Amateur Radio surrounding the tragic van Tuijl shooting incident; the 75th anniversary of the IARU; and travel both in country and abroad including the IARU Region 3 conference in Darwin, where the Morse Code issue was addressed. He also described the ARRL VEC's exhaustive work to support the crush of work from restructuring; the success of the *QEX/Communications Quarterly* merger and the continuing success of *NCJ*. He reported that the new Certification program has been an instant hit with the course available so far on the Web, and a backlog of hundreds of members eager to participate. Mr. Sumner added that as the Certification program continues to evolve additional courses will be available through in-person classes and self-study packages, as well as on-line through the Connecticut Distance Learning Consortium.

18. Mr. Race, as Chairman, presented the report of the Volunteer Resources Committee. He described the committee's work on the terms of reference for ARRL's three technical awards, the Certification program, and Section Manager guidance, as well as guidance for other volunteers in the field. He yielded the floor to Mr. Walstrom, who, as Chairman, described the report of the Ad Hoc National Convention Committee which sets forth recommended minimum requirements for an established convention/hamfest to be considered as a possible site for an ARRL National Convention.

19. On motion of Mr. Fuller, seconded by Mr. Butler, it was VOTED unanimously that the ARRL Board of Directors bestow upon the members and participants of the Hurricane Watch Net and its manager Jerry Herman, N3BDW, the 2000 ARRL International Humanitarian Award for their continuing efforts over the years to provide advisories and extraordinary service for the benefit of the international community in times of threat of hurricane.

20. On motion of Mr. Fallon, seconded by Mr. Stinson, it was VOTED unanimously that the ARRL Board of Directors present the ARRL Club 2000 Achievement Award for clubs of 100 or more members, to the 10-70 Repeater Association of Wanaque, New Jersey, for their activities in support of Amateur Radio recruitment and education, public service and technical achievement.

21. On motion of Mr. Bodson, seconded by Mr. Milnes, it was VOTED unanimously that the ARRL Board of Directors present the ARRL Club 2000 Achievement Award for clubs of less than 25 members, to the Peninsula Electronics Amateur Radio Society of Hampton, Virginia, for their dedication to the promoting of Amateur Radio in their community.

22. On motion of Mr. Race, seconded by Mr. Fallon, it was VOTED unanimously that the ARRL Board of Directors present the ARRL Club 2000 Achievement Award for clubs with 25 to 100 members, to the Big Rapids Area Amateur Radio Club of Big Rapids, Michigan, who are providing public service for their community, public relations for Amateur Radio, and technical advancement opportunities for their clubs, while keeping a family-oriented focus for their members.

23. On motion of Mr. Walstrom, seconded by Mr. Roderick, it was VOTED unanimously that the ARRL Board of Directors present the ARRL Club 2000 Achievement Award for school clubs, to the Central Bible College Amateur Radio Club of Springfield, Missouri, for their efforts in promoting Amateur Radio and its services within their college community.

24. Mr. Butler, as Chairman, reported on the activities of the Election Committee. He noted that the last election and ballot counting had gone smoothly.

25. The Chair presented ARRL DX Contest Plaques to Director Stinson for his participation in a multi-operator entry from Christmas Island as T32B in 2000. (Applause).

26. ARRL Foundation President Metzger then presented Mr. Haynie with a check for $50,000 for the ARRL Education Project. (Applause).

27. The Chair re-introduced Mr. Morton and presented him with the lapel pin worn by Directors and Vice Directors. (Applause). The Board was in recess from 2:51 PM until 3:16 PM.

28. Mr. Haynie presented the Executive Committee report. He stressed that in his opinion, the inability of many Amateurs to erect an antenna represents one of the biggest problems in Amateur Radio right now and that the problem is going to get worse. Mr. Haynie will work diligently to convince Congressmen to support our efforts to convince the FCC to apply PRB-1 more broadly. He also discussed various ways in which ARRL can begin the process of gaining grass roots support and increased exposure to legislators at all levels.

29. First Vice President Harrison, as Chairman, presented the report of the Enforcement Task Force. The Task Force is very pleased with the state of enforcement right now and expressed gratitude for the work of Mr. Hollingsworth of the FCC. Mr. Harrison recommends that the committee be dissolved at this time, but that it be emphasized that dissolution does not change the League's long standing commitment to enforcement.

30. First Vice President Harrison then presented the report of the SAREX Working Group. He yielded the floor to Ms. White who described the success of the first three schools to communicate with astronauts aboard the Space Station Alpha. Mr. Harrison explained that the SAREX acronym will continue to be used due to its wide familiarity throughout NASA.

31. Mr. Bodson, as Chairman, delivered the detailed and extensive report documenting the activities of the RFI Task Group. Mr. Bodson expressed deep admiration for the strength of the experience and knowledge of the members of the Task Group. Success has been achieved through cooperation with AT&T in the removal of 90 percent of the Phonex modems that were radiating around 3.525 MHz. Home Phone Networking and VDSL systems now have notches built into their systems that protect Amateur frequencies from interference. Mr. Bodson stressed that the biggest threat to Amateur Radio frequencies comes from Part 15 devices.

32. Mr. Huntington, as Board Liaison, delivered the report of the RF Safety Committee. Mr. Huntington added his praise for this committee as also being one that is well staffed with experts. The Committee's web pages have been moved to public access to benefit both Amateur and non-Amateur communities.

33. Mr. Stinson, as Chairman, presented the report of the Industry Advisory Council. He related that the Council is beginning to have real success as evidenced by industry standards being accepted for two power connectors and two microphone connectors. The Council also developed a plan for submitting ideas to the Japan Amateur Industry Association (JAIA).

34. Mr. Fuller, as Board Liaison, presented the report of the President's Roundtable. The Roundtable has not met since July 2000, but Mr. Fuller reaffirmed the terms and designs of this group whose future meetings and composition remain at the direction of the ARRL President. At this time the Board was in recess from 4:58 PM until 8:45 AM on January 20, 2001, reconvening with John Chwat and Derek Riker of Chwat and Company, and all persons hereinbefore mentioned.

35. Mr. Chwat and Mr. Riker presented the Legislative Affairs report on behalf of Legislative and Public Affairs Manager Steve Mansfield who was unable to attend. Mr. Chwat believes that the new leadership of the House committees combined with equal party representation presents an interesting and positive opportunity for ARRL concerns. He added that he anticipated the Amateur Radio Spectrum Protection Act would be reintroduced in 2001.

36. Mr. Bellows, as Chairman, reported on the activities of the Antenna Case Review and Assistance Committee. The Committee has not yet been presented with a case that meets the committee's requirements for funding.

37. Mr. Frenaye, as Chairman, supplemented the extensive written report of the Historical Committee with comments about the group's fact-finding visits to ARRL HQ, and other museums and display sites. He reports that the committee is studying all the possibilities for ARRL to store, archive, and display artifacts.

38. At this point, The Chair announced the committee appointments as follows: *Administration and Finance*: Directors Stinson, Chairman; Bellows, Day, Fuller, Bodson, Vice Director Fenstermaker, First Vice President Harrison, and Treasurer McCobb. *Membership Services*: Directors Fallon, Chairman; Roderick, Frenaye, Milnes, Isely, Vice Director Vallio, and Vice President Kanode. *Volunteer Resources*: Directors Maxwell, Chairman; Race, Walstrom, Heyn, Butler, Vice President Craigie and International Affairs Vice President Stafford. *Election*: Directors Bellows, Chairman; Frenaye and Fallon. *Industry Advisory Council*: Vice Director Goddard, Chairman. *RFI Task Group*: Director Bodson, Chairman; and Lab Supervisor Ed Hare, W1RFI. *Public Relations*: Vice Director Johnston, liaison. *RF Safety*: Vice Director Huntington, liaison. *Technology Task Force*: First Vice President Harrison, Chairman; Directors Frenaye, Bodson, Vice Director Raisbeck, Technical Affairs Manager Rinaldo, and Lab Supervisor Hare. *Historical*: Directors Frenaye, Chairman; Maxwell, Legislative and Public Affairs Manager Steve Mansfield, N1MZA, Al Cohen, W1FXQ, and Treasurer McCobb. *Antenna Case Review and Assistance*: Directors Bellows, Chairman; Fallon, James O'Connell, W9WU, and General Counsel Imlay. *Spectrum Strategy*: First Vice President Harrison, Chairman; Directors Maxwell, Bodson, Technical Affairs Manager Rinaldo, General Counsel Imlay, and J.P. Kleinhaus, W2XX. *Digital Voice*: Doug Smith, KF6DX, Chairman; Jesse Morris, KC5GTK, John Gibbs, KC7YXD, Gary Barbour, AC4DL, Charles Brain, G4GUO, and George Bednekoff, AC5WO. The Board was in recess from 10:01 AM until 10:21 AM.

39. Mr. Maxwell, as Chairman, supplemented the extensive written report of the Ad Hoc Spectrum Strategy Committee with comments about the seriousness of the threats to Amateur frequen-

cies, especially those above 30 MHz. He related the likelihood that Amateurs will increasingly be forced to share spectrum and that some of those sharing the bands with us will be Part 15 devices which are proliferating. Mr. Maxwell described upcoming noise level studies that will help determine the ultimate effect of such devices in the Amateur bands. He also pointed out that because the entire industry is moving rapidly, the ARRL must maintain its vigilance with regard to devices that may be deployed using our frequency allocations. ARRL also should move to create strategic partnerships in the industry to help head off future problems.

40. On motion of Mr. Heyn, seconded by Mr. Day, it was VOTED unanimously that the Report of the Ad Hoc Spectrum Strategy Committee is received and adopted. The committee is retained and extended for one year, during which time the Committee shall initiate and monitor the projects and recommended initiatives set forth at Section 4.2 of its Report. All work of the Committee shall be completed on or before January of 2002, and the intention of the Board is that, at that time, the Committee will tender to the Board a final report of its actions and further recommendations, and thereafter be dissolved.

41. On motion of Mr. Fallon, seconded by Mr. Bodson, it was VOTED unanimously that the Ad Hoc Spectrum Strategy Committee is tasked with studying the impact of unlicensed devices on Amateur operations below 30 MHz, and formulation of any strategies to address potential or actual interaction between such devices and Amateur stations.

42. On motion of Mr. Bodson, seconded by Mr. Milnes, it was VOTED unanimously that the Ad Hoc Spectrum Strategy Committee is tasked with monitoring the technical and regulatory developments related to the operation of unlicensed and licensed non-Amateur transmitters and intentional radiators in Amateur allocations. This monitoring shall include, but shall not be limited to, periodic reports from ARRL advocacy team participants. The Committee shall encourage increased ARRL participation in telecommunications industry and trade organizations, and shall seek input from Amateur groups with specific operating interests and other strategic partners in carrying out this task.

43. On motion of Mr. Maxwell, seconded by Mr. Fallon, it was VOTED unanimously that the Ad Hoc Spectrum Strategy Committee will pursue the inclusion of volunteer Amateur Radio operators in the study of aggregate noise levels planned and sponsored by the FCC's Technological Advisory Council (TAC). Should that study not be commenced on or before July 1, 2001, or should the methodology of that study as adopted by the TAC be such as to exclude empirical data gathering by Radio Amateurs, the Committee is tasked with the development of a test plan for a noise study to be conducted by ARRL. The ARRL study would determine aggregate noise levels in Amateur allocations in various environmental categories, over a medium term of years. The study would be conducted by measurements by Amateurs and Amateur clubs. The intention of the Board is that the results of such a study, if conducted by ARRL, would be published in professional technical journals and would serve as the basis for a proposed reevaluation of the adequacy of present Part 15 regulations of unlicensed RF devices.

44. First Vice President Harrison, as Chairman, presented the report of the Technology Task Force (TTF). In its report to the TTF the Technology Working Group recommended that three specific technologies be the focus of development studies: Digital Voice, High Speed Digital Networks, and Software Defined Radios. Mr. Harrison said that working groups for High Speed Digital Networks and Software Defined Radios should be created to join the existing working group for Digital Voice.

45. On motion of Mr. Frenaye, seconded by Mr. Butler, it was VOTED unanimously that ARRL proceed with the development of High Speed Digital Networks for the Amateur Service in accordance with the Technology Working Group report. The President shall appoint a group of individuals knowledgeable in the field from the international Amateur community and industry. The group shall report to the Technology Task Force and submit an initial report at the 2001 Second Board Meeting.

46. On motion of Mr. Harrison, seconded by Mr. Bodson, it was VOTED unanimously that ARRL proceed with the development of Software Defined Radios (SDR) for the Amateur Service in accordance with the Technology Working Group report. The President shall appoint a group of individuals knowledgeable in the field from the international Amateur community and industry. The group shall report to the Technology Task Force and submit an initial report at the 2001 Second Board Meeting. Mr. Harrison assumed the Chair at 11:20 AM.

47. President Haynie delivered the report of the Public Relations Committee. He explained that 2000 was a terrific year for Amateur Radio publicity across the country spurred by the tragic van Tuijl shooting incident and the release of the movie *Frequency.* He added that there were 14 candidates for the 2000 Bill Leonard, W2SKE Professional Media Award, which in itself is an indicator of the amount of PR activity last year.

48. On motion of President Haynie, seconded by Mr. Roderick, it was VOTED unanimously that the American Radio Relay League presents the 2000 Bill Leonard, W2SKE, Professional Media Award to Marjorie Wertz of the *Standard Observer* (Irwin, Pennsylvania) for her story "There's More to This Hobby Than Meets the Eye." (Applause). President Haynie returned to the Chair at 11:32 AM.

49. Mr. Frenaye, as liaison, reported on the activities of the Contest Advisory Committee. He said the Committee has been quite active in its task of studying the entire Club Competition program in order to produce a preliminary report to the MSC in March 2001. The Committee is studying the purposes for Club Competition, eligibility issues for submitting scores for clubs, and the club category definitions.

50. Mr. Walstrom, as liaison, delivered the report of the DX Advisory Committee. The DXAC has been quiet with no formal agenda items on its study list, but the group has been informally discussing issues such as electronic QSLing and the DXCC Card Checker program.

51. On motion of Mr. Maxwell, seconded by Mr. Fallon, it was VOTED unanimously that the following seven positions are adopted *en bloc* to constitute the American Radio Relay League's official Legislative Positions during the 107th Congress.

*Position #1: Consistent Application of FCC Limited Preemption Policy Toward Amateur Radio Antenna Systems.*

WHEREAS, the Federal Communications Commission in 1985 established a limited preemption policy which fairly balanced the Federal interest in protecting and enhancing Amateur Radio Emergency and Public Service communications and the legitimate, reasonable exercise of State and local land use jurisdiction; and

WHEREAS, This policy has worked well in the intervening years to encourage reasonable accommodation of Amateur Radio residential antenna systems by municipal land use authorities; and

WHEREAS, Private land use regulations are pervasive and routinely frustrate the Federal interest in promoting Amateur Radio communications, and yet Congress and the FCC have each concluded that FCC clearly does have jurisdiction to preempt or limit private land use regulations to the extent that such regulations frustrate Federal communications policy;

THEREFORE BE IT RESOLVED, that the American Radio Relay League supports nondiscriminatory application of the FCC's longstanding limited preemption policy to all types of land use regulations, in order to effectuate the important Federal interest in protecting and promoting Amateur Radio communications;

AND THEREFORE BE IT FURTHER RESOLVED, that the American Radio Relay League urges Congressional support for the clarification of the FCC limited preemption policy governing residential Amateur Radio antennas, so that private land use authorities cannot preclude, but must reasonably accommodate Amateur Radio communications in subdivisions and communities.

*Position #2: Support for Federal Preemption of Telecommunications Regulation*

WHEREAS, A strong, coordinated national system of telecommunications is in the national interest;

THEREFORE BE IT RESOLVED, the American Radio Relay League supports measures to improve federal management of telecommunications, including strengthening and improving the ability of the FCC to promulgate and enforce reasonable regulation of transmitter and antenna issues, of the resolution of electromagnetic interference, and of operating rules.

*Position #3: Radio Spectrum Management*

WHEREAS, The management of allocation, assignment and auction of radio frequencies is a complex technical task;

AND WHEREAS, spectrum auctions were introduced as a means of ensuring fair and timely assignment of licenses, not as a means of generating revenues to satisfy short-term objectives;

AND WHEREAS, Amateur Radio, police, fire and other traditional public service users save lives and property on an entirely non-commercial basis, but lack the resources to participate in spectrum auctions;

THEREFORE BE IT RESOLVED, the American Radio Relay League believes that spectrum auctions should not be used as a means to offset specific budget items, and that specific spectrum decisions should be made by expert professional agencies not Congress;

AND BE IT FURTHER RESOLVED, the American Radio Relay League believes that public service (including Amateur) radio frequency allocations under current US regulations should now be statutorily exempt from auction or reallocation to commercial services, whether on a primary or secondary basis, and that compensatory spectrum should be allocated whenever FCC or NTIA determine that an existing public service frequency must be reallocated to another radio service.

*Position #4: Preserve and protect Amateur Radio Frequency Allocations*

WHEREAS, Frequencies allocated to the Amateur Radio Service are the technological equivalent of a "national park," where all may enjoy a natural resource for the purpose of experimentation, education and voluntary emergency communications, provided they demonstrate, through testing, that they are responsible users; and protect against interference from unlicensed transmitters such as Part15 devices operating on frequencies allocated to the Amateur Radio Service;.

AND WHEREAS, Americans, through the Amateur Radio Service, may use a limited range of frequencies throughout the radio spectrum, often shared with government services, and where an increasing amount of spectrum is subject to public auction to the benefit of private economic interests;

THEREFORE BE IT RESOLVED, that the American Radio Relay League supports measures that would preserve and protect, on a primary basis, Amateur operator access to existing Amateur Radio Service and Amateur Satellite Service frequencies as a natural resource for the enjoyment of all properly licensed individuals, and protect

against interference from unlicensed transmitters such as Part 15 devices operating on frequencies allocated to the Amateur Radio Service.

*Position #5: Mandatory RFI Standards for Consumer Electronic Devices*

WHEREAS, devices that emit radio energy are proliferating dramatically;

AND WHEREAS, Many home electronic devices lack the necessary filtering and shielding to function properly near the types of transmitters commonly found in residential areas;

AND WHEREAS, it is in the public interest to have a robust, interference-free telecommunications environment;

THEREFORE BE IT RESOLVED, that the American Radio Relay League supports requiring the Federal Communications Commission to develop and implement effective mandatory standards for radio frequency susceptibility of consumer electronic devices.

*Position #6: Opposing Restrictions on Radio Reception*

WHEREAS, In response to a widely publicized incident some in the 105th and 106th Congresses attempted to tighten the laws prohibiting the interception and disclosure of cellular telephone conversations;

AND WHEREAS, laws already exist prohibiting such conduct both in the Communications Act (Sec. 105) and in the "Electronic Communications Privacy Act" provisions of the Criminal Code (18 USC 2510 *et seq*);

AND WHEREAS, communications privacy in general is better achieved by technological advancement than by law or regulation;

AND WHEREAS, Statutory privacy prohibitions impede technological development and have a detrimental effect on a broad range of lawful radio users including some Amateur operators, volunteer fire departments, emergency medical services and others;

THEREFORE BE IT RESOLVED, the American Radio Relay League opposes efforts to expand current prohibitions against cellular and PCS eavesdropping beyond those that already exist, except insofar as such efforts strengthen or clarify existing prohibitions, and are specifically restricted to cellular and PCS services that interface with wireline communication.

*Position #7: Support for the Military Affiliate Radio System*

WHEREAS, Congress has repeatedly emphasized the importance of the Military Affiliate Radio System (MARS) to the well-being of American military personnel overseas, specifically supporting the program in reports on the National Defense Authorization Act for Fiscal Years 1998 and 1999, and this view is shared by the Department of Defense;

AND WHEREAS, the MARS system is estimated to save the American taxpayer as much as $27 million a year;

AND WHEREAS, the volunteers in the Amateur Radio Service provide key communication links in the effective utilization of this important program;

THEREFORE BE IT RESOLVED, the American Radio Relay League urges Congress to support funding, legislation and other measures to maintain a healthy and robust Military Affiliate Radio System.

52. Executive Vice President Sumner reported on behalf of Mr. Moell, K0OV, the Amateur Radio Direction Finding (ARDF) Coordinator, that ARRL assisted with the funding needed to send the U.S. ARDF Team to China to compete in the World ARDF Championships in October 2000.

53. On motion of Mr. Race, seconded by Mr. Walstrom, the Board VOTED unanimously to ADOPT the following resolution:

WHEREAS, the Dayton Hamvention is celebrating its golden, fiftieth anniversary this year, and

WHEREAS, "Hams" from all over the world will converge on Dayton, Ohio for Hamvention 2001, May 18, 19, 20; and

WHEREAS, the Hamvention days will provide educational forums, opportunities to see the newest in equipment and electronic innovations, and the opportunity to socialize with lifelong friends from around the world; and

WHEREAS, Hamvention brings together more than 500 equipment vendors and the legendary world's largest Amateur Radio flea market;

NOW THEREFORE BE IT RESOLVED, that the ARRL Board of Directors, assembled in formal session this day, January 20, 2001, in Irving Texas, does hereby recognize this year's historic Hamvention, and the many members of the committee that make it possible, on the occasion of its fiftieth anniversary.

54. On motion of Mr. Isely, seconded by Mr. Butler, it was VOTED unanimously to waive the 60 day notice requirement and the policy of nominating/electing Honorary Vice Presidents only at the time of the usual election of Officers as specified in ARRL Standing Order # 69 for the purpose of nominating an Honorary Vice President at the Annual Meeting of the ARRL Board of Directors assembled in formal session this day, January 20, 2001.

55. On motion of Mr. Isely, seconded by the entire Board, the Board VOTED unanimously to ADOPT the following resolution:

WHEREAS, Edmond A. Metzger, W9PRN, has served as an appointed and elected official of the American Radio Relay League for the past forty-four (44) years, serving from:

1957 – 1980 as Illinois Section Communications Manager;

1965 – 1981 as Central Division Vice Director;

1981 – 2000 as Central Division Director;

1981 – 2001 as ARRL Foundation Director;

1993 – 2001 as ARRL Foundation President, and

WHEREAS, during his service as Director and Vice Director, he served on the Administration and Finance Committee as its Chairman, the Election Committee as its Chairman, and

WHEREAS, Edmond Metzger established a scholarship providing annual assistance for licensed college students studying engineering, and

WHEREAS, Edmond Metzger served the Springfield, Illinois community as:

A Sangamon Valley Radio Club volunteer instructor for many years;

A member of the Sangamon Valley Chapter of the American Red Cross Board of Directors from 1971 to 1977, and its Trustee of Amateur Radio Station W9DUA; and

A member of the Springfield Board of Education for five (5) years, including serving as its President in 1970 and 1971;

NOW THEREFORE BE IT RESOLVED, that the ARRL Board of Directors assembled in the formal session this day, January 20, 2001, in Irving, Texas, does hereby elect Edmond A. Metzger, W9PRN, Honorary Vice President of the American Radio Relay League. (Applause).

56. The Board recessed for lunch at 11:57 AM returning at 12:58 PM with all persons hereinbefore mentioned present except for Mr. Raisbeck, Mr. Chwat, and Mr. Riker. At this time, Mr. Stinson, as Chairman, presented the report of the Administration and Finance Committee. He outlined the Committee's work over the past year in developing various future scenarios for ARRL and explaining the options that the committee will recommend in order to meet the demands of the future, including: a membership dues increase, a new direction for funding the future operations of ARRL that focuses on voluntary contributions, adding development specialists to work towards increasing voluntary contributions, and Headquarters management reorganization.

57. On motion of Mr. Stinson, seconded by Mr. Bellows, it was VOTED unanimously that the 2001 Administration and Finance Committee Budget proposal, as amended to include management reorganization and the addition of a Development Department, is approved.

58. On motion of Mr. Stinson, seconded by Mr. Roderick, it was VOTED (with all Directors voting in favor, by roll call) that By-Law 36 is modified to read as follows:

*36.* The Board of Directors shall employ an Executive Vice President who shall hold office for such term and upon such compensation as the Board and he may agree upon. The Executive Vice President shall manage the affairs of the League under the direction of the Board of Directors. He shall be deemed a member of the Board, but without vote. He shall attend all Board meetings. He shall be in responsible charge, under the Board of Directors, of all property of the League and shall keep full records. He shall, under the general direction of the Board of Directors, employ such personnel as may be necessary for the effective accomplishment of the purposes of the League. He shall be the Chief Executive Officer of the League. He shall prepare and submit at each Annual Meeting of the Board of Directors a comprehensive report of the progress and status of the affairs of the League and shall furnish to the Board of Directors from time to time such financial information and statements as may be required. He shall perform such other duties as may be assigned to him by the Board of Directors. His entire time shall be devoted to the duties as set forth above. He shall furnish a bond satisfactory to the Board of Directors, the expense of the same to be borne by the League.

59. On motion of Mr. Stinson, seconded by Mr. Bodson, it was VOTED (with all Directors voting in favor, by roll call) that By-Law 37 is modified to read as follows:

*37.* The following officers shall report to the Executive Vice President.

a. The Chief Operating Officer, who shall have responsibility for and supervision over any and all matters relating to publication, advertising, circulation, membership services, field services and volunteer examinations. He shall under the general direction of the Executive Vice President, employ such personnel as may be necessary for the effective accomplishment of the duties set forth in this By-Law. He shall sign checks drawn by the Business Manager. He shall perform such other duties as may be assigned to him by the Executive Vice President. His entire time shall be devoted to the duties as set forth above. He shall furnish a bond satisfactory to the Board of Directors, the expense of the same to be borne by the League.

b. The Chief Financial Officer, who shall have responsibility for and supervision over any matters related to personnel policies, comptroller functions, purchasing and administrative services and data processing. He shall, under the general direction of the Executive Vice President, employ such personnel as may be necessary for the effective accomplishment of the duties set forth above. He shall be the Business Manager of the League. He shall collect all monies due the League and shall deposit the same in the name of the League in the depository specified by the Board of Directors, and shall deliver to the Treasurer such surplus funds as may be available for investment. He shall certify the accuracy of bills and vouchers on which money is to be paid and shall draw and countersign checks. He shall have charge of the books and accounts of the League and shall furnish to the Executive Vice President from time to time such statements as may be required. He shall be in responsible charge, under the Executive Vice President, of all the property of the League. He shall perform such other duties as may be assigned to him by the Executive Vice President. His entire time shall be devoted to the duties as set forth above. He shall furnish a bond satisfactory to the Board of Directors, the expense of the same to be borne by the League.

60. On motion of Mr. Stinson, seconded by Mr. Roderick, it was VOTED (with all Directors voting in favor, by roll call) that By-Law 39 is modified to read as follows:

*39.* The Administration and Finance Committee:

Reviews League management performance and effectiveness, including League finances, on a continuing basis. On an annual basis, reviews the operating budget prepared by the Chief Financial Officer and the Executive Vice President for the coming year and, after approval, forwards to the Board of Directors for ratification.

Reviews intermediate and long term budgetary projections as prepared by the Chief Financial Officer and makes appropriate recommendations to the Board of Directors.

Makes recommendations to the Board in connection with audit and tax matters, and acts as a Board audit committee.

Makes recommendations to the Board and the Executive Vice President in areas of staff management, procedures, and remuneration.

Acts as advisor to and supervisor of the Treasurer in regard to the investment of the League's funds.

Establishes bonding guidelines for League employees.

Acts as advisor to the Executive Vice President with regard to the League's publications programs, including *QST* and other periodicals.

61. Mr. Stinson moved, seconded by Mr. Bellows, that By-Law 4 be amended to read as follows, effective July 1, 2001:

*4.* The dues of Members shall be $39.00 annually worldwide, payable in advance. For members outside the United States, except for International members who elect not to receive *QST* by mail, the Executive Vice President shall assess such additional mailing costs as are consistent with the postal rates for destinations outside the United States. Members choosing to pay dues for more than one year in advance, but for no more than five years, may be entitled to lower rates as determined periodically by the Executive Vice President and as published in *QST*.

Mr. Heyn moved, seconded by Mr. Walstrom, to amend July 1, 2001 to read January 1, 2002, but the motion to amend FAILED. The question then being on the original motion, it was ADOPTED with all Directors voting in favor except Mr. Heyn and Mr. Day, who voted no.

62. Mr. Stinson moved, seconded by Mr. Butler, that By-Law 5 be amended to read as follows, effective July 1, 2001:

*5.* A member residing in the United States, its possessions or the Commonwealth of Puerto Rico who has reached the age of 65 years may request an annual dues rate of $36.00.

Mr. Roderick moved, seconded by Mr. Maxwell, that the dues rate for seniors be amended to read $33.00. The amendment FAILED. Mr. Frenaye moved, seconded by Mr. Milnes, that the dues rate for seniors be amended to read $35.00. The amendment FAILED. The question then being on the original motion, with 12 affirmative votes required for adoption, the motion FAILED with 8 votes in favor to 7 opposed. Those voting in favor were Messrs. Fuller, Isely, Bellows, Fallon, Milnes, Maxwell, Stinson, and Day; all other Directors voted opposed. The Board recessed from 3:37 PM until 3:47 PM.

63. Mr. Walstrom moved, seconded by Mr. Race, that By-Law 5 be deleted effective July 1, 2001. Directors Fuller, Isely, Bellows, Race, Fallon, Walstrom, Milnes, Maxwell, Stinson, and Day voted AYE. Directors Roderick, Frenaye, Bodson, Butler, and Heyn voted NAY. With 10 votes in favor and 12 required for adoption, the motion FAILED.

64. Without objection, the Board returned to consideration of amendment of By-Law 5. Mr. Stinson moved, seconded by Mr. Bellows, to amend By-Law 5 to read as follows, effective July 1, 2001:

*5.* A member residing in the United States, its possessions or the Commonwealth of Puerto Rico who has reached the age of 65 years may request an annual dues rate of $34.00.

All Directors voted in favor except Mr. Heyn, who voted opposed. With 14 votes in favor and 12 votes required for adoption, the amendment was APPROVED.

65. Mr. Stafford moved, seconded by Mr. Frenaye, that the following resolution be adopted:

WHEREAS, Morse code, named after Samuel Finley Breese Morse, is an invention that has been essential to telecommunications for over 150 years; and

WHEREAS, the international Morse code has been an essential mode to Amateur Radio from its beginning to this day; and

WHEREAS, Radio Amateurs formed a pool of skilled Morse operators vital in the 20th Century for national defense, disaster, maritime-mobile and aeronautical-mobile communications; and

WHEREAS, since the 1950s there has been a great influx of other technologies that have gradually reduced the need for trained Morse operators outside the Amateur services; and

WHEREAS, the aeronautical-mobile and maritime-mobile applications of Morse have been or are being terminated throughout the world; and

WHEREAS, there is an agenda item for the 2003 World Radiocommunication Conference to consider Article S25; and

WHEREAS, it is highly likely that administrations will delete the Morse code requirement in Article S25 at WRC2003; and

WHEREAS, the international Amateur community has followed the United States lead in reducing the code speed requirement for licensing to operate on bands below 30 MHz to 5 words per minute and there is a trend toward elimination of this requirement;

NOW THEREFORE BE IT RESOLVED, that the ARRL Board of Directors recognizes and accepts that suppression of the Morse code requirement in Article S25 is likely to occur at WRC 2003; and be it

FURTHER RESOLVED, that deletion of the requirement from Article S25 should not automatically or immediately mean a similar removal of the Morse code from Part 97 of the FCC rules; and be it

FURTHER RESOLVED, that each administration should determine if Morse code is retained as a testing element; and be it

FURTHER RESOLVED, it is the opinion of this Board at this time that Morse code should be retained as a testing element in the U.S.; and be it

FURTHER RESOLVED, that the Morse code is deserving of continued support as an important operating mode including providing for the protection and maintenance of sufficient spectrum in band planning; and be it

FURTHER RESOLVED, that staff develop a program designed to promote the use of Morse code; and be it

FURTHER RESOLVED, that this resolution supersedes all previous statements of policy related to suppression of the Morse code requirement in Article S25.

Mr. Fuller requested a roll call vote. In response to an objection, the Chair ruled that a request for a roll call vote must be in the form of an incidental motion. Mr. Fuller so moved, seconded by Mr. Roderick, but the motion was DEFEATED. The question then being on the main motion, the same was ADOPTED.

66. On motion of Mr. Frenaye, seconded by Mr. Fallon, it was VOTED unanimously that the President is authorized and instructed to appoint a committee of no more than five members for the purpose of soliciting membership input and updating the ARRL position on refarming of the HF Novice bands in light of the 1999 FCC license restructuring Report and Order. The committee shall initiate its solicitation no later than May 2001, and shall submit its final report to the Board for consideration of the issue at the 2002 Annual Meeting of the Board. The Board was in recess from 5:13 PM until 5:35 PM.

67. On motion of Mr. Race, seconded by Mr. Heyn, it was VOTED unanimously to ADOPT the following resolution:

WHEREAS, it has been 20 years since the Field Organization was reorganized; and

WHEREAS, the social and emergency uses of Amateur Radio have been affected by the advance of technology;

NOW THEREFORE, it is moved that the VRC study the Field Organization and its operation; and it is further

MOVED, a preliminary report shall be presented to the Board at the July 2001 Meeting; and it is further

MOVED, a final report and recommendations shall be presented at the 2002 Annual Meeting of the Board.

68. On motion of Mr. Roderick, seconded by Mr. Frenaye, it was VOTED unanimously that the President select an Ad Hoc Committee to solicit membership input on the current band plan for 160 meters and to provide recommendations for any changes at the Board of Directors meeting in July, 2001.

69. On motion of Mr. Bellows, seconded by Mr. Frenaye, it was VOTED unanimously to ADOPT the following resolution:

WHEREAS, significant experimentation with signal propagation is ongoing in the 160-meter band, which is facilitated by the use of beacons for limited time periods by certain Amateur stations; and

WHEREAS, beacon operation in that band is permitted pursuant to Section 97.203 of the FCC's rules, but only while under local or remote control; and

WHEREAS, automatically controlled beacon operation in the 160-meter band is reasonably necessary for a fixed period of time in order to gather accurate propagation data; and

WHEREAS, a request has been made by Radio Amateurs active in such propagation research that ARRL facilitate such research by obtaining from the FCC, by means of a waiver, STA or experimental license as appropriate, authorization to utilize a fixed number of automatically controlled beacon facilities at low power, for a fixed term up to two years, for the purpose of conducting propagation research in the 1800-2000 kHz band;

NOW, THEREFORE, it is MOVED that the Technology Task Force study a waiver, STA or experimental authorization from the FCC permitting a limited number of low-power, automatically controlled beacon facilities in the 160-meter band, subject at all times to the ARRL band plan, and subject, nevertheless, to the requirement that any such beacon operation be terminated immediately upon receipt by ARRL headquarters of bona fide complaints of interference to ongoing Amateur two-way communications. It is further requested that the Technology Task Force report back to the Board at its July 2001 meeting.

70. On motion of Mr. Day, seconded by the entire assembly, it was VOTED unanimously to recognize and to thank staff, especially Lisa Kustosik, KA1UFZ, and Stacy Rogers of President Haynie's firm, for their hard work to ensure the success of this function. (Applause).

71. There being no further business, following informal comments of those present the Board adjourned *sine die* at 6:46 PM. (Time in session as a Board: 14 hours, 25 minutes).

David Sumner, K1ZZ
Secretary

# ARRL Seeks FCC Review, Reversal of PRB-1 Denial

The ARRL is asking the full FCC to review part of an FCC *Order* that declined to include CC&Rs—covenants, conditions and restrictions—under the limited federal preemption known as PRB-1. Imposed by private homeowners' associations or by developers, CC&Rs—also known as "restrictive covenants" or "deed restrictions"—often impede or prohibit the installation of outside antennas.

"ARRL's petition relative to the application of its PRB-1 policy to private land use regulations has not, to date, been afforded a thorough review or a fair analysis," the ARRL said in its *Application for Review*, filed December 15. The ARRL maintains that the FCC should have the same interest in the effective performance of an Amateur Radio station and in the promotion of amateur communications regardless of whether the licensee's property is privately or publicly regulated.

In November, FCC Wireless Telecommunications Bureau Deputy Chief Kathleen O'Brien Ham—acting under "delegated authority"—turned down an ARRL *Petition for Reconsideration* that—among other things—called on the FCC to declare that PRB-1 applies to amateurs governed by CC&Rs or condominium regulations just as it does to hams regulated solely by local zoning laws. The ARRL now wants the full Commission to review—and reverse—O'Brien Ham's decision.

The ARRL has argued that since PRB-1 was promulgated in 1985, the FCC has made it clear that it has Congressional authority to prohibit restrictive covenants that could keep property owners and even renters from installing antennas to receive TV, satellite and similar signals. The same principle applies to Amateur Radio, the ARRL asserted.

The ARRL made it clear, however, that it's not seeking any kind of preferential treatment from homeowners' associations, architectural committees or condominium boards. "It would be entirely consistent with PRB-1, for example, for a homeowners association to permit only a relatively small antenna in a planned community, such as a backyard, ground-mounted vertical antenna or one of the small Yagi configurations similar to an outdoor television antenna," the ARRL said.

The ARRL said that since the FCC already has jurisdiction to apply PRB-1 to all types of land-use regulation and has said it's willing to "encourage" private land-use authorities to apply PRB-1, "there is no legal or policy reason for continuing the distinction" between private and public land-use regulation with respect to amateur antennas. The ARRL asserts that Amateur Radio operators should be able to negotiate "reasonable accommodation" provisions with local homeowner's associations just as they now may do with governmental land-use regulators.

A copy of the ARRL's *Application for Review* is available at **www.arrl.org/announce/regulatory/prb-1/prb1afr.html**.

## AO-40 Project Leader "Optimistic"

AO-40 Project Leader Karl Meinzer, DJ4ZC, has expressed confidence that, despite its problems, the satellite will be functional in the future—although its mission likely will be different from the one planned prior to launch. "Personally, I am optimistic, and I believe that the command and engineering team stands a good chance of turning AO-40 into an extremely useful Amateur Radio satellite," Meinzer said in an early January AMSAT News Service release.

Meinzer said that especially if the ATOS arcjet and the three-axis stabilization systems still work, "AO-40 will still be able to produce a large fraction of the Amateur Radio service expected from it."

Telemetry transmissions from AO-40 ceased December 13 while ground controllers were testing the onboard 400-newton propulsion system following an initial orbital shift. Some observers feared the satellite had been irreparably damaged. A computer reset command Christmas Day brought the satellite back to life, but telemetry data indicate some systems were damaged or lost.

Since Christmas, the AO-40 ground team has been analyzing telemetry sent via the 2.4 GHz beacon—the only operating transmitter—to determine the status of the satellite's onboard systems.

The ground team has determined that, in addition to the 2.4 GHz transmitter, the 2-meter, 70-cm and 1.2-GHz receivers and high-gain antennas are operational. As of mid-January, the 70-cm and 1.2-GHz omnidirectional antennas did not appear to be working, but the status of the 2-meter omnidirectional antenna had not been definitely established.

***AO-40 will still be able to produce a large fraction of the Amateur Radio service expected from it.***

The 2-meter transmitter was tested briefly, but unsuccessfully. "It demonstrated a marked temperature increase, but no signal was heard," Meinzer said. Additional tests of the 2-meter transmitter were pending at press time, but Meinzer said ground controllers first want to reduce the spacecraft's spin rate "to ensure that the satellite's heat-pipes will be able to handle the dissipation for extended periods."

In early January AO-40 team member and AMSAT-DL Vice President Peter Guelzow, DB2OS, suggested that a small leak on AO-40 could be responsible for the higher spin rate.

Meinzer said AO-40 command stations would follow "a conservative philosophy" in recovery operations.

AMSAT has proposed holding an inquiry into the incident that led to the loss of communication with AO-40.

Rick Lindquist, N1RL ♦ Senior News Editor

## CANADA PROPOSES, GERMANY AND BELGIUM ADOPT 5 WPM

Industry Canada has proposed to discontinue that country's 12 WPM Morse code requirement in favor of a 5 WPM requirement for full HF operating privileges. Radio Amateurs of Canada had sought the action last year. IC said it had received "a number of petitions" from those who contend there's no longer any justification for a 12 WPM Morse requirement.

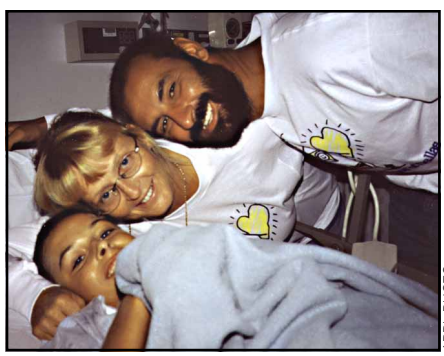
RAC President Kenneth Oelke, VE6AFO, last year recommended that the IC grant full HF operating privileges to applicants who pass a 5 WPM Morse test and the appropriate written examinations. At the same time, he requested that the IC consider beefing up the written tests.

The RAC has said that a move to a uniform 5 WPM Morse requirement for HF access would "be in harmony with what is happening in other parts of the world and would simplify the negotiation and implementation of reciprocal operating agreements."

Meanwhile, Germany and Belgium have approved changes in their Amateur Radio rules to lower from 12 WPM to 5 WPM the Morse code text speed required for HF operation.—*RAC; IARU*

## WILLEM VAN TUIJL, FAMILY HOPEFUL FOLLOWING US SURGERY

Willem van Tuijl, the boy wounded one year ago during a pirate attack off the coast of South America, is back home in the Netherlands after a short visit to the US last fall for additional surgery. Willem, 13, and his parents, Jacco and Jannie van Tuijl, KH2TD and KH2TE, had been sailing around the world when the attack occurred last March. The Amateur Radio community rallied on 20 meters in response to Jacco van Tuijl's frantic call for help following the incident. Several amateurs assisted the



ARRL PHOTO

**Willem, Jannie and Jacco van Tuijl embrace in Willem's hospital bed in Texas shortly after he arrived in the US a year ago to receive treatment for wounds received during a pirate attack at sea.**

## NOTABLE SILENT KEYS

• **ARRL staff member Paul R. Kokoszyna, KA1TRF, SK:** ARRL Headquarters staff member Paul Kokoszyna, KA1TRF, of Southwick, Massachusetts, died January 11, 2001. He was 35 and had recently been hospitalized with pneumonia. An ARRL member, Kokoszyna joined the HQ staff as Web applications developer in the Electronic Publications Branch last June. "In the short time he was here, Paul proved himself to be dedicated, conscientious, friendly, and supportive of his fellow staff members," said ARRL Executive Vice President David Sumner, K1ZZ. "He was proud to have upgraded to Extra in November. In short, his loss is a shock to us all and he will be greatly missed." ARRL Webmaster Jon Bloom, KE3Z, said, "During his too-brief time at ARRL, Paul made significant contributions to our new Web design. He was a pleasure to work with and will be sorely missed." Kokoszyna's wife, Andrea, and their young son, DJ, survive.

• **Al Gross, W8PAL, SK:** Al Gross, W8PAL, of Sun City, Arizona—the man who brought the world such wireless communications concepts and devices as the walkie-talkie, the pager and the cordless telephone—died December 21, 2000. He was 82. Gross got his ham ticket in 1934 at age 16, and his early interest in Amateur Radio helped set his career choice while he was still a teenager. Gross pioneered the development of devices that operated in the relatively unexplored VHF and UHF spectrum above 100 MHz. His first invention, a portable handheld radio transmitter-receiver he developed in 1938 while he was still in high school, he christened the "walkie-talkie." After World War II, Gross set up companies to design and build various wireless products for government, industry and consumer use. Cartoonist Chester Gould borrowed Gross' concept of a miniaturized two-way radio as the model for the two-way wrist radio in his *Dick Tracy* comic strip. During the 1950s and 1960s, Gross secured several patents for various portable and cordless telephone devices. In September 1958 Gross Electronics received FCC type approval for mobile and hand-held transceivers for use on the new Class D 27-MHz Citizens Band. "If you have a cordless telephone or a cellular telephone or a walkie-talkie or beeper, you've got one of my patents," Gross once said. He added that if his patents on those technologies hadn't run out in 1971, he'd have been a millionaire several times over. From 1990 until his death, he was a senior engineer for Orbital Sciences Corporation. Gross received numerous awards and honors during his distinguished career, including the 1992 Fred B. Link Award from the Radio Club of America and the 1999 Edwin Howard Armstrong Achievement Award from the Institute of Electrical and Electronics Engineers. As his IEEE biography put it, "It is clear that Mr Gross was a true pioneer and helped lead the way to today's wireless personal communications revolution."—*The W5YI Report; IEEE*

## ISS Expedition 2 Crew Scheduled for Launch

The three members of the International Space Station Expedition 2 crew—(l-r) Commander Yuri Usachev, UA9AD, of Russia and US astronauts Susan Helms, KC7NHZ, and Jim Voss—trek through the snowy Russian woods as part of their winter survival training. The training prepares the crew in the event that the *Soyuz* emergency crew return vehicle lands in a remote location. Having traded walking staffs and winter boots for spacesuits, the Expedition 2 crew was scheduled for launch March 1 on the space shuttle *Discovery* to relieve the Expedition 1 team. Space Station Alpha's first resident crew got to stay in space a couple of weeks longer than planned because of a tight shuttle launch schedule and necessary refitting on the *Discovery*. Expedition 1 crew commander William "Shep" Shepherd, KD5GSL, and Russian cosmonauts Yuri Gidzenko and Sergei Krikalev, U5MIR, arrived at the station November 2. During their stay, Shepherd spoke via ham radio with students at several schools as part of the Amateur Radio on the International Space Station—or ARISS—program.

family in keeping the badly wounded teenager alive as they sailed for a safe harbor in Honduras.

Through the efforts of ARRL President Jim Haynie, W5JBP, Willem was transported to the US for further surgery and rehabilitation. The youth was paralyzed from the waist down as a result of his injuries, however. The van Tuijls returned to the Netherlands in June.

Willem and his family quietly returned to the US in early November so he could undergo advanced nerve-graft surgery that might help restore the proper function of some of his internal organs.

In a bold move, Jaco van Tuijl said, surgeons at Jackson Memorial Hospital in Miami attempted to graft the severed nerves. It's the first time such a procedure has been attempted, and it will be months before it's known whether the

# FCC News

## ARRL DESIGNATED AS CLUB STATION CALL SIGN ADMINISTRATOR

The FCC has designated the ARRL-VEC, the W5YI-VEC and the W4VEC Volunteer Examiners Club of America as Club Station Call Sign Administrators. The FCC now accepts new, modification and renewal applications for Amateur Radio club and military recreation stations *only* from a designated CSCSA.

Applications for administrative updates or modifications of Radio Amateur Civil Emergency Service—or RACES—licenses also now must be filed via a CSCSA, but the FCC no longer issues or renews RACES licenses.

VECs anticipate that the new CSCSA program will be faster, more convenient, and more user-friendly.

The new CSCSAs will receive and process hard-copy applications and submit the information electronically to the FCC. The CSCSAs have been authorized by the FCC to develop their own forms and collect necessary information. CSCAs may not charge for this service.

Club station applicants should complete and file form NCVEC 605, available at **www.arrl.org/fcc/forms/html**.

## NEW FCC SYSTEM MEANS QUICK LICENSE GRANTS

The FCC's new system to handle batch-filed amateur applications from Volunteer Examiner Coordinators has cut processing time from hours to minutes. The FCC inaugurated the more rapid amateur license application processing system on December 28—slightly ahead of its original schedule.

"Way to go, FCC!" said an enthusiastic ARRL-VEC Manager Bart Jahnke, W9JJ, after his office fed its first batch of license applications into the system. Jahnke says five dozen ARRL-VEC applications resulted in license grants within an hour.

Except for a two-hour window right after midnight each day, the speedy new system looks for VEC submissions each hour on the half hour. With FCC license grant processing now measured in terms of hours instead of days, the major factor now determining the time from exam to license grant is how quickly VE teams get their test results to their VECs.

The FCC has been estimating a processing window of up to 90 minutes, depending on volume and arrival time. License grant results should be available immediately on the Universal Licensing System Web site, **www.fcc.gov/wtb/uls**, using the license search option.

On-line filings from individuals, weekend filings and FCC-manually processed applications put into the hopper during weekdays at Gettysburg continue to be handled as had been. Weekday filings are batched for midnight processing; weekend filings are queued up each Monday at midnight.

## FCC OPENS DOOR TO INCREASED TEST FEES FOR 2001

The FCC has suspended its regulatory limit on the reimbursement fee for Amateur Radio examinations, and the ARRL VEC has instituted a $10 test fee, effective January 1. An FCC *Public Notice* released December 4 explained that the Commission would not be announcing a maximum reimbursement fee for 2001, since the requirement to do so no longer appears in the Communications Act.

For now, the FCC says, it will suspend enforcement of the fee provision, §97.527(b), which continues to appear in the FCC rules. Several of the nation's other Volunteer Examiner Coordinators have followed suit in raising test fees, although at least one VEC charges no test fee whatsoever.

The new, higher fee reflects the fact that the ARRL VEC is doing more of the work on behalf of the FCC than was originally envisioned when the provision was included in the Communications Act. That effort includes data entry for all new and upgrade license applications once done by FCC staffers.

♦ **Petition seeks increased privileges for Novices and Techs with Morse credit:** The FCC has put on public notice a petition from Joseph Speroni, AH0A, that calls on the FCC to modify its rules to permit current Novice and Tech Plus or Technician with Morse credit licensees to operate CW in expanded subbands on 80, 40, 15 and 10 meters. Speroni has proposed permitting Novices and Technicians with Element 1 credit to operate on CW on 3525-3750 kHz; 7025-7150 kHz, 21,025-21,200 kHz and 28,000-28,500 kHz, maintaining the current power limitation of 200 W PEP on those segments. The FCC assigned his petition Rule Making number RM-10018.

♦ **FCC levies fine for illegal amplifier sales:** The FCC has fined Stephen Fowler, doing business as Exports R Us in Pineville, Louisiana, $7000 for marketing an unauthorized external radio frequency power amplifier. The FCC's New Orleans field office issued a *Notice of Apparent Liability* last September against Fowler d/b/a/ Exports R Us; the FCC says Fowler did not respond. The forfeiture was due within 30 days of the *Forfeiture Order*, adopted December 28, 2000.

### *Amateur Radio Enforcement*

♦ **FCC adopts consent decree in amateur interference case:** The second amateur cited in a 1999 malicious interference case in Pennsylvania has cut a deal with the FCC to avoid paying a $7500 fine. The FCC in mid-December adopted a consent decree terminating its proceeding against Michael E. Gallagher, KB1DTA (ex-KB3DHX), of W Concord, Massachusetts. In exchange for not having to pay the fine, Gallagher agreed to turn in his ham ticket and not reapply for five years. He also must stay out of further trouble with the FCC. Barring any unforeseen circumstances, the December 18 consent decree wraps up the FCC's malicious interference investigation of Gallagher and Kornwell H. Chan, W3CI, of Dresher, Pennsylvania. Also facing a $7500 fine, Chan worked his own deal with the FCC in 1999, agreeing to give up his ham ticket until 2003. In exchange, the FCC waived the fine, provided there are no further violations. In March 1999, Chan and Gallagher each were fined in connection with malicious interference to the Phil-Mont Mobile Radio Club VHF and UHF repeaters on two occasions the previous month.

♦ **FCC completes W5YI-VEC South Carolina Inquiry:** The FCC has wrapped up its probe into alleged irregularities at three 1999 South Carolina Amateur Radio exam sessions. The FCC says it found "nothing improper" at an October 9, 1999, W5YI-VEC test session in Iva, but it suggested the VEC could have avoided problems with forgeries at exam sessions in Clemson in July and August of 1999 by verifying the presence of volunteer examiners whose names and call signs appeared on exam session documents. The FCC initiated an audit of the W5YI-VEC last year, and the VEC has cooperated in the probe. In December, the FCC asked W5YI-VEC to detail how it screens and accredits VEs

surgery was successful.

Van Tuijl said the best possible outcome of the 18-hour-long operation would be a return of Willem's ability to flex his hip and knee joints—something that could tremendously improve his quality of life. Just as important could be the restoration of Willem's bladder and bowel functions as a result of the repair.

Many of the expenses of the surgical visit were paid for out of the Willem Fund, established after the youth came to the US for additional medical treatment. Neurosurgeons James Guest and Bart Green and other assisting physicians donated their services, van Tuijl said.

An article about Willem appeared in *People* magazine's year-end issue.

and its procedures for verifying the results of W5YI-VEC test sessions. In a letter to W5YI-VEC's Fred Maia, W5YI, FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth said the forgeries and a Clemson "sub-session" where two volunteer examiners are alleged to have fraudulently upgraded themselves "constitute an alarming failure of oversight and integrity in the Volunteer Examiner program at those sessions." The FCC alleges that then-volunteer examiners William J. Browning, ex-AB4BB and AF4PJ, and James F. Chambers, KF4PWF, "apparently awarded themselves upgrades to Extra class" at the ad hoc exam session on July 14, 1999, at Browning's Clemson home by forging the signatures of other VEs. The FCC also says someone forged the signature of VE Grady Robinson, AK4N, on applications for all 10 examinees at an August 26, 1999, session in Clemson. Hollingsworth said that Robinson "was not present at the session and was in no way at fault." As a result of the Clemson inquiry, Browning forfeited his Amateur Radio license. Chambers has been called in for retesting and his role "is still under review," Hollingsworth said.

♦ **San Francisco ham loses all but HF CW privileges for two years:** San Francisco amateur licensee Danny Kenwood, WA6CNQ, has again come in for FCC enforcement action. In an unusual enforcement twist, the FCC has modified Kenwood's General ticket to prohibit all amateur operation but HF Morse for a period of two years. Kenwood lost his VHF and UHF privileges for 90 days in October 1999 following allegations of profanity, obscenity, and deliberate interference directed at users of the K7IJ Grizzly Peak repeater and of failure to properly identify. Last spring, the FCC issued a *Warning Notice* to Kenwood on the basis of reports from the K7IJ repeater system control operator that the repeater had to be shut down due to Kenwood's alleged "interference and harassment to other operators." According to a December 5 letter to Kenwood from FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth, Kenwood voluntarily agreed to the HF CW-only modification, which continues through November 2002. Hollingsworth said the FCC could initiate revocation and suspension proceedings against Kenwood and levy a fine if he violates FCC rules or the terms of the agreement.

## In Brief

• **New section managers take office:** New ARRL section managers took office January 1 in several sections. In Eastern Pennsylvania, Eric Olena, WB3FPL, succeeded veteran SM Al Breiner, W3TI, who stepped down December 31 after many years as an ARRL field organization volunteer. In Eastern Massachusetts, Phil Temples, K9HI, has been elected to succeed Joel Magid, WU1F, who did not seek another term. In West Texas, Clay Emert, K5TRW, took over the reins from Charles Royall, WB5T, who stepped down due to health problems. In North Dakota, Kent Olson, KA0LDG, replaced Roger "Bill" Kurtti, WC0M, who moved out of the section. Incumbent section managers in Missouri, Nebraska, New York City-Long Island, Northern New York, South Carolina, Southern New Jersey, West Central Florida and Western Pennsylvania have been elected or re-elected for two-year terms.

• **Unopposed section managers continue new terms:** The following incumbent ARRL section managers ran unopposed in their respective races last spring, were declared elected and began new two-year terms on July 1, 2000. We apologize for the belated announcement of these facts and wish to recognize these ARRL section managers: Bruce Boston, KD9UL, Illinois; Peggy Coulter, W9JUJ, Indiana; William Woodhead, N1KAT, Maine; Rudy Hubbard, WA4PUP, Northern Florida; William Sawders, K7ZM, Oregon; Glenn Thomas, WB6W, Santa Clara Valley; Donald Michalski, W9IXG, Wisconsin. After nominating petitions were resolicited for the Vermont Section Manager election in July 2000, incumbent SM Bob DeVarney, WE1U, ran unopposed and was declared elected.

• **ARRL welcomes W1DGM to *ARRLWeb* editorial staff:** Dave Mello, W1DGM, an ARRL Life Member, has joined the ARRL Headquarters Web site editorial staff. Dave's career has spanned the fields of radar, rockets, inventions, and "blue sky" programs. His Amateur Radio interests include SSTV, RTTY, building projects from *The ARRL Handbook*, RCC and WAS.

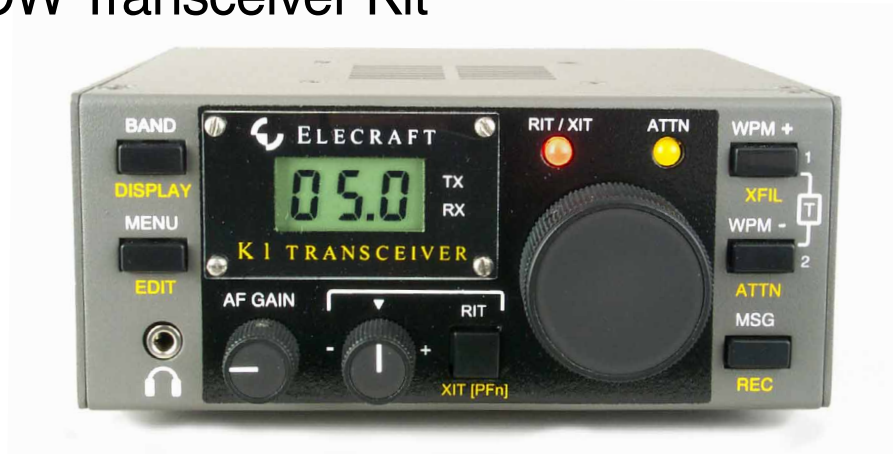
• **Slain Texas police officer was amateur:** An Irving, Texas, police officer shot and killed after answering a robbery call was an Amateur Radio operator. Aubrey W. Hawkins, KC5USI, a Technician licensee, died on Christmas Eve while responding to a robbery-in-progress call. He was 29. Hawkins had been a police officer in Irving since October 1999. Police said they believe seven escaped prison inmates were involved with the killing. An Eagle Scout, Hawkins was active in RACES and SKYWARN. Marv Kontak, N5MK, reports that more than 2000 attended Hawkins' funeral December 28.

• **ARRL DXCC Desk announces new 17-Meter Award:** The ARRL DXCC Desk now is accepting applications for its new 17-Meter Single Band DXCC Award. The 17-Meter DXCC certificates will be dated but not numbered, and 17-meter credits also will count toward the DeSoto Cup competition for 2001. To determine prior credits on 17 meters, contact DXCC for an update to help avoid duplicates and additional costs. More information and copies of DXCC records are available (in Adobe PDF format) by contacting the DXCC Desk at **dxcc@arrl.org** (if requesting via US mail, include $1.50 for postage or an SASE with $1.50 in postage).

• **Vote on *QST* Cover Plaque Award:** The winner of the *QST* Cover Plaque Award for December was Phil Salas, AD5X, for his article "A Simple HF-Portable Antenna." Congratulations, Phil! ARRL members are reminded that the winner of the *QST* Cover Plaque award—given to the author(s) of the best article in each issue—now is determined by a vote of ARRL members. Voting takes place each month on the ARRL Members Only Web site at **www.arrl.org/members-only/qstvote.html**. As soon as your copy arrives, cast a ballot for your choice as the favorite article! QST

# Elecraft K-1 QRP CW Transceiver Kit

*Reviewed by Al Alvareztorres, AA1DO, ARRL TIS Coordinator, with technical assistance from Zack Lau, W1VT, ARRL Senior Lab Engineer*




The first radio I ever assembled was the "Official Cub Scout Crystal Radio Set." The receiver was built right on the cover of its cardboard box using pictures of the components as a guide. That was 1951. Next, when I was around 13 years old, I put together a slug-tuned AM radio that I had ordered from an ad in the back of *Popular Electronics*. But what I consider my first *true* kit building experience took place in 1959, when I built a Heathkit AR-3 General Coverage Receiver. From that point forward I would hold all subsequent kits up to the "Heathkit standard."

As the years passed by, I assembled some kits from other manufacturers—Eico among them—but I always felt that Heath provided the best instruction manuals. By the late '80s I had successfully completed dozens of their products, including stereos, test equipment and several transceivers. When Heath left the kit business, I semi-retired from kit building.

So it was with some bias that I undertook the assembly of an Elecraft K1 QRP transceiver. Several of my colleagues have built Elecraft's more advanced K2 HF multiband transceiver (see "Product Review" March 2000)—and I was very tempted to purchase one of those—but I was concerned that a project of that magnitude might be beyond my capabilities. After having a look at the information that Elecraft provides on their Web site (including, incidentally, the complete assembly and operating manual in PDF), I decided that the K1 was a kit project that that I should be able to handle.

Zack Lau, W1VT—our Senior Lab Engineer (and already the proud owner of a K2)—was anxious to give Elecraft's latest offering a try as well. Our K1 kits—with sequential serial numbers—both arrived on the same day.

## What You'll End Up With

The completed K1 is a compact *dual-band* QRP CW transceiver with an impressive array of features. It has an LCD display; three filter bandwidths; RIT *and* XIT; AGC; an attenuator; a built-in CW keyer with two message memories; adjustable CW sidetone pitch and volume; and an internal speaker.

The K1 will cover your choice of any two of the 80, 40, 30, 20, 17 and 15-meter bands.

The overall tuning range within both of the bands is determined by the value of a capacitor that's installed in the VFO circuitry. The transceiver can be set up to tune over either an 80 or 150 kHz band segment. The narrower span results in a finer tuning rate. The capacitors can even be swapped later if you end up changing your mind!

The *portion* of each band covered is established in the alignment phase. The transceiver can be set up for from 7.000 to 7.080 MHz, or from 7.070 to 7.150 MHz for example. (Assuming here that you've chosen an overall tuning range of 80 kHz.)

Its relatively small size, rugged construction and meager appetite for dc power (around 50 mA on receive) make the K1 a particularly attractive choice for portable operation—hiking and camping for example.

The receiver is a single conversion superhet with an IF of 4.915 MHz. It employs a pair of NE602s—one for the receive mixer and a second for the product detector. This design is similar to that used in many of the other low current, low cost QRP rigs. In spite of the limitations of these simple devices, Elecraft has managed to achieve some fairly respectable receiver performance (see Table 1).

### Bottom Line

The Elecraft K1 raises the state of the art for home constructed QRP transceivers. With a PIC microprocessor running the show, this rig delivers an operating feel and collection of features that rivals some contemporary commercially constructed transceivers.

A 4-pole variable bandwidth crystal filter provides three receive filter bandwidths. The default settings are approximately 800, 400 and 250 Hz, but these can be easily varied to suit your personal preferences. The AGC, unlike the setup used in the K2, is audio derived. It can be switched on or off.

Audio from the receive stages is passed through a cascaded pair of common ICs: an LM386 and a LM380. The '386 serves as a preamplifier, providing lots of gain, while the '380 further amplifies the audio signal—delivering lots of output. The K1's top-mounted internal speaker does a good job; it's unlikely that you'd find yourself straining to hear this radio's audio over the howling winds. A 1/8-inch stereo headphone jack is provided right on the front panel—just in case.

The transmitter uses a 2SC1969 as the RF final transistor. This rugged device—very conservatively rated in this 5 W application—should easily be up to the task of withstanding the VSWR "challenges" often unintentionally encountered with portable antenna installations.

Tuning duties are handled by a varactor-tuned Colpitts oscillator that generates a VFO signal of 2.930 to 3.080 MHz. To minimize drift, Elecraft uses double regulation on the VFO's supply voltage and took care to well buffer the VFO circuitry from that of the transmitter.

Perhaps the most notable difference between the K1 and the other QRP kit transceivers currently on the market is its use of microprocessor control. A significant amount of the circuitry, most of the features and the LCD display are under

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

the direct command of a PIC16C77. This allows for multifunction control keys; display flexibility; built-in test and troubleshooting capabilities; an extensive control and configuration menu; and CW keyer and memory features. While most QRP kit transceivers use simple switches, potentiometers and analog tuning dials—just like the commercially built amateur transceivers produced decades ago—the K1's processor-based control architecture is similar to that found in contemporary factory assembled amateur gear.

The stylish 4-color front panel and the modular dark gray enclosure provide a sophisticated look and feel. The completed K1 even manages to look more like a commercially assembled transceiver than a few of the commercially assembled transceivers!

Front panel controls include a large (1 1/4-inch diameter) tuning knob; small (1/2-inch diameter) AF gain and offset knobs; and 6 fairly large multifunction control keys.

The 1 × 1/2-inch three-digit LCD window typically displays the more "significant digits" of the operating frequency (more on this later), but these same LCD segments are also employed to indicate a wide range of additional data. The information appears as either number digits or the familiar—but somewhat truncated—set of alpha characters that can be rendered using combinations of the seven straight segments available in the usual LCD "figure 8" segment pattern. In addition to the frequency, the LCD can display the supply voltage, the RF power output, the various menu titles and their settings, and a 6-segment relative signal strength bargraph.

The rear panel supports a BNC antenna connector, the **ON/OFF** switch, a coaxial-style dc power jack and a 1/8-inch stereo jack for connecting a straight key or paddles. The paddle sense can be reversed using a menu setting.

Available options include an internal automatic antenna tuner, a noise blanker and a neat little tilt-up stand. You can even purchase additional 2-band filter modules separately—'though the band filter mounting and connector arrangements were not designed with incessant module swapping in mind.

## What You'll Start Out With

The K1 kit arrives in a surprisingly flat box. The cabinet is constructed from five panels that are fastened together as the kit is assembled. Most of the components, except this sheet metal and the main PC board, come packaged in separate, labeled, zip-lock bags. Working with the contents of one bag at a time (even during inventory) makes the overall project seem considerably less daunting.

My first impression of the K1 *Owner's Manual* was very favorable. The booklet is large, has over ninety 8 1/2 × 11-inch pages in a landscape format, and is spiral bound—allowing it to lie flat on the workbench. It includes part lists and layouts, block diagrams, circuit details and schematics, an extensive section on troubleshooting, the operating instructions and even a "Quick Reference" page. The type is large and all of the illustrations and photographs are clear.

The first several pages are devoted to a tutorial on identifying components, a list of the tools that you'll need for assembly, and the all-important lessons on soldering and de-soldering. You'll also find a section with detailed instructions on the proper way to install transistors, ICs and capacitors.

Besides the usual basic electronics hand tools, the only other equipment required to complete this kit is a digital multimeter. The K1 features built-in test capabilities that become available as you progress through the assembly stages. These include a wattmeter, a frequency counter and a battery voltage monitor.

## Taking Attendance

Of course the first task when building any kit is taking an inventory of the parts. Here, Elecraft has managed to outdo even Heath. "Appendix A," the parts list, contains *actual photographs* (Heath typically used line drawings) of every component type to aid in identification. This is a real plus.

The inventory process begins with a general breakdown of the contents of the shipping box—the circuit boards, the cabinet panels, the knobs, and the various bags of parts ("Bag, Filter," "Bag, Front Panel," "Bag, RF Board," etc). It then goes on to separate sub-inventories of the contents of each of the bags.

The specific parts provided for the filter board will, of course, vary according to which two bands you have chosen. Elecraft suggests that you begin this stage of the inventory process by crossing off the parts that are listed for the bands you didn't order. They then recommend that you use two different color pens (one for each band) for checking off the components for those that you did. (These folks have thought of everything.)

I was very impressed with the quality of the PC boards. They are solder masked and have plated-through holes, making soldering easier on the relatively crowded boards. The silk screening on both sides of the boards is excellent. The component outlines are clear and the legends are well placed. I found no ambiguities as to where a specific component was to be installed—a problem that I've encountered building some other kits.

Most of the resistors used in this kit are "presorted." They are taped together in strips in the order in which they are to be installed. This is a real convenience!

During the inventory process I discovered that I was missing a 0.1 µF monolithic capacitor. In all fairness, there was an errata sheet packed with the kit explaining that the value of a capacitor had been changed. My kit erroneously contained the old value—I can see how that might happen. In any event, I called Elecraft the next morning and had the correct part in hand a few days later.


**The Elecraft K1 kit as delivered. The majority of the components are presorted into plastic bags, making the inventory and assembly processes considerably more manageable.**

**Table 1**
**Elecraft K1, serial number 00108**

| Manufacturer's Claimed Specifications | Measured in the ARRL Lab |
|---|---|
| Frequency coverage: Receive and transmit, any 80 or 150 kHz segment of any two bands covered; 3.5-3.65; 7-7.3; 10-10.15; 14-14.35; 18.068-18.168; 21-21.45 MHz.[1] | Receive and transmit, as specified. |
| Modes of operation: CW. | As specified. |
| Power requirement: 9-15 V dc, receive, 50 mA (no signal); transmit, 0.8 A, at 13.8 V. | Receive, 57 mA (maximum volume, no signal); transmit, 0.75 A (maximum), tested at 13.8 V. |
| Size (hwd): 2.4×5.2×7.1 inches; weight, 1.4 lb. | |
| **Receiver** | **Receiver Dynamic Testing** |
| CW sensitivity: 10-dB S/N, 0.15 μV. | Noise floor (MDS), 500 Hz filter:[2]<br>7 MHz –129 dBm<br>14 MHz –129 dBm |
| Blocking dynamic range: Not specified. | Blocking dynamic range:<br>7 MHz 107 dB<br>14 MHz 107 dB |
| Two-tone, third-order IMD dynamic range: Not specified. | Two-tone, third-order IMD dynamic range:<br>7 MHz 87 dB<br>14 MHz 86 dB |
| Third-order input intercept point: Not specified. | 7 MHz +1.5 dBm<br>14 MHz +0.0 dBm |
| Second-order intercept point: Not specified. | 14 MHz, +75 dBm. |
| S-meter sensitivity: Not specified. | Maximum indication: 490 μV.[3] |
| Receiver audio output: 1 W into 8 Ω, THD not specified. | 1.1 W at 0.3% THD into 8 Ω[4]. |
| IF/audio response: Not specified. | Range at –6 dB points, (bandwidth):<br>CW-N: 412-847 Hz (435 Hz) |
| IF rejection: Not specified. | 87 dB. |
| Image rejection: Not specified. | 69 dB. |
| **Transmitter** | **Transmitter Dynamic Testing** |
| Power output: 0-5 W. | Typically 0.3-5 W. |
| Spurious-signal and harmonic suppression: 40 dB. | 43 dB. Meets FCC requirements for spectral purity. |
| CW keyer speed range: 8 to 50 WPM. | 8 to 49 WPM. |
| CW keying characteristics: Not specified. | See Figure 2. |
| Composite transmitted noise: Not specified | See Figure 1. |

All dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.

[1]The exact operating range is determined by the builder.
[2]The actual filter bandwidth is somewhat narrower.
[3]With six LCD segments lit (builder adjustable).
[4]At maximum volume.

### The Assembly Process

The Filter Board (which supports the components for your two chosen bands) is assembled first. Next up is the Front Panel Board (perhaps this is a little reward to let you see what the radio is actually going to look like?). Finally the RF Board, the largest and most densely populated of the three, is constructed in two "sessions"—the receiver section is built up first and then the transmitter components are added. As each portion is completed, resistance and voltage checks (if applicable) are made.

The K1, much like the K2, is a modular design that uses virtually no point-to-point wiring. The controls, the display and all of the external connectors are mounted right on the PC boards. The only exceptions are a plug-in cable that connects the internal speaker and an RG-174 jumper on the underside of the RF Board. The Front Panel Board connects to the RF Board through a 20-pin header. The Filter Board is piggybacked onto the rear portion of the RF Board through three 8-pin connectors and held in place with three screws with lock washers.

The K1 assembly instructions are superb in both layout and clarity. They guide you through the assembly and tests on each section before you proceed to the next. With Heathkit's documentation—as I remember it—your actual resistance and voltage measurements would sometimes vary from the "nominal" values printed in the manual. You would then have to decide for yourself if the measurements you were seeing were close enough—and then continue on faith alone. In the K1 manual, resistance and voltage *ranges* are provided. There are also plenty of warnings and special instructions to insure that you have installed specific components correctly. By the time you reach the final alignment stages, you just *know* the radio is going to work!

Winding the toroids used in the K1

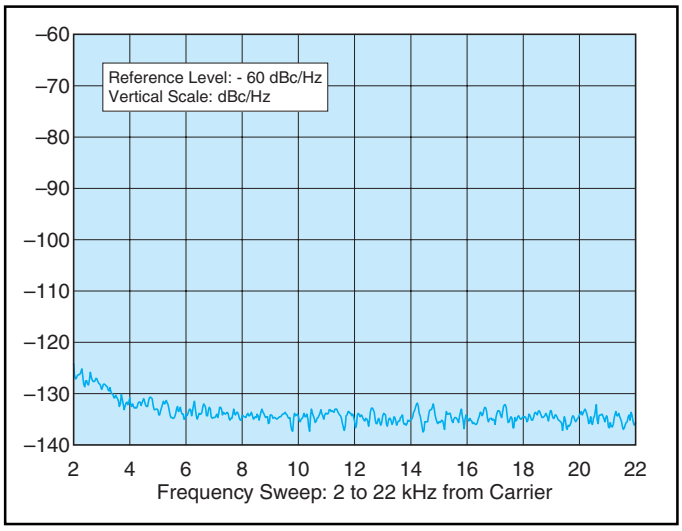



**Figure 1—Worst-case spectral display of the Elecraft K1 transmitter output during composite-noise testing. Power output is 5 W at 7.020 MHz. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.**

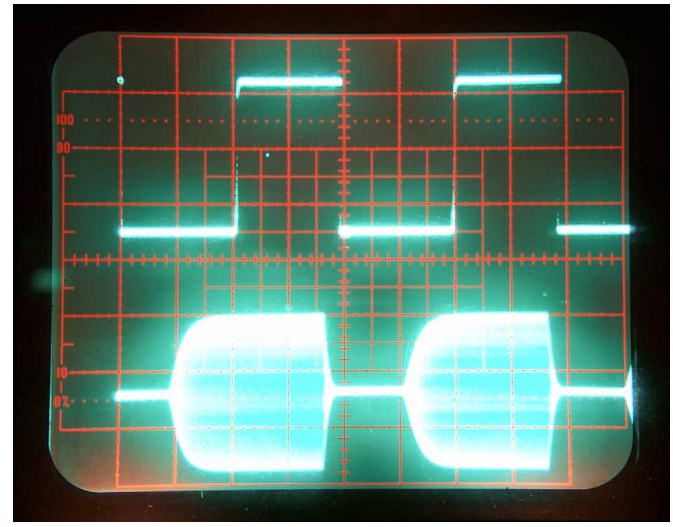


**Figure 2—CW keying waveform for the Elecraft K1 showing the first two dits in full-break-in (QSK) mode using external keying. Equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. Horizontal divisions are 10 ms. The transceiver was being operated at 5 W output at 14.020 MHz.**

turned out to be easier than I had expected. This is an aspect of kit building that I previously had little experience with—Heath would typically provide components such as these as a prefabricated subassembly. I must admit that I felt some initial pangs of "toroid-a-phobia."

After starting the first one I quickly realized that it was somewhat like sewing—only easier. No sharp needle! There are a total of 10 toroids that must be wound, and only the very last one presented any challenge whatsoever. T4 on the RF board requires a bifilar winding, so a twisted pair of wires has to be "sewn" through the core. This took me two tries to get right—but with only 5 turns, it required only a couple of minutes to rework. The toroid winding illustrations and the text descriptions in the manual are excellent.

"Alignment and Test" procedures are preformed in two parts—once after the receiver is completed and later when the transmitter components have been added to the RF Board. Some adjustments involve activating the on-board test features. These are enabled by pressing combinations of the front panel buttons.

After the second alignment and test phase has been completed, you're nearly there. Install the internal speaker, bolt on the top cover, stick on the rubber feet, slap on the serial number tag and… *it's time to play radio!*

The total assembly time for me was a little over 30 hours. I typically worked in 2 to 3 hour sessions and put the radio together over the course of a couple of weeks. Zack managed to assemble his K1 in just 18 hours.

Although the instruction manual is excellent and the builder support offered by both Elecraft and the participants on their rapidly growing e-mail reflector (currently boasting over 1000 members) is approaching the level of "legendary," I'd hesitate to describe the K1 as a suitable project for a beginner.

Heathkit probably would have rated a project such as this at least a "skill level 2" (their scale ran from 1 to 3). But if you've got decent PC board soldering skills, reasonably good vision and dexterity—and patience—you shouldn't run into any major problems successfully completing this kit. And yes, building a K1 *is* the perfect "dress rehearsal" for the assembly of a K2. The construction skills required are approximately equivalent.

## Learning the Ropes

The six keys on the front panel of the K1 all perform multiple functions. White legends above each key indicate its primary assignment. These are accessed with a light tap (or taps) of the key. The secondary control function legends appear in yellow below each key. Pressing and holding a key typically evokes these.

Switching the power on—or tapping the **BAND/DISPLAY** key—will result in a display of the current band and operating frequency. Since the LCD is only capable of indicating three digits at a time, it does so in stages. If the operating frequency is set to 7139.5 kHz for example, the display will first show **7**, then **139**, and then **39.5**. Two quick taps of the **BAND/DISPLAY** key will toggle the radio between bands.

Pressing and holding this same key allows you to change the information that's shown when the transceiver is in the receive mode. You can choose to view the frequency, an S meter bargraph or the dc supply voltage. Turning the VFO knob while in the S-meter mode will automatically bring up the frequency display.

The **MENU/EDIT** key is used to enter the menu mode and to edit the settings of the various parameters. While in the menu, the **WPM+/XFIL** and **WPM-/ATTN** keys are used to scroll up and down through the 16 alpha-tagged selections. Settings are altered by pressing and holding the **MENU/EDIT** key and then tapping the **WPM+/XFIL** or **WPM-/ATTN** keys to step through the available choices.

An **RIT/XIT [PFn]** key resides in the lower center portion of front panel. A quick tap will activate the receive incremental tuning. Pressing and holding this key briefly will evoke the transmit incremental tuning. When either is enabled, a flashing decimal point will appear in the LCD display. The transmit and receive frequencies can be offset—using a rotary control—by up to +/– 3 kHz.

In addition to the flashing decimal point, a bi-color LED—located above the main tuning knob—lights green when the RIT is on, or orange when the XIT is on. A second yellow LED, located just to its right, illuminates when the attenuator is on. A menu setting allows you to disable both of these LEDs to conserve battery power.

The XIT assignment of the **RIT/XIT [PFn]** key can be reprogrammed to serve as a shortcut key to any one of the K1's menu selections.

The **WPM+/XFIL** and the **WPM-/ATTN** keys—along with a **MSG/REC** key—are

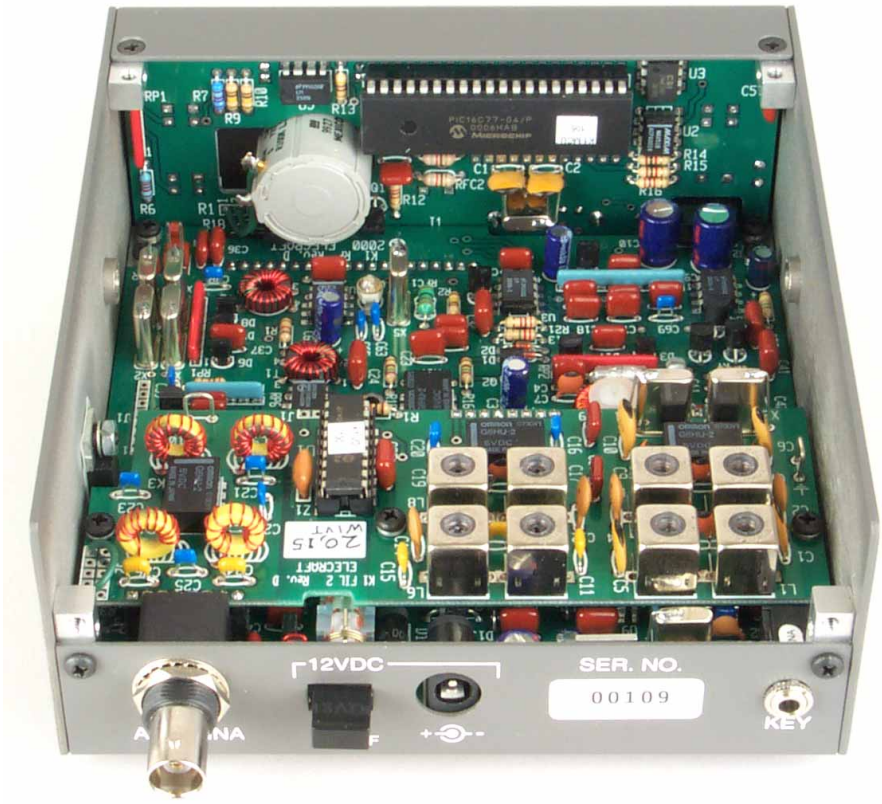



**Figure 3—An internal view of W1VT's K1. The Front Panel Board plugs into the main board along its front edge. The Filter Board, which determines the two bands covered by the transceiver, is towards the rear of the enclosure (the forground in this photo). It's positioned above the RF Board and connects to it through three 8-pin headers. Three small screws secure it in place.**

arranged in a column along the right edge of the front panel. In addition to the menu setting operations already mentioned, these keys are also used to vary the speed of the internal CW keyer, to step through the three filter bandwidth settings and to control a 14-dB attenuator. Pressing both keys simultaneously will lock the transmitter on—a handy feature for making antenna tuner adjustments, for example.

