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QST

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AMATEUR RADIO

August 2000

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...the IC-718 was very easy to operate with a minimum of "manual" intervention.
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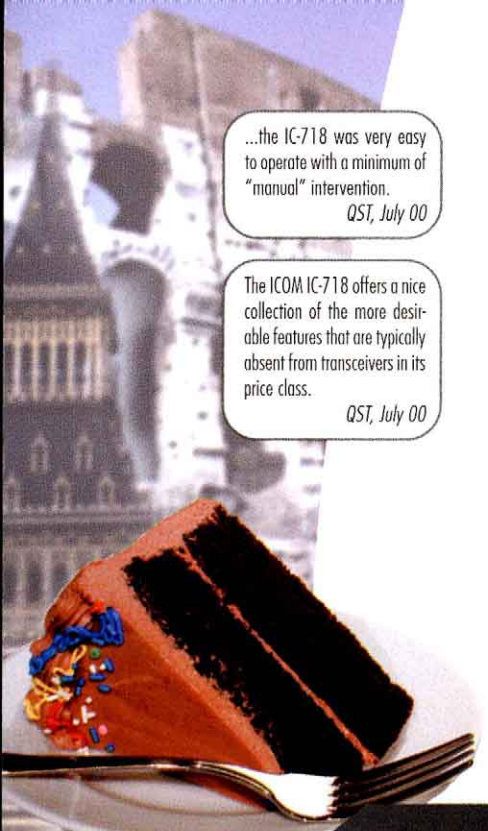

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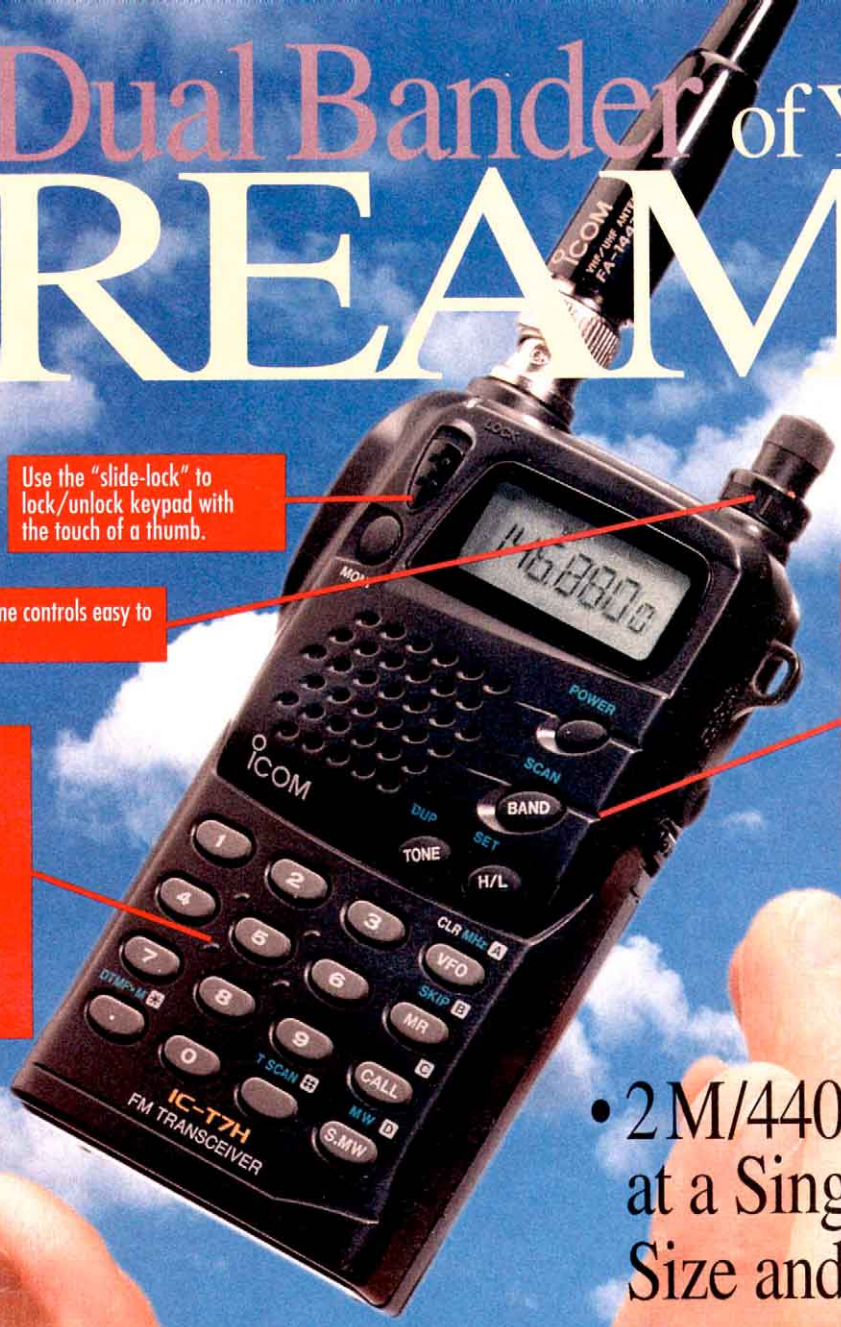

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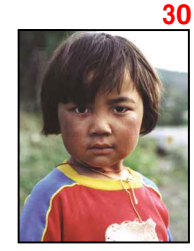

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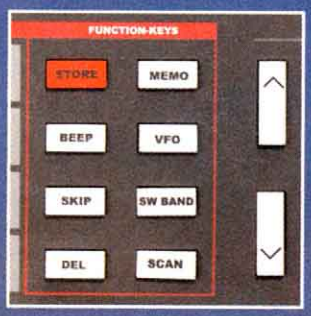

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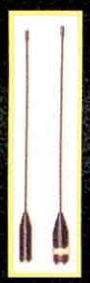

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"IT SEEMS TO US..."

Fixing 40 Meters

As anyone knows who has ever listened to the 40-meter band at night, the upper two-thirds of the band contains broadcasting stations. What are they doing there, in what ought to be a ham band?

As are most stories having to do with international frequency allocations, it's a long one. We may as well begin with the Washington International Radiotelegraph Conference of 1927, the first such conference after the opening of the short waves. At the time the majority of the world's radio amateurs were in the United States, and the backing that they enjoyed from their government was in sharp contrast to the situation in much of the rest of the world. In Chapter 18 of *Two Hundred Meters and Down*, the definitive history of the early years of Amateur Radio, Clinton B. DeSoto recounts in detail how a 300-kHz allocation, 7000-7300 kHz, was won for amateurs worldwide and was successfully defended at the Madrid Conference in 1932.

While amateurs in the Americas have managed to hang onto those 300 kilohertz ever since, we have not been as fortunate in the rest of the world. Our losses there have reduced the utility of the band in this hemisphere as well. The problems began at the Cairo Conference in 1938. Reflecting the rising tensions in Europe and an increasing desire to disseminate propaganda, the Fascist government of Italy proposed reallocating parts of the amateur bands at 7 and 14 MHz for broadcasting. There was enough support for the Italian proposals that the best deal our defenders could make was for shared use of 7200-7300 kHz by amateurs and broadcasting, with broadcasting permitted only outside the Americas.

There were hopes that after World War II the band would be put back into rightful order, but they were dashed by the Cold War. Indeed, the situation became worse at a series of Atlantic City Conferences in 1947. There, the broadcasting band outside the Americas was extended down to 7100 kHz, with 7150-7300 kHz exclusively for broadcasting and 7100-7150 kHz shared between amateurs and broadcasting (the arrangement in a few countries was more generous to amateurs).

At Geneva in 1959, the present allocations table for 7100-7300 kHz – broadcasting in Regions 1 and 3, amateur in Region 2 – was adopted. Twenty years later at WARC-79, despite a US proposal for a worldwide amateur allocation of 6950-7250 kHz, amateurs in Region 2 almost lost our access to 7100-7300 kHz; it took the unanimous support of the countries in the region just to maintain the *status quo*. Our disappointment was assuaged somewhat by the gains we achieved elsewhere in the HF spectrum.

The next international conference to deal with the band was held in Torremolinos, Spain, in 1992. There, the US proposed a worldwide amateur allocation of 6900-7200 kHz as one of a package of proposals for expanded broadcasting bands. In the end, there was insufficient support for broadcasting expansion below 10 MHz to free up the spectrum required for such a realignment. The best that could be accomplished at Torremolinos was the adoption of a recommendation that the alignment of the amateur allocations around 7 MHz be placed on the agenda of a future conference.

Which brings us to Istanbul and WRC-2000. As reported beginning on page 51 this month, WRC-2000 recommended that 7-MHz realignment—"harmonization" was a term often used—be placed on the agenda of WRC-2003. The ITU Council will determine the final agenda, but at this point it is best to assume that the Council will accept this recommendation and to plan accordingly.

The objective of the International Amateur Radio Union (IARU) is unequivocal: "The amateur service seeks an exclusive, worldwide allocation in the vicinity of 7 MHz of no less than 300 kHz." When the allocation was first made in 1927, amateur stations worldwide numbered in the tens of thousands. Now they number in the millions. Broadcasters are fond of speaking of their unfulfilled requirements for spectrum between 4 and 10 MHz, but in this frequency range the amateur service has access *only* to the 40-meter band. The band is essential for disaster communications in the daytime over paths of 300 to 1,000 km and frequently is the only band available for intercontinental communication at night. Fitting the wide and growing variety of amateur uses into the 100 kHz that is clear of broadcasting interference defies rational band planning.

On the other hand, the other HF services are not acknowledging any reduction in their own spectrum requirements. The maritime service has made a major commitment to satellite communication but has not volunteered to vacate HF. Military and disaster relief organizations continue to rely on HF fixed and mobile allocations. The aeronautical service is moving toward greater use of HF for data communication. HF broadcasters are hoping to compete with satellites and the Internet by leapfrogging from the noise and distortion of double-sideband AM to a brave new digital world, and doubtless will argue that they will need more spectrum to accomplish the transition.

Thus, the final gavel at WRC-2000 in Istanbul did not simply mark the end of an important four-week conference. It also marked the beginning of preparations for an even more important one, three years hence. Lest we forget, 40 meters is not the only major agenda item we face at WRC-2003. Among others, we have to defend against Little LEOs and deal with proposals to rewrite Article S25, the section of the Radio Regulations that deals specifically with the amateur and amateur-satellite services.

Achieving the best possible outcome for Amateur Radio at WRC-2003 will require a sustained, coordinated, worldwide effort. It is exactly the sort of mission for which the IARU was created 75 years ago. It is also a perfect example of why the ARRL established the Fund for the Defense of Amateur Radio Frequencies to support spectrum defense, domestically and internationally. Your ARRL membership and your contributions to the Fund are essential elements to our success.
—*David Sumner, K1ZZ*

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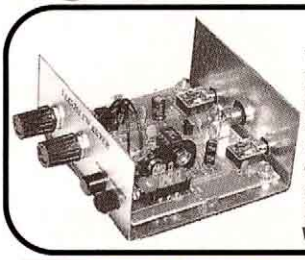

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5 Watt 2 Meter FM transmitter Kit lets you transmit voice and data -- AFSK data (up to 1200 baud) and FSK data (up to 9600 baud). Jumper select reactance or direct FM modulators. Reliable Motorola NBFM transmitter IC and PA transistor. Crystal controlled (x8 frequency multiplication). -60 dBc spurs and harmonics. Use 12-14 VDC, 1.5 amps. 5-pin DIN microphone jack. 1¾x4¾x5¼ in. *Difficult skill level.* Order **VEC-1202K, $99.95.**

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Shortwave Converter Kit converts AM or AM/FM radios to shortwave receivers at a push of a button. Choose two 1 MHz bands between 3 and 22 MHz. Popular 13, 16, 19, 25, 31, 41, 49 and 60 Meters international broadcast bands. On/off bypass, NE-602/612 mixer-oscillator IC and tuned input circuit. Use 9 V battery. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-101K, $27.95.**

Crystal radio set Kit lets you relive the experience of early radio pioneers. This baby really works! Wind your own inductor, wire up the earliest radio circuit without soldering a thing and listen to the magic of radio that needs no power. Put up an antenna, connect a ground. Stations come in amazingly loud and clear. Includes antenna wire, sensitive earphone. 1¾x5x6½ in. *Simple skill level.* Order **VEC-121K, $19.95.**

Shortwave Receiver Kit lets you listen to the world! Covers 75/80, 49, 40, 30, 31, 20, 25, 22, 19, 17, 16, 15 and 13 Meter bands. Explore AM, SSB, CW, WWV, RTTY and Packet signals. Vernier reduction drive, smooth regeneration control, RF stage. *Includes all metal cabinet.* 2 earphone jacks. Use 9V battery. 2½x7x6 in. *Intermediate skill level.* **VEC-102K, $59.95.**

QRP Transceiver Kits for 80/40/30/20 Meters

Great introduction to QRP, the hottest and fastest growing activities in ham radio. With this tiny *transceiver*, you'll discover what thousands of QRP enthusiasts already know -- you don't need a $1000 radio to get on the air and communicate worldwide. All it takes is some simple circuitry using less energy than a pen-light bulb! You get VXO frequency control, broad-banded transmitter circuitry, solid one Watt plus output, shaped keying, .3 uV sensitivity, direct conversion receiver. Includes crystal for popular QRP calling frequency. 1¾x4¾x5¼ in. *Intermediate skill level.* Order **VEC-1380K** (80 Meters), **VEC-1340K** (40 Meters), **VEC-1330K** (30 Meters), **VEC-1320K** (20 Meters) **$59.95 each.**

New!

Super CW Audio Filter Kit gives you three bandwidths: 80, 110, 180 Hz. Eight poles gives super steep skirts with no ringing. Pull CW QSOs out of terrible QRM! Plugs into phone jack to drive phones. QRM down 60 dB one octave from center frequency (750 Hz) for 80 Hz bandwidth. Improves S/N ratio 15 dB. Use 9V battery. 1¾x4x 3½ in. *Simple skill level.* Order **VEC-820K, $19.95.**

AM Radio Transmitter Kit lets you set up your own AM station and broadcast crystal clear programming from your studio with *you* as the disc jockey or talk show host. Play music from CD player, tape deck or other source. Choose clear frequency from 530-1750 KHz. Standard line level or microphone input. Easy CD, tape deck or mike mixers connect. Audio level adjustment. 1¾x4x3½ inches. *Simple skill level.* Order **VEC-1290K, $29.95.**

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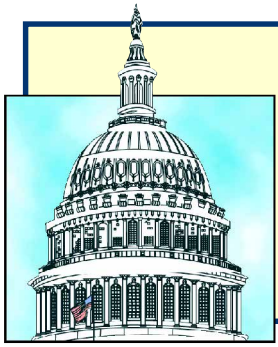

DC Currents

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.

Dog Days Descend as Lawmakers Sweat Out Final Days of 106th Congress

The 106th Congress is scheduled to adjourn early in October, and lawmakers have scrambled through the hot summer months to complete essential appropriations legislation that will keep the country running through the next budget cycle.

The good news is, it appears likely that they will be able to wrap up the 13 major appropriations bills without a major legislative bloodbath. The bad news is, that accomplishment may come at the expense of other legislation that is still hanging fire, including the House and Senate versions of the Amateur Radio Spectrum Protection Act. Indeed, the only telecommunications legislation that seems to be getting any attention involves Internet issues like digital signatures, online prescriptions and online gambling.

While the introduction of S.2183, the Senate companion bill to HR.783, by Senator Michael Crapo (R-ID), improves the prospects for action on this legislation, it becomes increasingly likely that, if any movement is to occur, it will be in the final hours of the Congress. One positive sign that this might still occur is the decision of Senator Conrad Burns (R-MT) to sign on as a cosponsor to the Amateur Radio Spectrum Protection Act. Senator Burns is Chairman of the influential Senate Telecommunications Subcommittee, which is the committee that must first vote on the bill. In addition to Senators Crapo and Burns, other Senate cosponsors (in order of sign-on) include Senators Daniel Akaka (D-HI); Susan Collins (R-ME); Blanche Lincoln (D-AR); Olympia Snowe (R-ME); Bob Smith (R-NH); Larry Craig (R-ID); Jesse Helms (R-NC); Ron Wyden (D-OR) and Rod Grams (R-MN).

In the House, the rapid accumulation of cosponsors had slowed to a trickle in late spring, when Representatives Brad Sherman (D-CA-24th); Bob Riley (R-AL-3rd); James P. McGovern (D-MA-3rd); Bob Clement (D-TN-5th); Mark Foley (R-FL-16th); Amo Houghton (R-NY-31st) and Jim Ramstad (R-MN-3rd) signed on. However, action picked up in June with the addition of Representatives John Conyers (D-MI-14th), Bill Pascrell (D-NJ-8th), John T. Doolittle (R-CA-4th) and Rick Hill (R-MT-at large) The current cosponsor total for HR.783 was 158 when we went to press. ARRL members still wishing to write to their Representatives and Senators may find a sample letter and other information on the ARRL's Web site at **http://www.arrl.org/govrelations/hr783.html**.

Low Power FM Broadcast Service Continues to Divide Lawmakers

● Even as Congress continues to slog forward on legislation to thwart the FCC's efforts to create a new Low Power Broadcasting service, a public relations effort to create public awareness and approval of the service has been launched by a broad coalition of supporters, including politicians, radio enthusiasts and community and civic organizations. The "Low Power Radio Coalition" announced its efforts at a Capitol Hill press event in June. Members include church groups such as the United States Catholic Conference, and local government groups such as the National League of Cities and the United States Conference of Mayors.

The so-called "micro radio" service, which would allow the creation of low power licenses for broadcasting on unused segments of the FM broadcast band, was the brainchild of FCC Chairman Bill Kennard. His proposal was intended to benefit churches, schools, PTAs and other community groups, particularly in areas where existing commercial radio was not addressing their needs. The licenses would be of two kinds: 50-100 W in a service radius of 3.5 miles and 1-10 W in a service radius of 1-2 miles.

From its inception the idea was fiercely opposed by the National Association of Broadcasters, which charged that the new service would create an unacceptable amount of interference to existing broadcast licensees. Hearings on the issue generated charges and counter charges on how much interference might really be created, and focussed on the veracity and scientific integrity of the various engineering groups called in to testify on behalf of, or in opposition to, the concept. Ultimately, legislation emerged in the House that would have killed the idea. However, that bill was eventually watered-down to allow some micro radio stations to be licensed after a testing period to determine whether low power signals would bleed onto nearby commercial broadcast signals. That bill passed the House and is awaiting action in the Senate, where similar compromise legislation has also been introduced.

To date, the FCC has received more than 700 license applications for the new service.

FCC Releases "Plain English" Guide on Antenna Emissions

♦ The Federal Communications Commission and the Local and State Government Advisory Committee have released a handbook to help local governments and citizens understand FCC safety rules on RF exposure from antennas. The handbook, entitled "A Local Government Official's Guide to RF Emission Antenna Safety: Rules, Procedures and Practical Guidance," can be downloaded from the FCC Web site at: **http://www.fcc.gov/oet/rfsafety**.

The handbook explains RF exposure limits and how they are derived, and where various RF-producing services fit into the spectrum. While the booklet is intended primarily to bring local officials up to speed on cellular and broadband PCS facilities and does not specifically address Amateur Radio issues, it might be of interest to hams who are involved in discussions with local officials on their own antenna installations. It may also be worthwhile reading for those who simply have an interest in the issue of RF exposure.

Internet Issues Find New Forum on Capitol Hill

♦ When the Internet moved out of the House and Senate Commerce Committees and into hearings before the Joint Economic Committee, a new batch of House and Senate lawmakers heard a variety of witnesses describe the extraordinary growth and influence of the new "digital economy." Among the heavyweights offering testimony at a hearing on "Barriers to the New Economy" were Andrew Grove, Chairman of Intel, Bill Gates, Chairman of Microsoft and a host of lesser, if no less interesting, digital gurus.

While Gates focussed largely on the links between the emerging Internet-based economy and America's educational system, Grove noted the interrelationships between "digitization" and "globalization" while also agreeing with Gates' contention that it was in America's economic interest to make building "world class" math and science education a national priority.

William Larson, Chairman of Network Associates, told lawmakers that one of the most crucial barriers to the new economy is lack of security on the Internet. Larson, whose company provides a number of virus protection, security and encryption tools, called for policies that would encourage research funding in areas of advanced security and to better educate the public on data security risks.

Dr. John Warnock, Chairman of Adobe Systems, described software piracy as the biggest threat. Warnock warned that an "anti-copyright/anti-patent" sentiment seems to be growing in the US—as evidenced by widespread copying and trading of copyrighted music online—that ultimately may thwart the new economy unless Congress strengthens intellectual property laws.

In perhaps the most stimulating testimony of the day, Jay Walker, Chairman of Walker Digital, traced the development of networks of all kinds, from the early days of the railroad and telegraph lines to the electrical distribution, telephone and now the "information network." Walker's testimony concurred with that of Warnock, that intellectual property issues, and particularly the role of the copyright office in protecting new developments, was a critical component of the new economy.

FCC Looks to the Future for Spectrum Availability and Efficiency

The FCC has begun to take an in-depth look at the issues of radio spectrum availability and efficiency. Some of what the Commission is looking at suggests radically new ways of allocating access to the spectrum.

The most revolutionary idea may be that of a secondary spectrum market similar to the way other commodities are traded.

FCC Chairman Kennard has called for "an aggressive program to avert a spectrum drought at a time when the promise of wireless data is greatest." Kennard said that spectrum ought to be treated like other commodities, and that the FCC should encourage technologies that are presumed to promote greater spectrum efficiency such as ultra-wideband and software-defined radios.

According to a news release issued by the FCC, Kennard has said that, "there is no inherent reason why a spot market for wireless bandwidth cannot develop, just like the ones for petroleum and pork bellies and T1 lines." Kennard first introduced the idea some months ago at a convention of the Cellular Telecommunications Industry Association (CTIA), but it has yet to be enthusiastically embraced by any large commercial interests.

Even so, Kennard's idea is not just talk; the FCC has held a public forum for "Facilitating Secondary Markets in Spectrum." Witnesses included experts from Nextel Communications, Rural Telecommunications Group (RTG), Williams Communications, UK Radiocommunications Agency, the American Enterprise Institute, Motorola Corporation and Mitre Corporation.

Morgan O'Brien, Vice Chairman of Nextel, suggested that the rules on spectrum licensing actually could be changed to allow companies to buy, trade or manage licensed spectrum without necessarily going through a government agency to do so. This would be similar in concept to the ways that other forms of property are now bought and sold. The idea could particularly benefit rural areas that lack effective telecommunication services, said Caressa Bennet, Counsel for RTG.

As part of its efforts to overhaul the system of spectrum management, the FCC has announced rulemakings on uses of ultra-wideband technology and for software defined radio.

According to the Commission, the ultra-wideband proposal could pave the way for a number of new technologies including radar imaging of buried objects, as well as high speed wireless data transmissions that could facilitate portable wireless Internet access. In addition, ultra-wideband technology is seen as a boon to secure communications for police, fire and rescue services, as well as wireless distribution of consumer services such as phone, cable and computer networking within homes and office buildings.

The software defined radio proposal could usher in a new generation of multi-purpose devices that could incorporate cellular, PCS and other wireless services in a single box. The Commisssion's Notice of Inquiry specifically asks for comments about how the concept might result in increased spectrum efficiency and sharing.

Media Hits

- When the movie *Frequency* opened in late April, clubs throughout the US held demonstrations at their local theaters to promote ham radio to movie-goers. Members of the Golden Triangle Amateur Radio Club got a nice write up on their efforts in *The Californian*, of Temecula, California. Club member Norb Dean, AD6F, said "You can't travel back in time, but you can talk to people all over the world."
- Southern Florida PIC Sherri Brower's, W4STB, "pitch" to the *Press Journal* in Vero Beach, Florida garnered a nice feature article on emergency preparedness and public service activities. The article detailed several local emergencies in which hams were active and quoted emergency management officials from area counties who called area ham radio networks "invaluable."
- PIO Mark Conklin, N7XYO, reported good press for SKYWARN and the Tulsa Repeater Organization (TRO). TRO's spring severe weather activities, including a storm spotting class, were featured in five area newspapers, including the *Tulsa Business Journal.*
- *The News Tribune* of Tacoma, Washington ran a full page article (including photos) on the Radio Club of Tacoma, a group in existence since 1916. The story offered a nice mix of nostalgia, information on restructuring, emergency communications and the "magic" of Amateur Radio. Club members Jerry Seligman, W7BUN, and Dick Ryan, W7RGD, were interviewed.
- School may be out for summer, but Jerry Ash, N1DGC, of Natick, Massachusetts is ready for his work with the Natick High School Amateur Radio club in the fall. Ash founded the school club in 1985 and has been sharing his passion for radio with students ever since. A story about Ash and his interest in sharing Amateur Radio with young people ran the local *Metrowest Daily News*.
- The *Journal North* of Santa Fe covered Amateur Radio's role during the Los Alamos fires in May. SM Joe Knight, W5PDY, and Ken Jones, KC5QZ, both of whom offered communication assistance during the emergency, were interviewed.

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

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

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

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

Call your dealer for your best price!

Rotator Specifications	T2X	HAM-IV	CD-45II	AR-40
Wind Load capacity (inside tower)	20 sq. ft.	15 sq. ft.	8.5 sq. ft.	3.0 sq. ft.
Wind Load (with mast adapter)	10 sq. ft.	7.5 sq. ft.	5.0 sq. ft.	1.5 sq. ft.
Turning Power (in pounds)	1000	800	600	350
Brake Power (in pounds)	9000	5000	800	450
Brake Construction	Electric wedge	Electric wedge	Disc brake	Disc brake
Bearing Assembly/How many	Tripl race/138	Dual Race/96	Dual race/48	Dual race/12
Mounting Hardware	Clamp plate	Clamp plate	Clamp plate	Clamp plate
Control Cable Conductors	8	8	8	5
Shipping Weight (pounds)	28	24	22	14
Effective Moment (in tower)	3400 ft/lbs.	2800 ft/lbs.	1200 ft/lbs.	300 ft/lbs.

HAM IV

$529.95

Suggested Retail

T-2X

$619.95

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CD-45II

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AR-40

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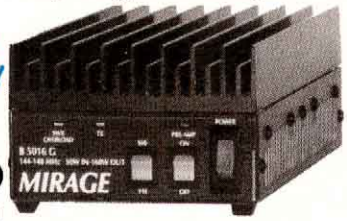

B-5016-G
$299
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The MIRAGE B-5016-G gives you 160 Watts of brute power for 50 Watts input on all modes -- FM, SSB, or CW!

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

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

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

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

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

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

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

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

Power Curve -- *typical B-5016-G output power*								
Watts Out	*130*	*135*	*140*	*145*	*150*	*155*	*160*	*165*
Watts In	*20*	*25*	*30*	*35*	*40*	*45*	*50*	*55*

More 160 Watt, 2 Meter Amplifiers . . .

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

B-1016-G, $379. MIRAGE's most popular *dual purpose* HT or mobile/base amplifier. 160 Watts out for 10 Watts in. For 0.2-15 Watt transceivers.

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

B-215-G, $379. MIRAGE's most popular *handheld* amp. 150 Watts out with 2 watts in; 160 watts out with 3½ Watts in. For 0.25 to 5 Watt handhelds radios.