The **MSG/REC** key is used to record and play the contents of the two CW memories. Each memory provides 90 bytes of EEPROM storage—the programmed messages will not be lost when the transceiver is shut off. An "Auto-Repeat" feature allows either message to be continuously retransmitted after a menu-selected delay interval of from 0 and 255 seconds. This would be convenient for beacon applications, for contesting or for repeatedly calling CQ on a "quiet" band.

Advanced features are controlled through the menu. These include the RF power output level; the AGC (on or off); the QSK delay; the sidetone volume and pitch; the key type (straight key or paddles); the paddle sense; and the iambic mode. Curtis A or Super CMOS Keyer III B emulation is supported.

The rotary controls and the buttons on the K1 all have a decent feel to them, but there is a noticeable amount of lateral play in the shafts of the potentiometers used for the volume and offset controls. This is undoubtedly a consequence of using board-mounted potentiometers, but it detracts somewhat—at least cosmetically—from the otherwise rugged appearance of this transceiver. Nylon bushings might help.

The main tuning knob controls the varactor-based VFO through a multi-turn potentiometer. Vigorous cranking generates a mechanical sound that resembles that made by a guitar player's fingers sliding along the strings from fret to fret. The tuning action is smooth and solid, however.

## QRV!

The K1—at least initially—is more complicated to operate than the typical QRP kit transceiver, but you'll quickly warm up to the nice selection of advanced features.

The digital display is particularly handy. If you should accidentally bump the main tuning knob in the middle of a QSO, it's easy to tune the radio precisely back to the desired frequency. This can be a problem with analog tuning arrangements.

Since the K1 employs a frequency counter to measure the actual frequency of the VFO—and uses that information to drive the display—you can easily compensate for any drift that might occur due to warm up periods, temperature extremes or wide variations in supply voltage. This simply involves making small adjustments of the main tuning knob to keep the displayed frequency constant.

The selectable filter bandwidths are another big plus. The wider settings are convenient when tuning around looking for activity or for listening for answers to your CQs. Once you've identified a target signal, you can switch to a narrower filter setting to reduce QRM.

The RIT arrangement on the K1 is nicely designed. The ability to switch it on and off makes it particularly useful for contesting. You can leave the filter bandwidth set at the narrower settings and not have to worry about re-matching your transmit and receive frequencies between contacts. This can be tricky with a strictly rotary control.

XIT is just icing on the cake! This added capability is especially handy for chasing DX in a pileup. First, tune to his frequency, then tap the **RIT/XIT [PFn]** key to activate the RIT, and use it to search for his listening frequency (simply hunt for the station in the pileup exchanging reports with him). When you've located one, hold the **RIT/XIT [PFn]** key down briefly and you'll be listening on his transmit frequency and all set up to transmit on his listening frequency!

I've had the K1 set up at my home station and used it to make several domestic contacts using my 80-meter dipole and an antenna tuner. Zack has worked a fair number of DX and domestic contacts on a variety of bands on his. (We purchased enough band modules to cover all the possibilities and have been swapping them off between us). Rick Lindquist, N1RL, took my rig home for a weekend and ended up playing around a bit in the North American QSO Party. He reported that the receiver held up reasonably well even under fairly busy band conditions and that he had no trouble at all participating with "just" 5 W.

For me, building the Elecraft K1 was sufficiently challenging to make things interesting—yet still simple enough to keep it fun. The completed K1 delivers a collection of features and a measure of performance that's a cut above those of the average QRP kit transceiver.

*Manufacturer*: Elecraft; PO Box 69, Aptos, CA 95001; 831-662-8345; fax 831-662-0830; **sales@elecraft.com**; **www.elecraft.com**.

Price: Elecraft K1 two-band QRP CW transceiver kit, $269; KFL1 additional two-band modules $59; KNB1 noise blanker, $29; KAT1 antenna tuning unit, $89; KTSI wide range tilt stand, $35.

# Idiom Press Rotor-EZ with RS-232

*Reviewed by Ward Silver, N0AX*
*QST Contributing Editor*

Of all of the operations in the average ham shack that have been interfaced to a PC over the last few years, one of the last holdouts has been antenna rotation control. While computer-controlled rotator systems and substitute control boxes have been readily available for quite some time, they have historically been rather pricey. Enter Idiom Press's Rotor-EZ with RS-232 controller kit for the Ham-II, III and IV, and Tailtwister control boxes.

A second nearly identical version of this kit—lacking the components required for computer interface capabilities but providing all of the other enhanced system control features—is also offered. The parts needed to add computer control can also be ordered separately and installed on the circuit board of the more basic version at a later time.


**Hidden inside this ordinary-looking rotator control box is a new product that enhances its operation and expands its capabilities.**

## What Does It Do?

The Rotor-EZ (pronounced "Rotor-Easy") is a small circuit board kit that can be installed inside the control boxes of any of the Ham-M or Tailtwister rotators that use analog meters and the three-lever control arrangement. The device employs a microprocessor that works with the existing control box's electronics, switches and meter to add both hands-off point-and-go operation and more "intelligent" rotator motor control.

Rotor-EZ smartens up the controller command operations with an automatic five second brake delay, electronic end points (to avoid the mechanical lock up that sometimes occurs when the motor runs into its end stops), an "Unstick" routine for Tailtwisters and jam protection. In other words, it takes care of all of the things an operator is supposed to do to reduce wear and tear on a rotator and tower, only automatically.

There is also a ninety-degree offset indication feature available—perfect for those who have additional directional antennas installed at right-angles to the main antenna. (This is a common configuration that's used to reduce interaction between closely spaced antennas.) Rotor-EZ is even smart enough to put up with—to some extent—the "dead spots" that sometimes develop in worn indicator potentiometers.

## How Does It Work?

The brain of the Rotor-EZ is a Microchip Technologies PIC16C73 microprocessor. It responds to your manual or computer commands and drives separate relays that control the brake solenoid and the motor in the rotator. The processor uses an analog-to-digital converter to read the position of the rotator motor's direction potentiometer and that of the control box's calibration control.

Once Rotor-EZ has been installed, the control box's existing front panel-mounted **CALIBRATE** knob becomes a go-to bearing set point control—Idiom Press refers to this as "Auto-Point." The meter is driven by the processor's outputs and serves double duty—it indicates the targeted direction when using the **CALIBRATE** knob to set the desired antenna bearing, and the actual direction as the antenna turns towards and reaches its new heading. The processor also controls four LED indicators and uses them to show what the system is doing, the progress of rotation and any error conditions.

## Building the Kit

I received my Rotor-EZ kit and immediately got down to business. The patient? My Tailtwister control box. This is the rotator control located farthest from my operating position and the one that takes the longest stretch to operate.

My Tailtwister frequently "sticks" when the brake wedge doesn't fully disengage as rotation begins (this is a common idiosyncracy with the Tailtwisters). The usual cure is a short manual pulse in the opposite direction before beginning a rotation. Rotor-EZ performs this automatically, so I was definitely anxious to take advantage of that feature. I disconnected the rotator control box, pulled it out of the shack and dragged it—kicking and screaming—off to my "laboratory."

The Rotor-EZ kit comes with a fair number of parts (see Figure 4). They're all packed onto a small circuit board that's designed to be mounted right on the studs of the meter in the control box (see Figure 5).

I am an experienced builder, so it only took about a half-hour to stuff and solder the board, even though I took the time to check off every step and double-check the resistor values. I recommend that you take your time during the assembly phase and be careful to do the job right—it would likely be very difficult to troubleshoot the board after it's been installed.

I had to drill a hole for one of the LED indicators in the front panel of my box—my unit originally had only three LEDs. Depending on your particular model and version of the control box, it may be necessary to drill additional holes for the other LEDs, and possibly a hole in the back panel to pass the computer control cable through as well. When drilling, it's a good idea to use masking tape on the inside of the box to catch any stray chips.

Once you've completed the circuit board, secured it to the meter, wired up the four LEDs and rewired the **CALIBRATE** control pot, you can run a "Pretest." If everything checks out, you can continue integrating the unit into the control box.

As I removed wires in the existing control circuitry, I took pains to record

### Bottom Line

Rotor-EZ adds set and go convenience, "intelligent" motor control, added features and optional computer controllability to the popular Ham-M and Tailtwister rotator systems.

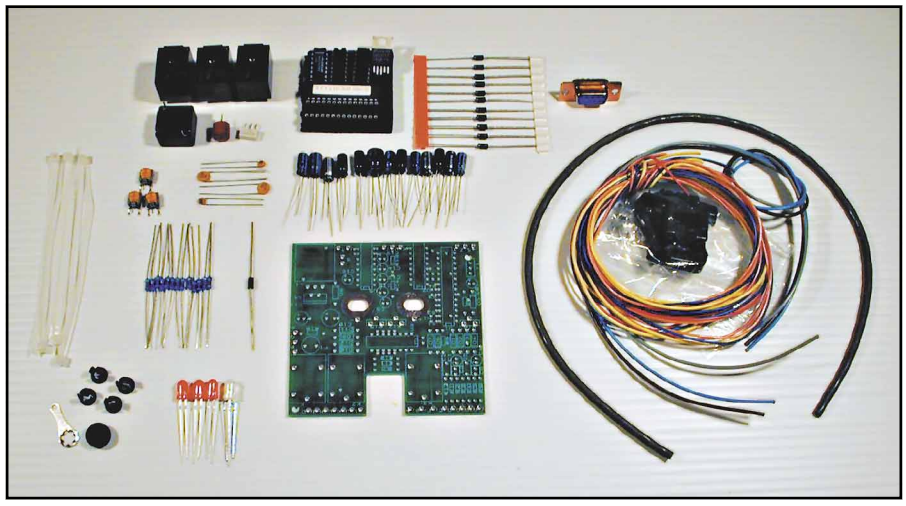


**Figure 4—The Rotor-EZ with RS-232 kit as delivered. The $3\frac{3}{8} \times 3\frac{3}{16}$-inch double-sided circuit board is solder masked and silk screened with component outlines and parts numbers. Everything you'll need—including hookup wire and wire ties—is included.**

the color of each wire and where it went in the original configuration. This is especially important should you decide to assemble and install the kit over several sessions—don't rely on memory alone!

A couple of warnings are in order here. The wires originally used within these control boxes are typically solid conductor and the insulation on them has a low melting point. If you linger too long with the soldering iron you'll melt the insulation off the wires. Most of the wires in my control box were long enough to snip them off at their connection points and strip off a little more insulation for reattachment.

There is a common modification that has been made to many of these control boxes over the years that keeps the brake off for a few seconds after you let go of the **BRAKE RELEASE** lever (see Figure 7). Rotor-EZ takes care of all brake delay operations, so if your box has had this change made, you'll want to begin by reversing this—and any other—user-installed modifications. The instructions naturally assume that you are installing Rotor-EZ in an unmodified unit.

I proceeded carefully through the process of interfacing the new brain to the remaining control box circuitry. There are quite a few wires involved. Take your time and pay close attention to properly dressing the leads. The completed installation is shown in Figure 8.

I then double-checked all my connections and applied power. Success! All of the smoke stayed *in* the components and the rotary **CALIBRATE** control and switches all appeared to behave properly. I followed the calibration instructions and had the rotator system back in operation within four hours of initially opening the case.

## The Instructions and User Manual

I found the instructions to be clear and straightforward, but there are no drawings—text only. When I asked Idiom Press about this, they told me that they have identified (among unmodified controllers) five different meter movements and at least three significantly different component layouts. There are also minor variations among these. Early boxes employed separate components where later boxes used printed circuit boards. Even then, there are at least two different versions of PC board models.

Since it would take a significant number of drawings or photographs to cover all of the possible variations, the instructions rely completely on text descriptions—and they do a very good job. I was able to complete the installation phase successfully by carefully following each step. Providing a table for the builder to jot down notes detailing where the original wires are routed would be a helpful addition, but scrap paper will suffice. On a scale of 0 (totally confounding) to 10 (Heathkit-like), I would rate these instructions a 7.

## Opportunities for Improvement

The component labeling on Rotor-EZ's PC board could have been clearer—some of the silk-screened text designators are obscured or overlay a solder pad. Also, the

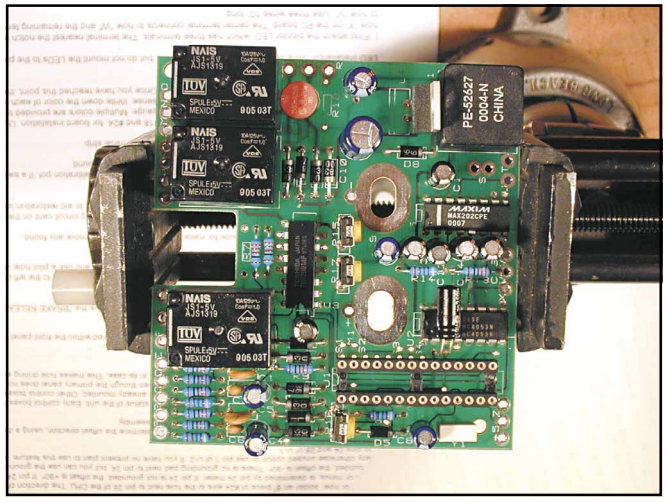



**Figure 5—The assembled Rotor-EZ circuit board ready for installation in the rotator control box. The vacant 28-pin socket in the lower right hand corner of the board is for the PIC16C73 microprocessor.**

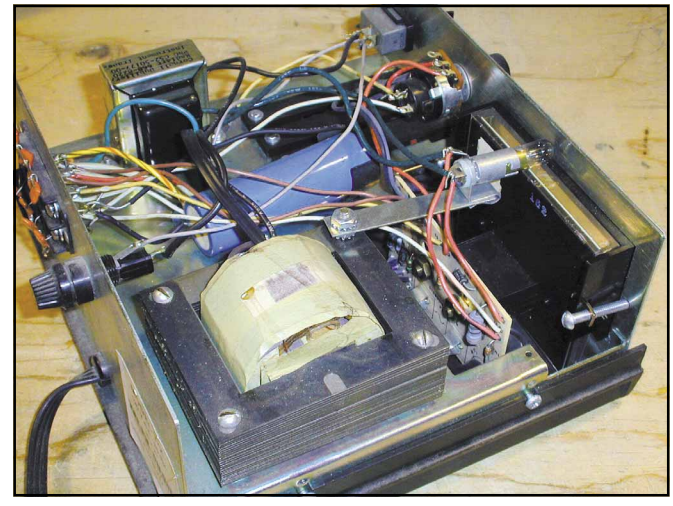


**Figure 6—My Tailtwister control box awaits "brain surgery." The Rotor-EZ circuit board will be replacing the original one that's mounted on the meter studs (located just to the right of the large transformer in this photograph).**

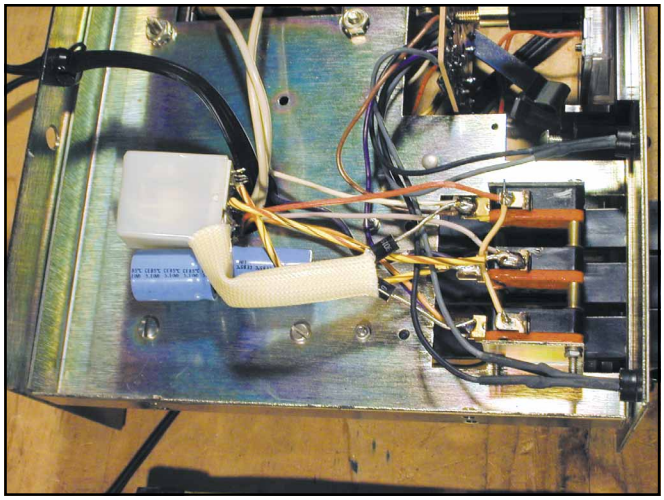


**Figure 7—The electrolytic capacitors, the relay (the white plastic cube) and the diodes in this photo are a modification that I added a few years back to provide a brake delay. This—and any other circuit changes that have been made—must be eliminated before Rotor-EZ installation begins.**

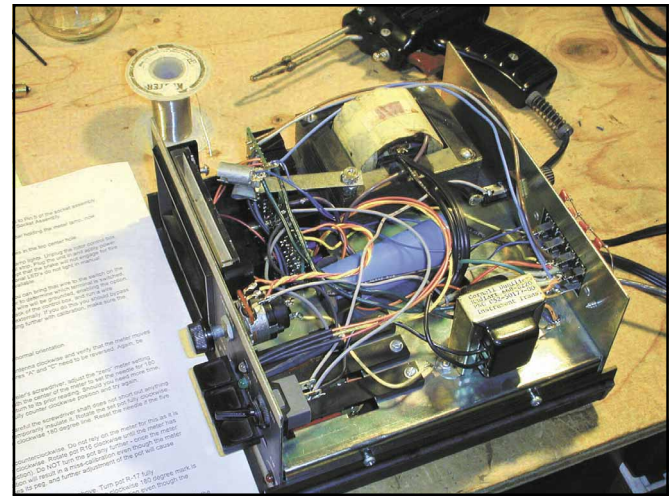


**Figure 8—The Tailtwister control box with the Rotor-EZ system installed. Close comparisons with Figure 6 will reveal a significant number of new connections between the original components and their new master.**

solder pads themselves are rather small. Since I received my kit, the silk screening has been improved and Idiom Press has indicated that they intend to increase the size of the pads at some point.

## Functional Review

My Rotor-EZ equipped control box has been trouble-free. Although I live quite close to a number of 50 kW AM Broadcast stations, I haven't encountered any RF interference problems either to or from the unit. Calibration was straightforward and it didn't require multiple trips outside to verify which direction the antenna was actually pointing.

To operate the modified controller, what was previously the **CALIBRATE** knob is now used to set the meter pointer to the desired bearing. A short press of what was once the **BRAKE RELEASE** lever then initiates antenna rotation. If you prefer, you can still use the **CW** and **CCW** (clockwise and counterclockwise) levers—in combination with the **BRAKE RELEASE** lever—in the "original" manual mode. Either way, the brake will automatically reengage 5 seconds after rotation stops.

The direction LEDs show what the unit is doing. In case of trouble, the status LED will blink or the meter will wiggle to alert the operator.

A really neat feature is the gradual change of color of the multicolored status LED. When a turn command is executed, the LED first appears red. As the rotator gradually turns toward the set point, the color changes from orange to green. I found myself turning the antenna just to watch the cool light show put on by the LED!

I connected the RS-232 cable to my PC and exercised the unit's computer control functions through a terminal program. The command protocol is listed in the user manual. I will eventually command the rotator through my logging software. The software protocol for Rotor-EZ is the same as that of Hy-Gain's DCU-1.

I have not tried the Overshoot option (which allows big antenna systems to coast through the last three degrees into position) or the 90-degree offset feature (for antennas mounted at right angles).

Have I found Rotor-EZ to be useful? You bet! I can set, start and forget—just like on the more expensive rotator control boxes. I never find myself accidentally holding the control levers down while brake wedge is stuck. I now even occasionally catch myself trying to use the Auto-Point mode on my currently (but not for long) stock Ham-IV control box.

## Summary

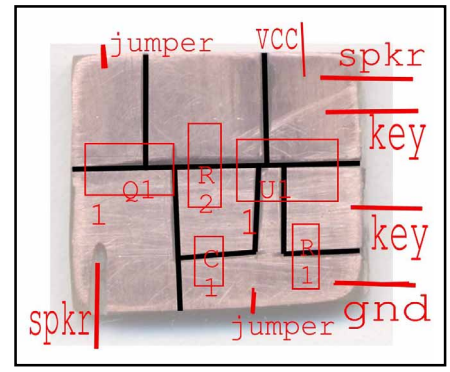
Rotor-EZ is a simple, useful product that fills a common need in ham shacks at a reasonable price. You sacrifice none of the functionality of the old control unit by installing it. The consistent and reliable method by which the rotator motor will be operated should prolong its life and save wear and tear on the tower and antennas. I—for one—am for *any* station improvements that will help keep Murphy at bay. Rotor-EZ is a product I can heartily recommend.

Price: Rotor-EZ kit including RS-232, $129.95; Rotor-EZ basic kit, $99.95 (plus shipping and handling).

*Manufacturer*: Idiom Press, Box 1025, Geyserville, CA 95441; 707-431-1286; **sales@idiompress.com**; **www.idiompress.com**. QST

# FEEDBACK

◊ Sam Ulbing, N4UAU, author of "The World's Smallest Code-Practice Oscillator," *QST*, Feb 2001, pp 39-41, has provided a part-placement diagram for his homemade PC board. You can download a picture of the diagram from Sam's Web page **http://n4uautoo.home.sprynet.com** and as ULBPIC.ZIP from the ARRL site **www.arrl.org/files/qst-binaries/**.—*tnx Sam Ulbing, N4UAU*




◊ Please refer to Ron Stone, KA3J, "The UniCounter—A Multipurpose Frequency Counter/Electronic Dial," *QST*, Dec 2000, p 34, Figure 1. Ron advises he incorrectly showed U1 pins 12 and 13 connected to DS1 pins 1 and 2, respectively. Correct the schematic to show U1 pin 12 connected to DS1 pin2 and U1 pin 13 connected to DS1 pin 1.—*tnx Ron Stone, KA3J* QST

# September 2000 VHF QSO Party Results

**By Dan Henderson, N1ND**
Contest Branch Manager

Everyone has a favorite season of the year. Some prefer to frolic in the crashing waves and warmth under the summer sun. Others find no greater pleasure than to swoosh down hillsides on snowboards or skis in the cold of winter. Most enthusiasts of gardening will probably tell you their favorite time of year is spring, when new life peeks from beneath the soil, bringing a sense of rebirth.

But for sheer beauty and a pleasant experience, it is hard to top fall. While the countryside is turned into a vivid palette of reds, yellows and gold, the possibility of finding a great VHF/UHF band opening increases. The prospect of broad, regional tropospheric openings during the early fall tempt the VHF/UHFer. The ARRL September VHF QSO Party is an excellent opportunity to experiment with new bands, equipment and operating locations.

In the 2000 ARRL September VHF QSO Party, 582 entries were received representing a total of 894 participants. A total of 269 entries were received for the debut of the Single Operator Low Power Category, while 148 entries came from Single Operator High Power participants. Rover entries accounted for 11.2% of the total, which reflected a slight increase in Rover participants from 1999.

Record setting performances are always a contest highlight. In the year 2000 contest, with the separation of the Single

## Top Ten

| Single Operator Low Power | | Single Operator High Power | | QRP Portable | | Multioperator | | Limited Multioperator | | Rover | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K2DRH | 137,200 | K1TEO | 385,264 | N8XA | 12,765 | W2SZ/1 | 1,883,211 | K3MQH | 545,523 | ND3F | 311,940 |
| W0UC | 84,870 | N2BJ | 183,274 | N9MYK | 6,622 | K8GP | 1,599,325 | K3YTL | 424,490 | N1MJD | 137,250 |
| AF1T | 68,561 | KE8FD | 182,016 | WB2AMU | 3,010 | K1WHS | 466,944 | W4IY | 334,170 | ND2X | 123,074 |
| K4TO | 66,836 | W4RX | 172,172 | KQ6EE | 1,972 | N2PA | 244,080 | NC1I | 324,445 | WB9SNR | 101,008 |
| K8MR | 55,440 | K1UHF | 162,024 | W1KMH | 1,850 | W4NH | 163,418 | N2HLT | 237,106 | N2JMH | 76,035 |
| K1JT | 44,631 | K3DNE | 149,450 | N7IR | 1,003 | N0UK | 121,260 | AA4ZZ | 231,768 | N6DN | 64,530 |
| KA9WBT | 43,392 | K2SMN | 140,995 | K6NT | 966 | N8KOL | 93,015 | N6RMJ | 150,914 | N2GKM | 52,074 |
| K5MA | 38,900 | WB9Z | 140,994 | W3PO | 826 | K3EOD | 41,735 | N2NK | 135,864 | AL1VE | 46,330 |
| N2SCJ | 35,400 | K8TQK | 138,846 | W9SZ | 672 | W6TOI | 34,162 | W9ICE | 135,828 | VE3OIL | 46,260 |
| W4EUH | 34,804 | K4QI | 131,026 | KK7AT | 650 | WA3ZKR | 31,284 | WB1GQR | 127,421 | N2MH | 42,444 |

| Northeast Region (New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections) | | | Southeast Region (Delta, Roanoke and Southeastern Divisions) | | | Central Region (Central and Great Lakes Divisions; Ontario Section) | | | Midwest Region (Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections) | | | West Coast Region (Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT/Yukon Sections) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AF1T | 68,561 | A | W4EUH | 34,804 | A | K2DRH | 137,200 | A | N0PB | 23,766 | A | N6MU (at N6NB) | 14,928 | A |
| K1JT | 44,631 | A | AD4DG | 22,940 | A | W0UC | 84,870 | A | K0MHC | 11,830 | A | K7CW | 8,018 | A |
| K5MA | 38,900 | A | KU4R | 18,564 | A | K4TO | 66,836 | A | K0VSV | 11,328 | A | KE6GFI | 7,830 | A |
| N2SCJ | 35,400 | A | KD4HIK | 15,225 | A | K8MR | 55,440 | A | K0MQS | 10,146 | A | WA7BJU | 6,804 | A |
| W1PM | 34,362 | A | AF4HX | 10,412 | A | KA9WBT | 43,392 | A | WA2HFI/0 | 8,928 | A | KF6ISR | 6,251 | A |
| K1TEO | 385,264 | B | W4RX | 172,172 | B | N2BJ | 183,274 | B | KM0T | 81,324 | B | K6TSK | 43,212 | B |
| K1UHF | 162,024 | B | K4QI | 131,026 | B | KE8FD | 182,016 | B | K5CM | 56,356 | B | N6AJ | 30,720 | B |
| K3DNE | 149,450 | B | K2UOP | 99,946 | B | WB9Z | 140,994 | B | W8CM | 44,339 | B | W6KBX | 28,490 | B |
| K2SMN | 140,995 | B | N8XUR | 30,272 | B | K8TQK | 138,846 | B | N0LL | 29,928 | B | KE7SW | 22,933 | B |
| K1GX | 113,971 | B | KN4SM | 28,747 | B | K9QFL | 103,373 | B | N0KQY | 24,250 | B | N7EPD | 21,440 | B |
| WB2AMU | 3,010 | Q | KD4NOQ | 40 | Q | N8XA | 12,765 | Q | N7QF | 12 | Q | KQ6EE | 1,972 | Q |
| W1KMH | 1,850 | Q | N3AWS | 6 | Q | N9MYK | 6,622 | Q | KF0GX | 12 | Q | N7IR | 1,003 | Q |
| W3PO | 826 | Q | KG4HYU | 2 | Q | W9SZ | 672 | Q | | | | K6NT | 966 | Q |
| WA3GYW | 588 | Q | | | | | | | | | | KK7AT | 650 | Q |
| VE2PIJ | 42 | Q | | | | | | | | | | KA7EXM | 442 | Q |
| W2SZ/1 | 1,883,211 | M | K8GP | 1,599,325 | M | N8KOL | 93,015 | M | N0UK | 121,260 | M | W6TOI | 34,162 | M |
| K1WHS | 466,944 | M | W4NH | 163,418 | M | | | | KF0Q | 20,175 | M | KF6KDC | 27,576 | M |
| N2PA | 244,080 | M | K4HUM | 27,540 | M | | | | K5IUA | 16,170 | M | K6TZ | 4,960 | M |
| K3EOD | 41,735 | M | KS4YT | 13,984 | M | | | | KK5IH | 9,504 | M | W6DHN | 4,148 | M |
| WA3ZKR | 31,284 | M | | | | | | | | | | | | |
| K3MQH | 545,523 | L | W4IY | 334,170 | L | W9ICE | 135,828 | L | N0QJM | 51,504 | L | N6RMJ | 150,914 | L |
| K3YTL | 424,490 | L | AA4ZZ | 231,768 | L | NI9E | 76,383 | L | W7SAO | 10,207 | L | VA7ISL | 21,300 | L |
| NC1I | 324,445 | L | W4VHF | 25,596 | L | N8ZM | 61,020 | L | N5XU | 3,808 | L | K6OUE | 13,662 | L |
| N2HLT | 237,106 | L | NG4C | 19,578 | L | K9TMS | 24,864 | L | K0FPC | 3,360 | L | KF6KDA | 13,459 | L |
| N2NK | 135,864 | L | K4SCS | 9,882 | L | KG9BV | 20,331 | L | K0MF | 2,675 | L | N7EY | 9,945 | L |
| ND3F | 311,940 | R | W3IY | 38,550 | R | WB9SNR | 101,008 | R | ND2X | 123,074 | R | N6DN | 64,530 | R |
| N1MJD | 137,250 | R | KB4NVD | 36,369 | R | VE3OIL | 46,260 | R | N0DQS | 13,769 | R | AL1VE | 46,330 | R |
| N2JMH | 76,035 | R | K1RA | 14,150 | R | K0PG | 31,195 | R | W5HL | 8,041 | R | W7DHC | 32,164 | R |
| N2GKM | 52,074 | R | KC3WO | 9,324 | R | KB9WVL | 27,378 | R | KB0QGT | 7,832 | R | KF6GYM | 31,137 | R |
| N2MH | 42,444 | R | KS4S | 672 | R | AA4R | 15,080 | R | NK5W | 4,370 | R | K6FZZ | 25,730 | R |

Operator category into Low and High power categories, new overall and divisional were as plentiful as the fall foliage (and the amount or raking we end up doing after the leaves fade and fall). All existing Single Operator records become the Single Operator High Power records.

Bob, K2DRH, has the honor of being the first person to hold the Single Operator Low Power category mark, (and Central Division record) with a score of 137,200 beating out Paul, W0UC, whose score was 84,870. The initial Division records were set by K1JT (Atlantic), K0MHC (Dakota), KU4R (Delta), K4TO

### Affiliated Club Competition Results

| *Club* | *Entries* | *Score* |
|---|---|---|
| **Medium Club** | | |
| Potomac Valley Radio Club | 20 | 2,999,981 |
| North East Weak Signal Group | 13 | 1,161,969 |
| Northern Lights Radio Society | 19 | 376,120 |
| Society of Midwest Contesters | 9 | 335,498 |
| Badger Contesters | 14 | 332,840 |
| Mt Airy VHF Radio Club | 6 | 241,701 |
| Rochester VHF Group | 10 | 211,110 |
| Yankee Clipper Contest Club | 3 | 39,139 |
| **Local Club** | | |
| Murgas ARC | 3 | 426,096 |
| South Jersey Radio Association | 7 | 54,426 |
| Downey ARC | 3 | 47,794 |
| Rocky Mountain VHF Society | 6 | 43,857 |
| Western States Weak Signal Group | 4 | 20,438 |
| Schenectady Museum ARA | 4 | 17,254 |
| Twin City Ham Club | 3 | 5,987 |
| West Valley ARA | 3 | 280 |

**The KF6GYM Rover station, complete with solar panels, set up for operation on top of 3,849-foot Mt Diablo (CM97) in California.**

### Multiplier Leaders By Band

**Single Operator Low Power**

| 50 MHz | | 144 MHz | | 222 MHz | | 432 MHz | | 902 MHz | | 1296 MHz | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N4GN | 44 | K0MQS | 57 | K2DRH | 34 | K2DRH | 42 | K2DRH | 13 | K2DRH | 20 |
| K2DRH | 39 | K4TO | 50 | K8MR | 32 | K4TO | 37 | W0UC | 9 | W3KM | 11 |
| W4EUH | 36 | N4GN | 49 | K4TO | 31 | VE3TMG | 29 | W3KM | 8 | W0UC | 10 |
| K4TO | 36 | K2DRH | 48 | WA1MKE/9 | 22 | N0PB | 28 | K1JT | 8 | KA9WBT | 9 |
| K8MR | 35 | W4EUH | 43 | K5MA | 22 | W0UC | 27 | AF1T | 7 | W3KJ | 7 |
| | | N0PB | 43 | | | | | | | | |

**Single Operator High Power**

| 50 MHz | | 144 MHz | | 222 MHz | | 432 MHz | | 902 MHz | | 1296 MHz | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K8LEE | 60 | KE8FD | 72 | KE8FD | 47 | KE8FD | 54 | K1TEO | 23 | K2TXB | 23 |
| K5CM | 52 | W3EME | 64 | K8TQK | 43 | K2TXB | 44 | KM0T | 15 | K1TEO | 21 |
| K1TEO | 49 | K8TQK | 64 | K1TEO | 36 | K4QI | 43 | K1GX | 14 | N2BJ | 19 |
| K3ZO | 48 | K4QI | 61 | WB9Z | 33 | K8TQK | 43 | N2BJ | 13 | KM0T | 19 |
| WB9Z | 42 | WB9Z | 61 | K4QI | 32 | WB9Z | 41 | K2YAZ | 13 | W9GA | 17 |
| N2BJ | 42 | | | | | | | | | | |

**Multioperator**

| 50 MHz | | 144 MHz | | 222 MHz | | 432 MHz | | 902 MHz | | 1296 MHz | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K8GP | 93 | K8GP | 85 | K8GP | 62 | K8GP | 70 | W2SZ/1 | 34 | K8GP | 36 |
| K3MQH -L | 86 | W4IY -L | 74 | K3YTL -L | 52 | K3MQH -L | 61 | K8GP | 32 | W2SZ/1 | 33 |
| W4NH | 73 | AA4ZZ -L | 73 | K3MQH -L | 52 | K3YTL -L | 54 | K1WHS | 19 | K1WHS | 21 |
| W4IY -L | 70 | K3MQH -L | 72 | W2SZ/1 | 45 | N2HLT -L | 49 | N2PA | 18 | N2PA | 19 |
| W2SZ/1 | 67 | K3YTL -L | 61 | W4IY -L | 45 | W9ICE -L | 48 | N0UK | 8 | W6TOI | 8 |
| K1WHS | 65 | N0UK | 59 | N2PA | 43 | W2SZ/1 | 47 | W4NH | 6 | N0UK | 8 |
| NC1I -L | 60 | W2SZ/1 | 58 | N2HLT -L | 42 | W4IY -L | 46 | K3EOD | 6 | WA3ZKR | 7 |
| K3YTL -L | 60 | N2HLT -L | 58 | AA4ZZ -L | 39 | AA4ZZ -L | 45 | KF0Q | 4 | K3EOD | 6 |
| AA4ZZ -L | 59 | W9ICE -L | 56 | W9ICE -L | 37 | NC1I -L | 43 | W6TOI | 4 | W4NH | 6 |
| W9ICE -L | 57 | W4NH | 55 | NC1I -L | 37 | N2PA | 42 | N1DGF | 3 | N1DGF | 4 |
| N2HLT -L | 57 | N2PA | 54 | | | | | WA3ZKR | 2 | KF0Q | 4 |
| | | | | | | | | K5IUA | 2 | KF6KDC | 4 |

-Q denotes QRP Portable
-L denotes Limited Multioperator

### QSO Leaders By Band

**Single Operator Low Power**

| 50 MHz | | 144 MHz | | 222 MHz | | 432 MHz | | 902 MHz | | 1296 MHz | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N6MU | 148 | KB0LYL | 195 | K2DRH | 59 | KE6GFF | 179 | AF1T | 18 | K2DRH | 29 |
| N3II | 135 | K0MQS | 178 | N2SCJ | 52 | K2DRH | 91 | W0UC | 18 | W0UC | 22 |
| K1JT | 106 | NZ8C | 167 | K8MR | 49 | K9YR | 74 | K2DRH | 16 | N2SCJ | 19 |
| K2DRH | 104 | N6MU | 163 | K1JT | 49 | K1JT | 73 | K1JT | 14 | W3KM | 18 |
| K8MR | 101 | K2DRH | 161 | W0UC | 48 | W0UC | 73 | W1PM | 13 | W3KJ | 18 |
| | | | | | | | | | | AF1T | 18 |

**Single Operator High Power**

| 50 MHz | | 144 MHz | | 222 MHz | | 432 MHz | | 902 MHz | | 1296 MHz | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K8LEE | 222 | W3EME | 511 | K1TEO | 105 | K1TEO | 171 | K1TEO | 48 | K2TXB | 55 |
| K1TEO | 219 | K1TEO | 379 | N2BJ | 81 | K2TXB | 164 | W4RX | 25 | K1TEO | 54 |
| W4RX | 210 | K1UHF | 334 | K1UHF | 80 | N2BJ | 137 | K1GX | 22 | N2BJ | 43 |
| K3ZO | 200 | K2TXB | 332 | KE8FD | 74 | W4RX | 124 | WA3DRC | 20 | K2SMN | 33 |
| N2BJ | 173 | K2SMN | 248 | W4RX | 69 | KE8FD | 109 | K3DNE | 19 | K1GX | 30 |

**Multioperator**

| 50 MHz | | 144 MHz | | 222 MHz | | 432 MHz | | 902 MHz | | 1296 MHz | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K8GP | 668 | K8GP | 700 | W2SZ/1 | 262 | W2SZ/1 | 447 | W2SZ/1 | 121 | W2SZ/1 | 146 |
| W2SZ/1 | 665 | W2SZ/1 | 689 | K8GP | 189 | K8GP | 352 | K8GP | 71 | K8GP | 88 |
| K3MQH -L | 542 | K3MQH -L | 619 | K3YTL -L | 165 | K3MQH -L | 279 | K1WHS | 36 | K1WHS | 44 |
| K3YTL -L | 487 | K3YTL -L | 528 | NC1I -L | 158 | NC1I -L | 269 | N0UK | 36 | N0UK | 42 |
| NC1I -L | 446 | NC1I -L | 435 | K3MQH -L | 147 | K3YTL -L | 263 | N2PA | 26 | N2PA | 31 |
| K2BAR -L | 418 | W4IY -L | 435 | N6RMJ -L | 138 | N6RMJ -L | 205 | W4NH | 10 | W6TOI | 29 |
| W4IY -L | 397 | K1WHS | 363 | W4IY -L | 119 | W4IY -L | 176 | K3EOD | 9 | NR5O -L | 15 |
| K1WHS | 395 | WB1GQR -L | 361 | K1WHS | 110 | N2HLT -L | 172 | KF0Q | 6 | WA3ZKR | 13 |
| N2HLT -L | 318 | AA4ZZ -L | 353 | WB1GQR -L | 105 | K1WHS | 165 | W6TOI | 6 | W4NH | 11 |
| W1QK -L | 306 | N6RMJ -L | 324 | N2HLT -L | 101 | WB1GQR -L | 160 | WA3ZKR | 6 | KF6KDC | 11 |
| | | | | | | | | N8KOL | 6 | K3EOD | 9 |

-Q denotes QRP Portable
-L denotes Limited Multioperator

**The WK6I QTH was 9600 feet up in the Inyo Mountains of California at an abandoned mine with an absolutely beautiful view of the eastern Sierra Nevada range.**

**Mike, N2YWN (left), helps Adam, KC2FDJ (right), get adjusted to a handheld beam from the KB2E Limited Multioperator set-up in the Adirondacks.**

**The 4 × 2.5 wavelength 2-Meter array of the AA4ZZ Limited Multioperator station located in the mountains of Western North Carolina.**

(Great Lakes), K2KIB (Hudson), N0PB (Midwest), AF1T (New England), K7CW (Northwestern), N6MU at N6NB (Pacific), AD4DG (Roanoke), W6OAL (Rocky Mountain), W4EUH (Southeastern), KE6GFI (Southwestern), K5LOW (West Gulf) and VE3TMG (Canada).

Leading the charge in the Single Operator High Power category was Jeff, K1TEO, who easily distanced himself from Barry, N2BJ and Gary, KE8FD, who staged a nip and tuck battle for runner-up honors. Jeff's performance was the only new Division record (New England) during the contest in the category, but fell a bit short of the existing category overall mark. Axel, N8XA, who beat Dick, N9MYK, won the QRP Portable category. There were no new records set in this category.

A new Limited Multioperator record and Atlantic Division record was set by the operators at K3MQH. Their effort outdistanced the crew at K3YTL. Besides K3MQH, new division records were also set by W9ICE (Central), N2NK (Hudson), N7EY (Northwestern), W4IY (Roanoke) and W7SAO (Rocky Mountain).

When you think about dominant VHF contesters, it doesn't take long before you come to the outstanding Multioperator Unlimited team that works from Mt Greylock, Massachusetts. This past September, the W2SZ/1 team once again took high score, with a new overall category mark of 1,883, 221 points. Hats off also to another traditional "top of the box" operation—the K8GP team that finished second in the category, though they did set a new Roanoke Division record in the process.

Taking advantage of a great time of year to be on the road, Brian, ND3F, established a new Rover category and Atlantic Division mark. His 311,940 outpaced Beau, N1MJD. Setting new division marks in the category were ND2X (West Gulf) and KB4NVD (Delta). Congratulations to these and all of the overall, divisional and sectional champions.

The second year of Club Competition in this contest saw a small increase in the total entries, as well as numerous entries from clubs that did not reach the minimum of three submitted scores as per the rules. Congratulations to the Potomac Valley Radio Club for taking first place in the Medium Club category and the Murgas Amateur Radio Club, who held top honors in the Local Club category.

The 2001 ARRL September VHF QSO Party will be contested September 8-9, 2001. Please note a change in the former QRP Portable category. The category has been renamed Single Operator Portable. The rules have been clarified to show that the operation must take place away from a permanent station location, and that the station may not change from 500-meter diameter circle as called for in General Rule for all ARRL Contests Rule 3.7. This category is for a fixed-station portable operation. The 10 W PEP requirement, the requirements for a portable power source, antennas and equipment remain the same. All previous records for the QRP Portable category will be transferred to this category.

## Scores

Each line score lists call sign, score, stations worked, multipliers, number of grids activated (if Rover), and bands (A= 50 MHz, B = 144 MHz, C = 222 MHz, D = 432 MHz, 9 = 902 MHz, E = 1296 MHz, F = 2304 MHz, G = 3456 MHz, H = 5760 MHz, I = 10 GHz, J = 24 GHz, K = 47 GHz, L = 75 GHz, M = 119 GHz, N = 142 GHz, O = 241 GHz, P = 300+ GHz). Single Operator Low and High Power band wins are listed in boldface type. A = Single Operator Low Power, B = Single Operator High Power, Q = Single Operator QRP Portable, L = Limited Multioperator, M = Multioperator Unlimited.

### 1

#### Connecticut

N1JMM 6,762 119 46 A A**BD**
W1AW (N4QX, op)
2,800 91 28 A **A**BD
K1WVX 2,494 59 29 A AB**CDE**
N1JML 1,403 55 23 A ABCD
WA1GTP 390 27 13 A ABC
W1VT 336 16 12 A **BI**
N1WCL 320 32 10 A B
WA1FUJ 297 24 11 A ABD
N1QVQ 55 8 5 A ABD
K1TEO 385,264 1010 242 B **ABCD9EFG**I
K1UHF 162,024 713 157 B ABCD9EF**I**
K1GX 113,971 484 143 B ABCD9EFG**HI**
W3EP 35,862 357 86 B ABD
W1WHL 140 20 7 B A
W1QK (+AA1MY,K1PHG,N1ABY)
88,305 726 105 L ABCD

#### Eastern Massachusetts

K5MA 38,900 283 100 A **ABCD**
W1PM 34,362 270 83 A ABCD**9E**
WG1Z 17,422 193 62 A ABCDE
KA1EKR 10,080 136 45 A BCDE**F**
W1DYJ 2,262 87 26 A AB
N1VQR 650 41 13 A ABD
WA1OFR 527 25 17 A ABD
W1GHZ 59,843 403 103 B **ABCD9E**
N1EKV 2,835 73 27 B ABCD
K1DAT 1,725 68 23 B ABD
W1XM (KB1CGZ,KD1KY,KT1D,W1GSL,KB1FMP, KB1FMS,KA2ZLZ, ops)
20,252 268 61 L ABCD
N1OP (K1BFD,WA1ZJE,WB1GMA, ops)
4,290 110 33 L ABD
N1FDX (+N1FYZ)
2,553 111 23 L AB

#### Maine

KA1PRD 230 23 10 A **AB**
K1WHS (+W1MRQ,K1BX,K1DY,K1TOL,N1LBI, N2CEI)
466,944 1182 256 M ABCD9EFGHIJ
N1DGF (+K1ZE)
17,820 187 66 M ABCD9E

#### New Hampshire

AF1T 68,561 375 109 A **ABCD9EFGHIP**
N1AFQ 1,320 54 20 A ABD
NM1W 154 22 7 A A
W1DAD 9 3 3 A A
K1TR 11,840 137 64 B **ABCD**

#### Rhode Island

KM1X 12,265 179 55 A **ABD**
KF4KHC 119 17 7 A B
W1BAT 1,026 50 19 B **ABD**

#### Vermont

K1LPS 10,248 114 61 A **ABCD9E**
W1ECH 350 25 14 A AB
W1RMC (K1ZK,op)
32 8 4 A B
W1AIM 32,844 217 102 B **ABCD9E**
W1KMH 1,850 54 25 Q ABCD
WB1GQR (W1SJ,AA1SU, ops)
127,421 904 109 L ABCD

#### Western Massachusetts

N1VOR 800 50 16 A **B**
K1MAP 468 27 13 A AB**CF**
N1MHH 308 20 14 A AB**CD**
WA1MBA 29,678 203 71 B **BCD9EFGHI**
N1RSY 572 44 13 B B
NC1I (+KA1QFE,N1DPM,N1MT,N1MUW,NC1B, W1QA,WZ1V)
324,445 1308 187 L ABCD
W2SZ/1 (K1DH,K2TR,KE2TP,N2YCA,WA1ZMS, K1EP,KA1DZV,N2BNY,N2YZO,WA2AAU,K2AD, KB2YQE,N2SZ,W1SZ,WA2SPL,K2JJB, KC1ZN,N2XRE,WS2B,WA8USA, ops)
1,883,211 2666 383 M ABCD9EFGHIJK

### 2

#### Eastern New York

WM2Y 2,520 100 20 A AB**CD**
W2BEJ 876 55 12 A AB**CD**
K2RI 287 30 7 A BCD
W2PR 120 30 4 A B
KA2MCU 40 8 4 A ABCD
W3HHN 11,388 154 52 B **ABCD9E**
N2TY (W2JHO,op)
4,221 156 21 B ABCD
W2WHO 396 26 12 B BD
K2QS (K2CSS,KC2BUV,KC2DMH,AA9KA, N2ZKX,KC2DQQ,KC2FQN, ops)
30,228 394 66 L ABD
N2UZQ (+N2TJQ,WA2BAH,KB2TSA)
16,218 257 51 M ABCDE

#### NYC-Long Island

K2OVS 5,676 102 44 A A**BD**
KF2XF 2,020 101 20 A **B**
KA2VZX 1,368 57 24 A AB
WA2ZFH 1,496 39 22 B **ABCDE**
WB2AMU 3,010 68 35 Q ABD

#### Northern New Jersey

K2KIB 27,965 240 85 A **ABCD9E**
WB2CUT 3,476 158 22 A **B**
W2UDT 1,620 60 27 A AB
KC2FYA 770 54 10 A BD
W2VU 640 40 16 A AB
WB2IDV 310 31 10 B **B**
N2NK (N2WM,N2IEL,WB3R,N2HMM,K2BM,W2KI, ops) 135,864 747 148 L ABCD
K2BAR(K2AMI,KC2DTA,WA2QHL,K2ZB, K2YLH,K2PJM,KA2NJP,W2MSK,KO2OK,WA2LXE, NA2AA,NO2T,WK2M,WI2W,KB2YGJ,KC2FBK, W1GI,KC2HLKB2OCW,WU2C,KC2CLH,ops)
117,720 893 108 L ABCD

#### Northern New York

N4TW 28 5 4 A **BCD**
WA2AEY 12,338 157 62 B **ABD**
W2NNY (NT2W,W2IB,KC2BEZ, ops)
20,825 188 85 L ABCD
KB2E (N2YWN,KC2FDJ, ops)
105 21 5 L B

#### Southern New Jersey

K1JT 44,631 363 87 A **ABCD9**
N2SCJ 35,400 321 75 A ABCD**E**
W2ZQ 12,168 194 59 A ABCD
W2PAU 4,165 100 35 A ABD
WA4FRA 27 8 3 A ABD
W2YRW 26 13 2 A B
K2SMN 140,995 543 173 B **ABCD**9EF
K2TXB 107,379 563 123 B **BDEI**
W2SJ 15,720 150 60 B ABCD9**EFG**
K2AA (W2MC,KD4HZW, ops)
14,740 207 55 L ABCD
K3EOD (+W2SJ)
41,735 351 85 M ABCD9E

#### Western New York

N2UIO 8,400 119 50 A AB**C**D
W2WGL 3,115 64 35 A **BD**
K2OEQ 1,856 53 32 A ABD
KB2SGX 1,425 25 4 A ABCD
N2WK 1,173 51 23 A **A**
K2CS 390 26 15 A A
NQ2O 85,374 319 162 B **ABCD9EF**
WA2ZNC 1,775 50 25 B ABCDE
KC2FNE 84 26 3 B ABD
N2HLT (+KB2DMK,N2JDQ,N2JDQ,N2HQW, KF3DY,N3HSY)
237,106 878 206 L ABCD
K2FA (KA2KQP,W2HQ, ops)
1,012 42 22 L ABD
K2GXT (KB1ENW,KC2FQD,N1YBY,KB1DOX, ops)
160 19 8 L ABD
N2PA (N2JQR,N2KG,N2YB, ops)
244,080 718 226 M ABCD9EF
K2IWR (KB2FAF,KB2LUV,KC2FLO,N2MRE, ops)
1,458 38 27 M ABCDE

### 3

#### Delaware

KB3FEE 2,040 85 24 B **AB**

#### Eastern Pennsylvania

W3KM 33,306 214 92 A BCD**9**EF
NA2T 31,668 300 87 A **ABD**
W3KJ 31,536 254 73 A BCD**E**F
N3OGF 3,108 66 37 A ABD
K3ZK 1,305 64 15 A ABCD
K3KEL 462 21 11 A D
KE3TC 301 31 7 A BCD
WA3DRC 36,127 217 91 B ABC**D9**EFG
N3NGE 34,675 214 95 B ABC**D**9EF**GH**
W3EME 32,704 511 64 B **B**
N3ADC 21,280 186 76 B ABCD9E
K3MD 18,900 192 75 B **A**BCDE
K3TV 12,936 248 44 B BDE
KB3ZS 12,349 170 53 B ABCDE
KB3IB 6,762 88 49 B ABCD9E
W3SZ 6,724 99 41 B BCDEF
KF3DT 5,740 109 41 B ABD**I**
KB3CPL 4,712 104 38 B ABD**I**
WA2FGK 4,620 43 33 B 9**EFG**
NE3I 3,104 65 32 B ABCDE
KB3FDY 950 32 19 B BD
WA3CSP 560 35 16 B A
W3JRY 481 30 13 B BD
K3MQH (+K3RA,N3ZTZ,AI3M,W2GG,N3EYB) 545,523 1587 271 L ABCD
K3YTL (WA1HHN, K3MKZ,K3TOW,LA3ILD, KA3EEO,KB3QI,KE3OA,N3EMF,N3FA,N3PBH, N3RN,N3TKK,WB3FKQ,WB3FYT, ops)
424,490 1443 227 L ABCD
N3XJX (+KA3PYZ,N3XJY)
22,869 221 77 M ABCDE
W3CCX (AA3GN +ops)
3,128 75 23 M BCD9F

#### Maryland-DC

K3IXD 20,088 252 62 A AB**CDE**
N3II 12,792 246 52 A **AB**
N3UM 4,290 130 33 A AB
W3MR 3,366 102 33 A AB
W6AXX 2,544 106 24 A B
KA3TCC 2,262 71 26 A ABD
WA4PRR 2,133 68 27 A ABD
N3SOK 836 44 19 A AB
K3DSP 630 35 18 A AB
WA3GYW 588 42 14 A AB
AC3P 570 37 15 A ABD
K1NV 437 23 19 A AB
N2TDT 294 42 7 A AB
W3OU 252 28 9 A A
K3DNE 149,450 555 6 B ABCD9**E**
K3ZO 34,440 420 82 B **AB**
N3HBX 13,688 193 58 B ABC**DE**
WN3C 7,832 146 44 B ABD
W3VRD 6,952 109 44 B AB**CD9**
N3CDA 1,764 51 28 B ABD
W3GN 1,368 57 24 B AB
W3PO 826 50 14 Q ABD
WA3ZKR (KA3EJJ,KC3VO, ops)
31,284 263 79 M ABCD9EF

#### Western Pennsylvania

KA3SDP 26,691 208 93 A **ABCD**
N3MBC 16 4 4 A A
WB0IWG 28 7 4 Q AB
W3SO (WR3Z,WX3B,K4VV,W3TEF,KD3SA, ops)
8,460 161 45 L AD
WA3RQD (+N3WP)
1,075 39 25 L ABD

### 4

#### Alabama

KU4WW 8,580 105 60 A A**BCD**
W4OZK 1,600 54 25 A **A**BD
W4ZRZ 21,052 205 76 B **ABCDE**
KU4IU 6,490 103 55 B **A**BD
K4EQH (+K4XDX,N4YQ)
6,490 106 55 L ABD
N4ION (+KS4B,K4WXX)
4,214 81 43 L ABD
KS4YT (at KF4DGS) (+KF4DGS,KV4T,AB4EJ, KD4CNG,KG4AFV)
13,984 149 76 M ABCDE

#### Georgia

W4EUH 34,804 252 113 A **ABCD**
K4KAZ 1,350 38 25 A ABCD**E**
N4WD 902 40 22 A ABD
KD4K 286 16 13 A ABCD
NY4F 80 12 5 A ABC
AE4GQ 187 15 11 B **ABD**
KG4HYU 2 2 1 Q B
K4HUM (W4GCL,KG4CFP,KE4KQB,KF4HQZ, KF4VBR,KG4BWB,KF4DZV,KE4TUW, KE4ZDG,K4QDB,KE4GBS, ops)
27,540 262 90 M ABDE

#### Kentucky

K4TO 66,836 320 154 A AB**CD**
N4GN 22,134 238 93 A **AB**
KD4EVB 7,261 116 53 A ABD
W4FVQ 6,519 91 53 A ABCD
AK4U 912 38 24 A AB
N8YHY 880 34 20 A BD
AD4ZW 38,259 243 117 B **ABCDE**
KC4JGS 15,836 179 74 B ABD

#### North Carolina

AF4HX 10,412 201 38 A **ABCD**
W4FSO 6,912 86 54 A ABCD**E**
AA4U 12 3 3 A ABD
K4QI 131,026 496 191 B **ABCDE**
W4VHH 11,310 104 65 B BDE**FG**
N4AJF 1,728 50 32 B ABD
AA4ZZ (+AA4S,K2SD,K4DXA,W4MW)
231,768 851 216 L ABCD
NG4C (+KN4QE)
19,578 183 78 L ABCD
K4SCS (W4FAL,K4NYS,K4HA, ops)
9,882 143 61 L ABCD
W4NH (K4TW,N9KHC,NX9O,W4EGT,W4KXY, W4SKI,WD4CNZ,K2JB,K4EA,K4RF,K4SZ, ops)
163,418 620 202 M ABCD9EFGHI

#### Northern Florida

KE4YYD 1,104 46 24 A **B**
W3TMZ/4 288 18 12 A B**D**
W2BZY 5,633 91 43 B **ABCD9EF**

#### Puerto Rico

WP4LNY 240 24 10 B **AB**

#### South Carolina

N4UFP 5,060 93 44 A AB**CD**
N4JZH 2,622 69 38 A A**B**
N4AOE 512 32 16 A AB
KR4QO 10,530 125 65 B **ABCD**
W4KSC 6,625 97 53 B ABCD
W2EA (N2FY,op)
1,316 45 28 B ABD

#### Southern Florida

K0VXM 6,732 96 44 A **ABCD9EF**
KF4FAJ 765 44 15 A ABCD
WA4OFS 442 22 13 A ABCDE
NJ2F 7,134 139 41 B **ABCD**
W2YX 750 45 15 B ABD

#### Tennessee

KU4R 18,564 170 78 A AB**CDE**
KD4HIK 15,225 153 75 A AB**CD**
KG4CKX 1,848 60 28 A ABD
AD4F 1,012 38 22 A ABCD
KA4CHT 741 31 19 A ABDE
WA4HLV 128 14 8 A ABCD
KE4OAR 42 7 6 A AB
KM4H (+K4DY)
3,312 90 36 L ABD
W4GGM (KF4QCH,K4APN,KG4CTF,KE4UTQ, KG4FNG,KG4GLZ,N4KN,KE4YBS,KR4FO, KA4ZDR,K4BX,K4RL,N4EO, ops)
1,800 60 30 L AB

#### Virginia

AD4DG 22,940 211 74 A A**BCD9E**
N4MM 5,400 135 40 A **AB**
AD4TJ 2,688 80 32 A ABD
K4FJW 2,139 93 23 A AB
K4FTO 644 37 14 A BD
KG4GVJ 616 44 14 A A
K4ME 310 31 10 A B
W4RX 172,172 675 171 B **ABCD9EFGH**
KN4SM 28,747 261 89 B ABD
WF4R 4,136 81 44 B ABD
W4MYA 1,044 50 18 B ABD
W4IY (W4AD,W4NF,W4RM,W4CE,W4DC, WA0DYJ,KG4HTL,N1TXI,K5OF,K8MLM, W4DAV, ops)
334,170 1127 235 L ABCD
W4VHF (+K4MQG)
25,596 297 79 L ABD
W8MOP (WW8D,N8RIG,K8WBS,N8GK, KD4ZUA,KC8CZN, ops)
5,350 96 50 L ABD
K3MZ (+WA3OFC)
2,291 67 29 L ABD

#### West Central Florida

K9HUY 1,800 69 25 B **ABD**

### 5

#### Arkansas

KD4NOQ 40 9 4 Q BC

#### Louisiana

K5ER 4,312 85 44 A **ABC**
K5OR 1,045 47 19 A AB**D**
K5CZD 630 36 15 A ABD
WA5RT 18 6 3 A A

#### Mississippi

N5YLS 7,011 93 57 A A**BCDE**
KJ5RC 1,080 40 27 A **A**B
N3AWS 6 3 2 Q AB

#### New Mexico

N5XZM 3,186 82 27 B AB**CD9E**
K5RHR 2,904 68 33 B **ABCDI**
KB5ZSK 440 27 10 B ABCDE

#### North Texas

K5LOW 3,876 82 38 A **ABD**
KM5OL 3,552 92 32 A AB**CD**
AD5AC 3,552 92 32 A AB**CD**
WA5VKS 1,740 66 20 A ABCD**E**
N0XLR 517 41 11 A ABD
W5ETM 21 7 3 A A
W8CM 44,339 301 101 B **ABCD9E**

#### Oklahoma

NL7CO 1,848 77 24 A **B**
KD5DLL 1,045 55 19 A **A**B
N5OHL 84 12 7 A AB
K5CM 56,356 305 146 B **ABCDE**
KN5TTN (+K5QNM)
18 6 3 L AB

#### South Texas

N5BA 1,150 37 23 A A**BCD**
AJ4F 276 23 12 A A**B**
K5LLL 15,477 149 67 B **ABCD9EF**
W3XO/5 8,642 104 58 B ABCDEF
N5XU (+W5JLP,KB5LBN,WM5R)
3,808 91 33 L ABCD
K5IUA (+AB5SS)
16,170 163 70 M ABCD9EFG

#### West Texas

KK5IH (+KK5KK)
9,504 97 72 M ABCDE

### 6

#### East Bay

KE6QR 944 51 16 A **ABD**
K6BIR 387 38 9 A ABD
W6OMF 8,976 114 51 B **ABCDE**

#### Los Angeles

WB2KXC 3,762 134 22 A **ABD**
KE6AXJ 3,060 120 17 A AB**CD**
W6IST 2,208 66 24 A ABCD
KE6FCT 2,190 59 30 A ABCD
K6HLH 1,998 50 27 B **BDE**
W6MO 380 26 10 B AB**CD**
KQ6EE 1,972 76 17 Q ABCDE
K6NT 966 42 14 Q BCD
N6RMJ (+W6PPT,KR6DR,K6IL,WA6DJS)
150,914 894 122 L ABCD
K6OUE (+KF6YYV)
13,662 294 33 L ABCD
W6TOI (KE6HPZ,KB6WKT, ops)
34,162 361 62 M ABCD9EF

#### Orange

KE6GFI 7,830 204 29 A **ABD**
KF6ISR 6,251 208 19 A B**CDE**
KE6GFF 5,012 179 14 A **D**
W6ZQ 3,072 100 24 A ABCD**E**
K6IBY 2,639 65 29 A ABCD

N6KZB 1,430 47 22 A ABCD
KE6QCB 540 46 9 A BD
K6TSK 43,212 374 78 B **ABCDE**
N6EQ 17,574 209 58 B **A**BCDE
WK6I (+W6ESS,KD6OBB)
2,550 67 34 L ABD

### Pacific

AH6TM 736 35 16 A **ABD**

### Santa Barbara

W9EC 1,298 43 22 A AB**CDE**
N6ZE 1,140 57 20 A **AB**
KC6NBI 1,040 49 20 A **A**BC
W6FM 12,213 153 59 B **ABCDE**
K6TZ (K6HOZ,W6DNN,WB6OBB,WB9KMO,W1PR, KF6IKO, ops)
4,960 121 31 M ABCD9EF

### Santa Clara Valley

W6IT 4,017 71 39 A **ABCDE**
KF6MXK 2,553 86 23 A **B**CD
N6DE 224 21 7 A BD
N6IV 48 9 4 A BD
W6ZZZ 8 4 2 A B
W6GYD 5,810 113 35 B **ABCDE**
KF6A 2,793 133 21 B **B**
KF6KDC (KE6HNR,KB6HRB,KC6UCN, KF6YLR, ops)
27,576 271 72 M ABCDE

### San Diego

K6CYS 84 7 4 A **E**
KF6JBB 8,756 157 44 B **ABCD**
W6EEB 704 38 16 B ABD

### San Francisco

WB9NJS 2,162 76 23 A A**BCD**
N6RA 1,040 65 16 A **A**
WA6KLK 7,480 128 44 B **ABCD**
WD6HDY (+KD6LTB)
4,840 111 40 L ABD

### San Joaquin Valley

N6MU (at N6NB)
14,928 311 48 A **AB**
K6YK 5,421 100 39 A ABC**D**
K6IRZ 5,304 100 39 A AB**CD**E
KF6DST 972 53 12 A BCD
KG6DAH 448 23 16 A ABD
N6AJ 30,720 229 80 B **ABCD9EF**
KF6KDA (+KF6WYH, KF6CNV)
13,459 236 43 L ABCD
K6QG (+WB6GPD)
5,680 123 40 L ABD

### Sacramento Valley

NZ6N 444 37 12 A **B**
K6NTZ 28 28 1 A B
W6KBX 28,490 256 74 B **AB**CD**E**
KC6ZWT 14,210 196 49 B BC**D**
K6AAA 2,472 103 24 B **B**
K6ME (+KE6NDG)
3,813 106 31 L ABD
W6DHN (+N6DPP,KF6BRO)
4,148 93 34 M ABCDE

## 7

### Arizona

WA7VHF 385 27 11 A A**BD**
K6IAH/7 190 17 10 A A**B**D
KE7NR 9,660 120 60 B **ABCDE**
WB7OHF 650 40 13 B ABCD
N7IR 1,003 51 17 Q ABD
NR5O (N9AV,NA7D, ops)
6,440 126 35 L ABDE

### Eastern Washington

N3CEV 6,400 100 50 B **ABCDE**
N7EY (+WA7TUE,KB7HDX)
9,945 166 51 L ABCD

### Idaho

WA7USB 1,121 49 19 A **ABD**
N7EIJ 2,790 78 31 B **ABD**
N7IJ 252 18 14 B AB
KK7AT 650 48 10 Q ABD

### Montana

N7CZ 224 25 7 A **ABD**

### Nevada

WB6YIY 152 19 8 A **A**
K7ICW 4,662 84 42 B **ABCDE**
NW7O 627 28 19 B ABC**E**

### Oregon

WA7BJU 6,804 126 42 A **ABCDE**
N7DB 4,318 106 34 A **AB**CD
K7HSJ 1,850 54 25 A ABCDE
W7DSA 1,440 54 24 B **ABCD**
KK7E 637 49 13 B **B**
KA7EXM 442 34 13 Q B
W7LT (KC7AOI,KC7PDI, ops)
3,275 112 25 L ABD

### Utah

N7DBW 732 46 12 A **ABD**
KA7EII 198 14 11 A ABD
N7QF 12 4 3 Q A

### Western Washington

K7CW 8,018 139 38 A AB**DE**
N7NGO 2,425 87 25 A **AB**D
W7DMN 867 51 17 A AB
KE7SW 22,933 220 71 B **ABCD9EF**
N7EPD 21,440 203 67 B ABC**D9E**
AA7VT 7,800 127 40 B ABCD9EF**I**
K7ND 3,729 65 33 B ABCD9EF
W7/JR1NKN 50 10 5 Q A

### Wyoming

WA7KYM 7,473 99 53 B **ABCDE**
K7KMT (+KI7WB,N7SVX,AC7DW)
1,421 42 29 L ABD

## 8

### Michigan

N4SC 17,808 157 84 A A**B**CD
K8KD 12,524 163 62 A AB**D**
N8AIA 6,336 107 48 A AB**C**
W8WNX 2,268 81 28 A **A**
N8ZVB 190 19 10 A A
K2YAZ 79,520 301 160 B ABC**D9EFGHI**
K8MD 71,769 355 141 B **ABC**D9E
K8PNW 3,838 72 38 B BDE
KC8OID 1,144 42 26 B ABD
NE8I 952 36 17 B ABCDEF
N8PVT (+KC8ALA)
736 32 16 L ABD

### Ohio

K8MR 55,440 318 132 A **ABCD**
WA8RCN 9,776 188 52 A AB
N8BJQ 8,296 136 61 A AB
KB8VUJ 6,890 105 53 A ABD
K8AB 5,085 93 45 A ABD
KC8CSD 2,871 55 33 A ABCD
W8DD 1,876 67 28 A AB
W8GBH 1,750 50 35 A AB
KB8UUZ 1,440 60 24 A A
KC8CFI 1,248 39 24 A BD
W8IDM 760 34 19 A ABD
WB8AUK 434 23 14 A ABCD
WW9DX 2 2 2 A A
KE8FD 182,016 519 237 B **ABCD**9EF
K8TQK 138,846 416 219 B ABCD**9EFG**
WA8RJF 42,000 225 125 B ABCD9EF
KC8CCD 39,195 220 117 B ABCD9EF
WB0IQK 2,479 67 37 B AB
N8LGP 1,740 60 29 B AB
WB8CEH 160 20 8 B B
N8XA 12,765 120 69 Q ABCD9EI
N8ZM (+N8IDS,KD8FO,KB8ZR,AB8IS)
61,020 373 135 L ABCD
NI8T (+KC8PBJ)
480 32 15 L B
N8KOL (+KA8ROX)
93,015 159 7 M ABCD9EF

### West Virginia

K3XO/8 3,852 97 36 A AB**D**
W8TN 2,812 76 37 A **AB**
K8KFJ 896 32 28 A AB
K2UOP 99,946 430 154 B **ABCD9EF**
N8XUR 30,272 245 88 B ABCD9E
K8GP (K1RZ,K1HTV,K3MM,K3SX,W3ZZ,N4UK, W4XP,K6LEW,K8ISK, ops)
1,599,325 2215 455 M ABCD9EFGHIJKP

## 9

### Illinois

K2DRH 137,200 460 196 A **ABCD9E**
K9YR 33,538 299 82 A ABCD
N9TF 21,120 233 64 A ABCDE
NZ8C 7,831 191 41 A AB
N9ERW 3,420 86 38 A ABD
W9TWJ 1,800 50 36 A AB
KG9PQ 1,748 67 23 A ABD
KB9II 1,206 56 18 A ABC
K9DDS 864 45 16 A ABD
K9MOT 264 24 11 A A
K6A (WA9FIH,op)
186 31 6 A A
K9PG 140 14 10 A AB
W9SE 63 9 7 A A
N2BJ 183,274 667 182 B **ABCD9E**
WB9Z 140,994 540 189 B **ABC**DE
NV8V 7,831 191 41 B AB
N9GH 6,032 77 52 B ABCDE
W9SZ 672 32 21 Q B
KG9PF (+K9IJ)
12,144 203 48 L ABCD

### Indiana

WA1MKE/9
27,540 180 102 A AB**CD9E**
W9DZ 17,710 194 77 A **ABD**
W9SR 9,333 153 61 A AB
KB9NKM 5,250 125 42 A **B**
K9RQ 4,462 77 46 A ABD
K9GPS 1,550 50 25 A ABD
K9MNQ 270 25 9 A ABD
K9NW 45 9 5 A B
KJ9C 20 5 4 A A
K9QFL 103,373 467 167 B **ABCDE**
K9EA 40,252 256 116 B ABCD
K8LEE 13,320 222 60 B **A**
AA9LT 6,554 89 58 B ABCD
W9ICE (WB9YCZ,WB8ERB,N8NQG,N8JLZ, N9QQY,K9YDO,K9ZX,KE4OED,KA9BFM, KB9NWP, ops)
135,828 545 198 L ABCD
KG9BV (KG9JA,KB9VZJ, ops)
20,331 212 81 L ABD
W9UUU (N9OYM,K9VDQ,N9WX,W9BBO, ops)
574 33 14 L ABD

### Wisconsin

W0UC 84,870 390 138 A **ABCD9EFGHI**
KA9WBT 43,392 318 96 A ABCDE
K9VHF 31,816 234 97 A ABCDE
WA1UJU 8,300 166 50 A AB
N9NDP 2,436 84 28 A BCD
KB0LGB 1,456 56 26 A AB
AA9RR 555 36 15 A ABD
KB9WSN 392 27 14 A ABD
KB9Q 240 15 12 A ABCD
KB9VSG 232 29 8 A AB
KB9UZV 200 25 8 A B
W9GA 84,528 399 144 B **ABCD9E**
K9UUT 8,748 157 54 B ABD
N0AKC 7,614 107 54 B ABCD9E
ND9Z 6,048 85 48 B ABCDE
WA9LZM 5,808 94 48 B ABD
W9PHJ 3,016 104 29 B AB
KB9TLV 1,932 84 21 B ABD
N9MYK 6,622 112 43 Q ABDE
NI9E (at N9FH) (+N9VA,N9FH,KA9WNX,KB9LYL, KB9KBK,N9LLT,W9RN,WB9UAI)
76,383 491 123 L ABCD
K9TMS (+N9REP,KB9JZY,K9TQPO,N9EG,AA9IL)
24,864 284 74 L ABCD

## 0

### Colorado

W6OAL 5,217 82 47 A AB**CD9EI**
N0POH 2,576 71 28 A A**B**CD
KA0MWA 55 10 5 A ABD
N0VSB 24,080 202 86 B **ABCDE**
W7SAO (+N0KE)
10,207 143 59 L ABCD
K0MF (+KE0XL)
2,675 90 25 L ABD

### Iowa

K0VSV 11,328 133 64 A AB**CD**
K0MQS 10,146 178 57 A **B**
NE0P 4,134 88 39 A **AB**D
AB0HF 128 16 8 A AB
KM0T 81,324 286 162 B **ABCD9EF**
KA0Y 16,000 141 80 B ABCDE

### Kansas

KC0IDI 5 5 1 A **B**
N0LL 29,928 185 116 B **ABCDE**
N0KQY 24,250 175 97 B **ABCDE**
W0EKZ 12,654 127 74 B ABCD**E**
K0FPC (+KA0JLF,N3KKM)
3,360 75 35 L ABCD

### Minnesota

K0MHC 11,830 128 65 A AB**CD**
WA2HFI/0 8,928 120 48 A ABCD**9E**
KC0AKU 7,584 129 48 A **AB**D
K0CJ 6,498 122 38 A ABDE
KB0LYL 2,730 195 14 A **B**
KB0TZA 1,350 56 15 A ABCDE
KB0OBT 1,190 69 14 A ABD
KC0HTB 612 58 9 A ABD
W0JMP 490 36 10 A ABCD
KC0HEW 168 16 8 A ABD
WB0TRA 104 13 8 A AB
K0SQ 10,653 134 53 B **ABC**DE
W0OHU 8,288 108 56 B AB**D**
NJ0M 4,223 101 41 B B**D**
W0PHD 3,404 57 37 B ABD**E**
WB0LJC 3,190 90 22 B ABCD**9EF**
N0QHP 10 5 2 B B
KF0GX 12 6 2 Q B
KC0EPV (+N0MWH)
966 53 14 L ABD
N0UK (+WA2PHW, W9FZ, WC0FXY, N0HJZ, WB0GGM, W0ZQ)
121,260 440 188 M ABCD9EFIP
KF0Q (+K0NY,KB0THN,KI0F)
20,175 175 75 M ABCD9EF

### Missouri

N0PB 23,766 189 102 A **ABD**
W0JRP 1,680 50 30 A AB**C**

### North Dakota

NT0V 6,750 69 54 B **ABCDEF**
WB0OAJ 110 10 10 B ABD

### Nebraska

WD0BQM 592 25 16 A **ABCDE**
N0YNP 6 2 2 A BD

### South Dakota

WB0HHM 7,072 97 52 A **ABCD**
WB0ULX 448 25 14 A ABD
N0QJM (+W0SD,W0OE,WB0TEM)
51,504 256 148 L ABCD

## CANADA

### Quebec

VE2ZP 1,350 48 27 A **ABD**
VE2PIJ 42 7 6 Q A
VE3ZY (VE3CMD,VE3FFK, ops)
102 12 6 L BD

### Ontario

VE3TMG 31,773 288 89 A A**BD**
VE3KZ 15,600 165 78 A **AB**D
VE3AJY 14,616 158 72 A ABDE
VE3FHU 7,695 94 58 A AB**CDE**
VE3SXE 5,661 97 51 A ABD
VE3CVG 1,210 44 22 A ABD
VE3TLT 416 26 16 A AB

### Manitoba

VE4KQ 2,624 51 32 A **ABCDE**

### British Columbia

VA7SSB 735 47 15 A **AB**D
VE7HPS 676 44 13 A AB**D**
VE7VDX 140 12 10 B **ABD**
VA7ISL (VA7AA,VE7DAY,VE7DXG,VE7GBO, ops)
21,300 285 60 L ABCD

## ROVERS

### Atlantic

ND3F 311,940 760 180 R 13 ABCD9EFGHIJP
N2JMH (+N2WVK)
76,035 395 103 R 8 ABCD9EF
N2GKM (+KC2EBH)
52,074 365 99 R 18 ABCD9E
N1MU (+WB2QMY)
32,782 228 65 R 9 ABCD9EFGH
N3VOP 3,857 120 29 R 2 ABD
W8IJ 450 24 15 R 3 ABD
KB2KJV 210 13 10 R 2 ABCDE
KD2P 50 10 5 R 2 B
N2XQI 18 6 3 R 2 B

### Central

WB9SNR 101,008 486 118 R 7 ABCD9EFGHI
K0PG 31,195 254 85 R 12 ABCDE
KB9WVL 27,378 242 78 R 12 ABCDE
KF9US 10,854 120 54 R 2 ABCD9EF
N9RLA 4,640 145 32 R 5 AB
W9AJ 406 24 14 R 4 ABD

### Dakota

KB0EET 400 31 10 R 2 ABD
KA0PPU 312 14 13 R 2 BDF
N0NYV 220 10 11 R 2 BDF

### Delta

KB4NVD (+N4OFA)
36,369 314 75 R 6 ABCD9EF

### Great Lakes

AA4R 15,080 214 58 R 4 ABD
K8DOG (+KF8QL)
11,210 144 59 R 4 ABCD9E
N8GHZ 4,284 71 42 R 2 ABCD
K8WW 3,844 122 31 R 4 ABCD

### Hudson

N2MH 42,444 386 81 R 11 ABCD
WA2IID (+KB2SSS)
34,580 284 70 R 6 ABCD9EFGHIJ
KB0WJO (+KB1EKZ)
6,020 96 28 R 8 ABCD9EFGHI
WB2SIH 4,278 111 31 R 5 BD
N1HL (+N2MSS)
1,334 46 29 R 4 B

### Midwest

N0DQS 13,769 192 49 R 11 ABCDE
KB0QGT 7,832 122 44 R 8 ABCD

### New England

N1MJD (+N1JEZ)
137,250 697 125 R 14 ABCD9EFG
K1SAV (+N1ISB)
18,130 205 49 R 6 ABCD9EFGHIJK
KE3HT 9,982 115 46 R 8 ABCD9EFGH
KJ1K 6,303 74 33 R 5 BCD9EFGH
KB1EAA (+KB1EUH)
1,444 56 19 R 2 ABCD
N1SFE 280 21 8 R 2 BCD

### Northwestern

W7DHC 32,164 336 59 R 9 ABCD9E
N7CFO 12,432 193 42 R 8 ABCD9E
N4SL (+WB7FJG)
6,633 170 33 R 8 ABD
KA6T 1,806 66 21 R 5 ABCDE

### Pacific

AL1VE 46,330 384 82 R 14 ABCDE
KF6GYM 31,137 225 97 R 5 ABCDE
K6WLC (+K0BGL)
5,831 100 49 R 5 ABD
N1GG (+N1VM)
2,231 60 23 R 4 ABD9F

### Roanoke

W3IY 38,550 278 75 R 3 ABCD9EFGHI
K1RA (+KD4DSX)
14,150 143 50 R 9 ABCD9EFGHI
KC3WD (+AA4GM)
9,324 125 36 R 13 ABCD9EFGI
KS4S 672 32 21 R 4 AB
K8DXN 667 28 23 R 3 ABD

### Rocky Mountain

NK5W (+KC5EFM)
4,370 96 38 R 2 ABD
W5VWZ 3,395 72 35 R 2 ABDI
KB0CY (+KA0DEH)
1,722 65 21 R 3 ABD

### Southeastern

KF4KND (+K4GSX)
200 19 10 R 2 ABD

### Southwestern

N6DN 64,530 460 90 R 11 ABCD9E
K6FZZ (+K6FZY)
25,730 266 62 R 11 ABCD9E
N6VHF 18,073 268 53 R 6 ABD
WB6JDH 11,136 249 32 R 4 ABCDE
KC6UIX 10,260 134 57 R 4 ABD
K6LMN 3,834 106 27 R 3 ABCD
AD6AF 2,496 110 16 R 4 ABD
KJ6JO 1,170 64 13 R 2 ABD

### West Gulf

ND2X (+K5UHF)
123,074 481 114 R 35 ABCD9EF
W5HL 8,041 180 43 R 12 ABD

### Canada

VE3OIL 46,260 345 90 R 8 ABCDEF
VA3MOD (+VA3TO)
1,624 43 29 R 4 ABDE

**Checklogs:** KG6AXD, VE2VLJ, K1TTT, K0JQA, KC5MVZ, NJ7A, WZ8T, W1XX

By Dan Henderson, N1ND
Contest Branch Manager

# 2000 ARRL 10 GHz and Up Cumulative Contest Results

**jar·gon** Pronunciation: 'jär-gən, (*n*): the technical terminology or characteristic idiom of a special activity or group

From the day most of us first experienced Amateur Radio, we quickly realized there is a unique language to the hobby. And nowhere in the wide panoply of the hobby will you find more jargon than when dealing with microwave enthusiasts (*n*: those who tend to become ardently absorbed in an interest). Most hams see the term "microwave" and automatically see the square box in the kitchen that we use for a fancy warming oven. The microwave (*adj*: radio frequencies above 1 GHz) aficionado (*n*: a person who likes, knows about, and appreciates a usually fervently pursued interest or activity) explores the most challenging frequencies of our hobby. From Gunnplexers and feedhorns to transverters and parabolic reflectors, their talents are put to use exploring great new horizons.

When discovering and exploring this segment of the radio spectrum, don't get lost in the jargon. Rather, consider the skills and talents that this excellent band of experimenters and operators exhibit. Many hams at times are stymied at the challenge of "hitting the local 2-meter repeater." When you consider that completing a QSO in the microwave realm is significantly more difficult, it is easy to appreciate those who meet the challenge.

In the 2000 ARRL 10 GHz and Up Cumulative Contest, a record 92 entries were received—(up 20% from 1999 and 11% more than the previous record set in 1993). In the 10 GHz Only category, John, WD4MUO/0, again leads the way, winning the contest for the third time in the last five years. John's 62,284 points represent an all-time record for the contest category as well. His 438 QSOs also sets a new standard, breaking his own year-old record. Finishing second in both total score (35,712) and total QSOs (244) was Ron, N0IVN. Jack, N6XQ, another familiar call in the contest, finished third in overall scoring with 23,286, while W5VSI finished third in total QSOs with 110. Paul, W1GHZ, worked the most different call signs on 10 GHz during the two weekends of the contest with 36, and finished fourth in the overall scoring.

The 10 GHz and Up category, Bill, K0RZ, edged out Don, N0UGY, in the overall score contest 32,333 to 28,530 and in total QSOs 264 to 240. Ron, K6GZA, placed third in overall score with 21,759 while Don, WB1FKF, finished fourth in scoring 16,986 while making QSOs with the most different call signs, 33.

Distance records on the microwave bands are hard to set, but congratulations go out to Gary, AD6FP, and Ron, K6GZA, who shattered the old 24-GHz distance mark. Their new record of 375 kilometers (232 miles) shattered the old record by 119 kilometers (approximately 73 miles). The top distance mark reported on 10 GHz was between N6XQ and WA6CDR, who completed a QSO over 817 kilometers. This falls short of the existing record (889 km) but was the only QSO reported over 800 km during the contest period.

JIM HOWARD, N2JMH

**The contest brings out some camaraderie. At grid FN02wv, N2JMH is kneeling by his rover while N2OPW stands watch. Right next door N2KXS and WO2P are set up and ready to work some VE3 stations across the lake.**

## Top 10

### 10 GHz Only

| | |
|---|---|
| WD4MUO/0 | 62,284 |
| N0IVN | 35,712 |
| N6XQ | 23,286 |
| W1GHZ | 18,593 |
| W1AIM | 17,588 |
| KK6MK | 17,311 |
| AF1T | 17,094 |
| KB1VC | 16,940 |
| KE6HPZ | 16,014 |
| W5VSI | 14,622 |

### 10 GHz and Up

| | |
|---|---|
| K0RZ | 32,333 |
| N0UGY | 28,530 |
| K6GZA | 21,759 |
| WB1FKF | 16,986 |
| AD6FP | 16,412 |
| K6JEY | 14,880 |
| KA1OJ | 11,385 |
| WB6DNX | 11,044 |
| W6OYJ | 10,456 |
| KF6PBP | 10,389 |

### QSO Leaders

#### 10 GHz

| | |
|---|---|
| WD4MUO/0 | 438 |
| N0IVN | 244 |
| W5VSI | 110 |
| W1GHZ | 107 |
| W1XE | 106 |
| AF1T | 99 |
| W1AIM | 93 |
| KB1VC | 92 |
| KE6HPZ | 87 |
| K0OXU | 84 |

#### 10 GHz and Up

| | |
|---|---|
| K0RZ | 264 |
| N0UGY | 240 |
| WB1FKF | 103 |
| K6JEY | 95 |
| KA1OJ | 85 |
| K6GZA | 77 |
| AD6FP | 77 |
| WB6DNX | 74 |
| W6OYJ | 68 |
| W2UTH | 64 |

### Different Calls Worked

#### 10 GHz

| | |
|---|---|
| W1GHZ | 36 |
| KC6UQH | 31 |
| AF1T | 31 |
| KB1VC | 30 |
| KE6HPZ | 29 |
| W1AIM | 28 |
| KA1UAG | 27 |
| WA1MBA | 25 |
| WA1ECF | 25 |
| WA1HOG | 24 |
| N6LL | 24 |

#### 10 GHz and Up

| | |
|---|---|
| WB1FKF | 33 |
| K6JEY | 32 |
| K6GZA | 30 |
| W6OYJ | 29 |
| KA1OJ | 28 |
| AD6FP | 28 |
| WB6DNX | 23 |
| W1RIL | 21 |
| KF6PBP | 21 |
| VE3SMA | 18 |

JIM HOWARD, N2JMH

**N2OPW with his 10-GHz set up ready for action in FN02.**

When you scan the scores, you will find the calls of most of the "usual suspects" and a bit of "fresh talent." Why not consider adding yourself to the 10 GHz and Up rosters in 2001? The ARRL Technical Information Service Web site at **www.arrl.org/tis/info/microwave.html** is an excellent resource—whether you are just starting with the microwave "jargon dictionary" or are adding terms to its thesaurus. Reprints of *QST* articles, technical resources, and links to other sites will prove useful as you start to master a new aspect of the hobby. Don't be intimidated—even the top scorers started with simple equipment and stations. And we suspect that if you contact some of the operators listed in the scoring results, they will be more than willing to help you develop your understanding and skills in this area. The more operators on the air, the more fun the contest becomes for all involved—from casual operators on up the box scores.

The 2001 ARRL 10 GHz and Up Cumulative Contest will be held over the weekends of August 18–19 and September 15–16. You may operate 24 hours during both 30-hour contest weekends. And as you do you will find that your personal "dictionary" expands to include some of the new "jargon" you pick. And you will find yourself microwaving (*v*: to heat or cook in a microwave oven) the airways, instead of the bag of popcorn in that box in your kitchen.

## Scores

Scores are listed by call areas. Within each call area, scores are listed in descending order. Score lines indicate call sign, score, QSOs, number of different call signs worked, and best DX in kilometers. (Band indicators: I = 10 GHz, J =24 GHz, K = 47 GHz.)

### 10 GHz Only

**1**

| | | | | |
|---|---|---|---|---|
| W1GHZ | 18,593 | 107 | 36 | 426-I |
| W1AIM | 17,588 | 93 | 28 | 373-I |
| AF1T | 17,094 | 99 | 31 | 379-I |
| KB1VC | 16,940 | 92 | 30 | 383-I |
| KA1UAG | 14,437 | 70 | 27 | 393-I |
| WA1ECF | 11,947 | 49 | 25 | 299-I |
| WA1HOG | 11,673 | 76 | 24 | 326-I |
| K1LPS | 8,795 | 40 | 20 | 290-I |
| WA1MBA | 8,076 | 46 | 25 | 353-I |
| W1VT | 7,361 | 44 | 16 | 379-I |
| K1TEO | 6,019 | 24 | 19 | 298-I |
| K1MAP | 5,748 | 46 | 17 | 137-I |
| N1EUX | 3,012 | 17 | 15 | 219-I |
| KB1DXD | 2,754 | 15 | 12 | 218-I |
| N1SAI | 1,511 | 8 | 8 | 144-I |
| N7IAL | 502 | 2 | 2 | 151-I |

**2**

| | | | | |
|---|---|---|---|---|
| K2TXB | 7,301 | 20 | 16 | 393-I |
| N2LIV | 6,929 | 25 | 21 | 305-I |
| K2RIW | 4,546 | 17 | 15 | 283-I |
| WO2P | 2,311 | 22 | 12 | 183-I |
| N2KXS | 2,187 | 19 | 12 | 183-I |
| N2MSS | 1,767 | 17 | 4 | 148-I |
| N2JMH | 913 | 11 | 7 | 54-I |

| | | | | |
|---|---|---|---|---|
| WB2GLW | 160 | 1 | 1 | 60-I |

**3**

| | | | | |
|---|---|---|---|---|
| KB3XG | 2,966 | 11 | 9 | 426-I |

**4**

| | | | | |
|---|---|---|---|---|
| AB4YK | 2,246 | 29 | 3 | 100-I |
| K4EFD | 1,603 | 13 | 3 | 158-I |

**6**

| | | | | |
|---|---|---|---|---|
| N6XQ | 23,286 | 77 | 23 | 817-I |
| KK6MK | 17,311 | 76 | 20 | 492-I |
| KE6HPZ | 16,014 | 87 | 29 | 540-I |
| N6LL | 10,252 | 51 | 24 | 541-I |
| KC6UQH | 9,507 | 49 | 31 | 312-I |
| WA6EXV | 9,295 | 57 | 22 | 262-I |
| KC6QHP | 8,905 | 27 | 18 | 339-I |
| K6HLH | 6,556 | 30 | 19 | 540-I |
| N6CA | 6,546 | 38 | 20 | 277-I |
| K6RRA | 5,024 | 32 | 20 | 218-I |
| WA6QYR | 4,705 | 17 | 15 | 529-I |
| N6PI | 4,316 | 17 | 11 | 339-I |
| KR7O | 3,323 | 16 | 10 | 323-I |
| K6VLM | 3,281 | 23 | 17 | 193-I |
| W6ASL | 1,350 | 11 | 8 | 92-I |
| KF6NKC | 311 | 2 | 2 | 55-I |

**7**

| | | | | |
|---|---|---|---|---|
| W7CS | 8,244 | 49 | 13 | 309-I |
| KD7TS | 446 | 4 | 3 | 84.7-I |
| AA7VT | 395 | 3 | 3 | 75-I |

**8**

| | | | | |
|---|---|---|---|---|
| NE8I | 949 | 8 | 6 | 169-I |
| K2YAZ | 779 | 8 | 4 | 184-I |

**0**

| | | | | |
|---|---|---|---|---|
| WD4MUO/0 | 62,284 | 438 | 19 | 268-I |
| N0IVN | 35,712 | 244 | 14 | 249-I |
| W5VSI | 14,622 | 110 | 5 | 246-I |
| K0OXU | 11,789 | 84 | 10 | 226-I |
| W1XE | 9,176 | 106 | 13 | 190-I |
| N0KE | 6,537 | 79 | 7 | 168-I |
| WB0LJC | 2,086 | 37 | 13 | 42-I |
| WA2VOI/0 | 2,034 | 40 | 9 | 65-I |
| KC0EPX | 1,921 | 37 | 11 | 53-I |
| W0AUS | 1,582 | 28 | 8 | 52-I |
| W9FZ | 1,555 | 29 | 9 | 48-I |
| N0UX | 1,201 | 17 | 8 | 47-I |
| KC0P | 824 | 11 | 7 | 24-I |
| N0NAS | 687 | 8 | 6 | 19.7-I |
| N0HJZ | 306 | 3 | 3 | 2-I |
| KB0UJE | 107 | 1 | 1 | 7-I |

**VE**

| | | | | |
|---|---|---|---|---|
| VE3FHM | 2,747 | 14 | 11 | 239-I |
| VE3NPB | 682 | 9 | 6 | 45-I |

### 10 GHz and Up

**1**

| | | | | | |
|---|---|---|---|---|---|
| WB1FKF | 16,986 | 103 | 33 | 380-I | 36-J |
| KA1OJ | 11,385 | 85 | 28 | 380-I | 36-J |
| W1RIL | 5,261 | 31 | 21 | 223-I | 36-J |
| W1JOT | 2,361 | 15 | 12 | 222-I | 33-J |

**2**

| | | | | | |
|---|---|---|---|---|---|
| W2UTH | 7,452 | 64 | 17 | 382-I | 24-J |
| K2AXX | 1,195 | 15 | 6 | 58-I | 1-J |

**4**

| | | | | | |
|---|---|---|---|---|---|
| W4SW | 3,083 | 38 | 4 | 105-I | 79-J |

**5**

| | | | | | |
|---|---|---|---|---|---|
| W5LUA | 1,622 | 13 | 10 | 350-I | 1-J |

**6**

| | | | | | |
|---|---|---|---|---|---|
| K6GZA | 21,759 | 77 | 30 | 770-I | 375-J |
| AD6FP | 16,412 | 77 | 28 | 540-I | 375-J |
| K6JEY | 14,880 | 95 | 32 | 540-I | 133-J |
| WB6DNX | 11,044 | 74 | 23 | 375-I | 133-J |
| W6OYJ | 10,456 | 68 | 29 | 331-I | 104-J |
| KF6PBP | 10,389 | 38 | 21 | 339-I | 2-J |
| WB6BKR | 5,639 | 15 | 11 | 329-I | 3-J |

**7**

| | | | | | |
|---|---|---|---|---|---|
| NU7Z | 314 | 3 | 3 | 4.6-I | 4.6-J |

**8**

| | | | | | |
|---|---|---|---|---|---|
| WB8TGY | 419 | 4 | 4 | 9-I | 8-K |

**9**

| | | | | | |
|---|---|---|---|---|---|
| WB9SNR | 2,282 | 10 | 9 | 310-I | 43-J |
| K9PW | 345 | 5 | 2 | 43-I | 42-J |

**0**

| | | | | | |
|---|---|---|---|---|---|
| K0RZ | 32,333 | 264 | 16 | 246-I | 94-J |
| N0UGY | 28,530 | 240 | 14 | 246-I | 90-J |
| W6HCC/0 | 9,431 | 59 | 11 | 347-I | 93-J |
| N0IO | 2,582 | 40 | 6 | 122-I | 119-J |
| KE6LHL | 593 | 9 | 3 | 63-I | 63-J |

**VE**

| | | | | | |
|---|---|---|---|---|---|
| VE3SMA | 4,406 | 34 | 18 | 229-I | 42-J |
| VE3EZP | 1,241 | 14 | 7 | 79.6-I | 3.3-J |

**Checklog**
N1EVX, N2OPW

# STRAYS

### *QST* Congratulates...

◊ Bob Wallace, K6OL, who was honored by the United States Geological Survey as they renamed their Menlo Park, California earthquake facility the "Robert E Wallace Earthquake Center."

### *QST* Congratulates...Terry Fox, WB4JFI

◊ Last September Terry (center) received the first ARRL Technical Innovation Award at the Roanoke Division convention in Virginia Beach, Virginia. On hand to present the award was Roanoke Division director Dennis Bodson, W4PWF (right) and ARRL Technical Relations Manager Paul Rinaldo, W4RI (left).

Previous • Next Strays

**Pictured left to right: W4RI, WB4JFI and W4PWF.**

By Dan Henderson, N1ND
Contest Branch Manager

# 2000 IARU HF World Championship Results

Twenty-four hour contests are a rarity in most sports. Nine non-timed innings will usually produce the victor in a baseball game. After completing 18 holes on a golf course, the individual with the lowest score, regardless of time, emerges as winner. Ten frames in bowling will determine the outcome of the contest. Wimbledon crowns a tennis champion when one challenger wins the proper number of untimed sets. A marathon is determined by whichever participant covers the prescribed distance in the shortest period of time.

In sports with clocks, professional basketball runs 48 minutes while football and hockey will determine winners at the 60-minute marks. Only in automobile racing will you find a 24-hour non-stop challenge. The 24 Hours of Le Mans or the 24 Hours of Daytona combine man and his machine in a challenge to see who can go the distance.

The 24-hour challenge of radiosport—known as the IARU HF World Championship—is one of the outstanding events in radio competition. Unlike most sprints or QSO parties, the single operator participant paces himself to last the full length of the contest in order to have the best chance of winning. Unlike the ARRL International DX Contest or CQWW (lasting 48 hours each), the single op in the IARU HF World Championship has only one chance to catch a band when it is hot. Misread a propagation change or miss a band opening, and your chances of winning are greatly diminished. There is never "tomorrow" to make up for the errors of Day 1.

It was perhaps this "all or nothing" atmosphere that made the 2000 IARU HF World Championship—held July 8-9, 2000—one of the most successful IARU contests ever. A record 1898 logs were received for this year's event—a whopping increase of 16.7% above last year's previous record participation. This includes the 53 participating stations in the World Radiosport Team Championship 2000—which was held in conjunction with this year's contest (see sidebar). Including the WRTC participants, this represented over 2800 operators active from single operator, multioperator and national IARU society headquarters stations around the world. Logs from 53 ITU zones were received, as well as 31 IARU national society headquarters stations, several IARU regional executives and Administrative Council members, and at least 105 DXCC entities.

When looking for Top Ten worldwide scores, you don't have to venture very far. Europe led the way worldwide with 21 Top Ten finishers, followed by Asia and North

## Top World Scores

### Mixed Mode

| Call | Score |
|---|---|
| EA8/OH2BYS | 2,948,148 |
| 5X1Z | 2,573,868 |
| OH1F (OH1MDR, op) | 2,157,654 |
| DU1/DK3GI | 2,088,400 |
| RX1AA | 2,069,217 |
| K3ZO | 2,054,140 |
| RD3Q (UA3QDX, op) | 2,029,608 |
| UA4HTT | 1,993,977 |
| UA9CLB | 1,921,725 |
| UA9CDV | 1,910,420 |

### Phone Only

| Call | Score |
|---|---|
| CT3BX | 3,047,384 |
| 4X1IM | 2,697,400 |
| PY2KC | 2,027,851 |
| T99W | 1,679,750 |
| W9RE | 1,658,038 |
| K5TR (at W5KFT) | 1,629,024 |
| WB9Z | 1,609,968 |
| RA4HTX | 1,575,658 |
| R3K (RX3DCX, op) | 1,535,338 |
| LX1NO | 1,500,096 |

### CW Only

| Call | Score |
|---|---|
| OH1MM | 2,060,580 |
| SP7GIQ | 1,965,593 |
| OH9W (OH6EI, op) | 1,786,428 |
| OH0PM | 1,758,540 |
| G0IVZ | 1,757,700 |
| WX0B (W4PA, op) | 1,754,808 |
| N4AF | 1,676,374 |
| RZ3AZ | 1,654,038 |
| RM6A (RA6CM, op) | 1,586,250 |
| W1WEF | 1,574,986 |

### Multioperator

| Call | Score |
|---|---|
| P3A | 5,269,336 |
| HG6N | 3,819,315 |
| UU5J | 2,800,820 |
| RF9C | 2,781,816 |
| UP0L | 2,709,510 |
| UZ7U | 2,376,085 |
| UN4L | 2,352,900 |
| 9AY2K | 2,219,966 |
| SK3W | 2,211,168 |
| ZX5J | 2,082,307 |

## Top W/VE Scores

### Mixed Mode

| Call | Score |
|---|---|
| K3ZO | 2,054,140 |
| N2NU | 1,810,524 |
| N2BA | 1,737,883 |
| NT1N | 1,695,864 |
| N9AG | 1,464,580 |
| W4MYA | 1,328,739 |
| K4AB | 1,263,924 |
| W5WMU | 1,241,723 |
| N2RM | 1,201,478 |
| VE3AT | 1,058,200 |

### Phone Only

| Call | Score |
|---|---|
| W9RE | 1,658,038 |
| K5TR (at W5KFT) | 1,629,024 |
| WB9Z | 1,609,968 |
| VE1JX (K6HNZ, op) | 1,121,586 |
| KK1L (at WJ1Z) | 730,448 |
| N4UH | 597,618 |
| WS1A | 590,004 |
| WF3J (UA6AN, op) | 572,010 |
| WC4I | 532,000 |
| W0ETC | 511,173 |

### CW Only

| Call | Score |
|---|---|
| WX0B (W4PA, op) | 1,754,808 |
| N4AF | 1,676,374 |
| W1WEF | 1,574,986 |
| N6MJ (at W6KP) | 1,519,755 |
| K5GN | 1,515,594 |
| W7RM (W4AN, op) | 1,454,336 |
| K2UA | 1,392,494 |
| KR1G | 1,389,884 |
| K9NW | 1,255,093 |
| AA3B | 1,248,156 |

### Multioperator

| Call | Score |
|---|---|
| KH7R | 1,757,154 |
| K5NZ | 1,460,592 |
| K8CC | 1,433,712 |
| K5MR | 1,417,955 |
| W4MR | 1,240,304 |
| NO9Z | 1,210,941 |
| W6XR | 1,159,038 |
| W6EEN | 1,125,927 |
| AA5NT | 1,110,550 |
| N3ME | 986,752 |

## WRTC Participants

The Third World Radiosport Team Championship was held concurrently with the 2000 IARU HF World Championship. The complete results of WRTC-2000 may be found in the October 2000 issue of *QST* or on-line at **www.qsl.net/s57aw/wrtc/results.htm**.

The following is a complete list of call signs used by WRTC participants during the 2000 IARU HF World Championship, along with the callsigns of the operators at each station. WRTC logs were included in the log checking process for this contest, but scores are not reported in the results.

| Call Used | Operators |
|---|---|
| S511E | DL6FBL, DL1MFL |
| S512T | LY3BA, LY2BM |
| S513A | JA8RWU, JH4RHF |
| S514U | JM1CAX, JO1RUR |
| S516M | EA7GTF, EA7KW |
| S517W | DL1IAO, DL2MEH |
| S518N | K6LA, K5ZD |
| S519I | KQ2M, W7WA |
| S521H | VE7SV, VA7RR |
| S522R | LW9EUJ, LU7DW |
| S523W | UT4UZ, RW1AC |
| S524G | LY1DS, LY4AA |
| S526O | K8NZ, W2GD |
| S527K | JH4NMT, JK3GAD |
| S528D | OM3BH, OM3GI |
| S529A | 5B4WN, 5B4LP |
| S531R | K1ZM, N2NT |
| S532N | PP5JR, PY2NY |
| S533G | DL6RAI, OE2VEL |
| S534J | K4BAI, K6LL |
| S536P | HA3OV, HA3NU |
| S537L | OH1EH, OH1NOA |
| S538F | S50U, S51TA |
| S539D | ON4WW, ON6TT |
| S541F | S59A, S58A |
| S542B | 9A3A, 9A2AJ |
| S543C | F6BEE, F6FGZ |
| S544Z | YT1AD, YU7NU |
| S546Q | K4UEE, N6IG |
| S547B | SP8NR, SP9HWN |
| S548X | UT5UGR, UU2JZ |
| S549L | RZ9UA, UA3DPX |
| S561C | VE3BMV, VE3KZ |
| S562P | IK2QEI, I2VXJ |
| S563X | N3AD, N3BB |
| S564Q | VK4EMM, VK4XY |
| S566Z | K9ZO, K7BV |
| S567F | EA3NY, EA3KU |
| S568Y | G3SXW, G4BUO |
| S571W | K3NA, N6TV |
| S572L | ZS6EZ, ZS4TX |
| S573O | 9A9A, 9A3GW |
| S574V | K9TM, N2IC |
| S576K | I5NSR, I5JHW |
| S577V | UA9BA, RN9AO |
| S578R | PY5CC, PY1KN |
| S581I | VE7ZO, VE3EJ |
| S582A | K1DG, K1AR |
| S583D | DL2CC, DL5XL |
| S584M | K1TO, N5TJ |
| S586U | OK1QM, OL5Y |
| S587N | RA3AUU, RV1AW |
| S588S | WC4E, W0UA |

### IARU Regional Executives and Administrative Council Members

| Call | Score | QSOs | Multipliers |
|---|---|---|---|
| W6ROD (W7EW, K6AW, N6TR, ops) | 2,091,408 | 2894 | 187 |
| PA0LOU | 364,854 | 740 | 147 |
| HC2EE | 132,048 | 364 | 84 |
| W4RA | 100,392 | 304 | 89 |
| PT2HF | 69,784 | 209 | 88 |
| SP5FM | 4,728 | 77 | 24 |

America with seven each, Africa with three and South America with two. Even with over 100 of the world's top contesters participating in WRTC, the level of competition did not drop off. While no overall worldwide scoring records fell during the contest, exciting single operator battles were seen across the categories.

Leading the way in the Single Operator mixed mode category was Mauri, EA8/OH2BYS, who held off a strong challenge from Mats, 5X1Z. While Mats won the QSO total—2920 to 2500—Mauri's 252 to 186 multiplier advantage was able to win the day, as both posted nearly identical points per QSO marks (4.74 for Mats and 4.68 for Mauri). Hernani, CT3BX, was able to win both the QSO and multiplier battle to edge Serge, 4X1IM, in the Single Operator Phone Only category – 3,047,384 to 2,697,400. In the Single Operator CW Only category Pasi, OH1MM's, 2264 QSOs and 244 multipliers (for a score of 2,060,580) edged out Sobon, SP7GIQ's, final total of 1,965,593 on 2286 QSOs and 227 multipliers. In the Multioperator category, the operators at P3A were able to work fast and steady rates and win handily over HG6N by a score of 5,269,336 to 3,819,315. Congratulations to all of the worldwide Top Ten leaders.

Outstanding competitive efforts were also seen among the US and Canadian participants. Leading the way was a very tight three-way race in the Single Operator Phone Only category. In the end Mike, W9RE, emerged victorious over George, K5TR (operating at W5KFT), and Jerry, WB9Z. Only 48,340 points separated these three top contesters—1,658,038 for W9RE, 1,629,024 for K5TR and 1,609,968 for WB9Z. The difference in this one was the points-per-QSO (PPQ) average. George worked the most QSOs and multipliers, but was defeated in the end by Mike's PPQ average of 3.85 to George's 3.52. Jerry's 2104 QSOs netted a PPQ average of 3.75, which allowed him to remain close. Those five-point QSOs can make a difference. Mike's winning score also is the only new W/VE category record set during the Championship in 2000.

The W/VE Single Operator CW-Only category also was witness to a close race, as Scott, W4PA, operating WX0B was able to beat out Howie, N4AF, by a score of 1,754,808 to 1,676,374. Well-known con-

### IARU Headquarters Stations

| | Scores | QSOs | Miltipliers |
|---|---|---|---|
| DA0HQ (DF8XC, DG0HD, DG0OKE, DG1BDF, DH7WW, DJ7AA, DK1BT, DK3WW, DK4WA, DK7YY, DK8YY, DL1AOB, DL1AOQ, DL1ASA, DL1AUZ, DL1AWI, DL1DTL, DL1VDL, DL2OAP, DL2OBF, DL2OE, DL2SAX, DL3ABL, DL3ALI, DL3APO, DL3DXX, DL3OI, DL3TD, DL4ALB, DL4ALI, DL4JS, DL4MM, DL5ANT, DL5AOJ, DL5AOL, DL5AWI, DL5AXX, DL5LYM, DL5XU, DL5YY, DL6MHW, DL6MYL, DL7AU, DL7BY, DL7IO, DL7IQ, DL7UBA, DL7URH, DL7UTM, DL7VOA, DL7VRO, DL7ZZ, DL8AKA, DL8ALU, DL8AUA, DL8DYL, DL8WAA, DL9AWI, DL9DRA, ops) | 18,987,007 | 19831 | 409 |
| EM0HQ (UA9KS, UR3MP, UR5EAW, UR5ECW, UR5EDU, UR5EDX, UR5EFJ, UR5IFB, UR5IOK, UR6IM, UR7EU, UR9IDX, US1ITU, US1MM, US2IM, US2IR, US7IM, US7MM, UT0ZZ, UT2IJ, UT2IY, UT2UB, UT3IZ, UT3UZ, UT5HP, UT5MB, UT5MG, UT5UIA, UT7EC, UU0JM, UU4JGR, UU4JMG, UU6JM, UU8JK, UX1MM, UX2MF, UX2MM, UX5MZ, UX6MM, UX7MA, UX7MM, UX8MM, UY0MM, UY6IM, UY8IF, ops) | 18,215,157 | 14919 | 393 |
| R3SRR/2 (DK4VW, DK8LV, EU1MM, RA2FA, RA2FBC, RA2FCL, RA2FO, RA2FW, RA4LW, RK3BY, RN1AM, RN2FA, RN3OO, RN3QO, RU4HP, RV2FW, RV3BA, RW4WO, RW4WR, RX3APM, RZ3FA, UA0QMU, UA1OMS, UA2BD, UA2FAM, UA2FB, UA2FC, UA2FF, UA2FJ, UA2FM, UA2FP, UA2FX, UA3ASZ, UA4LU, UA4LUL, UA4RC, UA6LV, ops) | 16,569,632 | 13025 | 382 |
| PA6HQ (PA4MM, PA3ALK, PB0AIU, PA3BAG, PA4LA, PA5TT, PA0ABM, PB7CW, PE9DX, PA3EWP, PA5ET, PA3CAL, PA3FQA, PA4EA, PA7FM, PA5GV, PA4WM, PA3GCV, PE1HWO, PA3HBB, PA3EZL, PA3FDO, PA5NT, PA7BT, PA5ZZ, PA1AW, ops) | 14,209,200 | 11366 | 360 |
| 4O0HQ (YU1JW, YU1KX, YU1NW, YU1UH, YU1ZZ, YT1BB, YU7AC, YU7AV, YU7BW, YU7CB, YU7CM, YU7GO, YU7GW, YU7JX, YU7KW, YU7NW, YU7WA, YU7YG, YT7KF, YT7TY, YZ7AA, YZ7DM, 4N7CA, 4N7DW, 4N7TW, 4N7ZZ, ops) | 13,507,739 | 12551 | 371 |
| SN0HQ (SP2FAX, SP2FWC, SP2WKB, SP3GEM, SP3HRN, SP3RBI, SP3RBR, SP4EEZ, SP5GRM, SP5INQ, SP6AYP, SP6AZT, SP6ECA, SP9ERV, SP9EWQ, SP9LJD, SP9NLK, SP9QMP, SP9WZJ, SP9XCN , ops) | 13,074,304 | 11204 | 368 |
| OM0HQ (OM1KM, OM2RA, OM2KW, OM2FY, OM2ZZ, OM3GB, OM3RM, OM3LU, OM3EA, OM3NA, OM5DX, OM5RW, OM5ZW, OM5RM, OM5DP, OM5TX, OM7JG, OM8AM, OM8AU, ops) | 12,437,172 | 11741 | 361 |
| W1AW/4 (AE4SW, AJ4Y, K4EL, K4LM, K4LQ, K4OJ, K4PG, K4XS, KD4UJK, KR4YL, KT3T, N3NN, N4BP, N4DL, N4KM, N4OX, N4PN, N4QV, N4TO, N4UF, N8PR, NA4AR, NA4CW, NU4Y, W1CW, W1YL, W4IR, W4SO, W4ZW, WA4B, WA4IMC, WD4AHZ) | 10,720,370 | 11121 | 323 |
| YR0HQ (YO2BEH, YO3APJ, YO3CDN, YO3FRI, YO3FWC, YO3GDA, YO3GJC, YO3GOD, YO3JJ, YO3ND, YO4AB, YO4ATW, YO4HW, YO4NF, YO5AJR, YO5BJW, YO5BLA, YO5TE, YO6AWR, YO6FWM, YO8AXP, YO8BPK, YO8CQQ, YO8DDP, YO8WW, YO9FJW, YO9GZU, YO9IGI, ops) | 10,016,502 | 10401 | 347 |
| NU1AW (KI1G, WF1B, NB1B, N1RR, WM1K, KM1P, KB1H, NB1U, K1EBY, N1XS, KE1LI, KB1DFB, AA1CE, LU9AY, W1RM, ops) | 9,322,316 | 8545 | 316 |
| SK9HQ (SM5AQD, SM0DRD, SM2EZT, SM0GYX, SM5HJZ, SM0JHF, SM0JSM, SM0KCO, SM0MXO, SM0TQX, SM7TZK, SM0WKA, DJ1YFK, ops) | 8,817,970 | 7864 | 322 |
| EW5HQ (EU1AZ, EU1CL, EU1FC, EU1SA, EU1UN, EW1NY, EW2AA, EW2ZB, EW6WF, ops) | 8,234,562 | 7756 | 323 |
| IU2HQ (I2MQP, IK2HKT, IK2CIO, IK2AHB, I2IFT, I2CZQ, IK2GSN, IK2GZU, IK2SAU, IK2NCJ, IK2JUB, I2OKW, ops) | 7,183,110 | 7898 | 330 |
| ER7HQ (ER1BF, ER1FF, ER1LW, ER3CW, ER4DX, ER5AA, ER5AL, ER5DX, ER5OK, UT7ND, UR5NMM, ops) | 6,381,609 | 6521 | 307 |
| GB5HQ (+GB3RS, GB4HQ) (G4JVG, G4EOF, GM3WOJ, GM4CXM, GM0CLN, GM0NAI, MM0CCC, ops) | 5,658,953 | 6267 | 269 |
| OH3X (OH3ES, OH3LQK, OH3RM, OH3RR, OH3WW, OH3XR, ops) | 3,970,048 | 4687 | 256 |
| S50ZRS (K1CC, N4GN, N5ZO, OH2BH, OK2PAY, S51UE, S52CW, S52GP, S53XX, S57GM, S57KM, S57XX, S58J, S58MU, S59ZZ, S51TE, S51UJ, S52RO, S57MWJ, ops) | 3,922,310 | 5163 | 274 |
| T90HQ (T94YT, T94DO, T95DXT, T94NR, T95MEQ, T95MEH, T94TX, T97C, T99Z, T94OL, T94NO, T98R, T95MOJ, T94CW, T92D, T92PGY, T92SOU, T94KU, T95T, T95DOA, T95LQG, T94EX, T94GG, T94MZ, T94LW, T94ZZ, T99P, T94J, ops) | 3,914,350 | 5755 | 275 |
| 3A2K (3A2AH, 3A2CR, 3A2LF, 3A2MS, 3A2MW, OH2BC, OH2TA, OH9MM, ops) | 2,069,704 | 3460 | 182 |
| 9V9HQ (9V1YC, 9V1BH, ops) | 1,906,529 | 2664 | 179 |
| J39HQ (AC8G, W8UE, ops) | 1,557,044 | 2365 | 194 |
| T77C (T77C, N6TJ, CT1BOH, ops) | 1,361,673 | 2588 | 171 |
| VE7RAC (at VE7SV) (VA7NT, VA7AM, VE7CA, VA7TT, VE7AGG, VE7MKA, ops) | 1,256,736 | 2226 | 159 |
| LX0HQ (LX1KQ, DL4FCH, LX1MG, DL3FCP, ops) | 1,256,577 | 2244 | 159 |
| OE2S (OE2GEN, OE2MON, OE2LCM, ops) | 673,792 | 1838 | 112 |
| OE1XHQ (+OE2S, OE6Z) (OE1EMS, OE1SZW, OE2GEN, OE2LCM, OE2MON, OE6HZG, OE6MBG, ops) | 464,970 | 1854 | 110 |
| LY1RMD (LY2BLQ, op) | 272,840 | 605 | 152 |
| DX1HQ (DU1SAN, DU1MS, RK3DT, DU1QNT, DU1IHU, DU1BP, DU3SV, ops) | 265,115 | 696 | 85 |
| HP0HQ (HP1AC, op) | 111,132 | 325 | 81 |
| LZ8NFF (LZ1OF, op) | 15,088 | 120 | 46 |

tester Fred, K3ZO, rounded out the Single Operator W/VE winners by taking the Mixed Mode category by a score of 2,054,140 to 1,810,524 over John, N2NU. The final W/VE Championship honors go to the multioperator crew at KH7R, who used their offshore locale to outscore the K5NZ operators 1,757,154 to 1,460,592.

Unique to this Championship are the IARU Society Headquarters Stations. While they only count one point per QSO, they do count as a special multiplier. Thirty-one entries were received from HQ stations. Leading the way once again was the DARC submission from DA0HQ, which posted an all-time high HQ score of 18,897,007. Also of note were the dedicated UARL operators at EM0HQ, who also bettered the old HQ record.

The IARU HF World Championship offers contesters a unique event that continues to display its popularity. The shorter duration of the event allows even the casual contester a chance to put up a competitive effort while challenging their operating skills. While skill and durability are key components, it doesn't require a Herculean marathon effort to participate for the full 24 hours of the event.

The 2001 IARU HF World Championship will be contested this coming July 14-15. Remember that electronically generated entries must be submitted in the required Cabrillo file format within 30 days after the end of the contest. Full rules for this year's contest will be found in the April issue of *QST* or online at **www.iaru.org/contest.html** after mid-March.

The time to start planning to participate in this year's premier radiosport event is now. You may not be able to run the Boston Marathon, compete in the World Cup for Brazil or drive in the 24 Hours of Le Mans. But any licensed Amateur Radio operator can test their skills and challenge themselves in the best challenge of their hobby: radiosport. See you on the air in July!

## Scores

Scores are listed by ITU Zone, and then by country, ARRL Section, or Canadian Province with the zone. Line Scores indicate call, final score, QSO total, Multiplier total, and entry class (A = Single Operator Mixed Mode, B = Single Operator Phone Only, C = Single Operator CW Only, D = Multioperator Single Transmitter).

### Zone 1

#### Alaska

| | | | | |
|---|---|---|---|---|
| WL7CMK | 86,028 | 354 | 67 | B |
| KL7FAP | 1,152 | 24 | 16 | B |

### Zone 2

#### Canada

#### Alberta

| | | | | |
|---|---|---|---|---|
| VE6JO | 498,708 | 1049 | 126 | A |
| VE6MAA | 6,541 | 59 | 31 | B |
| VE6JY | 4,620 | 44 | 33 | B |
| VE6BF | 209,138 | 496 | 106 | C |

#### British Columbia

| | | | | |
|---|---|---|---|---|
| VE7XB | 10,744 | 75 | 34 | A |
| VE7SL | 3,562 | 63 | 13 | A |
| VE7UQ | 40,257 | 175 | 63 | B |
| VE7XO | 38,742 | 185 | 66 | B |
| VE7UF | 313,848 | 733 | 108 | C |
| VE7IN (+VE7FO) | 351,764 | 792 | 119 | D |

### Zone 3

#### Manitoba

| | | | | |
|---|---|---|---|---|
| VE4YU | 143,592 | 415 | 93 | A |
| VA4AA | 3,066 | 44 | 21 | B |
| VE4IM | 103,760 | 337 | 80 | C |

#### Saskatchewan

| | | | | |
|---|---|---|---|---|
| VE5SF | 262,363 | 693 | 109 | A |
| VE5CPU | 135,030 | 369 | 105 | A |

### Zone 4

#### Quebec

| | | | | |
|---|---|---|---|---|
| VE2AWR | 318,875 | 769 | 125 | A |
| VE2GWL | 29,274 | 213 | 51 | A |
| VE2ZP (+VE3FU) | 768,500 | 1350 | 145 | D |

#### Ontario

| | | | | |
|---|---|---|---|---|
| VE3AT | 1,058,200 | 1800 | 143 | A |
| VE3RM | 665,550 | 1175 | 145 | A |
| VA3JK | 501,810 | 1041 | 129 | A |
| VE3STT | 367,428 | 703 | 134 | A |
| VE3XN | 275,440 | 671 | 110 | A |
| VE3MQW | 16,005 | 154 | 33 | A |
| VE3KP | 11,286 | 133 | 19 | A |
| VE3/K0DI | 2,890 | 60 | 17 | A |
| VE3HX | 445 | 89 | 1 | A |
| VE3BUC | 110,298 | 323 | 93 | B |
| VE3YQY | 29,870 | 151 | 58 | B |
| VA3UA | 485,996 | 1092 | 119 | C |
| VE3ZPD | 314,024 | 664 | 136 | C |
| VE3IAY | 259,109 | 634 | 113 | C |
| VE3OSZ | 49,407 | 142 | 129 | C |
| VE3WZ | 34,476 | 165 | 68 | C |

### VY0

#### Nunavut

| | | | | |
|---|---|---|---|---|
| VY0VDO | 40,467 | 254 | 41 | A |

### Zone 6

### W6

#### East Bay

| | | | | |
|---|---|---|---|---|
| KE6QR | 10,794 | 76 | 42 | B |
| K6BIR | 8,917 | 70 | 37 | B |
| N6RO | 792,160 | 1353 | 160 | C |
| K6WG | 73,590 | 327 | 66 | C |
| KK6F | 24,732 | 150 | 54 | C |
| K6JAT (+WB6NER) | 26,240 | 130 | 64 | D |

#### Los Angeles

| | | | | |
|---|---|---|---|---|
| N6ED | 279,292 | 560 | 131 | A |
| KU6T | 105,350 | 337 | 98 | A |
| K6RO | 61,460 | 259 | 70 | A |
| N6TW | 19,822 | 105 | 53 | A |
| N6GL | 18,824 | 122 | 52 | A |
| W6AFA | 379,236 | 760 | 132 | B |
| KB6FB | 141,066 | 483 | 102 | B |
| WB6NFO | 54,670 | 194 | 77 | B |
| WA6BOB | 3,380 | 58 | 20 | C |

#### Orange

| | | | | |
|---|---|---|---|---|
| K6EY | 126,040 | 421 | 92 | A |
| K6ACZ | 53,400 | 165 | 89 | B |
| NJ6A | 40,800 | 195 | 68 | B |
| N6MJ (at W6KP) | 1,519,755 | 1872 | 213 | C |
| N6BM | 299,835 | 671 | 135 | C |
| W6EEN (+K6XC,N6RT) | 1,125,927 | 1561 | 187 | D |

#### Santa Barbara

| | | | | |
|---|---|---|---|---|
| W6TK | 150,038 | 425 | 98 | A |
| WA5VGI | 130,284 | 348 | 94 | A |
| AC6T | 588,434 | 1018 | 154 | C |
| WA6BMH (W6BKY,KR6CL,KQ6FK, ops) | 23,821 | 179 | 41 | D |

#### Santa Clara Valley

| | | | | |
|---|---|---|---|---|
| N6EM | 94,500 | 275 | 100 | A |
| K6L (W6ISO, op) | 74,824 | 239 | 94 | A |
| K6EP | 44,280 | 186 | 72 | A |
| N6JM | 37,888 | 150 | 74 | A |
| NN6XX | 61,254 | 213 | 83 | B |
| K6A (K6III, op) | 130,350 | 366 | 110 | C |
| N6NF | 59,582 | 284 | 62 | C |
| K6AT (K6MJ, op) | 36,421 | 122 | 77 | C |
| KQ6CV | 10,542 | 93 | 42 | C |
| N7FF | 7,224 | 92 | 28 | C |
| W6PRI | 189 | 8 | 7 | C |
| W6YX | 415,625 | 967 | 125 | D |
| K6YA (AA6TA,W6FZA, ops) | 94,688 | 259 | 88 | D |

#### San Diego

| | | | | |
|---|---|---|---|---|
| N6VH | 60,408 | 251 | 72 | A |
| N6VS | 13,104 | 78 | 52 | B |
| K7JJ | 138,775 | 429 | 91 | C |

#### San Francisco

| | | | | |
|---|---|---|---|---|
| K6CTA | 53,328 | 281 | 66 | C |

#### San Joaquin Valley

| | | | | |
|---|---|---|---|---|
| N6MI (at N6NB) | 533,271 | 988 | 149 | A |
| KI6PG | 24,050 | 104 | 65 | B |
| K6MI | 1 | 1 | 1 | B |
| K6TTT | 138,648 | 394 | 106 | C |
| WA6FGV | 126,960 | 529 | 80 | C |
| K6CSL | 9,243 | 67 | 39 | C |

#### Sacramento Valley

| | | | | |
|---|---|---|---|---|
| K6TA | 64,446 | 237 | 69 | A |
| K6LRN | 12,198 | 107 | 38 | A |
| K6KO | 511 | 17 | 7 | B |
| W6NKR | 89,001 | 243 | 93 | C |

### W7

#### Arizona

| | | | | |
|---|---|---|---|---|
| N7UJJ | 165,444 | 477 | 102 | A |
| KD7EJC | 152 | 12 | 4 | B |
| W7YS | 35,091 | 150 | 63 | C |
| K7ON | 14,950 | 184 | 26 | C |

#### Eastern Washington

| | | | | |
|---|---|---|---|---|
| W7AVA | 4,077 | 39 | 27 | B |

#### Idaho

| | | | | |
|---|---|---|---|---|
| KW7N | 31,188 | 144 | 69 | B |

#### Montana

| | | | | |
|---|---|---|---|---|
| K7ABV | 53,526 | 215 | 66 | A |

#### Nevada

| | | | | |
|---|---|---|---|---|
| K7NV | 656,230 | 1284 | 137 | C |

#### Oregon

| | | | | |
|---|---|---|---|---|
| WA7ND | 46,332 | 325 | 44 | B |
| W7YVK | 1,818 | 25 | 18 | B |
| K4XU | 887,680 | 1488 | 152 | C |
| W7YAQ | 573,792 | 886 | 172 | C |
| W7ZB | 514,311 | 976 | 133 | C |

#### Utah

| | | | | |
|---|---|---|---|---|
| W7HS | 58,683 | 199 | 93 | C |

#### Western Washington

| | | | | |
|---|---|---|---|---|
| W7TSQ | 36,432 | 158 | 72 | A |
| W7RM (W4AN, op) | 1,454,336 | 1970 | 184 | C |
| K7RI (NW7DX, op) | 660,150 | 1318 | 135 | C |
| AB7RW | 134,700 | 342 | 100 | C |
| AD7U (+N6HR) | 925,452 | 1554 | 164 | D |
| N7WA (+W7CAJ,W7/JR1NKN) | 361,879 | 871 | 119 | D |
| W7OM (+K7SS) | 251,922 | 601 | 121 | D |

### Zone 7

### W5

#### Arkansas

| | | | | |
|---|---|---|---|---|
| KC5LDC | 570 | 19 | 10 | B |
| KM5G | 391,748 | 854 | 119 | C |

#### Louisiana

| | | | | |
|---|---|---|---|---|
| W5WMU | 1,241,723 | 1863 | 179 | A |
| KZ5D | 1,040,026 | 1641 | 181 | A |
| W5WZ | 72,890 | 299 | 74 | A |
| N5IX | 22,152 | 121 | 52 | B |
| W5CTV | 5,460 | 57 | 30 | B |
| K5MC | 254,898 | 589 | 126 | C |

#### Mississippi

| | | | | |
|---|---|---|---|---|
| KE5K | 104,067 | 299 | 93 | B |

#### North Texas

| | | | | |
|---|---|---|---|---|
| K5ZO | 905,352 | 1445 | 168 | A |
| N5JR | 382,440 | 810 | 120 | A |
| KN5L | 66,690 | 256 | 78 | A |
| W5RNF | 58,425 | 242 | 75 | B |
| W5AP | 38,805 | 168 | 65 | B |
| NF5W | 19,432 | 101 | 56 | B |
| K5VPQ | 2,852 | 43 | 23 | B |
| KC5OZT | 1,566 | 29 | 18 | B |
| WX0B (W4PA, op) | 1,754,808 | 2196 | 204 | C |
| K5RX | 1,001,368 | 1361 | 199 | C |
| N5PO | 471,504 | 893 | 141 | C |
| W5FO | 383,166 | 830 | 126 | C |
| WQ5W | 298,840 | 637 | 124 | C |
| NN5T | 102,400 | 321 | 100 | C |
| W5KAU | 36,888 | 178 | 58 | C |
| K5MR (+K5OT,K6NR,N5QQ) | 1,417,955 | 1815 | 203 | D |
| AA5NT (+WD5FLK,N5NJ,N3BUO) | 1,110,550 | 1740 | 167 | D |

#### Oklahoma

| | | | | |
|---|---|---|---|---|
| N5RXF | 72,656 | 291 | 76 | B |
| N5PMP | 57,974 | 205 | 82 | B |
| K5HP | 374,750 | 874 | 125 | C |
| K5KA | 155,904 | 505 | 87 | C |
| K5ADI (+K2BA) | 334,880 | 780 | 112 | D |

#### South Texas

| | | | | |
|---|---|---|---|---|
| NA4M | 310,632 | 722 | 129 | A |
| K5TR (at W5KFT) | 1,629,024 | 2173 | 213 | B |
| W5GCX | 28,535 | 120 | 65 | B |
| K5GN | 1,515,594 | 1791 | 222 | C |
| K8EP (at NX5M) | 739,500 | 1398 | 145 | C |
| KE5C (at N5TW) | 574,575 | 1092 | 141 | C |
| K5WA | 414,271 | 839 | 143 | C |
| KG5U | 93,342 | 299 | 94 | C |
| K5PI | 78,802 | 351 | 62 | C |
| NO5W | 37,200 | 192 | 62 | C |
| W5EB | 13,072 | 72 | 43 | C |
| W5NR | 144 | 13 | 6 | C |
| K5NZ (+W5BAK,K5GA) | 1,460,592 | 1973 | 196 | D |
| W5SB (+N1LN,K1OJ,W5MJ,WA5OJE) | 210,956 | 789 | 92 | D |

#### West Texas

| | | | | |
|---|---|---|---|---|
| N5DO | 665,616 | 1107 | 168 | A |
| KE5OG | 66,439 | 262 | 79 | B |

### W7

#### Montana

| | | | | |
|---|---|---|---|---|
| KC7UP | 4,056 | 48 | 26 | B |

#### Wyoming

| | | | | |
|---|---|---|---|---|
| NT7A (N0AH, op) | 565,360 | 1050 | 148 | A |

### W9

#### Illinois

| | | | | |
|---|---|---|---|---|
| K9SD (+KW0A,KA0GGI,KI9A,K9DD) | 913,325 | 1626 | 175 | D |

#### Wisconsin

| | | | | |
|---|---|---|---|---|
| KB9JIF | 64,640 | 264 | 64 | B |

### W0

#### Colorado

| | | | | |
|---|---|---|---|---|
| W0TM | 978,462 | 1488 | 171 | A |
| KG0ZI | 337,900 | 862 | 124 | B |
| K9MWM | 204,549 | 447 | 123 | B |
| K0UK | 102,069 | 290 | 99 | B |
| K0RF | 1,203,234 | 1687 | 186 | C |
| K0MT | 176,500 | 495 | 100 | C |
| K0COP | 6,944 | 71 | 32 | C |
| AB0MV (+AE0Q) | 572,800 | 1152 | 128 | D |

#### Iowa

| | | | | |
|---|---|---|---|---|
| NE0P | 98,640 | 372 | 90 | A |
| W0ETC | 511,173 | 1002 | 153 | B |
| W0PPF | 16,966 | 148 | 34 | B |
| N0AV | 669,980 | 1231 | 139 | C |
| N0AC | 107,793 | 403 | 87 | C |

#### Kansas

| | | | | |
|---|---|---|---|---|
| K0BJ/M | 3,277 | 52 | 29 | A |
| W0BR | 26,474 | 134 | 61 | B |
| WA5BOW/M | 1,962 | 33 | 18 | B |
| K0LLS | 639 | 17 | 9 | B |
| KG0UA | 33,664 | 139 | 64 | C |
| KK0SS (+KE4FDP,N0NB) | 673,594 | 1309 | 139 | D |

#### Minnesota

| | | | | |
|---|---|---|---|---|
| K0OB | 204,864 | 610 | 97 | A |
| N0XW | 50,464 | 201 | 76 | A |
| W0HW | 80,433 | 292 | 81 | C |
| K0AD | 70,752 | 354 | 67 | C |

#### Missouri

| | | | | |
|---|---|---|---|---|
| K0OU | 337,625 | 790 | 125 | A |
| KI0HQ | 113,796 | 417 | 87 | A |
| WA0OTV | 3,860 | 61 | 20 | A |
| W0DLS | 50,127 | 199 | 77 | B |
| K0DAT | 17,112 | 100 | 46 | B |
| K2HT | 6,042 | 51 | 38 | B |

#### North Dakota

| | | | | |
|---|---|---|---|---|
| WB0O | 436,885 | 890 | 131 | C |

#### Nebraska

| | | | | |
|---|---|---|---|---|
| W0UVC | 119,625 | 261 | 125 | B |
| NE0DX | 75,154 | 193 | 106 | B |
| N0LGU | 15,745 | 111 | 47 | B |
| K0XU | 10,080 | 71 | 35 | B |

#### South Dakota

| | | | | |
|---|---|---|---|---|
| W0SD (W0DB, op) | 801,003 | 1399 | 147 | A |
| WD0BMR | 156,222 | 437 | 99 | B |
| WB0ULX | 18,582 | 100 | 57 | B |

### Zone 8

### W1

#### Connecticut

| | | | | |
|---|---|---|---|---|
| NT1N | 1,695,864 | 2058 | 228 | A |
| N4QX (at W1INF) | 38,998 | 179 | 74 | A |
| K1JN | 363,150 | 723 | 150 | B |
| W1CRS | 105,844 | 398 | 94 | B |
| N1ZXL | 1,786 | 31 | 19 | B |
| W1WEF | 1,574,986 | 2104 | 191 | C |
| W1QK | 795,039 | 1545 | 131 | C |
| N4XR | 75,684 | 192 | 119 | C |
| K1UQE | 14,617 | 90 | 47 | C |
| WB8IMY/1 | 12,222 | 93 | 42 | C |
| W1CU (+K2RD,WA1FCN) | 881,600 | 1218 | 190 | D |
| WA1RR (KA1VMG,N1ZRD, ops) | 172,144 | 502 | 116 | D |
| N1MD | 106,890 | 279 | 105 | D |

#### Eastern Massachusetts

| | | | | |
|---|---|---|---|---|
| K1HT | 214,529 | 504 | 133 | A |
| K1JE | 208,864 | 537 | 107 | A |
| N1AU | 30,753 | 143 | 67 | A |
| WA1NPZ | 160,146 | 370 | 123 | B |
| W1KM | 1,163,790 | 1482 | 201 | C |
| K1VUT | 1,151,850 | 1712 | 175 | C |
| WO1N | 353,133 | 804 | 123 | C |
| K5MA | 309,504 | 751 | 104 | C |
| K1GU | 141,246 | 369 | 118 | C |
| KR1B | 37,544 | 198 | 76 | C |
| K1EP | 25,254 | 140 | 61 | C |
| W1TW | 14,718 | 121 | 66 | C |
| N1BB | 846,615 | 1434 | 165 | D |
| W1ZT (+K1EO) | 714,194 | 1174 | 169 | D |
| K1NU (+packet) | 114,130 | 282 | 113 | D |

#### Maine

| | | | | |
|---|---|---|---|---|
| NY1S | 361,261 | 772 | 139 | C |
| W1QHG | 3,192 | 32 | 21 | C |

#### New Hampshire

| | | | | |
|---|---|---|---|---|
| K1RO | 69,132 | 274 | 84 | A |
| KE1KD | 53,466 | 257 | 67 | A |
| WS1A | 590,004 | 1046 | 162 | B |
| W1DAD | 81,969 | 293 | 89 | B |
| KR1G | 1,389,884 | 1807 | 188 | C |
| WC1M | 1,194,270 | 1816 | 165 | C |
| NR1DX | 1,139,230 | 1563 | 185 | C |
| KC1F (+packet) | 97,012 | 332 | 79 | D |

#### Rhode Island

| | | | | |
|---|---|---|---|---|
| K1PLX | 317,364 | 620 | 159 | B |

#### Vermont

| | | | | |
|---|---|---|---|---|
| AA1SU | 219,520 | 596 | 128 | A |
| KK1L (at WJ1Z) | 730,448 | 1554 | 142 | B |
| W1CX | 584,928 | 1203 | 144 | C |
| K1KU | 20,852 | 127 | 52 | C |

#### Western Massachusetts

| | | | | |
|---|---|---|---|---|
| N6RFM | 544,086 | 850 | 167 | A |
| KX1X | 107,300 | 340 | 100 | B |
| N1ZZZ | 3,180 | 42 | 30 | B |
| W1TO | 80,500 | 258 | 92 | C |

### W2

#### Eastern New York

| | | | | |
|---|---|---|---|---|
| N2BA | 1,737,883 | 2182 | 203 | A |
| K2SX | 870,688 | 1314 | 184 | A |
| K2ETA | 102,375 | 302 | 105 | B |
| W1NXB | 7,627 | 94 | 29 | B |
| W2ZU | 150,535 | 433 | 85 | C |
| K2ZZ (+W1QJ,N1GS,WV1V) | 2,210 | 52 | 26 | D |

#### NYC-Long Island

| | | | | |
|---|---|---|---|---|
| K2QMF | 167,922 | 416 | 114 | A |
| NI2P | 84,150 | 269 | 90 | B |
| N2GC | 497,310 | 934 | 165 | C |
| N2NI | 17,155 | 128 | 47 | C |
| N1XL (+K2GH) | 162,426 | 480 | 107 | D |

#### Northern New Jersey

| | | | | |
|---|---|---|---|---|
| N2ED | 660,914 | 1157 | 158 | A |
| W1GD | 593,028 | 863 | 171 | A |
| N7UN | 132,696 | 408 | 97 | A |
| W2UDT | 117,900 | 361 | 100 | A |
| W2/VE3XAP | 281,760 | 620 | 120 | B |
| WA2BKN | 4,218 | 46 | 38 | B |
| W2EN | 482,384 | 920 | 146 | C |
| WA2VYA | 295,458 | 641 | 138 | C |
| W2LRO | 6,256 | 184 | 34 | C |

#### Southern New Jersey

| | | | | |
|---|---|---|---|---|
| N2NU | 1,810,524 | 2437 | 186 | A |
| N2RM | 1,201,478 | 1720 | 181 | A |
| W2YC | 378,764 | 586 | 179 | A |
| WK2G | 265,980 | 810 | 93 | C |
| N2CQ | 9,612 | 87 | 36 | C |
| WA2VQV | 7,830 | 60 | 45 | C |

#### Western New York

| | | | | |
|---|---|---|---|---|
| KM2L | 39,884 | 214 | 59 | A |
| N2UHI | 30,444 | 192 | 59 | A |
| WB2AIV | 12,246 | 98 | 39 | A |
| KG2AU | 132,264 | 407 | 88 | B |
| WB2OSM | 124,696 | 426 | 88 | B |
| N2LQQ | 16,008 | 100 | 46 | B |
| K2UA | 1,392,494 | 1953 | 178 | C |
| N2CU | 784,412 | 1220 | 164 | C |
| KW2J | 219,924 | 716 | 82 | C |
| WA2EYA | 26,730 | 157 | 55 | C |
| W2FUI | 15,505 | 131 | 35 | C |
| W6XR (+N2AU,W2AD) | 1,159,038 | 1844 | 171 | D |

**W3**

**Delaware**

| | | | | |
|---|---|---|---|---|
| KF3BT | 1,218 | 32 | 21 | A |

**Eastern Pennsylvania**

| | | | | |
|---|---|---|---|---|
| KB3TS | 269,000 | 592 | 125 | A |
| K3PP | 104,475 | 301 | 105 | A |
| W2TN | 298,155 | 659 | 139 | B |
| KB3CRG | 8,224 | 87 | 32 | B |
| AA3B | 1,248,156 | 1751 | 189 | C |
| W3BGN | 176,770 | 429 | 110 | C |
| N3NZ | 5,434 | 63 | 26 | C |

**Maryland-DC**

| | | | | |
|---|---|---|---|---|
| K3ZO | 2,054,140 | 2301 | 220 | A |
| W3UJ | 174,720 | 438 | 120 | A |
| K3TW | 20,196 | 152 | 51 | A |
| K3SA | 14,973 | 141 | 23 | A |
| N3HBX | 508,125 | 1131 | 125 | B |
| WZ3AR | 337,428 | 631 | 156 | B |
| K3GV | 138,738 | 334 | 114 | B |
| AJ3M | 85,932 | 431 | 77 | B |
| K2PLF | 579,864 | 1030 | 148 | C |
| N3NT | 375,947 | 732 | 143 | C |
| W3CP | 121,873 | 304 | 107 | C |
| NY3M | 120,350 | 438 | 83 | C |
| W3FQE | 1,957 | 34 | 19 | C |

**Western Pennsylvania**

| | | | | |
|---|---|---|---|---|
| N3GJ | 216,600 | 483 | 114 | A |
| AD8J | 94,924 | 348 | 76 | A |
| AA3LX | 75,287 | 274 | 79 | A |
| N3YEA | 7,650 | 88 | 30 | B |
| WB0IWG | 1,034 | 44 | 11 | B |
| KA3S | 261,096 | 594 | 129 | C |

**W4**

**Alabama**

| | | | | |
|---|---|---|---|---|
| K4AB | 1,263,924 | 2020 | 188 | A |
| KU4BL | 69,255 | 273 | 81 | B |
| KT4XA | 10,175 | 83 | 37 | B |
| W4NTI | 124,836 | 408 | 103 | C |
| KS4YT (+KV4T) | 329,554 | 932 | 106 | D |

**Georgia**

| | | | | |
|---|---|---|---|---|
| K4OGG | 73,950 | 316 | 58 | A |
| WA4TII | 453,468 | 798 | 159 | B |
| NJ8J | 1,513 | 28 | 17 | B |
| N4DU | 341,700 | 782 | 134 | C |

**Kentucky**

| | | | | |
|---|---|---|---|---|
| K4IU | 266,465 | 635 | 137 | A |
| WC4I | 532,000 | 1195 | 125 | B |
| W4LC | 82,560 | 253 | 86 | B |
| KN4IV | 23,562 | 140 | 42 | B |
| K4AO | 460,551 | 1006 | 147 | C |
| KG4BIG | 45,954 | 289 | 69 | C |
| N4XM | 4,200 | 69 | 20 | C |
| N4OKX (at N4GN) (+KS7O,N9FD,N4XM) | 657,760 | 1209 | 160 | D |

**North Carolina**

| | | | | |
|---|---|---|---|---|
| KS4XG | 717,760 | 1312 | 160 | A |
| N4UH | 597,618 | 1226 | 126 | B |
| W4YDY | 77,074 | 267 | 89 | B |
| KF4RDP | 59,850 | 207 | 90 | B |
| K4TMC | 27,378 | 129 | 54 | B |
| KF4VMT | 14,996 | 97 | 46 | B |
| N4AF | 1,676,374 | 2103 | 203 | C |
| N4CW | 654,829 | 1268 | 139 | C |
| WJ9B | 167,256 | 513 | 101 | C |
| W4MR (AA4NC,KI7WX,K4HA, ops) | 1,240,304 | 1887 | 178 | D |

**Northern Florida**

| | | | | |
|---|---|---|---|---|
| KB4N | 9,669 | 94 | 33 | A |
| N4EK | 134,640 | 554 | 85 | B |
| KE4SCY | 50,052 | 170 | 86 | B |
| W4UEA | 42,486 | 182 | 73 | B |
| WB4IHI | 32,136 | 133 | 78 | C |

**South Carolina**

| | | | | |
|---|---|---|---|---|
| K8MR | 55,388 | 276 | 61 | A |
| W2JJC | 385,203 | 1037 | 119 | B |

**Southern Florida**

| | | | | |
|---|---|---|---|---|
| W4SAA | 92,700 | 356 | 90 | A |
| W1ENZ | 23,598 | 135 | 46 | B |
| KA3MTO | 20,252 | 116 | 61 | B |
| KD4LIV | 424 | 15 | 8 | B |
| K1PT | 578,187 | 1031 | 153 | C |
| WD4JR | 125,370 | 387 | 105 | C |
| W2OO | 10,045 | 77 | 41 | C |

**Tennessee**

| | | | | |
|---|---|---|---|---|
| K4BEV | 117,758 | 347 | 97 | A |
| WO4O | 6,994 | 99 | 26 | A |
| NY4T | 196,680 | 583 | 132 | B |
| N5TWV/4 | 101,689 | 401 | 73 | B |
| N0BG | 96,228 | 286 | 99 | B |
| K4OOO | 47,810 | 191 | 70 | B |
| KW4JS | 23,162 | 173 | 37 | B |
| AK4ST | 9,503 | 74 | 43 | B |
| WD4PTJ | 693 | 17 | 9 | B |
| WW4RR | 1,080,744 | 1978 | 147 | C |
| K4RO | 838,352 | 1568 | 151 | C |
| N4DW | 282,375 | 589 | 125 | C |
| K4LTA | 200,043 | 763 | 93 | C |
| AA3VA | 115,218 | 320 | 111 | C |
| W4NZ | 63,543 | 289 | 59 | C |
| N4KN | 25,920 | 291 | 48 | C |
| W4AUI | 6,580 | 72 | 35 | C |

**Virginia**

| | | | | |
|---|---|---|---|---|
| W4MYA | 1,328,739 | 1916 | 177 | A |
| K4UVT | 51,090 | 195 | 78 | A |
| WB4DNL | 10,620 | 180 | 59 | A |
| WF3J (UA6AN, op) | 572,010 | 1096 | 138 | B |
| N4MM | 232,218 | 500 | 126 | B |
| KU4FP | 74,074 | 231 | 91 | B |
| KC2JT | 48,919 | 208 | 71 | B |
| K3ZJ/8 | 39,738 | 409 | 37 | B |
| WA4FXX | 10,564 | 74 | 38 | B |
| W4BQF | 45,375 | 360 | 33 | C |
| K6ETM | 1,679 | 33 | 23 | C |
| N3ME (+ops) | 986,752 | 1308 | 208 | D |

**West Central Florida**

| | | | | |
|---|---|---|---|---|
| K4LQ | 271,425 | 436 | 165 | A |
| W4UM | 11,154 | 94 | 33 | A |

**W5**

**Mississippi**

| | | | | |
|---|---|---|---|---|
| KB5FET | 64,452 | 209 | 82 | B |
| KF5AU | 53,840 | 188 | 80 | B |
| AC5SU | 71,617 | 312 | 91 | C |

**W8**

**Michigan**

| | | | | |
|---|---|---|---|---|
| K8GT | 231,336 | 540 | 126 | A |
| NU8Z | 134,394 | 498 | 78 | A |
| N8NX | 109,074 | 345 | 98 | A |
| KC8FXR | 38,160 | 266 | 53 | A |
| N8CN | 98,982 | 306 | 94 | B |
| KB8QO | 79,776 | 246 | 96 | B |
| KC8MPQ | 1,639 | 69 | 11 | B |
| K8JM | 290,952 | 789 | 108 | C |
| KT8X | 67,620 | 366 | 46 | C |
| K8IR | 61,067 | 201 | 79 | C |
| K8CV | 52,500 | 220 | 84 | C |
| KB8PGW | 24,232 | 185 | 52 | C |
| NZ8O (W8MJ, op) | 12,796 | 155 | 28 | C |
| K8CC (+K8GL,WD8S) | 1,433,712 | 1918 | 204 | D |

**Ohio**

| | | | | |
|---|---|---|---|---|
| N9AG | 1,464,580 | 1810 | 215 | A |
| W8AV (+K4LT,K8AJS) | 992,976 | 1711 | 151 | A |
| N8BJQ | 630,420 | 1147 | 158 | A |
| W8VE | 140,250 | 451 | 110 | A |
| K8ZT | 11,232 | 107 | 39 | A |
| KC8HWV | 19,768 | 118 | 56 | B |
| N8KM | 19,400 | 102 | 50 | B |
| N8WEL | 12,720 | 72 | 48 | B |
| KC8ANW | 4,536 | 50 | 27 | B |
| WB4JMO | 4,264 | 64 | 26 | B |
| W8KNO | 570 | 19 | 10 | B |
| W8GN | 696,784 | 1251 | 148 | C |
| KU8E | 401,520 | 913 | 140 | C |
| N8AGU | 101,084 | 364 | 74 | C |
| WT8P | 58,254 | 333 | 73 | C |
| W8IDM | 29,380 | 126 | 65 | C |
| AA8LL (+packet) | 124,344 | 400 | 88 | D |

**West Virginia**

| | | | | |
|---|---|---|---|---|
| K5IID | 379,093 | 835 | 143 | A |
| KV3R | 219,510 | 472 | 135 | B |
| K8OQL | 250,428 | 654 | 123 | C |
| KG8GW | 64,240 | 339 | 80 | C |

**W9**

**Illinois**

| | | | | |
|---|---|---|---|---|
| K9PG | 262,680 | 655 | 132 | A |
| W9LYA | 92,718 | 361 | 102 | A |
| KG9N | 1,260 | 87 | 3 | A |
| WB9Z | 1,609,968 | 2104 | 204 | B |
| K9YU | 108,339 | 403 | 77 | B |
| KB9UWU | 62,920 | 396 | 65 | B |
| W9LYN | 46,580 | 152 | 85 | B |
| W9HL | 17,702 | 100 | 53 | B |
| K9QVB | 497,078 | 1096 | 127 | C |
| K9MMS | 300,981 | 666 | 123 | C |
| K9GY | 114,130 | 366 | 101 | C |
| W9EBY | 88,815 | 325 | 93 | C |
| K9UQN | 59,214 | 246 | 71 | C |
| W9QFV | 14,820 | 159 | 39 | C |
| WB9MII | 444 | 27 | 12 | C |
| NO9Z (+KX9X) | 1,210,941 | 2018 | 157 | D |
| K9QT (+ops) | 103,418 | 342 | 83 | D |

**Indiana**

| | | | | |
|---|---|---|---|---|
| W9RE | 1,658,038 | 2041 | 211 | B |
| K9NW | 1,255,093 | 1694 | 199 | C |
| WT9U | 556,498 | 1219 | 142 | C |
| KJ9C | 220,388 | 551 | 119 | C |
| K9IG | 130,356 | 377 | 102 | C |
| K9BG | 88,548 | 299 | 94 | C |
| K4AT (at W9UR) (+K4WW,KC4WQ,W9UR) | 424,980 | 1051 | 135 | D |

**Wisconsin**

| | | | | |
|---|---|---|---|---|
| KB9KEG | 43,860 | 181 | 60 | A |
| N9PQU | 196,878 | 520 | 114 | B |
| W9HR | 5,082 | 46 | 33 | C |

**Zone 9**

**Canada**

**Maritime**

| | | | | |
|---|---|---|---|---|
| VE1JX (K6HNZ, op) | 1,121,586 | 1700 | 159 | B |
| VE1JS | 421,212 | 774 | 132 | B |

**Newfoundland-Labrador**

| | | | | |
|---|---|---|---|---|
| VO1MP | 1,042,910 | 1372 | 190 | A |
| VO1UO | 98,577 | 342 | 81 | B |

**Zone 10**

**Mexico**

| | | | | |
|---|---|---|---|---|
| XE1V | 102,588 | 304 | 103 | A |
| XE1/AA6RX | 129,265 | 357 | 103 | C |
| XE2L (+XE2MX,K6AM,N6KI) | 835,380 | 1677 | 140 | D |

**Zone 11**

**Jamaica**

| | | | | |
|---|---|---|---|---|
| 6Y4Y | 5,040 | 48 | 30 | B |

**Barbados**

| | | | | |
|---|---|---|---|---|
| 8P6SH | 99,110 | 272 | 106 | B |
| 8P6EX | 80,896 | 321 | 79 | B |

**Panama**

| | | | | |
|---|---|---|---|---|
| 3E1AA (HP1XVH, op) | 1,384,269 | 2120 | 157 | B |

**Dominica**

| | | | | |
|---|---|---|---|---|
| J75KG (K5KG, op) | 1,486,975 | 2137 | 175 | A |

**Netherlands Antilles**

| | | | | |
|---|---|---|---|---|
| PJ2I (ON4CFD, op) | 568,386 | 982 | 126 | B |

**Virgin Islands**

| | | | | |
|---|---|---|---|---|
| NP2DJ | 25,355 | 146 | 55 | B |
| WP2Z (AG8L, op) | 1,448,735 | 1841 | 205 | C |

**Puerto Rico**

| | | | | |
|---|---|---|---|---|
| WP4LNY | 113,634 | 504 | 59 | A |
| KP4KOE | 2,548 | 49 | 14 | B |
| KP4/K2OVS | 1,218 | 21 | 14 | B |

**British Virgin Islands**

| | | | | |
|---|---|---|---|---|
| VP2VF | 95,612 | 618 | 44 | B |

**Turks & Caicos Islands**

| | | | | |
|---|---|---|---|---|
| VP5O (RA9CO, op) | 1,653,964 | 1873 | 221 | A |

**Zone 12**

**Colombia**

| | | | | |
|---|---|---|---|---|
| HK3JJH | 271,278 | 924 | 63 | B |

**Argentina**

| | | | | |
|---|---|---|---|---|
| LU3ES | 13,650 | 94 | 35 | B |

**Venezuela**

| | | | | |
|---|---|---|---|---|
| YV5NWG | 16,974 | 93 | 69 | A |
| YW1A (YV1AVO, op) | 254,072 | 973 | 56 | B |
| YV2FEQ | 24,705 | 187 | 27 | B |
| YV7QP | 64,952 | 212 | 92 | C |

**Zone 13**

**Argentina**

| | | | | |
|---|---|---|---|---|
| LU5VV | 1,003,054 | 1265 | 173 | B |
| LU1UM | 435,768 | 748 | 134 | B |

**Brazil**

| | | | | |
|---|---|---|---|---|
| PS7SAS | 164,027 | 402 | 89 | B |
| PS7HF | 114,696 | 406 | 72 | B |
| PP7ZZ | 53,920 | 185 | 80 | B |
| PT2ND | 29,859 | 189 | 37 | B |
| PR2G | 28,600 | 137 | 55 | B |
| PS8NF | 23,052 | 121 | 51 | B |
| PR7FN | 13,760 | 100 | 43 | B |
| PT2CSM | 11,868 | 84 | 46 | B |
| PR7AR | 9,920 | 80 | 32 | B |
| PY7BEL | 6,860 | 59 | 35 | B |
| PR7SM | 4,998 | 58 | 21 | B |
| PR7SD | 1,029 | 23 | 21 | B |
| PR7QI | 512 | 19 | 16 | B |
| PS8ET | 220 | 12 | 11 | B |
| PX2W | 117,868 | 338 | 79 | C |
| PY2NDX | 81,592 | 315 | 56 | C |
| PY7ILM | 35,673 | 145 | 69 | C |
| PP7CI | 28,458 | 119 | 54 | C |
| PY2ECP (+PU2NYV) | 86,805 | 440 | 45 | D |

**Zone 14**

**Uruguay**

| | | | | |
|---|---|---|---|---|
| CX9AU | 328,160 | 642 | 112 | C |
| CX3CY | 4,608 | 109 | 9 | C |

**Argentina**

| | | | | |
|---|---|---|---|---|
| LU4FM (LU4FPZ, op) | 1,488,256 | 1867 | 176 | A |
| LU1FNH | 398,174 | 764 | 119 | A |
| LU5ER | 16,960 | 97 | 53 | A |
| LU1NDC | 1,353,885 | 1846 | 159 | B |
| AY0N | 964,782 | 1152 | 186 | B |
| LU4DX | 455,847 | 710 | 147 | B |
| LU6FF | 398,160 | 764 | 120 | B |
| LU5FB (LU1FKR, op) | 165,292 | 467 | 86 | B |
| LU1NAF | 119,658 | 613 | 42 | B |
| LO7H | 106,875 | 508 | 45 | B |
| LP2F (LU2FT, op) | 57,970 | 262 | 62 | B |
| LW7EGO | 19,448 | 142 | 34 | B |
| LW8EXF | 15,677 | 86 | 61 | B |
| LW9EOC | 3,546 | 53 | 18 | B |
| LU1DZ | 278,002 | 614 | 97 | C |
| LU5FA | 223,300 | 962 | 50 | C |
| LU8DW (+LU7AWP,LW9DAH) | 433,041 | 823 | 119 | D |
| LU1BJW (+LU1AEE) | 103,600 | 316 | 80 | D |

**Zone 15**

**Brazil**

| | | | | |
|---|---|---|---|---|
| PY2KC | 2,027,851 | 2396 | 193 | B |
| PY5HSD | 236,320 | 498 | 112 | B |
| PY2P (PY2RIK, op) | 143,047 | 586 | 53 | B |
| PU2PGR | 63,651 | 310 | 49 | B |
| PY2LED | 53,694 | 310 | 38 | B |
| PY5GA | 29,610 | 120 | 63 | B |
| PY1SX | 10,016 | 77 | 32 | B |
| PY5BF | 8,512 | 102 | 19 | B |
| PU2TES | 2,839 | 35 | 17 | B |
| PU2UDT | 1,932 | 29 | 21 | B |
| PT2AW | 83,460 | 291 | 65 | C |
| PY3AU | 71,208 | 204 | 86 | C |
| PY7OJ | 33,642 | 139 | 63 | C |
| PY2QD | 9,772 | 92 | 28 | C |
| PY3FBI | 8,901 | 87 | 23 | C |
| PY2GG | 255 | 11 | 5 | C |
| PY5FB | 200 | 9 | 8 | C |
| ZX5J (PP5WG,PP5UA,PY3PAZ, ops) | 2,082,307 | 2562 | 179 | D |
| PY3MHZ (PY3ADY,PY3AFS,PY3BM, PY3BZA,PY3FOX,PY3MM,PY3TMR, PY3YY, ops) | 263,424 | 514 | 128 | D |
| PY2GEC (PY2RIK,PY2ESZ,PR8RZJ, PU2WFP, ops) | 137,484 | 409 | 76 | D |
| PY2LDS (PY2NX,PY5FB, ops) | 15,356 | 89 | 44 | D |

**Zone 16**

**Chile**

| | | | | |
|---|---|---|---|---|
| CE8EIO | 132,750 | 396 | 75 | B |

**Falkland Islands**

| | | | | |
|---|---|---|---|---|
| VP8DBN (G0KTH, op) | 924 | 20 | 12 | B |

**Zone 18**

**Norway**

| | | | | |
|---|---|---|---|---|
| LA2IR | 80,100 | 250 | 90 | B |
| LA2EIA | 29,610 | 167 | 63 | B |
| LA9VBA | 8,220 | 71 | 30 | B |
| LA2HFA | 132,940 | 352 | 115 | C |
| LA5TFA | 53,550 | 228 | 90 | C |

**Aland Islands**

| | | | | |
|---|---|---|---|---|
| OH0V (OH6LI, op) | 405,283 | 1534 | 67 | A |
| OH0PM | 1,758,540 | 2018 | 237 | C |

**Finland**

| | | | | |
|---|---|---|---|---|
| OH1F (OH1MDR, op) | 2,157,654 | 2275 | 258 | A |
| OH2BLF | 196,470 | 501 | 111 | A |
| OH8CW | 155,880 | 461 | 120 | A |
| OH2RA | 1,160,123 | 1507 | 193 | B |
| OH2BPA | 69,106 | 218 | 109 | B |
| OH5PA | 2,898 | 50 | 21 | B |
| OH1MM | 2,060,580 | 2264 | 244 | C |
| OH9W (OH6EI, op) | 1,786,428 | 2074 | 238 | C |
| OH6XY | 1,053,990 | 1616 | 210 | C |
| OH6NJ | 987,528 | 1475 | 184 | C |
| OH2FS | 101,016 | 281 | 92 | C |
| OH2YL | 24,388 | 114 | 67 | C |
| OH1UP | 19,323 | 112 | 57 | C |
| OH3TZ | 18,972 | 97 | 68 | C |

**Denmark**

| | | | | |
|---|---|---|---|---|
| OZ5EV | 188,754 | 376 | 163 | B |
| OZ1ACB | 162,433 | 400 | 127 | B |
| OZ7RJ | 78,182 | 252 | 97 | B |
| OZ3ANT | 30,289 | 255 | 87 | B |
| OZ4NA | 20,800 | 107 | 64 | B |
| OZ1AA | 1,274,875 | 1542 | 217 | C |
| OZ8SW | 141,500 | 344 | 125 | C |
| OZ4FF | 85,028 | 235 | 116 | C |
| OZ1HQG | 75,330 | 269 | 93 | C |
| OZ5DX | 12,460 | 92 | 35 | C |
| OZ5RM | 11,078 | 114 | 29 | C |