100 Watts for 2 Meter HTs

B-310-G
$199
Suggested Retail
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Power Curve -- *typical B-5016-G output power*								
Watts Out	*25*	*50*	*75*	*95*	*100*	*100*	*100*	*100*
Watts In	*¼*	*½*	*1*	*2*	*4*	*6*	*7*	*8*

- ***100 Watts out with all handhelds up to 8 Watts***
- ***All modes: FM, SSB, CW***
- ***Great for ICOM IC-706***
- ***15 dB low noise GaAsFET preamp***
- ***Reverse polarity protection***
- ***SWR Protection***
- ***FREE mobile bracket***
- ***Auto T/R Switch***
- ***FREE handheld BNC to B-310-G patch cable***
- ***Ultra-compact 4³/x1³/x7¾ inches, 2½ pounds***
- ***One year MIRAGE warranty***

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

35 Watts for 2 Meter HTs

B-34-G
$89.95
Suggested Retail

Power Curve -- *typical B-5016-G output power*							
Watts Out	*18*	*30*	*33*	*35*	*35*	*35*	*35+*
Watts In	*1*	*2*	*3*	*4*	*5*	*6*	*8*

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

MIRAGE RUGGED!

35 Watts, FM only . . . $69.95

B-34, $69.95. 35 Watts out for 2 Watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3½x1¾x4¼ inches.

MIRAGE Dual Band 144/440 MHz Amp

BD-35
$159.95
Suggested Retail

Power Curve -- *typical B-5016-G output power*								
Watts Out 2 Meters	*30*	*40*	*45*	*45*	*45*	*45*	*45+*
Watts Out 440 MHz	*16*	*26*	*32*	*35*	*35*	*35*	*35+*
Watts In	*1*	*2*	*3*	*4*	*5*	*6*	*7*

- ***45 Watts on 2 Meters/35 Watts on 440 MHz***
- ***Auto Band Selection***
- ***Auto T/R Switch***
- ***Full Duplex Operation***
- ***5x1³/x5 inches***
- ***FREE mobile bracket***
- ***"On Air" LEDs***
- ***Single Connector for dual band radios and antennas***
- ***Reverse polarity protection***
- ***Works with all FM handhelds to 7 Watts***
- ***One year MIRAGE warranty***

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

6 Meter Amplifier

FCC Type Accepted

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

70 cm Amplifiers (420-450 MHz)

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

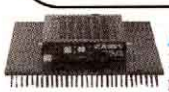
Amateur TV Amps

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

Remote Control Head for Amps

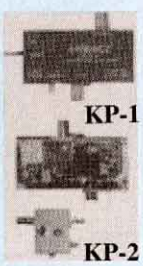
RC-1, $45, remote controls most MIRAGE amps. Check with Mirage for compatibility. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). Tiny 1¾x3¾x2½ inches.

Repeater Amps



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

Low noise GaAsFET preamps



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

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

Frequency (MHz)	*In Shack $139*	*Mast Mount $195*
28-30	KP-1/10M	KP-2/10M
50-54	KP-1/6M	KP-2/6M
144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

1¼ Meter Amps (223-225 MHz)

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

Commercial Amps ($199 to $395)

FCC Type Accepted

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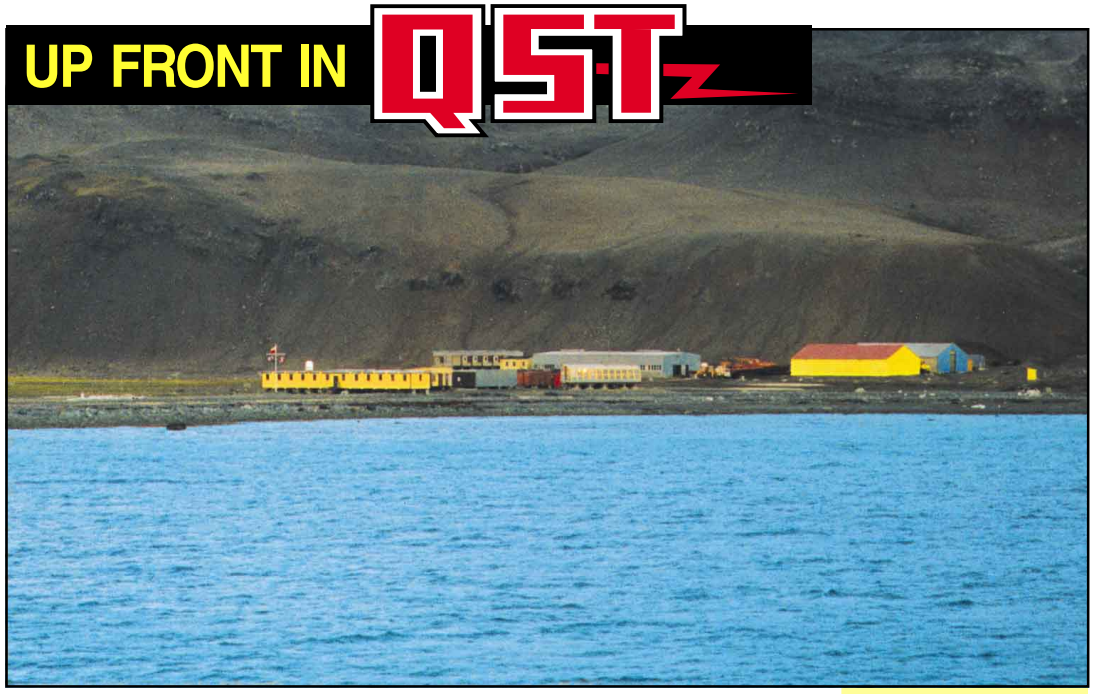
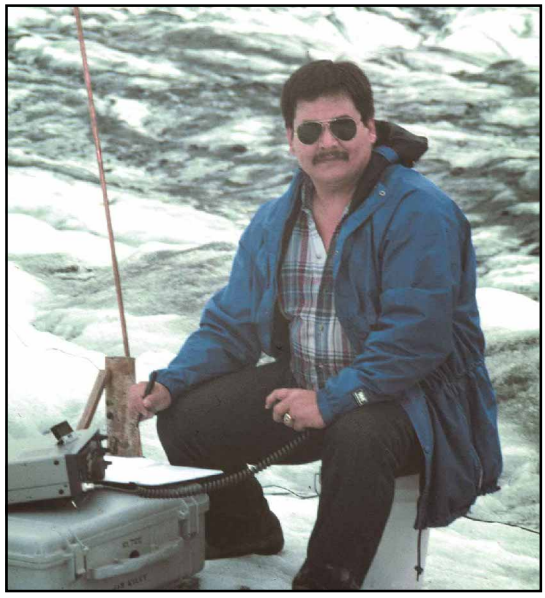
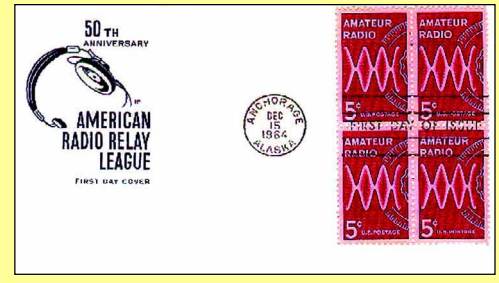


HF0POL—Polish Antarctic Research Station, South Shetland Islands. While on an expedition to Antarctica early this year, Tom, W9AEB (below), had an opportunity to visit the Polish research facility at Arctowski. Marek, SP3GVX (below, left), the chief radio operator, greeted Tom like an old friend. They spent hours discussing Amateur Radio and Marek showed him how easy it was to generate a pileup on the air by signing HF0POL. Marek will be at the station through December and is active on all bands. His QSL manager is SP3WVL.

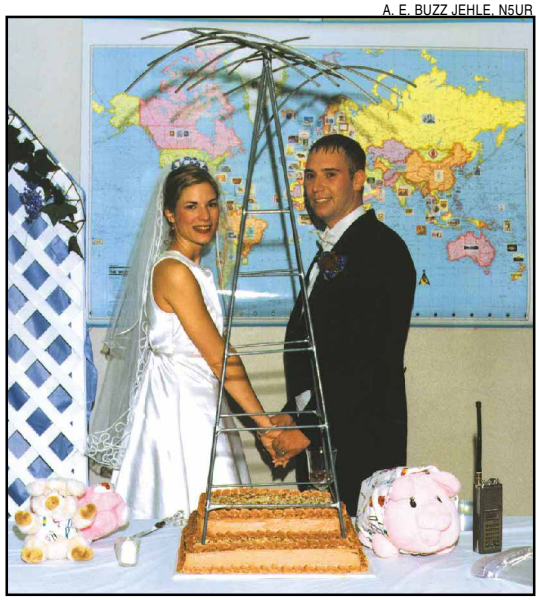


As long as we're showing photographs of chilly places... Randy, AL7PJ and John, KL7JR, trekked out to Alaska's Matanuska Glacier in September 1999 for what may be one of the first Amateur Radio glacier DXpeditions. In this photo Randy is shown working 20-meter phone. The duo contacted a number of stations, including more than 6 DXCC entities, despite poor propagation conditions.



This is only one of more than 120 Amateur Radio first-day covers in the possession of Gary Flechtner, WJ8C. The one shown here is dated December 15, 1964 and celebrates the 50th anniversary of the ARRL. Gary also has about 100 international ham covers. You can see many more at Gary's home page on the Web at: **http://www.bright.net/~wj8c**.

A. E. BUZZ JEHLE, N5UR



Has this cake been evaluated for RF safety? When Mike, AB5EB, married Jennifer last year, his buddies made the special "bachelor cake" shown here. Mike is an avid DXer and Islands on the Air hunter—when he isn't studying for his medical degree, or paying attention to his new wife, or…

How long is the coax between your mobile antenna and your radio? In this case, try 65 feet! When Terry, W8FK, embarked on his cross-country journey with a U-Haul truck towing a beautifully restored '59 Chevy pickup, he missed having Amateur Radio along for the ride. So, during a stop at the home of Skip, W9GYA, in Salida, Colorado, he decided that it was time to devise a solution. Skip helped Terry attach a Bugcatcher mobile antenna to the Chevy, and assisted with the task of routing the long piece of coax into the cab of the U-Haul. The antenna system worked perfectly. In fact, Skip and Terry maintained regular contacts through the rest of Terry's trip.

Boom box! Ocean County New Jersey ARES Emergency Coordinator, Bob, WX2NJ, needed to find an easy way to "mobilize" a long-haul 2-meter transceiver so that it could function as a portable station at a Red Cross shelter or anywhere else. The result is the magnificent "boom box" you see here. The box is complete with 36 A/h gel cells for portable operation and a 13-A switching power supply for times when ac power is available. But wait! There's more! The box also includes a battery charger, battery status display, cooling fans, headphone jacks and ample storage space. More photos and a schematic diagram can be seen on line at: **http://www.members.aol.com/wx2nj/aresbox.html**.

Nine radio astronomers—all hams. The town of Kotzing, Germany was host to a large gathering of radio astronomers last February. It's no surprise that such a meeting would attract a number of amateurs. From left to right: 7M1EPR; WA4BQM; N1DQR/VE2; N3HXQ; W3IWI; ZS6WLC; KL7RA; W8MIF and K1BK.

I won't work DX without my fez on! Last year Rick, NE8Z/HC1MD (third from left), operated as EA9/NE8Z from Ceuta and took a tour of northern Morocco. Pictured with Rick are Pedro, EA9PD (left), Rick's wife Maria, HC1MM, and Javier, EA9PB.

Can I get a witness? South Carolina Governor Jim Hodges (seated) signed a proclamation declaring June 19-25, 2000 as Amateur Radio Week. Witnesses for the auspicious event included: (front row, left to right) Art Patterson, KE4EAN; Isaac James, N4BMW; Patricia Hensley, N4ROS (ARRL South Carolina Section Manager); Mary Favaro, AE4BX; Will Lemmon, AF4QR; (back row, left to right) Gerald Hensley, K8AFP (Section Emergency Coordinator); Bernard Rogers, AF4IB; Matt McGuire, KF4AIT; David Jennings, AI4CC and Kenneth Bible, KB4QHJ.

Another Tuna Tin aficionado. Socrates is the companion of Jerry, W0PWE. When Jerry read about the W1FB Tuna Tin transmitter revival by Ed Hare, W1RFI, in the March 2000 *QST*, he was compelled to build one. He gathered all the parts, including the requisite tuna can. After Socrates helpfully consumed the contents of the can, Jerry successfully created his own Tuna Tin rig. No doubt Socrates will take greater interest in Jerry's future homebrew projects!

George, KC5RCC, isn't a radio astronomer, but he can sure pick an impressive operating location! George operated HF mobile with his screwdriver antenna while parked beside one of the antennas that make up the Very Large Array near Socorro, New Mexico. Which antenna do you suppose has the greater gain?

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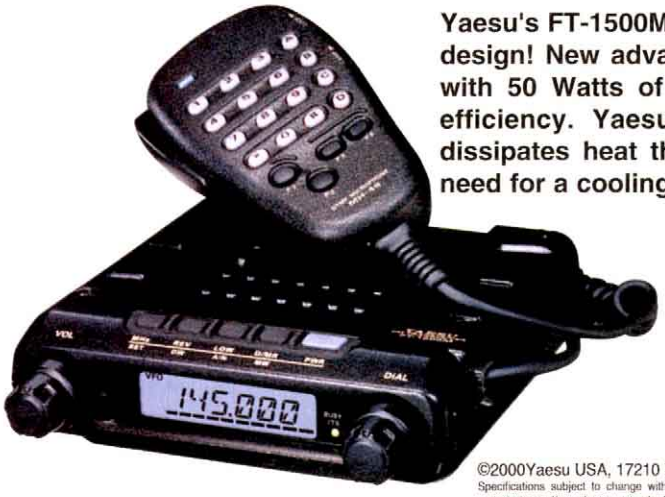

Yaesu's FT-1500M represents a technological breakthrough in radio transceiver design! New advances in power amplifier technology combine to provide you with 50 Watts of clean transmit power with enhanced current consumption efficiency. Yaesu's patent pending aluminum die-cast shell construction dissipates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

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WHERE ARE THE BARBARIANS?

♦ As an Official Observer I have spent a lot more time monitoring the HF bands since April 15 and I'm wondering if I'll soon be out of a job. I am hard pressed to find the poor operators I once found so easy to locate. Everywhere I go on the bands I find courtesy, good operating habits and sober operators. What happened to the LIDs, bigots and racists? Weren't we supposed to be overrun by these miscreants after April 15?

I know I'll spend more time below 50 MHz with the current crop of hams—many of them new to HF. I have been so reluctant to work the HF bands because of the poor operators, but they seem to have vanished for the most part.

Restructuring is just what the doctor should have ordered a long time ago. With so many hams discovering the pleasures of HF operating, and so many new hams joining our ranks, it will be a little tougher for the commercial interests to convince Congress that the amateur frequencies are under used.—*Bob Bailey, KA0MR, Moundridge, Kansas*

THOUGHTS ON 146.52 MHZ

♦ I read with interest the letter by Bill Andress, KC5HVV, in the May *QST* ("Highway Information Frequency?"). I just wanted to let everyone know that some of us are monitoring 146.52 MHz simplex for emergency and motorist assistance calls.

I'm usually on .52 when I'm at home or in my local travel area for several reasons. My wife, Pam, N3XFL, works within a few miles of our home, and her travel time is less than the wait for a chance to check into the commuter net on the local repeater. If she wants to call me, or I want to call her, we need a quiet channel. I work out of an office in my home, so after she gets to work I just leave the radio on the calling channel and monitor for transient motorists who need help and don't have the phone patch codes for the repeaters. There isn't much of that with so many cell phones around, but I'll be there when the need arises. If I'm traveling out of town, I can tell Pam which repeater to contact me on based on the direction I'm going. If I need to call 911, or make a personal phone patch from the car, I select a repeater which will connect me to the correct county or local calling area. (I have a cell phone, but only with "economy" service for my business.)

As for the CB and marine VHF communities, neither is a shining example to follow these days. I still have a CB, but it's so useless at this stage of the sunspot cycle that I'm mostly using the antenna for 10 meters. Since de-licensing, marine VHF has become so congested that the Coast Guard and FCC have joined in an effort to get recreational boaters off channel 16, with limited success.

No matter how we designate or describe the channel, the emphasis needs to be on using .52 to make initial contact, then moving to a nearby clear simplex channel to carry on any extended conversation.—*William M. Riley, N3SNU, President, Prince Georges County REACT, Bowie, Maryland*

♦ I would like to agree with KC5HVV as far as using 146.52 simplex. We have crossed the states from east to west and north to south, but rarely hear anyone using .52. A "Highway Information Frequency" is not a bad idea. It would be a real pleasure to have information when traveling. Let's use 146.52! We live close to the freeway and I monitor it for that very reason: to help others.—*Jack H. Stanton, N7QYL, Woodinville, Washington*

♦ Concerning KC5HVV's experience on 146.52 MHz while taking a long trip, I assume that he traveled from his home in southern Texas out to California using Interstate 10, which makes its way to El Paso, Las Cruces, out to Tucson and Yuma into California. I suspect the amateur population active on .52 over that path is indeed sparse, except in the larger cities. The problem, as I have found, is the *terrain*. West of El Paso, the terrain is mountainous, limiting simplex VHF coverage considerably.

This is why the ZIA Net, now largely defunct, was put together some 15 or 20 years ago. Travelers over I-10 or I-40 from west Texas had phenomenal coverage—virtually continuous from west Texas into California using interconnected privately owned, maintained and operated repeaters. The ZIA has been largely replaced by the Mega-Link, a system of interconnected repeaters installed, owned and operated by Paul Shock, WA5IHL, of Albuquerque, which covers New Mexico and much of southern Arizona. I have found no problem maintaining contact driving out to Las Vegas or through southern Arizona to Yuma and beyond.

The rugged terrain is the reason that wide coverage repeaters make more sense than simplex in the mountain West. While simplex certainly has its place, you do not have to be alone on trips east or west if you use the *ARRL Repeater Directory* and know where the systems are before you get there.—*Richard E Lambert, W5ZHI, Albuquerque, New Mexico*

♦ Concerning the need for travel information via Amateur Radio, why not use an APRS-style approach? I'm talking about a system that would allow your transceiver to automatically find the 10 nearest repeaters and sort them by proximity or signal strength.

This proposal would incorporate existing technology into a new system and require the manufacture of new product features and installation of new equipment. The backbone of the system would require participating repeater owners to beacon a packet message on a NRLF (National Repeater Location Frequency). The NRLF doesn't need to be in each band either. The NRLF could be on the 1.25-meter band, which is less crowded than 2 meters or 70 cm. To avoid beacon collisions, the beacons could rotate on a five-minute schedule, for example.

The NRLF beacon packet would contain information such as the repeater's call sign, position (latitude/longitude), geographic location name, input frequency, output frequency (if not standard), and CTCSS/PL tone frequency (if required). The mobile transceiver would have a receive-only frequency set to the NRLF. The radio should also be equipped with a GPS receiver/port. Information that is received can then be processed and programmed into special memories in the radio. User options could include features to sort by distance or possibly signal strength, then scan and display location names.—*Michael Dickey, KC7IYX, Fort Lee, Virginia*

REAL HAMS

♦ I certainly agree with, and applaud, K1ZZ's editorial in the May *QST* regarding "Real Hams." I hope his words will give the restructuring naysayers some pause for thought.

Non-ham friends often ask me why I bother to engage in HF DX when I could just as easily use the Internet or the telephone. My response is simply this: Why would you go fishing if all you wanted to do was eat fish? It's cheaper, and easier, to go to the supermarket. I see HF DX as akin to fishing—you never know what, if anything, you will catch. Therein lies the thrill, in addition to meeting new people who share similar interests.

I find that many non-hams are intrigued

to learn about the diversity and complexity of Amateur Radio if I can get their ear for more than a minute. I've also noticed that their intrigue is not one of overwhelming awe but more of a reflection on their own possible involvement.

This year marks my 40th anniversary as a licensed amateur. While I prefer phone operation and have the physical abilities to operate any mode, I realize that there is no guarantee that I will have these abilities in the future. Regardless of what life hands me, I know that there will be modes available to allow me to continue operating. Maybe the ultimate reward of Amateur Radio is that it is a lifelong hobby.—*Neal Enault, WA6OCP, Sunnyvale, California*

TRY CREATIVE QSLs

♦ After sending and receiving many QSL cards, we have all noticed the difference between the generic QSLs and the distinctive, even artistic, cards that come our way.

I've found that after a day of work, I'm at the mailbox to check for QSLs before I shed my work clothes. Sifting through the mail is one of life's little pleasures and QSLs invite me—especially those distinctive QSLs—to smile and ignore the bills! More than "the final courtesy of a QSO," the unusual cards display real character and provide interesting insights about the persons who sent them.

So I propose, or challenge, hams to go the extra mile in putting their ideas about themselves, about the hobby, about their communities on their QSL cards. Of course, time and cost can get in the way of a great QSL design. Still, our ingenuity at home-brewing could extend to QSLs. You can make a QSL from a drawing (I cannot draw well, so I ask my youngest son and my wife to help), or a picture of yourself, rig, antenna, shack, locale, club, Field Day moment, etc.

With a picture (and your call) on one side, you need to include all necessary QSL info on the other side, including your call again, prominently placed. Once you have a picture and the backside typed out with your call, address and so on, a photocopy business can duplicate it.

Make and send your unique QSLs onward, knowing you will improve someone's day. I'm always showing off the great cards to family and friends. And the interest in such cards just might create another ham.—*Michael Markowski, KD7BOD, Salt Lake City, Utah*

COMMON SENSE DX ADVICE

♦ I have been licensed since the late 1950s, but for the last 20-plus years I lived in the Chicago area where the only ham radio I enjoyed was an occasional mobile operation. Since taking a job transfer to Fort Wayne, Indiana, I have been able to put together a decent station that will allow me to do some serious DX chasing.

Things have changed since I was an active DXer in the early '70s. Ham radio is no longer the gentleman's sport it was 30 or 40 years ago. I am amazed daily at the language as well as the deliberate interference that is frequently found in DX pileups.

I have had the pleasure of working the recent "hot" ones since I again became active last March, including Clipperton Island, Chesterfield Island, Pitcairn and Yemen. In all cases, the DX station was operating split frequency, usually listening higher in the band. Because the DX station does not always announce on a frequent basis where he is listening, other stations do sometimes call on the DX station's transmitting frequency. When this happens, others are readily available to "advise" the intruder that he is in error. This is good; it helps the person calling on the wrong frequency. It helps the DX station to be heard by those trying to work him, and it helps also the masses that are calling.

Along with the good there is some bad, so I would like to offer some common sense advice, strictly based on my point of view, to those who would guard the DX frequency:

Do not scream "Up, Up, Up" at the calling station.

Do not tell the calling station "wrong VFO."

Do not tell the calling station "you won't get him here."

Do not say that the calling station is obviously one of the "new lids."

Please do not use profanity—it serves no purpose.

Simply, and quickly, inform the calling station where he should be transmitting. A quick "he's listening up 10" or "he's listening from 200 to 220" should tell the calling station all he needs to know; a quick message and he is gone, no longer causing interference. Common sense!

The months I have been back on the air has convinced me that we have come to a point where intentional interference will probably always be with us. In virtually every pileup I have been in, there has been someone tuning up, for a long, long, time.

Even so, I am still amazed, after all these years, that I can sit down at my rig, make contact with someone half way around the world whom I have never met and will probably never meet. I can converse with someone politically and culturally very different from me, but who is quite willing to tell me about himself, his family, his work, his life, and wants to learn about me, my family, my work, and my life. Who can ask for a better hobby?—*Ron Van Diver, K9UVK, Fort Wayne, Indiana*

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Ever dream of making an impossibly big dish antenna? Well, a bunch of sky-scanning scientists did, too—and wouldn't you know it? A ham and cosmic DXer started the ball rolling before World War II…

In 1937, Grote Reber, then W9GFZ, spent his summer working on what was probably the world's most unusual backyard project of his era—a 31.4-foot-diameter parabolic dish antenna weighing nearly two tons. Twenty years before Sputnik and nearly four decades before dish antennas were commonplace in residential neighborhoods, Reber's wood-and-iron structure quickly became "an item of local curiosity" in his hometown of Wheaton, Illinois.[1]

Had his neighbors known Reber's plans for this antenna, they would have been even more curious. A self-described "DX addict," Reber wrote later that by 1936, "after contacting hams in more than 60 countries and making WAC, there did not appear to be any more worlds to conquer."[2] When he read Karl Jansky's account of discovering the first radio emissions from beyond the Earth,[3] however, he found a new DX challenge! Reber designed his backyard dish antenna to seek radio waves from the heavens.

Reber succeeded in his quest for cosmic DX, making landmark scientific contributions to early radio astronomy. Today, his original antenna sits on the National Radio Astronomy Observatory (NRAO) grounds in Green Bank, West Virginia, as a permanent historical display. About a mile from Reber's antenna, its latest scientific descendant, a 16-million-pound structure with a parabolic dish more than 100 times larger than Reber's, is nearing completion.

On August 25, the NRAO, a research facility of the National Science Foundation, will formally dedicate this behemoth, called the Green Bank Telescope (GBT), in a ceremony that will be accompanied by an amateur special-event station using Reber's old call sign, now held by the NRAO Amateur Radio Club.

The Green Bank Telescope is the world's largest fully-steerable antenna. Its dish measures 100 × 110 meters (328 × 360 feet) and has an area of more than two acres. The entire structure turns on a circular track more than 200 feet in diameter. It would dwarf the Statue of Liberty and nearly matches the Washington Monument in height.

The GBT's design maximizes its effectiveness as a sensitive collector of faint radio emissions. Its giant primary reflecting surface is unblocked by the rest of the structure. Each of the 2004 aluminum panels making up the reflecting surface is mounted on motor-driven actuators that can correct for tiny errors in the shape of the antenna. A laser-ranging system bounces beams of light off the surface to measure deformations, which can then be corrected by moving the actuators. When this system is fully operational, it will maintain an average surface accuracy of a quarter-millimeter.

How does an antenna like this perform?

NRAO/AUI/NSF

The massive Green Bank Telescope (GBT) nears completion.

NRAO/AUI/NSF

The GBT reflector support structure is ready.

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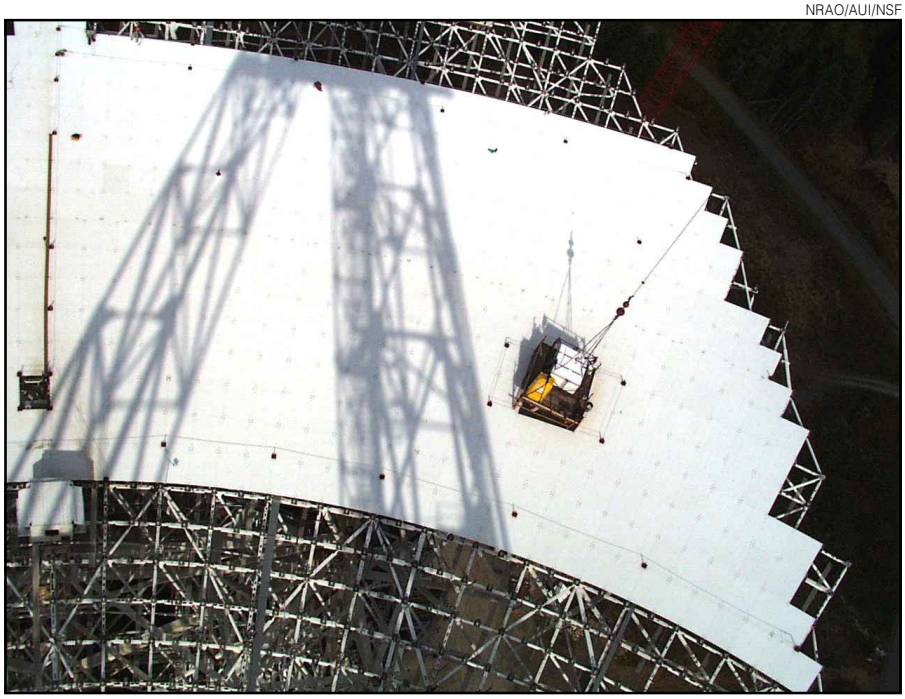


A close-up view of the installation of the individual panels that make up the GBT's reflector surface.