**Sweden**

| | | | | |
|---|---|---|---|---|
| SM6WQB | 272,573 | 569 | 161 | A |
| SM7BJW | 107,565 | 309 | 101 | A |
| SM6DER | 91,044 | 329 | 81 | A |
| 8S5A (SM5AJV, op) | 68,060 | 264 | 82 | A |
| SM3D | 17,116 | 136 | 44 | A |
| SM0BDS/6 | 1,092 | 26 | 14 | A |
| SM3LIV | 170,125 | 424 | 125 | B |
| SM5ARL | 154,616 | 300 | 154 | B |
| 8S7K | 32,880 | 160 | 60 | B |
| SM3FJF | 19,026 | 127 | 63 | B |
| SM7HSP | 17,105 | 81 | 55 | B |
| SM7FTG | 4,284 | 86 | 18 | B |
| SM5G (SM5JBM, op) | 303,208 | 579 | 151 | C |
| SM6BSK | 237,925 | 475 | 155 | C |
| SM3X (SM3CVM, op) | 235,704 | 650 | 122 | C |
| 7S5Q (SM5COP, op) | 234,936 | 658 | 117 | C |
| SK6HD (SM6FKF, op) | 203,304 | 443 | 129 | C |
| SM7BHM | 155,104 | 417 | 131 | C |
| SM0J | 110,400 | 300 | 115 | C |
| SM3SX | 76,533 | 266 | 97 | C |
| SM7EH | 69,093 | 228 | 81 | C |
| SM0CCE | 25,776 | 169 | 48 | C |
| SK3W (SM3WMV,SM3SGP,SM5TXT, ops) | 2,211,168 | 2216 | 248 | D |
| SM0R (+SM0RUX) | 46,500 | 201 | 75 | D |

**Zone 19**

**European Russia**

| | | | | |
|---|---|---|---|---|
| RZ1AWO (RA1ARJ, op) | 650,106 | 1222 | 162 | A |
| U1BA | 147,750 | 366 | 125 | B |
| RZ1ZB | 292,572 | 626 | 129 | C |
| UA1OAM | 268,752 | 593 | 132 | C |
| RN1AO | 189,702 | 703 | 81 | C |
| RK1NA | 128,904 | 326 | 131 | C |
| UA1ONG | 58,233 | 377 | 47 | C |
| UA1PBI | 37,620 | 157 | 60 | C |

**Zone 20**

**Asiatic Russia**

| | | | | |
|---|---|---|---|---|
| RN9XA | 757,212 | 1023 | 178 | A |
| RA9XF | 264,321 | 519 | 129 | A |
| UA9JMS | 64,856 | 232 | 67 | A |
| RK9CWG (RA9CGK, op) | 58,590 | 203 | 62 | A |
| RK9AD | 739,860 | 947 | 190 | C |
| UA9XC | 173,922 | 432 | 101 | C |
| RX9JW | 160,289 | 449 | 89 | C |
| UA9XEN | 77,468 | 204 | 107 | C |

**Zone 21**

**Asiatic Russia**

| | | | | |
|---|---|---|---|---|
| RJ9J (RA9JR, op) | 1,684,494 | 1962 | 203 | A |
| RA9KM | 89,635 | 257 | 91 | C |

**Zone 24**

**Asiatic Russia**

| | | | | |
|---|---|---|---|---|
| UA0QO | 165,850 | 390 | 107 | A |

**Zone 25**

**Asiatic Russia**

| | | | | |
|---|---|---|---|---|
| RM0I (RW0IP,RW0IW,UA0IAP,UA0IBB, ops) | 119,460 | 470 | 66 | D |

**Zone 26**

**Asiatic Russia**

| | | | | |
|---|---|---|---|---|
| UA0KCL | 183,976 | 440 | 104 | C |

**Zone 27**

**Ireland**

| | | | | |
|---|---|---|---|---|
| EI4DW | 397,842 | 870 | 122 | A |
| EI4CF | 277,200 | 563 | 144 | B |
| EI2CH | 170,925 | 431 | 129 | B |
| EI8GP | 245,750 | 541 | 125 | C |
| EI5IY | 44,622 | 184 | 74 | C |

**France**

| | | | | |
|---|---|---|---|---|
| F5NBX | 475,867 | 947 | 157 | A |
| F5RAB | 128,511 | 354 | 131 | A |
| F6FTB | 56,064 | 241 | 64 | A |
| F5NYK | 10,530 | 95 | 26 | A |
| F5NZO | 598,675 | 1028 | 175 | B |
| F8CIO | 436,221 | 767 | 171 | B |
| F5BBD | 221,394 | 595 | 91 | B |
| F/DL2KDW | 1,380 | 45 | 12 | B |
| F5JBR | 499,677 | 755 | 193 | C |
| F5ROX | 126,334 | 450 | 86 | C |
| F6GQO | 116,710 | 326 | 110 | C |
| F5UJK | 50,554 | 265 | 46 | C |
| F5MFL | 31,920 | 141 | 76 | C |
| F5ICX | 3,192 | 44 | 28 | C |

**England**

| | | | | |
|---|---|---|---|---|
| G4IIY | 279,456 | 509 | 164 | A |
| G0MTN | 211,050 | 574 | 134 | A |
| G3UFY | 82,960 | 271 | 122 | A |
| G4BJM | 54,693 | 328 | 59 | A |
| G0DVJ | 17,646 | 124 | 51 | A |
| G0NWY | 45,648 | 206 | 72 | B |
| G3FNM | 40,348 | 171 | 77 | B |
| G0IVZ | 1,757,700 | 2129 | 225 | C |
| G5G (G0LII, op) | 1,216,950 | 1685 | 190 | C |
| G3MXJ | 637,214 | 1114 | 158 | C |
| G4OGB | 335,154 | 659 | 166 | C |
| M4T (G0VQR, op) | 223,244 | 682 | 98 | C |
| G3YEC | 124,267 | 333 | 121 | C |
| G3MPB | 74,880 | 267 | 90 | C |
| G4FDC | 5,814 | 62 | 51 | C |
| M4R (G4AXX,G4KNO,G4EAG,M0DXR, ops) | 1,083,665 | 1461 | 209 | D |
| G3TXF | 431,025 | 826 | 175 | D |
| G4BWP (+packet) | 6,448 | 270 | 8 | D |

**Scotland**

| | | | | |
|---|---|---|---|---|
| GM4ELV | 6,996 | 80 | 33 | B |
| GM3CFS | 268,028 | 483 | 171 | C |

**Wales**

| | | | | |
|---|---|---|---|---|
| GW0AJI | 32,120 | 214 | 44 | B |
| GW3NJW | 305,688 | 720 | 141 | C |

**Luxembourg**

| | | | | |
|---|---|---|---|---|
| LX1NO | 1,500,096 | 1933 | 208 | B |
| LX1JH | 253,890 | 544 | 117 | B |

**Belgium**

| | | | | |
|---|---|---|---|---|
| ON4CAS | 403,856 | 720 | 172 | A |
| ON4KMB | 57,665 | 239 | 95 | A |
| OT0X | 1,381,800 | 1729 | 210 | B |
| OT0Z | 941,216 | 1781 | 134 | B |
| ON4BCJ | 598,400 | 947 | 187 | B |
| ON5GQ | 412,112 | 699 | 172 | B |
| ON4ANN | 252,300 | 556 | 145 | B |
| ON4CHK | 13,320 | 101 | 40 | B |
| ON5UM | 335,823 | 636 | 157 | C |
| ON4XG | 205,960 | 421 | 152 | C |
| ON6TJ | 124,432 | 348 | 112 | C |
| ON7CC | 97,356 | 314 | 114 | C |
| ON7SS | 5,124 | 58 | 42 | C |
| OT0P (ON6AH,ON7PC, ops) | 465,766 | 1077 | 119 | D |

**Netherlands**

| | | | | |
|---|---|---|---|---|
| PA0MIR | 540,995 | 831 | 205 | A |
| PA5KT | 283,220 | 582 | 140 | A |
| PA0RRS | 25,174 | 165 | 41 | A |
| PA0IJM | 500,612 | 1087 | 133 | B |
| PA0JNH | 116,938 | 332 | 118 | B |
| PA3AAV | 305,944 | 566 | 167 | C |
| PA3ELD | 76,368 | 270 | 86 | C |
| PA3AFF | 40,936 | 166 | 86 | C |
| PA1MRK | 30,442 | 257 | 31 | C |
| PA0JR | 15,390 | 104 | 57 | C |
| PA0JED | 8,004 | 100 | 29 | C |
| PA3BEJ | 4,862 | 53 | 34 | C |
| PA3CLQ | 4,134 | 52 | 39 | C |

**Zone 28**

**Croatia**

| | | | | |
|---|---|---|---|---|
| 9A5I | 229,425 | 512 | 161 | A |
| 9A3CY | 114,267 | 363 | 123 | A |
| 9A/S53XM | 43,911 | 253 | 51 | A |
| 9A/DK7ZT | 23,616 | 157 | 72 | A |
| 9A/DF5ZV | 20,988 | 148 | 66 | A |
| 9A5KV | 334,495 | 1049 | 133 | B |
| 9A6ACY | 80,324 | 445 | 86 | B |
| 9A2GA | 319 | 13 | 11 | B |
| 9A1AA | 1,100,846 | 1566 | 226 | C |
| 9A2EY | 76,900 | 283 | 100 | C |
| 9A2TN | 71,891 | 365 | 67 | C |
| 9A4OE | 52,398 | 255 | 71 | C |
| 9A/DL2FDD | 11,032 | 104 | 56 | C |
| 9AY2K (9A5W,9A6A,9A2R,9A7R,9A2EU 9A2AW, ops) | 2,219,966 | 2584 | 257 | D |
| 9A8D | 112,211 | 348 | 101 | D |

**Malta**

| | | | | |
|---|---|---|---|---|
| 9H1ZA | 835,490 | 1331 | 215 | C |

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|---|---|---|---|---|
| DL4MCF | 1,577,877 | 1972 | 227 | A |
| DJ5BV | 1,130,922 | 1204 | 243 | A |
| DJ2AA | 1,042,344 | 1488 | 186 | A |
| DH1TW | 1,028,924 | 1605 | 188 | A |
| DL1EFD | 831,844 | 1242 | 221 | A |
| DK0OVL | 696,385 | 1010 | 215 | A |
| DM3FZN | 378,100 | 650 | 198 | A |
| DK0MN | 339,680 | 803 | 160 | A |
| DL3ZAI | 208,978 | 480 | 154 | A |
| DL1WA | 197,608 | 519 | 136 | A |
| DJ9RR | 174,167 | 541 | 139 | A |
| DK2OY | 165,907 | 525 | 137 | A |
| DJ1OJ | 163,280 | 439 | 157 | A |
| DJ2IA | 151,480 | 348 | 140 | A |
| DJ5BWD | 142,891 | 434 | 137 | A |
| DK4YJ | 140,805 | 400 | 135 | A |
| DL4SZB | 137,108 | 310 | 151 | A |
| DL4JLM | 123,497 | 440 | 103 | A |
| DM3XRF | 121,550 | 387 | 110 | A |
| DL7ANQ | 101,880 | 337 | 120 | A |
| DK2AT | 100,422 | 333 | 126 | A |
| DL1DXA | 99,660 | 325 | 110 | A |

DL2RTJ 77,760 251 96 A
DM3HZN 75,905 265 85 A
DL5IAM 59,972 277 94 A
DL0HGW (DL9GMN, op) 58,300 234 106 A
DH2OOO 57,970 245 85 A
DJ5IW 53,144 215 73 A
DL9JON 47,718 166 99 A
DL2AL 35,816 177 74 A
DL4DRA 30,710 154 74 A
DF1LON 26,718 156 73 A
DL4FDM 12,160 104 76 A
DL5ZB 11,310 86 65 A
DL5AUA 10,812 103 51 A
DL1MGB 9,982 89 46 A
DL4AUE 8,648 74 47 A
DL1TC 7,560 58 42 A
DL4JTW 7,350 69 42 A
DF5AU 5,490 61 45 A
DL2AXM 1,100 28 22 A
DL9YAJ 1,486,134 1782 219 B
DL8PC 1,093,265 1124 205 B
DL8UD 1,028,775 1565 215 B
DL6NDN 257,840 731 110 B
DJ3HJ 192,814 527 107 B
DL7AOS 172,029 471 143 B
DF7YU 167,865 547 95 B
DF1ZN 161,976 405 136 B
DH2SP 139,080 410 122 B
DL8SDC 125,172 385 114 B
DK4IO 89,798 274 118 B
DH5AO 71,482 249 103 B
DH2SPK 65,598 296 87 B
DF1HF 63,648 221 104 B
DF3IS 56,496 230 88 B
DF2IAX 42,330 214 83 B
DL1FDK 33,840 192 72 B
DJ2UB 30,320 155 80 B
DH9SBL/P 26,523 162 63 B
DL6ZFG 25,920 160 80 B
DJ3XM 24,633 141 69 B
DL0THR (DL3ARK, op) 24,346 139 74 B
DF0PT (DL8BCU, op) 22,754 135 62 B
DL8UAA 17,028 115 66 B
DL9ZWG 16,215 111 69 B
DL5FCV 15,330 102 70 B
DH1UZ 11,970 100 57 B
DJ6QO/P 5,772 64 39 B
DL1HSR 4,466 40 29 B
DK5KJ 3,906 42 31 B
DL7LZ 2,700 50 30 B
DH6ARM 2,295 31 27 B
DJ1VQ 1,710 44 19 B
DL1OI 528 31 12 B
DJ2YE 420 32 10 B
DL3KUD 832,832 1215 224 C
DL5RMH 601,020 998 189 C
DL3NM 572,000 974 200 C
DL5YYM 488,565 887 189 C
DL0LY 423,462 783 183 C
DH2FW 381,765 828 155 C
DL0MFL 378,841 745 157 C
DL5KUD 328,072 593 184 C
DL6KWN 318,696 655 168 C
DL6KVA 277,758 494 234 C
DL4HRM 258,029 658 163 C
DL5JRA 236,754 550 126 C
DL3KWF 232,432 575 146 C
DL1TH 216,954 462 153 C
DL6RDE 205,206 530 138 C
DL4JYT 196,392 437 168 C
DL4JU 192,015 435 153 C
DK7ZH 188,940 443 141 C
DJ3XD 183,126 428 138 C
DL6JZ 168,190 459 139 C
DL5SVB 157,058 447 127 C
DL1ARJ 142,576 383 133 C
DL3BZZ 132,556 396 124 C
DL3BRA 130,620 347 140 C
DK7FP 129,064 353 104 C
DL7CF 123,855 311 115 C
DL2ANM 123,280 325 134 C
DL0KB (DL2GBB, op) 121,984 331 128 C
DK3KD 96,301 471 53 C
DL3HSC 84,088 273 92 C
DL1IA 83,681 229 157 C
DL4FN 81,374 453 58 C
DL7JV 79,500 284 100 C
DJ5GG 75,255 263 87 C
DL1LAW 72,050 301 110 C
DJ6TK 65,586 224 102 C
DL5JAN 63,180 195 117 C
DL7SAL 54,288 224 87 C
DM3PKK 49,528 220 82 C
DL5DBH 42,076 202 67 C
DL3OBE 33,916 202 61 C
DL1FMG 30,368 182 73 C
DL5JS 25,550 146 73 C
DL5MY 21,375 156 45 C
DL5SE 18,174 176 39 C
DL1EV 16,790 88 73 C
DL5CL 14,535 105 45 C
DK5AI 7,020 56 52 C
DL5ANS 6,468 64 42 C
DL2VER 4,640 70 40 C
DL1SBF 3,002 51 38 C
DL9GMC 2,904 72 12 C
DK9KW 624 30 13 C
DK0UN (DL6DCX,HA7XQ, ops) 1,114,997 1685 199 D
DL0GVM (DK3GG,DK3RA,DL2KUW, DL3SUG,DG3TX, ops) 1,080,770 1547 230 D
DF0RI (DJ2QV,DK3DM,DL8OBQ, ops) 1,054,746 1490 231 D
DL0DR (DL5IAI,DF1IAO,DH1ID, ops) 378,120 985 120 D
DK0OG (DL2RMC,DF7RG,DL3MBG, ops) 357,602 764 178 D
DF7BL (+DJ9CN,DF5BM,DG8BR) 348,364 655 188 D
DL0GH (DJ2MX,DL2FDL,DL4FAY, ops) 330,564 839 163 D
DK0DH (DF2DS,DK1DX,DH5DAM, DJ2DX,DH6WA, ops) 132,396 380 118 D
DN2BW (DK9BW,DD8BE,DG6BU, ops) 61,920 257 90 D

## Hungary

HA0HW 169,579 625 101 A
HA3OU 50,250 254 75 A
HA1XY 697,977 1181 189 C
HA4YF 433,320 759 184 C
HA6PQ 315,210 785 158 C
HA3PT 186,956 431 154 C
HA8LKB 44,612 261 76 C
HA0GK 11,433 111 37 C
HG6N (HA5TI,HA6DX,HA6ND,HA6NF, HA6NL,HA6NQ,HA6NY,HA6PX,HA6OB, HA6OI,HA6OY,HA6ON, ops) 3,819,315 3593 303 D

## Switzerland

HB9QA 25,665 161 87 A
HB9CQS 6,641 69 29 B
HB9ARF 337,172 833 158 C
HB2DOT 316,526 791 161 C
HB9XY 19,544 150 56 C

## Italy

IT9BLB 955,353 1470 201 A
IQ3X (IV3SKB, op) 576,710 1160 202 A
I2WIJ 215,436 607 156 A
IZ8AJQ 20,723 119 53 A
IR4B (IK4AUY, op) 859,569 1408 181 B
IR4R (IK4ALM, op) 774,720 1233 192 B
I3MLU 749,308 1115 196 B
I0SNY 729,930 1222 174 B
I1COB 529,950 1159 150 B
IK6GPZ 254,045 701 155 B
IZ5CML 227,808 424 168 B
IZ0BVU 177,408 480 132 B
IZ1AWD 109,000 275 125 B
IZ5ASZ 92,358 263 126 B
II3L (IV3KAS, op) 90,852 294 113 B
IT9VCE 89,355 329 105 B
IK6UBY 61,946 227 94 B
IZ2BKA 39,128 170 73 B
IZ0BPI 2,560 40 32 B
IK2WZV 543,576 1025 142 C
IQ6T (IK6SNQ, op) 456,918 1200 138 C
IK0HBN 359,716 708 203 C
IK4WMH 156,453 445 121 C
I6FDJ 139,230 415 117 C
IK2NCF 20,735 168 55 C
IR2D (IZ2DAY, op) 17,342 110 46 C
I5OQV 10,400 68 40 C
IZ1DFI 9,800 90 49 C
IO0A (I0TIC,IK0AZG,IK0XBX,I0ZUT, ops) 1,359,306 1943 222 D
IK1SLE (+IZ1BPR) 1,046,784 1551 192 D
IK4RQJ (+IK4VET,IK4XCL) 860,649 1465 183 D
II1H (I1HJT,I1NVU,IK1QBT, ops) 804,436 1550 166 D
IZ6CST (+ops) 120,780 318 122 D
IK2WYI (+I2JIN,I2LOL,IK2SFM,IK2ULB) 115,390 384 110 D

## Sardinia

IS0IGV 133,328 359 104 A
IS0HQJ 149,930 526 110 C
IS0OMH 116,718 537 98 C

## Bulgaria

LZ3YY 578,495 1293 185 A
LZ1ZF 528,500 1201 175 A
LZ2AU 374,528 886 176 A
LZ1BJ 371,360 928 160 A
LZ2NB 184,098 501 122 A
LZ2MP 106,000 392 125 A
LZ2UZ 34,629 309 51 A
LZ1FW 10,320 102 60 A
LZ1HB 208,072 748 124 B
LZ1DM 77,990 303 110 B
LZ2FM 14,960 95 80 B
LZ3UA 11,544 236 37 B
LZ2PL 930,305 1490 215 C
LZ1KSN (LZ1QZ, op) 287,060 785 155 C
LZ2RF 197,208 824 88 C
LZ1QH 102,108 341 134 C
LZ2DL 34,580 150 76 C
LZ1QZ 780 16 15 C
LZ6A (LZ2EG,LZ2HR, ops) 852,452 1584 212 D

## Austria

OE8SKQ 839,355 1416 165 A
OE5OHO 861,562 1367 169 C
OE6Z (OE6MBG,OE6HZG, ops) 259,692 1323 57 D

## Czech Republic

OK1FPS 669,200 1036 200 A
OK1XUV 639,216 996 193 A
OK2ZJ 239,033 591 151 A
OK1FKV 146,740 549 110 A
OK1SI 82,731 309 109 A
OK2QA 69,483 381 53 A
OK2BJ 24,180 108 65 A
OK1SRD 1,909 32 23 A
OK1DUO 451,630 958 190 B
OK1LO 35,454 195 57 B
OK2SBX 26,992 158 56 B
OK2CMW 13,283 125 37 B
OK2ZU 929,632 1328 209 C
OK2WTM 666,918 1028 201 C
OK2DRU 647,295 1051 165 C
OK1DRU 616,804 1029 164 C
OK2DU 553,215 974 195 C
OL4M 485,810 867 185 C
OK2HBR 458,556 895 159 C
OK1ZP 415,096 693 178 C
OK1HX 374,600 680 200 C
OK2QX 332,815 612 185 C
OK1FCA 326,196 692 156 C
OK1JN 249,389 555 161 C
OK2HI 208,000 527 128 C
OK1WF 116,815 517 61 C
OK2LW 73,625 234 125 C
OK2VP 43,212 198 78 C
OK2BNX 40,843 240 47 C
OK1AYY 33,957 195 77 C
OK1DVK 25,286 101 94 C
OK1AOU 17,319 106 69 C
OK2BHE 14,079 89 39 C
OK2SWD 1,010 23 10 C

## Slovakia

OM4TX 187,240 451 155 A
OM3CDZ 125,628 410 114 A
OM7VF 124,914 326 109 A
OM5KM 67,080 244 129 A
OM7AG 64,815 307 87 A
OM3YK 88,660 258 110 B
OM4DN 346,788 673 169 C
OM1M (OM1GM, op) 117,744 422 66 C
OM2TB 6,100 104 25 C

## Slovenia

S57DX 1,576,438 2065 257 A
S55A 819,693 1350 189 A
S55WW 405,594 855 174 A
S51NM 275,236 613 158 A
S5/K6XX 228,935 535 155 A
S54X 215,194 538 133 A
S53AK 122,158 455 103 A
S57IIO 91,324 503 79 A
S52GO 66,624 294 96 A
S51T 37,500 172 100 A
S5/N6VR 10,146 98 43 A
S57NPR 3,510 73 30 A
S51CK 604,080 1225 144 B
S5V (AI6V, op) 495,608 983 164 B
S57SXS 47,168 290 64 B
S51AD 14,735 158 35 B
S51WO 131,757 417 111 C
S53AU 80,563 273 119 C
S53MJ 14,256 179 81 C
S5/K1KI 5,819 100 23 C
S5S (at S54AA) (K5KR,N6ZZ,S54AA, ops) 820,636 1464 193 D
S50C (Z31GX,Z31JA,Z32XX,Z31MM, ops) 729,068 1241 212 D
S5/DL2MY (DJ9MH,DL2NBU, ops) 212,550 591 150 D

## Poland

SP4TKR 406,692 949 156 A
SP6MLX 395,478 707 173 A
SP2EWQ 387,612 719 194 A
SP5UAF 269,997 630 161 A
SP9LAS 247,508 544 172 A
SP5ICS 121,975 369 119 A
SP9GFI 119,296 337 128 A
3Z1V 112,893 299 121 A
SP9NH 81,991 318 91 A
SQ9DXN 40,326 195 94 A
SP2DKI 11,016 104 68 A
SP5DDJ/4 888 45 12 A
3Z7Z (SP7SEW, op) 247,533 701 143 B
SP6IEQ 145,743 374 111 B
SP3NUN 125,625 354 125 B
SP6NVK 112,266 335 126 B
SQ0CUX 112,112 399 112 B
SP5LCC 109,747 370 121 B
SP9X (SP9XWD, op) 104,052 363 116 B
SP3MEP 92,510 272 110 B
SP7A 83,995 257 107 B
SN4AAZ 71,820 231 105 B
SP1PLA (SQ1FTB, op) 69,510 292 105 B
SN7BCG (SQ7BCG, op) 69,195 271 105 B
SP6GNJ 56,335 182 95 B
3Z7FBQ 53,064 219 88 B
3Z6V (SP6DVP, op) 38,052 175 84 B
SP8OOB 29,760 180 64 B
SP6OPY 23,530 124 65 B
SP6TRX 22,850 167 50 B
SP7GRV 22,746 146 51 B
SP3GHK 18,210 140 39 B
SP9WUM 14,137 96 67 B
SP4SHD 8,835 100 31 B
SP9DEM 6,120 50 36 B
SP6FIB 1,200 20 12 B
SP7GIQ 1,965,593 2286 227 C
SP1NY 647,710 997 190 C
SP4DZT 146,640 336 120 C
SP4GFG 130,200 344 150 C
SN0KYU (SP6LV, op) 127,250 351 125 C
SP6CXH 107,214 334 107 C
SP8FHJ 101,280 311 120 C
3Z8BAB 92,853 487 57 C
SP4GHL 78,390 208 117 C
SP6BEN 77,520 282 85 C
SP9FT 69,871 229 107 C
SP3CW 62,566 241 82 C
SP1AEN 42,282 193 81 C
SP4BOS 28,602 213 42 C
SP3AOT 22,400 117 56 C
SP2IHG 12,096 108 54 C
SP3AZO 3,720 76 20 C
SP2BLC 3,376 111 27 C
SN8M (SP8MI, op) 3,013 86 23 C
SP6LV 1,430 41 22 C
SP3BOL 76 13 4 C
SP3PFR (SP3MGP,SP3FLR, ops) 459,264 915 184 D
SP9KRT (SP9ZW,SP9EMI, ops) 229,614 545 147 D
SP9KDU (SP9AVZ,SQ9FMU, ops) 148,806 394 126 D
SP9KJT (SP9IKF,SP6AXW, ops) 84,958 327 107 D
3Z1KG 26,475 141 75 D

## Greece

SV1DKR 109,112 437 92 A
SV/OK1YM 61,420 383 74 A
SV1DZB 134,090 388 110 B

## Bosnia-Herzegovina

T99W 1,679,750 2176 250 B
T94KW 47,175 249 75 B

## Corsica

TK/F6AUS 125,424 425 117 A

## Romania

YO6BHN 462,840 870 203 A
YO2DFA 279,345 739 165 A
YO7BGA 197,472 435 136 A
YO3FRI 193,248 482 144 A
YO4AAC 71,730 379 90 A
YO8GF 54,531 179 83 A
YO8MI 50,592 342 48 A
YO2GL 23,328 127 81 A
YO8ROO 17,689 165 89 A
YO6CFB 13,912 116 47 A
YO7LGI 12,243 100 33 A
YO5CYG 410,280 778 195 B
YO2KAB 188,440 602 140 B
YO3RU 125,552 449 118 B
YO8RTR 41,245 199 73 B
YO6QT 40,736 194 76 B
YO8COK 33,864 189 68 B
YO9FLD 33,376 204 56 B
YO9IAB 19,159 156 49 B
YO5BWI 17,346 150 49 B
YO4US 5,760 74 32 B
YO8BFB 4,140 76 30 B
YO4UQ 3,329 80 33 B
YO6AVB 3,276 53 18 B
YO6OEJ 2,490 98 10 B
YO7LTQ 1,848 37 24 B
YO3III 1,804 42 22 B
YO8SDT 1,617 51 21 B
YO4ZF 84,375 274 125 C
YO4CSL 51,211 208 83 C
YO5DAS 48,198 306 87 C
YO9DAF 37,668 257 43 C
YO8BPY 28,386 138 83 C
YO8DHD 6,858 92 27 C
YO5ODU 3,213 81 17 C
YO4BTB 1,960 40 20 C
YO2KJJ (YO2GL,YO2BP, ops) 221,100 507 150 D

## Yugoslavia

YU1EA 508,824 957 191 A
YU1PJ 200,016 476 144 A
YU1AAT (4N1MD, op) 2,662 30 22 A
YU7KWX 522,928 1076 161 B
YT7TY 168,080 483 110 B
YZ1AU 765,936 1312 162 C
YZ1SG 448,052 842 187 C
YU7LS 413,922 822 149 C
4N7N (YT7KM, op) 244,790 690 130 C
YU1HA 222,000 538 120 C
YU7SF 152,618 418 137 C
YU7KM 112,579 414 103 C
YZ1V (YU1SB, op) 83,996 296 83 C
4N1FG 74,052 338 99 C
YU1AAV 67,240 281 82 C

## Macedonia

Z32AF 279,015 645 165 A
Z31GB 745,380 1470 205 C

## Zone 29

## Azerbaijan

4K9W 104,208 298 104 A

## Armenia

EK6CC 682,290 968 171 B

## Moldova

ER3DX 135,660 365 140 A
ER1IM 183,024 491 123 B
ER3CT 80,136 290 108 B
ER1BF 34,279 155 83 B
ER5OK 1 1 1 B
ER1CW 319,113 670 159 C

## Estonia

ES5RIM 12,309 139 33 B
ES5QX 14,766 132 46 C
ES1XT (ES1CR,ES2JL,ES1DG, ops) 129,686 372 122 D

## Belarus

EW5O (EW8DX, op) 1,808,640 2343 240 A
EU1GA 85,942 273 97 B
EU1CC 62,333 247 83 B
EW1SW 29,288 199 56 B
EW1NA 5,626 50 29 B
EU6TT 5,358 51 47 B
EU1DX 1,120,245 1344 235 C
EW1EA 454,860 801 171 C
EW6AL 267,300 434 162 C
EU6AA 173,565 538 105 C
EW8CY 41,448 294 44 C
EW1CQ 25,854 165 62 C
EW2EG 1,827 94 9 C

## Lithuania

LY2IJ 1,790,776 1981 257 A
LY2OX 1,399,680 1664 240 A
LY2DX 543,168 957 192 A
LY2BBF 241,640 616 140 A
LY2BUU 110,208 367 112 A
LY2TX 85,921 327 107 A
LY2FN 65,195 309 85 A
LY2OM 35,713 207 71 A
LY1DF 12,375 99 45 A
LY3BH 1,284,232 1582 229 B
LY2OU 730,728 960 204 B
LY3IT 304,053 765 129 B
LY1FW 185,579 435 151 B
LY3CY 122,416 412 112 B
LY2BET 29,808 204 46 B
LY2MM 626,850 949 199 C
LY2FE 322,114 641 169 C
LY2AT 97,008 378 86 C
LY2GW 87,394 337 74 C

## Kaliningrad

UA2AW 4,092 48 33 A
UA2FL 3,735 61 15 A
UA2AB 1,885 37 29 A
RA2FO 656 23 16 A
RA2FHO 77 9 7 A
UA2CZ 155,661 304 159 C
UA2FHV 228 17 12 C
RK2FWG (RA2FHM, ops) 150,662 433 142 D

## European Russia

RX1AA 2,069,217 2483 223 A
RD3Q (UA3QDX, op) 2,029,608 2328 252 A
RW4AA 1,895,784 2163 264 A
UA3RAR 1,820,740 2113 236 A
RZ3BW 1,809,115 2096 259 A
RM3C (RA3CW, op) 1,346,615 1695 251 A
RA3AJ 1,272,095 1651 229 A
RN3QY 837,450 1196 225 A
RK3DH 618,233 980 217 A
RN3RQ 587,664 1005 198 A
RV1CC 491,402 844 194 A
RA3AUM 475,075 930 155 A
RA3NN 394,605 807 185 A
UA3AGS 319,643 629 163 A
RK1QXX 241,832 650 148 A
RV6ASU 232,798 478 167 A
UA4LY 226,144 486 148 A
RA3SL 225,675 535 153 A
UA6LP 153,136 369 136 A
R3/DL7BO 150,059 413 119 A
UA1ANA 131,634 396 103 A
UA6AF 124,640 522 80 A
RA3XO 121,440 350 110 A
UA4AO 97,340 262 124 A
UA3YCX 91,344 331 88 A
RW3TN 90,180 346 108 A
RA6AR 89,250 298 102 A
RN3FT 82,532 310 94 A
RW3LA 65,472 259 93 A
UA4RF 61,698 263 91 A
RA6LW 56,394 254 78 A
UA4CJJ 54,656 312 56 A
RW4NM 29,378 123 74 A
RA3RK 18,525 122 65 A
RN3FA 17,061 129 33 A
UA6HKD 9,182 139 26 A
RA4UAT 7,878 69 39 A
UA3RTZ 4,160 90 16 A
UA3RCM 3,104 47 32 A
UA3LQQ 1,204 60 14 A
R3K (RX3DCX, op) 1,535,338 1939 238 B
UA6ADC 1,231,264 1568 218 B
RA3WA 974,738 1282 227 B
RN4LP 961,130 1388 223 B
UA3BL 697,176 1107 207 B
RA3DNC 324,815 649 167 B
RU3DVR 178,192 405 148 B
RN3OG 173,328 437 138 B
UA3LHL 160,475 401 131 B
RU3WT 159,880 367 140 B
RW1ZN 115,010 255 106 B
UA4NC 114,114 340 133 B
RU3RN 106,384 307 122 B
RN3OK 76,285 309 73 B
R3/K5OE 68,765 296 85 B
RU6LA 42,312 171 82 B
RV4SBO 30,324 117 84 B
RA3DEJ 27,898 181 58 B
RW4LC 24,910 218 47 B
RW3DDG 10,989 75 37 B
UA3LBE 3,471 125 23 B
RV3DGY 48 12 2 B
RZ3AZ 1,654,038 1986 258 C
RM6A (RA6CM, op) 1,586,250 1870 250 C
RW6FO 1,126,770 1451 213 C
UA6LJ 1,108,131 1525 229 C
RU3AA 1,061,415 1440 229 C
RA1ACJ 923,041 1428 203 C
RW3FO 907,387 1365 223 C
UA3TU 840,240 1231 216 C
RU4CO 834,716 1300 211 C
RK6BZ 586,960 1110 184 C
RW3XA 432,810 694 210 C
RV4LC 333,165 627 167 C
UA3AMY 328,016 699 152 C
RA3AN 252,018 624 117 C
RW3VZ 237,654 426 163 C
UA3ABT 228,364 507 148 C
RA3UAG 214,935 461 161 C
RA4CTR 191,868 429 118 C
RW3DY 182,104 498 136 C
RA3NB 151,822 384 134 C
UA3RO 149,940 352 153 C
RV6YB 123,200 340 100 C
RK3RWA (UA3RAX, op) 117,646 360 118 C
RZ4AG 111,760 350 110 C
RX3AGQ 102,980 336 95 C
RA3RN 95,557 267 119 C
RA6LAE 74,981 245 97 C
RU3WR 74,256 259 102 C
RX3RB 69,054 297 102 C
UA3XBB 50,325 205 75 C
UA6ATG 39,403 163 91 C
RA4LZ 31,734 157 82 C
UA4SS 31,070 216 65 C
RX3ABN 21,853 133 41 C
UA6LFQ 216 10 9 C
RI3A (RK3FM,RK3FT,RA3DKE, ops) 1,757,752 2237 233 D
RK3RWL (RN3RC,RK3RX,RU3RQ, RA3RFA,UA3RPM, ops) 869,700 1288 195 D
RK4FWX (UA4FCV,RW4FZ,UA4FAR, RZ4FA,RA4FW,RK4FD,RW4FO,UA4FAO, ops) 757,445 1158 215 D
RZ4AWR (UA4AIY,UA4ALI,RZ4AN, ops) 736,143 1292 177 D
RK3QWM (RA3QH,RA3OU, ops) 325,952 636 176 D
RZ1AK (+UA1CIO) 240,427 578 121 D
RK3DZD (+ops) 218,418 666 118 D

## Ukraine

EO6F (UX0FF, op) 1,824,228 2408 254 A
UR2E (UR7EO, op) 415,368 865 162 A

UT0RW 395,629 648 169 A
UT2IW 394,396 695 172 A
UW7U 345,072 550 158 A
UY5ZZ 341,348 780 167 A
UR5MID 275,547 445 159 A
UY5TE 248,979 598 149 A
UT5HP 133,632 306 128 A
UW7C 123,228 377 126 A
US3IZ 121,893 355 123 A
UR5FCM 83,049 330 93 A
UX8IX 78,884 427 74 A
US1PM 56,160 273 72 A
UT5IZO (UN7PW,UT5IZ, ops)
52,275 242 75 A
UT0FT 18,409 169 41 A
UT2XX 17,442 95 54 A
UV7D (UT7DX, op)
1,142,174 1660 193 B
EM8I 397,413 919 123 B
UR6MX 191,424 783 64 B
UR7EM 177,552 421 144 B
UT3RN 113,920 441 80 B
UT7MD 100,711 264 127 B
UY0MF 87,400 312 95 B
UT5UOC 56,052 340 54 B
UR5WBQ 39,675 144 69 B
UR5XAW 39,433 181 47 B
EN1Z (UT0ZZ, op)
26,112 267 24 B
UT5RQ 22,620 129 65 B
UR4EI 13,260 99 65 B
UR5KBY 2,114 60 14 B
US5EAE 630 25 9 B
UT4MW 374 14 11 B
UX7IA 1,179,570 1800 210 C
UW5Q (UR3QCW, op)
1,009,967 1376 223 C
UT2ID 800,916 1364 186 C
UT8IT 270,928 534 164 C
US9QA 262,656 645 144 C
UV5Q (UX7QQ, op)
219,705 401 151 C
UX5EF 179,655 427 145 C
UR6IGG 138,852 397 114 C
UT7QF 129,948 441 98 C
UW7Q (UR7QM, op)
129,696 412 84 C
UR5XCC 34,048 178 56 C
UT8LO 26,011 217 37 C
UR3PFX 3,744 72 26 C
UU2JA 99 9 9 C
UU5J (UU1JA,UU2JQ,UU3JD,UU4JDR, UU4JDX,UU4JOK,UU0JX, ops)
2,800,820 2648 319 D
UZ7U (UY2UA,UT5UDX,UT3UA, ops)
2,376,085 2857 235 D
EO1I (UT1IA, op)
1,477,566 1882 249 D

**Latvia**

YL3DW 1,603,329 1734 273 A
YL2KA 864,902 1260 226 A
YL2MF 37,800 148 63 B
YL3BZ 8,323 55 41 B
YL2GN 582,900 1039 174 C
YL2MR 367,906 817 154 C
YL2PM 193,062 485 138 C
YL2CV 106,304 252 151 C
YL2PP 6,930 66 45 C
YL1XN (YL3DK,YL2HB, ops)
76,302 335 81 D

**Zone 30**
**Kyrgyzstan**

EX2T 104,160 300 80 B
EX2X 534,360 863 146 C
EX2A 62,832 254 56 C

**European Russia**

UA4HTT 1,993,977 2300 239 A
RA4HT 73,632 278 96 A
UA4WNH 9,676 82 59 A
RA4HTX 1,575,658 1901 241 B
RW4HO 1,360 32 17 B
RN4WA 638,550 1034 198 C
UA9AAP 76,048 358 49 C
RU4HH 48,672 251 52 C
RU4WT 40,500 259 50 C
RZ4PZL (UA4PMG,UA4PMO,UA4PNP, UA4PNT, ops)
643,401 995 201 D

**Asiatic Russia**

UA9CLB 1,921,725 2041 219 A
UA9CDV 1,910,420 1900 236 A
UA9AM 1,130,850 1371 210 A
RW9TA 950,600 1178 200 A
UA9CDC 810,271 1048 187 A
RA9AN 229,140 376 134 A
RU9LA 176,960 521 79 A
RX9WN 130,032 297 108 A
RA9AUH 91,448 322 71 A
UA9CNV 39,104 210 47 A
UA9AX 36,408 142 74 A
UA9CBN 589,082 996 139 B
UA9ACJ 267,344 462 154 B
RA9DA 195,244 384 133 B
UA9AAZ 185,136 416 114 B
UA9LCY 180,318 372 123 B
RX9ABE 163,800 342 126 B
RA9MBC 78,960 264 84 B
RW9MZ 40,356 185 57 B
RW9RF 38,025 161 65 B
RW9SW 1,338,018 1480 209 C
RA9DZ 951,280 1223 184 C
RA9SO 892,410 1089 197 C
UA9APA 384,125 562 175 C
UA9WQK 236,283 476 123 C
UA9BS 153,293 564 61 C
RA9MY 138,086 311 113 C
UA9FGJ 71,451 319 51 C
RK9CF 8,990 82 29 C
RF9C (UA9CIR,RA9CKQ,RA9CMO, RZ9CO, ops)
2,781,816 2569 248 D
RU9CWO (RV9CRP,RV9CRQ, ops)
3,780 54 21 D

**Kazakhstan**

UP5P (UN5PR, op)
456,500 746 166 B
UN2O 253,130 407 170 B
UN7CE 1,196,166 1382 186 C
UN8PF 96,446 305 83 C
UN7EX 7,656 68 29 C
UP0L (UN9LW,UN7LZ,UN7BN,UN0LL, UN9LCN, ops)
2,709,510 2793 222 D
UN4L (UN7LG,UN7LF,UN0LG,UN7LO, UN9LY,UN9LN, ops)
2,352,900 2468 220 D

**Zone 31**
**Asiatic Russia**

RZ9HG 1,103,508 1321 203 A
UA9ZBN 176,787 390 117 B
UA9ORQ 96,135 289 85 B
RZ9IB 52,266 218 62 B
RX9UKF 52,116 296 43 B
RU9YF 48,107 167 73 B
UA9OA 405,217 644 157 C

**Kazakhstan**

UN9FD 13,502 99 43 B
UN8FZ 25,134 130 59 C

**Zone 32**
**Mongolia**

JT1BV 55,680 290 48 B

**Asiatic Russia**

UA0ANW 978,624 1258 192 A
UA0ACG 308,844 612 138 A
UA0YAY 94,600 247 110 A
RU0AT 58,528 257 62 A
RA9ANO 41,393 175 71 A
RA0ANO 39,270 172 70 A
RA0AM 610,029 952 161 B
UA0SJ 158,147 356 121 B
UA0WL 105,222 332 78 B
UA0SE 3,060 45 20 B
RU0SN 776,258 1040 178 C
RN0A (UA0AGI, op)
207,765 430 135 C

**Zone 33**

**Asiatic Russia**

UA0ZBK 263,161 696 97 A
RA0JJ 230,640 538 120 A

**Zone 34**
**Asiatic Russia**

UA0FEN 382,848 788 128 A
UA0FZ 9,520 142 14 A
RA0FA 3 1 1 A
RA0CAH 2,880 50 16 B
RU0LL 490,560 1015 120 C

**Zone 36**
**Madeira Islands**

CT3BX 3,047,384 2951 226 B
CT3KY 22,513 112 47 B

**Canary Islands**

EA8/OH2BYS
2,948,148 2500 252 A
EA8AD 86,800 301 62 B

**Zone 37**
**Maritime Mobile**

YL2SW/MM 17,980 118 31 A

**Portugal**

CT1DVV 168,674 468 121 B
CT1ELF 10,557 75 51 B
CT2GBK 1,386 31 18 B
CT1BQH 101,860 503 55 C

**Spain**

EA1DBC 100,368 300 102 A
EA7CA 90,860 270 110 A
EA5FX 85,696 291 103 A
EA1BPO 133,860 415 92 B
EA4URE (EA4BPJ, op)
122,134 484 79 B
EA3KR 113,295 339 105 B
EA1AAW 37,895 200 53 B
EA4EMC 24,412 117 68 B
EA3DUZ 19,055 151 37 B
EA7FRX 18,648 111 56 B
EC4DFA 6,762 101 21 B
EC2BAH 1,725 30 15 B
EA1GL 1,220 25 20 B
EA7HE 832 22 13 B
EA4DRV 389,424 859 133 C
EA2BDS 322,185 654 141 C
EA3ALV 231,786 484 158 C
EA4BSC 184,668 412 132 C
EA4AMO 92,825 362 79 C
EA3AJW 80,295 477 53 C
EA5FID 67,840 266 80 C
EA5YU 66,768 353 52 C
EA7ASZ 62,451 220 81 C
EA3AR 52,056 426 27 C
EA5EU 20,825 249 25 C
EA1FBJ 19,765 121 59 C
EA1AHA 13,019 95 47 C
EA1DGG 7,686 68 42 C
EA5URP (EA5AFP,EA5AVP,EA5DWS, EC5CLP,EA5DFV, ops)
1,044,780 1723 165 D

**Balearic Islands**

EA6LP 228,930 560 130 B

**Zone 39**
**Israel**

4X/W5WP 164,720 352 116 A
4Z5FW 11,907 119 21 A
4X1IM 2,697,400 2875 200 B
4Z5CP 23,490 198 29 B

**Cyprus**

P3A (RA9JX,UA9YAB,RZ9IR,RK3AD, RZ9OA, ops)
5,269,336 4197 284 D
P39P (+ops) 230,336 851 59 D

**Lebanon**

OD5/OK1MU 466,848 1066 96 A

**Turkey**

TA3BN 24,354 123 54 B
TA3ET 13,299 85 33 B

**Zone 41**
**India**

VU3RGP 4,784 52 26 B
VU3DJQ 1,590 32 15 B
VU2UR 54,033 168 103 C

**Zone 44**
**Taiwan**

BV7FF 359,368 800 116 C

**China**

BA4DW 92,708 313 77 A
B4R (BA4RD,BD4RS,BD5RV/4, BD4RR, ops)
590,895 1166 135 D

**South Korea**

HL0K 61,875 346 55 A
HL1/JI1EFP 46,640 364 40 A
HL5UOG 190,008 434 117 C
HL5AP 67,734 238 71 C
HL0C (+ops) 160,674 595 59 D

**Hong Kong**

VR2BG 664,704 1157 144 C

**Zone 45**
**Japan**

JH7PKU 1,700,985 1999 195 A
JA6GCE 912,912 1345 168 A
JA1YNE (JP1OGL, op)
904,770 1322 162 A
JF4ETK 558,960 1070 120 A
JA0QWO 488,756 943 118 A
JR4PMX/1 457,886 750 143 A
JF1SQC 412,900 927 100 A
JR8VSE 286,520 669 116 A
JR4GPA 282,150 725 90 A
JG7AMD 206,112 508 96 A
7L4IOU 196,125 412 125 A
JA2AXB 175,448 394 104 A
JH2AMH 158,498 466 86 A
JR9NVB 140,335 471 65 A
JA0DAI 136,608 365 96 A
JJ3TBB 115,544 330 101 A
JI5SKS 102,872 306 88 A
JA2FSM 94,482 262 87 A
JH1JGZ 79,299 227 89 A
JF2SKV 70,200 258 75 A
JA1XUY 68,809 226 79 A
JH5OXF 65,046 230 74 A
JA0BJY 62,700 216 75 A
JH4WBY (AB2GM, op)
58,520 299 55 A
JA1BUI 54,870 221 62 A
JA2BQX 26,500 137 50 A
JA7DOT 19,998 91 66 A
JR3AAZ 19,825 97 65 A
JK7ESY 12,580 86 37 A
JA1XPU 11,305 84 35 A
JA0QNJ 7,572 138 12 A
JF2FIU 6,552 71 24 A
JE1REU 4,004 55 22 A
JL3IVX 2,664 38 18 A
JG1OWV 1,748 25 19 A
JI3ZOX (JL3IVX, op)
840 18 12 A
JA3WFQ 333 11 9 A
JJ2SHW 105 15 7 A
JA4DPL 249,755 618 95 B
JA7BJS 135,098 487 62 B
JL3VUL 104,220 369 60 B
JA5EO 84,005 377 53 B
JH6FTJ 63,720 136 118 B
JR1MRG 52,377 179 79 B
JH1UUT 44,352 176 63 B
JR1SGU 38,178 158 63 B
JG2REJ 30,780 122 54 B
JE7DOT 28,045 117 71 B
JG4OOU 23,439 143 39 B
JA8TEZ 20,299 101 53 B
JA3AOP 18,262 108 46 B
JJ3OOZ 17,300 92 50 B
JA2GHP 16,335 97 45 B
JA2LY/1 14,625 102 39 B
JA1NF 12,587 79 41 B
JA2CWU 12,075 91 35 B
JL3RDC 10,944 83 36 B
JR3RIY 10,500 80 35 B
JA6QDU 9,280 70 29 B
JH2WHS 8,204 77 28 B
JH2BTM 7,685 73 29 B
JM4UZM 6,075 61 27 B
JA9SCB 4,860 54 27 B
JA1MQS 3,850 35 22 B
JL2HUJ 3,840 44 24 B
JI8GZS 2,919 41 21 B
JK1BII 2,466 37 18 B
JN7XQN 1,248 28 13 B
JA1ALX/9 845 19 13 B
JN3MUC 700 16 10 B
JR3KAH 688 22 8 B
JG1GCO 374 12 11 B
JA9EJG 256 10 8 B
JE0VFV 215 13 5 B
JF3WNO 200 14 5 B
JA0BBM 168 10 6 B
JD1BIA 105 9 5 B
JR1BSV 56 4 4 B
JG3DOR 45 3 3 B
JH3AIU 1,175,196 1538 174 C
7J1AAI (W1NN, op)
789,906 1128 169 C
JR7OMD/2 361,548 683 132 C
JQ1UKK/7 310,144 601 128 C
JA7IC 307,154 538 137 C
JO3JYE 250,290 622 103 C
JQ3UDL 232,625 449 125 C
JA9CWJ 222,500 501 100 C
JS1OYN 221,536 502 112 C
JH1AZO 176,400 444 90 C
JK3GWT 150,670 384 95 C
JI1CUP 119,079 321 101 C
JA3AA 118,524 290 102 C
JR3WXA 117,299 314 91 C
JI7OED 116,850 322 95 C
7L1ETP 115,800 305 100 C
JA1XRH 107,432 285 104 C
JS1PWV 106,998 321 102 C
JA2KKA 104,720 281 88 C
JA1IRH 103,860 270 90 C
JA1PS 98,890 233 110 C
JA1NLX 87,906 247 91 C
JJ2QXI 87,548 277 86 C
JI1RXQ 81,530 307 62 C
JN1MSO 69,194 288 58 C
JG3LGD 64,480 203 80 C
JA5APU 61,400 318 50 C
JA5ATN 58,560 276 48 C
JA3ARM 58,140 178 85 C
JH4FUF 57,190 215 70 C
JA8AJE 55,115 201 73 C
JQ2FFS 52,272 174 72 C
JE4MHL 51,520 202 64 C
JH0EPI 50,184 326 34 C
JH6OPP 49,416 207 71 C
JN7OJA 45,162 151 78 C
JE4VRF 43,281 172 63 C
JA1CP 42,490 163 70 C
JH3JYS 38,570 145 70 C
JA9XBW 36,366 153 66 C
JR1LEV 35,750 138 65 C
JJ4PPK 35,090 126 58 C
JH1SWD 34,816 144 64 C
JA2OJ 33,972 148 57 C
JK1VSL 33,810 132 69 C
JA2QVP 31,408 151 52 C
JG3NKP/1 31,212 140 54 C
JA1KI 29,264 102 62 C
JH1MTR 24,624 114 54 C
JA1XEM 23,698 138 41 C
JH1PXY 20,196 131 36 C
JA7LMU/1 18,760 118 40 C
JA4BAA 16,800 108 40 C
JE8KKX 16,562 89 49 C
JA1MXY 11,767 75 41 C
JA2DHL 11,078 92 29 C
JA3RK 10,720 87 32 C
JA1RRA 10,010 91 35 C
JF7GDF 9,455 71 31 C
JA7ARW 9,108 69 36 C
JK1ATT 7,200 60 32 C
JA1GS 6,902 50 29 C
7K1EQG 5,670 53 30 C
JO7BBS 3,014 39 22 C
JH2NWP 2,300 31 23 C
JA3KZE 1,919 33 19 C
JF9HRV 1,760 36 16 C
JK1REJ 1,380 33 12 C
JG1BUG 1,001 19 13 C
JK1LUY 833 26 17 C
JA1AAT 702 20 9 C
7K1CPT 357 11 7 C
JJ1JRH 216 13 12 C
JE4VVM (+JI3OPA,JG4CLV,JH4UHW, JN4FEU) 1,274,711 1740 167 D
JG1ZUY (JG1ILF,JA9SSY,7N3PZJ, ops)
1,203,480 1574 180 D
8J2000 (JE2HCJ,JM2RUV,JG2TSL, JA2JDR, ops)
651,552 1257 132 D
JA4YPE (JF3EBO,JG3SNI, ops)
425,201 778 139 D
JA2YKA (JI4RDO,JK2VOC, ops)
101,570 366 70 D
JN1YUU (7M4JVV,7M4NBR,7M4UVV, 7M4WILL,7L3WGX, ops)
603 19 9 D

**Zone 46**
**Nigeria**

5N3CPR 136,694 368 82 A

**Mali**

TZ6DX (K4RB, op)
529,305 1062 105 C

**Zone 48**
**Uganda**

5X1Z 2,573,868 2920 186 A

**Zone 49**
**Thailand**

HS0AC (E20GMY,E21EIC,HS0GBI, HS1CKC, ops)
750,178 1412 143 D

**Zone 50**
**Philippines**

DU1/DK3GI 2,088,400 2237 200 A
DU1IVT 100,856 385 56 B
DU1LER 87,030 425 45 B
DU1DX 68,860 286 55 B
DU1UGZ 39,165 321 35 B
DU1LKY 39,039 268 33 B
DU3SV 32,800 231 32 B
4F9EAQ 13,146 132 21 B
DU1BP 2,196 29 18 B
DU1KXR 1,260 22 15 B
DU1SAN 700 19 14 B
4F2KWT 140,025 410 75 C
DU1ODX 105,324 342 67 C
DU1COO 43,596 260 36 C
DU1MHX 9,740 108 20 C
4G1A (DU1WHO,4F1FZ,N2NL,4F3XX, 4D1PMD, ops)
591,014 1238 103 D
DX1M (DU1KXR,DU1BP, ops)
13,804 92 34 D

**Zone 51**
**Indonesia**

YB8BHC 80,914 379 46 B

**Zone 54**
**West Malaysia**

9M2JI 309,620 605 137 C

**East Malaysia**

9M6AAC 233,016 419 133 C

**Singapore**

9V1RH 24,145 120 55 B

**Indonesia**

YB1AQS (DL8WPX, op)
1,755,468 1895 198 A
YB1KOR 54,166 154 73 A
YC3IZK 35,805 163 55 B
YB4JIM 56,025 197 75 C

**Zone 55**
**Australia**

VK2CZ 259 20 7 B
VK4TT 7,360 54 40 C

**Zone 57**
**South Africa**

ZS1NF 17,056 84 41 A
ZS6IR 217,487 590 79 B
ZS0M (ZS6MG, op)
44,732 196 53 C
ZS0E 12,870 78 45 C
ZS5T (+ops) 514,904 1057 104 D

**Zone 58**
**Australia**

VK6NU 110,004 266 103 B
AX6JIP (VK6JIP)
89,530 285 70 B
AX6ANC 810 19 10 B

**Zone 59**
**Australia**

VK5GN 441,750 773 125 A
VK5EMI 1,407 27 21 B
VK2AYD 652,480 890 160 C
VK2APK 457,380 757 135 C

**Zone 60**
**New Zealand**

ZL1ANJ 404,073 647 139 B

**Zone 61**
**Midway Island**

KH4/W4JKC 16,414 566 29 C

**Hawaii**

KH6FKG 288,279 735 81 B
KH6/W8RU 384 16 8 C
KH7R (KH6ND,KH6TO,AH6OZ,NH6XO, ND3A, ops)
1,757,154 2667 138 D

**Zone 62**
**American Samoa**

AH8A 558,108 1068 111 B

**Zone 64**
**Mariana Islands**

KH0CE 200,930 604 71 B

**Zone 65**
**Marshall Islands**

V73UX 187,440 499 80 B

**Zone 67**
**Antarctica**

R1AND 2,880 48 12 B

**Zone 75**
**Franz Josef Land**

R1FJV 4,485 60 23 A

**Checklogs:**

ZS6AUP, 3Z0PAF (SP5PPU, op), 4M3B, 4Z4TA, 9M2TO, AA3TT, AF5Z, DH5MM, DJ1UN, DJ0MAQ, DK3RED, DL1AZK, DL1DWT, DL1JFM, DL1JJI, DL1JMS, DL2HWI, DL2RVD, DL2ZAV, DL5CD, DL5CX, DL5KVV, DL6KWU, DL6YEK, DL7VAF, DL7VGU, DL0MBG, EA3DWU, EA5AJX, EA5VR, ER1FF, F/OK1EE, G8PW, HA1XY, HA6VA, HA9MDN, HA0IT, HG9VHF (HG9MET, op), HG0HQ, HK3DDD, HR5HAC, IV3RCH, IZ2ABN, K3WW, K6VL, KI7AO, LA3BX, LA7FJA, LA8LA, LU2AH, LU9APM, LY2BNL, LY2GV, LY3CW, LY3DA, LY3MU, LZ1JZ, LZ2PL, N4MM, OH1BOI, OH6RC, OK1DSU, OK2EC, OK2SGY, OL3A (OK1AY, OK1DRQ, OK1MR, ops), OZ5YL, OZ6TL, PA3ARM, PA3FFM, PA7XG, PA0SIM, PA0TV, RA1ARJ, RA3DPD, RA3MS, RA6AAW, RK9CYA, RU4WW (+RW4WM), RV6AMI, RX3AHL, RX3DTN, RX9TX, S5/K1ZZ, SM2UJW, SM6BZE, SM7GCZ, SP1BLE, SP1DMD, SP1GZT, SP2DWG, SP3NGB, SP4GDC, SP5BNB/4, SP7BDS, SP7ICE, SP7LHX, SP7XK, SP9MCU, SQ6Z (SP3GTS, op), SQ9CAQ, UA1AKE, UA1CIO, UA3BM, UA3EUW, UA3WFM, UA3WFS, UA3WW, UA3XJG, UA4CC, UA4LBK, UA4LDP, UA4LFC, UA4LLH, UA4QK, UA4RF, UA6AK, UR4MWU, UT2IO, UY5WA, UZ5Q, V63X, W5AB, W6ISQ, W7GG, WA2BMH, WM5R, WO6M, YI9OM, YL2BJ, YL2GTD, YO2KBQ, YO2KCB, YO2KJI, YO6KYZ, YO7KAJ, YO8CRU, YO8KOS, YO9BXZ, YO9IF, YP1W (YO3JW, YO9BGJ, ops), YU1KN, ZS0E

# Bouvet Island

The year 2000 was an exciting time in the DX world. We saw activity from six of the top 10 most wanted DXCC Entities (BQ9P, A5, 7O, E3, FR/T, 3Y). The last one being 3Y0C from Bouvet Island, which came as a total surprise just nine days before Christmas 2000. Astronaut Chuck Brady, N4BQW, landed on the island of Bouvet with a group of South African scientists and their Norwegian team leader.

This Norwegian island (54° 26' South 3° 24' East) is located 2574 kilometers (1600 miles) south-southwest of Cape of Good Hope, South Africa, in the South Atlantic Ocean. The island is composed of the remains of an extinct volcano and it measures 6 by 9 kilometers with most of its landmass engulfed in ice. The island was discovered by Jean-Baptiste Lozier Bouvet, a Frenchmen, on January 1, 1739. It wasn't until 1823 that the first landing took place by an American expedition. On December 1, 1927 Lars Christensen, a Norwegian, landed an expedition and claimed Bouvet for Norway.

In 1971, a Norwegian royal decree declared the island as a nature reserve. Bouvet's only inhabitants are seals, penguins and other sea birds. Landing on the island can be extremely difficult thanks to steep cliffs and high seas. The only safe area to set up camp is on the west coast of the island.

Bouvet ranked # 8 on the ARRL DXCC Most Wanted list in 1999. Past operations from this rare rock included LH4C (1962), 3Y1VC and 3Y3CC (1977), 3Y1VC and 3Y5DQ (1978-79) and 3Y5X (1990).

This is not the first time that Chuck has operated from such a rare location, as many will remember his operations from Palmyra and Kingman. Chuck is not on a DXpedition to Bouvet, however. He is working on the island as a medical assistant to the scientists. In his spare time, he is on the air as 3Y0C on all bands from 6 to 160 meters, primarily on SSB. Chuck has said that he expects to do some RTTY and may make a few CW contacts. His equipment includes an ICOM IC-756PRO transceiver, an ICOM PW-1 solid-state amplifier and a generator. He has vertical antennas for 40 through 160 meters and will use beams on 10 through 20 meters.

Chuck's most difficult task is keeping the antennas up because the winds at Bouvet can be severe. He also thought the generator would be usable for 12 hours a day, but after recalculating the fuel consumption rate, he was forced to trim that down to 3-4 hours daily. Suggested SSB frequencies are: 1835, 3795, 7095, 14195, 14260, 18145, 21295, 24945, 28495 and 50120 kHz.

**Here is Chuck, 3Y0C, enjoying one of the few sunny days on Bouvet.**

**Chuck has a devil of a time keeping this vertical antenna vertical in the 90-MPH winds. Note the clothing he is wearing as well as the operating shack to the right.**

**This is the 3Y0C operating shack. Chuck logs all QSOs the old fashion way—with pen and paper. He and the scientists sleep outside in tents.**

As of press time, the pileups have been growing rapidly. Many times the pileups have developed to the point where Chuck seems inundated and either pulls the plug or moves to another frequency. Cluster spots have contributed to the feeding frenzy. Chuck is scheduled to be on the island until mid-March. Deon, ZR1DQ, has set up a very informative Web site about the operation at **www.qsl.net/zr1dq/**. Send Bouvet QSLs to WA4FFW.

## NORTH KOREA

You may recall the much-anticipated multinational North Korean operation, which was announced in mid-October. Well, it was scheduled for late October, then rescheduled for early January 2001. Now I have learned that the operation has been scrapped.

The North Korean Organization for Army support is now refusing the use of any transmitting equipment during the Official Opening of the Educational Center, which was scheduled to take place on January 7, 2001. Obviously, this is a disappointment to the organizers of P5UK and the DX community.

North Korea has only been activated legitimately two times. This is a tough nut to crack, but the surprise Bouvet Island operation reminds us that there is always a way. Be assured that other DXpeditioners are looking for that way. P5 is going to take the right person, in the right place, at the right time. Most old timers will remember how long China was off the air—30 years! North Korea was added to the DXCC list in 1991 and has been active (on a limited basis) twice in the last decade. You gotta believe: DX *IS!*

## NATIONALS FROM BHUTAN

*Glenn Johnson, W0GJ/A52GJ, and his family spent the month of January 2001 in Bhutan on a work assignment. In his spare time, he worked closely with a group of nationals training to become Amateur Radio operators from this Himalayan nation. Glenn gives us a report on the soon to be licensed Amateur Radio operators from Bhutan.*

"All are very enthusiastic and fast learners. They are having so much fun that the director and chief engineer of the Bhutan Telecommunications Authority are also taking the class. One older gentleman was a good friend of Pradhan, A51PN, when Pradhan was active. He is in the class because he remembers the fun that Pradhan had on the air. He also fondly remembers Gus Browning.

"There are three classes of licenses in Bhutan: Novice, General and Restricted. Restricted and General have the same "advanced" theory test. The Restricted license has privileges only above 50 MHz. The General license requires a 5-WPM code test and receives all amateur privileges. I would estimate that the difficulty of that exam is somewhere

Bernie McClenny, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

**By the time you read this, we hope these Bhutanese nationals will be licensed and on the air.**

**Want to go on vacation and operate from a semi-rare DXCC Entity? Try the Bhutan Ham Centre!**

**Melissa Johnson, N0MAJ, was the first YL to be licensed in Bhutan. Her Bhutanese call sign is A52YL.**

between the present US General and Amateur Extra exams. It is certainly almost twice as long as either exam and is *timed*.

"The Novice class test is basically the same as the US Technician class in technical difficulty. It also requires a 5-WPM code test. Privileges are for CW in the 80 and 15-meter bands (3.575-3.625 and 21.100-21.200 MHz), and for all modes on 10 meters (28.100-28.600 MHz). Note that Bhutan is in ITU Region III and no amateur activity is allowed above 7.100 MHz, so the 40-meter Novice band is not available.

"From what I've seen in enthusiasm and learning of the code with the Code Quick method, there is no doubt in my mind that there will be at least a dozen new licensed A51 hams in Bhutan in January! I'm sure most of them will go on to obtain their General license. This is an incredible achievement considering that only 8-9 months ago, Bhutan was number 2 on the Most Wanted List.

"There is also an incredibly nice Bhutan Ham Centre, A51AA, which is fully equipped and ready for activity. Two towers are up with Yagis, along with an assortment of other wire and vertical antennas. Some of the new hams will be operating from there. There is an unobstructed path to North and South America as well as to Europe. I can vouch that the Ham Centre facility is nicer than any I have visited in my 36 years as a ham. If there ever was a five-star ham vacation spot, this is it. Bhutan honors foreign licenses and grants equivalent privileges of the home country. Visit **www.sophun.com** for complete details on arranging a visit and operating from the fascinating Kingdom of Bhutan!"

## 2001 INTERNATIONAL DX CONVENTION

This year's International DX Convention will be held on April 20, 21 and 22 in Visalia, California and will be hosted by the Northern California DX Club (NCDXC). It's not the easiest place to get to if you are traveling from outside of the area, but it's a great time to catch up with all the latest DXpeditions and DXers. George Allan, W6YD, is the chairman and can be reached by e-mail at **w6yd@aol.com** for more details or you can check the NCDXC web site at **www.ncdxc.org**.

## S79KMB

Anita M. Keighley, KN2N, writes she has been the QSL manager for Keith, S79KMB, since December 1990. After more than 10 years she has decided to resign because Keith now has more time to handle his own QSL chores. Anita has the logs for contacts made between December 1990 and July 2000. QSL cards may now be sent (no call on the envelope) to: Keith Berke, Anchor Café, Anse a la Mouche, Seychelles Islands, Indian Ocean. Anita would also like to thank her husband John, K2PZ, for his help.

## DX EXTRAVAGANZA

The Lone Star DX Association (Austin) in conjunction with the Texas DX Society (Houston), Central DX & Contest Club, (Austin), DX Amigos (San Antonio) and the West Texas DX Society will sponsor the DX Extravaganza at HamCom in June. There will be DX seminars, DX Talks, DX Hospitality Suite, and a DX luncheon. HamCom 2001 will be held at the Arlington Convention Center on June 8-10. Let's support this new DX gathering. Mark your calendars now!

## THE GAMBIA

A team of two German Amateur Radio operators announced they would be active from The Gambia from February 20 to March 5. Look for Mike, DL2OE, and Hans, DL7CM to be using C56/homecalls on 6 through 160 meters on CW, SSB and RTTY. The two will only be able to run 150 W, which is the maximum they are authorized to run. QSL via their home calls.

## YEMEN—7O1YGF

We've had many questions about the German DXpedition to Yemen, which took place in mid April 2000. The group was active as 7O1YGF (Yemen-German-Friendship) for 10 days when they were asked by Yemeni authorities to cease radio transmissions. Regarding the abrupt departure, after the team returned to Germany they issued a press release that stated: "The reason for that is, that until now no agreement on the final status of this unique special activity could be reached."

The team was originally promised a license upon arrival, but to date they have not been able to obtain one. The group made some 35,000 QSOs and confirmed them with QSLs. Until proper documentation is submitted to the ARRL DXCC Desk, 7O1YGF QSLs cannot be accepted for DXCC credit. As time passes it becomes less likely that this will happen.

An unauthorized operation from any country can jeopardize future operations. We can only hope that this is not the case with Yemen.

## DXCC ANNOUNCES NEW 17-METER AWARD

DXCC is pleased to announce the addition of a 17-Meter Single-Band DXCC award. Applications for this award are being accepted now. The 17-Meter DXCC certificates will be dated, but not numbered. The 17-meter credits will also count toward the DeSoto Cup competition for the year 2001.

If you do not know what credits you have on 17 meters, you can contact the DXCC for an update prior to applying. This will help avoid duplicates and additional costs. If you have Web access and can read Adobe (.pdf) files, contact the DXCC at **dxcc@arrl.org** for a copy of your record. If you do not have Web access, please send a note to the DXCC along with $1.50 for postage, or an SASE with $1.50 in postage. For further information, e-mail the DXCC at **dxcc@arrl.org**.

## ARRL OUTGOING QSL BUREAU

Effective January 7, 2001 postal rates increased both domestically and internationally. Expect to see a new rate for the ARRL Outgoing QSL Bureau very soon. Watch the ARRLWeb for details.

## MORE BHUTAN

Dimitri, RA9CO, reports he has obtained his visa and tickets to Bhutan. He plans to be active as A52CO from March 15 to 21. QSL via UA9DD, PO Box 69, Ekaterinburg, 620073, Russia.

## VIETNAM

Hans, WA1LWS, plans another operation as 3W2LWS in Vietnam. The trip is set to cover both modes of the ARRL DX contests February 17 through March 6. He likes CW and can often be found on 14027 and 21027 kHz during his operations.

## WRAP UP

That's all for this month. Keep those letters, pictures and newsletters coming. This month I would like to thank the following for helping to make this column possible: DL7CM, DXCC Desk, K5AT, KN2N, N7NG, *The Daily DX*, W0GJ, WA1LWS, WA4FFW, ZR1DQ. Until next month, see you in the pileups!—*Bernie, W3UR*

# Amateur Radio at The *Ironman USA 2000*

*By Thomas Dick, KF2GC, ARRL Section Manager, Northern New York*

It is a foggy, misty morning in the Adirondack Park on a serene Mirror Lake in northern New York. A loudspeaker breaks through the thousands of shouting voices and the chop, chop, chop of a helicopter. Suddenly the crack of a starter's cannon shot and the participants were off, swimming the first leg of the *Isuzu Ironman USA 2000 at Lake Placid*. A total of 1740 triathletes, for the next 16-plus hours, contested one of most rigorous races ever devised.

## The Grueling Course

First, a 2.4-mile swim across beautiful Mirror Lake. Then less than an hour later, racers began a lengthy bicycle route through some of the most beautiful scenery in the world. The bicycle course leaves Lake Placid to Keene, New York, and winds its way 14 miles downhill. (Some portions of this downhill could take riders at speeds approaching 70 MPH.)

Next, the course goes to Upper Jay and to Jay, then along the Hazelton Road back through Wilmington beside Whiteface Mountain before going back to Lake Placid. The contestants do this route twice—some 112 miles in all. Some contestants began to fade in relation to the front-runners. Once they completed the bicycling, they were ready to begin the final leg—the 26.2-mile marathon over some of the same roads.

Cameron Widoff, with a total elapsed time of 8 hours, 46 minutes, 5 seconds crossed the finish line to become the Men's *Ironman* Champion. Melissa Spooner built up a 10-minute lead to finish in 9 hours, 45 minutes, 57 seconds and became the Women's *Ironman* Champion. So, what does this have to do with Amateur Radio?

## Amateur Radio's Role

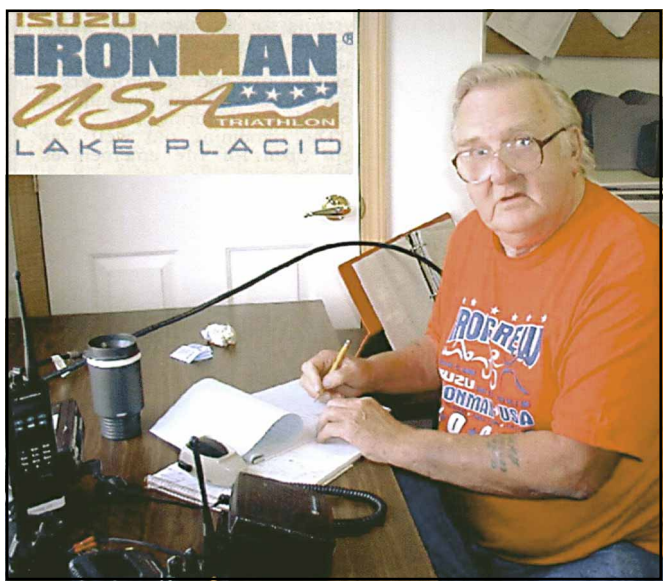
*Ironman 2000* would be the first to tell you that without the Amateur Radio Emergency Service and Amateur Radio operators, there wouldn't be adequate emergency communications for this mountainous route. The mountains here in Northern New York make communications for this world-renowned public event quite a challenge. The 145.11-MHz public health and welfare/emergency repeater, on top of Whiteface Mountain (4867 feet), is the only answer for *Ironman 2000*. Thirty-nine Amateur Radio operators were spread strategically among the many aid/medical stations, medical vehicles and ambulances over the entire course to make communications possible. Each operator was responsible to make his own equipment work in the ambulance and aid stations along the course all day long.

There were months of preparation for *Isuzu Ironman 2000 USA* requiring almost 3000 volunteers, 20 ambulance squads, 3 helicopters, hundreds of emergency staff and many doctors—not to mention all the village highway departments, New York State Police and local police. On race day, you only had to look at the huge white tents covering most of the 1932 and 1980 Olympic Ovals in the middle of downtown Lake Placid to realize the magnitude of this prestigious and rigorous event.

## Preparation is Key

George Warren, N2UTY, the communications captain, contacted the local clubs and passed out volunteer applications months in advance. Many of the Amateur Radio operators from *Ironman 1999* returned to do communications in 2000. Their critiques and evaluations will help to make future events even better.

On Saturday morning, July 29, 2000, Al Haggett, KB2LML, an ARRL District Emergency Coordinator in Northern New York, came to Lake Placid from Champlain to set-up along with Phil, N2ZGR, Ray, KC2DZA, Neal, KC2GOA, George, N2UTY, and Tony, WA2LRE, for this big event. Al said, "Preparation is key to providing good communications at public service events/ emergency services." Many hours of set-




**Chuck Orem, KD2AJ, operated as Net Control Station for the *Isuzu Ironman USA 2000 at Lake Placid.***

**Tom Dick, KF2GC and Alice Bourquin, N2YTS, were stationed at the medical tent.**

**Public Service Honor Roll Criteria Questionnaire**

Name and call sign:

e-mail address:

Postal address:

What ARRL Field Appointment(s), if any, do you hold?

The Present Public Service Honor Roll Categories:

This listing is to recognize amateurs whose public service performance during the month indicated qualifies for 70 or more total points in these 8 categories:

(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.

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1. In general, what do you think Amateur Radio operators mean by "Public Service"?

2. What do you believe the purpose of the Public Service Honor Roll is?

3.a. Do you think there is an appropriate balance between NTS-related activities and ARES-related activities?
Yes___ No___

3.b. If no, how would you suggest a better balance?

4. Category 8 (introduced in 1991) recognizes a ham who "provides and maintains an automated digital system that handles ARRL radiogram-formatted message traffic." What about other digital traffic handlers who check into an NTS-designated digital mailbox (on HF) or a bulletin board system (on VHF) to pick up traffic? Should this function be incorporated into Category 1, Checking into a public service net, using any mode, one point each; maximum 60?
Yes___ No___

5.a. Are there other traffic-handling functions performed by radio amateurs, using any mode, that are not addressed by the present categories? Yes___ No___

5.b. If yes, please list the other traffic-handling functions not addressed by present categories.

6.a. PSHR point categories have been weighted toward on-the-air activities. Should we broaden the scope of the PSHR to include more off-the-air activities? Yes___ No___

6.b. If yes, what off-the-air activities should be included?

7.a. Are there other forms of public service performed by Amateur Radio operators that are not presently addressed by the PSHR categories? Yes___ No___

7.b. If yes, please give an example.

8.a. Should there be a specific category that recognizes a ham's efforts that directly support and are directly involved with an actual emergency or disaster-relief operation? Yes___ No____

8.b. If yes, and since emergency operations last an extended period of time, which is more appropriate, a sliding scale of "time spent" — such as "X" number of points for "X" amount of time—or a set amount of "points earned" for each emergency operation no matter how much time was involved?
Time spent_____ Points earned___

8c. If you answered yes to 8.a, what sliding scale do you envision for either your choice of time spent or points earned—and what would you assign as a maximum number?

9.a. Should the amount of time that a ham spends per month on Amateur Radio public service activities (other than direct involvement in an emergency or disaster-relief operation—see Question 8 a.) be recognized by a separate point category?
Yes____ No____

9.b. If yes, which is more appropriate: a sliding scale of "time spent"—such as "X" number of points for "X" amount of time—or a set amount of "points earned" no matter how much time was involved? Time spent_____ Points earned_____

9.c. If you answered yes to 9.a., what sliding scale do you envision for either your choice of time spent or points earned—and what would you assign as a point maximum?

10. Category 6 recognizes the ham that serves as an ARRL official field appointee or SM. Should this category also include other volunteers, such as Assistant Emergency Coordinators and registered members of ARES? Yes___ No___

11.a. Do you believe the threshold of 70 points per calendar month to earn PSHR status is:
About right_____
Too low_____
Too high_____

11.b. If you think there should be a change, what would you recommend?

Additional comments are welcomed. Thank you!

ting up paid off when the event started and communications from net control began. After all, the public's health and welfare and reliable emergency communications are what ARES is all about.

On Sunday at 6:30 AM, the first health and welfare traffic was begun by Chuck, KD2AJ, net control stationed at the Emergency Management Center (EMC). It would be past 1:30 Monday morning by the time Tony, WA2LRE, finished up the last traffic for *Isuzu Ironman 2000*. I said, "There are Ironmen triathletes—absolutely. So, how about Ironhams also?" We had 39 hams involved, and many amateurs spent long hours in ambulances at aid stations and medical units. We provided the vital field support for information back to the EMC where coordination and dissemination of this traffic is logged and sent out. These Amateur Radio operators handled messages of vital statistics such as the athlete's number, blood pressure, pulse and any physical complaints or conditions. Moreover, we kept track of ambulance locations, and estimated times of arrival. We made sure that backup communications were available in case other communication systems didn't work. Thus, these triathletes in *Ironman 2000* were just a radio call away from emergency services and treatment.

## Thanks to All

The next *Isuzu Ironman USA Lake Placid* will be on July 29, 2001, and we will do it all again. Maybe you've thought about camping in the Adirondacks. This would be a great time to come. If you would like to volunteer, contact: **ironmanham@whiteface.net**, **kf2gc@arrl.org** or check out the Ironman Web site at **www.ironmanusa.com**.

Thanks to all our ARES members and fellow amateurs who made the *Ironman 2000 in Lake Placid* go so well: KC2ESO, KC2DZA, N2WMJ, KC2BKO, WA2JPM, N2RUL, N2ZZC, N7OTH, N2NRM, KC2BRN, KC2FDJ, N2TJA, KC2FDK, VE2NHK, N2YWM, WA2YBM, N2YTU, N2CYO, KB2RKV, KC2EZP, AB2G, N2XPS, N3TTY, N3ONZ, N1YWD, W1USE, N2ZGR, KC2GOA, KD2AJ, KB2LML, VE2MG, KC2ALG, KF2GC, AB2HQ, N2YTS, KC2BSZ, N2XHP, WB2YDT and N2UTY.