At 432 MHz, the GBT provides more than 51.5 dB of gain. That means that a seven-watt, 70-cm signal placed at the prime focus could produce more than a million watts of effective radiated power!

Although the GBT is usable to 100 GHz, Reber struggled with the primitive technology available for the "ultra-high" frequencies of 150-170 MHz in the 1930s. It took him nearly two years to detect radio emission from an astronomical object—our own Milky Way Galaxy—in 1939. Reber went on to map the sky at radio wavelengths, and the results of his research were published in the *Proceedings of the Institute of Radio Engineers*, the *Astrophysical Journal*, and *Nature*. He continued his radio-astronomy experiments for many years.[4]

The GBT will continue the quest for ever-fainter radio-emitting astronomical objects that Reber began. Its sensitive receivers will search for hydrogen gas in distant galaxies, study the nature of rapidly spinning pulsars, identify molecules in the tenuous material between the stars and seek previously unknown radio-emitting objects in the far distant universe.

Although Reber, who now lives in Tasmania, is well-known among radio astronomers as a ham who pioneered their science, it is a less-recognized fact that Jansky's original discovery of cosmic radio emission was based on one of ham radio's earlier great successes. When amateur operations resumed after the government-enforced hiatus during World War I, hams became serious about finding out what wavelengths below 200 meters—the wavelengths allocated to them—would do.[5] The big challenge was to get across the Atlantic on "the short waves."

In December of 1921, American ham signals were heard in Scotland and the first two-way transatlantic shortwave contact was completed by amateurs on November 27, 1923. To radio engineers of the time it was astounding not only that this was done using wavelengths then considered useless for long-distance communication, but also that the hams got across the ocean with transmitters running only modest power. In contrast, commercial transatlantic radio service on long waves used transmitters with power outputs that frequently exceeded 100 kW.

The efficiency of shortwave communication was very appealing to commercial firms. Among the commercial shortwave applications soon considered was transatlantic telephone service. It was the desire to identify sources of static and other noise in shortwave circuits that led Bell Telephone Laboratories to assign Jansky this task in 1928. The Bruce Array directional antenna Jansky designed for localizing shortwave noise sources became the world's first radio telescope when he discovered radio emission from the Milky Way in 1932. Thus, radio astronomy was born as a direct result of ham radio operators' success in utilizing "the short waves."

Today the links between ham radio and radio astronomy remain strong. Nearly 10 percent of NRAO's employees, including many who have contributed to the design and construction of the GBT, are licensed amateurs. Many prominent radio astronomers at universities and other institutions also are active hams. On August 25-27, when W9GFZ is heard on the air for the first time since the 1930s, amateur radio operators can help celebrate science's latest tool for unraveling the secrets of the Universe—a tool made possible by hams.

GBT Special Event

The National Radio Astronomy Observatory (NRAO) Amateur Radio Club will operate W9GFZ to celebrate the dedication of the observatory's newest radio telescope, the Green Bank Telescope in Green Bank, West Virginia. The call sign is that held by Grote Reber when he built the first parabolic-dish antenna for radio astronomy in his backyard in 1937.

W9GFZ will operate from the NRAO grounds in Green Bank from 1600 UTC August 25 until 2000 UTC August 27. Frequencies will be 3.940, 7.245, 14.275, 21.375 and 28.350 MHz. For a QSL card, send QSL and SASE to W9GFZ, PO Box 2, Green Bank, WV 24944.

NRAO/AUI/NSF

Grote Reber's original parabolic dish antenna. The antenna is now a permanent historical display on the National Radio Astronomy Observatory grounds in Green Bank, West Virginia.

You can contact the author at 1202 Avenida Ladera, Socorro, NM 87801-4775; **dfinley@aoc.nrao.edu**.

Notes

[1]Grote Reber, "Radio Astronomy Between Jansky and Reber," in *Serendipitous Discoveries in Radio Astronomy*, K. Kellermann and B. Sheets, Editors, National Radio Astronomy Observatory, 1983, pp 71-78.

[2]Grote Reber, "Early Radio Astronomy at Wheaton, Illinois," *Proceedings of the IRE*, Jan 1958, pp 15-23.

[3]K.G. Jansky, "Electrical disturbances apparently of extraterrestrial origin," *Proceedings of the IRE*, Oct 1933, pp 1387-1398.

[4]Richard W. Miller, VE3CIE, "The Listener," *QST*, Jan 1989, pp 58-59.

[5]Clinton B. DeSoto, *Two Hundred Meters and Down*, ARRL, 1936. QST

By Dr Glenn Johnson, W0GJ

Amateur Radio Comes to the Kingdom of Bhutan

Above, the author (left) and his son Mark, N0MJ, arrive in Bhutan aboard a Druk Air BAE 146-100 jet.

Hidden deep within the great Himalayan Mountains, Bhutan has developed a unique civilization over the past 2000 years. It is a matter of great pride to the Bhutanese people that their small kingdom was never colonized. This mythical land, one of the last hidden domains of man, is now cautiously coming out of centuries of isolation. The wind roaring down the majestic valleys of the Himalayas produces the sound of the mythical Thunder Dragon, for which the Kingdom is named: Druk Yul.

Gus Browning was active from Bhutan in the late '50s and into the '60s. Pradhan, A51PN, and Yonten, A51TY, were somewhat active back in the early 70s. In recent years, A51JS was active in 1990 and made over 14,000 contacts. A51/JH1AJT was active in 1995 and made over 3000 contacts. As a consequence of such limited activity over the past few decades, Bhutan has risen to nearly the very top of the Most Wanted lists, number 2 for Europe and most parts of the world.

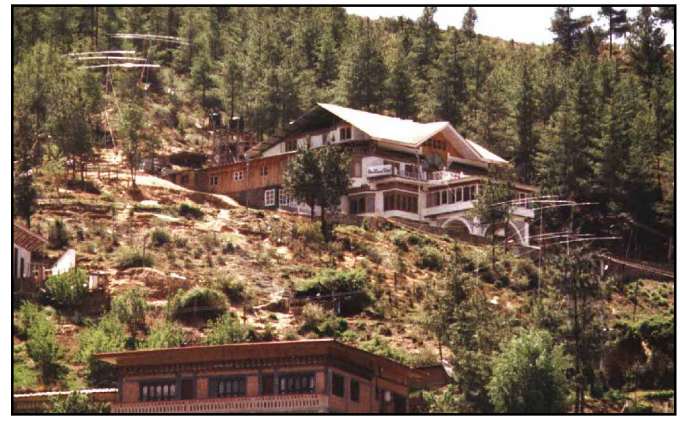
A52A

Last March, after decades of almost total silence, Amateur Radio was declared legal in Bhutan. The ink was hardly dry on the new legislation when the A52A DXpedition arrived!

My personal involvement with Bhutan came with my profession as an orthopedic surgeon. Orthopedics Overseas is a volunteer organization (similar to Doctors Without Borders) providing service to hospitals in a few third world countries. I've been scheduled to work in Bhutan for several years. I will be there with my family in January 2001, January 2003, and April 2005. My interest and assignment to Bhutan started with the "rarity" of A5 on the ham bands.

In 1997 His Majesty Jigme Singye Wangchuck began to slowly turn some control of the country over to the people. The Chief Engineer of the Ministry of Communications has had a long-time dream of bringing Amateur Radio into Bhutan. Finally, in late March of this year, the Telecommunications Act became law and

A Bhutan Tourism bus carried the A52A team from Paro along the twisting mountain roads to Thimphu.



Our base of operations—the Pine Wood Hotel in Thimphu. The SSB antennas are visible to the left of the hotel; the CW antennas were set up to the lower right.

Amateur Radio was officially sanctioned throughout the kingdom.

My first plan was to do a small Bhutan operation with just my son, Mark. When discussing the details with the Chief Engineer he suggested that I organize a team of a dozen or so operators for a first operation under the new law and announce our intentions publicly.

Only Two Weeks to Prepare

I immediately contacted the Heard Island VK0IR team members to see who could accompany a DXpedition expedition to Thimphu, Bhutan during the first two weeks of May. The goal was to return in time for the Dayton Hamvention to hand out A5 cards.

On such short notice only six of the original twenty VK0IR team members could commit. After more contacts I ended up with a team of 15. Except for my son Mark and me, the team was a Who's Who of DXers. In fact, three of the team members were still aboard the *Shogun* returning from the popular FO0AAA DXpedition to Clipperton Island when I contacted them about traveling to Bhutan!

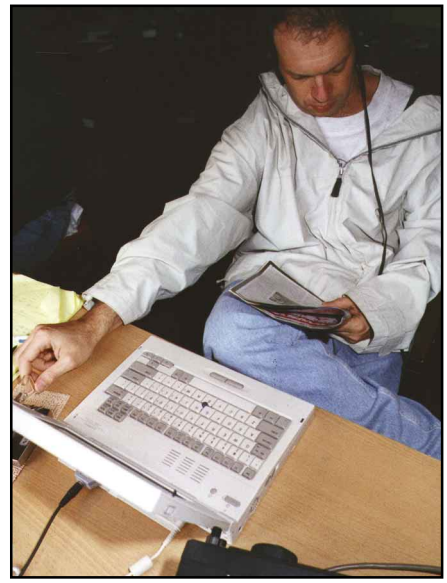
I have a more than full-time job as a surgeon, but it also became a full-time job organizing a major DXpedition on such a short schedule. I survived on 2-3 hours or less of sleep each night while juggling a flurry of e-mails, faxes and phone calls. I want to especially thank Zorro Miyazawa, JH1AJT, and Jim Smith, VK9NS for their encouragement, support and many helpful suggestions during the organizing phase.

Countdown

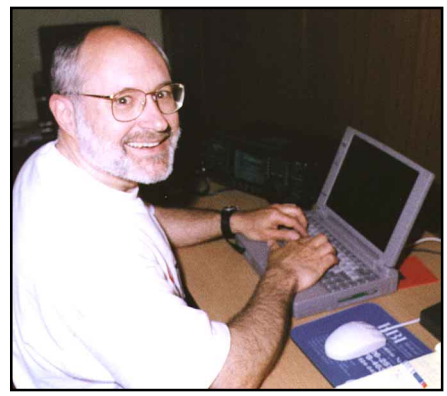
Bob Allphin, K4UEE, and I were able to organize our equipment in time, but it was down to the last minute. The Clipperton Island antennas were shipped to Bob's home in Georgia and crated. Don Greenbaum, N1DG, sent eight laptop computers via UPS Next Day air to Georgia. The freight truck was in Bob's driveway waiting for the final crate (the computers). Bob was actually able to telephone the UPS driver and give directions to his home. The driver detoured from his usual route and drove directly to Bob's. The computer crate was then moved from one truck to another and sped off to Bangkok. Thanks UPS!

For masts, Force 12 had a crew work overtime and a weekend to produce-35 foot masts that broke down into 40-inch lengths. Thanks Force12!

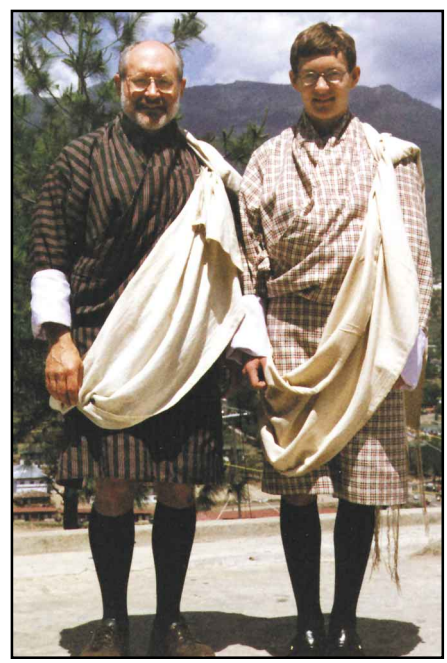
The Clipperton crew really liked the ICOM 756PRO transceivers, and ICOM was willing to supply seven for our DXpedition, but they needed to get them from the Clipperton gang, clean them up, and ship them to me. ICOM turned the rigs around in 24 hours and air shipped them to me. They arrived less than 12 hours before the truck arrived for my crates. Thanks ICOM!



James, 9V1YC, reels in the CW contacts. His only complaint? "I ran out of reading material while operating."



The author works a RTTY pileup.



The author (left) and his son Mark, N0MJ.

Just gathering the equipment was not enough. Every item unto the smallest nut and bolt had to be inventoried and accounted for in our shipping/customs WayBill. This needed to be approved by the TAB (Tourism Authority of Bhutan), MOC (Ministry of Communiucations), etc. However, we first needed to get our personal visa applications to Bhutan for processing before TAB would look at our inventory. This is exactly the time the *only* North American agent of Bhutan's airline, Druk Air, took an unannounced one-week vacation, leaving us in the lurch. His office personnel and I figured out how to gather our visa materials and send them off to Bhutan—with a few hundred dollars' worth of faxing.

Finally, on April 20, our visa applications had cleared. With less than 10 days to go, and hoping for an April 30 flight into Bhutan, we rushed to make reservations on Druk Air. We quickly learned that April is a festival month in Bhutan and that no seats were available on the 30th. Since Druk Air only flies from a few cities into Bhutan on an every-other-day schedule, there just happened to be the required number of seats on the May 2 flight from Bangkok.

Three members of our team, Al, Jari and Wes, were able to get seats on a Monday, May 1 flight from Delhi, India. They chose Delhi because they would be arriving from Europe and Katmandu. The rest of us resigned ourselves to arriving in Bangkok April 28 and 29 and waiting for the May 2 flight to Bhutan. All of our equipment, however, was still scheduled to depart Bangkok on an April 29 cargo flight—or so we hoped.

I arrived in Bangkok about midnight, seven hours before the scheduled departure of the cargo flight. The very first thing the next morning, I was on the phone to the Shipco agent in Bangkok. He said he could not tell me the status of the cargo until one hour after takeoff. One hour passed, then two. Agonizing hours, to say the least!

Good News...and Bad News

"I have some good news and some bad news," the agent said. "Seventeen of the 19 crates made it on the cargo flight, but at this time I can't tell you which ones didn't make it." I was certain it must have been a couple extra-long antenna crates, and we could live with that. A couple hours later, we found out that one crate had four radios, and the other had the power supplies, and headsets. Not good news at all!

The only possibility was to somehow get clearance to repack and send the equipment

Bhutanese student monks in downtown Thimphu.

on the next flight, which would be our own overbooked passenger flight leaving in three days.

The customs/cargo area of Thai Airways is exceedingly strict and intolerant of any variance. It took three full days of phone calls and faxes just to get permission to repack the two crates…*into two crates*. The WayBill and customs paperwork stated that we had a total of 19 crates, and there shall be no more than 19 crates. We made phone calls to the aircraft engineers to determine the maximum dimensions in the cargo hold. With several uniformed customs officials watching over us in the sweltering heat of the tropical warehouse, we built two cardboard crates to within an inch of the engineering specs.

Despite our efforts there were no guarantees that the crates would be on the plane with us in the morning! We contacted Druk Air headquarters in Bhutan and received a promise that they would do everything they could to help our DXpedition. By this time they were all very interested in what we were doing. The Bangkok agents all knew us and were pulling for us like cheerleaders.

I was told to arrive by 5:30 the next morning to check with the Druk Air gate agent but, of course, they could not tell me the cargo status. Even after boarding the shuttle bus we did not know the status of the two crates. Just as the bus was beginning to pull away, an agent jumped on board and asked for me. He announced that the crates were on board!

Arrival

Our Druk Air flight left Bangkok at 7:30 AM May 2 and refueled in Calcutta before heading into the Himalayan Mountains and Bhutan. The only airport in Bhutan is at Paro and on approach and departure, the planes weave their way through the valleys. There is no instrument approach; only visual flight rules apply. Several times a year there are clouds or fog that do not permit safe operation, so the planes will return to Calcutta.

On approach into Paro the Druk Air pilots will often tell the passengers that they are about to see the mountains and trees closer than they ever have in their lives. What a thrill it was to see the mountains so close!

After a perfect landing in a perfectly beautiful Shangri-La valley, we were all speechless. It was difficult to believe that we were finally in Bhutan, "forbidden" for so many years to Amateur Radio operators.

A beautiful new terminal building dominates the airport grounds, complete with the incredible detailing and painting that makes the Bhutanese architecture so famous. Passing through passport control and receiving our visas was remarkably easy (our visas were waiting for us!). We then went to the cargo area and retrieved our two "missing" crates.

I had a lump in my throat most of the way to Thimphu. The two-hour drive took us through spectacular scenery, but the lump was primarily from the excitement of meeting trucks on the narrow $1^1/_2$ lane road with shear cliffs dropping off hundreds of feet from the shoulder. The entire road system in Bhutan has three miles of straight road…total!

When we arrived at the Pine Wood Hotel we found most of the antenna and masts assembled and ready to go up. Our advance team had also picked up our licenses—assigned to A52A. After finding our rooms and enjoying a quick lunch, we had a strategy session and walk-around to plan our antenna farm.

Our goal was to have four stations on the air by dark. We set up our antennas in three areas: CW, phone, and RTTY. The low band antennas would be a few hundred meters away up on a ridge, clear of any trees and buildings. We worked hard until after dark. A little while later we were on the air on four bands at 1600Z, May 2.

The next day we finished installing antennas for seven stations: three CW, three SSB, and one RTTY. The third day, we concentrated on setting up our low band antennas.

The Pileup and Propagation Challenge

James, 9V1YC, did a superb job of scheduling the operators and matching them to wants and needs for openings to different parts of the world. We wanted to be fair to all DXers. We knew there would be near 24-hour propagation into Europe and twice daily openings into North and South America. James found the propagation patterns were identical to those he knew in Singapore.

We found that at exactly 8:30 AM local time the bands simply died for an hour or two, slowly picking up steam as the day

The A52A Team

(left to right): Harry Booklan, RA3AUU; Don Greenbaum, N1DG; Jin Fujiwara, JF1IST; Mark Johnson, N0MJ; James Brooks, 9V1YC; Mark Demeuleneere, ON4WW; Vince Thompson, K5VT; Yuu Yoshitani, JA3IG; Andy Chesnokov, UA3AB; Bob Allphin, K4UEE; Wes Lamboley, W3WL; Jari Jussila, OH2BU; Al Hernandez, K3VN; Mac Shimamoto, JA3USA; Glenn Johnson, W0GJ.

progressed. Our prime time for all bands and modes was during the evening hours, even though we plugged away during the daylight hours with slower rates.

With four stations during the first 24 hours, we had 7800 contacts in the log. On the 3rd and 4th days we logged more than 12,500. By the 4th and 5th days we were amazed at the number of contacts we had been able to make with only 100 W.

Jari, OH2BU, posted a listing of the top 10 DXpeditions of all time, ranked by number of contacts. It was soon obvious that we were approaching 10th place. This chart inspired the competitive edge in all of the team and we worked harder than ever, in spite of the poor solar flux. (Prior to our operation the flux had been 220 or so, and during the first week of our operation, it hung in the 120-125 range, slowly rising to 150-160 near the end of our operation. It rose to well over 225 after we left Bhutan.)

The Pine Wood Hotel proved to be an almost ideal location, save for the eastern Asia path. Even so, we worked thousands of JAs and HLs on the high bands. After a few nights on the low bands, however, it was obvious that the mountain to the east was hampering our ability to work these areas. The JA crew, for several evenings, traveled across the Thimphu valley to the Hotel Mottithang. From there, they worked Asia all night on the low bands.

From Number Two to Number Two

Almost hourly, Mark, ON4WW, would run from station to station to add up the contacts. Finally, at 2:40 AM on the last night of operation, Mark let out a war whoop! We had surpassed the famous VK0IR 80,630 total by 19 contacts! We knew we could not come close to the ZL9CI record of 96,000 contacts with 100 W, but from the number two Most Wanted country, *we were number two in all-time number of contacts.* The Thunder Dragon had roared!

We made about another 1500 contacts until we shut down at 0230Z May 12. We were operational for almost 10 days, making 82,087 contacts. That's an easy average of about 8200 contacts per day. Our major continental breakdown was: 62% Europe, 18% North/South America, and about 18% Asia. With our 24-hour propagation to Europe we really appreciated the Europeans standing by while we worked the twice-daily openings into North and South America.

All too quickly we said goodbye to our gracious hosts and new friends. We were in Paro by dark, as it is too dangerous to drive at night on the narrow roads. We were to be at the airport at 5:30 the next morning to return to our homes, a different world away.

Presenting an ICOM 746 transceiver to the Bhutan Ministry of Communications for the first Bhutanese Amateur Radio club station. Left to right: Wes, W3WL; Dasho Leki Dorji; Glenn, W0GJ; Jari, OH2BU and Mark, N0MJ.

The A52A Legacy

Yonten, A51TY, came to visit us one day. He toured our station. He shared stories of "the old days" and told about his recent operations.

ICOM Japan donated an ICOM 746 transceiver and Cushcraft donated an R8 multiband vertical for the establishment of a club station in Bhutan. Our team donated a couple A3Ss, an A3WS, masts and power supply, etc.

When I return this winter to work at the hospital in Thimphu, I've committed myself to teaching ham classes. I'm currently working with the Chief Engineer on assembling teaching materials. With luck there will be many native A51 call signs on the bands soon!

The biggest fear of the new hams in such "wanted" countries is the incredible impatience of the multitudes wanting a contact. It makes having casual, conversational contacts almost impossible. By reducing the demand for A5 with the A52A operation, life will be much easier for the new hams when they hit the airwaves.

Many in our DXpedition missed the opportunity to see Jim Smith, VK9NS, who was operating as A52JS from Paro at the time, but a lucky few were able to meet him while waiting in Paro for flights. We thank Jim for his efforts in Bhutan over the years and we're glad he was able to be the "first" A52 on the air.

QSLs in a Hurry

Wayne Carrol, W4MPY, "The QSL Man", helped me design a simple but effective QSL card that would be ready when we returned. True to his word, there were a few thousand cards already waiting when Mark and I arrived home. We sent out a "test" batch of a couple hundred cards the next day in preparation for Dayton. Within 72 hours of being home, we were headed for the Hamvention. At Dayton we processed about 3500 cards—less than one week after leaving Bhutan! By May 31 over 14,000 A52A cards had been sent. The QSL team primarily consisted of my family and me: Vivien, KL7YL; Melissa, N0MAJ; Mark, N0MJ; Paul, W0PRJ and Carrie, N0CMJ. Other tireless QSL helpers were W9NT, K0KG, KB0ROB and N0WBS.

Acknowledgments

This was truly a team effort. Each person on the team had some expertise and contribution to make. I especially want to thank NCDXF and INDEXA for early financial support for logistics and the multitude of individuals, clubs, and corporations for their generous financial and equipment donations. I'd like to thank most of all the people of the Ministry of Communications of the Kingdom of Bhutan for making this all possible. Finally, I'd like to thank W4MPY for helping make possible the rapid QSLing after our DXpedition had ended.

There is one other important acknowledgment I must make. My son Mark, N0MJ, turned 14 years of age one week before we left. He was my best friend and constant companion on this DXpedition. Even if I weren't his proud father, I'd have to acknowledge that this young man produced more than his share of the total number of contacts! He would operate SSB, CW or RTTY whenever there was an empty rig, even when not scheduled for a shift. He was an almost tireless operator and really made the pileups behave. One afternoon, while out to turn an antenna, he fell down a small cliff and lived to tell about it! After cleaning his wounds, he got back in the seat and continued operating. In one extended shift he put 968 contacts in the log. James, 9V1YC, is producing a video of A52A and I watched him film Mark in action.

You can contact the author at 14164 Irvine Ave NW, Bemidji, MN 56601-7121; **w0gj@arrl.net**.

By Rick Lindquist, N1RL

Dayton 2000: Hamvention Meets Convention

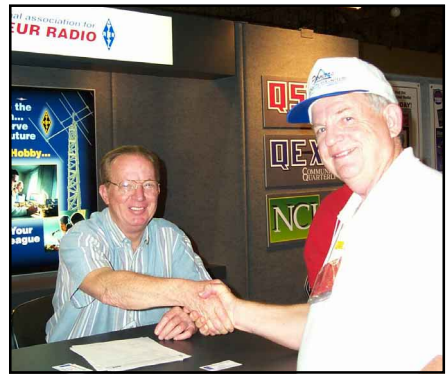
In a convergence of the planets of sorts, the Dayton Hamvention hosted the ARRL National Convention for the first time this year. Nearly 30,000 turned out for a terrific time.

It was a special year for Dayton Hamvention. Not only was it the first Hamvention after the calendar's odometer rolled over in anticipation of the new millennium, but it marked the first time that Hamvention has hosted the ARRL National Convention. Couple those auspicious occasions with the buoyant mood within Amateur Radio—especially as restructuring continues to play out—and you had a lot of people going home with pleasant memories.

"I had the time of my life!" exclaimed Connecticut Section Manager Betsey Doane, K1EIC, attending her first Hamvention. "The convention really made me stop and think again about how marvelous this hobby of ours really is!" Another first-timer was Whitey Doherty, K1VV. "Our first Dayton was great!" he enthused. "Flea market, forums, super prices on new ham gear!" Their sentiments epitomized those of many who attended Dayton Hamvention 2000.

General Chairman Jim Graver, KB8PSO, of the sponsoring Dayton Amateur Radio Association, reported a head count of 28,804 for this year's Hamvention—up again from the previous year's attendance, but not an all-time record. (Graver says the Hamvention's attendance peaked in 1993 at 33,669. Since the change in date from April to May in 1996, he says, attendance has remained around 28,000.)

Graver said feedback from this year's show has been "overwhelmingly positive," and he's proud of the DARA Hamvention Committee's team effort. "We did it with fewer volunteers, the weather cooperated, the community supported our show, the attendees came ready to spend their hard-earned cash, we had visitors from all over the central European and Pacific Rim countries and even the local law enforcement authorities commented on how smoothly the show went," he said.



ARRL President Jim Haynie, W5JBP, greets Jim Roebuck, W4AXO—one of the many Hamvention/Conventioneers to drop by to chat with the new League chief.

A New Look for the League

The ARRL marked Hamvention/Convention 2000 with a splashier, larger look. After many years of service, the League's admittedly tired convention display finally was relegated to the dustbin. The new arrangement offered more visual appeal and customer convenience. For the first time, DXCC card checking was available at the ARRL booth.

Integral to the "new look" was ARRL President Jim Haynie, W5JBP, elected in January and enjoying his first Hamvention in his new role. The gregarious and amiable Texan greeted many well-wishers at the

League booth, spoke and answered questions at several forums, and encouraged suggestions on how the ARRL could do its job better.

New First Vice President Joel Harrison, W5ZN, and vice presidents Kay Craigie, WT3P, and John Kanode, N4MM, also were prominent at this year's Hamvention. Kanode was inducted into the CQ DX Hall of Fame this year as well.

Rounding out the League's presence were several directors and vice directors, as well as section managers and various field appointees.

Exciting Times

"These are extremely exciting times for Amateur Radio!" President Haynie declared in opening his "Meet the President" forum. "I hope y'all are as excited about our future as I am, because if you are, we can do nothing but win."

Haynie recalled that a Hallicrafters receiver from his father opened a "window to the world" outside of the West Texas town where he grew up and introduced him to the mystery of radio. Haynie said he'd now like to bottle that wireless mystique "and plug it back into ham radio."

His answer is "The Big Project." His ham radio in the schools initiative would offer a turnkey curriculum in Amateur Radio for use in middle schools plus equipment to make it come alive in the classroom. Haynie described "The Big Project" as a "401K account for Amateur Radio" and said he plans to have the program in place by the end of 2001.

"It still is going to require a lot of money," said Haynie, who's indicated he plans to raise $1 million in the program's initial year through corporate and foundation grants. "In this case, I don't mind asking for the money."

Haynie said he's enlisted the assistance of Vice President Craigie to guide the project in the planning stages. The new president also invited ideas, comments and suggestions. "We're here to serve you," he said. "That's what we're all here for."

Just in from Istanbul

Taking a break from the International Amateur Radio Union observer team at World Radiocommunication Conference 2000, ARRL Executive Vice President David Sumner, K1ZZ, flew in from Istanbul, Turkey, to attend the League's National Convention.

During his "Vision for Amateur Radio's Future" forum, Sumner said he witnessed a higher regard for Amateur Radio's disaster communications capabilities at WRC-2000 than he'd seen at other recent conferences. WRC-2000 concluded June 2. Sumner said a "harmonized" worldwide allocation at

New Gear

It just wouldn't be Hamvention without new gear. Hamvention 2000 didn't disappoint.

Yaesu introduced its "elite-class" Model V FT-1000MP HF transceiver, featuring 200 W output and several improvements on the original MP platform. Among the updates, the manufacturer says, is a more bulletproof front end. The Mark-V also purports to be the first commercial amateur transceiver to provide for Class A power amplifier operation (at 75 W output), dramatically improving transmit IMD performance.

While Yaesu's Mark-V was on the street by June, Kenwood 's as-yet-unnamed all-band, all-mode transceiver remained under glass for display only at Dayton. The unit is still in development and no availability date was announced. The new transceiver is to borrow some features from the TS-570 and TS-870 transceivers, cover HF plus the 50, 144, 440 and 1200 MHz bands (100 W output up through 2 meters) and feature IF DSP.

The Yaesu Mark-V FT-1000MP transceiver. The power supply is included.

ICOM formally announced its economy-priced compact HF desktop transceiver, the IC-718. Described as an entry-level radio, the ICOM offers a basic band stacking register, direct frequency input, and a built-in CW keyer (see "Product Review," July 2000 *QST*, page 63).

Ten-Tec followed up its bargain-priced Pegasus PC-controlled transceiver—the hit at last year's Hamvention—with the Pegasus FP (for "front panel") this time around. The desktop unit, set to be available this month, will incorporate the functions and capabilities of the original Pegasus, but with a multifunction LCD front-panel display instead of a PC interface.

The Ten-Tec Pegasus FP transceiver.

Elecraft followed its popular K2 transceiver kit by debuting its baby brother K1 transceiver kit. The K1 is a two-band, low-power unit aimed at backpackers and travelers.

A new player, Mobat Communication—a partnership of Motorola and Bartal—introduced its MICOM H transceiver at Dayton. Based on a commercial-military design, the MICOM H is a computer-programmable DSP-based radio featuring 160-10-meter coverage and 125 W output.

Elecraft's new K1 low-power transceiver, which comes as a kit.

Other new stuff included the Alinco DR-135TP 2-meter FM transceiver with a built-in TNC; the updated Patcomm 16000A HF transceiver; the ICOM R3 wideband hand-held receiver (with TV); and TAPR's T238 APRS weather station kit.

Hamvention 2000 also provided an outstanding retail venue. The popular ICOM IC-706MkIIG—being offered at a killer price—was among the big sellers. Most felt that a combination of the robust economy and amateur license restructuring were driving business. Some retailers reported selling out of popular items before lunch on Saturday. Elecraft ran through its inventory of its popular K2 transceiver kits on Friday.

Kenwood's new HF/VHF/UHF transceiver.

Excerpts from Riley Hollingsworth's Hamvention 2000 Banquet Speech

"…I wish I could name every person who left a lasting impression upon me over this past year and a half… But in Texas and in California, in Georgia and in the Carolinas, and in Florida and in Minnesota, I had the good fortune to meet people who took the high road and who have a vision for Amateur Radio and who devote hundreds of hours of personal time to make it succeed.

"I've thought almost every day about those people, and I realized that what [ARRL Rocky Mountain Director] Walt Stinson, [W0CP], said about them is true: 'they are all bound together by one common bond: the love of the magic of radio'. They are people who want to make a difference, who want to leave a legacy, and who want to make the world a better place.

"…Instead of being cynical or jaded after 18 months of enforcement, I am more optimistic than ever about Amateur Radio. It is not only fundamentally sound, but it's a great hobby service as well. It's because of people such as you—you who make this annual migration to Dayton from all over the world.

"The North Carolina writer Thomas Wolfe said: 'We are the sum of all the moments of our lives—all that is ours is in them'. Amateur Radio has such moments—the people who understand it and care abut it. I saw them in California and in Texas, in Florida and in the Carolinas, in Georgia and in Minnesota and in New England. I met leaders and volunteers in Amateur Radio who helped in forest fires, in plane crashes and in tornadoes and in hurricanes and parades and marathons and walkathons and clubs, and devoted countless hours to the nets of our National Traffic System, and who taught classes to prospective licensees.

"…Amateur radio is fun and it's a hobby, but it's also serious business. Too many in our ranks over the last decade have taken our frequency allocations for granted. They have focused on rights and ignored responsibilities. They've failed to realize that just because one has a right to do something does not mean it's right to do it in every circumstance.

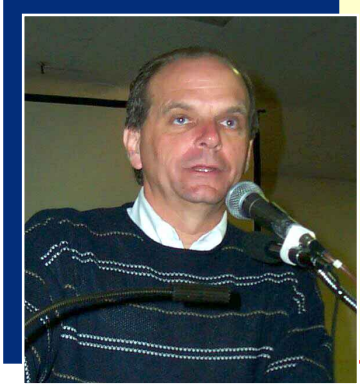
"They've failed to understand that more people than ever before listen to us, because more people than ever before are buying scanners and short-wave radios. And while they may have prided themselves on winning an argument over radio, or driving someone off the frequency, they failed to realize that for every person listening to them that decided not to become involved in Amateur Radio, they took it one step closer to extinction.

"What kind of service is it if you're afraid to leave the radio on in the house or the car? When you have to apologize for it ? Certain members of our ranks have taken everything for granted, and they know all the answers only because they haven't thought of all the questions.

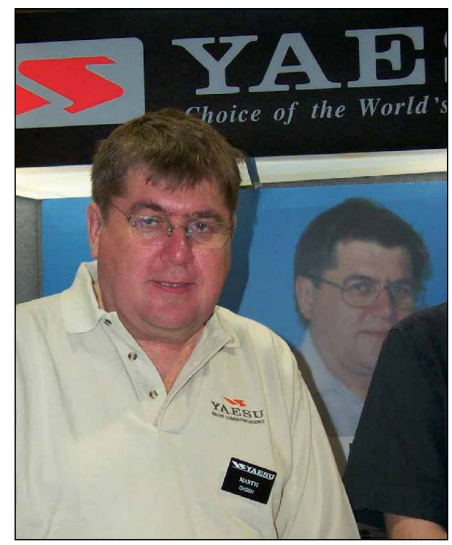
"As ham operators, we *must* be aware of our playing field—that is, the context in which we work and operate and enjoy this hobby/service. Our overall telecommunications industry in the US is the most *innovative* industry the world has ever known. Amateur Radio is fun, but it has to be taken seriously.

"The communications networks we have in this country are the envy of the rest of the world. There is *no reason* why our amateur service can't be the envy of the rest of the world. Because, like it or not, we are part of an international community.

"We take communications for granted, but Amateur Radio cannot isolate itself, and it cannot survive if we don't keep in mind every day that we are an important link in the world communications system, and that the public views us in comparison to all our other communications systems."—*Riley Hollingsworth, K4ZDH*



HQ staff member Dave Patton, NT1N, unfurls the new ARRL banner.



Standing in front of an image of himself, Dayton Hamvention Amateur of the Year and DX luminary Martti Laine, OH2BH, greeted visitors and well-wishers at the Yaesu booth. Hamvention called Laine "our number one Ambassador of Good Will" and cited his activation of new DXCC entities. The Technical Achievement Award winner was Paul Shuch, N6TX. The Special Achievement Award went to Prose Walker, W4BW.

40-meters—an item tentatively on the agenda for WRC-2003—would come about not because of DXing or contesting but because of Amateur Radio's disaster communications capability (a WRC-2000 wrapup is elsewhere in this issue).

Sumner said today's technology has opened Amateur Radio's once "unique window on the world" to many outside the hobby, especially those on the Internet. That trend will continue, he predicted, as telecommunication costs drop. So will the number of amateurs on the books. Those who got into ham radio as a cheap personal communication service—as many did in the code-free Technician boom of the early 1990s—no longer are attracted to the hobby, he said, and will let their licenses lapse.

"They're not on the air, they're not here at the Hamvention, they haven't bought a radio in eight or ten years, but they're still in the FCC database," Sumner pointed out. "Some people will ring their hands and say this is the death of Amateur Radio. It isn't. Nothing will have changed."

Hollingsworth a Hit!

After his appearance last year FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth, K4ZDH, vowed to be a Hamvention regular. He was back this year as the Hamvention banquet speaker.

Hollingsworth exhorted his audience to work toward making the Amateur Radio Service the finest it's ever been (see sidebar, "Excerpts from Riley Hollingsworth's Hamvention 2000 Banquet Speech"). He also emphasized that the Commission is in the enforcement business to stay.

In that vein, Hollingsworth announced that former amateur licensee Richard Burton was indicted May 5 on six felony counts by a federal grand jury in Los Angeles.

The vision thing: **ARRL Executive Vice President David Sumner, K1ZZ, predicted that Amateur Radio will have a ongoing role in scientific investigations, and that personal achievement and accomplishment will continue as incentives to be a part of Amateur Radio. "Lest we forget," he added, "it's supposed to be fun."**

Public Service Wants You!

ARRL Vice President Kay Craigie, WT3P, challenged Amateur Radio's public service leaders to "be the kinds of leaders whom we would want to follow." Craigie said that amateurs who participate in public service are "helping to earn the frequencies we have the privilege of using."

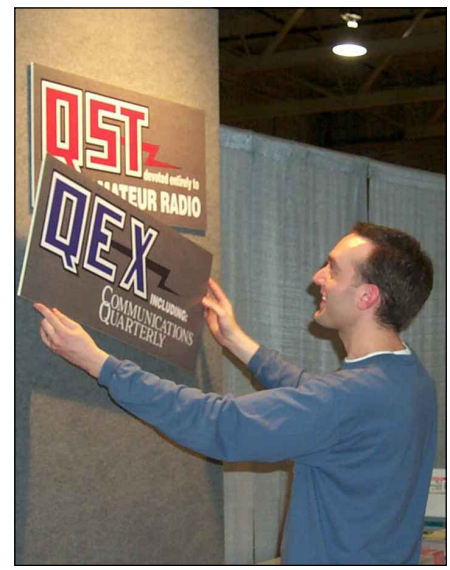
Craigie conceded that while hams have a responsibility to get involved in public service, personal time nowadays often is in short supply. She suggested that public service leaders rethink how they recruit and motivate.

"It's a challenge and a feeling of satisfaction, and you know that something you've done made a difference in the survival of your community," she said. "It feels good to help other people." And, she pointed out, it's good public relations for Amateur Radio.

Craigie's forum presentation is available on the ARRL Web site at **http://www.arrl.org/field/pubservice.html**.

Assistant Circulation Manager Kathy Capodicasa, N1GZO, sets up the League's retail counter.

Three DXCC card checkers meant little waiting for those who stopped by with their prized QSLs in hand. And the "take-a-number" system left no doubts as to who was next in line. Left to right are ARRL Contest Branch Manager Dan Henderson, N1ND; Special Assistant to the Executive Vice President Dave P atton, NT1N, and DXCC Manager Bill Moore, NC1L. Some 14,000 cards for 150 applicants were checked at the Hamvention/Convention.



ARRL Marketing Coordinator Bob Inderbitzen, NQ1R, sets up the League's new convention display.

Burton has been jailed twice in connection with alleged malicious interference on area repeaters. Hollingsworth noted that with fewer complaints in recent months the FCC has been able to focus on older and more complicated cases.

Hollingsworth and FCC colleague Bill Cross, W3TN, also had some fun at each other's expense during the relaxed Sunday morning FCC forum.

"As you may have noticed, Riley isn't here yet. He will be here later," Cross pointed out early in the session. "I saw the team of white horses pulling his red-and-gold carriage up Main Street."

Hollingsworth turned the tables. Responding to Cross's references to Hollingsworth's very public gaffe over the proper use of phonetics while identifying, Hollingsworth conceded he was sorry he'd raised the issue "except that it did cause Bill Cross to get a lot of questions and a lot of anxiety, and in that sense it was worth it."

Hamvention Post Mortem

"We enjoyed hosting the ARRL National Convention. It was definitely a 'plus' for Hamvention and the ARRL," said Graver, who's now looking ahead to Hamvention 2001. Exhibitors went away smiling this year, and he already has reservations in hand for next year's Hamvention. But, he conceded, topping this year's show will be "tough."

According to Graver, Hamvention 2000 handed out more than $80,000 in prizes, the banquet was a huge success and Riley Hollingsworth's address "one of the focal points," and most stayed over to enjoy the Smothers Brothers post-banquet entertainment.

"All in all, the entire amateur radio community thoroughly enjoyed this year's show and are already making plans to come back for our 50th show," he said.

All photos by the author.

By Peter H. Putman, KT2B

Digital Television: Bigger, Wider, Sharper

High-definition television is coming—and you've never seen anything like it!

There is nothing so constant as change. In the past 50 years we've moved from the single transistor to high-density integrated circuits; from desktop tube radios to palm-sized handie-talkies; from hand-keyed Morse code to high-speed packet data.

In this grand tradition of electronics evolution, the way we watch television is about to change as well—the first real change since color television was developed in the 1950s. You've probably heard about high-definition television—perhaps you've even seen a demonstration of it at your local electronics chain store. Maybe you were fortunate enough to be invited to a neighbor's house to watch a football game or prime time TV show in "HD," as it's called by the industry.

I've been following the developments in high-definition television for several years and own a widescreen HDTV set plus a couple of "set-top boxes" to decode and display the signals. To anticipate your questions: yes, it looks spectacular, and no, you won't want to watch regular television after seeing HD programming.

You've probably heard that HDTV will be the *only* way to watch television after 2006. That deadline will likely be pushed back a year or so. The truth is: Although the FCC has mandated full implementation of HDTV by that time, you won't have to throw away your old TV set because set-top converter boxes will be readily available.

Stepping Out of the Box

HDTV is really a part of a new set of television broadcasting standards known as digital television, or DTV. High-definition broadcasting was originally developed by NHK, Japan's national television network. The reason? The average room in a Japanese house is quite small, so people usually sit quite close to the TV screen. As a result, the picture scan lines are noticeable and objectionable!

Here's why. The color television broadcasting system we use in much of North America, named NTSC after the National Television Standards Committee, originally called for a maximum picture size of 20 inches (diagonally), with an optimum viewing distance of 7.1 times the screen height. For a 20-inch set that works out to a viewing distance of about eight feet. At that distance we don't see scan lines—just the images.

NHK came up with a system that packed

An image from NBC's nightly 1080i broadcasts of "The Tonight Show with Jay Leno."

As Easy as Grabbing the Remote

When digital television standards were first adopted in 1997, the news media made a big deal out of the fact that we would soon have "18 different high-definition television formats." In truth, there are only two: the 720-line system and the 1080-line system. All other systems are considered Standard Definition Television, or SDTV.

The multiple standards confusion arises because of the various refresh rates used. 1080-line signals can be transmitted with a 24-Hz progressive, 30-Hz progressive or 30-Hz interlaced rate, whereas 720-line signals can be transmitted with 24, 30, and 60-Hz progressive-scan refresh rates (as can 480i and 480p signals).

In truth, it doesn't matter which rate is transmitted by a given DTV station. DTV-ready sets and set-top boxes will be able to decode and display any of these signals automatically. All you'll need to do is lift the remote and change channels! A complete list of the DTV transmission standards follows.—*KT2B*

Network	*HDTV Standard Chosen*	*SDTV Standard Chosen*
CBS	1080 interlaced, 30 Hz	480 interlaced, 60 Hz
NBC	1080 interlaced, 30 Hz	480 progressive, 60 Hz
ABC	720 progressive, 60 Hz	480 progressive, 60 Hz
FOX	720 progressive, 60 Hz	480 progressive, 30 Hz
PBS	1080 interlaced, 30 Hz	480 interlaced, 60 Hz

nearly 2.5 times as many picture scan lines into a smaller area. Because of that, recommended viewing distances could shrink to only 3.1 times the screen height. In addition, a wider picture aspect ratio (width compared to height) made it possible to show more detail, resulting in more life-like images.

And that is what sets HDTV apart from everyday TV broadcasts—sharper images with a wider field of view. When most people see HDTV broadcasts for the first time, they're usually amazed at the picture quality. Movies look better. We see more of the action. Live sporting events are so detailed that you'd swear you're sitting in the stands watching the game.

The present HDTV system has little in common with the older Japanese system. For one thing, it's digital. For another, it can incorporate multiple audio tracks, including Dolby surround sound. Data can also be broadcast along with the signal for specialized applications such as on-line shopping. Broadcasters can even pack several sub-channels into one main channel.

Nuts and Bolts

Let's take a moment to see what makes digital television broadcasts so much better than regular television. In the NTSC system, electronic images are drawn by an electron gun inside a picture tube. This beam scans a complete image 30 times each second, using an *interlaced* scanning technique.

What this means is that the total number of scan lines in each TV picture—525, to be exact—are scanned in two fields. The first series of scans (known as the "odd" field) starts at the top of the picture and traces every other scan line starting with line 1 and proceeding to lines 3, 5, 7, 9 (etc) until reaching the bottom of the picture.

The electron beam then moves back to the top of the image and begins to scan the even-numbered scan lines (the "even" field) from top to bottom. Once the last even-numbered scan line is traced, the image is complete. The entire process of odd and even scans takes $^1/_{30}$ of a second, with each field being scanned (or "refreshed") in $^1/_{60}$ of a second.

Although there are 525 scan lines, we only see about 480 lines. The rest are used to carry picture blanking and synchronization information. The electron beam scans at a frequency of 15.75 kHz, which is the North American standard. You've probably noticed that some TV pictures seem to flicker, especially when lines of text appear on screen. This is a bandwidth-related picture artifact caused by interlaced scanning. We've put up with it since TV's earliest days.

Our present television channels require about 4.2 MHz to accommodate the width of the picture carrier. With guard bands, each TV channel occupies about 6 MHz. The only way to fit a TV signal with a 15.75-kHz scan rate and a 30-Hz picture refresh rate into such a small bandwidth is to use an interlaced scan. Scanning the image progressively—starting at line 1 and proceeding through all 525 lines in sequence each time the picture is refreshed—would require twice the bandwidth, or about 10 to 12 MHz per channel.

There's another "trick" in the tale. Television broadcasts first started as black-and-white signals that simply transmitted luminance information to define the picture. When color was added in 1953, the system had to be backward-compatible for those viewers who didn't own or wouldn't buy color TVs. As a result, a subcarrier known as the color burst signal was added to ride along with the luminance information, creating a composite (one wire) video signal.

Your TV set decodes and separates the color and luminance information, which can be challenging at times. Ever see a television anchorman's tie or suit appear to "shimmer" with color? That's an artifact of composite video decoding. It's annoying, but we've also learned to live with it.

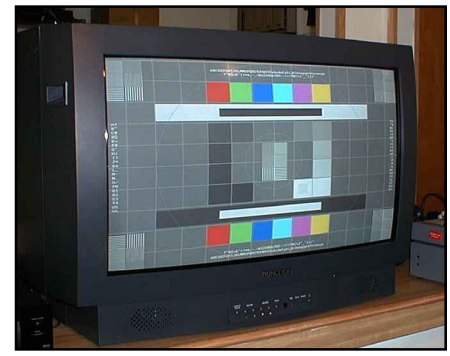
The Next Step

Digital television was intended to solve these problems, among others. The new system not only provides for an interlaced scan; it also allows for several progressive-scan formats. Your computer monitor uses progressive image scanning, and it shows a noticeable improvement in image quality over regular television.

Unlike NTSC broadcasts that use composite video signals, the new DTV standards keep the color and luminance information separate at all times (no more shimmering ties or suits). These two improvements alone—progressive image scanning and higher-quality color encoding and decoding—make the switch to digital television worthwhile.

The icing on the cake is the increased definition in DTV images. Depending on the particular broadcast network, DTV signals are being transmitted with 480 interlaced picture lines (known as 480i and similar to our current system), 480 progressively-scanned picture lines (480p), 720 progressively-scanned picture lines (720p), and even 1080 interlaced picture lines (1080i). The 1080 format represents a 2.25× improvement in resolution over our 525-line system.

Several of the DTV standards provide for a wider TV picture. Both the 720-line and 1080-line systems use a rectangular picture that has an aspect ratio (ratio of width to height) of 16:9. That's a field of view closer to real life. In contrast, our current TV pictures are almost square, with a 4:3 aspect ratio.



This Princeton 32-inch wide-screen TV can also be used to show DTV and HDTV signals.

Pioneer's 50-inch plasma-screen TV is only 4 inches thick and weighs less than 90 pounds. It can be used to show DTV and HDTV signals.

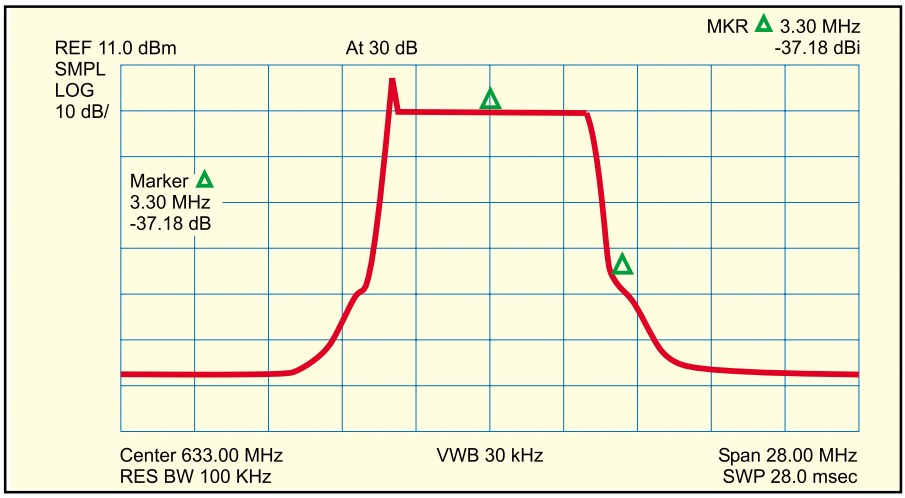
A plug-in-play unit from Pinnacle Systems lets you watch DTV broadcasts on your personal computer for $399!

If you're wondering how engineers can possibly fit an image with that much resolution and progressive scanning into a 6-MHz channel, the answer is digital compression.

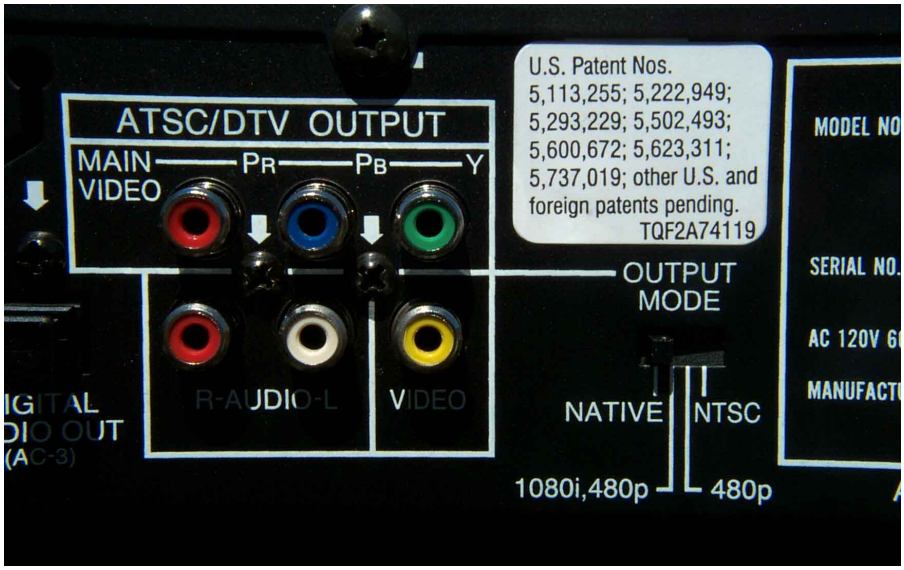
Packin' Those Packets

DTV signals are 100% digital in nature. Unlike our present analog TV systems, there is no amplitude-modulated video carrier with frequency-modulated audio subcarriers. Instead, a modulation technique well-known to hams—vestigial sideband—carries the digital video and audio signals.

This modulation scheme (Eight-Level



This spectrum analyzer display shows a "clean" DTV signal from channel 24 in San Francisco. Note the almost perfectly level carrier wave from left to right. The small "spike" at the left side is the pilot, which enables a DTV receiver to lock-on to the signal.



This rear view of the Panasonic TU-DST51 digital TV receiver shows the three DTV signal connections. They are usually color-coded green, blue, and red. Notice the DTV format selector switch. There's also an optical connection for Dolby 5.1 surround audio.

Vestigial Sideband Modulation, or 8VSB for short) was developed by Zenith and promoted by the Grand Alliance, a consortium of manufacturers led by Zenith. The Grand Alliance came into existence in the 1990s when several proposed digital TV standards were being debated by the FCC, including the older analog standard used in Japan since the late 1970s.

As you probably know, compression is the magic behind storing music on compact discs (CDs), watching high-quality movies on digital video discs (DVDs) and managing large call volumes on the digital cell phone networks.

An HDTV image with 1080 scan lines requires a data stream of over 1.2 gigabits per second (Gb/s)! And that's using an interlaced picture scan. Uncompressed, such a signal would require a TV channel more than 200 MHz wide. Through the magic of signal compression, a 1080-line interlaced signal can be compressed 51:1 to a data stream of only 19.4 megabits per second (Mb/s).