## REVISITING PUBLIC SERVICE HONOR ROLL CRITERIA

In response to ARRL members' comments, the ARRL Volunteer Resources Committee is discussing the possible revision of the Public Service Honor Roll (PSHR) and/or broadening the criteria for PSHR points. The PSHR criteria were last revised in 1991 by the ARRL Public Service Advisory Committee. (Reference May, 1991, *QST*, p. 71.) Please look over the present list of PSHR categories and point values assigned to each (see previous page), and answer the questions. Please return the questionnaire by **April 2, 2001**. Photocopy the questionnaire and send it to:

ARRL Field and Educational Services
225 Main Street
Newington, CT 06111-1494

or fax it to 860-594-0259. You can also fill out and submit the PSHR Criteria Questionnaire on-line via the ARRLWeb at **www.arrl.org/forms/field/pshr/index.html**. QST

# Field Organization Reports

### Public Service Honor Roll December 2000

This listing is to recognize amateurs whose public service performance during the month indicated qualifies for 70 or more total points in the following 8 categories (as reported to their Section Managers). Please note the maximum points for each category: 1) Checking into a public service net, using any mode, 1 point each; maximum 60. 2) Performing as Net Control Station (NCS) for a public service net, using any mode, 3 points each; maximum 24. 3) Performing assigned liaison between public service nets, 3 points each; maximum 24. 4) Delivering a formal message to a third party, 1 point each; no limit. 5) Originating a formal message from a third party, 1 point each; no limit. 6) Serving as an ARRL field appointee or Section Manager, 10 points each appointment; maximum 30. 7) Participating in a communications network for a public service event, 10 points each event; no limit. 8) Providing and maintaining an automated digital system that handles ARRL radiogram-formatted messages; 30 points. Stations that qualify for PSHR 12 consecutive months, or 18 out of a 24-month period, will be awarded a certificate from HQ on written notification of qualifying months to the Public Service Branch at HQ

777 NM1K
466 N5JZ
445 KB2WII
408 K4FQU
382 K5NHJ
370 K9JPS
363 K7BDU
335 KB2RTZ
286 N9VE
279 WA9VND
269 W7TVA
265 KA2ZNZ
257 N5NAV
256 WA5OUV
250 W7BO

242 W5ZX
241 KK5GY
233 KC5OZT
232 NN7H
229 WA5I
220 K7VVC
219 WB5ZED
218 KB8ZYY
217 N1LKJ
216 KK3F KB1DSB
206 AF4DL
205 N8EXV
200 KB1AJ
198 N5IKN

195 WX8Y
192 KA4FZI
191 KA5KLU
189 W4EAT W4ZJY
188 WB2UVB
185 W0OYH KC2EOT
182 KA2GJV
181 KV4AP
178 N8FPN K9FHI
176 WB4GM
173 N2RPI
172 W8YS
170 W6IVV

168 K2UL KC2GJM K6YR
166 N2CCN
164 W6DOB K8GA
163 WN0Y N7YSS
161 KC4TLG
160 WB5NKC
159 NC4ML N8BV
158 N8IO W6QZ
157 W2EAG
156 N5OUJ
155 W2RJL
153 NR2F

154 K0IBS N9KNJ KC2AHS
152 K4IWW WX4H
150 K4RBR K4SCL KC4ZHF
148 NZ1D
147 W4CAC WB4TVY KB5W AF4NS KC8LBZ N2OPJ
146 W2MTA KJ4N KB2EV
145 WA4DOX AB4XK
144 WB2GTG KB2KLH
143 KR4MU

WA1FNM
142 W0LAW WO0A
141 KA1GWE KD4GR
140 KT6A WD4JJ W5GKH
139 KE4JHJ N2KPR WD9FLJ
138 K3JL W3YVQ WB5NKD N9BDL AF4QZ W7ZIW W7GB
136 W9YCV
135 W0WWR
134 KK1A W3BBQ
133 W4NTI
132 KC7SRL N2WDS W9CBE
131 K5IQZ NY2V KT4PM WB2FGL
130 WB0ZNY KE3FL K4AKC WA4QXT N3YSI WU4C K9LGU
129 N3ZKP N2AKZ KC8CON KB5TCH WA0TFC
128 N0SU

KA8WNO NN2H WB2QIX KA4UIV KC6SKK N9MN KB2VVB
127 AA3SB W7QM
126 W1PEX K2DN AA8SN
125 KC7ZZB W3NNL W2GUT AD4IH N2GJ W7GHT
124 K4YVX WA1JVV
123 W1ALE WA2UKX K1JPG
122 KA4HHE K0PIZ K7MQF K7GXZ
121 K5DPG N7DRP AA2SV KD1LE W3OKN KT4TD
120 W3VK W3IPX N3EFW K9GBR KA2DBD K4DMH AD6LW
119 KI4YV N3WKE W9ZY AF2K W2FR N9TVT WD0GUF W7LG KB2VRO KF6OIF

118 W5CDX N8DD K4MTX KA8WNO
117 KB0DTI KB2VVD KG2D
116 N1JBD W1QU KC7SGM W3CB N1JBD
115 W1JX WA1QAA
114 AB4E
113 AA3GV N7AIK KB2ETO WA4EIC
112 KE4JFS KG4FXG AG9G K2PB
111 W2MTO
110 K8JP W5XX WI1G
109 K2VX
108 W4WXA K4WKT WD9HII W2PII K8KV KB4DXN
107 W4DGH N2WFN K8VFZ KC6NBI
106 KA2CQX N3WAV WA2GUP W6JPH
105 K8QIP

W5AYX WB7VYH
104 AD4XV WA8SSI KF4KSN KD4HGU
103 AA4YW N3SW KC5VLW KA4LRM
101 K5MC K6AGD KC8HTP KA2BCE WR8F
100 WW8D
99 W2LC
98 K8LEN AC5Z N3RB
97 KE4GYR AA2ED K4BG
95 W1JTH K4BEH WB2IJH WA8DHB
94 KA8VWE KJ3E WB4UHC KF5A WB4PAM KG4CHW
93 WB2LEZ
92 N3WK W8SZU
90 W4CC KO4OL
89 KA2ZKM K3TX WA4GLS KE4VBA AA8PI W2CC

88 WA2YOW KA1VAX N1LAH WA4EYU
87 WA4CSQ
86 KG5GE
85 W0FCL W7VSE KC2ANN
83 KE0K
82 K8AE K2DBK WB9GIU
81 N7CEU WJ3K K1YLB K1FP KA7TTY
80 N5GG KB4WBY
79 KJ5YY
78 KC3Y K3UWO
77 KE4DNO
76 KB1EPQ W4QAT K1SEC
75 KC7SGL K1TSV K8SH N1IST
74 K1STV KF4NJP K3CSX AF4CD
73 N4JAQ
72 W4AUN
71 KM5YL N2JRS

The following station qualified for PSHR during the months indicated, but was not previously recognized in this column: (Sep) WA2GUP 101. (Oct) WA2GUP 131.

### Section Traffic Manager Reports December 2000

The following ARRL Section Traffic Managers reported: AK, AL, AR, AZ, CO, CT, DE, EMA, EWA, GA, IA, ID, KS, KY, LA, ME, MDC, MI, MN, MO, MS, NC, NFL, NH, NLI, OH, OK, OR, ORG, SBAR, SC, SD, SFL, SNJ, STX, TN, VT, WCF, WMA, WNY, WPA, WV, WWA, WY.

### Section Emergency Coordinator Reports December 2000

The following ARRL Section Emergency Coordinators reported: AZ, CT, EWA, IN, KS, KY, LA, MDC, MI, MN, MO, NLI, OH, SD, SFL, STX, SV (North), TN, VA, WMA, WCF, WNY.

### Brass Pounders League December 2000

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

| *Call* | *Orig* | *Rcvd* | *Sent* | *Dlvd* | *Total* |
|---|---|---|---|---|---|
| KK3F | 20 | 2140 | 2082 | 58 | 4300 |
| NM1K | 747 | 183 | 8878 | 0 | 1808 |
| WX4H | 0 | 733 | 883 | 17 | 1633 |
| W5SEG | 49 | 598 | 507 | 10 | 1164 |
| W7BO | 44 | 432 | 544 | 0 | 1020 |
| W1PEX | 0 | 103 | 888 | 12 | 1003 |
| KT6A | 1 | 499 | 479 | 1 | 980 |
| K7VVC | 79 | 394 | 443 | 41 | 957 |
| K7BDU | 180 | 307 | 436 | 15 | 938 |
| WZ7V | 0 | 456 | 36 | 423 | 914 |
| W6IVV | 12 | 370 | 451 | 0 | 833 |
| WB5ZED | 21 | 392 | 361 | 30 | 804 |
| K4FQU | 276 | 112 | 388 | 14 | 790 |
| W6DOB | 1 | 342 | 392 | 25 | 760 |
| KA2ZNZ | 37 | 321 | 271 | 90 | 719 |
| WA9VND | 55 | 315 | 239 | 46 | 655 |
| W9YPY | 0 | 384 | 336 | 0 | 640 |
| W4EAT | 1 | 319 | 296 | 10 | 626 |
| KB2WII | 175 | 130 | 182 | 124 | 611 |
| W2EAG | 7 | 302 | 276 | 12 | 597 |
| K9JPS | 0 | 278 | 32 | 269 | 571 |
| KA4FZI | 2 | 305 | 240 | 22 | 569 |
| WB2GTG | 8 | 229 | 288 | 18 | 543 |
| N5IKN | 0 | 270 | 153 | 117 | 540 |
| W9IHW | 5 | 239 | 61 | 205 | 507 |

BPL for 100 or more originations plus deliveries: N9VE 209, KB2RTZ 197, K9GU 192, K5NHJ 174, WA5OUV 151, K8LJG 143, N5JZ 128, KK5GY 123, KC6GJM 113. QST

# Aurora Warnings

March is a prime month for aurora, because there is a greater probability of geomagnetic disturbances around the equinox periods near March 21 and September 21 than at other times. Underlying solar activity is not greater during these periods, but rather the magnetic fields of Earth and Sun are more strongly coupled. Thus, whatever solar eruptions do take place are likely to have a stronger effect on the Earth's magnetic field, which in turn initiates the sequence of events that cause auroral storms.

Radio amateurs have long sought ways to predict and anticipate geomagnetic disturbances and associated aurora. Radio aurora effects typically last only a few hours, so leaving the matter to chance may mean missing valuable operating time. Over the past several decades, a number of simple ways to anticipate such events have proved reasonably reliable. These methods are still useful, but they are primarily ways to identify auroral events already in progress or at best aurora just about to happen. Longer lead times could be even more helpful.

In recent years, data collected by satellite instruments, improved understanding of solar-geophysical effects, and the rapid distribution of information by the Worldwide Web has significantly improved auroral forecasting. Radio amateurs are delighted with these new forecasting methods, but they have implications that are more-serious for a host of other services. HF and satellite communications of all sorts can be disrupted by aurora. Solar storms present a physical threat to satellites and other spacecraft, as well as to humans who may be in orbit about the Earth. Geomagnetic disturbances can induce destructive currents into telephone lines, long-distance power distribution grids and pipelines. Warnings of aurora can allow various services time to take protective measures.

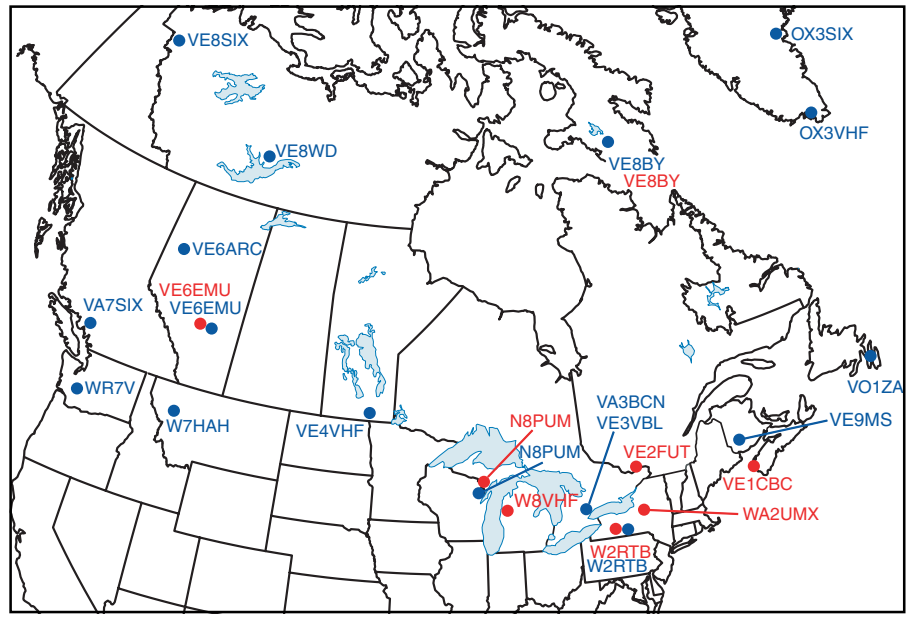


**Figure 1—Six-meter beacons potentially useful for aurora and auroral-E warnings in Canada and the northern US are shown in blue, and two-meter beacons are indicated in red. For details, see Table 1.**

## Traditional Methods

Radio amateurs have long used a number of indications to anticipate aurora. These include weak and wavering signals on the lower HF bands in the late afternoon, auroral distortion on polar paths on the higher HF bands and especially a geomagnetic K index of four or greater. For many decades, a worldwide network of geophysical observatories has reduced disturbances in the Earth's magnetic field to two scales, the 24-hour A index and the three-hour K index.

The K index is probably the more useful of the two, as it provides an indication of geomagnetic conditions at three-hour intervals on an ordinal scale from one to nine. A K-index of four or greater suggests that radio aurora is likely over the northern US, especially in late afternoon or evening. Higher K values indicate increasing intensity and southern expansion of aurora. The A and K indices, along with a 24-hour forecast of solar and geomagnetic conditions, are broadcast at 18 minutes after each hour over WWV at 5, 10, 15 and 20 MHz. The same message can be heard by telephoning 303-497-3235. Elaborate graphic presentations of the same data can be viewed over the Web. See the "Aurora Web Sites" sidebar for some of URLs of these pages.

### This Month

| | |
|---|---|
| March 11 | Good EME conditions |
| March 21 | Transequatorial propagation peaks ± 2 weeks |
| March 31-April 1 | European Worldwide EME Contest (432 MHz, 2.3, 5.7 GHz) |

## Beacons

Specially designed beacons can provide direct indications of aurora, but unfortunately, there are few such stations currently operating in North America. The most useful 50-, 144- and 222-MHz beacons would be located in southern Canada or the northern US border. To be most effective, they should run 10 to 50 W to small northern-facing Yagis. Published sources suggest that only VE6EMU in southern Alberta currently meets these criteria. A wider network of auroral beacons, especially from Maine to Minnesota, would be quite useful and might make the beacons good club projects.

About 20 other beacons are in locations that could provide warning of aurora, but they use omnidirectional antennas, such as crossed Yagi, egg-beater design, ground planes or vertical dipoles (see Table 1). These general-purpose beacons thus have limited potential for detecting aurora, but they are certainly worth monitoring anyway. The beacons across central and northern Canada are probably more suited for detecting associated auroral-E propagation.

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**Aurora Web Sites**

**Today's Space Weather** from NOAA presents geomagnetic K indices, electron and proton flux levels, as well as a brief three-day forecast of geomagnetic conditions in colorful graphic formats.
**www.sec.noaa.gov/today.html**

NOAA's **Space Environmental Service Center** provides more detailed descriptive forecasts of solar activity and geomagnetic levels.
**www.sec.noaa.gov/forecast.html**

A daily **Aurora Forecast** from the University of Alaska Geophysical Institute is designed primarily to aid visual observers, but the forecasts are also useful for radio. Forecast maps can be tailored for any place on Earth.
**www.gi.alaska.edu/cgi-bin/predict.cgi**

The **N1BUG Aurora Monitor** contains a variety of pages with much useful real-time data, aurora images from space and forecasts, along with many links to professional and popular aurora sites, including an aurora discussion list.
**members.mint.net/n1bug/prop/aumon/aufr.html**

**Table 1**
**50 and 144-MHz Beacons in Canada and the Northern USA**

| *MHz* | *Call* | *Grid* | *Power and Antenna* |
|---|---|---|---|
| 50.008 | VE8SIX | CP38 | 85 W 4-el |
| 50.012 | OX3SIX | HP15 | 100 W dipole |
| 50.020 | VE8WD | DP22 | 20 W omni |
| 50.036 | VE4VHF | EN19 | 35 W omni |
| 50.039 | VO1ZA | GN37 | 1 W omni |
| 50.041 | VE6EMU | DO33 | 35 W 4-el Yagi NNE |
| 50.044 | VE6ARC | DO05 | 25 W omni |
| 50.045 | OX3VHF | GP60 | 20 W omni |
| 50.048 | VE8BY | FP53 | 30 W omni |
| 50.049 | VA3BCN | FN03 | 2 W dipole |
| 50.057 | VA7SIX | CN89 | 10 W omni |
| 50.059 | VE3UBL | FN03 | 10 W omni |
| 50.062 | W7HAH | DN28 | 50 W omni |
| 50.065 | VE9MS | FN65 | 1 W omni |
| 50.068 | N8PUM | EN65 | 10 W dipole |
| 50.069 | W2RTB | FN12 | 10 W omni |
| 50.073 | WR7V | CN87 | 10 W omni |
| 144.276 | W2RTB | FN12 | 15 W omni |
| 144.276 | VE2FUT | FN25 | 15 W omni |
| 144.278 | N8PUM | EN65 | 10 W omni |
| 144.284 | VE1CBC | FN64 | unknown |
| 144.285 | VE6EMU | DO33 | 20 W 5-el N |
| 144.289 | WA2UMX | FN23 | 20 W omni |
| 144.292 | VE8BY | FP53 | 23 W dipole array |

## Web Sites

Several professional and amateur Web sites provide a variety of images, graphics and data useful for predicting aurora. The most useful information includes visual observations of coronal mass ejections (CME) from the sun, satellite measures of solar wind, proton and electron fluxes and images of the Earth's polar region taken from space.

Mass ejections of energetic protons and electrons from the sun can trigger dramatic geomagnetic disturbances. High-energy electrons and protons ejected from the Sun travel with the solar wind along the Sun's magnetic field lines. If these particles intersect the Earth's magnetic field, high-energy electrons may be directed toward the poles along the Earth's magnetic field lines. An auroral storm may result. This takes about 30 to 40 hours from the time the CME is first detected.

Earth satellites can provide about one-hour warning of such an event in the form of a sudden increase in solar-wind velocity and dramatic increases in proton and electron flux. These events show up clearly in the graphics and usually trigger descriptive warnings of an imminent geomagnetic storm. The effects can often be seen directly in visual images of the southerly extension of the aurora over the northern pole.

Several Web sites provide detailed tutorials and hints for using and interpreting the vast array of data available. Check on-line European packet networks to discover whether any Europeans are hearing or working stations via auroral or auroral-E propagation. Generally, Europe experiences the effects of aurora about five hours before North America.

## Operating

CW remains the preferred mode for aurora contacts because of severe Doppler distortion and broadening. SSB may be possible on 50 MHz, where distortion is less severe, but SSB is nearly impossible on 144 MHz and higher. Contacts at 222 and 432 MHz are usually possible whenever contacts can be made at 144 MHz, but signals will be weaker with Doppler distortion and broadening much greater.

It is essential to use a wide frequency separation between signals during auroral sessions, because it is impossible to separate two close stations with auroral distortion. The ordinary calling frequencies are almost certain to be occupied, so it is best to avoid them entirely. Listen below 50.100 MHz for CW activity and higher than 50.130 MHz for clear spots to operate SSB. On 2 meters, it was the practice not so long ago for auroral activity to begin around 144.110 MHz and spread out from there. This neatly avoided normal SSB activity centered on 144.200 MHz and provided some clear space to operate. This is still a good idea that needs reviving. On the higher bands, it may be a good idea to operate some kilohertz away from established calling frequencies to have a greater chance of being in the clear.

## ON THE BANDS

Worldwide 6-meter activities dominated the reports for December, but there was other propagation during the month. Sporadic E appeared on 6 meters across the US and Canada on at least 10 days, coincidentally on dates when F-layer propagation was also most evident. Six-meter DXers also noticed aurora during several of their morning sessions, but there was only one report of 2-meter auroral contacts. The Geminids meteor shower generally attracts a good deal of attention, but this year interest must have waned. Only one station reported making a Geminids contact. Finally, a new microwave record was broken on New Year's day in Virginia.

Read on for the details. Dates and times are UTC. Thanks also for the reports from NT1N, K2OVS, WB2AMU, WV2V, K4FB, W4WRL, K7ICW, K0AZ and N0JK, which also made this month's summaries possible.

## Six Meter DX

December is usually the peak month for worldwide propagation from most of North America, but activity fell short of the hopes of many DXers. The primary reason was that the solar flux ranged between 135 (December 9) and 201 (December 20), which is generally too low for sustained spectacular conditions. Nevertheless, there were some interesting sessions. A handful of West Coast stations managed contacts with Europe. Quite a number of Northeastern operators were treated to a rare two-hour opening to New Zealand, and V73AT gave out contacts on two afternoons across much of the US and Canada, including the East Coast.

Stations in Florida probably worked more European countries than did those in the Northeast, an interesting switch in the normal routine. Much of the rest of the activity was consistent with the two previous months of DX. In general, conditions to Europe, South America, across the continent and into the

Pacific were best during the first five days of December, although the solar flux fell from 185 to 147 during this period. Six meters was also open for transatlantic contacts nearly every day during the second half of the month, at least from the Northeast, but DX activity to other places lagged behind.

### Caribbean, Central and South America

Stations throughout the eastern half of the US and adjacent Canada were treated to strong openings to the south on December 1 to 4, 10, 11, 12, 23 and 25, primarily before noon local time. The majority of contacts with 8P9HW, 9Y4AT, FG5BG, FM1DQ, FY5KE, HC1MD, HC2FG, HK3PJ, HK4SAM, HP2CWB, HP3XUG, P43JB, P49MR, P49T, PZ5RA, V26JT, V31PC, VP2MDD, VP2VI, VP5KE, VP5/AA5B, YS1AG and several KP4, PY, TI and YV stations, were on SSB.

Several DX operators patiently logged pages full of contacts with eager US stations that were calling in the pileups. Antonio Scolamiero, YV4DDK, listed several hundred stations in all US call areas (save 6 and 7), VE1 and VE3 during the month. On some days, US stations could easily work half-a-dozen countries. Howard Sine, WB4WXR (EM74) in Alabama, reported an unusual evening opening that lasted for an hour after 2350 on December 10, during which he logged many LU, CE, CX, PY and ZP calls.

### Europe and Africa

There was transatlantic propagation on the mornings of December 1 to 5, 17 to 22 and 24 to 30, primarily from the East Coast. On most days, VE1YX and other stations in the Canadian Maritime Provinces had much better conditions than did those elsewhere. The band opened earlier (sometimes as early as 1200), European signals were stronger, and the Maritime stations worked more European countries than any others in North America. On December 18 alone, VE1YX reported working 225 Europeans in at least 22 countries as far eastward as Poland and Cyprus (5B4FL), which counts as Asia. VE9AA made a single odd contact with LZ2DF on December 26, when signals from OX, CT3, EH and CT were strongest along a southerly skewed path.

Conditions on most days were not quite this spectacular, especially for US stations. Signals were often weak with fading, openings were short and quite selective with opportunities often limited to the best equipped stations on both sides. The vast majority of openings extended only as far as Ireland (EI) and the United Kingdom (GM, GD, GI, GW and G). During the last few days of December, island stations CU7BC, TF3GW and OY9JD gave out contacts to eager takers, primarily in the Northeast. Contacts from the W1 and W2 call areas to PA, ON, SM, OZ, DL, HB, OK, S5 and I were less common. Contacts even further east were rare.

Those in Florida did better than this, especially on December 5 and 18. Bruce Sternstein, K2RTH (EL95), ran a huge pile-up on the fifth, logging OZ, SM and LA for new countries, along with numerous G, GM, F, PA, ON and DL calls. On the 18th, Bruce added SP (for country #101), along with more SM, OZ, DL and OK stations. SM7BAE was 59+ at times. K2OY/4 (EL86) made 19 QSOs with PA, DL, SP and OK that day, running 190 W into a seven-element Yagi. AE4RO (EL97) worked OM3EY and heard an OZ beacon. From the Florida panhandle, AC4TO (EM70) logged I, DL, OK and SP for new countries and heard many others he could not work.

Midwesterners also got a piece of the action. W8 and W9 call area stations worked CU, TF, GM, GI, EI, GW, G, HB and I on several days. See Table 2 for a summary. K0AZ (MO) snagged EI5FK and GM0EWX on December 3, when selected Europeans made their westernmost contacts. K5CM (OK) hooked up with G4CBW that same day. K1SG (MA), K8MFO (OH), WB9HLM, K9HMB, K9TI and K1MOD (all IL) worked S92DX on December 4, the only US stations to do so before S92DX left Sao Tome.

West Coast operators, who have often listened with envy as others worked Europe, got some breaks this December. N6CA and N6XQ hooked up with EH7KW on December 1 around 1750 over a path skewed south toward Africa. Signals were weak. A few more West Coast stations made it on that memorable December 3. GW4VEQ, GM6NX, G4CBW and GI0OTC worked through staggering pileups of W1, 2, 3, 8 and 9 stations through the morning. After 1700, GW4VEQ worked N5JHV (NM), eight W7 (AZ) stations, N6XQ, N6CA and N6CT, the latter with 599 signals. GM6NX heard N5JHV but could not attract his attention. G4CBW logged N5JHV and heard WA7COJ. GI0OTC worked AA7A (AZ) and perhaps others.

### Transcontinental

Single-hop transcontinental F-layer contacts took place on December 1, 2, 3, 4 and 27. The most intense opening was undoubtedly December 3, when coast-to-coast paths opened prior to 1700 and persisted until at least 2200.

**Table 2**

**US to Europe and Africa on 50 MHz in December (Except W1, 2, 3)**

| *Day* | *US Calls and Call Areas (State)* *DX Calls* |
|---|---|
| 1 | W6—EH7KW |
| 3 | W4 (SC, FL, AL)—GM, GI, EI, GW |
| | W5 (NM), W6, W7 (AZ) GW4VEQ |
| | W7 (AZ)—GI0OTC |
| | W8 (OH)—GM, GW |
| | W9—(CU) |
| | W0 (MO)—GM, EI |
| 4 | W4 (FL, AL)—GM, GI, HB, LA SM |
| | W5 (OK)—G |
| | W8 (OH), W9 (IL)—S92DX |
| 5 | W4 (FL)—GM, G, PA, ON, F, DL |
| | W5 (OK, NM)—G |
| | W7 (AZ)—GW, GI |
| 17 | W4 (NC)—HB |
| | W8 (OH)—EI, HB, I |
| 18 | W4 (FL)—PA, ON, OZ, DL, I, OK, SM, SP |
| 20 | W4 (FL)—F |
| 24 | W4 (GA, FL)—GW, I, OK |
| | W8 (OH)—EH |
| 25 | W4 (VA)—TF |
| | W8 (OH)—GM |
| 27 | W8 (OH)—GM, GI, GW |
| | W9 (IL, WI)—GM, CU |
| 28 | W8 (OH)—TF |
| | W9 (IN, WI)—GM |
| 29 | W8 (OH)—CU |
| | W9 (IL)—GM |

The first hour or so coincided with the time when West Coast stations made their contacts with the United Kingdom. Signals from both coasts were as strong as many old-timers can ever recall during similar openings, but the skip zone did not shorten up significantly.

### Alaska, Asia and the Pacific

There were only a few modest openings to Asia in December, but East Coast stations worked across the Pacific on at least two days. Widely scattered DXers in Washington, Oregon and Nevada made a few Japanese contacts on December 1; W7XU/0 logged eight JAs the next afternoon; and a few JAs made it into California and Colorado logs on December 3.

V73AT in the Marshall Islands made contacts with VE7 and VE6 stations, along with W7XU/0 and VE9AA, on December 2. The next day between 2113 and 2229, while transcontinental signals were still booming, V73AT ran off 80 CW contacts in W1, 2, 3, 8, 9 and 0 (MN) through a big pileup and QRM. This was a welcome surprise to East Coast operators, who had no other indications of propagation to the Pacific. The only other notable Pacific opening took place between 2100 and 2230 on December 23, when ZL2TPY, ZL2IP and ZL2KT made quite a few SSB contacts into the Northeast.

Less spectacular but no less surprising were the two days on which Alaskans worked across the US as far as southeast as Florida. Stations across the northern half of the US, from Washington and Oregon to Michigan, West Virginia and south to Missouri reported KL7NO and WL7M on December 2. The following afternoon, when many other paths seemed to break loose, AL7NU, NL7Z and KL0RG joined their fellows to work across much of the US. W5UWB in south Texas reported that AL7NU was in for two hours, as stations across much of the south reported the Alaskans, including AE4TO (FL) and WB4WXE (AL).

There was also interesting propagation from Southeast Asia to much of Europe during the first week or so of December. Conditions were especially good on December 3 and 4, when western Europeans logged 9M2NK (West Malaysia), DU1/GM4COK (Philippines), VR2LC and others in Hong Kong and YB5QX (Indonesia). XU7AAP (Cambodia) ran a string of Europeans on December 8. Another notable Asian opening took place on December 17, when UK9AA hooked up with SP6ASD and other ES and OH stations, the first ever 6 meter contacts from Uzbekistan.

### Sporadic E

There were scattered reports of single-hop E skip somewhere across the country on December 2, 3, 4, 11, 17, 27, 28, 29 and 31. These short-lived openings were typical for the mid-winter sporadic-E season. George Clement, KF4ZKU (EL89), did make some unusual winter E-skip contacts with KP4EIT and KP4UK from Florida on the afternoon of December 11. George was running just 10 W to a three-element Yagi. Gary Carter, WA4IAM (FM06), has been having some success running PSK31 during E-skip openings on 50.290 MHz, which seems to have become the center for such activities.

### Aurora and Meteor Scatter

Other modes were scarce. Ray Bohmer, W1REZ, (FN55) in Maine was surprised to

## EME Annuals

Published Earth-Moon-Earth annual standings include stations with a minimum number of unique initial contacts as of January 1. For a complete list of all reporting stations, check the VHF/UHF/Microwave Standings Boxes at **www.arrl.org/announce/standings**. To ensure that the Standings Boxes reflect recent activity, submit reports at least every two years by e-mail to **standings@arrl.org**. For printed reporting forms, send a request with SASE to Standings, ARRL, 225 Main St., Newington CT 06111.

| Call Sign | Initial QSOs | DXCC | States |
|---|---|---|---|
| **6 meters (50 to 54 MHz)** | | | |
| K6QXY | 30 | 12 | 10 |
| W6JKV/5 | 19 | 9 | 7 |
| W7HAH | 15 | 5 | 6 |
| W7FN | 15 | 5 | 4 |
| W5FF | 13 | 5 | 4 |
| VE1ALQ | 12 | — | — |
| **2 meters (144 to 148 MHz)** | | | |
| W5UN | 2453 | 154 | 50 |
| KN6M/5 | 2012 | 96 | 40 |
| KB8RQ | 1582 | 143 | 50 |
| VE7BQH | 1235 | 130 | 50 |
| W7CS | 739 | 85 | 50 |
| N5BLZ | 715 | 84 | 50 |
| W7HAH | 703 | 84 | 50 |
| W5DOG | 638 | 81 | 50 |
| W0HP | 628 | 84 | 50 |
| N1BUG | 500 | — | 50 |
| W7FN | 459 | 67 | 50 |
| K1CA | 425 | 104 | 50 |
| W5LBT | 375 | 130 | 50 |
| WA6PEV | 339 | 52 | 50 |
| KI3W | 337 | 61 | 50 |
| VE3KH | 290 | 52 | 50 |
| AA7A | 284 | 47 | 48 |
| K6AAW | 231 | 39 | 47 |
| N4GJV | 251 | — | 49 |
| W8WN/4 | 216 | 46 | 36 |
| VE1ALQ | 204 | 68 | 50 |
| W0PT | 196 | 36 | 32 |
| VE3BQN | 196 | — | 38 |
| K8BHZ | 190 | 41 | 32 |
| WA4MVI | 184 | 44 | 46 |
| VE6TA | 176 | 35 | 43 |
| WA1JOF | 151 | 33 | 33 |
| W7GJ | 151 | 101 | 50 |
| WD5AGO | 150 | 31 | 32 |
| WA7KYM | 147 | 29 | 40 |
| AF1T | 128 | 28 | 46 |
| K0FF | 147 | 31 | 31 |
| W0VD | 136 | 38 | 27 |
| N7EIJ | 127 | 25 | 39 |
| W7EME | 114 | 40 | 41 |
| W8WVM | 111 | 29 | 35 |
| KV6J | 108 | 17 | 27 |
| N0AKC/9 | 107 | 22 | 48 |
| K6WLC | 101 | 3 | 15 |
| W3EME | 100 | 26 | 16 |
| W5UWB | 100 | 29 | 36 |
| I2FAK | 994 | 117 | 50 |
| HB9CRQ | 725 | — | 50 |
| SM5BSZ | 587 | 86 | 46 |
| PA0JMV | 567 | 100 | 50 |
| EA2LU | 562 | 65 | 42 |
| IK2DDR | 324 | 54 | 38 |
| S52LM | 312 | 60 | 33 |
| JA4BLC | 296 | — | — |
| F9HS | 252 | 49 | 27 |
| KL7X | 243 | 33 | 49 |
| PA3DZL | 232 | 46 | 28 |
| HB9Q | 203 | — | — |
| JA9BOH | 194 | 39 | 34 |
| LA8LF | 192 | 39 | 37 |
| SV1BTR | 165 | 48 | 29 |
| 9H1CD | 148 | 39 | 27 |
| SM3AKW | 132 | 29 | 21 |
| AL7FS | 119 | 11 | 49 |
| DL5DTA | 108 | 24 | 17 |
| **1.25 meters (222 to 225 MHz)** | | | |
| VE3AX | 35 | 4 | 35 |
| W5LUA | 29 | 4 | 34 |
| W1JR | 27 | 3 | 27 |
| K2UYH | 12 | — | 6 |
| **70 cm (420 to 450 MHz)** | | | |
| K2UYH | 601 | — | — |
| N4GJV | 598 | 52 | 50 |
| K1FO | 527 | 75 | 49 |
| N9AB | 355 | — | — |
| KD4LT | 330 | 47 | 38 |
| K0RZ | 295 | 45 | 39 |
| W7FN | 289 | 58 | 50 |
| W1ZX/3 | 289 | 41 | 47 |
| N2IQU | 267 | — | — |
| W1JR | 228 | 41 | 50 |
| W0RAP | 211 | 48 | 44 |
| W0KJY | 207 | 43 | 42 |
| W5LUA | 201 | 33 | 46 |
| W7HAH | 192 | 40 | 46 |
| W4TJ | 190 | 40 | 43 |
| VE1ALQ | 188 | 31 | 33 |
| W6DF | 131 | 30 | 26 |
| KB3PD | 120 | 27 | 44 |
| WA4OFS | 115 | 27 | 32 |
| K1CA | 108 | 27 | 30 |
| W3XS | 105 | 25 | 30 |
| WD5AGO | 101 | 23 | 25 |
| KA0RYT | 94 | 23 | — |
| WA4MVI | 79 | 12 | 38 |
| W8TN | 74 | 16 | 28 |
| W8MQW | 71 | 12 | 12 |
| VE6TA | 68 | 18 | 18 |
| KB8RQ | 52 | — | — |
| DL9KR | 710 | 81 | 50 |
| SM4IVE | 510 | 47 | 31 |
| OE5JFL | 502 | — | — |
| DK3WG | 362 | 64 | 42 |
| UR5LX | 360 | 60 | 41 |
| SM2CEW | 352 | 62 | — |
| SM3AKW | 345 | 55 | 35 |
| OK1KIR | 342 | 62 | 44 |
| G3LTF | 334 | 55 | 47 |
| DL9NDD | 321 | 47 | 38 |
| JA9BOH | 292 | 47 | 42 |
| G3SEK | 275 | 54 | 42 |
| I2COR | 251 | 40 | — |
| JA4BLC | 248 | — | — |
| OZ4MM | 177 | 39 | — |
| G4ERG | 166 | 34 | 30 |
| KL7WE | 162 | — | 50 |
| OH2DG | 162 | — | — |
| LA8LF | 160 | 32 | 32 |
| ON4KNG | 146 | 36 | 18 |
| ZS6AXT | 140 | 34 | — |
| EA6ADW | 140 | 22 | 18 |
| UA9FAD | 131 | — | — |
| OE9ERC | 127 | 30 | 22 |
| PA3DZL | 121 | 38 | 30 |
| EA2LU | 119 | 32 | 18 |
| DK3FB | 114 | 32 | — |
| IK5WJD | 68 | 23 | 13 |
| SV1BTR | 64 | 25 | 17 |
| OX6OL | 60 | — | — |
| AL7OB | 58 | 15 | 18 |
| OK1CA | 57 | 25 | 22 |
| **33 cm (902 to 928 MHz)** | | | |
| W5LUA | 9 | 2 | 6 |
| AF1T | 7 | 1 | 6 |
| W0RAP | 6 | 2 | 5 |
| WA8WZG | 5 | 5 | 5 |
| **23 cm (1240 to 1300 MHz)** | | | |
| W5LUA | 190 | 40 | 32 |
| WD5AGO | 162 | 35 | 33 |
| K2UYH | 161 | 28 | 34 |
| VE1ALQ | 130 | 30 | 23 |
| W2UHI | 120 | 30 | 24 |
| N6BQ | 119 | 29 | 25 |
| N2IQ | 119 | — | — |
| K2DH | 105 | 31 | 22 |
| KD4LT | 89 | 27 | 16 |
| K0YW | 84 | 24 | 20 |
| W0KJY | 72 | 22 | 25 |
| VE6TA | 66 | 22 | 18 |
| W4TJ | 64 | 23 | 22 |
| W4OP | 61 | 22 | 13 |
| W3XS | 58 | 20 | 21 |
| K3HZO | 54 | — | — |
| W0RAP | 53 | 17 | 16 |
| OE9XXI | 235 | 43 | 33 |
| OE9ERC | 206 | 36 | 28 |
| SM4IVE | 165 | — | 37 |
| OK1KIR | 164 | 37 | 25 |
| ZS6AXT | 163 | 31 | — |
| HB9BBD | 156 | 36 | 17 |
| SM3AKW | 154 | 34 | 20 |
| EA6ADW | 147 | 31 | 24 |
| OZ4MM | 146 | 28 | 14 |
| SM6CKU | 145 | 28 | 17 |
| G3LTF | 142 | 31 | 20 |
| G4CCH | 140 | 30 | 23 |
| LA8LF | 124 | 27 | 29 |
| F5PAU | 120 | — | — |
| SM2CEW | 103 | — | — |
| DJ6YW | 102 | — | — |
| OE5JFL | 92 | — | — |
| HA5SHF | 89 | 20 | 6 |
| S57DCD | 80 | — | — |
| JA4BLC | 73 | — | — |
| OK1DFC | 70 | 25 | 13 |
| I2COR | 63 | 26 | 10 |
| OH2DG | 56 | — | — |
| JA9AHB | 55 | — | — |
| **13 cm (2300 to 2310, 2390 to 2450 MHz)** | | | |
| W5LUA | 45 | 20 | 9 |
| WA8WZG | 13 | 10 | 4 |
| OE9XXI | 51 | 19 | 11 |
| OE9ERC | 46 | 20 | 8 |
| OK1KIR | 39 | 19 | 9 |
| ZS6AXT | 31 | 16 | — |
| JA4BLC | 19 | 12 | 3 |
| G3LTF | 14 | 12 | 2 |
| JA7BMB | 11 | 8 | 3 |
| SM3AKW | 10 | 9 | 2 |
| **9 cm (3300 to 3500 MHz)** | | | |
| W5LUA | 5 | 5 | 1 |
| W7CNK | 2 | 1 | 2 |
| ZS6AXT | 7 | 5 | — |
| **5 cm (5650 to 5925 MHz)** | | | |
| W5LUA | 20 | 14 | 4 |
| VE1ALQ | 13 | 9 | 3 |
| W7CNK | 10 | 6 | 2 |
| OE9ERC | 20 | 14 | 2 |
| OE9YTV | 17 | 13 | 3 |
| OE9PMJ | 16 | 12 | 3 |
| OK1KIR | 15 | 11 | 3 |
| **3 cm (10 to 10.5 GHz)** | | | |
| W5LUA | 30 | 15 | 6 |
| AA5C | 22 | 14 | 4 |
| WA5VJB | 19 | 10 | 5 |
| OK1KIR | 12 | 10 | 2 |
| OE9ERC | 11 | 7 | 3 |

find some 2-meter aurora on December 12 just after 0040. He worked K0PW and KA0RYT (both EN34 in Minnesota) at about 1800 km and heard others scattered across the upper Midwest. Herb Krumich, WA2FGK (FN21), provided the only report of meteor-scatter work during the Geminids shower. Herb completed with KU4WW (EM54) in Alabama for his 42nd state on 2 meters. Surely, there was more activity during both events but this is all that was reported.

## Microwaves

### *145 GHz Record Extended*

Brian Justin, WA1ZMS, reports that the 145-GHz distance record (34 km) he helped set in November has been smashed with a 61-km contact made on January 1. During this latest effort from Virginia's Blue Ridge Mountains, Brian was at the controls of W2SZ/4 on the Blue Ridge Parkway (FM07fm), while WA4RTS/4 was set up west of Stauton in FM08ia. The temperature was below freezing with relative humidity of about 60%. Brian calculates that this reduced the atmospheric losses (mainly due to water vapor) to 0.27 dB per km. The pair had the same 5-mW transceivers used in November but with some improvements to one of the dish feeds.

## NOTES FROM ALL OVER

### EME Conditions for 2001

At least half a dozen weekends remain in 2001 with good Earth-Moon-Earth conditions, according to data supplied Derwin King, W5LUU. The very best day of the year was February 7, with a total signal degradation of considerably less than 0.1 dB at 144 MHz. EME conditions generally deteriorate throughout the rest of the year, but there are still some prime opportunities. July 1 and October 14 rate excellent conditions (degradation less than 1.0 dB).

Degradation compares ideal conditions (0.0 dB) with calculated additional losses from the actual distance to the Moon and noise from stars and other sources in the sky behind the Moon. Weekends when the total path degradation on Sunday at 0000 UTC is no more than 2.5 dB (which Derwin rates as good or better) appear in the This Month box each month. Degradation at 144 MHz can be as high as 12 dB—the equivalent of two S-units. Good, very good and excellent weekends provide the best chances for completing EME contacts, especially for smaller stations. Many thanks to W5LUU for providing the Moon data used throughout the year.

## VHF/UHF/MICROWAVE NEWS

### European Worldwide EME Contest

The French Amateur Radio association REF and the German Amateur Radio journal *DUBUS* are sponsoring their fifth annual international EME contest over two weekends in late March and April. The first weekend for 432 MHz and 2.3 through 5.7 GHz bands runs for from 0000 March 31 to 2400 April 1. The second weekend for 144 MHz, 1.3 and 10 GHz runs the entire UTC days of April 28 and 29.

There are separate entry classifications determined by effective radiated power on each band. Scoring distinguishes between scheduled and unscheduled contacts below 2.3 GHz. Multipliers are DXCC entities, US and Australian states and Canadian provinces. For full rules and entry format, see *DUBUS* issue #4/2000 or **www.dubus.org**

# Unlicensed Operators on the High HF Bands: What to Do?

*By Brennan Price, N4QX*
*Field and Regulatory Correspondent*

An amateur wakes up one Saturday morning and turns on his rig. The solar conditions are supposed to be amazing over the weekend, perfect for snagging a few new countries on 10 meters. He flips the band to 28 MHz and hears heavy noise; it sounds somewhat like distorted speech. He tunes up the band and the speech becomes stronger, and less distorted. Finally, at about 28.535 MHz, he resolves the signal—on lower sideband. A fellow is chatting away, and coming in very strong. From his description of the weather and the neighborhood, he appears to be nearby. The person with whom he's talking appears to be across the country. The conversation is a little more risqué than a typical amateur QSO, but not seriously offensive. He's curious who these folks are, so he gives his call sign.

"What's that?" asks the local.

"This is WW1XYZ," he repeats. "What's your call sign?"

"My call sign is Garbageman. Get off my fine frequency!" he shouts into his microphone. Of course, Garbageman doesn't really describe the frequency as "fine." He instead uses the gerundive form of what Jean Shepherd, K2ORS (SK), described as "the queen mother of dirty words" in his 1983 film "A Christmas Story." Our hapless ham just sits there stunned, shaking his head and deciding to try 15 meters instead. He can't hear anything but Garbageman anywhere on 10.

The above story has been dramatized for effect, but according to a respondent to ARRL's survey of unlicensed operation, conducted in October of last year,[1] Garbageman exists, is on the air regularly, and has been known to tell amateurs to get off his "fine" frequency. Of course, Garbageman may only use 28.535 MHz legally if he has an Amateur Radio license of at least General class and operates within the rules. Given his habitual use of lower sideband on 10 meters, and his use of "Garbageman" as a call sign, it is unlikely that he is a licensed amateur of any class. The frequency isn't his. It's ours.

Garbageman isn't alone. Unlicensed operations are fairly prevalent in the upper HF bands, particularly 10 and 12 meters. At the top of the sunspot cycle, when 10 and 12 exhibit remarkable propagation, these operations appear to become more numerous. In reality, these operators have probably been using our bands for some time; we only hear them more often when Old Sol is at its strongest.

Between October 1 and 14, ARRL received nearly 400 reports documenting at least 1000 isolated cases of apparently unlicensed operation on 10 and 12 meters. Roughly half of the cases appear to have originated in the United States; most of the rest of the cases appear to have originated elsewhere in the Americas.

Many IARU member societies, including the ARRL, participate in the IARU Monitoring System, documenting intruders of all types heard in the amateur bands.[2] Because of the large number of CB-like operations on 10 meters, coupled with the fact that many of these operations are mobile and difficult to find, most monitors understandably report only items that are more easily traced.

The Monitoring System has a nice track record in documenting and finding intruders and persuading them to QSY. The success rate is not 100%, but it is much greater than zero.[3] However, CB-like operations are so numerous, trying to find them all can be a logistical nightmare. These operations are best documented and identified one at a time; someone close to the source is usually best able to do this. In this column, we offer some common sense guidance about how to document these intrusions, find them, if necessary, and how to proceed in the event that you find one.

## Who Has Enforcement Power To Stop These Folks?

The telecommunications authority in the country involved. In the United States, that's the Federal Communications Commission. It's important to remember that the FCC is the enforcement body, and the amateur community isn't. The FCC is willing to accept and act on documentation provided by amateurs, but it is critical to remember that our role is limited to documentation. *An amateur taking the law into his or her own hands and directly confronting an intruder takes an absolutely unacceptable risk, and may be held civilly and criminally responsible for his or her actions.*

## What If I Hear A Source Apparently From Outside the United States?

Individual telecommunications administrations are the only authorities that can take action in their respective countries.The FCC can be effective in dealing with unlicensed domestic operation, as long as we are effective in documenting such operation, there's very little the Commission can do about intruders outside the United States, aside from advising a foreign administration through diplomatic channels.

If the country of a persistent intruder can be identified, you may report it to the ARRL Monitoring System via e-mail at **n4qx@arrl.org**. It will be passed along to the appropriate IARU Member Society, if one exists, for their consideration. Beyond that, there's not much that a United States amateur can do, aside from standing at the appropriate border or coast and menacingly shouting, "Bad RF! Stay out of this country! I'm warning you!" This is not recommended, as it is ineffective and looks quite silly.

## Someone's Operating Without A License in the United States. Help Me Turn the Scoundrel In!

Okay. Do you have the scoundrel recorded on tape?

## Uh...No.

I hate to break this to you, but the scoundrel is *not* operating without a license. In fact, the scoundrel doesn't exist. You're imagining things, or might as well be. I'm serious.

The FCC cannot act on a case unless there is evidence that the offending transmission in fact happened. Tape is far and away the best way to provide this evidence. It's very hard to argue with tape. It's very easy to dismiss a claim of unlicensed operation without it. So easy, in fact, that people documenting unlicensed activity for potential FCC action are well advised to make the following sentence their mantra:

*If it isn't on tape, it never happened.*

Go back and read the above sentence several times. It's important. Most months, ARRL Headquarters receives at least one phone call from an amateur, claiming "I caught this person doing such and such red-handed! How do we get FCC action?" Almost invariably, there's

[1]Notes appear on page 103.

John C. Hennessee, N1KB ♦ Regulatory Information Specialist

no tape of the alleged offense. The call ends shortly thereafter, as HQ can't help the amateur unless there's a tape.

### How Do I Make These Tapes?

According to FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth, K4ZDH, recordings should be made on *standard* cassette tapes, include the date and time of the recording, and the frequency of the transmission. Any notes should be made off the tape, not recorded by voice on the tape. The purpose of the tape is to record the offending transmission, not the editorial comments of the observer.

### I Have Tape. Help Me Turn the Scoundrel In!

Great. Tape is crucial. Do you have any idea where the scoundrel is located?

### No. I Was Hoping You Could Get the FCC To Find Them.

That's easy enough to ask, but we really can't expect it.

The FCC's High Frequency Direction Finding facility in Columbia, Maryland, is a great tool, but like the rest of the Commission, its resources are limited. In severe, persistent cases, we have asked the HFDF facility for assistance, and its staffers have graciously provided it. However, we cannot expect them to track down every domestic unlicensed operator. The Amateur Service cannot afford to jeopardize a valuable relationship with the HFDF facility by asking for assistance more often than they can provide it.

Sometimes, an unlicensed operator will give telltale signs of his identity and location while on the air. Listen to the tape. The intruder may give enough information to give himself away. But if he doesn't, the process isn't over. The intruder has to be found, and we can't rely on the FCC to find him. If the Commission is to take action, amateurs have to find him. That takes a lot of volunteered time and energy, and it's hard work. But it isn't impossible work, and amateurs have successfully done it in the past.

### The Scoundrel Appears To Be Half A Continent Away, and He Says He's Mobile.

Sometimes there are battles you just can't win. In fact, since most of the unlicensed operations one hears on the high HF bands are both mobile and half a continent away, the battles you can't win greatly outnumber those you can.

The best way to combat distant, mobile HF operation is probably to choose intruders that are more easily found, those that are stationary or near to the observer, preferably both. Amateur enforcement actions have been widely publicized recently, and behavior among amateurs has noticeably improved. Future enforcement actions against unlicensed HF operation are likely to generate publicity, and the publicity will cause people to think twice before keying their microphones in the amateur band.

### The Scoundrel Appears To Be Half A Continent Away, But He's Stationary.

If you're in Miami, and you hear an intruder say he's in Indianapolis, and the intruder is stationary, please feel free to give ARRL Headquarters a call or e-mail. We will alert the Amateur Auxiliary in the area. Official Observers are volunteers, and can't be expected to drop everything to find the intruder. But if the notification isn't made, the chance of successfully finding the intruder is zero.

### The Scoundrel Is In My Town!

It's time to go DFing. You don't have to be an Official Observer to DF, but you do have to use some common sense, and it greatly helps to work in teams. A thorough discussion of direction finding techniques is beyond the scope of this article. I recommend consulting the appropriate sections of the *ARRL Handbook* and the excellent book *Transmitter Hunting: Radio Direction Finding Simplified*, by Joseph Moell, K0OV, and Thomas Curlee, WB6UZZ.[4]

### I Found The Scoundrel! What Do I Do Now?

If the intruder is mobile, you write down the license plate number, turn around, and go home. If the intruder is fixed, you write down the address, turn around, and go home. *The most important steps in either case are the last two: turning around and going home.*

Go back to the first question in this column and read the answer again. Never forget that amateurs aren't police officers. You do not have arrest powers. You do not have powers to seize equipment. The only thing you can do as an amateur is document the fact that an intrusion occurred and establish its source. *An amateur taking the law into his or her own hands and directly confronting an intruder takes an absolutely unacceptable risk, and may be held civilly and criminally responsible for his or her actions.* I know I said that before. It bears repeating.

Once you have taped the unlicensed operation and identified its source, send the tape, documentation, and a brief description of any DF work to Riley Hollingsworth at the FCC, 1270 Fairfield Rd, Gettysburg, PA 17325. If you would like your package to be reviewed by someone familiar with amateur enforcement matters before it is sent to the FCC, please feel free to send it to ARRL Headquarters for a review. If the case is complete, we will forward it to the Commission. If it needs further work, we will advise what needs to be done, and offer guidance to help you make the package complete.

### What Is The ARRL Doing About The "Freebanders" Who Operate Above The CB Band But Below 10 Meters?

Nothing, because the freeband is not an amateur band.

The spectrum between CB and 10 meters is occupied by a variety of Fixed and Mobile Services. The primary occupants of these bands are generally well equipped to combat unlicensed operation on this band when they elect to do so. Unless a freeband station is emitting a spur that falls within an amateur band, the freeband operation is not an amateur concern.

### I Have Neither The Time Nor The Energy To Find Intruders.

I can't say I blame you. It's a hard, thankless, and often fruitless job. But there is something you can do to combat the problem: *get on the air and use 10 and 12 meters!* CB-like operations often appear on these bands because they are relatively uncrowded compared to the Citizen's Band. Unlicensed operation drops on contest weekends, when the ham bands are quite busy. Getting on the air and using our spectrum is the quickest, easiest way to discourage unlicensed operation. It's difficult for these stations to communicate on frequencies already in use, and it's easier for us to use 10 and 12 meters than to find unlicensed operators. So the next time you turn on the radio, don't let the Garbagemen of the world drive you off! Finding intruders is not the only way to beat them; working through their QRM is often equally satisfying.

**Notes**

[1]Rick Lindquist, N1RL, "IARU Monitors Seek Reports of Unlicensed Operation," *QST*, Dec 2000, p 76.

[2]The HF band segments exclusively allocated to the Amateur Service worldwide are 7000-7100, 14000-14250, 21000-21450, 24890-24990 and 28000-29700 kHz. Any non-amateur signal in these bands is an intruder. Non-amateur signals in other United States amateur bands may or may not be intruders, depending on the location of its source. For more information on the IARU Monitoring System, please see **www.iaru-r2.org/p8e.htm**.

[3]For a successful "kill" on the part of the Monitoring System, see "HF Intruder Apparently Buzzes Off" on the ARRLWeb, **www.arrl.org/news/stories/1999/10/14/2/**.

[4]Both books are available from your favorite dealer or the ARRL Publications department. See **www.arrl.org/shop** or call toll free at 888-277-5289.

# BC-625 Surplus 2-meter Transmitter

After World War II the VHF bands changed. Gone were 5 meters and 2½ meters. Replacing them were two new bands, 6 meters and 2 meters, both still popular today. One of the reasons 2 meters became popular was the availability of inexpensive war surplus radios such as the "SCR-522 VHF XMTR-RCVR" used in American and British planes.

For $39.95 or less you could purchase the 100-pound SCR-522, consisting of a BC-624 receiver and a BC-625 transmitter in "excellent" condition, complete with conversion instructions. Various magazines published articles about using them, and included conversion instructions as well. Ham clubs around the country encouraged members to pool their funds and turn the conversions into club projects. Soon they were heard everywhere on 2-meters.

## Conversion Details

According to the *Surplus Radio Conversion Manual, Volume 1*, (1948) one of the first things you would do is remove and discard the mechanical tuning arrangement. Mechanical modifications would include a new front panel designed to accommodate a new 4-position crystal switch, a panel meter and microphone and key jacks. Detailed drawings indicated where the panel holes were to be drilled for the new controls so that they would align with the existing transmitter metering and tuning controls. Extension shafts from the controls would allow tuning knobs to be added to the panel. The panel was attached using brackets mounted on either side of the transmitter chassis.

Individual options and designs were all different, due to different needs of the owners. The one pictured in this column has additional controls and switches: an audio gain control, an MCW/phone switch, a power switch, a **PLATE ON** switch and an external crystal jack instead of the 4-position switch.

## Two BC-625 Gems

I own two modified BC-625s. The unit shown in this column is the best looking one I have ever seen. The unknown builder was extremely talented and attended to details such as the hand-drawn paper labels and tuning-control indicators. He placed the radio in a "Bud" manufactured cabinet; it must have really looked good in his station. The other BC-625 that I own is plain and functional without indicators or a cabinet. Both worked very well for the owners, I'm sure.

**SCR-522 VHF XMTR-RCVR**
**for all-purpose work**
**at 100-156 MC**


Used on all AAF and RAF planes—now yours at a fraction of cost. Ten-tube crystal-controlled superhet has 3-microvolt sensitivity at 10 mw output. 7-tube temperature-stabilized xmtr delivers 15 watts. Remote push-button tuning on 4 crystal-controlled send-receive channels. 28 volt d-c dynamotor powers entire rig. Complete with tubes, plugs, instructions for conversion to 110 volt a-c operation. Excellent condition. Weight, about 100 lbs.

**This advertisement for the SCR-522 appeared in May 1947 *QST*.**

## Power Supply

After the transmitter modifications were completed, the only other required item was a power supply. Three voltages were needed: +300 V, –150 V and 12 V (for filaments). This is an extremely simple power supply to construct, making the entire project an easy one for the new ham.

The SCR-522 could also be used mobile with a 28-V PE-94A dynamotor for high voltage, and by adding an extra 28-V battery and charging system to the car. The BC-625 itself would reside in the trunk with the BC-602 remote control box near the operator. Our modern miniaturized mobile rigs make BC-625 mobile installations look extraordinarily bulky and complicated by comparison! Visit my Web site at **www.eht.com/oldradio/arrl/index.html** for more images of the BC-625.

## SEE YOU AT THE HAMFESTS

Hamfest season is upon us. Check the Old Radio Museum schedule on my Web page to see where I'll be. Look for my call letters on my hat and say hello.—*K2TQN* QST


**A close-up of the converted BC-625. Notice the intricate detailing of the paper labels.**

**A view of the entire converted BC-625 in its Bud cabinet.**

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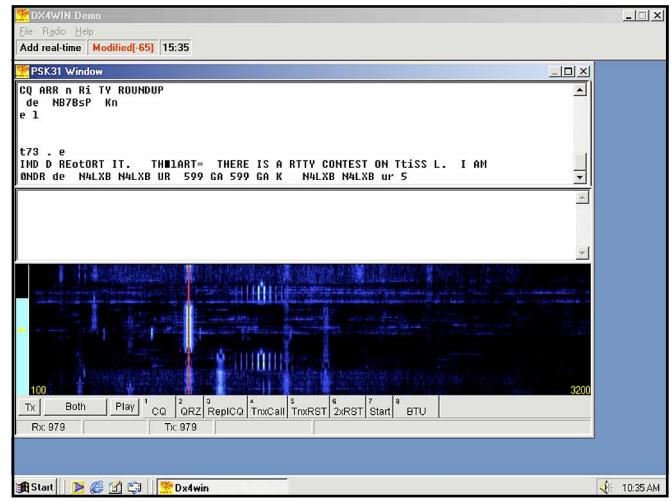
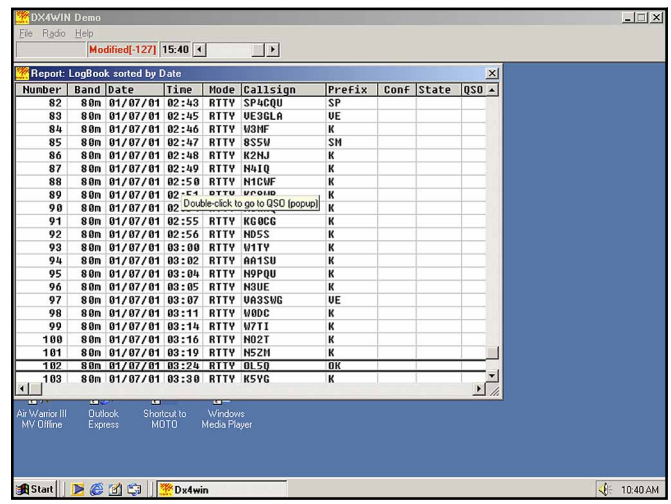
# DX4WIN/32

*DX4WIN/32* from Rapidan Data Systems is a software package that adds new meaning to the word "multifaceted." It does all standard logging tasks such as award tracking (DXCC, WAS, WAZ, IOTA, VUCC, TenTen and more) and label printing. It even includes features that are quickly becoming standards in the rest of the software logging world such as rig control, multiple log access and so on. But *DX4WIN/32* adds a number of abilities that place it in front of the pack…

- PSK31 operation with your PC soundcard. You can send and receive PSK31 within *DX4WIN/32*—and log your QSOs in *DX4WIN/32* as you go.
- CW keyboard.
- World map display with grayline.
- Antenna rotator interfaces.
- CD-ROM database support.
- A contest mode with dupe checking and incrementing serial numbers.




***DX4WIN/32* in the PSK31 mode. Individual signals are displayed in the waterfall portion of the window.**




**My RTTY Roundup log sorted by date.**

## Test Drive

My opportunity to try *DX4WIN/32* came early last January. I had just finished working the ARRL RTTY Roundup using *WriteLog* software. Could *DX4WIN/32* digest my *WriteLog* file? I entered *WriteLog* and saved my RTTY Roundup file in ADIF format, a standard for database exchange. Then, I opened *DX4WIN/32*, started a new log labeled WB8IMYRTTY, and then used the Import function to read the *WriteLog* ADIF file.

The data flowed into *DX4WIN/32* effortlessly, and I received a report of the results. Now I could page through the log, sort the QSOs as I pleased and print labels. I jumped to the award-tracking section to see how many entities I had bagged for my RTTY DXCC.

*DX4WIN/32*'s world map function is intriguing. With the map window open, you can see the path to the DX station in question and the distance in miles or kilometers. You also have your choice of several map projections (some of which I'd never heard of!). As you drag your mouse pointer over the map, the countries are highlighted along with their call sign prefixes.

Speaking of the map, *DX4WIN/32* can monitor spots from radio PacketClusters, Internet "telnet" clusters or Webclusters. *DX4WIN/32* will integrate all of the incoming spots into a single window, announce them verbally—and show the targets on the world map (with bearings from your position). DX hunting doesn't get much better than this.

The PSK31 module performed admirably. It uses the panoramic approach popularized by *DigiPan*. You see a waterfall display below the text windows and "tuning in" a signal is as easy as clicking your mouse. *DX4WIN/32*'s PSK31 performance was outstanding.

## Ease of Use

Despite its complexity, *DX4WIN/32* is relatively simple from a user standpoint. You can select "user levels" from beginner to expert as you become accustomed to the software. It's obvious that Rapidan Data Systems designed *DX4WIN/32* to be as intuitive as possible. I'm not an experienced user of logging software, yet I was able to navigate my way around *DX4WIN/32* without turning to the printed manual or the help files. When you don't have a log open, you can leave *DX4WIN/32* running in the background on your *Windows* desktop (it appears as a narrow bar across the top).

*DX4WIN/32* isn't a processor hog. It will run on just about any Pentium PC under *Windows 95/98/ME*. *DX4WIN/32* also conserves hard drive space; 15,000 QSOs can be stored in less than 1 Mbyte.

There are certainly less expensive logging programs on the market, but if you want to turn your station computer into a true Amateur Radio nerve center, *DX4WIN/32* will leave you happy with your investment!

*Manufacturer: Rapidan Data Systems, PO Box 418, Locust Grove, VA 22508; tel 540-785-2669;* **www.dx4win.com/**. *$89.95 plus $6.95 shipping and handling to the US and Canada; $11 elsewhere. Virginia residents add 4.5% sales tax.* QST

Steve Ford, WB8IMY ♦ QST Managing Editor

# The Good News

There is a lot of news to tell you about in this installment of Digital Dimension and all of it good! One item even reverses some bad news I passed on to you last fall, so let's get on with it.

### *WinLink* and APRS Mated

As winter grips the Northeast (19ºF at high noon today), I sit here chewing on a Piña Colada jelly bean thinking about a warmer locale, where there is no ice, no snow, and no hanging "chads." The South Pacific sounds really inviting—yes, that's it, a cruise to Tahiti, with a HF rig and computer by my side to keep in touch with the folks shivering back home.

In past installments of my various *QST* columns (most recently in March 2000), I have waxed about the merits of *WinLink*. This HF PACTOR/PACTOR II bulletin board system (BBS) has an Internet backbone that allows you to pick up your radio mail anywhere in the world, as long as your HF station can connect to a *WinLink* mailbox station.

Recently, a new tool was added to *WinLink*'s bag of tricks: *WinLink* position reports are now displayed at the **www.findu.com** Web page. (See Digital Dimension in January 2001 *QST* for the **www.findu.com** story.) So, next time you type search for WA1LOU at **www.findu.com**, instead of finding the WA1LOU land barge traveling between work and home on I-691, you might find the WA1LOU yacht docking at Papeete (in your dreams, Horzepa).

### PSK-31 With Your Kantronics TNC

Version 1.5 of *PacTerm '98*, a *Windows* 95/98/Me/NT/2000 host-mode packet-radio terminal program for Kantronics TNCs, now supports the PSK-31 mode and the AGW Packet Engine. (The PSK-31 sound card uses the TNC's keying circuit or serial port for keying the radio with RTS or DTR, which frees a serial port for other functions.) The upgrade is free for current owners of *PacTerm '98*. For more information, surf to Creative Services Software's Web site at **www.cssincorp.com/pacterm/**. The latest version of their *PKTerm '99* host-mode software for Timewave and AEA TNCs also supports the PSK-31 mode and the AGW Packet Engine.

### Weather Kit Available Again

In July 2000, I wrote that the weather station kit (the WS-1) was available from Dallas Semiconductor (**www.ibutton.com/weather/index.html**). You could connect the WS-1 to your radio with the T-238 interface kit that is available from Tucson Amateur Packet Radio (TAPR) at **www.tapr.org/tapr/html/Ft238.html**.

In September 2000, I reported that due to the increased demand for the WS-1, the inventory of kits was prematurely depleted. No more were available and there were no prospects that it would ever be available again. (Fully assembled and tested weather stations were still available from Texas Weather Instruments—**www.texas-weather.com**—at a substantially higher cost than the kit.)

This month, I have some good news: the weather station kit is now available for $79 from a company in Mexico called Tecnologia Aplícada. They're also known as AAG, Automatizacion Aplicada a Gasolineras S.A. de C.V. Surf to **www.aag.com.mx/weather.html** for more information.

### Surfin' and the ARRL Members Web Pages

If you are reading this, you are likely an ARRL member and if you have access to the Internet, I hope you have registered to use the ARRL Members Web pages at **www.arrl.org/members/**. To register all you need is the membership number from your *QST* address label. Once you are registered, you can view lots of good stuff including a *QST* Product Review archive from 1980 to the present and a searchable index of every issue of *QST* and *QEX*. Some of the stuff like ARRL contest results and Product Reviews appear here first—before you are likely to receive your copy of *QST*. Other stuff, like the ARRL Web Extra feature articles and the ARRL membership certificate maker, are unique to the Members Web pages and will not be published anywhere else including *QST*.

Among the other unique stuff is a virtual weekly column called "Surfin'" written by yours truly. My column discusses Web pages related to Amateur Radio. In each installment, I strive to identify and describe interesting and unique Web sites devoted to hamming. (If you have any suggestions, please send them to me.)

So, surf to the ARRL Members Web page and while you are there, surf to Surfin'. QST


**The ARRL Web Extra features 'zine at www.arrl.org/members/ is available to all ARRL members.**

Stan Horzepa, WA1LOU ♦ One Glen Ave, Wolcott, CT 06716-1442 ♦ wa1lou@arrl.net, www.tapr.org/~wa1lou

# The Quest for Power—*Finale*

In the January column, we tackled the task of locating a suitable power source for our rigs and we examined different ways to find or put a suitable hole in the firewall. In this month's wrap-up, our journey to the battery continues from the *north* side of that firewall.

Although routing power leads through the engine compartment of a modern auto isn't a trivial task, a few basic precautions will guarantee your success. Steer clear of steering and suspension components, exhaust system parts, belts, the engine and anything connected to it. Existing vehicle wiring harnesses will trace safe paths, but try to maintain as much distance from them *and control modules* as possible to lessen the chance of RFI/EMI problems. Make absolutely certain to avoid contact with metal brake, fuel, transmission or power steering fluid lines. Although quite rugged, they employ thin wall tubing that can easily be punctured by an electrical arc, causing an instant under-hood inferno. Securing power cables to these lines is an invitation to disaster. Once you are satisfied with the routing of your cables, judicious use of cable ties or nylon cable clamps will ensure that they stay put. Don't use adhesive-backed anchors—engine compartment temperature extremes and vibration will unhook them in no time.

## Terminal Potpourri

Attaching equipment power leads to your vehicle's battery should produce a secure, lasting connection that doesn't compromise the integrity of the existing battery/electrical system connections. There are a variety of ways to make those connections, depending on the style of battery your auto uses. The one way you should *never* make connections is to place a wire between the existing battery terminal and post. In addition to greatly reducing the contact area of the post and terminal, it will allow acidic gases from the battery to corrode the connection. Eventual result? An engine that won't crank.

In top post battery installations with original equipment, molded terminals, you can secure cable ends to the battery terminal clamping bolts using two flat washers and an additional nut of the proper size and thread pitch. Place one washer against the existing clamp nut (I use brass or stainless steel washers and nuts), add your cable end, another washer and finish off with the nut. Of course, this assumes the bolt has enough threads extending beyond the nut to add the required hardware. If not, simply replace the bolt with one that is long enough to allow the extra hardware. Mechman sells a neat replacement bolt with a stud end specifically for attaching auxiliary electrical equipment. What you shouldn't do is place your connector between the nut and the battery terminal. You'll end up over-tightening the nut and damaging the terminal. If you aren't timid about doing things your way, you can cut off existing battery cable terminal ends and replace them with ones made specifically to accommodate multiple cables. See the "Info Box" for suppliers.

Owners of GM and other vehicles with side terminal batteries need only replace the battery terminal bolt with an adapter called a *post extender* that provides an attachment for your cable end. GM dealers sell a kit for this purpose, but it's a bit pricey. You can buy individual adapters from many auto sound shops for a few bucks each, or spring for a package of ten for $12 from MCM Electronics (catalog #GMBATT). Finally, if you are replacing the battery in your auto, choose one with a combination of top and side terminals and you can dedicate the secondary terminals to equipment connections.

## Fuses

All equipment leads (negative and positive) should be fused as near the battery as practical. This protects the positive lead, and ultimately your vehicle, should a short develop. Why fuse the negative lead? Your auto has two ground connections to the battery: a light gauge wire to the chassis, and a heavy gauge wire to the engine. If the engine ground opens, you probably wouldn't know it until you cranked the engine. That's when the starter motor would attempt to draw 150+ A through the chassis ground *and possibly the ground circuitry of your rig*. A fuse in the negative lead will protect your rig from damage. If you run a single set of power leads for multiple rigs, the main fuses should be rated equal to the sum of the ratings of the individual equipment fuses—naturally, each piece of equipment still needs its own fuse.

### Info Box

- MCM Electronics, **www.mcmelectronics.com**, has a variety of automotive electric fuses and holders, cable clamps, and multi-feed battery connectors.
- Mechman, **www.mechman.com**, provides the 4×4 market with an interesting assortment of heavy-duty automotive power accessories, terminals and shielded power leads.

## Safety First!

No sane person would handle a live grenade with reckless abandon, yet many persons aren't aware of the potential for personal injury posed by the common lead-acid automotive battery. Capable of supplying many hundreds of amps into a short circuit, a battery can cause severe burns as it instantly vaporizes a wire in your hands. If that isn't bad enough, batteries can and do explode! Because they generate hydrogen gas as a chemical byproduct of the charge/discharge process, one spark is all it takes to launch battery fragments and sulfuric acid dozens of feet. Always wear eye and face protection when working around automotive batteries, avoid creating sparks or shorts and disconnect the negative battery cable until all wiring is completed.

## Don't Get Your Wires Crossed!

When I worked for a local two-way radio shop, I occasionally repaired *crispy critters*. Once-healthy 12-V radios installed in heavy equipment, crispy critters were radios that had suffered the misfortune of incorrect power connections. During installation, we would connect radios across only one 12-V battery in the 24-V system. Unfortunately, when the mechanics would replace batteries, sometimes they would accidentally reconnect the radio power cables across both batteries—or just hook them up backward. Needless to say, our radios responded rather poorly to such treatment. If you do your own auto service, you probably won't have to worry about crossed-polarity power connections in your radio installation. If you have automotive service work performed by others—even if it isn't electrical service—it's a good idea to disconnect power plugs from your rig(s) until that work is complete and you can verify that all connections are correct. QST

Roger Burch, WF4N ♦ Box 100, Island, KY 42350 ♦ wf4n@arrl.org

# The Big Five

Let's start this month's column with a question: Which QRP club is the oldest? Thanks to the research of Dick Pascoe, G0BPS, we know the answer.

A British shortwave listener, John Whitehead, in London, England, started the QRP Research Society in 1949.

If, by now, you've guessed that this month's focus is on QRP clubs, you're absolutely correct. We'll provide a thumbnail sketch of *The Big Five*, starting with the G-QRP-Club, in England.

### G-QRP

The Rev George Dobbs, G3RJV, started this club in 1975 by placing a small ad in *Short Wave* magazine. From its humble beginnings with only 30 members, the G-QRP-Club has grown to well over 10,000 members in 25 years. G-QRP-Club membership is open to all amateurs worldwide. Their outstanding quarterly newsletter, *SPRAT*, focuses mainly on homebrewing gear, accessories and antennas. Each issue is crammed with practical information on low power communications. The club has a large library of data sheets available free to members. These data sheets contain articles of interest to QRPers from overseas magazines. The G-QRP-C sponsors a host of contests/operating events during the year. They also have an extensive QRP awards program and an internal QSL bureau for their members. Rev Dobbs visits "the Colonies" each year to attend the Dayton Hamvention and man the G-QRP booth.

### QRP ARCI

The QRP ARCI is the oldest stateside QRP club still functioning. Although started in 1961 it wasn't until 1981 that the club finally became a "real" QRP club, by accepting the universally agreed upon standard of 5 W RF output. The ARCI has, in recent years, become the umbrella organization for many of the regional QRP clubs that started popping up in the 1990s. The QRP ARCI has a fully functioning group of officers and board members who run the organization. Worldwide membership is open to all with current membership over 11,000. The QRP ARCI sponsors two major QRP QSO Parties, one in the spring and the other in the fall. Interspersed between these two contests is a series of short duration, sprint-type events throughout the year. The QRP ARCI offers an extensive awards program for members. Their newsletter, *The QRP Quarterly*, is filled with technical and operating information. Each year at Dayton Hamvention, the QRP ARCI sponsors the Four Days In May, a huge gathering of QRPers where technical forums, building contests and information exchange are the order of the day.

### Michigan QRP Club

Our third low power organization is the Michigan QRP Club. The M-QRP-C is the oldest of the regional clubs and boasts a membership of 1700 QRPers. Membership is open to all. *The Five Watter*, the club's quarterly newsletter, focuses on homebrew construction and operating hints and kinks. The Michigan club sponsors several QRP contest/operating events during the year, starting in January with the M-QRP-C QSO Party. This club is a very friendly group who maintains a presence at Dayton each year. A regular contributor to *The Five Watter* is C.F. Rockey, W9SCH. "The Rock" has forgotten more about QRP than most of us will ever know.

### NorCal

Doug Hendricks, KI6DS, and Jim Cates, WA6GER started the Northern California QRP Club (NorCal) in 1993. At one of the first meetings, the club acquired a technical guru in the form of Wayne Burdick, N6KR, who designed the club's NorCal 40 CW transceiver kit, along with the Sierra, the SST and the Elecraft K1 and K2 rigs. NorCal has a membership in excess of 3300. The club is responsible for igniting a huge homebrew movement within the ham radio hobby by providing inexpensive, high performance QRP kits. NorCal sponsors the QRP forums at Pacificon each fall. Each year's list of forum presenters reads like a who's who of low-power communications. QRP to the Field is a mini-Field Day, sponsored by NorCal, which promotes portable QRP operation. NorCal has attracted a worldwide following. Their outstanding quarterly technical publication, *QRPp*, sets the benchmark for QRP club newsletters.

### New Jersey-QRP Club

Finally, George Heron, N2APB, formed the New Jersey-QRP Club a couple of years ago. It has quickly become "NorCal-East." George and the NJ club sponsor and coordinate Atlanticon, a major gathering of East Coast QRPers each spring. Atlanticon 2001 will be held in conjunction with the Timonium hamfest in Maryland this March (see "Conventions and Hamfests" in this issue). This presentation of cutting edge technical forums, a building competition, vendor displays and a limitless exchange of information is what Atlanticon is all about. George also publishes *QRP Homebrew*, a quarterly home construction magazine targeted at the QRP crowd. The NJ-QRP Club has no dues, but the *QRP Homebrew* magazine does require a subscription. The club is very homebrew oriented and has kitted several club projects (the Rainbow Tuner and a remake of the Tuna-Tin II 40-meter transmitter to name just two) which they sell via their Internet Web site. In fact, all of the clubs we've discussed maintain Web sites. The URLs are included along with postal mail addresses for those who are Internet-challenged.

I know that I have not covered the club topic in detail. There are many more QRP clubs in existence than I could possibly list or describe here. Each of the clubs I've profiled have links to other QRP groups, as well as kit vendors and parts sources, on their Web pages. Click around, find a regional club in your area and join in the fun. QST

### The Big Five Roster

- G-QRP Club: The Secretary, Rev G.C. Dobbs, G3RJV, St Aidan's Vicarage, 498 Manchester Road, Rochdale, Lancs, OL11 3HE England; **www.btinternet.com/~g4wif/gqrp/htm**.
- QRP ARCI: Membership Chairman, Doug Holloway, K4EQ, 438 Brookdale Dr, Piney Flats, TN 37686; **www.qrparci.org/index.htm**.
- Michigan QRP Club: L.T. Switzer, N8CQA, 427 Jeffrey Ave, Royal Oak, MI 48073-2521; **www.tir.com/~k8dd/miqrp.htm**.
- NorCal: Jim Cates, WA6GER, 3241 Eastwood Rd, Sacramento, CA 95821; **www.fix.net/~jparker/norcal.htm**.
- NJ-QRP: George Heron, N2APB, 2419 Feather Mae Ct, Forest Hill, MD 21050; **www.njqrp.org/**.

Rich Arland, K7SZ ♦ 25 Amherst Ave, Wilkes Barre, PA 18702 ♦ k7sz@arrl.org

# COMING CONVENTIONS

## TEXAS STATE CONVENTION

**March 17-18, Midland**

The Texas State Convention (46th Annual St Patrick's Day Hamfest), sponsored by the Midland ARC, will be held at the Midland County Exhibit Building, Service Rd; 1/2 mile E of the intersection of Fairgrounds Rd and old Hwy 80 (also called Front St or Business 20); westbound on I-20, Exit 144; eastbound on I-20, Exit 143. Doors are open Saturday 8 AM to 5 PM, Sunday 8 AM to 2 PM. Features include huge indoor flea market, many dealers, large tailgate area, T-hunts, forums and meetings, WAS card checking, VE sessions (Saturday, 1 PM), RV parking/hook-ups, refreshments. *TI:* 146.76, 145.13 (88.5 Hz), 147.3, 444.2. Admission is $7 in advance, $8 at the door. Tables are $12 each (for the first 4), $17 (for each additional table over 4). Contact Larry Nix, N5TQU, 915-685-3372; **oilman29@home.com**; or Pete Stull, WB7AMP, 915-686-6755 (days) or 915-362-6644 (eves); **w5qgg@arrl.net**; **www.w5qgg.org**.

## MAINE STATE CONVENTION

**March 30-31, Lewiston**

The Maine State Convention (22nd Annual "Andy" Hamfest and Computer Fair), sponsored by the Androscoggin ARC, will be held at the Ramada Conference Center, 490 Pleasant St; take Exit 13 off I-495 (Maine Tnpk) to traffic light, take first left after light. Doors are open Friday 7-9 PM, Saturday 8 AM to noon. Features include exhibitors, vendors, flea market, dealers, new and used radio and electronics gear, computers, forums, VE sessions (Saturday, registration 10 AM, exams start at noon). Talk-in on 146.61. Admission is free Friday evening, Saturday $5, under 16 free. Tables are $10 (for the first table, plus admission; $6 for each additional table). Contact Ivan Lazure, N1OXA, 115 Old Lisbon Rd, Lewiston, ME 04240; 207-784-0350; **n1oxa@arrl.net**; **www.mainearrl.org/convent.htm**.

## NEBRASKA STATE CONVENTION

**March 30-31, Norfolk**

The Nebraska State Convention (2001 Ham Odyssey), sponsored by the Elkhorn Valley ARC, will be held at the Northeast Community College Lifelong Learning Center, 801 E Benjamin Ave; from the intersection of US Hwys 81 and 275 go N on Hwy 81 (13th St) to Benjamin Ave, turn right (E), proceed E for approximately 1.7 miles to entrance of NECC (on N side). Doors are open Friday 5-9 PM, Saturday 8 AM to 5 PM. Features include flea market, dealers, seminars (NWS, APRS, ARRL Certification Program with special guest speaker Dan Miller, K3UFG from ARRL HQ), ARRL forum, VE sessions (both days), banquet ($12 each or $20 per couple), refreshments. Talk-in on 146.73. Admission is $6 in advance, $7 at the door. Tables are $15. Contact Sam Seikaly, WA6BRE, 55422 835th Rd, Norfolk, NE 68701-1222; 402-379-4073; **sseikaly@conpoint.com**; **www.qsl.net/evarc/**.

## MARYLAND STATE CONVENTION

**March 31-April 1, Timonium**

The Maryland State Convention (Greater Baltimore Hamboree and Computerfest), sponsored by the Baltimore ARC, will be held at the Maryland State Fairgrounds, York Rd; I-695 to I-83 N, take Exit 17 (Padonia Rd) off I-83, follow signs. Doors are open Saturday 8 AM to 5 PM, Sunday 8 AM to 4 PM. Features include giant indoor electronics flea market, vendors, major manufacturers, commercial exhibitors and displays, outdoor tailgating (opens at 6 AM), forums, VE sessions (Sunday, registration 9 AM, testing will start promptly at 10 AM; preregistration is requested but not required, walk-ins accepted; Bob Busch, WB3KXJ, 301-317-7819 or **rbusch@erols.com**), banquet, refreshments. Talk-in on 146.67, 224.24, 449.625 (107.2 Hz). Admission is $5 per day in advance, $6 per day at the door. Contact Sharon Dobson, K3DUH, Box 95, Timonium, MD 21094; 410-426-3378; **k3duh@amsat.org**; **www.gbhc.org**.

**February 24**
**Vermont State, Milton***

**March 10-11**
**Roanoke Division, Charlotte, NC***

**April 20-21**
**Southeastern VHF Conference, Nashville, TN**

**April 21-22**
**Washington State, Yakima**

**April 29**
**Delaware State, New Castle**

**May 4-5**
**Louisiana State, Baton Rouge**

**May 5**
**South Carolina State, Greenville**

**May 5-6**
**West Texas Section, Abilene**

***See February *QST* for details**

### Attention Hamfest and Convention Sponsors:

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You're encouraged to register your event with HQ as far in advance as your planning permits. Hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register. Registering dates with ARRL HQ doesn't constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your division director. For conventions, approval must be made by your director and by the executive committee. Application forms can be obtained by writing to or calling the ARRL convention program manager, tel 860-594-0262.

**Note**: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance. QST

# HAMFEST CALENDAR

*Attention:* The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **March 1** to be listed in the **May** 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.)**

**British Columbia (New Westminster)—Mar 4**. Bob Kungl, VE7KW, 604-524-9177.

**California (Linda)—Mar 10**. Ron Murdock, W6KJ, 530-674-8533.

**California (Palo Cedro/Redding)—Mar 31**. Donna Ferguson, N6SVV, **warhawk@hdo.net**.

**Colorado (Longmont)—Apr 7**. Fred Pilz, K0PLZ, **larc@qsl.net**.

†ARRL Hamfest

†**Connecticut (Pomfret)—Mar 17**, 8 AM to noon. *Spr:* Eastern Connecticut ARA. Pomfret Community School, corner of Rtes 169 and 101; 4 miles W of Rte 395. Flea market, VE sessions (limited spaces available, must preregister). *TI:* 147.225 (156.7 Hz), 146.52. *Adm:* $2. Tables: $10. Paul Rollinson, KE1LI, 182 Wrights Crossing Rd, Pomfret Center, CT 06259; 860-928-2456; **ke1li@arrl.net**.

†**Connecticut (Waterford)—Mar 31**; set up 9 AM; public 10 AM. *Spr:* Radio Amateur Society of Norwich (RASON). Waterford Senior Center, on Rte 85; from Hartford take Rte 2 S to Rte 11 to Rte 85 S; from the shoreline take Rte 95 to Rte 85 N. Ham Radio Auction (bring your gear to sell; 10% commission to RASON), free parking. *TI:* 146.73. *Adm:* Free. Mark Noe, KE1IU, 860-536-9633; **mnoe@snet.net**; **www.rason.org**.

†**Florida (Ft Walton Beach)—Mar 17**, 8 AM to 5 PM. *Spr:* Playground ARC. Okaloosa Fairgrounds, 1958 Lewis Turner Blvd (State Rte 189); I-10, Exit 12. *TI:* 146.79. *Adm:* $5. Tables: $10 (includes 1 admission). Louis Carter, KF4HRM, c/o PARC, Box 873, Ft Walton Beach, FL 32549; 850-243-4315 or voice/fax 815-461-0859; **parcfest@aol.com**; **www.bsc.net/playground/**.

†**Florida (Stuart)—Mar 17**. *Spr:* Martin County ARA. Martin County Fairgrounds, 2016 S Dixie Hwy, S of Monterey Rd, follow signs. *TI:* 147.06. *Adm:* Free. Romund Madson, KS4KM, 1841 SE Hanby Ave, Port St Lucie, FL 34952; 561-337-1841.

†**Florida (Zephyrhills)—Feb 25**; set up 6 AM; public 8 AM to 2 PM. *Spr:* Zephyrhills Area ARC. Zephyrhills Lions Den, 5827 Dean Dairy Rd; N of SR 54, between I-75 and SR 301. "Phinney Fest" (in memory of Ernest Phinney, WB4UMT), tailgating ($5), vendors (must have admission ticket), VE sessions (10:30 AM), refreshments. *TI:* 147.135. *Adm:* $5. Tables: $5. Ron Russell, N8VFE, 38545 Goodland Dr, Zephyrhills, FL 33540; 813-782-1602; **ron301@aol.com**.

†**Georgia (Marietta)—Mar 17**; set up Friday 1 PM; public Saturday 8 AM to 3 PM. *Spr:* Kennehoochee ARC. Jim Miller Park; from I-75 at Windy Hill Rd, go W for approximately 5 miles to Austell Rd, take left and go 1/4 miles to Callaway

Gail Iannone ♦ Convention Program Manager

Rd, take right onto Callaway Rd, go 3/4 mile, hamfest on right. Flea market, boneyard, vendors, exhibitors, VE sessions (9 AM, First United Methodist Church, Whitlock Ave NW and N Marietta Pkwy), RV hookups ($10 each), free parking. *TI:* 146.88 (100 Hz). *Adm:* $5, under 12 free with adult. Tables: $20 (includes 2 chairs), boneyard space $10. Margaret Durham, KB4QKW, 1097 Seven Springs Circle, Marietta, GA 30068; 770-977-4405; **mjanewalls@aol.com**; **qsl.asti.com/hootch/KARC-HamF.html**.

†**Illinois (Grayslake)—Mar 25**; set up 6 AM; public 8 AM to 1 PM. *Spr:* North Shore RC. Lake County Fairgrounds, Rtes 120 and 45; 4.4 miles W of Hwy 94, on Rte 120. Indoor radio, electronics, and computer swapfest; commercial vendors; VE sessions (9 AM to noon); free parking; refreshments. *TI:* 147.345, 146.52. *Adm:* advance $5, door $6. Tables: commercial $25, swapfest (on wall) $15, swapfest (in center) $10; electricity $5. Jacob Fishman, NE0NS, 834 Bach St, Northbrook, IL 60062; 847-291-4160; **ne0ns@arrl.net**; **www.ns9rc.org**.

**Indiana (Columbus)—Apr 7**. Marion Winterberg, WD9HTN, 812-342-4670.

†**Kentucky (Elizabethtown)—Mar 31**, 8 AM to 2 PM. *Spr:* Lincoln Trail ARC. Prichard Community Center, 404 Maulberry St; on Highway 62, E of 31 W Bypass. Flea market, forums, VE sessions. *TI:* 146.98. *Adm:* advance $4, door $5. Tables: $7. Leon Priest, N4TFK, Box 342, Vine Grove, KY 40175; 270-351-4721; **n4tfk@qsl.net**; **www.qsl.net/w4bej**.

†**Louisiana (Rayne)—Mar 17-18**; Saturday 8 AM to 3 PM, Sunday 8 AM to noon. *Spr:* Acadiana ARA. Rayne Civic Center, 300 Frog Festival Dr; approximately 15 miles W of Lafayette on I-10; take Exit 87 (Hwy 35 S), go S to first traffic light, turn right on Oak St, go 2 blocks, turn right on Gossen Memorial, Center at end of street. Flea market, commercial dealers, VE sessions (Sunday), RV parking (on site with power and water), refreshments. *TI:* 146.82. *Adm:* $4. Tables: $15. Al Oubre, K5DPG, 3011 Sugar Mill Rd, New Iberia, LA 70563; 337-367-3901; **k5dpg@arrl.net**; **www.acadian.net/w5ddl/**.

**Maine (Lewiston)—Mar 30-31**, Maine State Convention. See "Coming Conventions."

**Maryland (Timonium)—Mar 31-Apr 1**, Maryland State Convention. See "Coming Conventions."

†**Massachusetts (Amherst)—Mar 11**, 9 AM to 1 PM. *Spr:* Mount Tom Amateur Repeater Assn. Amherst Regional Middle School, 170 Chestnut St; from Mass Pike take Rte 91 N to Exit 18, take Rte 9 N to Amherst Center, left on Main St, right at 3rd light. Amateur Radio and Electronics Flea Market; tailgating; VE sessions; GROL, GMDSS-O/M, Ship Radar exams; handicapped accessible; refreshments. *TI:* 146.94. *Adm:* $5. Tables: 8-ft $15. Cindy Loiero, K1ISS, 27 Deepwoods Dr, Westfield, MA 01085; 413-568-1175; **n1fi@arrl.net**; **www.mtara.org**.

†**Michigan (Marshall)—Mar 17**; set up Friday 6 PM, Saturday 6 AM; public 8 AM to 3 PM. *Sprs:* Southern Michigan ARS and Marshall High School Photo Electronics Club. Marshall High School, 701 N Marshall; I-94 to Exit 110, go S on old US-27 to North Dr, go E on North Dr, 2 blocks to school. 40th Annual Michigan Crossroads Hamfest, dealers, free parking, refreshments. *TI:* 146.66, 146.52. *Adm:* advance $4, door $5. Tables: 8-ft $8 (plus admission). Jim Holloway, KG8GZ, 117 Humphrey Dr, Battle Creek, MI 49014; 616-963-6602.

†**Minnesota (St Paul)—Mar 24**, 8:30 AM to 3 PM. *Spr:* Robbinsdale ARC. Concordia University, Ganglehoff Center, 235 Hamline Ave; I-94 to Snelling Ave, S to Concordia Ave, E to Hamline Ave. 20th Annual Midwinter Madness Hobby Electronics Show, commercial vendors, large indoor flea market, VE sessions (9 AM, walk-ins welcomed; Dave Harrell, 651-459-8678), handicapped accessible, free parking. *TI:* 147.15. *Adm:* advance $5.50, door $7, under 12 free. Tables: $25, with electricity $55. Harriet Johanson, KB0UPH, 4737 S Highway 101, PMB 276, Minnetonka, MN 55345; 763-537-1722; **k0ltc@visi.com**; **www.visi.com/~k0ltc**.

†**Missouri (Kansas City)—Mar 10**; set up 6 AM; public 8 AM. *Spr*: Ararat AR Shrine Club. Ararat Shrine Temple, 5100 Ararat Dr; I-435, exit at Eastwood Trafficway, W to Ararat Dr, N to 5100 Ararat Dr. Commercial vendors; exhibits; equipment; antiques; computer hardware and software; homebrew items; "See and Hear" program by Bob Heil, K9EID; seminars and tech sessions; VE sessions (advance registration only); handicapped accessible; free parking; refreshments. *TI*: 145.13. *Adm*: advance 3 for $5, door $3 each. Tables: 8-ft $15. Steve Dowdy, WJ0I, 12411 Olive St, Kansas City, MO 64146; 816-941-3392; **sdowdy@kc.rr.com**; **www.hambash.com**.

†**Missouri (Lebanon)—Apr 7**; set up 7 AM; public 8 AM to 2 PM. *Spr:* Lebanon ARC. Ag-barn behind the Kenneth E. Cowan Civic Center, 500 E Elm St (E Business Loop 44); from I-44 go N on Jefferson (Hwy 5) to Elm St, go E on Elm to Civic Center. Vendors, tailgating ($6), VE sessions (Bill Wheeler, K0DEW, 272 Donna Lee, Lebanon, MO 65536; 417-532-7710; **bwheeler@advertisnet.com**), refreshments. *TI:* 145.47. *Adm:* Free. Tables: $8. Chuck Sears, AA0RK, 10901 Welch Bridge Rd, Niangua, MO 65713-9102; 417-589-8122; **freedom1@advertisnet.com**.

**Nebraska (Norfolk)—Mar 30-31**, Nebraska State Convention. See "Coming Conventions."

†**New Hampshire (Henniker)—Mar 25**; set up 7 AM; public 8 AM to 1 PM. *Spr:* Contoocook Valley RC. Henniker Community School; Rte 202/9 to Rte 114 Exit (New England College/Pat's Peak), turn down hill onto Rte 114 S, go right at flashing light, School is 5th building on left. Tailgating (wx permitting), VE sessions (sign up at 9 AM; testing at 9:30 AM sharp; Dexter Howe, KY1M, 603-938-2955), refreshments. *TI:* 146.895 (100 Hz). *Adm:* $3 or 2 for $5. Tables: $10 (first table), $8 each additional (includes 1 admission; some with power). Jock Irvine, N1JI, c/o Henniker Community School, 15 Western Ave, Box 2418, Henniker, NH 03242; 603-428-3476 (ext 256); **n1ji@arrl.net**; **www.qsl.net/k1bke**.

†**New Jersey (Clinton Twp)—Mar 17**, 8 AM to 2 PM. *Spr:* Cherryville Repeater Assn. North Hunterdon Regional High School, Rte 31 (Annandale); Exit 17 off I-78, take Rte 31 S to high school on right. VE sessions, handicapped accessible, free parking, refreshments. *TI:* 147.375. *Adm:* $6. Tables: $15 (without electricity), $20 (with electricity). Rob France, N3QDC, 4803 Rush Dr, Pipersville, PA 18947; 908-788-4080 or 215-766-8066; **n3qdc@att.net**; **www.qsl.net/w2cra**.

†**North Carolina (Kinston)—Mar 25**; set up Saturday 4-9 PM (overnight security provided), Sunday 6 AM; public 8 AM to 3 PM. *Spr:* Down East Hamfest Association. Lenoir County Fairgrounds, Fairgrounds Rd; Hwy 11 S. Tailgating, VE sessions, meetings (ENC traffic net, Skywarn), free parking, refreshments. *TI:* 146.685. *Adm:* advance $4, door $5. Tables: 8-ft $10 (electricity $5). Doug Burt, W4OFO, Box 1778, Kinston, NC 28503; 252-524-5724 (after 6 PM); **jeanhd@icomnet.com**.

†**North Carolina (Raleigh)—Apr 8**, 8 AM to 4 PM. *Spr:* Raleigh ARS. North Carolina State Fairgrounds, Jim Graham Bldg, 1025 Blue Ridge Blvd; I-440, Hillsborough St Exit, W to NCS Fairgrounds. Hamfest/Computer Fair, all indoor flea market and dealer area, forums (ARRL, ARES, NTS, MARS), VE sessions (11 AM), contests (Homebrew, QLF, QBH), RARSfest welcoming reception for vendors and dealers (Saturday eve, Apr 7, 7-8 PM), full RV hookup and overnight camping ($15 per night), free parking. *TI:* 146.64. *Adm:* advance $5, door $6; under 13 free. Tables: $15 each; 4 or more $14 each. Chuck Littlewood, K4HF, 2005 Quail Ridge Rd, Raleigh, NC 27609; 919-872-6555; **k4hf@arrl.net**; **www.rars.org**.

†**Ohio (Madison)—Mar 25**, 8 AM to 2 PM. *Spr:* Lake County ARA. Madison High School, North Ridge Rd; I-90 to Rte 528, go N to Rte 84 or Rte 20, turn left to Burns Rd, follow signs to High School. Hamfest/Computerfest; flea market; vendors; new and used Amateur Radio, computer, and assorted electronic equipment; VE sessions; paved parking, refreshments. *TI:* 147.21. *Adm:* $5. Tables: 6-ft $8, 8-ft $10. Roxanne, 440-257-0024 or 440-209-8953 (9 AM to 9 PM); **tbrown@ncweb.com**; **hamradio.org/lcara**.

†**Ohio (Maumee/Toledo)—Mar 18**; set up Saturday 3:30-7:30 PM, Sunday 5:30-8 AM; public 8 AM to 2 PM. *Spr:* Toledo Mobile Radio Assn. Lucas County Recreation Center, 2901 Key St; S of Heatherdowns and N of Anthony Wayne (Rte 24); Exit 6 off 475/23. Free parking, handicapped parking. *TI:* 147.27. *Adm:* $6. Tables: regular $25, wall $30 (to order tables send application form and SASE to TMRA Hamfest, Box 273, Toledo, OH 43697-0273 by Mar 5). Paul Hanslik, N8XDB, 419-385-5056; **www.tmrahamradio.org**.

**Ontario (Brampton)—Mar 24**. Michael Brickell, VE3TKI, 905-826-5176.

†**Pennsylvania (Monroeville)—Mar 25**; set up 6-8:30 AM; public 8:30 AM to 3 PM. *Spr:* Two Rivers ARC. Monzo's Palace Inn, intersection of Rtes 22 and 48, at Turnpike; from E or W take PA Turnpike (I-76) to Exit 6 (Monroeville), take Business 22 ramp, turn left at traffic light, go 200 feet, Palace Inn on left; from N or S take PA Turnpike Rte 48 to Monroeville, Palace Inn is at intersection of Rtes 22 and 48. Hamfest/Computer Fair, equipment, accessories, vendors, forums. *TI:* 146.73, 147.12. *Adm:* $5. Tables: 6-ft $20 (includes 1 chair; 115/60 outlets $10 each). Roxanne Gaal, WB3ROX, 312 Lawrence Ave, N Versailles, PA 15137; 412-823-6613; **gaal@pgh.net**; **www.qsl.net/w3oc/hamfest.htm**.

†**Texas (Brenham)—Mar 31**, 7 AM to noon. *Spr:* Brenham ARC. Brenham Fairgrounds, 1305 E Horton Loop; just N of Hwy 290 and 105 Horton Loop. VE sessions, RV hookups ($10). *TI:* 147.26. *Adm:* Free. Tables: advance $7 (reserve by Mar 15), door $10. Dan Lakenmacher, N5UNU, 10312 Hwy 36 N, Brenham, TX 77833; 979-836-8739; **lindan@pointcom.net**; **www.alpha1.net/~barc**.

**Texas (Midland)—Mar 17-18**, Texas State Convention. See "Coming Conventions."

**Texas (Weatherford)—Mar 24**. Elizabeth Hunkele, N5ONE, 817-594-1700.

†**West Virginia (Beckley)—Mar 24**, 9 AM to 3 PM. *Sprs:* Plateau ARA and Black Diamond ARC. Raleigh County Armory, 200 Armory Dr; follow I-77 to I-64E, proceed E to Exit 124, take Rte 19N to Armory Dr. VE sessions. *TI:* 146.79, 145.37. *Adm:* $5. Tables: $5 (without power), $15 (with power). Frank Acord, N8YZB, 176 Old Pax Rd, Mt Hope, WV 25880; 304-877-6482; **n8yzb@citynet.net**; **members.spree.com/sip1/plateau**.

†**West Virginia (Charleston)—Mar 17**, 9 AM to 3 PM. *Spr:* Charleston Area Hamfest and Computer Show. National Guard Armory, 1707 Coonskin Dr; take Greenbrier Exit off I-64/77 towards airport, veer right past airport exit, at traffic light turn left onto Coonskin Dr, Armory is 3/4 mile on left. VE sessions. *TI:* 145.35, 146.52. *Adm:* $5. Tables: $5. William H. (Jack) Kibler, Jr., K8WMX, Box 916, St Albans, WV 25177-0916; 304-722-3150; **k8wmx@juno.com**.

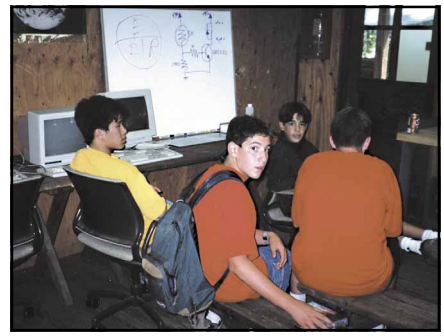
†**Wisconsin (Jefferson)—Mar 18**; set up 7 AM; public 8 AM to 2 PM. *Spr:* Tri-County ARC. Jefferson County Fairgrounds Activity Center, Hwy 18 W. Vendors, refreshments. *TI:* 145.49. *Adm:* $4. Tables: 8-ft $6. John Satterlee, WA9SAB, 213 Frederick St, Ft Atkinson, WI 53538; 920-563-6381 (eves); fax 920-563-9551; **satterle@ticon.net**; or **tricountyarc@globaldialog.com**.

†**Wisconsin (Milwaukee)—Apr 6-7**; Friday 2-7 PM, Saturday 8 AM to 4 PM. *Spr:* Amateur Electronic Supply. AES Headquarters, 5710 W Good Hope Rd. "AES Superfest", indoors, 36 major manufacturers, forums, clubs, VE sessions. *TI:* 146.85. *Adm:* Free. Ray Grenier, K9KHW, 5710 W Good Hope Rd, Milwaukee, WI 53223; 414-358-4088; **rayk9khw@aol.com**; **www.aesham.com**.

†**Wisconsin (Stoughton/Madison)—Apr 8**; set up Saturday eve; public Sunday 8 AM to 2 PM. *Sprs:* MARA and Madison Area Repeater Assn. Mandt Community Center, Stoughton Junior Fairgrounds, S 4th St; enter Stoughton on Hwy 51 (Main St), turn S on 4th St, cross the bridge, Junior Fairgrounds (Mandt Park) is on your left. Huge flea market, dealers, electronics, computers, new and used equipment, VE sessions, free parking. *TI:* 147.15. *Adm:* advance $4, door $5. Tables: advance $12, door $15 (plus admission). Paul Toussaint, N9VWH, Box 8890, Madison, WI 53708-8890; 608-245-8890; **n9vwh@arrl.net**; **www.qsl.net/mara/**.

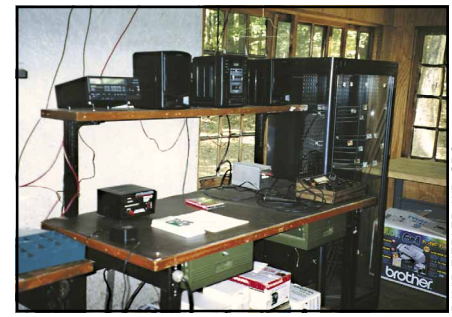
# Your Foundation Dollars Hard at Work!

Contributors are the keys to all of our successful programs, of course, but just as important are the many countless hams who are working to promote Amateur Radio enjoyment for present and future generations. Two projects the Foundation helped fund in 2000 illustrate the point…



DAVID FIEDLER, WB2CDG

**Scouts studying electronic circuit analysis in the Forestburg HTTC classroom.**




DAVID FIEDLER, WB2CDG

**Ham radio equipment inside the HTTC at the Forestburg Scout Reservation.**

### Who Wants to See A Million There?

The Eastern States Exposition, held annually in Agawam, Massachusetts, is among the top 10 regional fairs in overall attendance in the Northern Hemisphere. Each year, regional Amateur Radio clubs provide the planning, staffing and know-how to put on a two-week, high-visibility display booth at the fair. The booth is a public relations hit every time. Larry Buck, K1HEJ and Tammy Krauss, K1TLK, provided this glimpse of their group's effort:

"This major event draws the public from all the New England states as well as New York, New Jersey, Pennsylvania and Canada. This year more than 1.3 million people came through the gate! Our booth provided a window into the hobby's accomplishments, with a reminder of our instant readiness to provide emergency communications. We take this opportunity to show the public the educational experiences of SAREX, or how the hobby allows us—one-on-one—to talk with people in other countries. We take National Traffic System messages and explain how NTS works. The booth is completely dedicated to showing the public what services hams can provide. Presentations have variety, too, and change with each volunteer manning the booth. We try to create positive experiences for each visitor. Packet, HF and VHF stations are operational and nonhams can get in close to see how everything works. We're happy to answer tons of questions."

### VicYIP Grant Helps 'Em Earn High Tech Badges

David Fiedler, WB2CDG, wrote: "In an effort to encourage more young people to seek careers in science and technology, the Monmouth Council (New Jersey) Boy Scouts of America constructed and equipped the Forestburg Scout Reservation (FSR) High Technology Training Center in 1997 in the Catskills Mountains near Monticello, New York. Knowing that the earlier an interest in science and technology could be developed in a youngster, the national Scout organization established merit badges courses in radio, electricity, electronics, computers, space explorations, and other high-tech topics.

With the assistance of an ARRL Foundation Victor C. Clark Youth Incentive Program Grant, the Council was able to equip the camp facility with some basic equipment including general-purpose ham band receivers, a VCR and TV to show training tapes, a workbench and some textbooks. This past summer we were able to provide sufficient instruction to qualify a total of 80 Scouts (between the ages of 11-14) for both electricity and electronics merit badges and 25 Scouts for the radio merit badge. Interviews with frequent users of the Center have confirmed that it is fulfilling its intended mission. Even Scout leaders have reported an increased interest in ham radio, participation in the ARRL-BSA sponsored Jamboree on the Air (JOTA) and more Scouts investigating technology careers. Many Scouts have had fun monitoring ham transmissions, building radio kits and antennas, learning Morse code and Q signals, and other ham skills."

### Contributor's Corner

We thank the following for their generous contributions to:

*Victor C. Clark Youth Incentive Program Fund*
Richard Maier in loving memory of Thomas Maier, W1EQG
John T. Jones Jr, W3NTD, in fond memory of Orion M. Arnold, W2HN
Emille A. Cole in fond memory of Charles "Kim" Kimmerly, N5XGI

*The Goldwater Scholarship Fund*
Ian A. Elliot, W7JMX, in fond memory of William J. Sullivan, W7FC

*The Mississippi Scholarship Fund*
Mary K. Pierson, N5HXS; Ann N. Tyra; the Mississippi Section Phone Net; Wendell A. McCollom and Edward W. Scheufele, AB5RS, in fond memory of Charles Kimmerly, N5XGI

*Paul and Helen L. Grauer Scholarship Fund*
Tri-Lakes ARC (Missouri) in fond memory of Joe Olson, W5JO

*The PHD ARA Scholarship Fund*
PHD ARA, Inc (Missouri)

*The General Fund*
Andrew Family Foundation (Illinois)
Wynmoor ARC (Florida) in fond memory of Sidney Rotz, N4LPR
Edmond R. Hinkle and Janet E. Brown in fond memory of Paul Hinkle, W9HK
Everett G. Siebert, KD4BGY; James K. Schuck; Wilbur C. Carruth, AB4XK; Norman J. Weddell; Max E. Norman and the Polk Ham Club (Florida) in fond memory of Michael Fahnestock, KF4RZH
Carl J. Lump, KQ2O, in fond memory of Ted Marks, W2FG
C.W. "Jack" Barbrow, WA4IAQ, in fond memory of Roy M. Snead, KC4VRZ
John T. Jones Jr, W3NTD, in fond memory of William J. Ludes, K3BWZ
John T. Jones Jr, W3NTD, in fond memory of Raymond Craig, W7LBY
Estate of Ruth Meissner (Connecticut); Linda Ruekert; Mr and Mrs Don Coeyman; Marjorie E. Booth; Carol Ann Borges; Maureen and Francis Floor; Daryl and Sandy Meske and Craig R. Dotterer in fond memory of Homer Apple, W4AIT
Dr Ron Levy, K2CO and Mrs Ron Levy in joyful celebration of the 80th birthday of John Burgio, W2JB
Wellesley Foshay, W9VK and Miriam Foshay
Jim Cochran, KK0SS, in fond memory of Duane Runyan, W0KIO
Thomas Doyle, N1MUV, in fond memory of Richard Hatt, AA1EC and Robert Thoroux, N1ZCK

As received and acknowledged during the months of **November** and **December**. QST

Mary E. Lau, N1VH ♦ Secretary, ARRL Foundation Inc

# SILENT KEYS

**It is with deep regret that we record the passing of these amateurs.**

W1AGE, Paul H. Silbert, Marblehead, MA
WA1AHC, Jeffrey W. Zimmerman, West Springfield, MA
N1AKG, James T. Chamberlain, Reading, MA
*WB1EMZ, Barbara P. Kent, Norwalk, CT
KA1FJD, Royce A. Haskell, Littleton, NH
KA1TRF, Paul Kokoszyna, Southwick, MA
*KB1HZ, Stuart Montgomery, Concord, NH
W1ICF, Richard T. Carroll, Brookfield, CT
W1JJ, Russell E. Small, Marblehead, MA
W1NYY, Thomas P. Anselmo, Wethersfield, CT
W1QXV, Max H. Voigt, Chicopee, MA
N1SGL, Bradford M. Erickson, South Yarmouth, MA
WA1VOA, Paul Umbdenstock, Tolland, CT
W2VRS, Norman Strohmeier, West Seneca, NY
W3BSY, Michael E. Overman, McLean, VA
KR3D, Michael F. O'Keefe, Mechanicsburg, PA
W3EUC, Joseph R. Hoeflich, Harrisburg, PA
WA3IQT, Jay M. Sipe, Altoona, PA
KA3MXM, William J. Brewer, Clearwater, FL
*W3OO, Carl Kirschbaum, Allison Park, PA
*K3SA, Steven C. Affens, Olney, MD
*W3TO, Jack C. Shaffer, Cogan Station, PA
W3TWH, John F. Strauss, West Chester, PA
*KB4AQ, John I. Richardson, Mobile, AL
AD4BD, Harold L. Gandy, Spotsylvania, VA
WA4CEG, Leon K. Johnson, Bradenton, FL
K4CQX, Robert M. McCutchen, Huntsville, AL
W4DAL, P. G. Walters, Avondale Estates, GA
W4DLH, James O. Johnson, Kenansville, NC
KS4FB, Frank T. Larrabee, Oak Hill, FL
W4FJL, James L. Holman, Columbus, GA
WA4FOF, Charles E. Cortez, Barnwell, SC
W4GUO, Franklin H. Prestwood, Valparaiso, FL
K4HTU, Robert W. Lucas, Saint Cloud, FL
W4IGE, Walter D. Rollick, Maryville, TN
WB4IKA, Norman R. Marshall, Jonesboro, TN
KD4IOC, William F. Zeiders, Dade City, FL
K4IPV, Joseph J. Carr, Annandale, VA
WA4JJX, George W. Gehres, Jacksonville, FL
W4LJC, Samuel J. Burke, Clearwater, FL
KX4O, Fred W. Sedenquist, Huntsville, AL
WA4ORE, Moffett H. Spencer, Roxboro, NC
KB4PFP, Michael H. Murdock, Hixson, TN
W4PRK, Robert B. Anderson, Cocoa Beach, FL
K4QBX, James H. Turner, Kingsport, TN
KE4SKO, Travis L. Martin, Clanton, AL
W4USQ, Robert G. Holloway, Gainesville, FL
KC4ZBP, Richard A. E. Welsh, Savannah, GA
WA5BWX, Sylvan R. Sibley, Natchitoches, LA
N5EUM, Ralph Huggins, Midland, TX
KC5GLU, John A. Hime, Goldthwaite, TX
W5GM, Jack D. Gant, Ardmore, OK
W5IYF, Everette S. La Garde, Ingram, TX
N5LRO, Richard W. Leggett, Fort Meyers, FL
KD5P, Donald W. Shaw, Bellefontaine, MS
K5THA, John T. Oakes, Bella Vista, AR
K5TKL, Thomas K. Low, Fort Worth, TX
KC5TU, Rainford R. Halls, Socorro, NM
N5XGI, Charles F. Kimmerly, Vancleave, MS
W5YKB, Thomas H. Harp, Bartlesville, OK
KD5YU, George T. Bennett, Pineville, LA
W5ZAV, Louis W. Smith, Tulsa, OK
WH6CQA, Harold T. Yoshikawa, Hilo, HI
K6DR, Anthony W. Borgia, Fairfield, CA
AH6EL, Clayton F. Caughill, Kaneohe, HI
K6HJ, John H. Hedger, Deming, NM
W6HLM, Francis Orella, Petaluma, CA
W6IGF, Carl R. Bergman, Walnut Creek, CA
KA6KGK, John P. Tomko, Leburn, KY
K6LNJ, Arthur G. Pearce, Oceanside, CA
NA6R, Alton W. Jones, Salinas, CA
KC6ROJ, William E. Morrison, Westminster, CA
W6RQ, Albert W. Lotze, San Francisco, CA
*W6TAE, Norman L. Lake, Magalia, CA
WB7AAZ, George M. Stratton, Phoenix, AZ
W7AHS, Russell L. Miles, Boise, ID
W7BBN, John M. Scowcroft, Salt Lake City, UT
N7BHP, John W. Noffsker, Inchelium, WA
W7CQK, Harold K. Long, Renton, WA
*W7DAZ, Johnnie D. Cathey, Airway Heights, WA
KA7DKR, Virginia M. Wilson, Walla Walla, WA
KA7DLS, W. R. Garrecht, Leavenworth, WA
W7EPS, Virgil W. Treadwell, Yakima, WA
ND7G, Roger A. Wilson, Tucson, AZ
*W7JIE, M. L. Gibson, Seattle, WA
KC7KEL, John W. Warren, Murray, UT
AB7LG, Duane A. Peters, Brigham City, UT
WG7P, Charles T. Nuzum, Pittsburgh, PA
W7ZT, Ronald J. Finger, Corona de Tucson, AZ
WB8BOB, Harry W. Spencer, Kalamazoo, MI
*K8CSG, William R. Gary, Houston, TX
WB8KLM, Harvey H. Meister, Cincinnati, OH
W8MFW, Albert A. Brehm, Cincinnati, OH
WD8NAS, Isaac N. Reid, Tampa, FL
W8PBA, Edgar M. Walters, Marietta, OH
W8TEX, Cecil N. Tyree, Dayton, OH
WA8UKV, William F. Coleman, Owosso, MI
WA8WWI, Harold G. Crombie, Elyria, OH
W8ZRL, George J. Purden, Goshen, OH
N9BGK, Elmer R. Fritz, Knox, IN
KF9CQ, Richard E. Van Strien, Highland, IN
N9CUK, E. K. Marlin, Evansville, IN
K9CUQ, Floyd Spearing, Roscoe, IL
W9DBO, Elmer F. Kleppin, Streator, IL
WD9DYE, Edward H. Isotalo, Appleton, WI
W9FLA, Joseph F. Harant, Cicero, IL
K9GBN, Arthur L. Oates, Pekin, IL
W9GDS, Robert L. Walgreen, Cedar Park, TX
KA9HUX, Norbert J. Nevens, Brookfield, WI
*K9KTH, James R. Myers, Bloomington, IN
W9MCS, Leroy W. Dressler, Evanston, IL
N9MKB, Clifford S. Shreve, Fort Wayne, IN
W9NGP, Edward F. Rice, Oconomowoc, WI
N9QQ, Richard C. Trempe, Wausau, WI
N9QYV, Barbara J. McCoy, Muncie, IN
WB9SQE, Earl W. Renfroe, Riverside, CA
KA9TBO, Sylvia G. Plank, Muncie, IN
KB9TD, James R. Vandehey, Auburndale, WI
W9UIN, Joseph H. Kadlec, Evanston, IL
KA9URE, Howard F. Wilke, Orland Park, IL
WB9WUT, Dorman L. Hughes, Decatur, IN
N9XJK, Michael J. Graves, Verona, WI
K9YGA, John R. Banks, Cleveland, IL
*W9YL, Sue Miller, Waldron, IN
W9ZFR, Clarence E. Webb, Richmond, IN
KA9ZIE, Gary Phillips, Muncie, IN
KC0CHC, Barbara A. Erickson, Cottage Grove, MN
WD0FDU, Edwin A. Keeney, Jefferson City, MO
KA0FTA, Robert A. Morgan, Rapid City, SD
K0HAW, Robert E. Hunter, Kansas City, MO
K0LJ, Larry Johnston, Cedar Rapids, IA
WB0MFS, Walter L. Abbott, Springfield, MO
WB0PLY, Blair X. Carmichael, Fulton, MO
OE6MKG, Karl Mulisch, Gratkorn, Austria Europe
VE2WF, Warren Fleming, Greenfield Park, QC, Canada

*Life Member, ARRL

‡Call sign has been re-issued through the vanity call sign program.

Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation Inc, 225 Main St, Newington, CT 06111. QST

Kathy Capodicasa, N1GZO ♦ Silent Key Administrator

# NEW PRODUCTS

## STEALTH ANTENNA FROM IAC

◊ International Antenna Corp has announced the release of the Stealth Bazooka, a fully functional 17-foot flagpole with a tri-band HF vertical antenna inside. Its hidden talents make it an especially attractive choice for "antenna restricted" applications.

The antenna is designed to cover 20, 17 and 10 meters and is rated for 1.5 kW PEP. Additional bands can be covered through the use of an antenna tuner. No coils or traps are used.

The flagpole shell is constructed of impact resistant furniture grade PVC and has a high gloss white finish.

The total assembled weight is 19 lbs. The antenna comes complete with a ground radial kit, all stainless steel hardware and a US flag.

Price: $489 plus shipping and handling. For additional information contact International Antenna Corp, PO Box 121430, Clermont, FL 34712; tel 407-654-7111; **www.iacantennas.com** QST

Previous • Next New Products

# STRAYS

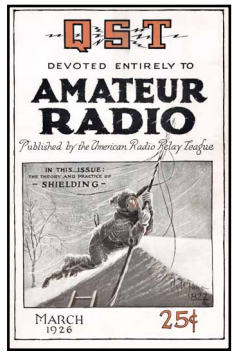
## SETI TECHNICAL SYMPOSIUM

◊ The SETI League will be holding its first Technical Symposium the weekend of April 28-29 at the College of New Jersey (formerly Trenton State College) in Trenton, New Jersey. SETI League members from around the world will present papers on radio astronomy, microwave communications, and the hardware, software, and search strategies being used to seek scientific evidence of other intelligent civilizations in the cosmos. Preregistration is requested by no later than 1 April 2001. The conference registration fee ($30 US for current SETI League members, and $80 for nonmembers) includes one copy of the Conference Proceedings, published as a service to The SETI League by ARRL. An awards banquet is scheduled for Saturday night, with banquet tickets available only in advance, at $30 US. Registration details, lodging and transportation information is available at The SETI League's Web site at **www.setileague.org/admin/meet2001.htm**.

Previous Strays

# 75, 50 AND 25 YEARS AGO

## March 1926

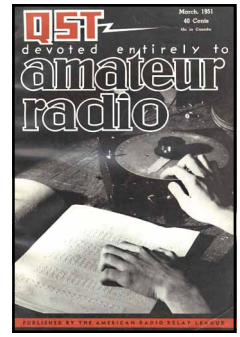



◊ The cover art by Clyde Darr, 8ZZ, shows an unfortunate ham lying on his roof in the snow, holding the antenna mast and trying to keep the *rest* of the antenna from blowing down! The lead editorial, "Roll Over," notes that every year at about this time, a lot of unauthorized stations show up in the amateur bands. The editorial reports that the League has been quite successful in getting the cooperation of the Navy and the Federal Government in reining in these interlopers.

D. R. Clemons, in "The Shielding Problem," uses 12 pages to explain shielding in radios; without proper knowledge, he observes, it's possible that shielding can make some problems even worse. J. K. Clapp describes "Multiplex Short Wave Reception," using two receivers, to optimize radio links. Rufus Turner describes "A Power Amplifier for the Low-Powered Transmitter" that uses two or more 201-A tubes in parallel. In "Amateur Radio to the North Pole Again," F. H. Schnell tells about the equipment to be used by amateur operators Howard Mason and Robert Waskey in the forthcoming polar expedition, with the first tests to begin this month. One photo shows the equipment set up in portable fashion on Lake Monona in Wisconsin—surely a good place to test the equipment for operation under Arctic conditions!

"Pse QSL Card" opens by saying, "It's time something was done about the business of QSL cards, and this article is going to present a policy which it is suggested be adopted." The article advises hams to send cards when requested, and reply to cards received. Short-wave listeners are advised to send cards only to DX hams, and not to US hams or DX broadcast stations.

## March 1951




◊ The cover photo shows some of the operating aids used by sight-impaired hams to operate their stations. The editorial advises hams of the new antenna and tower restrictions (effective February 15, 1951) that apply to hams who live near airports.

The lead article, "Hamming by the Touch System," tells about a day spent with Bob Gunderson, W2JIO, a blind ham. By Goodman, W1DX, describes "A Two-Stage Linear R.F. Amplifier" to give a little more power to your S.S.B. signal. Vern Chambers, W1JEQ, tells about his one-tube converter for receiving WWV on 5 and 10 Mc., "The 'WWV-er'." "We Have New Regulations" reports on the new expanded 75-meter phone privileges (3800 to 4000 kc., available March 1), the new Technician and Novice class licenses (available July 1), and the new Amateur Extra class license (available January 1, 1952).

George Grammer, W1DF, tells about his design for "Adjustable Dummy Antennas." William Rawson, K2AX, describes "An All-Band Mobile Station" with 12 watts output on the HF bands with CW and AM phone. "Hams Aid Korean War Effort" tells about many of the ways hams have helped with communication in and out of Korea on behalf of the military and its servicemen and—women. In "The Deluxe Fixed-Portable Package," Gilbert Countryman, W3HH, tells about his complete 40-watt 40-meter C.W. station.

## March 1976


◊ The cover photo shows W2AEE's HF beam looking out over the metropolitan area around Columbia University, with the caption, "How many consumer electronic devices are near this antenna? A potential RFI problem?" The editorial discusses "A New Growth for Amateur Radio," stating the goal of 100,000 new hams by 1979 and 60,000 new League members by 1979, and discussing the League's determination to make those goals come to pass.

Tony Dorbuck, W1YNC, presents "RFI Primer," with thoughts for both the newcomer and the experienced ham. "Mobile Marine under Sail," by Brandon Wentworth, K6UJ, tells how the author combines his two hobbies. "A VOX for a Very Small Box," by Douglas Blakeslee, W1KLK, describes his tiny VOX, built around two one-dollar IC chips. George Downs, W1CT, discusses compensated coaxial filters as "A Cure for Intermod Alley" in Boston. John Kaufmann, WA1CQW, and Gary Kopec, WA8WNU, describe "A Homomorphic Speech Compressor"—a new kind of speech processor.

Vic Clark, W4KFC, Vice President of the ARRL and the IARU, tells how those organizations are preparing for the WARC conference to be held in 1979, in "Working toward WARC." Deputy Communications Manager Ellen White, W1YL, presents the summary of "Straight Key Night." QST

Al Brogdon, W1AB ♦ Contributing Editor

# W1AW Schedule

| PACIFIC | MTN | CENT | EAST | MON | TUE | WED | THU | FRI |
|---|---|---|---|---|---|---|---|---|
| 6 AM | 7 AM | 8 AM | 9 AM | | FAST CODE | SLOW CODE | FAST CODE | SLOW CODE |
| 7 AM-1 PM | 8 AM-2 PM | 9 AM-3 PM | 10 AM-4 PM | VISITING OPERATOR TIME (12 PM - 1 PM CLOSED FOR LUNCH) | | | | |
| 1 PM | 2 PM | 3 PM | 4 PM | FAST CODE | SLOW CODE | FAST CODE | SLOW CODE | FAST CODE |
| 2 PM | 3 PM | 4 PM | 5 PM | CODE BULLETIN | | | | |
| 3 PM | 4 PM | 5 PM | 6 PM | TELEPRINTER BULLETIN | | | | |
| 4 PM | 5 PM | 6 PM | 7 PM | SLOW CODE | FAST CODE | SLOW CODE | FAST CODE | SLOW CODE |
| 5 PM | 6 PM | 7 PM | 8 PM | CODE BULLETIN | | | | |
| 6 PM | 7 PM | 8 PM | 9 PM | TELEPRINTER BULLETIN | | | | |
| $6^{45}$ PM | $7^{45}$ PM | $8^{45}$ PM | $9^{45}$ PM | VOICE BULLETIN | | | | |
| 7 PM | 8 PM | 9 PM | 10 PM | FAST CODE | SLOW CODE | FAST CODE | SLOW CODE | FAST CODE |
| 8 PM | 9 PM | 10 PM | 11 PM | CODE BULLETIN | | | | |

W1AW's schedule is at the same local time throughout the year. The schedule according to your local time will change if your local time does not have seasonal adjustments that are made at the same time as North American time changes between standard time and daylight time. From the first Sunday in April to the last Sunday in October, UTC = Eastern Time + 4 hours. For the rest of the year, UTC = Eastern Time + 5 hours.

♦ **Morse code transmissions:**

Frequencies are 1.818, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, $7^1/_2$, 10, 13 and 15 wpm.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice text is from the pages of *QST*. The source is given at the beginning of each practice session and alternate speeds within each session. For example, "Text is from July 1992 *QST*, pages 9 and 81," indicates that the plain text is from the article on page 9 and mixed number/letter groups are from page 81.

Code bulletins are sent at 18 wpm.

W1AW qualifying runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted on approximately 3.590 MHz by K6YR. At the beginning of each code practice session, the schedule for the next qualifying run is presented. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. Send a 9×12-inch SASE for a certificate, or a business-size SASE for an endorsement.

♦ **Teleprinter transmissions:**

Frequencies are 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.

Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Fridays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

♦ **Voice transmissions:**

Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ **Miscellanea:**

On Fridays, UTC, a DX bulletin replaces the regular bulletins.

W1AW is open to visitors from 10 AM until noon and from 1 PM until 3:45 PM on Monday through Friday. FCC licensed amateurs may operate the station during that time. Be sure to bring your current FCC amateur license or a photocopy.

In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

Headquarters and W1AW are closed on New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the following Friday, and Christmas Day.

# CONTEST CORRAL

**W1AW Qualifying Runs** are 10 PM EST, Monday, March 5, and 7 PM EST Tuesday, March 20. The K6YR West Coast Qualifying Run will be at 9 PM PST on Wednesday, March 7. Check the W1AW schedule for details.

## March

### 3-4

**ARRL International DX Contest, phone**, see December 2000 *QST*, page 110.

### 11-12

**North American Sprint, RTTY**, sponsored by *NCJ*, 0000-0400Z Mar 11 (local time, Mar 10); 80, 40, 20 only. North American stations work everyone; others work NA stations only. Exchange other station's call, your call, serial no., name, and state/province/DXCC country. The same station can be worked multiple times provided 3 contacts separate the contact in both logs, regardless of band. QSY rule: Stations calling CQ, QRZ, etc, may only work one station in response to that call; they must then move at least 1 kHz before working another station or 5 kHz before soliciting another call. Once you are required to QSY, you may not make a new QSO on the previous frequency until you have made a contact at least 1 or 5 kHz (as required) away. Team competition. Awards. Electronic entries accepted. Send logs no later than 30 days after the end of the contest to Wayne Matlock, K7WM, Rt 2, Box 102, Cibola, AZ 85328; **rttysprint@ncjweb.com**; **www.ncjweb.com/**.

**Wisconsin QSO Party**, sponsored by the West Allis RAC, 1800Z Mar 11 until 0100Z Mar 12. CW and phone. 80 40 20 15 10 6 2 meters. Work stations once/mode/band, no repeater QSOs. Single op/multi-single/multi-multi, fixed/mobile. WI stations send county; others send state/province/DXCC country. CW: 3.550 3.705 7.050 7.125 14.050 and 15/10/6/2 meters; phone: 3.890 7.230 14.290 21.350 28.400 and 6/2 meters. Score 1 pt/phone, 2 pts/CW QSO. Final score is QSO pts WI counties (max 72); WI stations score QSO pts WI counties + states/provinces. WI mobiles/portables add 500 bonus points for each county they make 12 or more QSOs from. Mobile operators may not sit on a county line to operate. Power level multiplier: multiply your QSO points by the power multiplier: 150 W or more × 1, 5 to 150 W × 1.5, less than 5 W × 2. Awards. Send logs within 30 days to West Allis RAC, PO Box 1072, Milwaukee, WI 53201; **www.warac.org/**.

### 13-14

**CLARA and Family HF Contest, phone and CW**, sponsored by the Canadian Ladies ARA, from 1700Z Mar 13 until 1700Z Mar 14. 80 40 20 15 10 meters Work stations once per band/mode. Cross-mode contacts count as phone for both stations. Single ops only. Exchange RS(T), state/province/DXCC country, and whether CLARA member or nonmember. Multipliers are Canadian provinces and DXCC countries. Score 5 pts for CLARA-member-to-CLARA member, YL-non-member-to-CLARA-member and OM-to-CLARA-member QSOs on phone; 2 pts per QSO with CLARA family members; 3 pts per QSO with non-CLARA YLs on phone; 1 pt per QSO w/OMs. Awards. Send logs by April 22 to Helen Archibald, VE2YAK, 130 Embleton Cres, Pointe Claire, QC, Canada H9R 3N2; **archibal@pubnix.net**.

### 18-20

**Virginia QSO Party**, sponsored by the Sterling Park ARC, 1800Z Mar 17 to 0200Z Mar 19. Single operator, mobile, club, single-multi and multi-multi. Work stations once per band/mode, mobiles as they cross county lines. VA stations work everyone, others work VA stations only. Exchange serial number and state/province/DXCC country (VA stations send county). CW: 1.805 and 50 kHz up; phone: 1.845 3.860 7.260 14.260 21.360 28.360; Technician: 10 kHz up and 28.360; VHF/UHF: 50.125 147.48 223.50 446.00. No repeater or cross-mode QSOs. Score 1 pt/phone, 2 pts/CW, and 3 pts/VA mobile QSO. Final score is QSO pts VA counties (max 95); VA stations use VA counties/states/provinces/DXCC countries for multiplier. VA mobiles add 100 bonus pts for each VA county from which they make a QSO. Club competition. Awards. Send logs by Apr 15 to Virginia QSO Party, Call Box 599, Sterling, VA 20167; **www.qsl.net/sterling/**.

### 24-25

**CQ WW WPX Contest**, phone, sponsored by *CQ Magazine*, from 0000Z Mar 24 until 2400Z Mar 25 (CW is May 26-27). Single ops operate no more than 36 hours, off periods must be 60 min or more. Classes: single op single/all band, high, low (< 100 W), QRP (< 5 W) or assisted; multi-single (10-minute rule); multi-multi; rookie; tribander and single element; and band restricted. Send RS(T) and serial no. Score 3 pts/QSO w/different continents on 14-28 MHz and 6 pts/QSO w/different continents on 1.8-7 MHz; score 2 pts/QSO w/stations in North America on 14-28 MHz and 4 pts/QSO w/NA stations on 1.8-7 MHz. Stations in own country count one point. Multipliers are prefixes worked (ie, N8, KA1, HG73, JD1). Work stations once/band; prefixes count only once. Awards. Club competition. Send logs by May 10 (CW, Jul 10) to *CQ Magazine*, 25 Newbridge Rd, Suite 405, Hicksville, NY 11801; **n8bjq@erinet.com**; **ourworld.compuserve.com/homepages/n8bjq/**. QST

# SPECIAL EVENTS

**Arlington Heights, IL:** Peace Corps ARC, KA9NLX, 1600-2200Z **Mar 1**, celebrating the 40th anniversary of the Peace Corps. 7.283 14.325 21.375 28.550. Certificate. John Paskevicz, 1423 North Ridge Ave, Arlington Hts, IL 60004.

**Port St. Lucie, FL:** PSLARA, K4RSL, 1700-2100Z **Mar 1** to **Mar 10**, commemorating the arrival of the New York Mets baseball team to Port St. Lucie for their spring and summer training. 14.050 14.230 21.230 28.350. Certificate. Dr Maurice I. Sasson, W2JAJ, 8590 Florence Dr, Port St. Lucie, FL 34952.

**Nutley, NJ:** Robert D. Grant United Labor ARA, N2UL, 1400-2400Z **Mar 3**, to honor Walter Reuther and the UAW. 28.420 14.240. Certificate. Charles Helms, 112 Prospect St, WA2VJA, Nutley, NJ 07110.

**Macon, GA:** Macon Amateur Radio Club, W4BKM, 1500-2200Z **Mar 17**, during the 19th annual Cherry Blossom Festival. 14240 21335 28390. Certificate. Macon ARC, PO Box 4862, Macon, GA 31208.

**Mount Holly, NJ:** NWS-Phi SKYWARN Association, WX2PHI, 1500-2100Z **Mar 18**, promoting the beginning of Hazardous Weather Week in Pennsylvania. 7.273 14.273 28.373. Certificate. John Holmes, WX3W, WX2PHI Special Event, 126A Worman Rd, Bath, PA 18014-9099.

**New Port Richey, FL:** GulfCoast Amateur Radio Club, K4C, 1230Z **Mar 22** to 2000Z **Apr 1**, 2001, for the 79th annual Chasco Fiesta in New Port Richey, Florida. 7240 14250 21365 28400. Certificate. GulfCoast Amateur Radio Club, Chasco Fiesta, PO Box 595, New Port Richey, FL 34656-0595.

**Laguna Woods, CA:** Leisure World Amateur Radio Club, W6LY, 1400Z **Mar 24** to 2000Z **Mar 25**, celebrating the 2nd birthday of the City of Laguna Woods. 7.250 14.250 28.380. QSL. Ernie Senser, 3031 Calle Sonora, Unit B, Laguna Woods, CA 92653.

**Timonium, MD:** Baltimore Amateur Radio Club, W3FT, 1200Z **Mar 31** to 2000Z **Apr 1**, celebrating the 30th anniversary of the Greater Baltimore Hamboree and Computerfest. 7.260 14.310. Certificate. Baltimore Amateur Radio Club, Awards Manager, PO Box 120, Reisterstown, MD 21136. QST

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

# NEW PRODUCTS

## ON SEMICONDUCTOR POWER SUPPLY DESIGN SEMINARS

◊ Switching power supply design seminars sponsored by ON Semiconductors will be taking place in selected US cities throughout 2001, with additional seminars in Europe and Asia. The topics presented on the first day of the seminars include modeling, magnetics, power stage characteristics and voltage/current-mode feedback loop design. The topics addressed on the second day will be flyback topology, multiphase buck converters and power factor correction preconverters. Included in the single registration fee of $95 is a copy of *Power 4-5-6*, power supply design software that offers component design, large-signal simulation feedback control design and small-signal analysis in one package. More information about the seminars is available on the Web at **onsemi.com/**. QST

Previous New Products

# SECTION NEWS

## The ARRL Field Organization Forum

### ATLANTIC DIVISION

**DELAWARE**: SM, Randall Carlson, WB0JJX—The Executive Committee has just approved the 2001 Delaware State Convention for April 29, 2001, in New Castle, Delaware. It will once again be sponsored by the Penn-Del Radio Club. More details will be forthcoming, but mark your calendar and make plans to attend. With the start of the new year, many clubs have elected new officers. Make sure you delegate someone to update your club ARRL affiliation record on the ARRL Web site to reflect any changes in officers and/or contact information. Also please forward me any changes in contact information so that I can update the Section Web page with your club's new information. Traffic (Dec) DTN: QNI 174 QTC 23 in 21 sess., DEPN: QNI 36 QTC 0 in 5 sess, KCARC QNI 29 QTC 1 in 5 sess. K3JL 51. 73, Randall.

**EASTERN PENNSYLVANIA**: SM, Eric D. Olena, WB3FPL — SEC: Michael O. Miguelez, N3IRN. ACC: Steve Maslin, N3ORH. OOC: Alan Maslin, N3EA. STM: Paul Craig, N3YSI. SGL: Allen Breiner, W3ZRQ. TC: Lawrence Thomas, AA3PX. PIC: Robert Josuweit, WA3PZO. ASMs: Dave Heller, K3TX, George Law, N3KYZ, James E. Bear, WB3FQY, Harry Thomas, W3KOD, also WA3PZO, & N3YSI. There are many Hams who do a tremendous amount of work and good deeds and yet do not wish to take any official credit for all of the good things that they do. For instance, Dudley, WA3JXW, has been handling traffic in and out of the Berks County area for years without a thought of getting recognition for his work. We should all take the time to say thank you to each of these selfless individuals who give so much to Amateur Radio. Without the vast volume of work that these people do we would be sure losers. From The South Mountain Repeater Association (SMRA) newsletter, "Echoes from South Mountain" comes the note that they are looking to host a senior ham radio conference for Cumberland and possibly surrounding counties. Their conference would provide an opportunity for younger hams to look and listen as older hams told of their experiences with spark, crystal, tubes etc. SMRA is hoping to get such a conference organized for this summer. Sounds like a great idea. We'll keep our ears open and find out how things go. At a recent Pennsylvania Emergency Management Volunteer Organizations Active in Disasters (VOAD) meeting a question was asked that surprised me. The question was, "What happens when cell phones go out?" The question itself was not as much a surprise as the source of the question. The person asking the question was from an organization that is very active in all sorts of disaster scenes. The person himself has been at numerous locations through out the country. The ARRL has been represented at the PEMA VOAD meetings since the group was organized (approx. 1985). At another meeting another person had all kinds of praises for Amateur Radio and his comment was "I don't know how they do it..." Perhaps we should view this as a reminder that anyone who is involved in any group such as a VOAD should take a few minutes at one of the meetings and give a brief description of Amateur Radio and its capabilities. An occasional review would help too, since members of this type of mixed group changes often. Tfc: N3YSI 337, W3IPX 230, W3IVS 182, W3UAQ 151, N3EFW 144, W3NNL 114, W3HK 111, K3TX 77, N3SW 69, K2BCL 68, W3JKX 54, W3TWV 26, N3AT 14, KA3LVP 12, K3ARR 11, KB3BBR 11, N3AO 9, KB3CVO 7, N3AS 7, N3IRN 6, W3TI 5, AD3X 4, W3DAB 4, KB3CKD 2, N3KYZ 2, KB3DCT 2, N3HR 1, Net Tfc: EPA 59, EPAEPTN 31, PTTN 31, PFN 31, MARCTN 13, D3ARES 8, LCARES 5, MCOES4, SEPPTN 9, D4ARES 4.

**MARYLAND/DC:** SM, Bill Howard, WB3V, 410-551-6775, wb3v@arrl.org—ASM/RACES Al Nollmeyer, W3YVQ (w3yvq@arrl.net). BM: Al Brown, KZ3AB 301- 490-3188 (kz3ab@arrl.net). SEC: Mike Carr, WA1QAA (bamcc@erols.com) 410-799-0403. STM: Bruce Fleming, 301-863-6582 (MEGASWOOP@aol.com). MDC Section Web Homepage *http://users.erols.com/wb3v/mdc*. HC EC K3EF reports 22 members, 2 sessions of the HC ARES/RACES Net on 147.135, which maintains liaison with MEPN and BTN. FR EC N8AAY reports 10 members, 4 sessions of the FRED ARES Net on 147.06. Eric has finalized preparation of a joint ARES/RACES registration form for use in FRED. AA EC N3QXW reports 38 members, 3 sessions of the AA ARES Net on 147.805, which maintains liaison with NCAC, MEPN, and BTN, and one training session. N3QXW & N3WOF conducted successful field packet tests between BWI airport and Baltimore Shock Trauma Center in preparation for an upcoming exercise at BWI. N3QXW, N3WOF, N3GT and N3SEO geared up to man the AA EOC in preparation for the winter storm, which headed north instead. In a special note, this was received in response to a special event activation: On behalf of the County Commissioners, I want to congratulate you and the members of the Charles County and Southern Maryland Amateur Radio Clubs for their celebration in Cobb Island of the 100th anniversary celebration of the birth of the first radio broadcast. The Commissioners noted the articles in the local media and extend their sincere appreciation for the service you are able to provide to our community during emergencies and wish you continued success in your future endeavors. Signed Nina Voehl, Public Information Officer, Charles County Government. Also, we are pleased to report that the Charles County ARC, Inc. has been officially designated a Special Services Club. Through the efforts of its members, this club is recognized for its extended efforts on behalf of Amateur Radio and services to its community.—Bill Howard WB3V, and with the nets: NET/NET MGR/QND/QTC/QNI: SN/KC3Y/31/43/304, MEPN/N3WKE/ no report/, MDD/WJ3K/62/38/760, MDD Top brass: AA3SB 170, K3JL 167, AA3GV 137, BTN/AA3LN/no report/, SMN/KE3OX/no report. Tfc: KK3F 4300, N3QA 273, AA3GV 118, AA3SB 92, W3YVQ 85, N3WKE 85, KO4A 73, KJ3E 72, KC3Y 42, N3KGM 40, W3CB 28, N3WK 21, WJ3K 17, N3ZKP 17, K3CSX 15, WA1QAA 12, W3VK 8, KE3FL 2, PSHR: KK3F 216, W3YVQ 138, KE3FL 130, N3ZKP 129, AA3SB 127, W3VK 120, N3WKE 119, W3CB 116, WA1QAA 115, AA3GV 113, KJ3E 94, N3WK 92, WJ3K 81, KC3Y 78, K3CSX 74.

**NORTHERN NEW YORK**: SM, Thomas A. Dick, KF2GC, http://www.northnet.org/nnyham, e-mail: kf2gc@arrl.org—ASMs: KD2AJ, WZ2T, WB2KLD, N2ZMS, WA2RLW. ACC: WZ2T. BM: KA2JXI. OOC: N2MX. PIC: N2SZK. SEC: WN2F. STM: N2ZGN. TC: N2JKG. The NNYARA - Lake Placid Hamfest Committee met at the Red Cross Building in Saranac Lake, NY on Dec 9 at 11 AM -1:30 PM. First, I want to thank all those in attendance at this very important first meeting. Those in attendance were Roland Patnode-WA2RP, Jackie Patnode-KB2ZIE, Chuck Orem-KD2AJ, Alvah Haggett-KB2LML, Walter Brady-N2YMY, Hugh Brown-W2IB and Thomas Dick-KF2GC. NNY-Clubs represented were DOERS, OARC, OVARC, TLARC, CVARC, MVARC, PSARC,SLVRA and NNYCC. The meeting began at 11:05 AM by Hamfest Chairman - KF2GC. We completed information needed for our application and ARRL affiliated sponsorship of this event. This Lake Placid Hamfest is scheduled for Saturday Oct 13, 2001, beginning at 8 AM and ending at 4 PM. Vendors can come early to set up the night before. Our next, Lake Placid Hamfest 2001 meeting will be on Jan 20, 2001 at 11 AM in Saranac Lake, NY and at the Red Cross Building.

**SOUTHERN NEW JERSEY**: SM, Jean Priestley, KA2YKN (@K2AA) e-mail ka2ykn@voicenet.com. ASM: W2BE, K2WB, W2OB, N2OO, N2YAJ. SEC: KC2GID. STM: K2UL. ACC: KB2ADL. SGL: W2CAM. OOC: K2PSC. TC: W2EKB. TS: W2PAU. WB2MNF AA2BN KD4HZW WB3IJB WA2NBL N2QNX N2XFM. It's been some time since we fought for our spectrum spaces. We still need to use them to keep them. They went for part of 220 band for monetary values and got it. As mild winters go, we go several years and Nature sends us 30 inches of snow. There could be someone not hearing activity on the bands and say, "the hams aren't using the space, let's get it." Just one hour a week more on the bands will make a difference. Dec QNI NJPN 209 W2CC NJSN 220 K2PB NJM 161 WA2OPY NJN/E 180 AG2R NJN/I 151 AG2R (with NNJ) JSARS 319 KC2ATQ SJVN 258 WB2UVB SJTN 53 KB2RTZ. Tfc: KB2RTZ 408, K2UL-4 147, K2UL 108, AA2SV 91, KJ4N/2 89, WA2CUW 75, WB2UVB 68, N2WFN 60, W2AZ 37, KA2YKN 25, N2VQA 14, KA2CQX 11, N2ZMI 6, KB2VSR KB2YBM KC2ETU 1. Congratulations to KB2RTZ on his Brass Pounders Award. PSHR: KB2RTZ 335, WB2UVB 188, K2UL 168, AA2SV 121, N2WFN 107, KA2CQX 106, KA2YKN 57, N2VQA 43, KB2YJD 4. The committee for the Battleship New Jersey project has formed. Work is progressing. Holiday City mourns loss of Sidney Cohen, W2HXH.

**WESTERN NEW YORK**: SM, Scott Bauer, W2LC— Congratulations to the Rochester Amateur Radio Association RARA on their 70th anniversary! The key to their success is a great group of officers and volunteers who run the club and organize activities. RARA officers: Pres. Keith N2BEL, VP Peter W2SKY, Sect. Howard Greenwald, Treas. Richard K2VCZ, board of directors: Mary Kay, KC2DPG, Jaime N3ZSS, Ed N2EH, Scott K9EEE, Jack N2SNL, Allen W2AES, and Tom English. 13 others organize specific activities from the Rochester Hamfest and Atlantic Division Convention (June 1, 2, 3), through newsletter editor to club historian. With 24 plus members involved it is no surprise that RARA is so successful! In recognition of significant and dependable performance of 2nd region operators the WB2VEG and N2XJ Memorial Award goes to KA2GJV, N2LTC, WB2QIX, WB2GTG and N1JX. Congratulations to all, well deserved! Al, N2CCN, is now WNY Section Emergency Coordinator. Al has a long history of experience in public service, emergency communications and the national traffic system. Please welcome Al to his new position. Silent Key, December 23, Pete, W2WSS, one of the great ones. 73, Pete, and good DX.

| *Net* | *NM* | *Sess* | *QNI* | *QSP* | *Net* | *NM* | *Sess* | *QNI* | *QSP* |
|---|---|---|---|---|---|---|---|---|---|
| BRVSN | N2OYQ | 31 | 119 | 0 | CHN | W2EAG | 31 | 187 | 71 |
| CNYTN | WA2PUU | 31 | 315 | 98 | EBN | WB2IJZ | 21 | 342 | 0 |
| ESS | W2WSS | 31 | 359 | 90 | NYPHONE | N2LTC | 31 | 276 | 404 |
| NYPON | N2YJZ | 31 | 437 | 162 | NYS/E | WB2QIX | 31 | 387 | 229 |
| NYS/L | W2YGW | 31 | 246 | 242 | NYS/M | KA2GJV | 31 | 206 | 133 |
| NYSCN | W2MTA | 5 | 23 | 5 | NYSPTEN | WB3CUF | 31 | 346 | 55 |
| OARCN | N2KPR | 4 | 41 | 5 | OCTEN/E | KA2ZNZ | 31 | 1548 | 435 |
| OCTEN/L | KA2ZNZ | 31 | 630 | 456 | STAR | N2NCB | 29 | 206 | 23 |
| STTHN | KC2AWA | 8 | 35 | 14 | TIGARDS | W2MTA | 3 | 16 | 1 |
| WDN/E | N2JRS | 31 | 529 | 84 | WDN/M | KB2VVD | 31 | 562 | 104 |

Traffic (December 00), * indicates PSHR, # for BPL: N2LTC*# 2009, KA2ZNZ*# 719, KB2WII*# 611, KA2GJV* 482, NN2H* 351, W2MTA* 314, KC2GJM* 252, WB2IJH* 250, N2KPR* 205, KC2EOT* 198, W2FR* 176, WB2QIX* 152, N2CCN* 146, NY2V* 125, WI2G* 103, KA2DBD* 98, W2LC* 94, KG2D* 93, KB2VVD* 69, AF2K* 62, KB2ETO* 60, W2PII* 54, N2JRS* 35, W2GUT* 33, AA2ED* 28, WA2UKX* 26, K2DN* 23, WA2GUP* 23, N2WDS* 20, KA2BCE* 19, KC2GVL 13, W2RH 13, KG2HA* 1. Digital; Stn Rx/Tx: N2LTC 658/608, KA2GJV 24/18, NY2V 2/2, K2DN 3/0.

**WESTERN PENNSYLVANIA**: SM, John Rodgers, N3MSE—ASM: N3MYZ. SEC: N3SRJ. ASM-ARES: WB3KGT. ASM-Packet: KE3ED. OOC: W3ZPI. PIC: W3CG. STM: N3WAV. TC: WR4W. DEC-SO: KD3OH. DEC-N1: N3QCR. DEC-N2: KA3UVC. DEC-S1: KA3HUK. DEC-S2: N3BZW. DEC-Rapid Response: N3HJY. DEC-OES: K3TB. I would like to announce the appointment of Sally Cripe, N3MYZ, as the new assistant section manager for Western Pennsylvania. Sally is a member of the Ellwood City Amateur Radio Club and will serve as my chief assistant in all areas. I am looking forward to working with her especially in getting new ideas on promoting more involvement in the various areas. Sally will also be helping with the planning of the President's Conference and EC Conference that should be this spring. She also plans to be present at the league table at various hamfests so feel free to stop by and say hello. Mike Lazaroff, the DXCC field card checker for the section, has offered to speak at club meetings on how to obtain your DXCC and on QSLing. He is also available for field checking at hamfests. Mike, K3AIR, has worked over 200 countries and has a great deal of experience in this area. Any club wishing to contact Mike can do so at k3air@arrl.net.The featured Web site for this month belongs to the Radio Association of Erie. The Web site address is http://public.surfree.com/n3ntj/rae.html. Please check out their newsletter and other portions of the site. Clubs in need of speakers for meetings may contact me for scheduling. I still have some dates available in my schedule for the year. 73 de John Rodgers, N3MSE, WPA-SM n3mse@arrl.org.

### CENTRAL DIVISION

**ILLINOIS**: SM, Bruce Boston, KD9UL—SEC: W9QBH. ACC: N9KP. STM: K9CNP. PIC: N9EWA. TC: N9RF. OOC: KB9FBI. DEC-Central: N9FNP. DEC-S/W KB9AIL. Congratulations to W9GIG who is the new ARRL Central Division Director. Other election results also continue to come in from around the section. York RC officers for the 2001 are Pres KE9VC, VP WK9J, Sec W9EG, Trea K9BFU. The new officers for the Schaumburg ARC are Pres W9ZJX, VP N9TOI, Sec K9AND, Trea KA9ZKR. SARC members are trying their hand at a PSK31 net from 7-9 PM. Tuesday on 28.121. SARC held their holiday party Dec. 21. The Peoria Area ARC holds a weekly net at 8:30 PM. Sunday on 147.075 MHz. An "all hazards" training net operates at 8:50 PM. Wednesday on 146.850. The club has decided to purchase VHF and UHF antennas for the station at the Red Cross. PAARC trustee WB9CIR attended a Project IMPACT meeting and reported that Peoria has been declared a Storm-Ready Community. According to the Egyptian RC newsletter, information about the Storm-Ready designation can be found on the Internet at www.nws.noaa.gov/stormready. The 2001 officers of the ERC are Pres N9OQK, VP KB9OHJ, Sec TBD, Trea KB9AIL. Technical Coordinator N9RF reports he was asked to review the new ARRL Handbook, and said it is a good book. ARES EC WA9RUM is helping ESDA program 56 weather alert radios for public buildings throughout the county. The DuPage ARC began a "Kids Class" Jan. 13. The class is for the Technician license, and will run 11 weeks. The North Shore RC held their annual banquet Jan 13. Members of Lake Co RACES assisted the Salvation Army in their annual Christmas Party for underprivileged children. About 2,200 children attended the event. At the end of the festivities all of the children got to go on stage to meet Santa and a member of the Chicago Bears. The Fox River Radio League held its winter banquet Jan 27. ARES EC K9DRW reports the group held a Simulated Emergency Test Dec. 18. The drill consisted of a table-top, radio and field exercise. The scenario involved severe winter weather in the form of freezing rain followed by heavy snow. Drill participants also had a hazardous materials spill to consider. The entire exercise lasted more than three hours and provided some valuable insights into future needs. The Kishwaukee ARC held their Christmas Party Dec. 13 with 24 in attendance. The Western Illinois ARC is offering a 12-week ham class through the end of March at the Illinois Veterans Home. The club held its annual dinner meeting Jan. 13. WIARC is working with the Hannibal club to put the Cardiff Lighthouse in Hannibal on the air for the 2001 edition of the Lighthouse Weekend, Aug. 4-5. Dec tfc: K9CNP 135, NN9M 43, W9HLX 37, WB9TVD 35, NC9T 18, W9FIF 8, WA9RUM 5, KA9IMX 4. ISN report de WB9TVD QNI 249, QTC 72, Sessions 30. 9RN report de KF9UBX sessions 62, traffic handled 186, average per session 3, rate of traffic 4, percent IL represented during month 80% NN9M, W9HLX, N9PLM, NS9F. W9VEY Memorial Net report de K9AXS 5 with 177 check-ins. W9VEY total for the year 2000 was 76 pieces of traffic and 2522 check-ins.

**INDIANA**: SM, Peggy Coulter, W9JUJ—ASM for Resources & Recruitment, W9IH. SEC: K9ZBM. ASEC: WA9ZCE. STM: W9FU. OOC: KC9V. SGL: K9JZZ. PIC: KB9LEI. TC: W9MWY. BM: KA9QWC. ACC: N9RG. Sympathy extended to the families and friends of Silent Keys: 11/24 John L. Modesitt, WA9DGC, Brazil; 12/26 Richard G. Sunderland, WA9LHC, Ft. Wayne; 1/5/01 Gary Dean Schriefer, KA9ECY, Lamar. They will be missed. The Clark Co. ARC had another successful Bethlehem Special Event Station. Contacts were made with 41 states plus Canada. Total number of contacts not sure but KB9THQ made 195 contacts. Congratulations to Don Fulk, KB9EQC receiving the Indianapolis Radio Club

Continued on page 122.

Steve Ewald, WV1X ♦ Public Service Specialist

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- 55 watts
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- Backlit remote control mic
- Mil spec 810, C/D/E*[1]


### IC-207H Dual Band Mobile
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- Remote head capable

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- Large Front Firing Speaker


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**Dual Bands at a Single Band Price!**
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- 70 memories
- Great audio
- CTCSS encode/decode
- Auto repeater
- Easy operation!
- Mil spec 810, C/D/E*[1]

### IC-T2H 6W, 2M Transceiver
**Commercial Grade Rugged**
- Easy to use
- Customizable keys
- LCD backlight display
- 40 memory channels
- Up to 6W @9.6 V CD
- 500 mW audio
- Mil spec 810, C/D/E*[1]

$20 COUPON

### IC-T81A 4 Band Transceiver
**Worlds First 4-bander HT**
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- Wide band receiver - 30 to 1300 MHz**
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- Monitor function
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- Mil spec 810, C/D/E*[1]

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LOW PRICE
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- 5W @ 13.5 V
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- True dual band with V/V, U/U
- Optional PC programmable
- Mil spec 810, C/D/E*[1]

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- 100w 160-6M, 12VDC
- Built-in DVR, CW Memory Keyer
- DSP, Auto-Notch • 99 Memories
- Computer controllable, CAT System

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### FT-8100R 2M/440 Mobile
- Ultra Compact • 50w/35w 2m/440
- 110 memories • Wide Band RX
- Backlit mic • Remotable front panel w/opt. YSK-8100

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### DJ-196T 2M HT

- 5 Watt out
- 40 memories
- Alphanumeric Display
- CTCSS + DCS Built-in
- "S" Meter
- Auto Dialer

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NEW!

### DJ-V5TDC 2M/440 HT

- 5 Watt out w/optional EBP 46
- Cool Clear Design
- 200 Memories • Dry cell pack incl.
- Rx 76 mHz to 1gHz (cell blocked)
- AM Air Rx • Wide FM Rx

**Lowest Price Full Feature Dual Band!**

$179.95

### DR-605TQ 2M/440 Dual Band Mobile

- 50W 2M, 35W 440
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- Super Compact
- Lightweight Power Supply
- 30 amp. 5-15 VDC output
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NEW!

### DR-135TP 2M Mobile

- 50 Watt out • Alpha Numeric Display
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NEW!

### 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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### UHV-6

40M-70cm Mobile Antenna

40/*20/15/10/6/2M/70cm
* optional coil

A 6M/2M/70cm whip that accepts 1,2 or 3 HF coils for up 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...

HF/VHF/UHF on a single antenna!! Contact any Ham Radio Outlet store for duplexer/ triplexer options.

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NEW!

High Sunspots= Great HF Mobiling!

### 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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- Compact, Mobile Meter
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- Mounting Bracket Included

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**anaheim@hamradio.com**

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Great for packet, and APRS compatible

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Detailed illuminated map shows time, time zone, sun position and day of the week at a glance for any place in the world. Continuously moving - areas of day and night change as you watch. • Mounts easily on wall. Size: 34 1/2" x 22 1/2".

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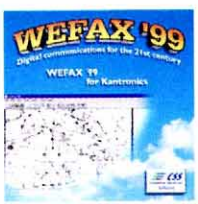
Host mode control program for Kantronics TNCs. Pacterm '98 supports multiple windows for each Packet and HF mode, plus synchronizing with Log Windows. Super support from CSS.



Logwindows The first and best logging program for Windows, Log Windows has been a favorite for nearly a decade. It will be the last logging software you'll ever need. Supports remote antenna switching with TopTen band decoder. TNC control, rotor control, DXCC 2000, DXCC, WPX, WAC, WAS, VUCC, WAS, IOTA Grayline display, Telnet Cluster and more.

Wefax '99 Wefax for your Kantronics KPC or KAM TNCs. Receive real time HF Weatherfax images to keep track of hurricanes, typhoons and other weather events worldwide.




If you're a weather fan, you'll enjoy taking advantage of this on option on your Kantronics TNC. Plus, being able to save the images to Windows bitmap files, do automatic scheduling and more.


Digital Trio Get Pacterm '98, Log Windows and Wefax '99 all in one package for a special price. Great for the ham that requires the best. The Digital Trio lets you do all the popular HF modes, and logs your contacts at the same time.

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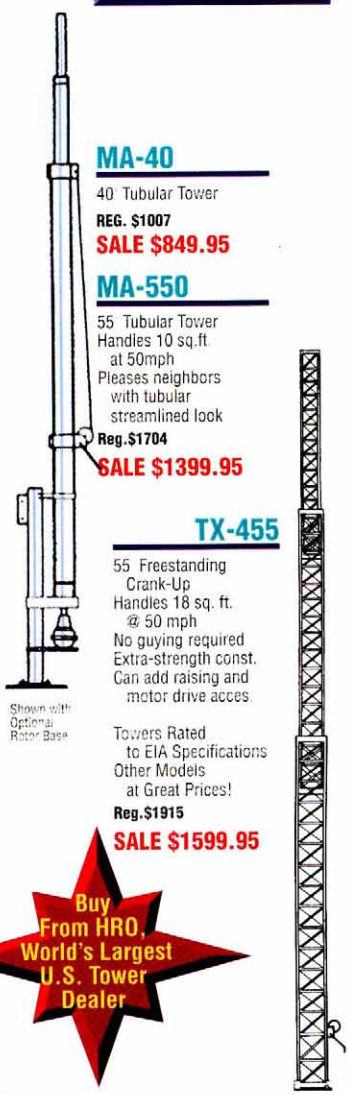

Shown with Optional Rotor Base

### MA-40

40' Tubular Tower

**REG. $1007**

**SALE $849.95**

### MA-550

55' Tubular Tower
Handles 10 sq.ft. at 50mph
Pleases neighbors with tubular streamlined look

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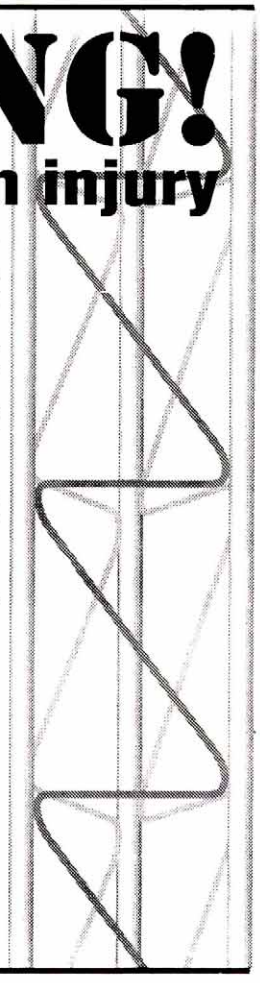
## Save your life or an injury

Base plates, flat roof mounts, hinged bases, hinged sections, etc., are not intended to support the weight of a single man. Accidents have occurred because individuals assume situations are safe when they are not.

Installation and dismantling of towers is dangerous and temporary steel guys of sufficient strength and size should be used at all times when individuals are climbing towers during all types of installations or dismantlings. Temporary steel guys should be used on the first 10' of a tower during erection or dismantling. Dismantling can even be more dangerous since the condition of the tower, guys, anchors and/or roof in many cases is unkown.