A 720-line progressive signal would need to be compressed 46:1 to achieve the same data rate, while a 480-line progressive signal would need to be compressed by about 16:1. Obviously, the data compression/expansion programs must have a lot of error checking and use a high level of nearly lossless compression!

We're on the Air

Guess what? This 19.4 Mb/s signal—which also contains all of the audio and synchronization information—*does* fit in the bandwidth occupied by an existing 6-MHz TV channel. History repeats itself! In effect, we've designed a television system for the 21st century while accommodating 50-year-old broadcast channel allocations.

The plan is to have all analog TV broadcasts cease by 2006, at which time those TV channels will "go dark" and be re-allocated by the FCC for other spectrum uses. While most of the new digital channels are in the UHF TV band, there are a few DTV assignments in the existing VHF (channels 2-13) TV spectrum. But these broadcasts will eventually move to UHF.

Here's another benefit to digital television. Sophisticated digital signal processing, digital filtering and error-checking circuits can separate signals from background noise and interference much better than analog TV sets can. As a result, digital signals require only 15 dB signal-to-noise (S/N) ratios for perfect reception—no ghosts, static or interference.

That means that broadcasters can use less transmitter power, which in turn should free more spectrum space. This doesn't mean you won't experience drop-outs or "hits" every once in a while (drop-outs are pixilated freeze-frame images). DTV signals *are* susceptible to multipath reflections and atmospheric conditions, but major complications from these factors should be rare.

It doesn't take much of an antenna to receive DTV broadcasts. I use an off-the-shelf UHF antenna from Channel Master (model 4221, $19.99). My QTH is about 25 air miles from the broadcast towers in Philadelphia. I can regularly watch digital broadcasts on KYW-DT (CBS, channel 26, 1080i), WPVI-DT (ABC, channel 64, 720p), WTXF-DT (Fox, channel 42, 480p) and WHYY-DT (PBS, channel 55, 1080i). Even at a distance of 65 miles from their antenna sites, I receive good images from WCBS-DT and WNYW-DT in New York City.

The local NBC station, WCAU-DT, is also broadcasting a 1080i digital signal on Channel 67. In some areas, cable systems are starting to carry DTV channels, and there are even satellite television broadcasts in HDTV from HBO and Showtime.

At present, most DTV programming is simply a digital version of what's being broadcast on each station's analog channel. Many sporting events, movies and even a few sitcoms and hourly dramas, however, are broadcast in the 16:9 widescreen format. This year's Super Bowl and the NHL All-Star game were transmitted in 720p by ABC for those lucky enough to receive and watch the signal.

Want to watch DTV? You'll need to get a DTV-ready TV set (about $2500 for the cheapest versions) with a built-in DTV decoder or pick up an external set-top decoder (from $650

to $1000). The decoders are about the size of a VCR. Some allow you to watch the DTV and HDTV broadcasts on your regular TV (requires a TV with a composite or S-video input). You can also connect the set-top box through your VCR to watch the signals.

Yes, today's prices are quite high. But you can be sure they'll drop quickly! The first color television sets would have cost more than $5000 in today's dollars—yet today you can pick up a 27-inch color set for about $300. VCRs have also plummeted in price, and even DVD players can be purchased for a lot less than $200. DTV sets and decoders will follow suit.

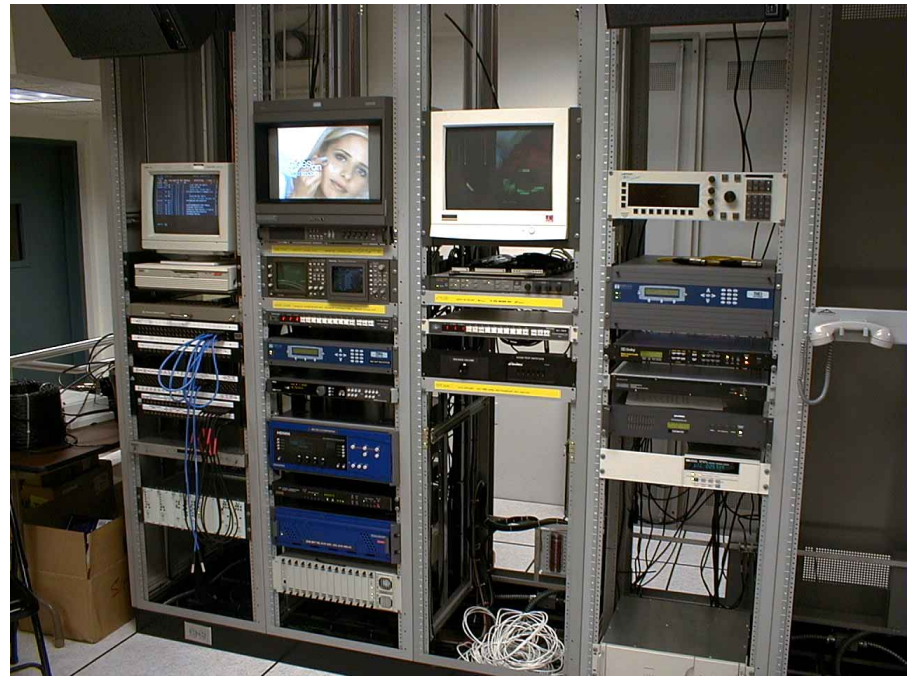
Other Goodies

Having a digital television broadcast system opens up a world of new opportunities. Thanks to the aforementioned data compression, multiple TV broadcasts can be sent on the same channel. You'd be able to watch a sporting event in 16:9 widescreen or 4:3 format. Not into sports? Tune in the third DTV sub-channel for a sitcom or talk show.

If you are really into TV and have put together a nice sound system you'll be able to decode and play back surround-sound audio broadcasts on your existing system. You may also be able to receive data transmitted along with the broadcast that could allow you to order a particular product you saw on a program, such as a car, clothing, a computer or even a pizza with all the toppings.

As I write this (mid-February) there are nearly 100 DTV stations listed as being "in operation" by the nonprofit, Washington, DC, based Advanced Television Standards Committee. Surprisingly, many smaller TV markets have more channels on the air than their larger counterparts.

Philadelphia, Los Angeles and San Francisco have at least five full-time DTV broadcasters, while New York City has only two and Chicago but one—and the Chicago station isn't even on the air most of the time because of ongoing antenna tests. Of course, this will all change in the coming months.



This equipment rack is the main DTV control point and studio-transmitter link (STL) for Philadelphia DTV station WCAU-DT, broadcasting on channel 67.

The FCC has set a target of having 200 operational DTV stations on-air this year.

Want to know more? There are several Web sites you can check for breaking news about DTV. For a detailed list of stations, try **http://www.nab.org/pressrel/DTVStations.asp**. For news about HDTV, the ATSC has several press releases on its site at **http://www.atsc.org** (you can also get details from the FCC Web site at **http://www.fcc.gov**). More news can be found at the HDTV Magazine site at **http://www.web-star.com/hdtvmagazine/menu.html**.

I maintain several articles on digital television and HDTV on my own site at **http://www.projectorexpert.com**. The Consumer Electronics Manufacturers Association (CEMA) has information on its web site at **www.cemacity.org**. Another excellent information and product review site is Etown.com, an on-line consumer electronics magazine at **http://www.etown.com**.

Check these sites out and start getting ready for digital television—because 2006 will be here sooner than you think!

*Pete Putman, KT2B, has been licensed since 1970 and was an avid VHF/UHF/microwave operator and contester for many years. He operates ROAM Consulting, Inc, based in Doylestown, Pennsylvania. ROAM works with manufacturers of electronic displays and presents seminars on display technologies for commercial and consumer audiences. Pete writes for several trade journals (*Video Systems, Millimeter, Sound and Video Contractor*) and Etown.com. He is a member of the Society of Motion Picture and Television Engineers (SMPTE) and the International Communications Industry Association (ICIA). You can contact Pete at 4180 Hilltop Circle, Doylestown, PA 18901-5608;* **kt2b@projectorexpert.com**

NEW PRODUCTS

SATELLIT 800 SHORTWAVE RECEIVER FROM GRUNDIG

◊ Lextronix Inc, exclusive North American distributor of Grundig shortwave receivers, has recently announced the Grundig Satellit 800 Millennium shortwave receiver.

The Satellit 800 was engineered through a partnership with the R.L. Drake Company. The new receiver covers the AM and shortwave bands from 100 kHz to 30 MHz, the 87-108 MHz FM broadcast band and the 118-137 MHz VHF AM aircraft band.

Mode capabilities within the shortwave range include AM (with synchronous detection) and upper and lower single sideband. Stereo FM Broadcast reception is supported and can be enjoyed using an included set of stereo headphones or by connection to hi-fi equipment through the line-out jacks on the back panel.

The receiver features a built-in 4-inch dynamic speaker, a telescopic antenna, separate bass and treble controls, and a retractable carry handle.

Other highlights include a large LCD display, a direct frequency input keypad, dual 24-hour clocks, a timer, a switchable attenuator, selectable bandwidths, 70 frequency memories, an analog S meter, fast and slow AGC settings and analog-like tuning.

Power is supplied by six D batteries, an external 9 V dc source or by connecting the included multi-voltage ac adapter. Enclosure dimensions are approximately 9½ × 20½ × 8 inches (HWD). The Satellit 800 weighs 14 lbs.

Price: $699.95.

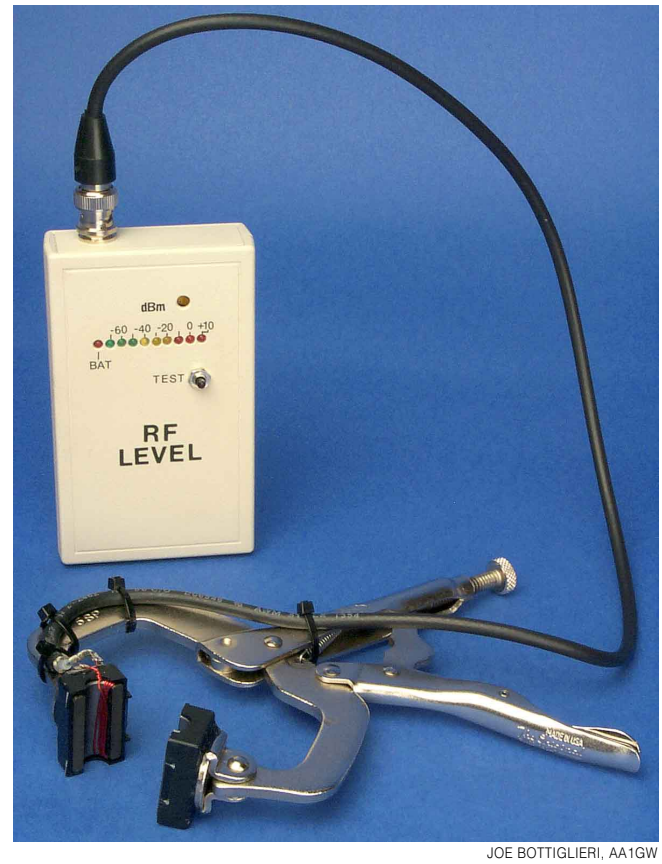
For additional information visit your favorite shortwave radio products dealer or contact Lextronix Inc, 3520 Haven Ave, Unit L, Redwood City CA 94063; tel 800-872-2228; fax 650-361-1724; **http://www.grundigradio.com**.

Next New Product

By Rick Littlefield, K1BQT

A Wide-Range RF-Survey Meter

Find and measure the presence of RF energy over a 500-MHz range with this inexpensive, easy-to-build meter.



JOE BOTTIGLIERI, AA1GW

This handy RF-survey meter measures signal levels from −70 dBm to +10 dBm over a 500-MHz frequency range. The detector's wide response and pocket-size portability make it useful for design work and bench-testing, RFI hunting, EMR hazard detection, fox-hunts, surveillance sweeps and many other tasks around the shack and in the field—and it's cheap and easy to build!

Circuit Description

The heart of this project is U1, Analog Device's AD8307 wideband detector IC (see Figure 1). This eight-pin device is a specialized instrumentation chip that accurately reads RF levels over a huge 92-dB signal range, then generates a 0.5 to 2.5-V dc log-output signal to drive a signal-strength indicator. It works a bit like the RSSI (received signal-strength indicator) feature found on many FM receiver ICs, but covers a frequency range spanning VLF to over 500 MHz with a virtually flat response.[1] The IC's logarithmic output is important because it permits us to use a linear-scale voltage display to indicate signal strength in decibels (dB) or decibels referenced to a milliwatt (dBm)—just like a spectrum analyzer.

U1's output feeds an LM3914 LED driver (U2) that controls the meter's 10-segment color-coded LED array. The first LED lights with no signal present to function as a power-on and battery status indicator. The remaining nine LEDs illuminate sequentially, in 10-dB increments, as signal input increases over U1's 90-dB measurement range. U2 is configured in the bargraph mode, which means the LEDs illuminate collectively as the reading increases. This mode draws a bit more operating current than the single-LED mode, but yields a far more colorful and easy-to-read display. To compensate for increased current drain, a momentary press-to-test power switch is used to conserve power anytime measurements aren't being taken. I chose the solid-state LED array over an electromechanical meter because it delivers sufficient accuracy for casual survey work, and because it is virtually bulletproof.

Do you need greater resolution? The AD8307's accuracy is within 1 to 2 dB over its entire dynamic range and could be used to drive a more sophisticated display consisting of a dc-amplified large-scale meter or a recalibrated DVM module. For more complete technical information, data sheets and application notes are available at Analog Device's Web site: **http://www.analog.com/logamps**.

Construction

Nearly all of the parts required to build this project are readily available at your local RadioShack store or can be ordered via RadioShack's Web site **http://www.radioshack.com**. PC boards are available from FAR Circuits,[2] and single quantities of the AD8307s can be purchased from me.[3]

Assembling the meter is simple. The only tricky operation I encountered was mounting the LEDs at the correct height to mate with the panel openings. I solved this problem by making a small spacer-gauge from a scrap of PC board and slipping it under each LED during soldering. Spacing may vary slightly, depending on the LED manufacturer. The LED array is much easier to make if all the diodes are manufactured by the same company and have identical case styles. When mounting capacitors, lay C5 on its side so it clears the front panel. Use caution when installing U1. The AD8307 is static-sensitive, so use a wrist strap, a grounded soldering iron and standard CMOS-IC handling precautions.

Testing and Final Assembly

Perform the initial testing and calibration before mounting the PC board in its case. Attach a fresh 9-V battery to the snap clip. If you don't have a precision signal generator available, apply power and adjust the **ZERO** trim pot (R2) so only the first red LED illuminates. This will provide a rough calibration, and your meter will be

[1]Notes appear on page 44.

A Current Probe for the RF-Survey Meter

This little meter can be a useful accessory for the home experimenter. Microwattmeters can be quite expensive, even if they're used equipment. For example, this meter can be used to indicate the power from an LO in a receiver or transmitter design.

Microwattmeters also have other uses. With a small whip antenna (ie, a "rubber ducky"), the meter can be used as a relative field-strength indicator. With a rubber ducky, W1AW's signal registered at about half scale as I wandered, meter in hand, around ARRL HQ and the grounds. (HQ staff are used to seeing Lab personnel running around doing all sorts of weird things.) Be careful not to place the meter too close to an antenna, though; it is possible pick up too much RF and possibly damage the meter.

Several companies now sell hand-held current probes based on technology similar to that used in this project. Those probes have a current probe composed of a small clamp-on ferrite bead wrapped with a few turns of wire. The meter then can be used to accurately measure small RF currents and as a relative indicator of the amount of RF noise present on computer cables, the outside of a coaxial cable, telephone wiring, etc.

The commercial units I've seen have the ferrite probe mounted directly on the meter. Although this is handy, it can make the meter awkward to use in tight quarters. To measure noisy cables, I want something a bit more portable. I considered using various spring-type clamps available at hardware outlets, but they all seemed far too springy. As I strolled through the tool department at Lowe's, the Vise Grip clamp shown in Figure A caught my eye. The flat parts of the clamp seemed perfectly suited to the task I had in mind. The ferrite beads with plastic covers used here are available from Palomar Engineers, PO Box 462222, Escondido, CA 92046; tel 760-747-3343; **palomar@compuserve.com**, **http://www.palomar-engineers.com/** and from RadioShack (RS 273-104).

To build the probe, first trim the latch on the ferrite bead's plastic housing so that the sections no longer snap together. Use a few dabs of epoxy to hold each half of the bead to the Vise Grip clamp, as shown in Figure B. (Be careful not to get any glue on the ferrite material.) The clamp's flat sections are perfectly suited for this arrangement; other clamps don't have these flats. Once the glue sets, carefully pry out one ferrite section from the plastic housing. Wrap three to five turns of small enameled wire (#28 will do) on the bead half, leaving about $^3/_8$ inch of wire for leads. Using a small dab of glue to hold it in place, press the bead back into its housing.

Remove about $^3/_{16}$ inch of insulation from each of the probe's wire ends and solder them to a short length of RG-58 coaxial cable. Cover each lead connection with a length of heat-shrink tubing or insulated sleeving. Install a BNC male connector at the cable's other end. I used a couple of small plastic ties to secure the coax to the clamp; see Figures A and B. (For photographic purposes, I didn't add the heat-shrink tubing.) The probe is now ready to use.

To use the probe, adjust the Vise Grip clamp carefully so that the probe's ferrite sections *just* close when the clamp is squeezed. (Excessive closing pressure may damage the ferrite sections. Once the proper adjustment point is reached, consider locking the adjustment screw in place with epoxy or using a jam nut.) Clamp the probe over the cable you're checking. With four turns of wire on the bead, the cables on several computers at HQ just lit the meter's yellow LEDs. Significantly noisier computers lit the meter's red LEDs, indicating that those cables could be a source of RFI. If desired, you can calibrate the probe/meter combination using a signal generator and a 47-Ω resistor to create a known current.

Microwattmeters can be useful pieces of test equipment for the RF designer. New microwattmeters cost several thousand dollars. This project can get you nearly the same performance at a lot lower cost.—*Ed Hare, W1RFI, ARRL Laboratory Supervisor*

Table 1
Signal levels falling within the survey meter's range span a 90-dB range.

Power (dBm)	*Power (W)*	*Approximate Potential Across 50 Ω*
+10	10 mW	1 V
0	1 mW	300 mV
−10	100 µW	100 mV
−20	10 µW	30 mV
−30	1 µW	10 mV
−40	100 nW	3 mV
−50	10 nW	1 mV
−60	1 nW	300 µV
−70	100 pW	100 µV

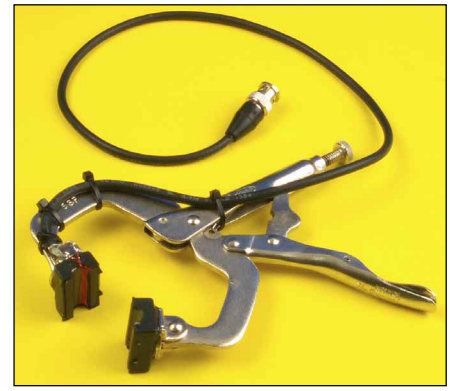


Figure A—A handy probe is made by attaching the two halves of a modified ferrite core to a Vise Grip clamp. Plastic ties secure the cable to the clamp.

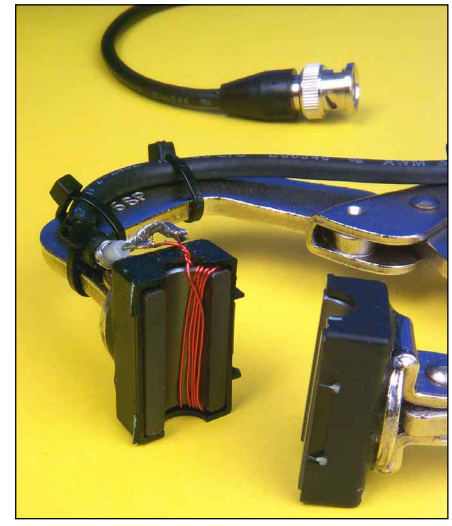


Figure B—Close up view of the modified ferrite core wound with a few turns of enameled wire.

reasonably accurate for most survey tasks.

If you have access to a signal generator, install two short leads on the BNC connector and tack-solder them temporarily to the PC-board-input connections. With power applied and nothing connected to the BNC connector, adjust R2 so the first LED illuminates. Then, set the generator for CW output at 100 MHz and connect its patch cable to the BNC jack. Reset R2, as needed, so the last LED just illuminates with +10 dBm of signal applied. When calibrated, reducing the generator's output in 10-dB increments should extinguish one LED per step. If the bargraph reading doesn't change reliably with each step change between +10 and −60 dBm, reset R2 slightly until it does. Note that the low-level green LED (−70 dBm) may remain on continuously because of stray RF pickup on the generator cable.

Once alignment is complete, remove the BNC connector and install the PC board in its case. Secure the PC board in position by the **POWER** switch, omitting the switch's lock washer when installing. Make sure all LEDs are seated in the case openings before fully tightening the switch's mounting nut. Install the BNC connector in its panel and, using short leads, permanently connect it to the PC board.

Operation

Avoid connecting this meter to signal sources more powerful than +20 dBm (100

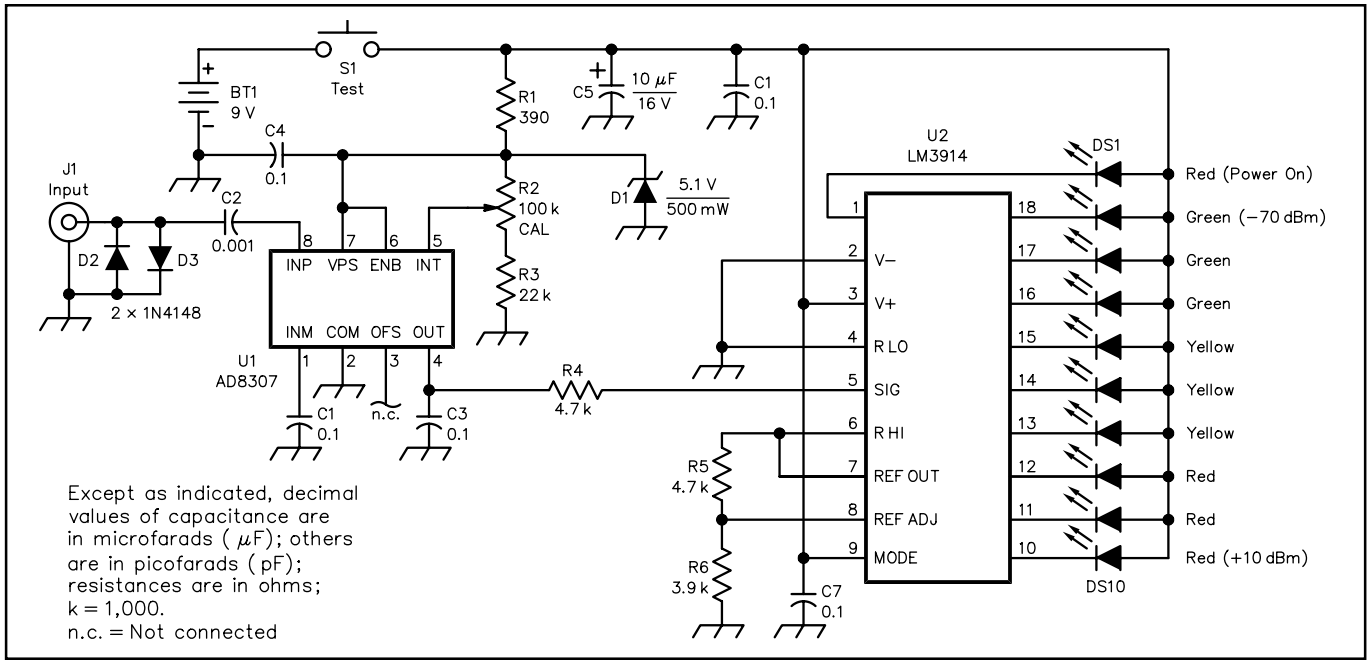


Figure 1—Schematic of the RF-survey meter. Unless otherwise specified, resistors are 1/4-W, 5%-tolerance carbon-composition or film units. Part numbers in parentheses are RadioShack; numbers with 900 prefix are for RadioShack's on-line catalog (http://www.radioshack.com). Equivalent parts can be substituted; n.c. indicates no connection.

C1, C3, C4, C6, C7—0.1 µF disc ceramic
C2 —0.001 µF disc ceramic
C5—10 µF, 16 V electrolytic or tantalum
DS1, DS8-DS10—3 mm LED, red (900-6085)
DS2-DS4—3 mm green LED (900-6086)
DS5-DS7—3 mm yellow LED (900-6087)
D1—1N5231B, 5.1 V, 500 mW Zener diode (900-3088)
D2, D3—1N4148
J1—BNC chassis mount connector (RS 278-105)
R2—100 kΩ, 6-mm horizontal-mount trim pot (RS 271-284)
S1— SPST momentary, normally open switch (RS 275-1571)
U1—Analog Devices AD8307
U2—National LM3914 (900-6840)
Misc: Case—2 3/4×4 5/8×1-inch (HWD) box with 9-V snap clip (RS 270-211)

mW) without first installing an attenuator or sample tap to reduce the input to a safe level. To operate your meter, press the **TEST** switch and observe the bargraph display. If the lowest segment fails to illuminate, check the battery condition before proceeding. The meter draws approximately 20 mA (depending on how many LEDs are lit), so frequent use will necessitate periodic battery replacement.

When making measurements, remember this is a basic survey tool designed for gathering ballpark indications rather than precise data. Also, as with any broadband device, it cannot discriminate between narrowband and wideband energy sources or tell you the frequency of an applied signal. Finally, remember that the dBm is a unit of RF power referenced to a 50-Ω load. The unterminated input impedance of U1 is approximately 1 kΩ at 100 MHz, so readings taken across unknown loads will be *relative* indications that are comparable in dB, but not absolute values in dBm.

Summary

This simple hand-held project uses a low-cost instrumentation IC to detect the presence of RF energy over a 500-MHz range. Approximate signal intensity is displayed on an easy-to-read LED display, and a wide range of sampling attachments may be used for picking up signals. I find I use it often, both on the bench and in the field, whenever I need a quick "reality check" for the presence of RF. It's especially useful for tracking down RFI sources, as Ed (W1RFI) Hare's sidebar, "A Current Probe for the RF-Survey Meter," illustrates.

Notes

[1]Rick Littlefield, K1BQT, "The Analog Devices AD8307 92-dB Logarithmic Amplifier," *Communications Quarterly,* Summer 1999, pp 77-80.

[2]A PC board is available from FAR Circuits, 18N640 Field Ct, Dundee, IL 60118-9269, tel 847-836-9148 (voice and fax). Price: $4 plus $1.50 shipping for up to four boards. Visa and MasterCard accepted with a $3 service charge; **http://www.cl.ais.net/farcir/**.

[3]Contact the author for information.

Rick Littlefield, K1BQT, is an Extra Class licensee and active ham since 1957. An avid builder, RF-product designer and author, he's written for a wide range of Amateur Radio publications since 1969, and was inducted into the QRP-ARCI Hall of Fame in 1996. Rick holds a Master's Degree from the University of New Hampshire and currently works as a technical writer in the electronics industry. You can contact Rick at 109A McDaniel Shore Dr, Barrington, NH 03825; **k1bqt@aol.com**.