The dismantling of some towers should be done with the use of a crane in order to minimize the possibility of member, guy, anchor or base failures. Used towers are not as inexpensive as you may think if you are injured or killed.

Get professional, experienced help and read your Rohn catalog or other tower manufacturers' catalogs before erecting or dismantling any tower. A consultation with your local professional tower erector would be very inexpensive insurance.



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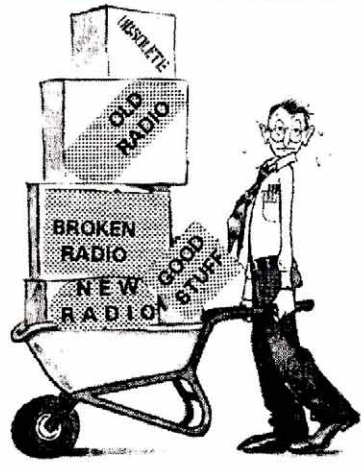


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*Bringing Communication to Education Since 1980*

Amateur of the Year Award. Members of Porter Co. ARES assisted Santa with visits to Shut-Ins in South Haven. Not much news this month. The cold snowy wx must have slowed all down. Send me your news. Let us know what you are doing. NM's ITN/W9ZY, QIN/K9PUI/KJ9J, ICN/K8LEN, VHF/W9FU.

| Net | Freq | Time/Daily/UTC | QNI | QTC | QTR | Sess |
|---|---|---|---|---|---|---|
| ITN | 3910 | 1330/2130/2300 | 3160 | 459 | 1685 | 93 |
| QIN | 3656 | 1430/0000 | 146 | 66 | 743 | 55 |
| ICN | 3705 | 2315 | 84 | 16 | 277 | 27 |
| IWN | 3910 | 1310 | 2139 | – | 310 | 31 |
| IWN VHF Bloomington | | | 523 | – | 465 | 31 |
| IWN VHF Kokomo | | | 672 | – | 155 | 31 |
| IWN VHF Northeast | | | 1110 | – | 620 | 31 |
| Hoosier VHF nets (13 nets) | | | 640 | 35 | 1077 | 51 |

D9RN total QTC 186 in 62 sessions IN represented by N9KNJ, W9UEM, WB9QPA, W9FU, KB9NPU, AB9A and K9GBR. 9RN total QTC 168 in 62 sessions IN represented by K9PUI, KO9D, WB9OFG, K9BZM, WB9UYU and W9FC. Tfc: W9FC 391, W9ZY 115, K9PUI 92, KO9D 69, W9FU 69, N9KNJ 61, AB9AA 53, W9JUJ 48, WD9HII 39, KB9NPU 38, K9ZBM 35, KA9QWC 31, K9GBR 30, KA9EIV 28, W9UEM 27, K9RPZ 20, W9BRW 20, K9DIY 18, K8LEN 16, WB9OFG 15, W9EHY 6, WB9NCE 4, K9OUP 1.

**WISCONSIN**: SM, Don Michalski, W9IXG—SEC: WB9RQR. STM: K9LGU. ACC: K9FHI. SGL: AD9X. OOC: W9RCW. PIC: K9ZZ. TC: K9GDF. ASM: K9UTQ, W9RCW, W9CBE. BM: WB9NRK. With deep regret, I inform you that John Klein, K9OGT, age 57, succumbed to cancer. John, brother of Bob Klein, K9RTB, was a member of the RRRC. Norbert Nevens, KA9HUX, is a SK. Also, Dick Trempe, N9QQ, passed away. Dick was a member of the WVRA, ARES and an OO. Jack McLeland, W9ATK, age 63, passed away. Jack was a member of the Ozaukee RC, MRC, an officer of SEWFARS and MARC and was also very active in broadcast radio. Congratulations to the following amateurs who received Ham of the Year awards from their club: Scott Ellington, K9MA of FLARC and Dave DePover, KB9MKP of RRRC. Congratulations to Tim, WO9U, and Carrie, KB9UZK, on their engagement! They should be registered at AES! 9RN report for December shows 98% Wisconsin participation. Our SGL, AD9X, needs to know if you are having problems with antenna restrictions, PRB-1. Also, he asks you to monitor and report any local ordinances proposed that could ban mobile phone use. Amateurs might be caught in the ban, also!! You can contact Jim at ad9x@arrl.net. Monitor his current reports on the section Web site: www.w9ixg.eboard.com. Good work by the Green Fox ARC on erecting a 130 foot tower and two repeaters! Time to register for SKYWARN classes. For list of classes, contact Tom Weeden, WJ9H, at wj9h@arrl.net or his SKYWARN site: www.execpc.com/~tcweeden. A wonderful time was had at the West Allis Swapfest. Many more hamfests are coming up so look forward to meeting you! 73, Don, W9IXG, w9ixg@arrl.org. Tfc: WZ7V 914, W9YPY 640, K9JPS 571, W9IHW 507, N9VE 455, K9GU 415, N9TVT 406, K9LGU 168, W9CBE 156, N9BDL 111, K9FHI 84, W9YCV 71, N9KHD 65, N9UW 62, KG9B 61, AG9G 48, KB9ROB 51, AD9X 50, KE9VU 47, AA9BB 41, W9BHL 36, KA9FVX 33, W9RCW 31, K9HDF 27, WB9ICH 25, WD9FLJ 15, W9ODV 11, W9PVD 9, KB9QPM 9, W9RSX 6, K9UTQ 5.

## DAKOTA DIVISION

**MINNESOTA**: SM, Randy Wendel, KM0D—HELP WANTED: If you would like to volunteer as an Affiliated Club Coordinator and assist clubs with affiliation and annual reporting and possibly acting as a central point for club access to resources such as guest spkrs, please contact me. I am also seeking those who may be interested in helping coordinate technical resources and assist referring people seeking technical info to others who have such knowledge (antenna theory, PSK31 setup, interference trouble, etc). Also, I am interested in finding someone interested in coordinating the dissemination of bulletins and news items throughout various nets across MN. See my contact info on *QST* p.12. If anyone else is interested in giving a small amount of time toward volunteering in the field organization, let me know. It is my desire to help those who are interested in participating in the field organization and being a part of local Amateur Radio activities which fall under the scope of the FO. For those of you on HF, we still seek participation in our daily ARRL nets. Since we do sponsor NTS activities as well, we do seek participants from several major cities (and ARRL affiliated clubs). Please mention this at your club meetings. 73 de KM0D.

| Net | Freq | Time | QNI/QTC/Sess | Mgr |
|---|---|---|---|---|
| MSPN/E | 3860 | 5:30 P 673/82/31 | W0WVO | |
| MSPN/N | 3860 | 1205P | 300/88/31 | WA0TFC |
| MSSN | 3710 | 6 P | N/A | vacant |
| MSN/1 | 3605 | 6:30 P | 257/97/31 | K0WPK |
| MSN/2 | 3605 | 9:50 P | 124/26/31 | K0PIZ |
| PAW | 3925 | Daily | 3126/108/94 | KA0IZA |

Tfc: W0LAW, WO0A, KB0OHI, KB0AII, WA0TFC, K0PIZ, K0WPK, KA0AIJ, W3FAF, W0HPD, KA0IZA, W0WVO, K0PSH, WD0GUF, KN9U, N0JP, KA0YSL, KC0HAW.

**NORTH DAKOTA**: SM, Bill Kurtti, WC0M— Peace Garden Hamfest July 13-15 at the International Peace Gardens. Lots of fun for the whole family. Fargo and Bismarck Xmas Parties went well. Congratulations to WQ0J being voted the Ham of the Year for the RRRA. Well deserved, Al. After 14 years as your Section Manager, I decided not to run again. But have been serving by appointment until someone would replace me as I did not want to leave the position open. My desire to quit as SM is due to several reasons including my hearing loss. That makes it hard to communicate properly with members. Also, I leave the state for about 3 months in the winter, and I feel that after this many years it's time for new blood and new ideas. I wish to thank every one for your support and hard work to make ham radio prosper in our section—especially in the frequent floods and SKYWARN program. I have felt it an honor to carry on the work started by WB0TEE who started the SKYWARN program. Also, we always want to remember his vision in promoting the Superlink that has spread across the state and beyond now. It's been a pleasure working with you all. I value your friendship and I hope you will support Kent Olson, KA0LDG, as you have supported me.

**SOUTH DAKOTA**: SM, R. L. Cory, W0YMB—Lake Area ARC at Watertown had the top score in the last Field Day class 3A with 2242 points putting them in 161st place out of 296 clubs. Prairie Dog ARC at Yankton was 196th with 1782 points. Clear Lake was 210 with 1194 points. Their 2 nets had a decline in checkins for Dec. South Dakota CW Net has become inactive. New officers for the Pierre ARC for 2001 are Pres KD0S, Jim Zahradnice; VP KF0OM, Don Armstrong; Sec KA0SFV, Mike McNammara; Treas N0NPO, Greg Bond, Trustee AA0CT, Gary Wallace. WD0T, WB0RWH and KD0S worked the ARRL 10 meter contest Dec 9-10. They worked 739 CW QSOs in 38 states and 57 DX countries for 2393 total QSOs in 128 DX countries. Great job. Mobridge Area ARC has installed a new antenna and line on their 2 meter repeater and coverage is much better now. Also their CW net time has been changed to Saturday morning at 8:30 AM CST on 3700 and their 2 meter net follows after the CW net.

## DELTA DIVISION

**ARKANSAS**: SM, Roger Gray, N5QS, e-mail n5qs@arrl.org – I just returned from the quarterly DEC meeting at Conway OES. We had a very good presentation on APRS and its possible applications that could be used in ARES/RACES applications. We discussed the new radios being deployed to some of the county OES stations around the state and some of the plans for the packet network and rapid communications response to disasters and other needs that are presented from county governments around the state. This will be my last column, and I look forward to getting back to Amateur Radio as a hobby for a while. I will be working with Bob for the transition for during the next couple of months and will offer him my complete support during his term. I want to thank all the section staff who have helped me for the last 4 years and ask you to help Bob during his term as Section Manager I have really enjoyed working with you. Dec 2000 Tfc: K5BOC 132, K7ZQR 48, WB5BRD 42, N5QC 18, W5RXU 14, W5LZQ 8, W5HDN 5, AD5AM 4, W9SET 4, N5HZC 3, ARN 87, APN 22, AMN 18, OZK 17.

**LOUISIANA**: SM, Mickey Cox, K5MC —NE DEC/Ouachita Parish EC K5ER reports that Ouachita Parish was chosen a Project Impact Community for 2000 and at FEMA's annual Project Impact Summit in Washington, D.C. was also named a "Star Community" (one of only 10 in the nation) for its exemplary work in disaster mitigation. Major reasons for this honor are the public awareness campaign, frequent tornado drills, very active SKYWARN group, and joint inter-agency weather and communications training coordinated by the local ARES personnel. Ouachita Parish was also the first Emergency Managers Weather Information Network (EMWIN) retransmission site in the section, in large part through the efforts of K5ER, KB5ZVK, and K5NOE. Congratulations to all involved for these very important contributions to public service! Speaking of public service, the League is considering changes to the criteria for the PSHR. Currently the PSHR is heavily slanted in favor of the traffic handlers with little recognition for those active in ARES. Fill out the survey at www.arrl.org/forms/field/pshr/index.html by April 2 so that your thoughts will be known. The 2001 officers for the SWLARC are WB5NXD (President), KI5EE (Vice President), KD5EHL (Secretary), and KD5GHQ (Treasurer). Tfc: WB5ZED 804 (BPL), K5IQZ 173, W5CDX 147, W4DLZ 75, K5MC 66, KG5GE 21, K5DPG 20, KM5YL 10. PSHR: WB5ZED 219, K5IQZ 131, K5DPG 121, W5CDX 118, K5MC 101, KG5GE 86, KM5YL 71. Net Reports: sessions/QNI/QTC. LTN: 31/349/96. LCW: 30/206/46.

**MISSISSIPPI**: SM, Malcolm Keown, W5XX—Section Web Site: www.arrlmiss.org. The Jackson ARC and Jackson-NWS joined forces to participate in the NWS Special Event 2000 on Dec 2. Over 300 QSOs were made from the NWS office. Tornadoes touched down in Central Mississippi in mid-December. SKYWARN was activated in Jackson and Meridian to gather weather reports for the NWS. Supporting the effort from Jackson were AB5WF and KD5EPT and from Meridian WB5OCD, KD5EOE, KD5GWM, KD5GCK, KD5CBK, KD5FJA, K5XC, N5JCG, and KD5JYK. WB5OCD reports that the Meridian Club has completed another class with 7 graduates. Keep it going! Many clubs have new incoming officers. Because of pressing personal commitments N5JGK has retired as MSPN Manager. Asst. NM WJ5K will takeover the reins. Thanks to Mel for doing a super job over the past two years. Regret to note the passing of Charles, WD5CRE, who was a faithful check in to the MSPN for many years. Net Reports: sessions/QNI/QTC. MSPN 31/3695/56, MTN 31/98/61, MSN 31/1156/7, PBRA 31/697/5, MSSN 21/83/3, West Coast MS ARES 13/187/4, Stone Co ARES 5/46/0, MAEN 5/82/0, JARCEN 4/44/0, MCARES 4/36/0, Lowndes Co 4/45/0, MBHN 4/28/0, NW MS ARES 3/16/2. PSHR: KB5W 147, W5XX 110, KJ5YY 79. Tfc: KB5W 305, KD5CKP 16, KJ5YY 15, W5XX 8.

**TENNESSEE:** SM, O. D. Keaton, WA4GLS—ASM: WB4DYJ. ACC: WA4GLS. PIC: KE4CES. WD4JJ. STM: WA4HKU. TC: KB4LJV. I hope everyone had a very Merry Christmas and a Happy New Year. A great big thank you for making the year 2000 a great year and for your support in this section's programs. I enjoyed, "The Prez Sez," as published in the CARC WAVES by AD4F, where he thanked numerous hams who had taken part in the club's success during his presidency. May I quote one paragraph: "I also want to say thank you to the person who has encouraged me, supported me and loves me, my wife, Charlie Ann Curle, WG4G. Without her help, I couldn't have done half what I did get done. She has been a rock for me when I needed her." What a wonderful acknowledgement. QRM reported a real good year for BARC, some of its activities were: W4B Bristol Motor Speedway special events station, a great Field Day, several community events, good club programs and a great hamfest. DARC elects the following officers for 2001: K4TTA-pres, KB4KA-vp, KD4LTR-treas, KU4AW-sec, K4DIT-dir of publications, KF4SGJ-dir of training. WA4IQC-dir of programs, AA4GX-dir of meeting and special events. Club awards to

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-- Martin F. Jue, K5FLU
President and Founder
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***I know I'm not the only ham who can't understand all the speech in a QSO caused by high frequency hearing loss. I developed a solution that I want to share with my fellow hams.***

### *I almost gave up my ham radio hobby*

**I** have been a passionate ham radio operator for over 40 years ever since I was a teenager. I loved every minute of it. Still do, but I almost had to give it up.

**As** I grew older (I'm 56 now) I found myself asking "*What did you say?*" so often it got downright embarrassing. I can hear pretty good most of the time. I just can't always understand what people are saying and my left ear is weaker than my right ear.

**It** got to where I was having trouble carrying on QSOs. I could hear, but I just couldn't quite make out all the words.

**My** hearing problem almost put a stop to my lifelong hobby.

**There** was no way I was going to give up ham radio . . .

### *Research showed me what to do*

**I** searched the literature and spoke to hearing and speech experts.

**According** to their research on the intelligibility of speech in hearing English words:

**1.** The frequencies important for speech intelligibility are the consonant sounds from 500 to 4000 Hz. They contribute 83% of word intelligibility.

Frequencies from 500 to 1000 Hz contributes 35% of word intelligibility and 35% of sound energy.

Frequencies from 1000 to 4000 Hz contributes *48% of intelligibility* but has *only 4% of sound energy!*

**2.** In contrast, frequencies from 125 to 500 Hz contributes 55% of sound energy but only 4% to word intelligibility.

***In** other words, nearly half the speech intelligibility is contained in 1000 to 4000 Hz frequency range with only 4% of the speech sound energy.*

**On** the other hand, the low frequencies 125 to 500 Hz have most of the speech energy but contribute very little to intelligibility.

### *How I improved my ability to hear and understand QSOs*

**The** research showed me what to do.

**First**, drastically increase the speech energy above 500 Hz where 83% of intelligibility is concentrated.

**Second**, drastically reduce the speech energy below 500 Hz that contributes only 4% of intelligibility.

**Amateur** radio communications limit audio to about 300 to 2700 Hz.

**I** split the audio band into four overlapping octave ranges centered at 300, 600, 1200, 2400 Hz.

**I** could boost or cut each range by nearly 20 db to give me full control. This let me maximize speech intelligibility for most kinds of frequency loss.

**My** left ear is weaker than my right ear so I split the output audio into left and right channels with separate 2½ watt amplifiers. A balance control lets me equalize the perceived loudness to each ear. *Now both ears help in improving speech intelligibility!*

### *I couldn't believe my ears!*

**I** built one and hooked it to my rig.

**I** boosted the high frequencies, cut the low frequencies, set the volume and adjusted the balanced control so I could hear each side equally loud.

*I couldn't believe my ears! Speech that I could hear but barely understand before was now highly understandable. I got my ham radio back!*

**With** this concept, you'll *understand* QSOs better and enjoy ragchewing and contesting more, even if you don't have high frequency hearing loss.

### *It helped me so much I wanted to share this with my fellow hams*

**I** developed this into an accessory that any ham can use.

**I** made it immune to RFI, added a front panel phone jack, on/off speaker switch, two selectable transceiver inputs, a bypass switch for in/out comparison and built it into 10Wx2½Hx6D inch aluminum enclosure. Needs 12 VDC.

### *Other Uses*

**Replace** your rig's audio section for superb audio. Eliminate hum, buzzes, poor frequency response, low audio power.

**Works** with SSB, FM, AM, CW -- any voice mode. Use any rig -- ham, marine, aircraft, CB. Use for PA systems, internet phone, radio talk shows.

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KF4LULR, presidential award; KF4PFY, Newcomer of the Year; KN4PM, Ham of the Year, K4DIT, Marconi Award, N4WAL, Bob Youngblood Award. Toy, KA4MNH, has served as the West TN Weather NM for several years. Due to health reason, Toy has resigned. We all thank Toy for his longtime work in emergency communications and wish him well. Gene, W4SRK, has accepted this vacancy with enthusiasm and dedication. RACK provided communications in the Buddy's BBQ 5 K Run for the Cure race. Net Sess/QTC/QNI: TMPN 31/48/2771; TCWN 23/46/206; TEMPN 21/34/765; TEPN 18/29/2053; TSCWN 19/34/109. DRN-5 rpt 62 sess, 574 msg, TN rpt 56% by KE4GYR, W4OGG. Tfc: N4PU 80, KE4GYR 54, WB4DYJ 48, WA4HKU 30, WA4GZZ 18, W4SYE 16, KI4V 12, WA4GLS 10, K4VMO 8, WD4JJ 4, K4UMW 3.

### GREAT LAKES DIVISION

**KENTUCKY**: SM. Bill Uschan, K4MIS—ASM: Tom Lykins, K4LID—SEC: Ron Dodson, KA4MAP. SGL: Bill Burger, WB4KY. ACC: Todd Schrader, KF4WFZ. TC: Scotty Thompson, KI4AT. STM: Mitchell Sparks, KG4EAB. PIC: Steve McCallum, W2ZBY. BM: Ernie Pridemore, KG4IVG. Ballots for the Section Manager election were mailed towards the end of December, and in February we will find out the winner. Congratulations to KE4JFS, Bill, for being the winner of the Bluegrass Holiday Traffic Jam with a score of 130. He was followed by WB4ZDU with a score of 42, and KG4FXG with a score of 40. Maybe in the future there will be another one of these contests. Craig Still, N4CQR, has been appointed DEC for ARES Area 13. It is with deep regret that we mention that Paul Harmon, WB8VEQ, of Riceville and Noel Kennedy KE4IJM, of Maysville became SKs during December.

| Net | QNI | QTC | Sess | NM |
|---|---|---|---|---|
| KRN | 772 | 21 | 21 | N4AFP |
| KTN | 1159 | 35 | 31 | KB4VKS |
| KTN | 1077 | 35 | 31 | K4LID |
| KSN | 218 | 45 | 31 | KO4OL |
| TSTMN | 340 | 25 | 31 | KG4EAB |
| CARN | 341 | 28 | 28 | AD4EI |
| 4ARES | 492 | 31 | 30 | WA4RRR |

Tfc: K4AVZ 65, KE4JFS 84, KO4OL 39, WB4ZDU 24. PSHR: KE4JFS 112, KO4OL 90.

**MICHIGAN**: SM, Dick Mondro, W8FQT (w8fqt@arrl.org)—ASM: Roger Edwards, WB8WJV (wb8wjv@arrl.net). ASM: John Freeman, N8ZE (n8ze@arrl.net). SEC: Deborah Kirkbride, KA8YKK (ka8ykk@arrl.net). STM: James Wades, WB8SIW (wb8siw@arrl.net). ACC: Sandra Mondro, KG8HM (kg8hm@arrl.net). OOC: Donald Sefcik, N8NJE (n8nje@arrl.net). PIC/SNE: David Colangelo, KB8RJI (dcolangelo@ameritech.net). SGL: Ed Hude, WA8QJE (edhude@juno.com). TC: Dave Smith (DSmith@smithassoc.com). Youth Activities: Steve Lendzion, KC8MCQ (kc8mcq@arrl.net). BM: Thomas Durfee, Jr., WI8W (wi8w@arrl.net). The Ides of March are upon us, and what a better time to start thinking and planning for the June Field Day Activities. If your club has not yet begun planning activities and naming activity chairmen, then it's time to get moving. This is one of the fun things we do each year, but it cannot be done by one or two people. It takes everyone pitching in to do their share. If you haven't participated in Field Day, try it and you won't be disappointed. Congratulations to Mark Wayne,W8UBS, for accepting appointment as Public Information Officer for the Garden City Amateur Radio Club. As you read this, some may have already attended a severe weather SKYWARN Spotter Class. We all should be preparing for the spring and summer severe weather season. Be sure to attend your local spotter class or one in an adjoining county. Be sure to check that your ready kit is packed for the spring-summer storm season. Tfc reports for December 2000: KB8ZYY 387, K8GA 315, K8LJG 185, WX8Y 179, N8EXV 155, N8FPN 138, WB8SIW 137, AA8PI 133, KA9EIZ 125, K8AE 105, AA8SN 80, W8RF 63, W8RNQ 59, WI8K 31, K8UPE 31, WA8DHB 25, W8RTN 25, K8ZJU 24, N8UN 20, N8TDE 19, K3UWO 17, W8YIQ 16, N8EXS 5, KI8GR 5. Please support the following Section Nets:

| Net | QNI | QTC | Sess | NM | Freq | Time | Day |
|---|---|---|---|---|---|---|---|
| QMN | 639 | 338 | 65 | WB8SIW | 3.663 | 6:30&10 PM | Daily |
| MACS | 267 | 87 | 30 | W8RNQ | 3.953 | 11 AM | Daily (1 PM Sun.) |
| MITN | 508 | 295 | 31 | N8FPN | 3.952 | 7 PM | Daily |
| UPN | 1384 | 52 | 35 | AA8SN | 3.921 | 5 PM | Daily (Noon Sun.) |
| GLETN | 511 | 118 | 31 | VE3SCY | 3.932 | 9 PM | Daily |
| SEMTN | 371 | 70 | 31 | WI8K | 146.640 | 10:15 PM | Daily |
| WSSBN | 852 | 37 | 31 | WB8ICN | 3.935 | 7 PM | Daily |
| D8 ARES | 27 | 0 | 04 | VE3EUI | 3.932 | 7:30 PM | Friday |
| MI-ARPSC | 89 | 2 | 4 | W8FQT | 3.932 | 5 PM | Sunday |

**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, n8aeh@arrl.net. ASM-Central Ohio: Mary Carpenter, N8OAM, Columbus, n8oam@arrl.net. ASM-SW Ohio: John Haungs, W8STX, Cincinnati, w8stx@aol.com. ASM-SE Ohio: Connie Hamilton, N8IO, Marietta, n8io@arrl.net. SEC: Larry Rain, WD8IHP, Mansfield, wd8ihp@arrl.net. STM: Jack Wagoner, WB8FSV, Hilliard, fsv@netwalk.com. ACC: Brenda Krukowski, KB8IUP, Monclova, kb8iup@arrl.net. TC: Mike Brown, W8DJY, Middletown, w8djy@arrl.net. PIC: Scott Yonally, N8SY. Mansfield, n8sy@arrl.net. OOC: Richard Kuns, KC8TW, Fairfield, kc8tw@arrl.net. SGL: Jeff Ferriell, K8ZDA, Columbus, jferriell@law.capital.edu.A good thing about my making mistakes; it proves Ohio hams are reading the column. John S. Lehman, K8PJ, Columbus, noticed I misprinted his traffic total (it was 153 messages) and Tom Kravec, W8TK, Columbus, noticed I missed his Field Day Class 1B-2ops score which won the category - something he and his partner, Douglas Klein, K4LT, Akron, have done for two decades for all but a couple of years-exclusively on CW (both errors were in the January, 2001 issue). Want to promote ham radio? Try a public display. See *QST*, February, 2001 issue, page 36 for an idea at the movies or try your local shopping malls or museums. Been seeing many Ham Radio Trivia Tests in our Ohio ham radio newsletters. Great idea; even this 42-year veteran learns something new all the time. OHIO SECTION CONGRATS (A) To Massillon ARC new officers, Don Finley, W8DEF, pres; Gene Beckwith, W8KXR, veep; Linda Finley, K8MOO, sec; Anne Ballinger, N8GAF, tres; Bob Kiplinger, K8KIP, trustee; (B) To Lorain County ARA and Canton ARC for renewed affiliation as ARRL Special Services Club, and (C) To Salem Area ARA new officers, Mel Lippiatt, KA8OEB, pres; Bill Wilson, KC8GND, veep; Roger Thawley, KC8CTV, sec; Lela McClaren, KB8YPD, tres; Kimber Ford, KC8OCE, and Dale Leach, KC8OCG, trustees. MARCH HAMFESTS: (18) Toledo MRA at Maumee and (25) Lake County ARA at Mentor-On-Lake. de K8QOE. Now for December traffic reports

| Net | QNI | QTC | QTR | Sess | Time | Freq | NM |
|---|---|---|---|---|---|---|---|
| BN (E) | 155 | 65 | 253 | 31 | 1845 | 3.577 | WD8KFN |
| BN (L) | 175 | 86 | 311 | 31 | 2200 | 3.577 | NY8V |
| OSN | 185 | 74 | 596 | 31 | 1810 | 3.708 | WB8KQJ |
| OSSBN | 2141 | 450 | 2162 | 931 | 030, 1615, 1845 | 3.9725 | KF8DO |
| OH Section ARES | | | | | 1700 Sn | 3.875 | WD8IHP |

Tfc: N8IXF 332, WD8KFN 275, N8IO 241, N8BV 174, WB8KVM 142, W8STX 141, KD8HB 140, N8TNV 129, KA8FCC 85, KC8HJL 82, WA8SSI 79, KA8VWE 71, WA8EYQ 69, W8BO 67, N8YWX 66, WA8CXG 63, KI8IM 61, WB8HHZ 58, KC8JKE 58, W8PBX 49, KD9D 49, WD8KBW 48, N8DD 46, NS8C 46, N8RRB 43, K8JP 38, KC8DWM 34, W8RG 33, K8QIP 32, W8RPS 32, NY8V 32, N8WLE 28, KX8B 27, N8CW 26, WB8PGM 26, WA8HED 24, N8GOB 22, KC8HTP 22, K3RC 21, N8IBR 18, KC8KYP 17, KB8SIA 17, WD8QXT 17, KC8HPR 16, N7CEU 16, N8OD 15, KB9KSR 15, KC4IYD 14, N8JMP 13, N8GP 12, KI8O 11, W8DYF 10, KC8PCT 8, W8VQV 8, N8RAK 7, K8RDY 7, WD8SIQ 6, KC8PDY 5, KB8ESY 3, KB8SBK 3, K8WC 1.

### 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 (December 2000) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 26/8 CDN 283/141 CGESN 22/6 ESS 359/186 HVN 515/167 SDN 478/163 NYPHONE 276/810 NYPON 437/330 NYS/E 387/479 NYS/M NR NYS/L 246/490 NYSPTEN NR. Field Day is 6/23-24. Now is the time to start thinking about new ideas, ways to publicize the event, how to involve more hams and non-hams (work Oscar-40?). Please share your ideas with others and with me! 73 de KR2L. PSHR: N2JBA 161, WB2ZCM 147, W2AKT 144, KC2DAA 134, W2JHO 131, N2YJZ 114, WA2YBM 114, WB2IIV 97. Tfc: N2JBA 81, WB2IIV 68, WB2ZCM 65, W2JHO 52, N2TWN 49, N2YJZ 46, W2AKT 36, KC2DAA 32, WA2YBM 31, N2AWI 11, K2AVV 5, WA2BSS 5, KL7JCQ 1, KC2BUW 1.

**NEW YORK CITY / LONG ISLAND**: SM, George Tranos, N2GA—ASM: KA2D, N1XL, K2YEW, W2FX, KB2SCS. SGL: N2TX. SEC: KA2D. ACC: N2MUN. PIC-East: N2RBU. PIC-West: K2DO. TC: K2LJH. BM: W2IW. OOC: N1XL. STM: WA2YOW. Congrats to new club officers: Great South Bay ARC: President - N2MUN, VP - N2PIK, Corresponding Secretary - N2KYP, Recording Secretary- N2GBM, Treas - KA2D. Suffolk County RC: President - KB2YAP, VP - W2FX. Hamfests: GSBARC on Mar. 4 in Lindenhurst. Classes: LIMARC one day Tech class on Apr. 28 in Levittown. Congrats to HOSARC for receiving a $3,500 ARRL Foundation grant - to be used to fund computers to run SSTV, packet, satellite and APRS at the Hall of Science. Check the NLI Webpage at www.arrlhudson.org/nli for more information. VE exam list follows: Manhattan: BEARS, ABC Cafeteria, 125 West End Ave at 66th Street, Contact Jerry Cudmore W2JRC at 212-456-5224 for dates & times; East Village ARC, 2nd Friday at 7 PM, Laguardia HS, Amsterdam Ave and West 65th Street, Manhattan. Contact Robina Asti, KD2IZ, at 212-838-5995; Columbia University VE Team, 3rd Monday at 6:30 PM, Watson Lab, 6th Floor, 612 West 115th Street, Manhattan. Contact Alan Crosswell, N2YGK, at 212-854-3754; Queens: Hellenic ARC, 4th Tuesday at 6:30 PM, Pontion Society, 31-25 23rd Ave, Astoria, NY. Contact George Anastasiadis, KF2PG, at 516-937-0775. Hall of Science ARC, 3rd Saturday at 9:30 AM, Hall of Science, Flushing Meadows, Queens. Contact Lenny Menna W2LJM at 212-562-5106; Nassau County: Grumman ARC (W5YI), 2nd Tuesday at 5 PM, Northrop-Grumman Plant 5, South Oyster Bay Road via Hazel Street, Bethpage, NY. Contact Bob Wexelbaum, W2ILP, at 631-499-2214; LIMARC, Exams every 2nd Saturday only on odd months (Jan, Mar, May, Jul, Sep, Nov) at 9 AM, NY Institute of Technology, 300 Building, Room 311, Northern Blvd, Greenvale, NY. Contact Al Bender W2QZ at 516-623-6449. Suffolk County: Great South Bay ARC, Normally, 4th Sunday at 12 noon, Babylon Town Hall, ARES/RACES Room, 200 East Sunrise Hwy, North Lindenhurst. Contact Tom Carrubba at 631-422-9594; Larkfield ARC, 2nd Saturday in Feb, May, Sep, Nov, Huntington Town Hall, Room 114. Contact Stan Mehlman, N2YKT, at 631-423-7132; Peconic ARC, exams held January, April, July, and October on next to last Friday at 6:30 PM at Southold School, Oaklawn Ave, Southold, NY. Contact Ralph Williams N3VT at 631-323-3646. Mid Island ARC, last Weds of each month at 7 PM at 36 Dew Flag Rd, Ridge NY 11961, Contact: Mike Christopher W2IW at 631-924-3535. Report all changes to N2GA before the 12th of the month. Tfc: WB2GTG 543, N2AKZ 292, W2RJL 169, KB2KLH 144, WA2YOW 39, KC2FWD 13, KA2UEC 12, KA2D 11, KA2YDW 11, WA2VZK 9, N2TEE 4.

**NORTHERN NEW JERSEY**: SM, Jeff Friedman, K3JF— Net and traffic data submitted by STM Dave, WB2FTX.

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**The** rugged world famous MFJ-989C handles 3 KW PEP SSB amplifier input power (1500 Watts PEP SSB output power). Covers 1.8 to 30 MHz, including MARS and WARC bands.

**MFJ's** *AirCore*™ roller inductor, new *gear-driven* turns counter and weighted spinner knob gives you exact inductance control for absolute minimum SWR.

**You** can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave -- nearly any antenna. Use coax, random wire or balanced lines.

**You** get everything you've ever wanted in a high power, full featured antenna tuner -- widest matching range, lighted Cross-Needle SWR/Wattmeter, massive transmitting variable capacitors, ceramic antenna switch, built-in dummy load, *TrueCurrent*™ Balun, *scratch-proof* Lexan front panel -- all in a sleek compact cabinet (10¾Wx4½Hx15D in).

***MFJ AirCore™ Roller Inductor*** gives high-Q, low loss, high efficiency and high power handling.

**MFJ's** exclusive *Self-Resonance Killer*™ keeps damaging self-resonances away from your operating frequency.

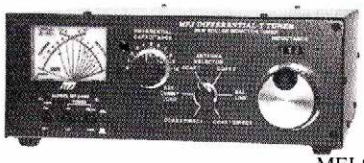
**Large**, self-cleaning wiping contact gives good low-resistance connection. Solid 1/4 inch brass shaft, self-align bearings give smooth non-binding rotation.

**MFJ *No Matter What*™ Warranty**

**MFJ** will repair or replace your MFJ-989C (at our option) *no matter what* for one year.

## *More hams use MFJ tuners than all other tuners in the world!*

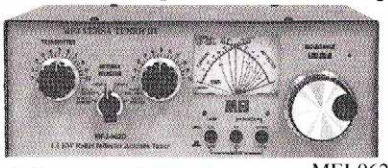
### MFJ-986 Two knob *Differential-T*™



MFJ-986 **$329.95**

***Two*** knob tuning (differential capacitor and *AirCore*™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 10¾Wx4½Hx15 in.

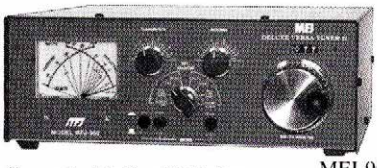
### MFJ-962D *compact* Tuner for Amps



MFJ-962D **$269.95**

**A** few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10¾x4½ x10⅞ in.

### MFJ-969 300W *Roller Inductor* Tuner



MFJ-969 **$199.95**

**Superb** *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. 3½Hx10½Wx9½D inches.

### MFJ-949E *deluxe* 300 Watt Tuner

MFJ-949E **$149.95**

***More*** *hams use MFJ-949s than any other antenna tuner in the world!* Handles 300 Watts. Full 1.8 to 30 MHz coverage, 48 position *Precision48*™ inductor, 1000 Volt tuning capacitors, *full size* peak/average lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, dummy load, *QRM-Free PreTune*™, scratch proof Lexan front panel. 3½Hx10⅝Wx7D inches. **MFJ-948, $129.95.** Economy version of MFJ-949E, less dummy load, Lexan front panel.

### MFJ-941E *super value* Tuner

MFJ-941E **$129.95**

***The*** *most for your money!* Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek 10½Wx2½Hx7D in.

### MFJ-945E HF+6 Meter *mobile* Tuner

MFJ-945E **$119.95**

**Extends** your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $4.95,** mobile mount.

### MFJ-971 *portable/QRP* Tuner

MFJ-971 **$99.95**

**Tunes** coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x6½x2½ inches.

### MFJ-901B *smallest* Versa Tuner

MFJ-901B **$79.95**

**MFJ's** smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

### MFJ-16010 *random* wire Tuner

MFJ-16010 **$49.95**

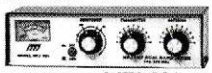
**Operate** all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

### MFJ-906/903 *6 Meter* Tuners

MFJ-906 **$79.95**

**MFJ-906** has lighted Cross-Needle SWR/wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $49.95.** Like MFJ-906, less SWR/Wattmeter, bypass switch.

### MFJ-921/924 *VHF/UHF* Tuners



MFJ-921 or MFJ-924 **$69.95**

**MFJ-921** covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x2½x3 inches. Simple 2-knob tuning for mobile or base.

### MFJ-922 144/440 MHz Tuner

MFJ-922 **$79.95**

**Ultra** tiny 4x2½x1¼ inch tuner covers VHF 136-175 MHz and UHF 420-460 MHz. SWR/Wattmeter reads 60/150 Watts.

### MFJ-931 *artificial* RF Ground

MFJ-931 **$89.95**

**Creates** artificial RF ground. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire. Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. **MFJ-934, $169.95,** Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

**Free MFJ Catalog**

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1 Year *No Matter What*™ warranty 30 day money back guarantee (less s/h) on orders from MFJ


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**Tech Help:** (662) 323-0549

| Net | Sess | QNI | QTC | QSP |
|---|---|---|---|---|
| NJM | 31 | 161 | 86 | 81 |
| NJPN | 34 | 207 | 53 | 39 |
| NJSN | 31 | 220 | 22 | 20 |
| NJN/E | 31 | 180 | 120 | 92 |
| NJN/L | 31 | 151 | 102 | 58 |
| CJTN | 31 | 219 | 52 | 43 |
| NJVN/E | 31 | 453 | 60 | 49 |
| NJVN/L | 31 | 400 | 49 | 46 |

Tfc: W2MTO 182, N2OPJ 64, KC2AHS 60, N2GJ 46, KB2VRO 44, N2RPI 43, K2VX 42, W2CC 20, K2PB 19, KC2ANN 13, K2DBK 5, N3RB 5.

### MIDWEST DIVISION

**IOWA**: SM, Jim Lasley, N0JL—ASM: N0LDD. SEC: NA0R. ACC: N0IJP@KE0BX. BM: K0IIR@W0CXX. SGL: K0KD. I thought the OARC was doing well having a breakfast once a month. NIARC does it twice a week! Downtown Hardee's Monday and Thursday at 0900. OARC does their's the second Saturday 0815 at Country Kitchen. SWIRC reports a membership record of 168 and climbing! Also looks like they had a good program on baluns in January. March 3 is their flea market in Council Bluffs. For info try WA0ZQG@arrl.net. DARC had to cancel their Jan meeting due to MLK holiday... and busy schedules! TSARCN is spending money again. First they make it and then they spend it. APRS, SSTV, tent, and climbing harness. Sorry to note that the following have recently become silent keys: K0SVZ, KB0TZK, WB0BRY. MARC says new officers have been elected so it is safe to come to the meetings now. OK. I think I have had the opportunity to serve in all capacities one time or another (or more than one time!). I found that when I had time constraints that I could get the help I needed. Looks to be time for VHF and UHF work. Time for aurora. I have been slow to get up there. Just got back on digital a month or so ago. By the time you read this, it will be time to think about FD and antennas again. Let me in on your FD. 73 de N0JL. Newsletters were received from CVARC, NIARC, FMARC, DMRAA, SWIARC, OARC, DARC, TSARCN, MARC. Tfc: W0SS 199, KB0RUU 175, N0JL 16, WB0B 12.

**KANSAS**: SM, Orlan Cook, W0OYH—ASM/ACC/OCC: Robert Summers, K0BXF. SEC: Joseph Plankinton, WD0DMV. STM: Ron Cowan, KB0DTI. PIC: Scott Slocum, KC0DYA and TC Frank Neal, N8FN. This is that time of the year when the HF bands stretch out and it is impossible to hear our Kansas stations. Hang in there and keep the nets going. It will change back soon. I see Kan has gained 12 new hams this month with calls KC0J?? Congrats to all. Wendell W0TQ of the Kansas-Neb Radio Club is asking for nominations for "The Ks Amateur of the year before May 1.Send to 717 2nd Ave. Concordia Ks 66901. I must recognize two ECs, June KB0WEQ & Scott KC0CGI for their detailed monthly 2 page EC activity rpt. I am calling for a large Section Meeting again for Sunday Aug 17 in Salina at the ARRL State Convention. Please put it on your calendar NOW. For further Section news and info, check into the nets and visit "KAR" Kansas Amateur Radio Web site on line - http://www.arrl.org/field/nets/. Nov. Kansas Nets: sessions/QNI/QTC, KSBN 30/1177/69 KPN 21/328/30 KMWN 30/626/526 KWN 30/989/663 CSTN26/1940/93 QKS 60/294/68 QKS-SS 10/31/4 SEC 48/549/14 QNS KB0AMY N0BTH K0BXF WD0DDG WD0DVM/SEC W0PBV WA0SSR. TEN 227 msgs 60 sessions Kans 93%w/AA0OF KX0I W0WWR NB0Z WB0ZNY W0SS mgr. BBS AA0HJ received 64 W1AW bulletins sent 346 per NTS tfc 0. Ks tfc: W0WWR 213 W0OYH 96, WB0ZNY 72, K0RY 38, KB0DT 23, N0RZ 13 N0ZIZ 11, W0FCL 8. OBS WA0DTH 14.

**MISSOURI**: SM, Dale Bagley, K0KY— For more news, checkout ARRL MO Web page http://www.qsl.net/arrl-mo. MO Traffic Nets, Daily: SSB 3.963 MHz 5:45 PM, CW 7:00 PM and 9:45 PM 3.585 MHz. The Ararat Shrine Hamfest in Kansas City, will be held at the Ararat Shrine Building March 10, 2001. Steve Dowdy, WJ0I and Ray Pautz, N0RP, are heading up this year's event. Roger Bessmer, KB0IIG, one of the usual chairpersons had to cut back due to health issues. The Missouri QSO Party rules should be available soon according to the Boeing Employees ARS project chairman Eric Zust, W0TT. The event will be held in either the Fall of 2001 or the Spring of 2002. Amateurs in MO and other sections will be encouraged to participate. If your club wants to receive the MO Section Bulletins, please contact, MO Section Bulletin Manager, Brian Smith, KI0MB. His e-mail is brnsmth@mo-net.com. Brian is doing a great job organizing news from ARRL Affiliated Clubs in the Section and distributing the bulletin via e-mail to those requesting the mailing. MO SEC Patrick Boyle, K0JPB, reports that there are approximately 561 ARES members in the MO Section. There are 5 DECs and 51 ECs leading the ARES efforts. Patrick has provided excellent leadership and is working to expand the ARES program in the Section. The Central Missouri Radio Association will again sponsor the ARRL MO State Convention in 2001. The event will be held in conjunction with their CMRA Hamfest. It is expected to be Aug 25, 2001. Many ARRL members have expressed their enjoyment of the 2000 Convention/Hamfest and are looking forward to the 2001 event. Net sess/QNI/QTC: MTN 31/542/49; Jackson Co ARES 5/64/0; AUDRAIN Co ARES 5/43/0; MON 48/117/48;N0ATH RPTR 92/0; Rollabillboard 30/400/5; WAARCI 5/96/0. Tfc: KE0K 47, WA0YJX 26. PSHR: KE0K 83.

**NEBRASKA**: SM, Bill McCollum, KE0XQ—ASMs: W0KVM, N0MT, WY0F, WB0ULH & WB0YWO. It is with deep regret to inform you that Jim Duckworth, K0JFE has become a Silent Key. He passed away December 15, 2000, and was a member of the Grand Island ARS. W0TIF, Alvo Crawford of Seneca became a SK on January 5, 2001. Congratulations to KB0MTT of the Lincoln ARC for being awarded the Jerry Cox Award. This award is given annually to a Lincoln area amateur that exemplifies Ham Radio spirit through activity, example and leadership. The AKSARBEN ARC set up a station for Kid's at the Omaha Children's Museum. The station included the following modes: SSTV, APRS & HF. Archie "ham" comic books were distributed to all the kids. Who knows, there might be some new hams! The AKSARBEN ARC Auction will be held Sunday April 8 at the Millard Social Hall. Net Reports: MARES: QNI 149, QTC 2 & 5 sessions. Mid NE 2M ARES: QNI 359, QTC 4 & 31 sessions. NE Storm Net: QNI 1119, QTC 23 & 31 sessions. NE 40M: QNI 646, QTC 14 & 29 sessions. NCHN: QNI 251, QTC 12 & 27 sessions. NMPN: QNI 1836, QTC 10 & 31 sessions. Tfc: W0AP 52, K0OAL 36, KE0XQ 20, WD0BFO 18, WY0F 6, KA0O 2, W0EXK 2, W0UJI 2, WC0O 2, KA0DOC 2. PSHR: KA0DBK 64, KB0YTM 15, KC0HOX 33.

### NEW ENGLAND DIVISION

**CONNECTICUT**: SM, Betsey Doane, K1EIC—BM: KD1YV. OOC: W1GC. PIC: W1FXQ. SEC: WA1D. SGL: K1AH. STM: K1HEJ. TC: W1FAI. Congrats to Maria, KA1KAU, for her having received professional recognition as a blind directory assistance operator by way of a very nice article in the local newspaper! Maria has been distinguished as among the more efficient ops. She reads the computer screen with speech in one ear and listens to the customer on the phone in the other ear—not an easy feat! Your SM along with presidents of four CT clubs attended the New England Division cabinet meeting mid January chaired by Director Tom Frenaye, K1KI. Clubs represented were: the BEARS of Manchester Club, Insurance City Repeater Club, Middlesex Amateur Radio Society and the Radio Amateur Society of Norwich. This is the first time I can remember that we had this many CT club presidents attending! Larry, K1HEJ, president of ICRC gave out some certificates to clubs and individuals who participated in last year's Big E special event and reported that we have again been invited back to West Springfield. This year's dates are September 14-30. Clubs and individuals should plan now to participate—contact K1HEJ or me if you want to reserve a date and we'll direct you to this year's scheduling coordinator. Clubs are needed to assist with the sorting of QSL cards for the New England incoming QSL Bureau. Some clubs devote an evening to this task and make it their program for the month. If interested, contact me or Don, K2KQ. Net sess/QNI/QTC: WCTN 31/281/50; WESCON 31/296/89; NVTN 31/125/63; CPN 31/284/113; CN 26/82/28. Tfc: NM1K 1808, KA1GWE 190, KB1CTC 130, WA4QXT 58.

**EASTERN MASSACHUSETTS**: SM, Phil Temples, K9HI—ASMs: WA1ECF, N1GTB, WA1IDA, N1UGA. BM: N1IST. OOC: K1LJN. PIC: N1PBA. SGL: K3HI. STM: NZ1D. (SEC, TC, ACC: open) e-mail list: ema-arrl@qth.net, Web: http://www.qsl.net/ema-arrl. Former STM Jim Hatherley, WA1TBY, lost his long battle with cancer. The Section extends sincere condolences to his family. The Marconi Radio Club, W1AA, recently celebrated the 98th Anniversary of Guglielmo Marconi's first transatlantic radio transmission between Cape Cod, USA and England. The Town of Bridgewater recently donated new repeater equipment to the Massasoit ARA to show appreciation for MARA members' support of the town's EOC! Minuteman Repeater Assoc. sponsors weekly live competitive fox hunts on the input of the 146.61 Marlboro repeater. All are invited to join the fun. Kudos to KD1LE and KD1SM, who have contributed greatly to fox hunting by constructing homebrew equipment and speaking at area radio clubs. ASM WA1ECF wants input from Cape & S.E. Mass. members for possible club presentations. Contact Stan at wa1ecf@arrl.net. The Honeywell / Waltham ARA auction in Newton was well received. Is your club contact info current with ARRL? Wellesley ARS hosted a recent talk by K1NDF on propagation. It's time to start planning for Field Day 2001. Please send me your site location, directions, and times asap so we can compile a section-wide list. Incidentally, this SM will conduct a tour of as many FD sites as possible. Have your club members participated in SKYWARN training recently? Contact DEC KD1CY for details. Southeastern Mass. ARA is proud of its new repeater, largely due to the efforts of K1IBR. Kudos to the Police AR Team for a superb Web site, at http://members.aol.com/wb1gof/. What activities does your radio club offer to the younger crowd? North Shore ASM N1UGA reports that both Salem and Danvers high school clubs are up and running with North Shore RA support. Framingham ARA is conducting weekly classes for Scouts who wish to earn their radio merit badge. "How do computer wireless LANs fit in with ham radio? Well, those wireless designers have to come from somewhere. The refrain over the past few years has been, 'we're losing those kids to computers'. In fact, the most valuable engineers in the coming century may be those who know both computers and radio." From "President's Message", FARA Framingham Circuit. Tfc: W2EAG 597, N1LKJ 436, KW1U 424, KB1AJ 200, NZ1D 199, K1SEC 73, N1LAH 73, KY1B 66, WA1FNM 57, N1AJJ 56, N1TPU 56, WA1LPM 55, KB1EB 45, NG1A 42, K1BZD 41, KD1LE 39, KF4EYL 37, KA1VAX 36, K8SH 32, N1IST 32, N1SGB 29, N1TDF 22, WA1VRB 11.

**MAINE**: SM, Bill Woodhead, N1KAT- The position of OOC has been filled by N1RY, Ray Sirois, upon the resignation of Clark, KA1WRC. We would like to thank Clark for his years of service to the League and Amateur Radio. Ray had offered to fill in, and in a very timely fashion: at a Yankee Radio Club meeting, he was able to help explain how to nip malicious interference in the bud. Ray will also be giving a talk on the Official Observer Office and how it works and how you can help at the Maine State Convention. He will also be available to talk to other clubs and how you can get involved as an Official Observer. There is legislation pending in the State House to restrict any cell phone or radio communication while operating a moving vehicle. We need to work hard to see that this does not pass. Send your Representatives a QSL card with a short note, stating that you strongly oppose this legislation that will negatively affect the hobby. Being involved with emergency operations and public service events require us to be able to communicate while mobile. This is a very serious matter that requires everyone's participation. 73, Bill, N1KAT. Tfc: W1KX 138, W1QU 61, W1JTH 44, W1JX 40, W1BLT 33, KA2ZKM 29, N1JBD 22, KA1RFD 17.

**NEW HAMPSHIRE**: SM, Al Shuman, N1FIK (n1fik@arrl.org)—Web site (www.nhradio.org) Congrats to the newly elected officers of the North Country ARC for 2001. Pres: Mort KH6GR, VP: Stewart, N1ZGK Sec: Ed, N1UZA and

# 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.

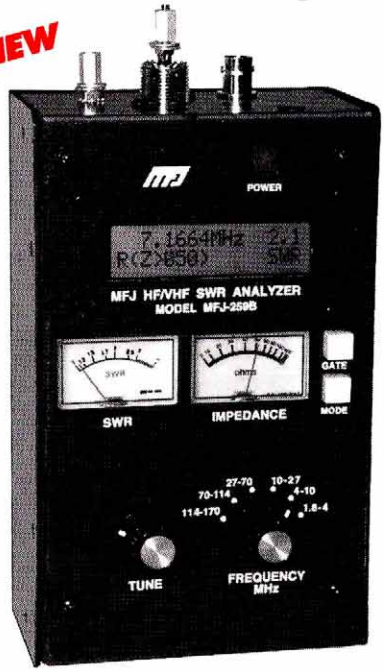
**Take** the guesswork out of building and adjusting matching networks and baluns.

**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!***

#### *New!* *Tunable Measurement Filter*™

**MFJ-731, $89.95.** *Exclusive* MFJ tunable RF filter allows accurate SWR and impedance measurements 1.8 to 30 MHz in presence of strong RF fields. Has virtually no effect on measurements. Works with all SWR Analyzers.

### MFJ *No Matter What*™ warranty

**MFJ** will repair or replace (at our option) your MFJ *SWR Analyzer*™ for one full year.

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*http://www.mfjenterprises.com*

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders from MFJ

MFJ-224 **$159.95**

## MFJ 2 Meter *FM SignalAnalyzer*™

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Tres: Tom, WA1JVV. The NHARA (NH Council of Clubs) seeks a knowledgeable volunteer to write the next version of the NH QSO Party software. If interested and you or someone you know has the skills, please contact Ed Deichler at k2te@juno.com. Thanks to all who worked the 2001 NH-QSO Party in Feb. Active in ARES or the NH Field Organization? You may be eligible for a NH ARRL Patch or mug. The ARES program continues to expand as it rejuvenates. ARES Members met at NHOEM on 1/13 to reaffirm the response plan in the event of activation. N3CLZ and I attended the 2nd meeting of the Volunteer Organizations Active in Disasters (VOAD) on 1/6. VOAD coordinates activities of volunteer organizations responding in disaster situations. Jerry, K0TV reports that the Town of Hudson has voted "NOT" to enact what was considered an extremely restrictive tower & antenna ordinance. Jerry thanks all who either attended or wrote the Hudson Planning Board. Drive safely 487-3333 73-Al. Net/NM/sess/QNI/QTC: GSFM/N1RCQ/ 31/185/27; GSPN/WB1GXM/31/136/95;VTNH/WA1JVV/31/163/ 113. Tfc: W1PEX 1003, N1NH 112, WA1JVV 93, W1ALE 48, WB1GXM 27, N1CPX 7, K1STV 7.

**VERMONT**: SM, Bob DeVarney, WE1U— I hope everyone had a chance to check out the Vermont QSO party the first weekend in February. It sure helps to "get Vermont on the map" so to speak. Also the same weekend was a QRP operating event called FYBO, short for Freeze Your B*** Off, and was a lot of fun. The multiplier is the temperature at the operating position, so you get a multiplier of 5X if the temperature is below 20 degrees... no sweat here in Vermont!! Hope everyone gets a chance to get to the ARRL Convention and Milton Hamfest, the last weekend in February, at Milton High School. See you there! I have been remiss in my duties reporting the net activity, so here's the report from December: Net Sess/QNI/QTC/QTR/NM: VT YL Net 4/27/0/92 minutes/KA1LDS; Green Mtn Net 26/740/19/2357 minutes N1HXC; VTNH Traffic Net 31/ 163/113/385 minutes/ WA1JVV; VT Phone Emergency Net 5/44/5/210 minutes/ WA1DLA;VT Phone Traffic Net 31/183/40/597 minutes / KB1DSB; Central VT Traffic Net 31/106/35/364 minutes/ KB1DSB. 73 de WE1U. Tfc: KB1DSB 135, K1YLB 44, KB1EPQ 33, K1BVT 12, AA1PR 9, W1RFP 4.

**WESTERN MASSACHUSETTS**: SM, William C. Voedisch, W1UD, w1ud@arrl.org— *ASM:* N1MAP. ASM (digital) KD1SM. STM: NZ1D. SEC: K1VSG. OOC: WT1W. It's been a cold winter. I want to welcome Bill Wornham, NZ1D, to the Western Mass crew. Bill volunteered to take over as STM. He is also the STM for EMA. Knowing Bill for 30+ years, I know he will do an excellent job. Good time to snuggle up to the rig and work DX or handle traffic. I don't think this cycle has been as good as it could have been. Maybe later this spring the propagation will improve. Spring is just around the corner, and it will be time for antenna work. Field Day will be here before we know it. Have you and your club made plans yet? Don't wait until the last minute! Get newly licensed and upgraded club members involved. Careful planning always pays off, and it will keep "Murphy's Law" from attacking your FD site. MARA members supported LEMA during the snow emergency on the weekend of Dec 30. Tfc: Nov K1TMA 187, W1SJY 29, KD1SM 14, N1WAS 92, N1ISB 14, W1UD 245. Dec K1TMA 171, W1SJV 23, KD1SM 10, N1WAS 70, N1ISB 15, W1ZPB 145, W1UD 273.

### NORTHWESTERN DIVISION

**ALASKA**: SM, Kent Petty, KL5T — Alaskan hams, are you ready for APRS? Anchorage and Fairbanks are coming online, with the Kenai Peninsula hopefully soon to follow. Please contact KL5T, WL7BF, or AD4BL for information on how you can help in this effort. We are still looking for a sponsor for our state PRB-1 effort. Will your state representative be willing to help? Contact your State Government Liaison, Rob Wilson, AL7KK, for input. HF nets: Sniper's Net 3920 1800 AST, Bush Net 7093 2000 AST, Motley Group 3933 2100 AST, and Alaska Pacific Net 14292 M-F 0830 AST. Please report communication drills and exercises, emergency communication activations, and public service activities on FSD-157 to KL5T.

**EASTERN WASHINGTON**: SM, Kyle Pugh, KA7CSP—The International Space Station is on the air on 144.8 for voice and packet downlinks, and 145.99 for packet uplink. To spot when the ISS is overhead go to this tracking Website: http://liftoff.msfc.nasa.gov/temp/StationLoc.html. Gayland Kellison, K7AD, of Kennewick earned a Worked All States (WAS) award for 50 MHz. Congratulations Gayland! There were 7 out of 10 OO stations reporting monitoring activity for December. 73, KA7CSP. Net Activity: WSN: QNI 867, tfc 344; Noontime Net: QNI 8121, tfc 487; WARTS: QNI 3415, tfc 115. Tfc: K7GXZ 381, W7GB 226, KA7EKL 107, K7BFL 89, KK7T 17. PSHR: W7GB 138, K7GXZ 122.

**IDAHO**: SM, M.P. Elliott, K7BOI — OOC: N7GHV. SEC: AA7VR. STM: W7GHT. Our ARES/RACES group pulled off a great project at Christmas. With the use of ham radio, they brought Santa to a group of cancer kids at several hospitals in the Treasure Valley. They were so successful that the hospitals want them back and want to expand the program to the full pediatrics ward. What a worthwhile endeavor! When you or your club become involved in public service projects let me know so that your ideas can get to others. A copy of the Idaho tower bill is available on the Web site. It was introduced into legislative committee in February. 73 - Mike, K7BOI. Tfc: W7GHT 342, WB7VYH 66, KB7GZU 62, W6ZOH 5, N7MPS 2. PSHR: W7GHT 125, WB7VYH 105, N7MPS 22. Nets: FARM - 31/2752/49/W7WJH; NWTN 31/1222/93/KC7VAH; IDACD - 21/466/9/ WB7VYH; IMN - 31/383/195/W6ZOH. http://id_arrl.homestead.com/mainpage.html

**MONTANA**: SM, Darrell Thomas, N7KOR—Congratulations are in order for William McQuire, N7MSI, for his selection as Ham Of The Year by the Capital City Radio Club, Helena, MT. Bill has been very active in all aspects of Amateur Radio and has helped many new hams get started in the hobby. He is also very active as an Elmer for Army MARS in the Montana Section. The directors of the Glacier/Waterton International Hamfest are hard a work preparing for the next event to be held July 20-22, 2001, at the Three Forks Campground near East Glacier, MT. Registration forms and information should be out soon. Net/QNI/QTC/NM MSN 167/3 W7OW, MTN 2494/69 N7AIK, IMN 383/193 W6ZOH. PSHR: N7AIK 113.

**OREGON**: SM, Bill Sawders, K7ZM—ASM: KK7CW. SEC: WB7NML. STM: W7IZ. SGL: N7QQU. OOC: NB7J. STC: AB7HB. ACC: K7SQ. I am very happy to announce the reappointment of Bob Benafel, NB7J, as our Oregon Section Official Observer Coordinator. Bob has done an outstanding and terrific job coordinating the OO program in this section. The OO program not only listens and monitors for intruders and violators, but issues "good guy" reports to operators that illustrate outstanding operating procedures. New 2001 Officers of the Central Oregon DX Club are Russ Spalding, W7MT, President. Ron Smith, K9QAM, as Vice-President, and A.J. Parry, WA7AJ, was re-elected as Secretary/Treasurer. The CODXC sponsors the annual Oregon QSO Party, which will be held in May this year. Full details of this year's event will be printed in this column next month. Our congratulations go out to Mark, KD7GTJ, and Bonnie, AB7ZQ, Altus, who were married December 15th at McMinnville's First Church of the Nazarene. Bonnie is in her second term as President of the McMinnville ARC. Could a new Yaesu FT-1000D be on the newlywed's wish list, soon? Enjoy the upcoming spring weather, everyone, and keep in touch. NTS traffic totals for December: N7DRP 185, N7YSS 139, W7IZ 107, KC7SRL 90, KC7ZZB 86, K7NLM 70, K6AGD 63, W7VSE 49, KC7SGM 40, KK1A 16.

**WESTERN WASHINGTON**: SM, Harry Lewis, W7JWJ—For the first time in living memory, George, K7BDU, did not receive top honors in traffic handling for the month of December. George, with a respectable total of 938, was edged out by John, W7BO, with a grand total of 1020. Other traffic handlers with honors W7TVA with 566, K7MQF 296, W7QM 257, W7ZIW 197, N7YSS 139, W7LG 145, KJ7SI 25, K7SUQ 17 and yours truly W7JWJ 4. All, except the last, qualified for PSHR. We're looking for a few good Official Observers. If you would like to join the Field Auxiliary in monitoring the bands and maintaining the good name of all radio operators then just drop an e-mail to Official Observer Coordinator, Renee Eck, AA7KE@arrl.net. The Washington State Emergency Net convenes each Monday evening on the frequency of 3987 kHz at 6:45 PM. Pacific and again on Saturday mornings at 9:00 AM. John, KJ7SI, is the new net manager. Now that you have upgraded, this is a good place to participate in learning all about amateur radio in its planning for emergency service. Now the SEC N7NVP report: The mainstay of emergency communications is the venerable voice circuit but, when you need to send long messages that require a high decree of accuracy, digital gets the job done. N7DRT, Dave Tyler's team in Clallam Co recognizes that, and has linked law enforcement and health care in the remote west end of the county with the Port Angeles area. Recently a digipeater has been added to improve the connectivity. Thanks to Casey Hicks, KJ7XE, and all who worked with him. The Walk-N-Knock Food Drive was supported by 59 hams in Cowlitz and Clark Co. It was a 2-day event and in Clark Co over 130.7 tons of food was collected and over $5,500 in cash was contributed. Other participants included Students, cubs, boy and girl scouts and, members of the Lions organization. Well done to all. It was the personification of the holiday spirit. The fleamarket season begins with the annual ham and computer show at the Puyallup fairgrounds March 11 and sponsored by the Mike and Key ARC. Check out http://www.mikeandkey.com/ - 73

### PACIFIC DIVISION

**EAST BAY**: SM, Andy Oppel, KF6RCO—ASMs: KC6TYB, KE6QJV. SEC: KE6NVU. DECs: KE6QJV/Alameda County, KO6JR/Contra Costa County, WA7IND/Napa County, K6HEW/Solano County, N6UOW/Training, W6CPO/Technical Services, KQ6TM/Section Plans and Administration. OOC: KD6FFN. STM: W6DOB. ACC: KC6TYB. EB Web Page: http://www.pdarrl.org/ebsec/. Webmaster is KB6MP. MDARC elected new officers: KE6WRE/Pres, N6SWE/VP, N6JOX/Sec, WA6JAU/Treas, and Directors KE6PTT and KR6CR. EBARC mourns the loss of member AC6WF (also active in ROVARC), who was a VE and assisted with licensing classes. EBARC elected W8JSN 1st VP for 2001 and welcomed new member K5DKA. ROVARC elected officers for 2001: KE6ZWO/Pres, WB6NOV/VP, WA6SCN/2nd VP, KC6SSF/Sec, K6VEO/Trustee, W6KNO/Treas. ORCA is planning a video night as a way to get more families involved with the club. KC6TYB and I attended VVRC's Holiday Dinner to present KF6KFP with the EB Section Public Service Award for Solano County. December tfc: W6DOB 760, WB6UZX 46, KE6QR 8. 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, Jan Welsh, NK7N—ASM: Dick, W6OLD. SEC: Paul, NN7B, N7YQ, Stan appointed Assistant SGL, congratulations! Stan's looking for info on antenna restrictions you run into. His e-mail is n7yq@att.net NV Newsletters, Static, SIERA, FARS, LVRAC, RARA, Elko ARC and the Carson Currents, CVRCs edition are all informative. For SNARS code study session specifics call 775-786-6735, and brush up on the fun way to tell jokes. NN7B says to check the NV Section Emergency Plan on NV ARES Web site at www.cvrc.net/ares/plan/. For CVRC spring licensing class starting 2/14/01 and NV ARES info check in at W6OLDs site at www.cvrc.net or call 775-267-4900. Dick also maintains www.pdarrl.org/nevsec site where you can find out about NV section news, leaders, organizations, clubs, N. NV and S. NV repeaters in the Pacific Div. I'm now able to check in Saturday's 8.30 AM ARES net, get a decent signal report and hear voices I've not heard before. Previous antenna's too good at hearing power line noise to the exclusion of anything else. Thanks to KE7DB-Norm for all his help with this one. 73 Jan, NK7N. Tfc: W7VPK 238, N7CPP 52, K7NHP 17, WV7YL 1.

**PACIFIC**: SM, Ron Phillips, AH6N— Dale Fajardo, AH7D, reports that the Emergency ARC Net had a total number of check-ins of 175. The net meets Monday through Friday at 1930. Those acting as NCS are AH6P Dennis, AH7E David, KH7UK Todd, KH7WU Rob, KH7CHI Crissy, NH7BG Kurtis,

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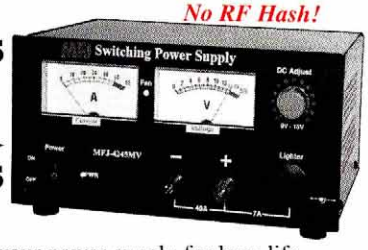


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**Front-panel** control lets you vary output from 9 to 15 Volts DC.

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**Brightly** illuminated 3 inch meters let you monitor load voltage and current.

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**You** get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

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**MFJ-1118, $74.95.** This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. Lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC supply.

**Two** pairs of super heavy duty 30 amp 5-way binding posts connect your transceivers. Each pair is fused and RF bypassed. Handles 35 Amps total.Six pairs of heavy duty, RF bypassed 5-way binding posts let you power your accessories. They handle 15 Amps total, are protected by a master fuse and have an ON/OFF switch with "ON" LED indicator.

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**MFJ-1116, $49.95.** Similar to MFJ-1118. No 30 amp posts. Has "ON" LED and 0-25 VDC voltmeter. 15 amps total.

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WH6DAB Alex, and WH7QQ Paul. Many thanks to all for contributing your time. KH6BZF reports on Sunday, Dec10, the Oahu Civil Defense gang met at Windward Oahu's Kualoa Ranch for their Christmas get-together. KH6B reports the Hilo ARC and HI QRP Club participated in the ARRL 10-Meter Contest 9-10 Dec. 730 QSO points in 98 sections/ entities resulting in a claimed score of 71,540. This using QRP, CW and SSB. Gordon West, WB6NOA, visited the JITB group December 7 and became member number 351 in the HI QRP Club. Ted Leaf, K6HI, went to Honolulu and rode back to Kona on the new Aegis class destroyer, the U.S.S. O'Kane. Ken, KH6CQH, Wilbur, KH7E, Doris, KH6ER and Fern are all having a good time traveling in two motor homes from place to place on the mainland. We expect them back home soon. Thanks again to all for your timely inputs to the ARRL monthly report.

**SACRAMENTO VALLEY**: SM, Jerry Boyd, K6BZ—A reminder that EMCOMM 2001 will be held near Redding on Saturday March 31. Contact SEC/N K6SOJ for information and reservations. Anyone interested in emergency/public service communications is urged to attend. As a reminder, there are a number of field organization appointments available within the Section. As mentioned in a previous column, the northern portion of the Section is "under-represented" in terms of OO, PIO, OES, ORS, TS, and LGL appointees. Any interest, please contact me. Congratulations to the Trinity County ARC for maintaining an excellent and informative Website. SOJOURNERS has been undertaking a year long study of the low bands to determine best band for reliable communications out to about 300 miles during various hours of the day and seasons of the year. A study of NVIS antennas has also been underway. 160 meters is often neglected and can, many times, be the best for such comms during evening hours. Congratulations to SOJOURNERS for this effort and also for its very successful, first special event activity which occurred recently. No Cal, So Or, Nev ARES net meets on Wednesdays at 1930 hours local on 3987. Visitors are welcome to check in. Who will be the first in the Section to work through AO-40? Let me know, and I'll mention the QSO in this column. Until next month, 73 de K6BZ.

**SAN FRANCISCO**: SM, Len Gwinn, WA6KLK—ASM: KH6GJV. SEC: KE6EAQ. TC: N1AL. The Willits ARS awarded certificates of appreciation to Bill Edmondson, N6OUW, Lois Bender, KD6LSQ, Arlene Davison KG6CTJ, Irma Osborne, NA6I, John Brand, K6WC, Ron Logan, KB6OFY, and Norton Heath, N7LMX, for their contribution to the club in 2000. The Redwood Empire DX Assoc. gave its annual Spirit Award to John Tagliaferrio, KE6ZSN, for exception service to the club last year. The Maritime Radio Historical Society, K6KPH, was on the air for Straight Key Night January 1st. They operated from the original RCA commercial site that had the call sign KPH. The transmitters are located in Bolinas, and the group operated from the receiver site at Pt Reyes on 7050 kHz., keying the transmitters by landline link. SEC Lee Dibble, KE6EAQ, re-appointed Mike Knope, KD6LYU, as the Petaluma area EC. For many years, Mike has lead the largest and most active ARES group in Sonoma County. Although there are too many to mention here, SRJC's Herb Sullivan K6QXB, and, Agilent's Al Bloom, N1AL and John Breckenridge WB6FRZ, all principals in the project, were beaming with pride when it was reported that once AO-40 was back on the air, the telemetry indicated that the sun sensor was working just fine! The Empire Amateur Radio Society is once again putting together a group to go to the Dayton Hamvention. The rooms have already been blocked. Persons interested should contact ASM KH6GJV. It's not too soon to start planning for Field Day. Make it a blow out event! 73 until next month!

**SAN JOAQUIN VALLEY**: SM, Donald Costello, W7WN—ASM: Mike Siegel, KI6PR. ASM: John Lee, K6YK. ASM: Pat Fennacy, W6YEP. SEC: Kent LeBarts, K6IN. OOC: Victor Magana, N1VM. ACC: Charles McConnell, W6DPD. STM: Fred Silveira, K6RAU. I am writing this issue of the Section News in January of 2001 so, I wish you all a happy and most prosperous New Year. Amateur Radio operators now face many changes and challenges going forth into the twenty first century. There is some concern that Amateur Radio will not survive the spectrum grabs and the long time Hams have concerns about loosing our heritage, including cw, due to the tremendous influx of new operators. Our new operators will continue our heritage and build upon it if only we remember the importance of elmering those who are now joining us in this fine service. All politics aside, we are all intrigued by the magic that comes from reaching out all over the planet, making new friends every day, with our radios. Thank you all for the opportunity to represent you as your Section Manager going forward into this new century.

### ROANOKE DIVISION

**NORTH CAROLINA**: SM, John Covington, W4CC— SEC: KE4JHJ. STM: N0SU. BM: KD4YTU. TC: K4ITL. PIC: KN4AQ. OOC: W4ZRA. SGL: AB4W. ACC: vacant. http://www.ncarrl.org. We were very fortunate to have made it through 2000 without a lot of severe weather in North Carolina. I hope the same will be true for 2001, but in any event we all need to be prepared. As a backup communications resource, we are only activated during a disaster if a communications emergency exists. While it may be disappointing to not be activated, the most important thing is to be ready. Another aspect of our public service communications is SKYWARN. SKYWARN spotters do not have to be hams, but our special way of communicating is of great benefit to the NWS. They simply don't have the staff or equipment to field the number of phone calls they would receive if all of us phoned in our reports. Amateur Radio provides a means for them to rapidly gather information over the area of interest. By providing requests to the NCS, it also allows the NWS to be selective in what kind of information is gathered. Training is important! Make sure you attend a SKYWARN training class each year so you will know what to look for. Practice during drills so you will know how to report. Listen during an activation so you will know what and when to report. Don't ask the NCS for a personalized weather report. Doing so may delay important information from being relayed to the weather service, and could delay a needed severe weather warning from being issued. Listen much, report when needed. Congratulations to Carl Starnes, W4EAT, who has qualified for a PSHR certificate. New NC Morning NM is Ron Rearick, AD4XV. Thanks to outgoing NM Bob Southworth, KI4YV, for his service. Charlotte Hamfest is Saturday and Sunday Mar 10 and 11. Plan to attend at least one of the ARRL forums while you are there. Dec Tfc: W4EAT 626 (BPL), NC4ML 476, AB4E 410, WB4TOP 257, KI4YV 236, K4IWW 178, AA4YW 178, KE4JHJ 165, W3HL 111, W4IRE 103, KE4AHC 97, AD4XV 82, W4FMN 61, WA4SRD 31, W4CC 19, KL7NL 17, AE4HJ 14, WA2EDN 13, NT4K 13, KB8VCZ 11, KE4YMA 11, KC4PGN 10, KR4OE 8, N0SU 6, N8UTY 5, KT4CD 5.

**SOUTH CAROLINA**: SM, Patricia M. Hensley, N4ROS—Our ARRL programs require direction by qualified leaders. We are fortunate to have the following: Emmie Patience, KA4LRM, STM; Sue Chism, K4ENX, OOC; Boykin Roseborough, KD4AJJ, SGL; Gerald Hensley, K8AFP, SEC; Marc Tarplee, N4UFP, TC; and Haney Howell, K2XN, PIC. All of these individuals are extremely well-qualified and are dedicated to the objectives of ARRL. Formation of a State Club Presidents' Council requires input from all club presidents. Please contact me regarding your local club. It is hopeful that a SC QSO Party can be coordinated by them in the near future. This will allow us to know each other better and give out-of-staters the availability to work SC counties. Formation of school radio clubs requires the willingness of existing clubs to become mentors. Governor Hodges' recent support of mentoring programs provides us with the opportunity for planning in this area. Clubs are encouraged to discuss their willingness to participate and forward their interest to me. In turn, I will make the appropriate school contacts. See you at Charleston and Charlotte. Tfc: AF4QZ 119, KA4LRM 74, W4DRF 40, KA4UIV 36, WD4BUH 22, K4BG 13, KQ4SY 9, K4JMV 6.

**VIRGINIA**: SM, Lynn Gahagan, AF4CD—SEC, OOC: KR4UQ. STM: W4CAC. ASM/A: KE4NBX. ASM/B: W4TLM. ASM/C, TC: W4IN. ASM/D: KF4LGV. ASM: KC4ASF. PIC: W2MG. A change in the leadership on the digital front has taken place. Ben Sager, KC4ASF, is stepping down as the Section Digital Manager and Jim Dodd, KF4LGV, has taken over the position. A promotion at work, with more responsibly requires much more of Ben's time. This prompted him into having to step aside. Thanks, Ben, for all you hard work and time you have given to this program. Everyone please give Jim your support as we together continue to build the digital system in Virginia. Ben will remain as an advisor and will retain his ASM position. MFJ has return the UHF amp that was in need of repair and it will soon be reinstalled at the VA.ARES/RACES digital site at the State EOC. District 13 held it's ARES meeting on Jan 13 to announce that Brian Squibb, W4PAJ, would take over the DEC position from W4TLM. Also it was announced that W4BOT, Bill, would take over as the EC of Franklin Co. Thanks fellows for giving Terry a hand out that way. I'm sure you both will do a great job. Fred, N4IF, was unable to attend the meeting. He was ill with that terrible Flu bug that is going around. There are now eight training programs on the www.aresva.org site for everyone to view. These are just a few of the programs that Va. ARES/RACES is offering to our membership as training aids. There are now over 600 registered members on our site with more each day. The District 7 group has put together a communication trailer. It's my understanding it is fully equipped with just about anything you would need for communicating while being deployed in a disaster. March brings up the forth anniversary of the Old Dominion Emergency Net. The net has grown from just having a hand full of participants to an average of 35 checking in at each session. The current Net Manager is NB3O. Steve has brought with him many new suggestions and ideas on moving the net forward. Perhaps there will be a time that the net will meet every night. All it would take would be a NCS for each night. I am sure there would be enough participants around to hold the nets. I am sad to report that KR4IH, Joe is now a Silent Key. Joe lived in Norfolk and was active on the VFN, several of the Va. NTS nets as well as the ODEN. He will be surely missed. 73 de AF4CD. Tfc: W3BBQ 314, WA4DOX 272, N4ABM 216, KV4AP 210, K4MTX 148, KR4MU 129, K0IBS 122, W4CAC 88, K4YVX 80, KV4AN 78, W4SEE 29, W4YE 26, WB4UHC 18, AF4CD 14, KB4CAU 11, W4JLS 9, KU4TM 6, KU4MF 4, WB4ZNB 4, W4MWC 4, K4JM 3, N4FNT 3.

**WEST VIRGINIA**: SM, O.N. (Olie) Rinehart, WD8V—STM: KC8CON. SEC: W8XF. ASEC: KA8ZOO. SGL: K8BS. TC: K8LG. OOC: N8OYY. ACC: WD8MKS. APRSC: W8XF. PIC: N8TMW. The real millennium is here with same story as last year! Little or no effect or affect on AMATEUR radio. Looking forward to seeing all of you at Hamfests and Conventions real soon. Charleston WV March 17th. The winter weather has been cold but no records broken. A strain on nerves and our Emergency Teams. Good job you people. Hey about good job's certificate # 4930 for 5 band DXCC has been awarded to W8PT Rich Kennedy of Morgantown WV. Congratulations, Rich. 73. Tfc: KA8WNO 306,KC8CON 68, WD8DHC 216, W8YS 175, WD8V 87, WW8D 41, N8MNA 116, W8WWF 45, N8BP 14. PSHR: WD8V 130, W8YS 172, WD8DHC 128, KC8CON 129, KA8WNO 118, WW8D 100, N8MNA 49; WVFN 1324/176/31 KC8CON; WVMDN 875/57/31 WW8D; WVN E 115/37/31 W8WWF; WVN L 28/42/31 W8WWF; ARES/RACES 46/14/02.

### 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. Larry Dunn, N9HSW, has stepped down as Pikes Peak ARES (Dist 14) EC; succeeding him is Wes Wilson, K0HBZ. Thanks, Larry, for your past service, and thanks Wes for stepping up to coordinate this active ARES district. The Mountain States Net is starting out with a lot of participation- if you are interested in a slow-speed CW traffic net, stop by 3715 kHz at 0245Z daily and check in. As you've probably read elsewhere, the ARRL's first continuing education course (for CE

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**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*".

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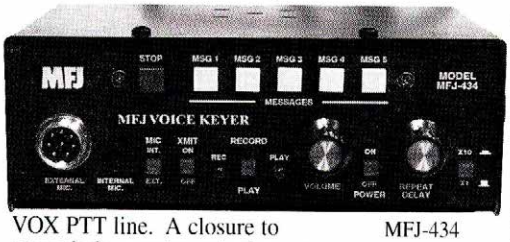


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**This** *professional grade* MFJ Boom-Mic Headphones set is designed for contesting, DXing and traffic nets. Features *total comfort* design with leatherette padding for operating long hours.

**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.

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**Each** phone has individual volume and speech enhancement control. Superb leatherette padding.

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credit) is the Emergency Services course, which spearheaded by Colorado's own Pat Lambert, W0IPL. Next time you see Pat at a swapfest or other event, thank him for his efforts that will benefit Amateur Radio nationwide. The Pikes Peak Radio Amateur Association has changed its swapfest date: instead of early May, this year's swap will be held June 2nd. Your Section Manager has appointments available for those who wish to participate in brining ARRL programs to the Amateur Radio community in Colorado. Surf over to: www.arrl.org/FandES/field/org/ to read descriptions of the various volunteer positions available, then contact Tim, WB0TUB, or any Section staff (listed above) to get involved. E-mail news to me: n0wpa@arrl.net 73, de N0WPA. NTS traffic: AD0A 136, K0TER 129, KI0RP 59. CAWN: W0WPD 950, W0LVI 625, K0HBZ 469, WB0VET 414, K4ARM 390, AA0ZR 386, N0NMP 383, AB0PG 315, W0NCD 265, W0GGP 242, N0FCR 223, KI0ND 172, WD0CKP 161, N0DKK 94.