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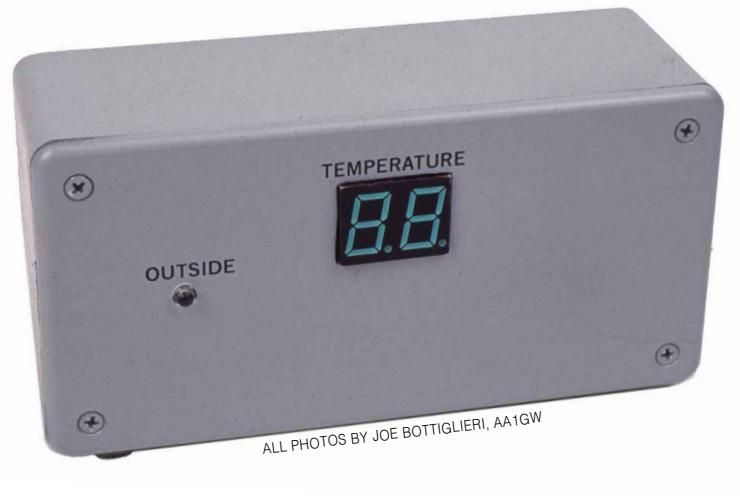
Next New Product

By Bert Kelley, AA4FB

Build An Indoor-Outdoor Thermometer for Your Shack

Buying ready-made shack accessories is easy to do, but you miss the fun of building. Capture some of that fun with this project!

Sure, I could have gone to the local electronics store and bought a ready-made LCD thermometer, but that's contrary to the builder in me! All builders derive satisfaction in creating something useful for the shack or home. This thermometer sports a bright display that can be seen easily day or night. Add good accuracy and ease of construction and you can understand why I enjoyed designing and building this accessory. I think you'll enjoy it, too!



ALL PHOTOS BY JOE BOTTIGLIERI, AA1GW

A dual seven-segment display provides temperature readout. An LED labeled OUTSIDE illuminates when that corresponding temperature is being displayed.

Circuit Description

Refer to Figure 1. The thermometer uses two LM34CZ sensors, one for measuring the temperature *inside* the shack, another for measuring the temperature *outside* the shack.[1] To do this, the sensors convert the temperatures to dc voltages. The voltages produced by these sensors vary by only 10 mV (0.01 V) per degree Fahrenheit. The voltages are amplified, then converted by two analog-to-digital converters (ADCs) in a *programmed* PIC, U1.[2] I selected the 16C71 PIC specifically for its ADCs. The ADC outputs are represented as a digital word that changes each time the ADC input changes by 19.6 mV. This, in turn, causes the temperature display to change one degree. The LED display (DS1) slowly alternates between showing the inside and outside temperatures. When the outside temperature is being displayed, an LED (DS2) mounted on the front panel lights. When DS2 is off, the inside temperature is shown.

The Fahrenheit temperature scale we use in the US is one of the peculiar ways of expressing measurement quantities we have inherited. When the temperature goes below 0° F, the numbers go negative and should be so indicated. For related reasons, this thermometer displays temperatures only between +1° to +99° F even though the sensors are capable of a wider range.

When you consider that it takes a sensor-voltage change of only 0.01 V to alter the thermometer reading one degree, you can see that this voltage must be handled carefully. The sensor output is multiplied by a factor of two (more accurately, by 1.96) to meet the PIC ADC requirements. Most op amps don't like input-signal voltages near their upper- and lower-voltage rails, ie, near ground and +5 V. To keep all input signals above the ground rail, the thermometer uses the circuit shown in Figure 2. By comparing Figures 1 and 2, you can see that a regulated bias voltage (about +1.55 V) is applied to the **GROUND** terminal of each LM34CZ sensor. This raises the sensor's output voltage to a value suitable for use with the LM358 op amp (U4). Calibration trimmers on each op-amp's noninverting input keep things simple. The op amp inverts the signal, but software in the PIC compensates by inverting it again.

The calibration trimmers add a small offset voltage to the op amp inputs to compensate for variable parameters such as re-

A rear-panel view of the prototype thermometer. At the center of the panel is the buzzer. The outside and inside temperature-probe jacks are at the bottom left. A push-button switch for the optional Morse code output is centered above the speaker. To the right of the push-button switch is one of the ventilation holes. The dc-input jack is at the lower right of the panel.

[1]Notes appear on page 48.

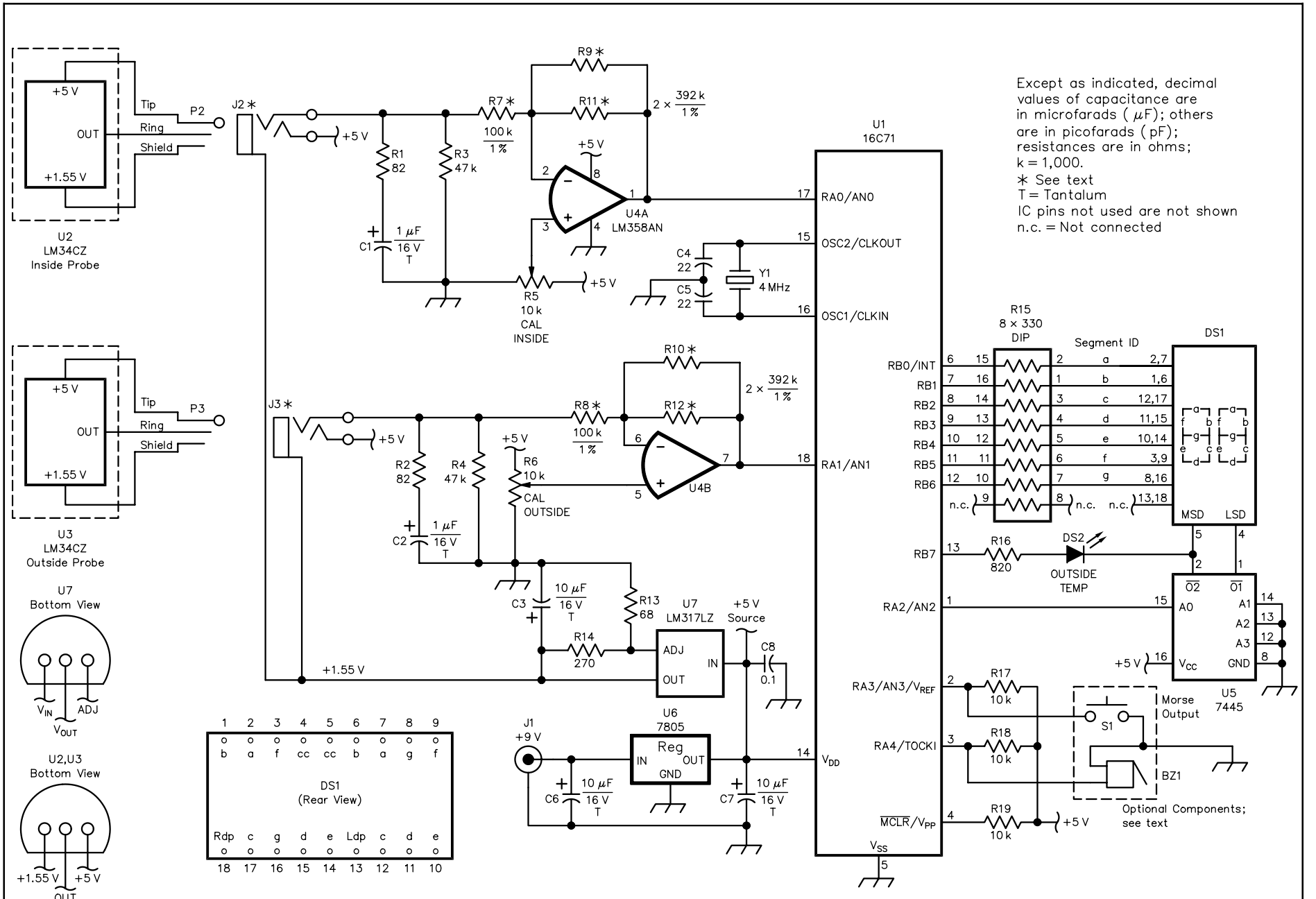

Except as indicated, decimal values of capacitance are in microfarads (μF); others are in picofarads (pF); resistances are in ohms; k = 1,000.
∗ See text
T = Tantalum
IC pins not used are not shown
n.c. = Not connected
U1
16C71
U2
LM34CZ
Inside Probe
U3
LM34CZ
Outside Probe
U4A
LM358AN
U4B
U5
7445
U6
7805
U7
LM317LZ
U7
Bottom View
U2,U3
Bottom View
DS1
(Rear View)
R15
8 × 330
DIP
Segment ID
Morse
Output
Optional Components;
see text
OUTSIDE
TEMP
CAL
INSIDE
CAL
OUTSIDE
+5 V Source
MSD
LSD

Figure 1

Figure 1—Schematic of the homemade indoor/outdoor thermometer circuit. Unless otherwise specified, resistors are 1/4-W, 5%-tolerance carbon-composition or film units. Equivalent parts can be substituted; n.c. indicates no connection. RS part numbers in parentheses are RadioShack; Jameco Electronics, 1355 Shoreway Rd, Belmont, CA 94002; tel 650-592-8097, domestic fax, 800-237-6948, international fax, 650-592-2503; info@jameco.com; http://www.jameco.com; Digi-Key Corp, 701 Brooks Ave S, Thief River Falls, MN 56701-0677; tel 800-344-4539, 218-681-6674, fax 218-681-3380; http://www.digikey.com. Resistors: Except for R9 through R12, all resistors are contained in the RS 271-312 assortment.

BZ1—Optional piezo buzzer element (RS 276-073)
C1, C2—1 µF, 16 V tantalum (Jameco 154860 or RS 272-1434)
C3, C6, C7—10 µF, 16 V tantalum (Jameco 94078 or RS 272-1436)
C4, C5—22 pF ceramic (Jameco 15405 or from RS 272-801)
C8—0.1 µF ceramic (Jameco 151116 or RS 272-109)
DS1—Common-cathode, 0.56-inch, dual 7-segment green display (Digi-Key P-359; Jameco 24707 is similar except the display is red.)
DS2—Green LED (RS 276-304; or use red RS 276-307)
J1—Power jack with two #2 machine screws and nuts (RS 274-1565)
J2, J3—1/8-inch three-circuit (stereo) jacks (RS 274-249)
P1—Part of wall-mount power supply; mates with J1
P2, P3, 1/8-inch three-circuit (stereo) plugs (RS 274-284)
R5, R6—10 kΩ multiturn trimmer (Jameco 41822 or RS 271-343); see text.
R7, R8—100 kΩ, 1% tolerance (Digi-Key 100KXBK) or select the value using an accurate ohmmeter. See text.
R9-R12—392 kΩ, 1% tolerance (Digi-Key 392KXBK) or select the value using an accurate ohmmeter. See text.
R15—330-Ω DIP resistor array (Jameco 108572). The resistor array can be replaced by six individual 330-Ω, 1/4-W resistors installed in the R15-socket area.
S1—Optional momentary contact push-button switch (Jameco 26622 or RS 275-1556)
T1—Pri: 120 V ac; sec: 9 V, 200 mA, center positive wall transformer (Jameco 100845)
U1—*Programmed* 16C71; see Note 1. *Unprogrammed* IC (Digi-Key PIC16C71/JW)
U2, U3—LM34CZ precision Fahrenheit temperature sensor (Digi-Key LM34CZ or Jameco 107094)
U4—L358AN dual op amp (Jameco 120862)
U5— SN7445 BCD to decimal decoder (Jameco 50403)
U6—7805T 5-V, 1-A positive-voltage regulator TO-220 case (Jameco 51262 or RS 276-1770)
U7—LM317LZ adjustable positive-voltage regulator (Jameco 23552)
Y1—4-MHz low-profile crystal (Jameco 137832 or Digi-Key CTX402)
Misc: Enclosure 3×6×2 inch HWD (RS 270-1805); self-stick rubber feet for cabinet (RS 64-2346); 50 ft three-conductor wire (RS 278-871); optional trimmer adjustment tool (Jameco 153314); one 18-pin soldertail socket (RS 276-1992 or Jameco 112230); one 24-pin soldertail socket (Jameco 112264); two 16-pin soldertail sockets (RS 276-1998 or Jameco 112221); one 8-pin soldertail socket (RS 276-1995); four 3/8-inch-long spacers, #4-40 inside thread (Jameco 165538); hardware; contact or epoxy cement for mounting one end of each spacer; four #4-40, 1/4-inch-long machine screws for spacers.

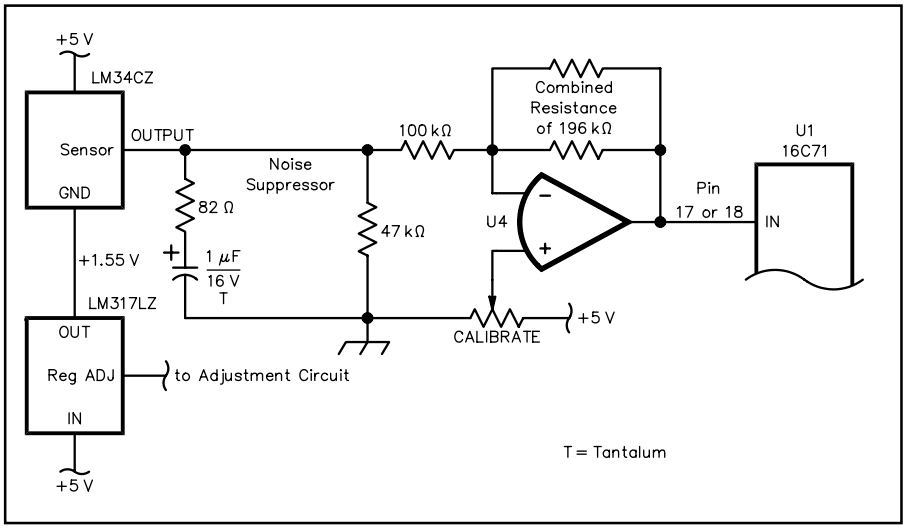


Figure 2—To keep any input signal above the ground rail, I used the basic circuit shown here. See the text and compare this fundamental circuit with that of Figure 1.

sistor value variances or slight differences among the sensors themselves. It is possible to add too much or too little offset. If that occurs, the op-amp output is forced to work near one of the supply rails, precisely the condition that we want to avoid. To prevent the offset voltage from being too high or low, the software in the PIC detects the condition and shuts off the display (DS1). If the offset is anywhere near the proper voltage, the display lights so it can be calibrated to match the reference thermometer reading. Calibration (discussed later) is a one-time adjustment. (When you turn on the thermometer for the first time, the display will probably not illuminate because a calibration trimmer needs adjustment.)

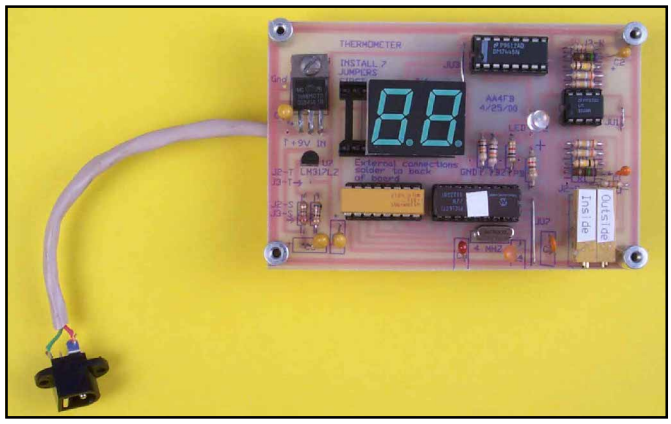
An optional Morse code temperature readout is available; it requires but two additional components, S1 and BZ1. Although included specifically for visually impaired hams, this readout is usable by anyone, as when you might need to have your eyes turned elsewhere.

Construction

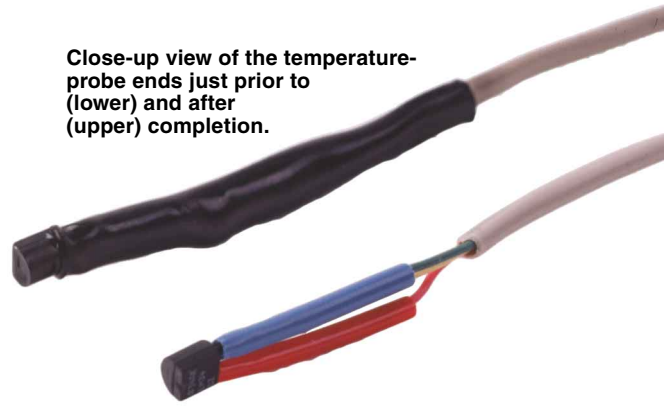
The display is housed in a plastic RadioShack project box. The box is fitted with self-sticking feet and looks great even when unpainted. I wanted to apply decals, so after I drilled the necessary holes in the box, I applied a quick coat of light-gray Krylon spray enamel. If you use a metal case instead of a plastic one, *insulate the sensor-cable jacks* (J2 and J3) from the enclosure because the bias voltage is present on the jack sleeves. Note that +5 V is connected to the tip of the plug.

The connectors are installed on the back panel as are the parts for the optional Morse readout. To prevent heat build-up within the enclosure, I drilled two 5/8-inch ventilation holes, one in the back panel and one in the cabinet bottom. If the PC board is mounted 3/8 inch from the front panel, the notches for access to the two calibration pots (R5 and R6) can be located at the lower box edge where they are invisible. Use a DIP socket for the display so it will project through the enclosure's panel. An 18-pin DIP socket with the correct pin spacing is not a standard item, so use a 24-pin DIP socket and remove the unused pins at one end of the socket.

The LM34CZ is affected by heat entering the IC via the leads. Use small-diameter heat-shrink tubing (RadioShack # 278-1610) on the IC's leads to insulate them and the solder connections. When you're sure the probe wiring is correct, apply epoxy to the sensor cable leads. When the epoxy has cured, slip a piece of heat-shrink tubing over the sensor, leaving the end of the sensor exposed so the temperature can be sensed directly through its plastic TO-92 case. When shrinking the tubing, take care not to overheat it. The com-



A view of a finished thermometer PC board.



Close-up view of the temperature-probe ends just prior to (lower) and after (upper) completion.

pleted sensor end is about the same diameter as the LM34 case. In my shack, the inside temperature probe dangles at the end of a short piece of cable. Tape or clamp the outside temperature probe cable at your location of choice. Place the outside probe in a well-ventilated shady location, not in an area exposed to direct sunlight.

Part Pointers

Mount small parts close to the PC board and use a low-profile crystal. For R7 through R12, use resistance values that result in the ratio of Rx/100 kΩ = 1.96, where Rx equals 196 kΩ, the combined resistance across the input/output of the op amps. A selected 220-kΩ resistor connected in parallel with a 2.2-MΩ resistor or two 392-kΩ 1% resistors connected in parallel will provide the 196 kΩ between the inverting input and output of each op amp. For R7 and R8, select the value closest to 100 kΩ. If the resistance ratios aren't close to 1.96, the thermometer accuracy will vary over its range. *Don't substitute ordinary trimmers for the multiturn pots specified.*

Calibration

With no power applied to the digital thermometer, ensure that J2 and J3 are properly and fully inserted into their respective jacks. I used a photographic thermometer to calibrate the instrument. Because the liquid thermometer's response is much slower than that of the digital thermometer, you must allow several minutes for the reference to stabilize before calibration can be made. The standard and the digital thermometer readings should agree closely after calibration. You can calibrate th thermometer at *any* temperature in its range, even ambient temperature.

Apply power to the thermometer. As explained earlier, when the thermometer is turned on for the first time, the display (DS1) probably will not light. Preset the calibration pots for a reading of 2 V at U1 pins 17 and 18. Then, make your fine calibration adjustments to have the digital thermometer match the reference. Thereafter, the digital thermometer should track closely with the standard at temperature extremes when the temperature is stable. The thermometer's tracking accuracy depends to a great extent on the accuracy of the resistor values used in setting the op-amp gain. A slight variation at temperature extremes is typical and may even be due to an error in the reference.

To activate the optional Morse readout, press and hold S1 until the code starts. An *I* is sent to identify inside temperature followed by the reading, then an *O* is sent to identify the outside temperature followed by that reading. The display blanks briefly while the code is being sent. The Morse tones near 2000 Hz are matched to the piezo speaker's frequency response. An ordinary speaker will not work in this circuit.

Summary

Now you've got a practical digital thermometer and have had some fun building it yourself! I'm sure you'll find it a useful addition to your shack. As always, I welcome your comments.

A Temperature-Calculation Example

Here's an example of how the program in the PIC calculates the temperature.

Let's assume that the display is showing a temperature of 73°. The output of U6 is 5.0 V and the ADC in the PIC has 255 steps.

$$\frac{5.0\text{V}}{255} = 0.0196\text{ V per step} \qquad \text{(Equation 1)}$$

Assume a voltage of 1.607 V exists at pin 18 of U1:

$$\frac{1.607}{0.0196} = 81.9891\text{, so the ADC in U1 is on step 82} \qquad \text{(Equation 2)}$$

82 decimal equates to 52 hexadecimal; this is the output of the ADC in the PIC. The ADC output in the PIC is inverted to compensate for the inversion of the preceding op amp:

52 hex = 0101 0010 binary

Inverted = 1010 1101 binary = AD hexadecimal (Equation 3)

After conversion from hexadecimal to binary coded decimal (BCD), AD hexadecimal = 173 decimal. The program drops the leading digit (1) and the display shows 73, which equates to the temperature.—*Bert Kelley, AA4FB*

Notes

[1]For more information on the LM34, refer to Application Note 460 at National Semiconductor's Web site: **http://www.national.com/apnotes/Analog-TempSensors.html**.

[2]PC boards and *programmed* PICs are available from FAR Circuits, 18N640 Field Ct, Dundee, IL 60118-9269; tel 847-836-9148 (voice and fax). Price: $24 for a minikit including the crystal, LED display a *programmed* PIC and PC board, plus $1.50 shipping for up to two kits; PC board only $5 plus $1.50 shipping for up to four boards. Visa and MasterCard accepted with a $3 service charge; **http://www.cl.ais.net/farcir/**. For those who want to program their own PICs, copies of the .ASM and .HEX files are contained in KELLEYTH.ZIP available for download from **http://www.arrl.org/files/qst-binaries/**.

Adelbert ("Bert") Kelley, AA4FB, was first licensed in 1940 as W8VSX, later as W2VSX and K4EEU. Bert's retired from engineering maintenance at WFLA-TV in Tampa, Florida. Bert's work has been published in QST since 1948 and he's still going strong! You can contact Bert at 2307 S Clark Ave, Tampa, FL 33629-5707; **aa4fb@mindspring.com**.

By Dan Miller, K3UFG

Progress Report: ARRL Certification and Continuing Education Program

An emergency communication course will debut soon.

Amateur Radio is an ever-changing avocation. As hams we're challenged to adapt to these changes by whatever means necessary. Not long ago noted writer and technical designer L.B. Cebik, W4RNL, observed, "Over the years, changes in FCC Amateur Radio license procedures and structures have convinced many hams of the need for additional opportunities for certification and continuing education (C-CE)."

The current C-CE program is the result of an ARRL Board action based on a recommendation by David Sumner, K1ZZ.[1] Soon thereafter, an on-line forum was established at **http://www.arrl.org/members-only/forums/w-agora.php3** with the intention of fostering a "marketplace of ideas." The result would be a member-based process for developing a C-CE program to provide amateurs with the chance to earn recognition for their mastery of a host of subjects.

L.B. offered to become the moderator of the C-CE forum and the member response was outstanding. It was soon obvious that the topic generating the most interest was emergency communications.

The Next Steps Forward

Because of his excellent background in emergency communications, Pat Lambert, W0IPL, was chosen to moderate this topic for the certification-continuing education forum. To provide ARRL staff with support and guidance, I was picked to walk our pilot project through the growing stages.

An advisory committee was formed of amateurs who possessed expertise in several critical areas including writing, editing, project management, legal issues and more. Communicating through an Internet e-mail reflector set up by Al Waller, K3TKJ, a small but competent group has been working feverishly to meet the program deadlines. Many other people have volunteered in a variety of capacities and have been put on a separate list as backup advisors. They will be involved in the beta-testing development phase.

Dave Sumner, K1ZZ (left), thanks L.B. Cebik, W4RNL, for carrying a great amount of the load for the new ARRL Certification-Continuing Education Project. In the early '90s, L.B. documented ideas for such a project in ARRL's educator publication, *Proceedings of the ARRL National Educational Workshop.*

The Pilot Project Advisory Committee is made up of the following volunteers:

Pat Lambert, W0IPL, Longmont, CO

L.B. Cebik, W4RNL, Knoxville, TN

Rich Slover, ND4F, Knoxville, TN

Bill Thompson, W2MTA, Newark Valley, NY

Rob Foshay, W9VK, Naperville, IL

Ron Hashiro, AH6RH, Honolulu, HI

Eldon McDonald, KE4OCW, Magnolia Springs, AL

Taylor Davidson, N4TD, Knoxville, TN

Jeffery Stidham, KC7FUY, Walla Walla, Washington

Richard Werner, K7UK, Omak, Washington

Charles Harris, KE4SKY, Annandale, VA

Randy Long, W0AVV, Masonville, CO

By the end of summer a course in basic emergency communications should be ready for release. The course will offer licensed Amateur Radio operators a means of developing the knowledge and skills needed to assist their local communities by providing emergency communication.

Ron Hashiro, AH6RH, emphasized the need for improved emergency communication skills with two poignant examples: "A noted problem is having walk-ons show up during a bona-fide disaster, or newcomers without background or experience bring ideas to the table that are incompatible with existing operations. I'm not talking about incremental improvements, but disruptive activities. For example, during one of our exercises, a lead operator decided to 'test' the system, and not follow the instruction received from another Emergency Operations Center (EOC). He insisted that the calling party change frequency to *his* operating frequency at the called location as part of the test. His crew wasted many precious minutes convincing him to use standard operating procedure, follow the requested instruction, and change *his* frequency and call the other EOC. It took quite a number of messages through a relay station to get a connection on the requested frequency.

"The real situation was this: The calling party experienced a series of technical problems and had to use a commercial radio

[1]See "2000 Annual Meeting of the ARRL Board of Directors," March, 2000 *QST*, page 62. Also, "It Seems to Us" on page 9 in the same issue.

programmed with only one usable Amateur Radio frequency—the one that had been requested to be used—and could not establish any other contact except as requested. Although the equipment and procedural problems were real, the situation was not as critical as it would be in a true emergency. After the simulated emergency ended, we re-enacted the entire scenario, developing a plan through education, to prevent a recurrence."

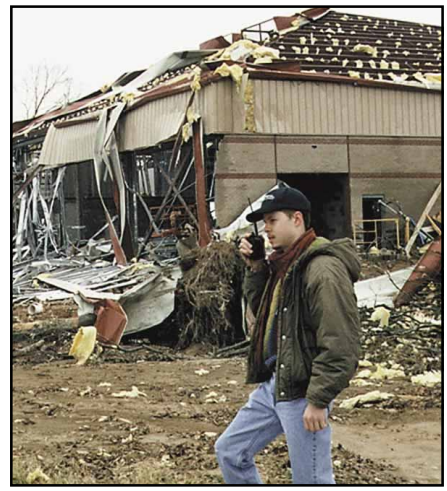
Ron continued: "In another situation, during the planning of a simulated nerve gas terrorist attack, one of the leaders began getting excited at the involvement in the simulation. We had to pull him aside and coach him that his team's role is to provide emergency communications at the command post upwind of the incident site, and not to interfere with the emergency response personnel—and certainly not to enter the hot-zone. Despite the lack of hazmat suits or protective gear, he had misled himself into thinking that the team could operate in the hot-zone and be immune to nerve gas. As he began to understand the emergency situation and the matching exercise simulation, he modified the response plan and did a wonderful job of providing excellent communications from the assigned area."

Randy Long, W0AVV, also tells us: "During the flood of 1997 at Ft. Collins, Colorado, in addition to our 'old reliable' regular communications personnel, a few new people responded. Because they were licensed, owned radios similar to what was being used during the disaster, and had a strong desire to get involved, they assumed that on-the-job training would be all that they needed. Wrong! In a real disaster, there is no time for training new people. Formal nets with extensive traffic handling require experienced and reliable communicators to get the job done. The time for training and learning is before any emergency. Such an attempt to train newcomers during a disaster simply creates a second disaster!"

Program Past

L.B. Cebik deserves a great amount of thanks for his assistance in this formative phase of the new ARRL Certification-Continuing Education Program. Long before the ARRL Board of Directors gave their approval for the program, he developed and documented ideas that have brought us to this point. Together with all the ARRL members who've shown support for this program, we are able to proceed on course. Singlehandedly, L.B. responded to every communication that was received through the initial C-CE forum.

Pat Lambert, W0IPL, joined us as moderator of the emergency communication section of the discussion forum and soon began



Michael Goodman, KD5FAQ, handles disaster communications in the proud tradition of Amateur Radio. Now more hams will get the chance to polish their emergency communication skills.

work on development of our pilot project. Pat has done an outstanding job and is now heading up the effort by the Pilot Project Advisory Committee. Our sincere gratitude goes to Pat and the entire committee. As volunteers, they are spending considerable amounts of time on what will become the best training course ever available for emergency/disaster communications.

Program Present

The current outline for the upcoming Emergency Communication Course is available at **http://www.svvi.net/w0ipl/emcom-rd.htm**. Materials have been received from many sources, including the Colorado ARES; Erie County (Pennsylvania) SKYWARN; 1999 ARRL Mississippi Simulated Emergency Test report; and Virginia District 2 ARES/RACES. This is by no means a complete list of contributors—we've gratefully received too many to name them all here. Some material has simply been used for review purposes and as reminders of what needs to be addressed in our outline. The committee is working to fill in all the blanks so that each topic will convey knowledge and understanding to the course-takers, allowing them to successfully participate in emergencies. Your ideas, comments, suggestions, and criticism are welcome. This is your emergency communications course—from start to finish!

Program Future

The C-CE Program welcomes your input on all of the course topics found on the forum. Please take a moment to check in and offer your input. Let us know what additional courses you would like to see offered; there are still many unanswered questions, and work that needs to be done. With your assistance and participation, we can make the ARRL C-CE Program one of the greatest ham radio tools of the new millennium. Materials and comments may be sent to Dan Miller, K3UFG, ARRL Certification Specialist, 225 Main St, Newington, CT 06111; tel 860-594-0340, **dmiller@arrl.org**; fax 860-594-0259. On behalf of the ARRL, and all the volunteers who have assisted in this program, thank you for your continued support. QST

NEW PRODUCTS

NEW MASTER REPLACEMENT GUIDE FROM PHILLIPS ECG

◊ The 19th edition of the *ECG Master Replacement Guide* (ET-2875) features approximately 306,000 crosses to US, European and Asian electronics components parts numbers and has been expanded to include new product families including power MOSFETs, TRIACs, dual Schottky barrier rectifiers, general purpose diodes and rectifiers and resettable fuses.

In addition to the extensive listing of substitutions and replacements, there are sections on replacement procedures, a surface mount transistor selection guide, accessories and heatsink information, and much, much more.

The latest edition of the ECG *Instant Cross* PC program—a semiconductor and relay cross reference guide on diskette—is also available. This year both *DOS* and *Windows* versions of the software are offered.

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

Next New Product QST

STRAYS

KC5NTW HONORED BY NEW MEXICO TECH

◊ Jon Spargo, KC5NTW, of Socorro, New Mexico, was awarded an Honorary Master of Science degree in Astronomical Instrumentation by the New Mexico Institute of Mining and Technology (NM Tech). Spargo received the award at the Socorro university's commencement exercises on May 13.

The university recognized Spargo for his extensive volunteer work as the leader of efforts to build, operate and expand NM Tech's Etscorn Campus Observatory, an astronomical facility used for student and faculty research and public education. The observatory was dedicated in 1993 and has served thousands of K-12 students from throughout New Mexico since then.

The official citation for Spargo's award also noted his numerous other community-service activities, including his support of the Socorro Amateur Radio Association's public-service programs.

Next Stray

By IARU President Larry Price, W4RA; IARU Secretary David Sumner, K1ZZ and ARRL Technical Relations Manager Paul Rinaldo, W4RI

World Radiocommunication Conference 2000

Istanbul, Turkey

World Radiocommunication Conferences often forge agreements that substantially affect Amateur Radio. Thanks to your support, the IARU and ARRL were in Istanbul last May and June to monitor these crucial proceedings.

A World Radiocommunication Conference (WRC) is a meeting of Member States of the International Telecommunication Union (ITU) empowered to revise a basic treaty instrument called the Radio Regulations (RR). The RR contain basic definitions, frequency band allocations and the rules for the many radio services including the amateur and amateur-satellite services. WRCs are convened every 2-3 years and consider agenda items generated by the previous WRC and approved by the ITU Council, an administrative body that meets annually and holds the purse strings. The accelerating pace of telecommunications development has put increasing pressure on WRCs to find ways to accommodate new uses of the radio spectrum without destroying the enormous investment that has been made in existing radiocommunication services.

At the invitation of the government of Turkey, WRC-2000 met in the Istanbul Conference and Exhibition Centre from May 8 through June 2, 2000. Attendance topped off at some 2400 people, consisting of delegates and advisers from 150 administrations (that is governments) and observers from various organizations throughout the world including the International Amateur Radio Union (IARU).

The key issues for this conference were finding spectrum for the third-generation (3G) mobile system called IMT-2000, replanning Region 1 and 3 satellite-to-home TV broadcasting, spectrum for radionavigation-satellite systems including the proposed European *Galileo* satellites, replanning the spectrum in the range 71-275 GHz, and sharing between services. Equally important, the conference was tasked with recommending an agenda for the next WRC (probably to be held in 2003) and a preliminary agenda for a WRC in 2005 or 2006.

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Conference chairman F. M. Yurdal, TA2MY.

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Radiocommunication Bureau Director Bob Jones, VE3CTM.

Of course, it would be impossible for a conference of this size to deal with such wide-ranging and complex issues in a single forum. Instead, the conference was structured into several committees and working groups. Most of the conference proposals were referred either to Committee 4, Regulatory and Associated Issues, or Committee 5, Allocations and Associated Issues. The committees themselves were subdivided by topic into working groups, and sometimes into sub-working groups or drafting groups. Agreements reached in smaller groups were brought back up the line for approval or modification at each higher level, culminating in approval by the Plenary. In addition to the committees there were two Working Groups of the Plenary, the first for issues related to a replanning of satellite broadcasting in Regions 1 and 3 and the second for future conference agendas.

Recent WRCs have worked very hard to achieve consensus and to avoid formal voting. No country can be forced to accept a regulation that it believes is contrary to its national interests, so conference decisions

must be generally acceptable to everyone.

Setting the Agenda for the Next Conference

There were literally dozens of proposals for agenda items for the next WRC. Working Group 2 of the Plenary met 15 times to identify the items having sufficient support to warrant inclusion and to establish priority. Many more informal meetings were held between representatives of regional telecommunications organizations, such as CEPT for Europe, CITEL for the Americas, and APT for the Asia-Pacific area. When the smoke cleared, the recommended WRC-2003 agenda included several items that concern the amateur services. Here is what's on our plate for WRC-2003:

• Consideration of the realignment of amateur and broadcasting bands around 7 MHz on a worldwide basis. Any amateur who has operated on 40 meters knows the problem: the upper two-thirds of the band is used for broadcasting outside the Americas. A solution was attempted at the World Administrative Radio Conference in 1992, but the best that could be accomplished at that time was the adoption of a recommendation calling for consideration by a future conference.

• Possible revision of Article S25—the basic rules for the amateur and amateur-satellite services. This includes the issue of whether to retain the treaty requirement to demonstrate Morse code proficiency for access to amateur bands below 30 MHz. Several administrations are known to favor dropping the requirement.

• Review of the terms and definitions of Article S1 to the extent required as a consequence of changes made in Article S25. Article S1 contains, among other things, the definition of the amateur and amateur-satellite services. This and another item, review of the provisions of Article S19 concerning the formation of call signs in the amateur services in order to provide flexibility for administrations, were European proposals prompted by administrations' desires to solve specific problems for their amateurs.

• Consideration of additional allocations for non-geostationary (non-GSO) Little LEO satellites below 1 GHz. Little LEOs received no new allocations at WRC-2000, but they have another shot if they can develop persuasive studies showing they can share with other services.

• The introduction of digital modulation techniques in the HF broadcasting service. Digital radio is seen by some HF broadcasters as giving the service a new lease on life and could be cited as a justification for expanded broadcasting allocations.

• Harmonized bands to meet the global/regional needs of public protection agencies. This item enjoyed broad support among developing countries that are particularly vulnerable to natural disasters. While not directly related to Amateur Radio, this item could have allocations implications.

• Two additional items of interest were recommended to Council for inclusion if additional budgetary and conference resources could be provided: the adequacy of the frequency allocations for HF broadcasting from about 4 MHz to 10 MHz, and the provision of up to 6 MHz in the band 420-470 MHz for the Earth exploration-satellite service.

The above list does not contain everything that might conceivably concern us at the next conference but includes the ones that merit the closest attention. The WRC-2000 decisions regarding the next agenda

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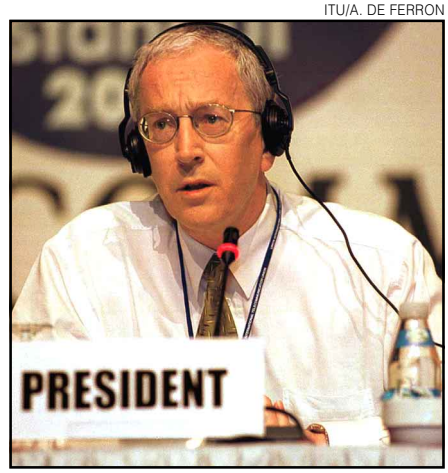

Committee 5 (Allocations and Associated Issues) chairman Chris van Diepenbeek.

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A view of the plenary meeting room.

Radio Amateurs at WRC-2003

The Conference elected Fatih Mehmet Yurdal, TA2MY, Chairman of the Board of Turkey's Telecommunications Authority, as its overall chairman. Of the many committees, working groups, sub working groups and drafting groups, several other amateurs held important chairmanships. They included Eberhard George, DL7IH, chairman of the important Working Group 2 of the Plenary that developed the recommendations for future conference agendas, and Hugh Railton, ZL2MT, chairman of Committee 4 (Regulatory and Associated Issues). ITU Radiocommunication Bureau Director Robert Jones, VE3CTM, coordinated the work of his sizeable staff imported for the occasion from Geneva to make the conference flow smoothly.

Representing the International Amateur Radio Union (IARU) were President Larry Price, W4RA; Secretary David Sumner, K1ZZ; and Wojciech Nietyksza, SP5FM. IARU Vice President David Wardlaw, VK3ADW, was a member of the Australian delegation and represented the Wireless Institute of Australia (WIA). Jay Oka, JA1TRC was in the delegation of Japan for the Japan Amateur Radio League (JARL). Ken Pulfer, VE3PU, was in the Canadian delegation for the Radio Amateurs of Canada (RAC). Oyekunle B. Ajayi, 5N0OBA, was on the Nigerian delegation for the Nigerian Amateur Radio Society. Paul Rinaldo, W4RI, was a member of the United States delegation for ARRL.

In addition, there were at least 46 other licensed radio amateurs in the delegations of administrations and observer organizations there for the interests of their employers.

Special Event Station TA1ITU

It has become customary at major ITU events for radio amateurs of the host country operate a special-event amateur station at the conference site. WRC-2000 was no exception. TA1ITU was activated by the Turkish Radio Amateur Club (TRAC) during the first week of the conference and was operated throughout the conference period by TRAC members and licensed delegates. Equipment was loaned by Yaesu.

Table 1

A Comparison of Amateur Allocations Before and After WRC-2000

Bear in mind that the post-WRC-2000 allocations are not yet implemented; domestic allocations remain as they are until Part 97 of the FCC Rules is amended. (Capital letters signify primary allocations. Lower case designates secondary allocations.)

Bands (GHz)	*Old Amateur Allocations*	*New Amateur Allocations*
75.5-76	AMATEUR AMATEUR-SATELLITE Space research (space-to-Earth)	A new footnote permits the amateur services to use the band 75.5-76 GHz until 2006.
76-77.5	RADIOLOCATION Amateur Amateur-satellite	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth)
77.5-78	RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth)	AMATEUR AMATEUR-SATELLITE Radio Astronomy Space research (space-to-Earth)
78-79	RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth)	RADIOLOCATION Amateur Amateur-satellite Radio astronomy Space research (space-to-Earth)
79-81	RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth)	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth)
81-81.5		A new footnote allocates this band to the amateur and amateur-satellite services on a secondary basis.
119.8-120.2	FIXED EARTH EXPLORATION-SATELLITE (passive) INTER-SATELLITE MOBILE SPACE RESEARCH (passive) Amateur	
122.25-123		FIXED INTER-SATELLITE MOBILE Amateur
134-136		AMATEUR AMATEUR-SATELLITE Radio astronomy
136-141		RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite
142-144	AMATEUR AMATEUR-SATELLITE	
144-149	RADIOLOCATION Amateur Amateur-satellite	
241-248	RADIOLOCATION Amateur Amateur-satellite	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite
248-250	AMATEUR AMATEUR-SATELLITE	AMATEUR AMATEUR-SATELLITE Radio astronomy
275-400	(Not allocated)	
275-1000	(Not allocated)	

constitute recommendations to the ITU Council, which sets the final agenda approximately two years before the next conference. Assuming the Council goes along, the next conference cycle is going to be a busy time for the international advocates of Amateur Radio!

3G Bullet Dodged

A possible threat to amateur spectrum at 2300-2400 MHz was that this band might be designated for use by the third-generation cellular systems known in ITU parlance as IMT-2000 or International Mobile Telecommunications. Proponents were eager to find at least 160 MHz of spectrum for terrestrial use and additional spectrum for handset-to-satellite applications. While China indicated interest in using the 2300-2400 MHz band domestically for IMT-2000, the conference found the bandwidth being sought in other bands. The new bands identified for IMT-2000 terrestrial use are: 862-960 MHz in Region 1, 806-902 and 928-960 MHz in Region 2, and 806-960 MHz in Region 3; 1710-1885 MHz; and 2500-2690 MHz. WRC-2000 also named some mobile-satellite service bands for the satellite component of IMT-2000.

Bands above 71 GHz Shuffled

A WRC-2000 agenda item called for review of the existing allocations above 71 GHz to improve the allocations to the passive services (radio astronomy and Earth exploration) in the range 71 to 275 GHz. While these bands are not widely used today, it is the nature of WRCs to be thinking of the future. Over the past two years, the IARU, ARRL and several sister societies have been working with the spectrum managers of the passive services to protect amateur interests. Early in the process, it was clear that radio astronomers were interested in sharing our bands. Since they just listen, they would cause us no interference. They were willing to tolerate some interference from amateurs in order to obtain access to these allocations. Compatible sharing partners provide some measure of protection against the future introduction of incompatible partners, so it was in our interest to work with them.

The extension of the allocation table to 1000 GHz (see Table 1) indicates interest in allocation of these bands at a future conference, possibly as early as 2006. In the meantime, bands of particular interest to the passive services between 275 and 1000 GHz are identified by footnote. The ITU is starting studies of frequency bands above 3000 GHz

DAVID SUMNER, K1ZZ

Deputy head of the Polish delegation, Chris Slomczynski, SP5HS, chats with Jadwiga Nietyksza and Wojciech, SP5FM, just before the closing ceremony.

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Looking across the Bosphorus from the conference center.

KRIS HUTCHISON

IARU team members at WRC-2000: (l-r) David Sumner, K1ZZ; David Wardlaw, VK3ADW; Wojciech Nietyksza, SP5FM; Larry Price, W4RA; Ken Pulfer, VE3PU; and Paul Rinaldo, W4RI.

(3 THz), although there is a small problem: the present definition of radio waves is limited to frequencies below 3000 GHz!

Radionavigation-Satellite Service Gains at 23 cm

The status of the amateur service secondary allocation at 1240-1300 MHz and the amateur-satellite uplink band at 1260-1270 MHz are unchanged, but we have a new sharing situation. The conference allocated the band 1215-1260 MHz to the radionavigation service for space-to-space use to provide protection from potential future users that might interfere with satellites receiving GPS signals. This allocation is based on years of successful operation without protection and without interference. In theory, it should not affect amateur use of the 1240-1260 MHz band.

In addition, there are new space-to-Earth and space-to-space allocations for the radionavigation-satellite service in the band 1260-1300 MHz for the proposed European *Galileo* positioning satellites similar to GPS. The allocation does not diminish the amateur and amateur-satellite service allocations but could be cause for future concern.

Country Footnotes

A housekeeping agenda item for all WRCs is one calling for deletion of country footnotes to simplify frequency allocations. The agenda item calls for countries only to delete their names, not add them. However, it has become customary for conferences to permit additions when there is no objection from affected neighboring administrations.

The principal changes affecting the amateur services were to improve the status of the amateur service in the 160-meter band in Austria, Liechtenstein, and Switzerland, to suppress a footnote for domestic broadcasting in Canada in the band 3950-4000 kHz, and to add the fixed and mobile services in eight Region 2 countries (not including the USA or Canada) in the band 10.0-10.45 GHz and in Uzbekistan and seven Region 2 countries (again, not including the USA or Canada) in the band 10.45-10.5 GHz. Uzbekistan was deleted from the short list of countries in which the bands 14250-14350 kHz and 18068-18168 kHz have a primary allocation in the fixed service.

Broadcasting Satellites

Reading this article might give the impression that the conference was full of amateur items. On the contrary, perhaps a third or half of the resources were consumed by replanning of the broadcasting-satellite service (BSS) "slots" in the geostationary arc. BSS provides direct-to-home television broadcasting. This was a politically charged issue on which past conferences failed to reach agreement. It wasn't easy but WRC-2003 hammered out a new plan, which mostly affected Regions 1 and 3.

Another significant satellite-related issue was sharing between GSO and non-GSO satellites. The new non-GSO systems promise to deliver high-speed Internet connections anywhere in the world. It wasn't easy, but the conference reached agreement on the power limits and other rules of sharing that will allow existing services to continue operating and new services to be introduced without unreasonable constraints.

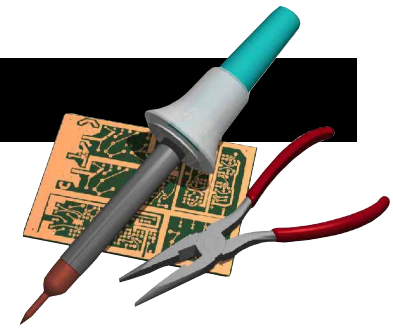
What's Next?

The amateur items on the WRC-2003 agenda will result in a significant preparatory workload for the IARU and its national societies, including the ARRL. The IARU Region 3 Conference and IARU Administrative Council meeting in Darwin, Australia in late August will provide an early opportunity for coordinating a plan for success at WRC-2003.

Larry E. Price, W4RA, has served as President of the International Amateur Radio Union (IARU) since May 1999. Prior to that, Larry was IARU Secretary and held a number of volunteer posts in the ARRL, including President from 1984 to 1992.

Paul Rinaldo, W4RI, is Technical Relations Manager of the ARRL. Paul heads the ARRL's Technical Relations Office in Washington, D.C.

David Sumner, K1ZZ, is Executive Vice President and Secretary of the ARRL as well as Secretary of the IARU. QST



The Doctor is IN

Q Arnie, N1SZS, asks, "I would like to run my TNC and ICOM IC-737 transceiver simultaneously utilizing software that controls both devices. How do I configure my computer's two serial ports using *Windows 98*?"

A From the *Windows* **START** button, select **Settings**, then **Control Panel**, then double-click on **System**. Select the **Device Manager** tab, then click (once) on the "+" next to the Port item. You should see lines for both COM1 and COM2. Click on COM2, then click the **Properties** button. Next, click the **Resources** tab. If you need to change the settings shown, you will have to click on the "Use automatic settings" box to clear the check mark. Next, select the "Interrupt Request" line or "Input/Output Range" line and click the "Change Settings" button to change the setting to whatever you need it to be.

Q Erik Iddings, KF4KRK, asks, "I'm having problems with RFI to my neighbor's (and my own) telephone. One neighbor picked me up on a 900-MHz cordless phone. She said she could not understand anything but could tell I was on the air. My mother has picked me up on a corded telephone, again nothing legible. And my other neighbor picks me up on his 49-MHz cordless.

"I operate 6-meter SSB using an ICOM IC-706 MkII with 100 W PEP. My radio and tuner are properly grounded. I even made up a coax balun at the shack entry point hoping that would solve the problem. The interference is still there.

"One of my fellow ARES members is an engineer with the telephone company. I called her the other day and told her about the problem. She had the customer service manager and a line technician come out and install an RF suppresser on one neighbor's incoming line. That didn't work.

"I'm about to go out of my mind trying to figure this out. Unless I can get this RFI problem resolved, it looks like I'm going to have to give up operating on 6 meters unless all the neighbors are at work!"

A Start with the premise that the FCC rules require that spurious emissions (signals outside the ham bands) not cause interference with other radio services. This is your sole regulatory responsibility.

Now, those 900 MHz and 49 MHz cordless phones are regulated by Part 15. Part 15 says that these devices must not cause harmful interference and are *not* protected from interference from licensed users. The FCC's material on interference also adds that non-radio devices (telephones, alarm systems, etc) that experience interference are "improperly functioning" as radio receivers. Although you may want to help your neighbors resolve these problems, the rules may help you put that into perspective. For RFI that is not caused by a rules violation, your help is simply neighborly and you should see yourself as a *locator* of solutions, not a provider of solutions.

For general info about RFI, info for your neighbor, info on telephone interference, info on Part 15, see **http://www.arrl.org/tis/** and follow the TISPAGES and RFI links.

I will add that you can sometimes correct problems with cordless phones by filtering the base unit. Get a RadioShack telephone interference filter for the line and a Palomar F-140-43 ferrite core for the power supply lead (wind about 5 turns or so). If this doesn't work, it is the RF end of the phone being overloaded. For the 49 MHz phone, it is rare that base-unit filtering works to suppress interference from a 6-meter signal. The wireless phones or their owner's manuals should have a label that indicates that they are not protected from interference.

Q In the "PSK31 2000" article in the May 2000 *QST*, there is a single-transistor circuit that is used for transceiver keying via a computer COM port. I've seen this circuit used frequently for other switching applications, but some versions add a diode between the base of Q1 and ground. Why is this?

A Radio designer Dave Benson, NN1G, provides the answer: "The diode (D2) between the base of Q1 and ground acts as a 'shunt diode' (see Figure 1). The RTS or DTR pins on COM ports can drop to about -10 V in the 'off' state, which may be sufficient to get Q1 to go into reverse breakdown. The results could be a rig that is locked in transmit, or otherwise be erratic in its keying characteristics. Adding the shunt diode will prevent this from happening."

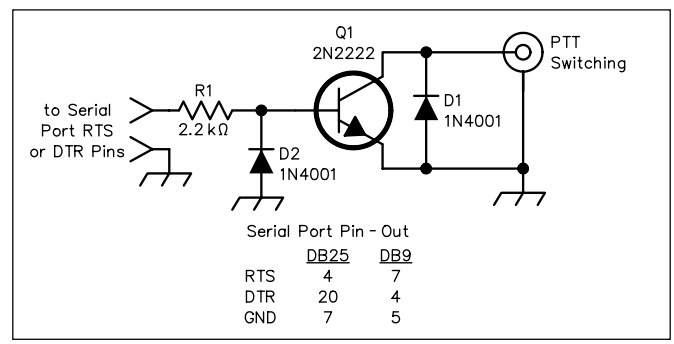


Figure 1—A COM port switching circuit modified with the addition of a shunt diode (D2) between the base of transistor Q1 and ground.

Q Mark Schoonover, KA6WKE, asks, "I'm just getting started in low-power (QRP) operating and I have two questions. How do you establish an RF ground while out in the field? In the Army we pounded in ground rods for field operations. Most of my QRP will involve hiking to various sites and the thought of dragging along a ground rod and hammer is not too exciting."

A Depending on the type of antenna system you use, grounding in the field may not be all that important. Many antennas, such as dipoles, Yagis, and so on, do not require ground connections for proper operation. Consider the space shuttle; it is nowhere near a ground, but it works just fine!

Other antennas *do* require grounds—end-fed wires, most verticals, etc. In those cases, you establish the best ground possible with a *counterpoise*, which can consist of one or more 1/4-wavelength wires connected to the "ground" point such as a short ground rod. Counterpoise radials work best if they are a few inches above the soil.

RF notwithstanding, don't forget the role grounding plays in lightning protection. If you are truly in the field, however, you shouldn't be anywhere near the antenna if lightning is about.

Q I need a quick refresher on the meaning of Q. Can you help?

A Hmmm…I believe Q was the name of an omnipotent alien who appeared occasionally on *Star Trek: The Next Generation*. His "meaning" wasn't always clear!

But if you're talking about the ratio of an electronic component's ability to store energy to the sum total of all of its energy losses, I can help. That's Q in a nutshell and it is expressed mathematically as:

$$Q = \frac{X}{R}$$

where:

Q = figure of merit or quality

$X = X_L$ (inductive reactance) for inductors and X_C (capacitive reactance) for capacitors (in ohms), and

R = the sum of all resistances associated with energy losses in the component (in ohms).

The Q of capacitors is ordinarily high. Good quality ceramic capacitors and mica capacitors may have Q values of 1200 or more. Small ceramic trimmer capacitors may have Q values too small to ignore in some applications. Microwave capacitors typically have poor Q values (10 or less at 10 GHz).

Inductors are subject to many kinds of electrical energy losses including wire resistance, core losses and skin effect. As a result of inherent losses, inductor Q rarely, if ever, approaches capacitor Q in a circuit where both components work together.

Q I plan to vacation in Europe this fall and I'd like to try some 2-meter FM repeater operating. I'm a little confused, though, about using 1750-Hz access tones vs. subaudible CTCSS access. Which of these systems do the European repeaters use?

A They may use both. It's standard practice in Europe to transmit a 1750-Hz tone to access a repeater. Virtually all European repeater systems are configured in this way. Many, however, include CTCSS access as well. This means that you must send the required 1750-Hz access tone and then include the necessary CTCSS tone during your transmission. Fortunately, most modern FM transceivers include the ability to transmit the 1750-Hz burst *and* CTCSS tones.