**NEW MEXICO**: SM, Joe T. Knight, W5PDY—ASM: K5BIS & N5ART. SEC: K6YEJ. STM: N7IOM. NMs: WA5UNO & W5UWY. TC: W8GY. ACC: N5ART. New Mexico Roadrunner Net handled 95 msgs with 1331 checkins. New Mexico Breakfast Club handled 250 msgs with 1061 checkins. Yucca Net handled 25 msgs with 594 checkins. Caravan Club net handled 1 msg with 50 checkins. SCAT Net handled 4 msgs with 496 checkins. Four Corners Net handled 26 msgs with 353 checkins. GARS Net handled 2 msgs with 60 checkins. Rusty's Net handled 57 msgs with 783 checkins. Valencia County Net handled 11 msgs with 31 checkins. Deming ARC Net handled 15 msgs with 87 checkins. Boy did we have a white Christmas! Snow and ice, highways closed and accidents everywhere. Congratulations to all the new club officers, and we hope you will have a very successful year. K5TEE and his crew plan the Winter Tailgate (Jan 27) at Del Norte High School (ABQ). The Spring Tailgate will follow at St Paul's Methodist Church parking lot (ABQ) the last weekend in April. The Mesilla Valley "Bean & Chili Feed" is also usually the last weekend in April. So sorry to report the passing of Bob Belshe,W5DMG and Hilda Law, KC5SG, longtime members of the Roadrunner Traffic Net, and also George Adams, KC5Q of Las Cruces. They will certainly be missed. Very best 73, W5PDY.

**UTAH**: SM, Mel Parkes, AC7CP—Don't forget to attend the Utah VHF Society Swap meet on 24 Feb. Note the new location, Utah State Fair Park 1000 West North Temple in Salt Lake City. The doors open at 8:00 AM. There will be lot of interesting good stuff for sale. Come see what your ham shack may need. Check out the Utah Hamfest 2001 Web page at http:\\www.utahhamfest.org and register early. We already have some very special guests and presentations planned that you will not want to miss. 73 de AC7CP.

**WYOMING**: SM, Bob Williams, N7LKH—Wyoming Section has a new Section Emergency Coordinator, Marty Luna, WE7MA. His predecessor, Steve Cochrane, WA7H, has taken a new job with FEMA in Denver and felt it necessary to resign. He has done a very nice job for the last four years. It is to Steve that we owe thanks for the excellent series of exercises for Y2K last year. Like Steve, Marty has outstanding qualifications for the position. He has been an EC, he works for WEMA as director of Laramie County Emergency Management Agency and is Area One RACES Officer. Also, he lives near and works with Scott Harris, W7WRO, the Wyoming RACES Officer. That is a very nice combination for helping us with our objective of making ARES/RACES/WEMA all one word, at least as far as the participants are concerned. That is critical with our low ham density. Sweetwater County ARC held a special event station on November 20, about the Big Boy U. P. steam engines, and made about 120 contacts. Tfc: NN7H 393.

## SOUTHEASTERN DIVISION

**ALABAMA**: SM, Bill Cleveland, KR4TZ — We are having a Section Wide emergency communications meeting at the State EMA office in Clanton, AL,on March 3 at 10 AM. All EC, DEC, Emergency Net Managers, Club EC, emergency relief and SKYWARN organizations are invited to attend. Amateur Radio operators interested in becoming involved in emergency communications are also invited. Space is limited and preference will be given to Emergency Communication Managers. Please RSVP me by phone (334-661-3892) or email (kr4tz@arrl.org) if you want to attend this meeting. The only topic will be finalizing the Section-Wide Emergency Plan. ARRL affiliation is not required for your Emergency Organization to attend this meeting. If you are interested in helping the development of our emergency plan then you are encouraged to check-in to the Alabama Emergency Net (AEN) that operates every Tuesday at 7:30 PM on 3.965 MHz. A general Section meeting will be scheduled for June to handle the rest of the Section's business. Jack Evans (KC4PZA) had to step down as Section Emergency Coordinator. Please thank Jack for stepping in and taking over the position when Walt Verney became ill. I appreciate the amount of time and effort that Jack put into his appointment. Jack passes the torch to Dan Jeswald (W4NTI) who volunteered to be our new SEC. Thank you, Dan, for taking the job and I look forward to working with you on our updated Section Emergency Plan. Spring storm season is almost upon us, so please support your local SKYWARN net and the AEN. God Bless & 73, Bill Cleveland, KR4TZ.

**GEORGIA**: SM: Sandy Donahue, W4RU—ASM/South Ga: Marshall Thigpen, W4IS. ASM/Legal: Jim Altman, W4UCK. Asst SM/IT: Mike Boatright, KO4WX, SEC: Lowry Rouse, KM4Z. STM: Jim Hanna, AF4NS. SGL: Charles Griffin, WB4UVW. BM: Eddie Kosobucki, K4JNL. ACC: Susan Swiderski, AF4FO. OOC: Mike Swiderski, K4HBI. TC: Fred Runkle, K4KAZ. PIC: Matt Cook, KG4CAA. Website www.qsl.net/arrl-ga. We have a Website now created by Asst SM, KO4WX. See address above. Lanierland ARC named Ed Cravey, KF4HPY, as their Amateur of the Year. At the annual ARES conference in Forsyth, Val Ashcraft, AF4VH, named ARES'er of the year. A long time friend and QCWA member Wendall Cushing, K4VN is a SK after a long illness. He is missed. New officers in the ARC-Savannah: Pres. KF4LMT, V Pres. AF4KL, Sec. K4DJD, Tres. AD4KA, Activities KF4EFP. Another SK, Howard Binkley, K4DNB, Butler, Ga. Our sympathies to his family. Albany ARC new officers: Pres. W4AYK, V Pres. KG4CCM, Sec. W4GOD, Tres. K4PHE. Hamfests in March include the Kennehoochee fest on March 17, in Jim Miller Park. The Southeastern VHF Society annual conference on April 20-21 in Nashville, TN features Emil Pocock, W3EP, *QST* "World Above 50 MHz" columnist as Saturday night banquet speaker. Finally, if you are not going to Dayton this year, head to Statesboro for their hamfest, May 19, at Ogeechee Tech. 73, Sandy. Tfc: Dec: AF4NS 209, W4WXA 154, WB4GGS 148, KF4FXG, 69, W4AET 50, K1FP 45, WU4C 42, KA4HHE 38, K4WKT 37, K4BEH 30, K4ZC 15, K4BAI 6, AD4AZ 6, AF4PX 3.

**NORTHERN FLORIDA**: SM, Rudy Hubbard, WA4PUP—ASM Capital District: Jim Giles, K4VRT, Fl Crown District: Billy Williams, N4UF, Suwannee District: Joe Bushel, W2DWR, E Central District: Rick Palm, K1CE, W Central District: Charlie Lord, NR2F, E Panhandle District: Nils Millergren, WA4NDA, W Panhandle District: Steve Richbourg, KO4TT. The Staff responsible for the Northern Florida Section ARRL programs are: ACC: Steve Barber,WA4B, BM, Dave Sutherland, N4GMU, OOC, Frank Ambrose, W4QV, PIC, Mike Welch, KF4HFC, SEC, Nils Millergren, WA4NDA, SGL, John Hills, KC4N, STM: Morton, WX4H, TC, KO4TT, Packet, Dave Sutherland, N4GMU. The people listed above have the authority and responsibility for managing and supervising their respective areas. They make the appointments for their areas, and the ASMs are available to represent the Section on matters when the Section Manager is not available, such as speaking at clubs, and other administrative matters for the district. The purpose is to assure all amateurs the Section Leaders are there to assist and have a more cohesive operation and provide the best service to all desiring amateur assistance. Another function is the operation of the NTS system. The Nets are in need of control operators, and the Net Managers would appreciate volunteers. It is not a difficult job, but one which is desperately needed. The NFAN, and NFPN Managers have a need for both primary and alternate control operators. Why wait, but start asking yourself what can you do for the organization, not what the organization can do for you. The ranks of our group seems to get smaller, and this is evident by the number of license amateurs at the exam session. There is a place for all. 73, Rudy. Tfc: WX4H 1633, KE4DNO 311, NR2F 204, AG4DL 216, N9MN 209, K1JPG 106, KF4WIJ 99, AF4PU 92, KB2EV 76, WB2FGL 72,K4DMH 51, WD4IIO 42, KB4DXN 42, K8KV 31, K4JTD 30, AB4PG 29, W4KIX 26, W8IM 25, WX4J 22, KM4WC 22, WD4LIF 21, WA4EYU 20, N4JAQ 19, WB2IMO 18, KG4EZQ 18, WA1VOP 15, KB4DCR 14, KJ4HS 11, N4EC 7, WB9GIU 4, W4ZET 1.

**PUERTO RICO:** SM, Víctor Madera, KP4PQ—Comenzamos un nuevo milenio viendo grandes cambios en la radioafición. La FCC ha puesto gran interés en ver que se cumplan las reglas a cabalidad. Como resultado, ahora hay solo dos VECs representados en Puerto Rico, el ARRL/VEC y el W4VEC/VEC. Efectivo el primero de enero se descontinuó el servicio de W5YI/VEC en la isla. La asamblea anual del PRARL se celebró exitosamente. Se eligió la nueva Junta que preside Mario Rivera, KP4NNC. Felicitamos a todos los electos. La FRA llevó a cabo el hamfest de Año Nuevo en la Cancha Salvador Dijols de Ponce el 28 de enero de 2001. Las clases para principiantes dio comienzo el 17 de enero y se extenderá por 16 semanas. También hay clase programadas para la biblioteca de Boquerón, PR que comienzan en la misma fecha. Ya se completó de preparar el nuevo libro en español para entrenar los nuevos Observadores Oficiales. El curso esta programado para el mes de febrero. Interesados comuníquense con el Section Manager por correo regular, teléfono o via email a kp4pq@arrl.org

**SOUTHERN FLORIDA**: SM, Phyllisan West, KA4FZI—SEC: W4SS. STM: KJ4N. ACC: WA4AW. PIC: W4STB. OOC: K4GP. BM: KC4ZHF. SGL: KC4N. DEC/ASM: N4LEM, WB9SHT, AA4BN, KD4GR, WB2WPA. Thanks to Dade ARC, Ft Myers ARC, Indian River ARC, Orlando ARC, South Brevard ARC, Vero Beach ARC, Wellington ARC, and ECs for the newsletters and activity information. The South Brevard ARC was the eyes and ears for parade officials of the Melbourne Light Parade Dec 9. The next challenge is the 50 km Beach Run, Cocoa Beach to Eau Gallie and back. The Broward ARES/RACES team again provided communications for the Winterfest Boat Parade. The Dade Radio Club has been working hard on preparations for the Miami Hamboree, February 3 and 4. We look forward to an exciting and rewarding weekend at that major event. The Indian River ARC's Roy Hill, W6QCM, came up with a new drill idea. They held a terrorist-attack drill to see how many 10 and 40 meter mobile radios and VHF links they could get on the air. The drill was reported a great success and they plan to do it again next year. Vero Beach ARC hams tried something new for them in the Sun Runners Marathon. It was the first time they used a mobile APRS station mounted on a bicycle that trailed the last runners. It was ridden by K4EBK. The APRS station consisted of a GPS receiver connected to a hand-held 2-meter transceiver and TNC packet controller programmed to beacon every 2 minutes. Lee County hosts the Ft Myers ARC hamfest January 12 and 13. KA4FZI was named Amateur of the Year by the Fort MyersARC at the Dec meeting. The club recently learned that they placed 29 in the country in the 4A operating class on Field Day. Congratulations Ft Myers! KJ4N, SFL STM, was awarded the W2SWE Memorial Award for Outstanding Public Service to NJ Traffic Handling. Great Job! You earned it, Jan. Monroe County reports continued success with the linking of their 2-meter and 440 repeaters being linked during emergency drills to cover full length of the Keys. Osceola has added 4 new ARES members this month. Weekly nets and monthly meetings on Thursdays at 7 PM. West Palm will provide communications for the annual walk to raise money for cancer research, which will be held in downtown WPB. Dick, AF4OR, is the event's coordinator. There will be an HF station setup in the van to give demos of amateur radio contacts to event attendees. Tfc by STM, Jan, KJ4N: K4FQU 790, WA9VND 655, KA4FZI 569, KB4WBY 278, KC4ZHF 226, K4VMC(club) 175, KD4HGU 166, KJ4N 147, KD4GR 135, WA4EIC 110, WB4PAM 104, KE4UOF 102, AA4BN 74, KD4JMV 62, W6VIF 49, WA4CSQ 40,

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**MFJ's *tunable* super DSP filter automatically eliminates heterodynes, reduces noise and interference *simultaneously* on SSB, AM,CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX, weak signal VHF, EME, satellite.**

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***Only* MFJ gives you 5 *tunable* DSP filters. You can tune each lowpass, highpass, notch, and bandpass filter including optimized SSB and CW filters. You can *vary* the bandwidth to pinpoint and eliminate interference.**

***Only* MFJ gives you 5 *factory* pre-set filters and 10 *programmable* pre-set filters that you can customize. Instantly remove QRM with a turn of a switch!**

**MFJ's *automatic notch* filter searches for and eliminates *multiple* heterodynes.**

**You also get MFJ's advanced *adaptive noise reduction*. It silences background noise and QRN so much that SSB signals sound like FM.**

**The *automatic* notch and *adaptive* noise reduction can be used with *all* relevant tunable pre-set filters.**

***Automatic gain control* (AGC) keeps audio level constant during signal fade.**

### *Tunable bandpass filters*

**Narrow** band signals like CW and RTTY jump out of QRM when you switch in MFJ's exclusive *tunable* FIR bandpass filters.

**You** can tune the center frequency from 300 to 3400 Hz, and vary the bandwidth from 30 Hz to 2100 Hz -- from super-tight CW filters to wide razor-sharp Data filters.

**You** can use two tunable filters together. For example, tune one to mark, one to space and set bandwidth tight for a super sharp RTTY filter.

### *Tunable highpass/lowpass filters*

**You** can tune the lower cutoff frequency 200 to 2200 Hz and the upper cutoff frequency 1400 to 3400 Hz. This lets you create custom filters for voice, data and other modes.

**Signals** just 75 Hz away literally disappear -- they are reduced 57 dB!

### *Automatic notch filter*

**MFJ's** automatic notch filter searches for and eliminates multiple heterodynes in milliseconds. It's so fast, that even *interfering* CW and RTTY signals can also be eliminated.

**You** can *selectively* remove unwanted tones using the two *manually tunable* notch filters -- an MFJ exclusive. Knock out unwanted CW stations while you're on CW.

### *Adaptive Noise Reduction*

**Noise** reduction works in all filter modes and on all random noise -- white noise, static, impulse, ignition noise, power line noise, hiss.

**The** LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

### 15 *pre-set* filters -- factory set or you custom program

**You** can select from 15 *pre-set* filters. Use for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode.

If you don't like our pre-set filters, you can program your own -- an MFJ exclusive! Save center frequency/bandwidth, lowpass/highpass cutoffs, auto/manual notch, noise reduction -- all filter settings -- in 10 programmable filters.

### *Plus more . . .*

**A** push-button bypasses your filter -- lets you hear the *entire* unfiltered signal.

**2½** Watt amplifier, volume control, input level control, speaker jack, PTT sense line, line level output. 9½x2½x6 inches.

**Plugs** between your transceiver or receiver and external speaker or headphones. use 12 VDC or 110 VAC with MFJ-1315, $14.95. Cable Pack, MFJ-5184, $7.95, includes receiver cable, DC cable, 2 open-end TNC cables.

### *New Features*

**MFJ's** exclusive *tunable Spotting Tone*™ -- accurately tunes even the narrowest CW filter.

**MFJ's** exclusive *Adaptive Tuning*™ -- tuning rate automatically becomes finer as you narrow bandwidth -- makes narrow filters easy-to-use.

**MFJ's** exclusive *FilterTalk*™ -- sends precise filter settings in Morse code.

**Has** automatic notch with variable aggressiveness, new quieter 2½ Watt audio amplifier, new speaker switch keeps phones always active.

**Manual** and automatic notch can be used together. Noise reduction, automatic notch and custom filter you saved in memory is selected.

**You** get an accurate easy-to-use input level indicator, improved manual notch in the CW mode, adjustable line level output, more Mark-Space frequencies and baud rates for data filters and automatic bypass during transmit for monitoring CW sidetone, voice or data by sensing the PTT line.

### *Firmware Upgrade*

**For** MFJ-784, order **MFJ-55, $29.95**. Gives you most features of the MFJ-784B.

# 60 dB Null *wipes out* noise and interference

MFJ-1026
**$179.95**


**Wipe** out noise and interference *before* it gets into your receiver with a 60 dB null!

**Eliminate** all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

**It's** *more effective* than a noise blanker because interference much stronger than your desired signal can be completely removed without affecting your signal.

**It** works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

**You** can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

**Use** the MFJ-1026 as an *adjustable phasing network*. You can combine two antennas to give you various directional patterns. You can null out a strong interfering signal or peak a weak signal at a push of a button.

**Easy-to-use!** Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

**RF** sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312B, $14.95. 6½x1½x6¼ inches.

**MFJ-1025, $159.95.** Like MFJ-1026 less built-in active antenna, use external antenna.

### Add DSP to any Multimode

MFJ-781
**$129.95**

**Add** "brick wall" DSP filtering to any TNC or multi-mode data controller. Copy signals buried in noise and QRM. Under severe QRM, DSP greatly improves copy of Packet, AMTOR, PACTOR, GTOR, Clover, RTTY, SSTV, WeFAX, FAX, CW -- nearly any digital mode. Automatic gain control, On/Off Bypass switch. Plugs between transceiver and multi-mode. Uses 10-16 VDC or 110 VAC with MFJ-1312B, $14.95. 4½x2½x5 inches.

### DSP for your MFJ-1278/B

MFJ-780
**$99.95**

**Plug** a MFJ-780 "brick wall" DSP filter into your MFJ-1278/B multi-mode and you won't believe your eyes when you see solid copy from signals completely buried in QRM! MFJ-1278/B automatically selects the correct DSP filter for Packet, AMTOR, Pactor, RTTY, ASCII, FAX, Color SSTV, Navtex or CW. Plug in a MFJ-780 and copy signals that other multi-modes can't. *Some soldering needed.*

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**VIRGIN ISLANDS**: SM, John Ellis, NP2B, St Croix. ASM: Drew, NP2E. St Thomas. ASM: Mal, NP2L, St John, Section Internet Mgr (SIM) Jeanette, NP2C, St Croix, SEC: Duane, NP2CY, St Thomas. PIC: Lou KV4JC, St Croix. ACC: Debbie, NP2DJ. St Thomas, NM, Bob VP2VI/W0DX Tortola. Sorry to hear of the passing of Nell, XYL of Bob Denniston, W0DX/VP2VI. Our condolences Bob. St John Club to provide communications for the 8 Tuff mile run, from Cruz Bay to Coral Bay on St John. Team RITTY on St Thomas did not participate in the ARRL RTTY contest but plans major assault on the WPX. January issue of QST reports Bob, N4BP, operating NP2B in CW SS made 127 contacts - that should be 1127! (who dropped the "1")! PSK31 continues to generate interest and now we are seeing interest in MFSK-16. A privilege to work WW2LST, a gutsy move by some pretty gutsy guys! Jack, KC6WYX operator on board the LST handled the pileups well. VI section Website http://www.viaccess.net/~jellis), e-mail SM with news at np2b@atthehelm.com. Wishing health and DX to all & good luck in the contest! 73, John, NP2B.

**WEST CENTRAL FLORIDA**: SM, Dave Armbrust, AE4MR, *ae4mr@arrl.org http://www.wcfarrl.org*—ASM: NA4AR. ASM-Web: N4PK. ASM-Legal: K4LAW. SEC: KD4E. TC: KT4WX. BM: KE4WU. STM: AB4XK. SGL: KC4N. ACC: AC4MK. PIC: AB2V. Highlands County ARC names Norm Ward, K4RBR, ham of the year. With several new ECs, SEC KD4E reports an increase of 84 ARES members and has scheduled a SET for 2/24. WCF celebrated its first anniversary across the bands with the Next Contact Special Event on 1/14. Congratulations to all. The Big Stick repeaters should be on the air about the time you read this frequencies are 145.430 MHz and 442.950 MHz with a PL tone of 100 Hz. Hamfests: Sebring 2/17, Zephyrhills 2/25. December:

| *Net/NM* | *QNI* | *QTC* | *Bulls* | *QND* | *Sess* |
|---|---|---|---|---|---|
| AIN/WA4ATF | 79 | 6 | 9 | 121 | 4 |
| PINN ARES/WB2LEZ | 101 | 2 | 6 | 186 | 6 |
| POLK ARES/KE4VBA | 65 | 0 | 2 | 72 | 4 |
| HILL ARES/KD4CQG | 75 | 2 | 7 | 56 | 4 |
| SPARC/KF4FCW | 446 | 42 | 0 | 744 | 31 |
| TURTLE/KT4TD | 383 | 65 | 0 | 437 | 31 |
| FMSN/KT4PM | 290 | 85 | 0 | 508 | 31 |
| TPTN/AD4IH | 738 | 128 | 0 | 532 | 31 |
| QFNS/KF4KSN | 187 | 49 | 0 | 674 | 31 |
| QFN/AB4XK | 895 | 504 | 0 | 1,235 | 62 |

PSHR: K4RBR 150, K4SCL 150, AB4XK 145, KT4PM 131, AD4IH 125, KT4TD 121, KF4KSN 104, WB2LEZ 93, KE4VBA 89, W4AUN 72. Tfc: AB4XK 360, K4SCL 288, KT4TD 60, AD4IH 55, KT4PM 44, KE4VBA 39, KF4KSN 36, K4RBR 25, WB2LEZ 9, W4HCS 5 W4AUN 3. 73, Dave, AE4MR.

## SOUTHWESTERN DIVISION

**ARIZONA**: SM, Clifford Hauser, KD6XH— I was privileged to attend the Central Arizona DX Association Awards Banquet on January 13. It is an annual event that recognizes people who have contributed to the club and Arizona during the last year. This event was nicely done, thank you CADXA for a good time and 25 years as a club (also ARRL affiliated for 25 years). The Yavapai ARES was given special thanks from the Prescott Red Cross for its help in locating a family member that was on a Caribbean cruise. Lee Cunningham was instrumental in using Amateur Radio to get a priority message to this person about a deceased relative. All other forms of communications failed. The 2001 Amateur Radio Club listing has been mailed to over 65 clubs. If your club has not received this mailing, please contact me and I will send you the paperwork. Also, if the information in this listing is not correct, then please let me know so it can be changed. The Northern Arizona DX club has 100% ARRL membership and they are listed as a special service club. The next hamfest is this month at the Scottsdale Community college on 10 March. A hamfest will be held at DeVry on 07 April sponsored by the Arizona Amateur Radio Association. The Arizona Web site is alive and doing well. Tom Fagan, WB7NXH, has developed this Web site for the Arizona section and is always providing new material and updating it every day. The address is "www.qsl.net\arrlaz\ ". Please keep your newsletters coming so I can keep up with the activities around the state. I have started school, so every Tuesday and Thursday afternoon (1600 hours to 1900 Hours) I will be attending Pima Community college to learn AUATOCAD 2000. Maybe you can teach an old dog new tricks. So if you call and I am not home, please leave a message and I will call you back. 73, Clifford Hauser, KD6XH. ATEN: 936 QNI, 54 QTC, 31 sess. Tfc: K7VVC 957, W7EP 103, WA7JCK 21.

**LOS ANGELES**: SM, Phineas J. Icenbice, Jr, W6BF — It is a new year, and we have new technology. Ham transmitting stations that are becoming more and more like computers. We now have many Amateur Radio systems that are remote controlled. This doesn't sound that astounding because this was easy to accomplish 35 or more years ago. Now, W7DXX has a well known system referred to as a REMOTE BASE-station, that can be computer controlled from almost any place in the World via the Internet. This is just great. Get on the Internet and check in with W7DXX, or some other great friend that has the computer interface, and you may be able to work a station like Keith's. You can operate from a foreign country or your apartment. Now who can legally operate this remote base? Or better yet, why is it that the FCC does not have the words "remote base" in their rules or vocabulary? Because of the new low cost Internet-control-technology almost any one with a computer can participate in this new fad. The FCC has stated that; we don't regulate "systems" - we regulate, stations. Remember that the FCC also regulates control operators. Many new issues have been evaluated recently with respect to alien operation, and the latest interpretations are all "go," but with some limitations as stated in part 97.107 and some other FCC section rules like 97.7. Some day soon, you may operate a remote Radio station on a far-away island, right from the comfort, of your very own apartment. At least this popular new mode of operation could solve some CC&R problems; maybe yours. Give it try, you might like it! - The Los Angeles Area Council of Amateur Radio Clubs, LAACARC, has elected Ken Getzin, NE6K Chairman kgetzin@home.com and Bill Leslie, WA6POK, Vice Chairman & our new Section ACC, wa6pok@arrl.net. Other elected officers are: Spud, K6KH, and "Bev," WA6TIU. Michael, KK6WO, is our ARRL Division and Section Webmaster. Michael has agreed to do the LAACARC Web site also. (The way to go, Michael.) The latest meeting had an honored guest, Archie, W6LPJ. Archie received a plaque for his and Rosemary's long and faithful service to Amateur Radio. The plaque was presented by the outgoing Chairman, Walt, N6SMT. (For 27 years plus of the service to Amateur Radio.) Attention club officers, if you need a program check out our web site at qsl.net/arrlsw/lax or contact Bill, WA6POK, for ARRL tapes. These tapes were purchased for your use. Just e-mail Bill at: wa6pok@arrl.net . de Phineas, W6BF

**ORANGE**: SM, Joe Brown, W6UBQ, 909 687 8394—ASM Riv Co: Joe, KO6XB, 909 685 7531. ASM Orange Co: Art, W6XD, 714 556 4396. ASM: SB Co James, KE6LWU. Fullerton ARC celebration, July 29, 1950, six men signed and notarized the document that was to become the Articles of Incorporation of the Fullerton Radio Club, that was 50 years ago. Congratulations IEARC Officers for 2000-2001. Chuck Sweeten (N6RQK), Pres. Donnie Crews (N6ZOL) VP. Becky Ormonde (K6EY) Sec. Bob Overholser (KD6PCC). Club Page is http://www.qsl.net/w6ier, check it out. With its successful launch on an Adrianne 5 rocket, AMSAT Phase 3D finally became Oscar 40, the most capable ham radio satellite ever launched. CLARA a private repeater group tries to maintain a frequency monitor at all times. Ray Grimes, W6RYS, Chief Radio Officer for OCRACES, advises the unit is using our new technology. It has added SSTV and PSK-31 digital text messaging to their tool box. As cellphones and the Internet become more commonplace OCRACES must explore leading-edge technologies in order to remain one step ahead of our competition. SM comments: I believe this is a good move. All Amateur Radio Public Service Operators or Organizations whether RACES, ARES, Clubs that work Parades or Good Deed Activities should consider these technical innovations. This will improve their Amateur Radio Communication Capabilities. Riverside Co ARES/RACES is planning to use these technical innovations. CONVENTION News! Let's not forget the 2001 SW Division in Riverside CA. Sept.7-9, 2001. Your clubs should have an application. FREE LOGO PIN WITH EARLY BIRD REGISTRATION. Section Traffic Manager Report; K6CTW 357, W6JPH 269, KC6SKK 221, W6QZ 135, W6QZ NTS BBS 206. PSHR: W6QZ 158, KC6SKK 128, W6JPH 106. SCN/V NET MGR W6JPH REPORTS. 21 sessions, QNI 144, QTC 83, 14 mins/session. Congratulations to K6CTW on making BPL for December. From April Moell, W6OPS. The North Pole event was a success and again we received the best Christmas presents: sparkling eyes, golden smiles, bubbling giggles, and tears of thanks.

**SAN DIEGO**: SM, Tuck Miller, NZ6T, 619-475-7333—This winter was a bit different as we had a major fire in January. The Viejas fire consumed over 11,000 acres, burned more than 5 houses, and several out buildings. Animal Rescue was busy helping to evacuate all kind of critters ranging from horses, cows, and even pot bellied pigs. RACES once again came thru providing communications for various governmental agencies, and ARES was very busy providing communications support for both the Red Cross, and the California Dept of Forestry. The following persons helped out in the ARES effort, Steve K6PD, Don N6CEO, Dan KD6OKR, Michael KF6ZRP, Jim N6LWL, Walt WA6ODQ, Dave KC6YSO, Steve KD6WRL, Gary KG6AXX, Glenn WM6B, Jerry KF6ZRQ, Jim W6HME, Bill KC6TXN, George WA6PTZ, Susan KF6WXA, Clint KF6ZRR, Lee KF6ZRN, Dick AC6RZ, Bob KF6YVC, Del N6JZE, Frank WA6YWC, Al W6WYN, Wade KE6BZI, Gordon WB6POW, George KO6BU, Ken WA6BCC, Kent K6FQ, Scott KF6ZRT, and Doug KF6QXU. Many thanks go out to these folks, not only to ARES, but to the other ham groups as well. For you DXers, time is drawing nigh for our annual DX convention in Visalia. Held in the month of April, this convention draws DXers from all around the globe, and many big names as well. The ARES alert, edited by Steve Adams K6PD is distributed at club meetings through out the section. It is now available on the section web site in .pdf format. Visit the section Website at www.qsl.net/sdgarrl. Sign up for the members only Website for the League, and get a weekly newsletter from the SM. Tfc: KT6A 980, KD6YJB 173, KF6YVQ 28, KO6BU 10, WA6IIK BPL: KT6A 980. PSHR: KT6A 140, KD6YJB 58, KO6BU 39.

**SANTA BARBARA**: SM, Robert Griffin, K6YR, (k6yr@arrl.org or k6yr@arrl.net)—SEC: Jack Hunter, KD6HHG (kd6hhg@arrl.net). STM: Ed Shaw, KF6SHU (kf6shu@arrl.net). SGL: Paul Lonnquist, NS6V (paul@dock.net). ACC: Michael Atmore, KE6DKU (ke6dku@aol.com). OOC: Howard Coleman, W6HQA (w6hqa@arrl.net). PIC: Jeff Reinhardt, AA6JR, (jreinh@ix.netcom.com). TC: Warren Glenn, KM6RZ (wglennrz@ix,netcom.com). ASMs: Ventura, Don Milbury, W6YN (w6yn@arrl.net). San Luis Obisipo, Bill Palmerston, K6BWJ, (bpalmers@fix.net) & for Internet, Jack Bankson, AD6AD (ad6ad@arrl.net); & DECs: Santa Barb-Dave Lamb, WA6BRW (wa6brw@arrl.net); SLO-Bill Peirce, KE6FKS (ke6fks@arrl.net) & Ven-Dave Gilmore, AA6VH (aa6vh@arrl.net). ACC: KE6DKU. reports that VCARC has been renewed as a Special Services Club. Congrats! I encourage club leaders to contact our ACC for info on the benefits of the SSC status, and on renewing annually. Congrats to new VCARC Board: KA6GSU, Prexy; KO6IO, VP; KF6BXN, Secy; KD6PQF, Treas; & Dirs: N6XD & KE6BBP. FREE instant Section news updates? Join the SB Reflector! e-mail majordomo@qth.net the message subscribe arrlsb. SB Sec Web: www.qsl.net/arrlsb/. Join in our Section NTS traffic nets: SCN slow speed NTS Net, M-F, at 1915 local on 3598 kHz & SCN/SB at 2100 local on 147.000+(131.8), 224.90- (131.8) & 449.300-(131.8). That's 30! Rob, K6YR, SM.

**WEST GULF DIVISION**

**NORTH TEXAS**: SM, Don Mathis, KB5YAM—STM: KC5OZT. BM: KC5OZT. SEC: K5MWC. SGL: N5GAR. OOC: WB5UDA. ACC: WN5PFI. ASMs: KX5K, K5RE, KK5QA, KK5NA, N5JZ, KB5LWZ, N5JL, KD5HIS, AD5X, W5GPO. At this time, the results for the North Texas Section Election are in and Larry Melby, KA5TXL, will be the next NTX SM. Congratulations Larry. I have been chewing off fingernails along with many others regarding AO-40. Glad to hear that it is responding again. As you all know, we had a major ice storm in NE TX, AR, OKL, and LA. I was very proud of the way that the amateur community responded. At the severe risk of missing someone, I would like to give SPECIAL mention to the following persons. To N5NAV, W5ZX, and the rest of the ARES group that supported us. Having the 7285/3873 ARES nets was invaluable. Thanks to the many NCS stations. Thanks to the many hams that supported the net with relays and just being there if needed. The members of my staff that really came through (again). KD5HIS (sure glad that I did not let you resign), KC5OZT, K5MWC, N5JZ (many many hours). The many members and supporters of the NTX ARES group and Emergency Relief Groups including especially W5BJ, N5WYT, KB5WEE, KD5BKC, N5ZB, AC5UZ, KC5SMC, KB5THL. To the many others that I may have missed or did not get your involvement in time for this article, I thank you all. I heard many of you on the air that I had the honor of meeting during this last year and a half. This storm again pointed out the need to have known multiple, reliable, flexible forms of communication in place. Both HF and VHF were used extensively. Anything that relies on commercial power can be lost. Cell phones can be lost. The organization MUST be in place before the emergency. Communications support outside the affected area must be in place. We have some more to do before the next emergency and will be working on these issues in the near future. Tfc: December: KC5OZT 410, K5NHJ 405, N5JZ 402, W5AYX 99, WA5I 79, KB5TCH 64, KC5VLW 18, AC5Z 17, KC5SMC 13, AC5UZ 4, K5TEK 1. BPL: K5NHJ 174 orig/deliveries, N5JZ 128 orig/deliveries. 73, Don, KB5YAM.

**OKLAHOMA:** SM, Charlie Calhoun, K5TTT—ASMs: N6CL, W6CL, W5ZTN. SEC: KA7GLA. ACC: KB5BOB. PIC: WA9AFM. OOC: WB9VMY. SGL: W5NZS. STM: K5KXL. Tfc: N5IKN 540, KF5A 398, WA5OUV 388, KK5GY 315, KE5JE 153, K5KXL 127, WB5NKC 141, WB5NKD 133, WA5IMO 67, KI5LQ 62, W5REC 48, N5FM 2.

**SOUTH TEXAS**: SM, Ray Taylor, N5NAV—ASMs: NR5ED, N5WSW, W5GKH, K5DG, N5LYG, WA5UZB, KK5CA, K5EJL, W5ZX,WA5TUM, KB5AWM, WA5JYK, K5PFE, K5PNV, and K5SBU. STM: W5GKH. SEC: W5ZX. ACC: N5WSW. TC: KJ5YN. BM: W5KLV. OOC: W5JAM. SGL: K5PNV. March is a beautiful month. As the winds come and the trees are budding. Let's take a look back to Christmas Day when trouble really began for North Texas, Oklahoma, Arkansas, and upper Louisiana as the worst ice storm since the 1940s. On Monday morning, reports began coming in of power outages with trees falling over roadways and phone outages due to the ice storm that crippled portions of the four states. At 1 PM, we set up the emergency net on 7285 to service all the agencies that were now in serious trouble. By night fall all power, telephone including cell phone and 911 service was out in the cities hardest hit. By noon Tuesday, all water and gas were shut down. By Monday evening, the police stations, fire departments, hospitals, and shelters were manned by Amateur Radio operators under the direction of ARES. Jim Haynie, W5JBP, got involved with AT&T on the phone in Dallas getting information as to the poles and equipment needed to restore telephone service. Two hospitals were in the process of being evacuated at the same time. While all this was going on we had interference from other hams, so I called the FCC for assistance. Before one patient could be transported, they needed light to finish surgery. One of the hams took a portable generator to the hospital to furnish light. I thought that was real thinking. This is one reason I stress training in our clubs for just such an emergency. You never know what might happen, so it helps to be trained and ready for anything. It's very important that all learn to think and work under pressure. I just wish I had room to mention all the call signs of the hams involved (about 250). I thank all the NCS operators for their long hours. The ones in the field did an outstanding job with very little rest, manning shelter, etc. I don't want to leave out those that were working in the freezing weather moving trees, climbing poles, and feeding the less fortunate. We had 53 deaths as a result of this disaster. For those that just kept interfering with the net, this was no joke. It really makes one wonder what is in the minds of a person like this, and to find out that some were Extra class hams. The hams, under the direction of ARES, furnished communications for local police, fire departments, Red Cross, Salvation Army, DPS, AT&T, Baptist Mens Kitchens, hospitals, city officials, and shelters. We closed the net at 3 PM January 1. The Paris News had a great write up on the services of ham radio in this time of need by Paris, TX. Tfc: W5SEG 1164, KA5KLU 345, W5KLV 177, W5ZX 150, W5GKH 96, N5NAV 79, N5OUJ 70, K0YNW 50, W5TUK 42.

**WEST TEXAS:** SM, Clay Emert, K5TRW, 915-859-5502, k5trw@arrl.org—I have been asked to fill the remainder of Charlie Royall's term as WTX SM. I would first like to thank Charlie for all the hard work he has put in on behalf of the section. His health would not let him continue. I can only fill this position with your help. By way of introduction, first licensed in the fall of 58 with my current call which lapsed during the Viet Nam War & came back to Amateur Radio in 75 with the call, WB5VIV. I applied for and was granted my original call in 78. Born in El Paso, of Texas Hill Country parents, I have always called West Texas Home. Now the important stuff. NWS Special Event Station celebrated the contributions of Amateur Radio. Midland's participation by K5JOG, W5ZOX, N5UNH, KC5ZJO, KD5LRD, N5POB, KB5MGK, N5OMV, NX5E, KD5HGE, KD5GCQ, N5PSP, KD5MHM, KD5IRL, KD5KZR, WB5G & W5RCB made contacts on CW, PSK31, ATV as well as SSB. Everyone had fun at the successful event. SET by Big Bend ARC ARES group provided practice with their "telephone tree," writing & delivering formal message traffic. N5DO, WA5ROE, KC5HHI, KE5OG, KD5SEB, KP4FF, KM5VM, N5JOE, NV5S, KD5EIT, KB5SJU & KD5BXC participated. Best 73, Clay, K5TRW.

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Super LOW

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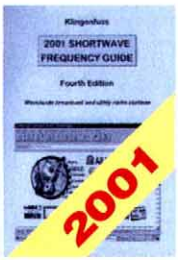


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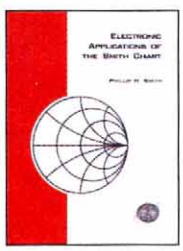


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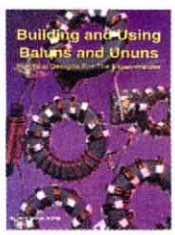


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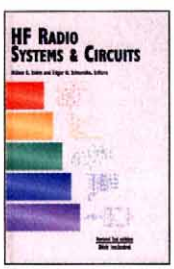


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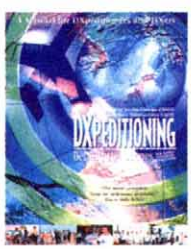


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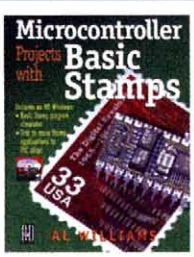


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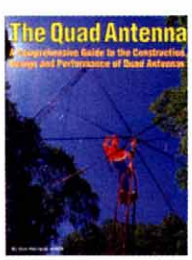


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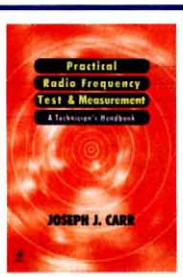


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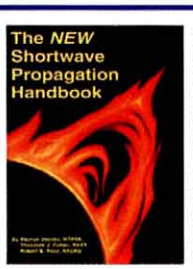


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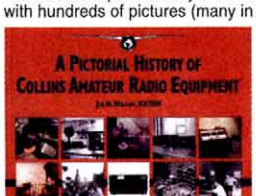


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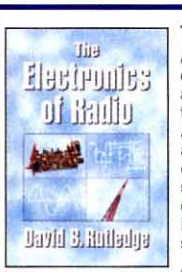


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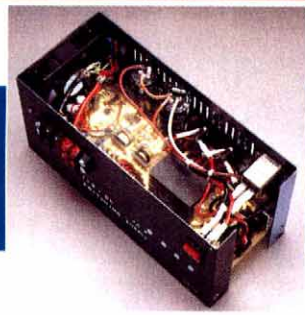

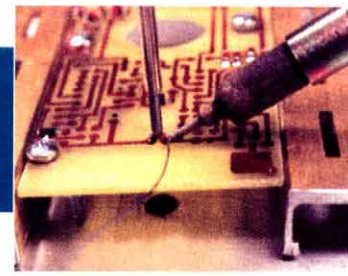

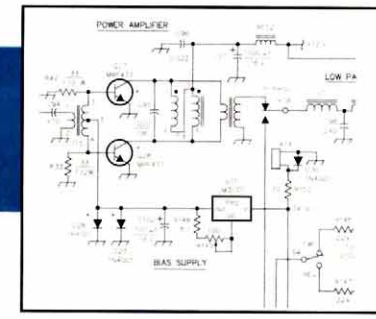


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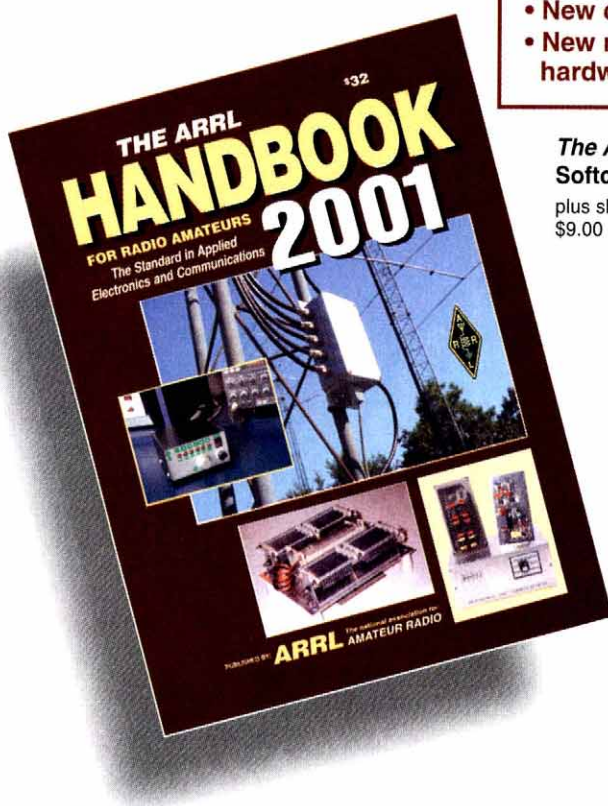


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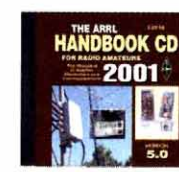


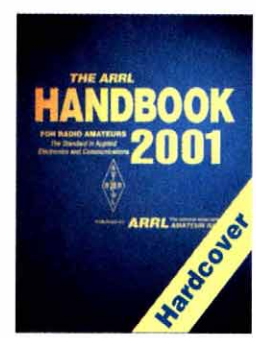


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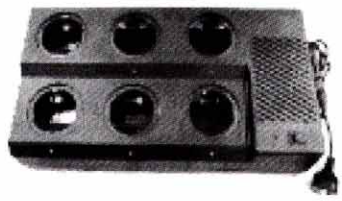

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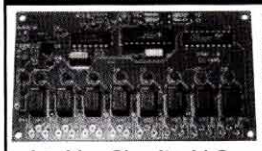

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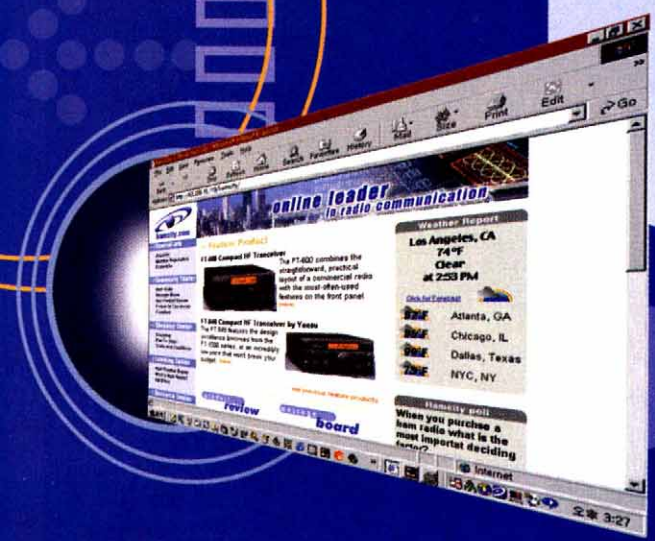


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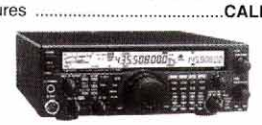

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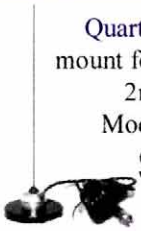

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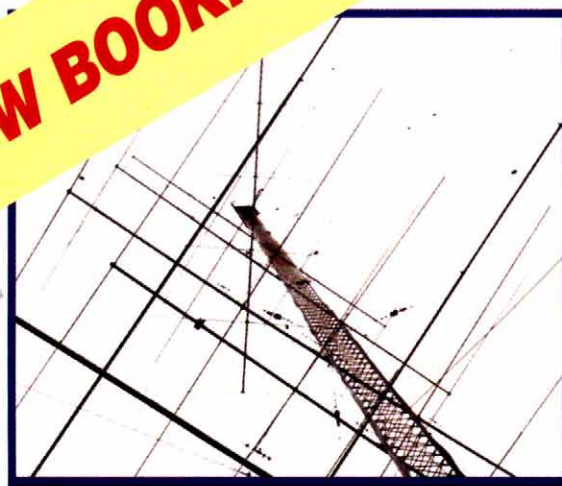

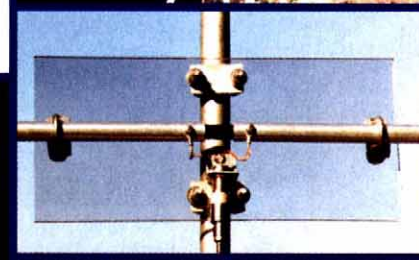

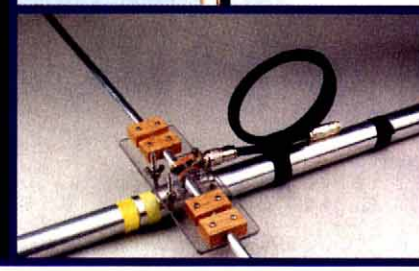

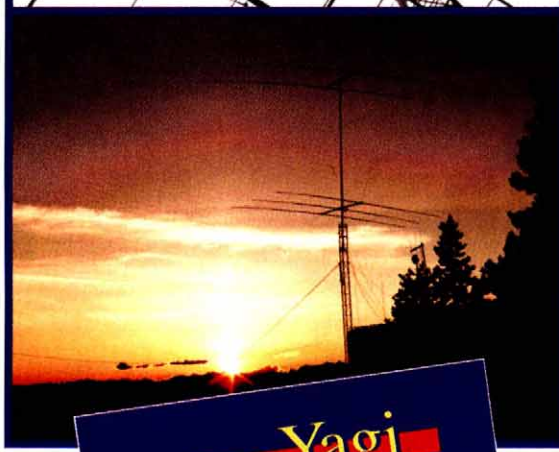

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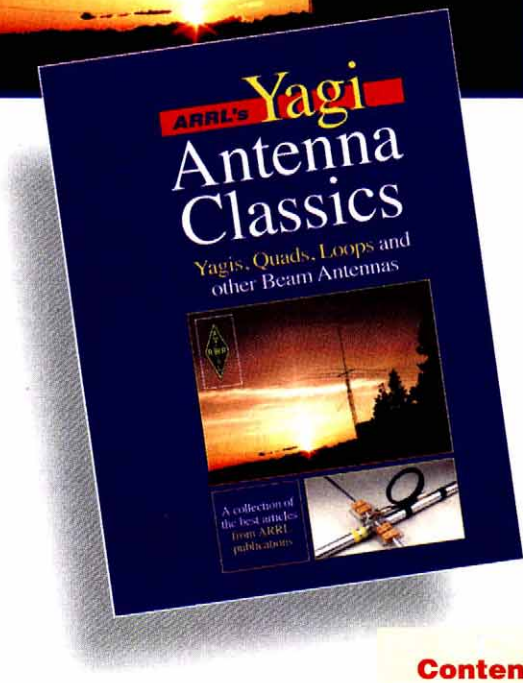


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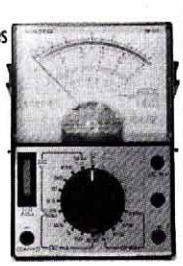

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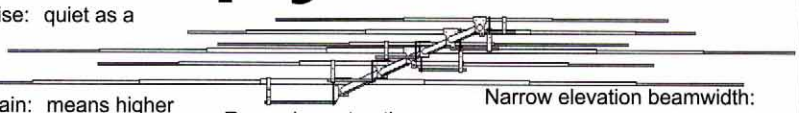

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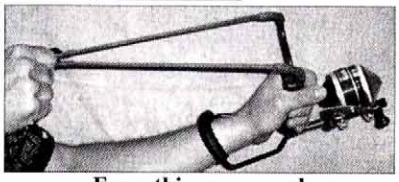

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**RT-11 Autotuner**
Assembled: $209
Kit: $179

**Remote Control**
Assembled: $39
Kit: $29

**Icom/Alinco Cable**
Assembled: $15

**Balun**
Assembled: $30
Kit: $25

**Specifications:**

- Water Resistant Enclosure
- Microprocessor Controlled
- Tunes 1.8 to 54 MHz
- Matches Antenna SWR of 10:1 (3:1 on 6M)
- Tunes in .1 to 5 Seconds (3 Average)
- Case Dimentions: 8.5 x 5 x 3 Inches
- Flange Mounting Brackets
- 5 to 150 Watts
- Optional Remote Control Head
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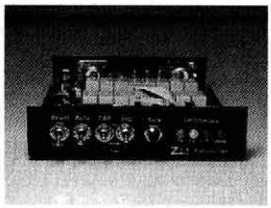
## Z-11 QRP Desktop Autotuner



- Designed just for QRP Operation
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**Remote**
Assembled: $39
Kit: $29

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- 5 to 150 Watts
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The Bearcat 895XLT is superb for intercepting trunked communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: PS001 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; PS002 DC power cord - enables permanent operation from your vehicle's fuse box $14.95; MB001 Mobile mounting bracket $14.95; EX711 External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.

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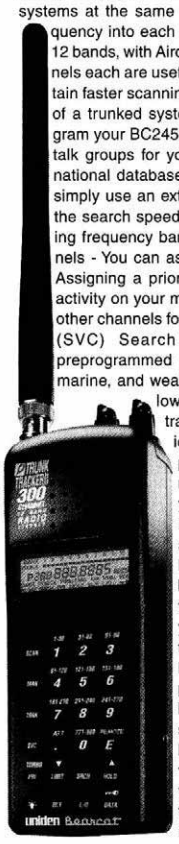

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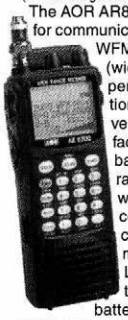

The AOR AR8200 Mark IIB is the ideal handheld radio scanner for communications professionals. It features all mode receive: WFM, NFM, SFM (Super Narrow FM), WAM, AM, NAM (wide, standard, narrow AM), USB, LSB & CW. Super narrow FM plus Wide and Narrow AM in addition to the standard modes. The AR8200 also has a versatile multi-function band scope with save trace facility, twin frequency readout with bar signal meter, battery save feature with battery low legend, separate controls for volume and squelch, arrow four way side rocker with separate main tuning dial, configuarable keypad beep/illumination and LCD contrast, write protect and keypad lock, programmable scan and search including LINK, FREE, DELAY, AUDIO, LEVEL, MODE, computer socket fitted for control, clone and record, Flash-ROM no battery required memory, true carrier re-insertion in SSB modes, RF preselection of mid VHF bands, Detachable MW bar aerial. Tuning steps are programmable in multiples of 50 Hz in all modes, 8.33 KHz airband step correctly supported, Step-adjust, frequency offset, AFC, Noise limited & attenuator, Wide and Narrow AM in addition to the standard modes. For maximum scanning pleasure, you can add one of the following optional slot cards to this scanner: CT8200 CTCSS squelch & search decoder $89.95; EM8200 External 4,000 channel backup memory, 160 search banks. $69.95; RU8200 about 20 seconds chip based recording and playback $69.95; TE8200 256 step tone eliminator $59.95. In addition, two leads are available for use with the option socket. CC8200 PC control lead with CD Rom programming software $109.95; CR8200 tape recording lead $59.95. Includes 4 1,000 mAh AA ni-cad batteries, charger, cigar lead, whip aerial, MW bar antenna, belt hook, strap and one year limited AOR warranty. Enter your order now at http://www.usascan.com.

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- Write articles, book material and papers about RFI
- Develop and maintain a database for tracking and documenting RFI problems

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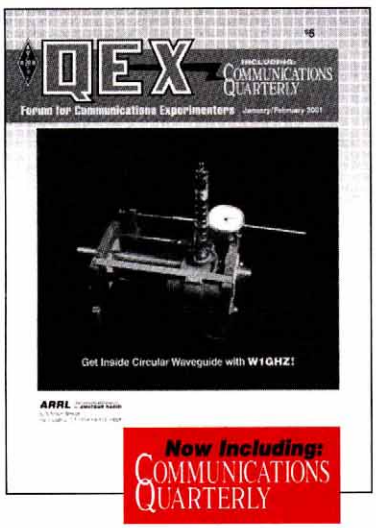


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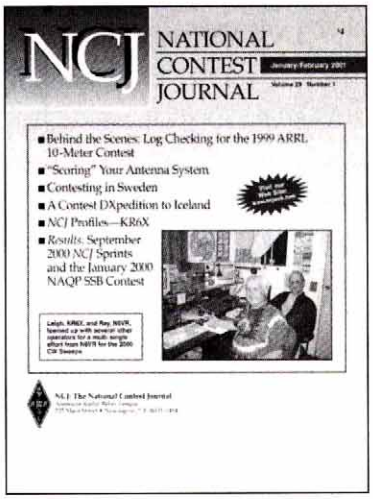


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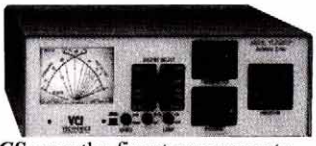

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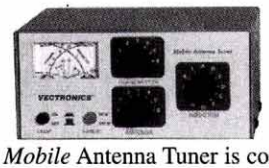

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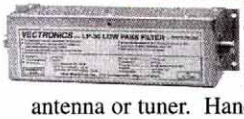

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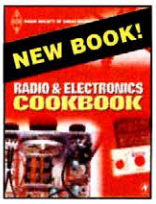


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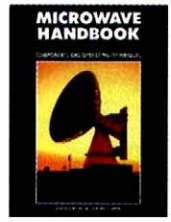


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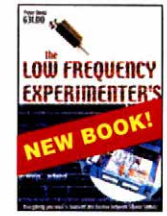


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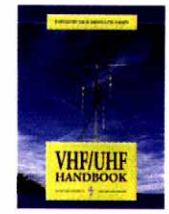


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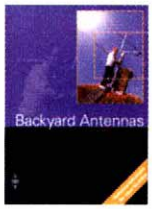


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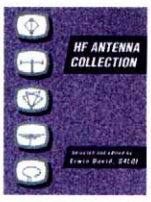


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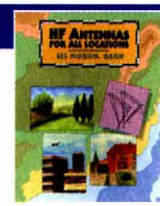


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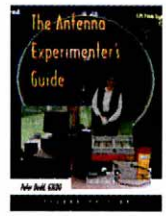


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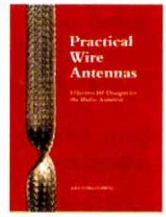


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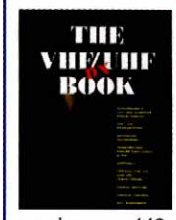


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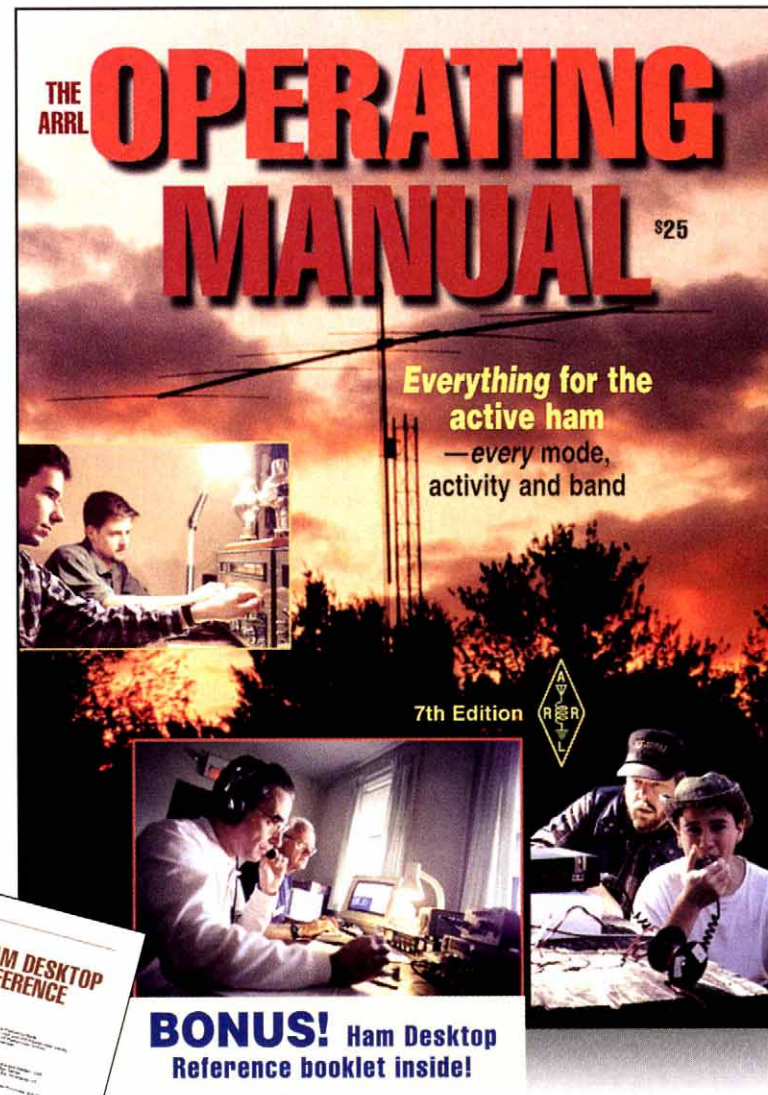


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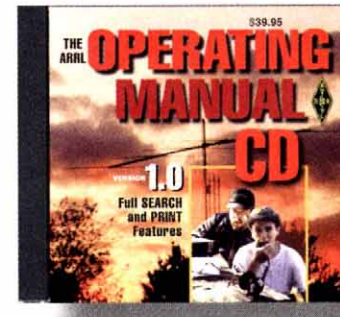


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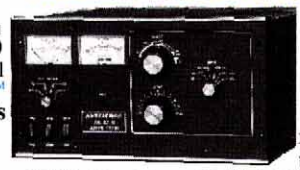

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| T400-80 | 80', 34 square feet | $1939 |
| T500-72 | 72', 45 square feet | $1879 |
| T600-64 | 64', 60 square feet | $1799 |

**Many more Trylon towers in stock!**

## BENCHER / BUTTERNUT

| | |
|---|---|
| Skyhawk, Triband Beam | $1129 |
| HF2V, 2 Band Vertical | $219 |
| HF5B, 5 Band Minibeam | $429 |
| HF6VX, 6 Band Vertical | $299 |
| HF9VX, 9 Band Vertical | $349 |
| A1712, 12/17m Kit | $54 |
| CPK, Counterpoise Kit | $129 |
| RMKII, Roof Mount Kit | $159 |
| STRII, Roof Radial Kit | $125 |
| TBR160S, 160m Kit | $119 |

**More Bencher/Butternut–call**

## M2 VHF/UHF ANTENNAS

**144–148 MHz**

| | |
|---|---|
| 2M4/2M7/2M9 | $89/109/119 |
| 2M12/2M5WL | $149/189 |
| 2M5-440XP, 2m/70cm | $159 |

**420–450 MHz**

| | |
|---|---|
| 440-470-5W/420-450-11 | $129/89 |
| 432-9WL/432-13WL | $169/219 |
| 440-18/440-21ATV | $119/139 |

**Satellite Antennas**

| | |
|---|---|
| 2MCP14/2MCP22 | $169/219 |
| 436CP30/436CP42UG | $219/259 |

## ROHN TOWER

| | |
|---|---|
| 25G/45G/55G | $79/179/229 |
| AS25G/AS455G | $39/89 |
| GA25GD/45/55 | $68/89/115 |
| GAR30/GAS604 | $35/24 |
| SB25G/45/55 | $39/89/109 |
| TB3/TB4 | $85/99 |
| HBX32/HBX40 | $349/439 |
| HBX48/HBX56 | $589/699 |
| HDBX40/HDBX48 | $549/699 |
| BXB5/6/7-8 | $39/49/59/59 |

**Please call for more Rohn prices**

## US TOWER

| | |
|---|---|
| MA40/MA550 | $849/1399 |
| MA770/MA850 | $2359/3649 |
| TMM433SS/HD | $1139/1379 |
| TMM541SS | $1499 |
| TX438/TX455 | $1069/1599 |
| TX472/TX489 | $2649/4599 |
| HDX538/HDX555 | $1379/2399 |
| HDX572MDPL | $6329 |

**Please call for help selecting a US Tower for your needs. Shipped factory direct to save you money!**

## COMET ANTENNAS

| | |
|---|---|
| GP15, 6m/2m/70cm Vertical | $149 |
| GP6, 2m/70cm Vertical | $139 |
| GP9, 2m/70cm Vertical | $179 |
| B10NMO, 2m/70cm Mobile | $36 |
| B20NMO, 2m/70cm Mobile | $49 |
| SBB2NMO, 2m/70cm Mobile | $39 |
| SBB5NMO, 2m/70cm Mobile | $49 |
| SBB7NMO, 2m/70cm Mobile | $75 |
| Z750, 2m/70cm Mobile | $55 |
| Z780, 2m/70cm Mobile | $69 |

**Much more Comet in stock–call**

## M2 ANTENNAS

**50–54 MHz**

| | |
|---|---|
| 6M5X/6M7JHV | $199/239 |
| 6M2WLC/6M2.5WLC | $419/449 |

**10/12/15/17/20m HF**

| | |
|---|---|
| 10M4DX, 4 Element 10m | $379 |
| 12M4DX, 4 Element 12m | $379 |
| 15M4DX, 4 Element 15m | $419 |
| 17M3DX, 3 Element 17m | $379 |
| 20M4DX, 4 Element 20m | $499 |

**More M2 models in stock–please call**

## GLEN MARTIN ENGINEERING

**Hazer Elevators for 25G**

| | |
|---|---|
| H2, Aluminum Hazer, 12 sq ft | $359 |
| H3, Aluminum Hazer, 8 sq ft | $269 |
| H4, HD Steel Hazer, 16 sq ft | $339 |

**Aluminum Roof Towers**

| | |
|---|---|
| RT424, 4 Foot, 6 sq ft | $159 |
| RT832, 8 Foot, 8 sq ft | $229 |
| RT936, 9 Foot, 18 sq ft | $389 |
| RT1832, 17 Foot, 12 sq ft | $499 |

**Please call for Glen Martin info**

## UNIVERSAL ALUMINUM TOWERS

| | |
|---|---|
| **4**-40'/50'/60' | $519/739/1049 |
| **7**-50'/60'/70' | $939/1369/1789 |
| **9**-40'/50'/60' | $729/1049/1469 |
| **12**-30'/40' | $559/869 |
| **15**-40'/50' | $969/1399 |
| **23**-30'/40' | $869/1289 |
| **35**-30'/40' | $979/1509 |

**Bold in part number shows wind-load capacity. Please call for more Universal models. All are shipped factory direct to save you money!**

## DIAMOND ANTENNAS

| | |
|---|---|
| D130J/DPGH62 | $79/139 |
| F22A/F23A | $89/119 |
| NR72BNMO/NR73BNMO | $39/54 |
| NR770HBNMO/NR770RA | $55/49 |
| X200A/X3200A | $129/210 |
| X500HNA/700HNA | $229/369 |
| X510MA/510NA | $189/189 |
| X50A/V2000A | $99/149 |
| CR627B/SG2000HD | $99/79 |
| SG7500NMO/SG7900A | $75/112 |

**More Diamond antennas in stock**

## MFJ ANTENNAS

| | |
|---|---|
| 259B/269 | $219/299 |
| 1798, 80–2m Vertical | $239 |
| 1796, 40/20/15/10/6/2m Vert. | $179 |
| 1793, 80/40/20m Vertical | $159 |
| 1792, 80/40m Vertical | $145 |
| 1788, 40–15m Loop | $399 |
| 1786, 30–10m Loop | $349 |
| 1780, 14–30 MHz Loop | $229 |
| 1768, 2m/70cm Beam | $65 |
| 1762, 3 Element 6m Beam | $65 |

**Big MFJ inventory–please call**

## COAX CABLE

| | |
|---|---|
| RG-213/U, (#8267 Equiv.) | $.36/ft |
| RG-8X, Mini RG-8 Foam | $.19/ft |
| RG-213/U Jumpers | Please Call |
| RG-8X Jumpers | Please Call |

**Please call for more coax/connectors**

## TIMES MICROWAVE LMR® COAX

| | |
|---|---|
| LMR-400 | $.59/ft |
| LMR-400 Ultraflex | $.89/ft |
| LMR-600 | $1.19/ft |
| LMR600 Ultraflex | $1.95/ft |

## TOWER HARDWARE

| | |
|---|---|
| 3/8"EE / EJ Turnbuckle | $10/11 |
| 1/2"x9"EE / EJ Turnbuckle | $15/16 |
| 1/2"x12"EE / EJ Turnbuckle | $17/18 |
| 3/16" / 1/4" Preformed Grips | $4/5 |

**Please call for more hardware items**

## HIGH CARBON STEEL MASTS

| | |
|---|---|
| 5 FTx .12" / .18" | $35/59 |
| 10 FT x .12" / 11 FT x .18" | $65/120 |
| 15 FT x .12" / 17 FT x .18" | $95/180 |
| 20 FT x .12" / 22 FT x .18" | $120/219 |
| 12 FT x .25" / 17 FT x .25" | $189/267 |

## GAP ANTENNAS

| | |
|---|---|
| Challenger DX | $259 |
| Challenger Counterpoise | $25 |
| Challenger Guy Kit | $14 |
| Eagle DX | $269 |
| Eagle Guy Kit | $22 |
| Titan DX | $299 |
| Titan Guy Kit | $22 |
| Voyager DX | $389 |
| Voyager Counterpoise | $49 |
| Voyager Guy Kit | $38 |

**Please Call for Delivery Information**

## LAKEVIEW HAMSTICKS

| | | | |
|---|---|---|---|
| 9106 | 6m | 9115 | 15m | 9130 | 30m |
| 9110 | 10m | 9117 | 17m | 9140 | 40m |
| 9112 | 12m | 9120 | 20m | 9175 | 75m |

**All handle 600W, 7' approximate length, 2:1 typical VSWR ... $24.95**

## HUSTLER ANTENNAS

| | |
|---|---|
| 4BTV/5BTV/6BTV | $129/169/189 |
| G6-270R, 2m/70cm Vertical | $149 |
| G6-144B/G7-144B | $109/159 |

**Hustler Resonators in stock–call**

## ANTENNA ROTATORS

| | |
|---|---|
| M2 OR-2800P | $1095 |
| Yaesu G-450A | $239 |
| Yaesu G-800SA/DXA | $319/399 |
| Yaesu G-1000DXA | $479 |
| Yaesu G-2800SDX | $1069 |
| Yaesu G-550/G-5500 | $289/589 |

## ROTATOR CABLE

| | |
|---|---|
| R51(#20)/R52 (#18) | $.22/.32/ft |
| R61 (#20)/R62 (#18) | $.28/32/ft. |
| R81/82/83/84 | $.25/.39/.52/.85/ft |

## PHILYSTRAN GUY CABLE

| | |
|---|---|
| HPTG1200I | $.39/ft |
| HPTG2100I | $.52/ft |
| PLP2738 Big Grip (2100) | $5.50 |
| HPTG4000I | $.79/ft |
| PLP2739 Big Grip (4000) | $7.65 |
| HPTG6700I | $1.15/ft |
| PLP2755 Big Grip (6700) | $10.95 |
| HPTG11200 | $1.55/ft |
| PLP2558 Big Grip (11200) | $16.50 |

**Please call for more info or help selecting the Phillystran size you need.**

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# HUGE ICOM DEALS ★ HUGE YAESU DEALS

**IC-775 DSP.. New Lower Price!**
The Icom IC-775DSP is a competition class HF transceiver featuring 200 watt RF output, digital signal processing, automatic antenna tuner, true dual RX, CW memory keyer, CTCSS tone encode, twin pass band tuning, dual antenna inputs, 101 memory chanels, built-in power supply, and much more. Supplied with AC power cord.

**PW-1 ..... New Lower Price!**
The Icom PW-1 is a 1000 watt solid state linear amplifier for HF and 6m operation, featuring a high power automatic antenna tuner, built-in power supply, and a removable front control panel, and more.

**IC-746 ..... Icom Special!**
The Icom IC-746 is an all mode transceiver covering HF/6m/2m. The radio features digital signal processing, 100 watt RF output on all bands, twin PBT, a 4.9"multifunction LCD display with band scope, automatic antenna tuner, and more. Supplied with a hand mic and DC power cord.

**IC-756PRO ..... New!**
The Icom IC-756 PRO is an all mode HF/6m transceiver featuring DSP, automatic antenna tuner, 100 watts RF output, digital twin PBT, a 5" multifunction LCD display with band scope function, and more. Supplied with hand mic and DC power cord.

**FT-1000MP Mark-V ..... New!**
The Yaesu FT-1000MP Mark-V is a competition class HF DSP transceiver with auto tuner, 200 Watts RF output, and more!

**FT-1000MP ..Closeout Special!**
Competition class HF DSP transceiver.

**FT-1000D ..... In Stock!**
The FT-1000D is a competition class HF XCVR featuring true dual RX, automatic tuner, 200 watts RF output, and more.

**Quadra System ... Lower Price!**
Solid state 1 kW autotuning amplifier.

**FT-847 ..... Yaesu Special!**
The Yaesu FT-847 is an all mode transceiver covering HF/6m/2m/70cm! The radio is perfect for satellite operation, and features digital signal processing, built-in RS-232 interface, tone encode/decode, and more. Supplied with an up/down microphone and DC power cord.

**FT-920 ..... Yaesu Special!**
The Yaesu FT-920 is an all mode HF/6m transceiver featuring digital signal processing, automatic antenna tuner, CW memory keyer, CTCSS tone encode/decode, 127 memories, and more. Supplied with up/down hand mic and DC power cord.

**IC-706MK2G ..... Icom Special!**
The Icom IC-706MK2G is a compact HF/6m/2m/70cm all mode transceiver with digital signal processing, automatic repeater offset, built-in CW keyer, built-in CTCSS tone encode/decode/scan, 107 memory channels and more. A detachable front panel offers convenient mounting, even in compact vehicles.

**IC-718 ..... New!**
The Icom IC-718 is an all mode HF transceiver featuring a front panel mounted speaker, IF shift, optional DSP module, multiple scanning modes, noise blanker, RIT, and more.

**IC-2800H..... Icom Special!**
The Icom IC-2800H is a 2m/70cm dual band mobile FM transceiver with a 3" color TFT display. The radio features a separate control face, video input, bandscope display, 9600 bps Packet jack, CTCSS tone encode/decode/scan, 232 memories, cross band duplex, and more. With DTMF hand mic, mounting brackets, and power cord.

**IC-2100H ..... Great Low Price!**
The IC-2100H is a rugged 2m mobile XCVR with CTCSS tone encode/decode/scan, DTMF paging/squelch, 113 memory channels, switchable display color and more.

**FT-90R ..... New!**
New ultra-compact 2m/70cm dual band mobile transceiver with detachable control panel, and huge extended RX range.

**FT-2600M .. New Lower Price!**
Rugged 2m mobile with intermod-proof receiver, big display, and an illuminated DTMF mic. Built to MIL-STD 810.

**FT-8100 ..... New Lower Price!**
Great 2m/70cm dual band mobile, 45/35 Watts, removable front panel, and more!

**FT-100D ..... New!**
Ultra-compact all mode XCVR for HF/6m/2m/70cm.Features DSP, CW memory keyer, tone encode/decode, 200 memories, VOX, and more. Supplied with a DTMF hand mic, DC power cord and mounting bracket.

**FT-817 ..... Now In Stock!**
A truly tiny self-contained all mode HF/6m/2m/70cm QRP XCVR featuring DSP, tone encode/decode, 200 memories, VOX, and more! With hand mic, DC cord and bracket.

**IC-W32A ..... New Lower Price!**
**IC-Q7A ..... Icom Special!**
**IC-T7H ..... Icom Special!**
**IC-T81A ..... New QuadBand HT!**
**IC-T2H ..... Amazing Low Price!**
**IC-R3 ..... Video RX, In Stock!**

**IC-207H ..... Great Low Price!**
The Icom IC-207H is a 2m/70cm dual band mobile transceiver featuring CTCSS tone encode/decode, 182 memory channels, removable front control panel, and more. Supplied with a back-lit DTMF hand mic, mounting bracket, and a DC power cord.

**IC-PCR1000 ..... Icom Special!**
**IC-PCR100 ..... Icom Special!**
**IC-R8500 ..... In Stock!**
**IC-R75 ..... New, In Stock!**
**IC-R2 ..... In Stock!**
**IC-R10 ..... Icom Special!**

**G-2800SDX ..... $1069**
Heavy duty antenna rotator handles 34 sq. ft. of antenna load, and features 450° rotation, preset and variable speed.

**G-1000DXA ..... $479**
**G-800SA/DXA ..... $319/399**
**G-450A ..... $239**
**G-5500 ..... $589**
**G-550 ..... $289**

**VX-5R ..... Now In Stock!**
Tiny 6m/2m/70cm triband HT, with CTCSS tone encode/decode/scan, high capacity Lithium-Ion battery pack, extended RX with AM/FM and FW Wide modes, and more.

**FT-50RD ..... Yaesu Special!**
**VX-1R ..... Yaesu Special!**

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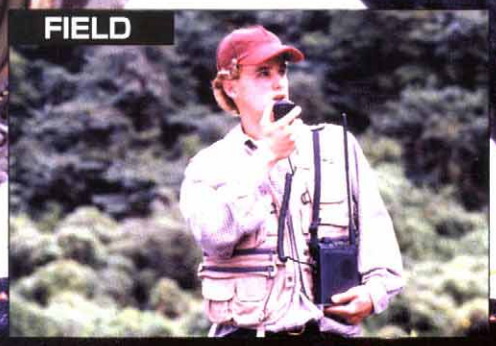
# The Ultimate Backpacker!

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






Actual Size

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

●**ULTRA COMPACT:** Measuring just 5.3" x 1.5" x 6.5" WHD (135 x 38 x 165 mm) and weighing about 2 1/2 pounds (1.17 kg, including the supplied antenna and alkaline cells), the FT-817 is small and light enough to take along wherever you're going.

●**WIDE FREQUENCY COVERAGE:** 160-10 meters on HF, plus the 50, 144, and 430 MHz Amateur bands. Plus FM Broadcast, AM Aircraft, and Public Safety receiver coverage.

●**MULTIMODE DESIGN:** Ready for action on SSB, CW, AM, FM, FM-Wide (Rx), 1200/9600 bps Packet, and Digital, including dedicated USB and LSB PSK-31 configurations.

●**5 WATTS POWER OUTPUT:** Using a new-technology all-band MOS FET power amplifier, the FT-817 provides 5 Watts of power output when using a 13.8 Volt DC source. When using Alkaline batteries or the optional FNB-72 Ni-Cd Battery Pack, power is automatically set to 2.5 Watts; via Menu, this can be changed to 0.5 Watt, 1 Watt, or up to 5 Watts.

●**WIDE CHOICE OF POWER SOURCES:** The FT-817 is equipped with an alkaline "AA" cell battery case, and a 13.8 volt DC cable is also supplied. Available as an option is the FNB-72 Ni-Cd Battery Pack (9.6 V, 1000 mAh), which can be recharged using a 13.8 Volt power supply while the radio is being operated.

●**TWO ANTENNA PORTS:** A "BNC" connector is provided on the front panel, and a type "M" connector on the rear panel, with Menu selection of which connector will be assigned for operation on HF, 50 MHz, 144 MHz, and 430 MHz.

●**OPTIONAL 10-POLE COLLINS MECHANICAL FILTERS:** An optional filter slot is provided, accommodating either the YF-122S (2.3 kHz) SSB filter or the YF-122C(500 Hz) CW filter. You get "base station" performance even from a mountain top.

●**INCREDIBLE MEMORY RESOURCES:** You get a total of 208 memories, including 200 "regular" memories which may be separated into ten groups of up to 20 channels each. And you can append an Alpha-Numeric "Tag" to each memory to aid in channel identification.

●**A CW OPERATOR'S DREAM MACHINE:** You get a built-in Electronic Keyer with adjustable weighting, adjustable CW Pitch, CW Normal/Reverse frequency tuning, and you can even use the microphone's UP and DOWN keys to send CW via the Keyer.

●**BUILT-IN CTCSS AND DCS:** The built-in CTCSS and DCS Encoder/Decoder systems provide you with the versatility you need for repeater access or selective calling.

●**DUAL - COLOR LIQUID CRYSTAL DISPLAY:** Select from Blue or Amber display illumination, which can also be switched off to conserve battery life. And while you're away, the Spectrum Scope will provide you with a visual record of activity ±5 channels from your current operating frequency.

**See the exciting new FT-817 at your Yaesu Dealer's showroom today!**

ALL MODE PORTABLE TRANSCEIVER

# FT-817

HF/50/144/430 MHz Multimode Transceiver

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*Choice of the World's top DX'ers℠*

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# The DXer's Advantage... Packet Cluster Tune




**Brochure & Operators Manual Available at our Website**

## The All New TS-2000 Multi Band/Multi Mode Transceiver

The all new Kenwood **TS-2000** series transceiver offers today's demanding Amateur operator high performance operation without the compromising limitations found in other similar multi-band, multi-mode transceivers. The **TS-2000** offers three distinct operation platforms, the traditional transceiver with full function front panel, or the high-tech looking "silver box" version that allows mobile operation with the new RC-2000 compact control head, or the ARCP-2000 computer control program making the **TS-B2000** functional from your personal computer. The new **TS-2000** offers 100 watts on HF, 6 meters and 2 meters, 50 watts on 70cm, and when you add the optional UT-20 1.2 GHz module at 10 watts, you will have assembled the most advanced dual receiver multi-mode transceiver ever produced. You will be happy to know the **TS-2000** is transverter frequency display function ready to work the latest satellite frequencies available.

IF stage DSP in the main band and AF stage DSP in the sub-band provide unparalleled noise reduction performance. Because the **TS-2000** has a built-in TNC, DX Packet Cluster Tune is available on the sub-band and can automatically shift the desired HF or 6 Meter frequencies direct to the main band for instant contacts. A DXer's dream come true. You will also be sure to enjoy the built-in antenna tuner, 5+1 antenna ports, RS-232 terminal and the world's first HF fully backlighted front control panel.

The **TS-2000** multi-band multi-mode transceiver, the highest performance Amateur Radio ever produced. **Available now.**

KENWOOD
COMMUNICATIONS CORPORATION

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3975 Johns Creek Court, Suwanee, GA 30024
P.O. Box 22745, Long Beach, CA 90801-5745, U.S.A.
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