Q Woody, WD4NSB, asks, "I have a 45-foot pole in my front yard that has my 10-meter Yagi antenna mounted on it. All of my coaxial feed lines are routed to the pole through a PVC pipe buried under the ground. I have just put up a McCoy Dipole (nonresonant random length) and will be feeding it with 450-Ω ladder line from a tuner for operation on all bands (160-10 meters). Can I run the 450-Ω ladder line through the PVC pipe with no problems? If I can't run the 450-Ω ladder line directly in the pipe, can I make up a 100-Ω balanced line from two lengths of coax (using the center conductors as the feed line and grounding the braids)?"

A Running ladder-line underground through your PVC pipe is not a good idea. Other than very short lengths, or short points of contact, ladder line needs to be kept about 2 feet from any conductors. Running it through your pipe will place it just fractions of an inch away from ground, not to mention the other feed lines in the pipe, for a considerable distance.

Making a balanced line from two pieces of coax is also counterproductive in your situation. The reason for using ladder line in the first place is because of its low loss—this advantage is negated when using the coax balanced line.

If the feed line *must* go through the pipe to your dipole, my advice would be to use parallel multiple dipoles fed together at a common feed point with good quality coax. You probably won't need to use an antenna tuner. See Figure 5 on page 7-3 of the 18th edition of the *ARRL Antenna Book*.

Q I'm familiar with Yagi antennas, but I also hear occasional references to antenna designs known as *quads*. What are these?

A Like a Yagi antenna, a quad is *directive*. That is, it focuses your RF power in a particular direction. In terms of how they are put together, quads are different animals. They consist of two or more loops of wire, each supported by a bamboo or Fiberglass cross-arm assembly. The loops are a quarter wavelength per side (one full wavelength overall). One loop is driven and the other serves as a parasitic element—usually a reflector. A variation on the quad is called the *delta loop*. The electrical properties of both antennas are the same. Both antennas are shown in Figure 2. They differ mainly in their physical properties, one being of plumber's delight construction, while the other uses insulating support members. One or more directors can be added to either antenna to obtain additional gain and directivity.

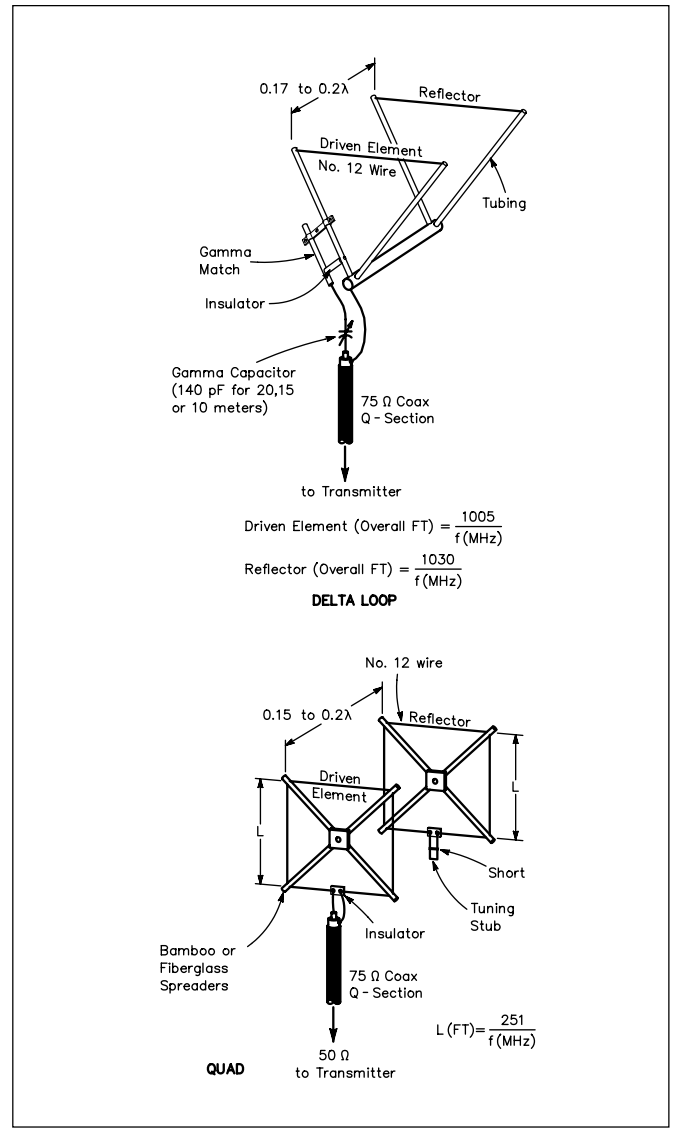
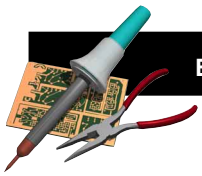


Figure 2—Typical quad and delta loop antenna designs. The 1/4 wavelength of 75-Ω coax acts as a matching transformer between the 100-Ω feed point impedance and the 50-Ω impedance of the station coax.

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



By L. B. Cebik, W4RNL

Basic Beams for 12 and 17 Meters

Have you been looking for some well-designed and easy-to-build radiators for the 12- and 17-meter bands? Try these!

Small directional beams are a popular choice for 12 and 17 meters. There, the lower signal density requires less gain and front-to-back ratio (F/B) than we need on other HF bands for successful operation. Although we can scale and adapt beams for 15 and 10 meters and press them into duty for 12 and 17 meters, we might save a bit of tower space and trouble by looking at alternative designs suited to these narrow bands.

The Driver-Director Alternative

The most common form of two-element Yagi used on 20 through 10 meters is the driver-reflector type. The antenna offers modest gain and F/B with an easily matched feedpoint impedance. In a fairly straightforward way, we can design driver-reflector Yagis to cover the entire span of 20 and 15 meters and at least the first megahertz of 10 meters.

An alternative and much neglected two-element Yagi design uses a driver and a single director. On 20, 15 and 10 meters, this beam type is used only by those who wish to operate solely in either the CW (or data) or the SSB portions of the band. Driver-director Yagis are inherently narrow-band arrays that sustain their characteristics for a bandwidth that is less than 1% of the design frequency.

However, driver-director arrays have some advantages. Figure 1 shows one of them: a shorter boom length. As we reduce the element spacing, the gain of driver-director Yagis increases (up to a limit). The feedpoint impedance also decreases with closer spacing. A practical spacing limit is between 0.07 and 0.08λ, leaving us with a feedpoint impedance in the 20- to 25-Ω range. This impedance range minimizes power losses due to natural assembly resistances and lets us use standard matching networks, such as the gamma or beta. In contrast, a driver-reflector Yagi requires an element spacing between 0.125 and 0.15λ to optimize most parameters. In short, a driver-reflector Yagi will be 1.5 to 2 times longer than a comparable driver-director design.

The driver-director design offers a second benefit over the driver-reflector Yagi: increased F/B. Figure 2 overlays free-space azimuth patterns for the two designs for 17 meters. With respect to gain, there is little difference between the designs, with the driver-director array having a slight, but not operationally significant, advantage. In the F/B department, however, the driver-director array shows nearly a 10-dB improvement.

The so-called "WARC" bands (30, 17, and 12 meters) are very narrow, with 17 and 12 being 100 kHz wide (18.068 to 18.168 MHz and 24.89 to 24.99 MHz, respectively). These bandwidths fall well within the operating bandwidth limits of driver-director Yagis. Driver-director Yagis may be very well suited for these bands, with performance improvements over other designs and savings in boom length and wind loading.

Monoband Beams for 12 and 17 Meters

I designed a pair of driver-director Yagis for 12 and 17 meters using antenna-modeling software, in this case, *NEC-4*.[1] *MININEC* and *NEC-2* would have been equally satisfactory. My procedure involved two steps: creating a basic design with a uniform-diameter

[1]Notes appear on page 62.

Table 1
Basic (Uniform-Diameter) Element Dimensions for 17- and 12-Meter Driver-Director Yagis
All dimensions are in inches.

17 Meters: 0.5-Inch-Diameter Elements

Driver Length	314.4
Director Length	304.6
Element Spacing	49.6

Beta (Shorted Transmission Line) Length

Impedance	Length
600 Ω	6.6
450 Ω	8.8

12 Meters: 0.5-Inch-Diameter Elements

Driver Length	228.0
Director Length	221.3
Element Spacing	36

Beta (Shorted Transmission Line) Length

Impedance	Length
600 Ω	4.8
450 Ω	6.4

Table 2
Anticipated Performance Parameters: 17- and 12-Meter Driver-Director Yagis

Frequency (MHz)	*Free-Space Gain (dBi)*	*F/B (dB)*	*Pre-Match Feedpoint Impedance (R ± jX Ohms)*	*Post-Match Feedpoint Impedance (R ± jX Ohms)*
17 Meters				
18.068	6.3	20.6	21 – *j*30	60 + *j*16
18.118	6.5	21.9	20 – *j*27	55 + *j*6
18.168	6.7	20.8	18 – *j*23	46 – *j*3
12 Meters				
24.89	6.5	21.7	19 – *j*29	62 + *j*10
24.94	6.6	21.6	18 – *j*26	56 + *j*2
24.99	6.7	20.2	17 – *j*24	49 – *j*4

Note: When remodeling for an element taper schedule, adjust element lengths to achieve these performance figures.

model and then adjusting the dimensions for the use of an "element-taper schedule." An element-taper schedule specifies in decreasing sizes the tubing diameter used for each element from the center to the tip. At HF, uniform-diameter elements add unnecessary weight to the antenna. Moreover, available nesting aluminum tubing sizes (I recommend 6063-T832) make construction convenient.

Table 1 presents the dimensions of the basic uniform-diameter models, using 0.5-inch-diameter elements. The dimensions for each antenna are set so that the driver shows a reactance of about $-j25\ \Omega$. This reactance facilitates the use of a beta match hairpin, which is actually a shorted section of transmission line and provides an inductive reactance across the feedpoint connections. The table lists alternative lengths according to the impedance of the parallel line fabricated for the beta line.

The anticipated performance as predicted by the *NEC* models appears in Table 2. We can expect a free-space gain of about 6.5 dBi, with a F/B ratio of over 20 dB. I have listed the anticipated pre-matched and post-matched feedpoint impedances for both antennas. In the *NEC* models, the beta match consists of a shorted transmission line placed in parallel with the feedpoint.

One error often made by beginning antenna builders is to simply copy model dimensions using whatever materials may be available. This route often leads to mediocre beam performance. Before we translate the model into a physical antenna, we must adjust the dimensions for the element-taper schedule.

Figure 3 shows the taper schedule used in the test antennas. The centermost section uses 36 inches of $^5/_8$-inch-diameter tubing, starting from the element centerline. The next tubing section is a 6-foot length of $^1/_2$-inch-diameter material, with 69 inches showing. The overlap is about 3 inches: much more overlap adds unnecessary weight, while much less weakens the junction. The element tip sections are made from $^3/_8$-inch-diameter tubing. The 12-meter tips are quite short, while the 17-meter tips are quite long.

The element lengths and tip sections are listed in Table 3. The taper schedule used here is for test purposes only. Although the final elements appear to be strong, many builders prefer to use a more aggressive taper schedule for additional strength. That is to say, they use more different tubing sizes, beginning with a larger diameter. This technique results in shorter lengths of each tubing size, a practice that can yield stronger elements. Part of my reason for using longer lengths of fewer tubing size stems from a desire to reuse the tubing in other test antennas.

If we keep the same spacing as we used with the uniform-diameter model, the element lengths for the tapered elements will be longer to achieve the same performance and feedpoint impedance. On 12 meters, the elements will be four to six inches longer than on the uniform-diameter model. On 17 meters, the elements will be over six inches longer on the tapered-element model.

If we choose a more aggressive tapering schedule, we may expect the elements to be even longer relative to the uniform diameter model. This holds true even if we begin with larger-diameter tubing. The required extra length to make a tapered-diameter element electrically equivalent to a uniform-diameter element is not simply a function of the average diameter. Instead, it is a complex function involving the tubing diameters and the rate of decrease along the element length.[2] In general, for any beam you wish to

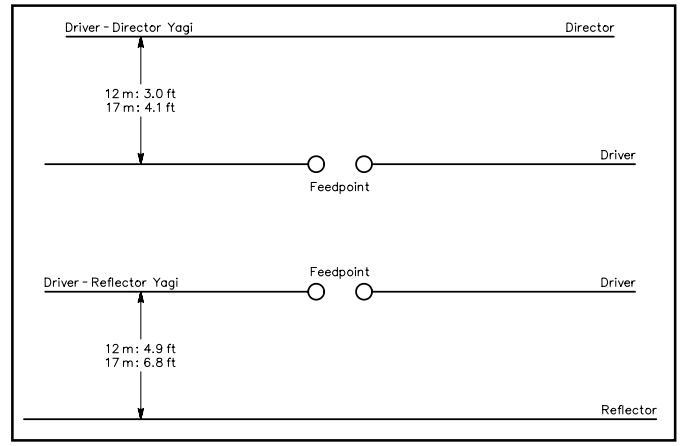


Figure 1—A comparison of driver-reflector and driver-director types of two-element Yagi arrays.

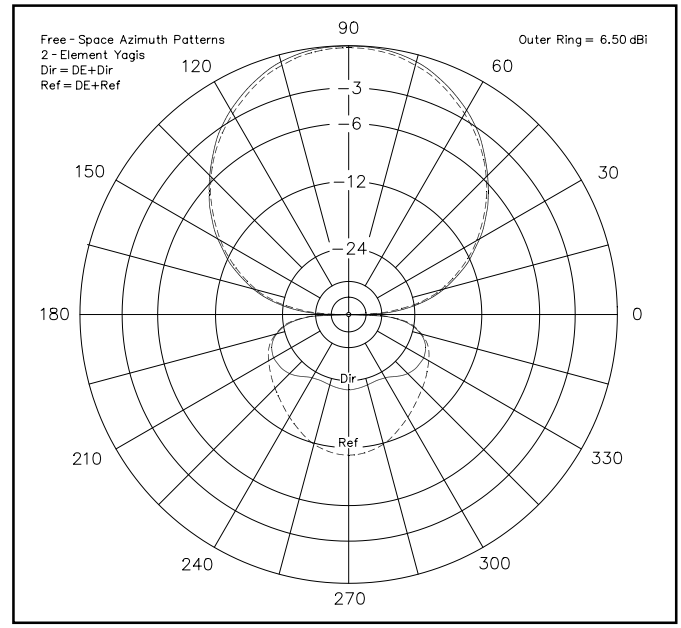


Figure 2—Overlaid free-space azimuth patterns of 17-meter two-element driver-director and driver-reflector arrays.

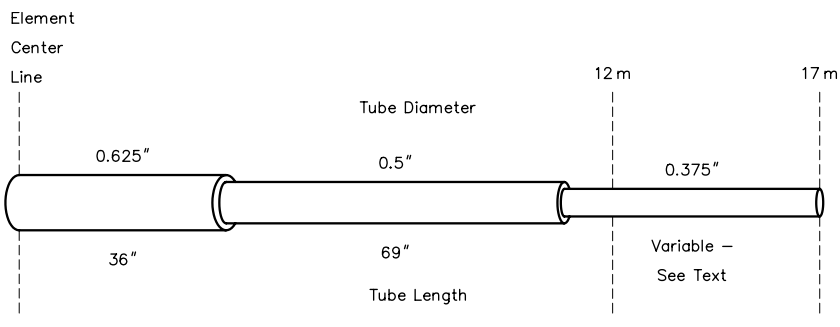


Figure 3—The element diameter-tapering schedule used in all of the antennas described in this article. Note that only a half-element is shown, with the other half being a mirror image of the portion displayed. The tip length will vary from element to element, with 12-meter tips being very short and 17-meter tips being quite long.

reproduce using a variant tapering schedule for the elements, it pays to remodel the antenna using the materials planned for the physical version. Modeling software, whether devoted strictly to Yagis or more generally applicable (such as *NEC*), provides the best known guidance for Yagi construction. In many cases, I have built Yagis directly from careful models and have had to make either no adjustments or only the most minimal adjustments.

In the case of the 12- and 17-meter band driver-director Yagis, the only required adjustment made was to the beta-match shorted line. My test line consisted of #12 AWG copper wire spaced as close as possible to one inch. The match-line spacing was dictated by the spacing of the stainless-steel bolts on the driver used for both the beta and the female coax connection. Because the characteristic impedance of a one-inch-spaced #12 line is close to 385 Ω, the line length increased slightly from the *NEC* model: to a little over 10 inches on 17 meters and to a little over 7 inches for 12 meters.

PHOTOS BY THE AUTHOR

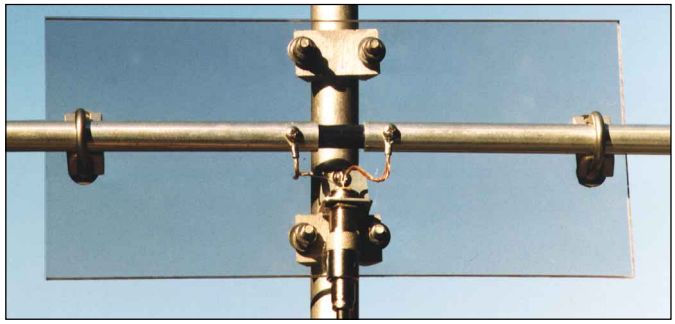


Figure 4—A close-up view of the polycarbonate boom-to-element plate, saddle U bolts, Fiberglas stiffening rod, and driver connection points of the beams in this article. The construction of parasitic elements is similar, but the element is continuous across the plate.

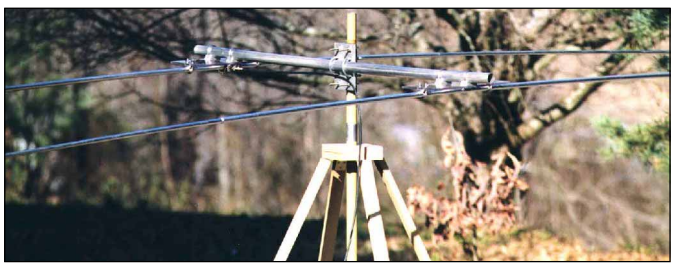


Figure 5—The 12-meter driver-director beam during initial construction, using a stand and short mast to raise the elements to a good working height.

Table 3
Adjusted Stepped-Diameter Element Dimensions for 17- and 12-Meter Driver-Director Yagis
All measurements are in inches.

17 Meters			
Driver Length	321.4	Tip Length	55.7
Director Length	311.4	Tip Length	50.7
Element Spacing	49.6		
Beta (shorted transmission) line length (1-inch-spaced #12 AWG wire)	10.3		
12 Meters			
Driver Length	231.6	Tip Length	10.8
Director Length	224.6	Tip Length	7.3
Element Spacing	36		
Beta (shorted transmission) line length (1-inch-spaced #12 AWG wire)	7.3		

See the text and Figure 3 for the element-tapering schedule used for this example. Final dimensions may vary with changes in the element-tapering schedule.

My test models used polycarbonate (Lexan) plates to mount the elements to the boom. Figure 4 is a close-up of the driver boom-to-element plate, with the coax connector and its connections before adding the beta match. There is no allowance in the models for "plumber's delight" construction in which the elements make electrical contact with the boom. For short-boom antennas, I often use either PVC or aluminum tubing as the boom and have found no difference for these antennas when using insulated elements. Figure 5 shows the 12-meter version of the antenna during initial construction, using a four-legged support stand to bring all of the antenna components to a good working level.

Field adjustment of the antennas is a two-step procedure. After verifying that the element structures and spacing correspond to the model, use one of the available SWR analyzers to read both the feedpoint resistance and reactance without the beta match line. The readings should correspond closely to the model reports. If not, then adjust the elements until they do. This should involve no more than a small change of the driver tip lengths. A driver-director Yagi is just a bit more finicky than a driver-reflector beam in driver length adjustment, but mounting the antenna on a long mast and propping it on a stepladder can ease the task. Position the antenna to point upward as straight as possible and get it as high off the ground as you can while still being able to reach the driver for adjustment. Although the result may not hold precisely when the antenna is at its operating height, the setting will generally be close enough to permit final adjustment only to the beta-section length or width, since widening the beta match is equivalent to increasing its length.

Now, at near-ground level, add the beta match and adjust its size for a nearly perfect 50-Ω match at the center of the band. Secure the connections. At the antenna's operational height, you should be able to refine the adjustment with nothing more complex than a little widening or narrowing of the line.

I have omitted other building details, since there are so many preferred variations.[3] My element-to-plate U bolts are stainless steel and use saddles, as do the plate-to-boom U bolts. The driver has an 18-inch-long insert of $^1/_2$-inch-diameter Fiberglas rod that aligns the split element sections and prevents tube crushing from either the U bolts or the connection bolts. I use a $^1/_4$-inch-thick aluminum plate for the boom-to-mast mounting, with U bolts sized for the mast and the boom. Tubing sections can be locked together with stainless-steel hose clamps, aircraft-grade pop rivets, or sheet-metal screws. Deburr drilled holes to ensure that you can separate the element sections later in the life of the beam. In addition, a thin coating of a conductive antioxidant at each tubing junction is advisable.

Two Beams in One

The individual two-element Yagis for 12 and 17 meters can be stacked on a single mast and fed individually. However, the two antennas tend to interact, even with a separation of up to 12 feet. The 17-meter Yagi will show a small increase in gain, but a larger (5-dB) decrease in F/B at some separations. The 12-meter beam shows a reduction in gain with an increase in the feedpoint impedance (with the beta line installed). A separation of about 8 feet appears to be as close to optimal as you might get.

Even though the individual antennas are lightweight, many builders prefer to have their beams lined up in one plane. Therefore, finding a way to combine two beams in a single dual-band array appears desirable. At the same time, if we can reduce the number of feed lines to one, we will have simplified everything possible.

One of the simplest techniques for feeding two beams with a

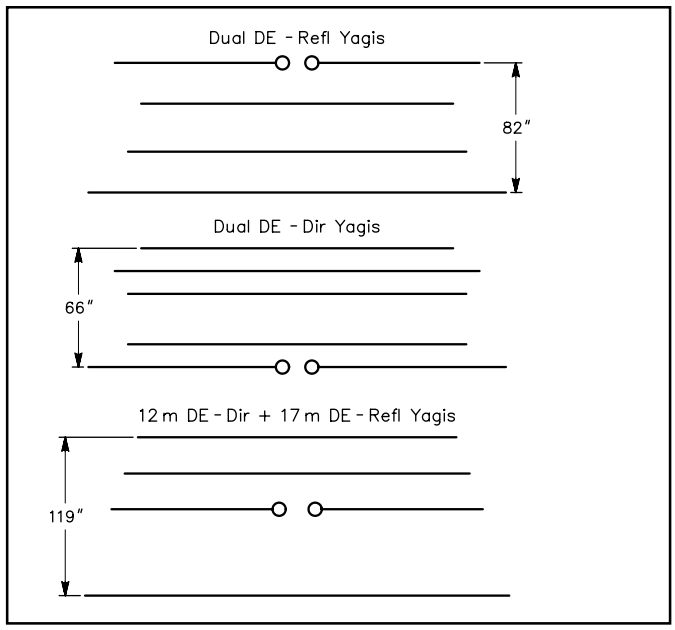


Figure 6—Outline drawings of some possibilities for open-sleeve coupled 12- and 17-meter arrays. See the text for the reasons why the top two have been rejected for this article, even though they might be capable of good performance.

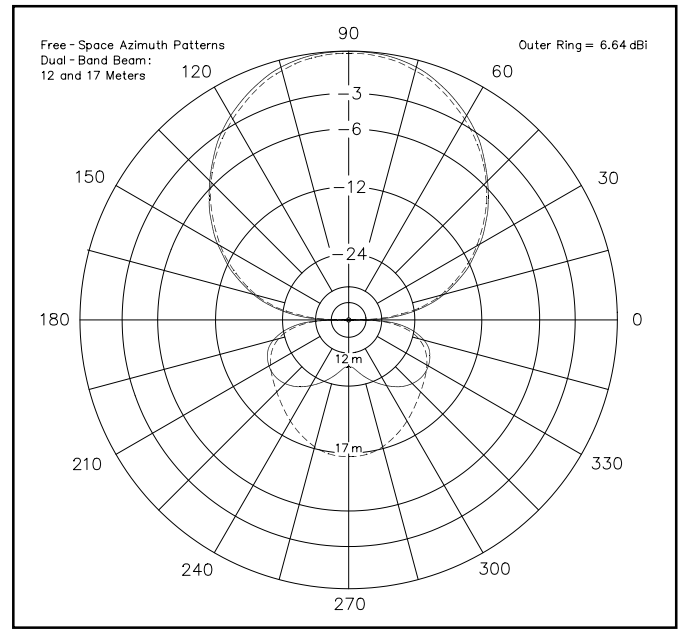


Figure 7—Overlaid 12- and 17-meter free-space azimuth patterns for the dual-band beam described. Compare these patterns to those in Figure 2.

single line is to use open-sleeve coupling, a technique developed and patented by Tom Schiller, N6BT. In effect, we connect the feed line to the lower-frequency driver. On the lower band, the driver acts normally as part of its array of elements. On the higher band (or bands, in the case of triband beams), we simply feed the lower-frequency driver with the higher-frequency signal. Closely spaced to the lower-band "master" driver is a shorter "slaved" driver for the upper band. It receives virtually all of the higher-frequency energy and operates as the driver for its own array of elements.

Finding the correct length and spacing for the slaved driver can be tedious without some guidance. The object is to adjust the length and spacing so that the master driver shows the proper feedpoint impedance at not only its own lower frequency, but at the higher frequency as well.

Assuming we want to have both beams pointed in the same direction, there are several approaches to combining the two beams using open-sleeve driver coupling. Three such approaches are outlined in Figure 6. One scheme, at the upper left, combines two driver-reflector Yagis, with the 12-meter elements nestled inside the 17-meter pair. A second scheme, at the upper right, combines driver-director Yagis, with the 12-meter driver immediately in front of the 17-meter driver. Note that the 12-meter beam has three elements. When a higher-frequency director lies behind or in front of a director used for a lower frequency, it tends to yield poor results. The answer is to use two directors. Although the single director will not yield standard two-element (driver-director) performance, the pair of directors does. The inner and outer director combination yields standard two-element performance—and sometimes a little bit more.

However, I have rejected both of these schemes for the present effort, although either one would produce a very compact dual-band Yagi. Both designs are very finicky. Models indicate that adjustments of less than a quarter inch in either element length or spacing for the 12-meter drivers can upset performance. Although such tolerances can be obtained in a commercially produced beam, home construction rarely permits such precision.

Less critical is the lower scheme in Figure 6. This array uses a driver-reflector design for 17 meters with a driver-director design for 12 meters. The overall length is about 10 feet, with the master driver positioned just forward of the center of balance, where the boom-to-mast mounting plate attaches. The design has an added advantage. We can select any desired impedance for the upper-band beam simply by changing the spacing and length of the slaved driver until the master driver shows the desired impedance with a 12-meter signal. With a driver-reflector beam for 17 meters, we can choose element spacing that gives us an acceptable match when directly connected to 50-Ω coaxial cable. With proper design, we can forget a matching network altogether.

Table 4
Basic (Uniform-Diameter) Element Dimensions for a 17- and 12-Meter Dual-Band Yagi
All measurements are in inches.

Element	Function	Length	Distance from Reflector
1	17-m Reflector	326.4	——
2	17-m Driver (fed)	307.2	81.6
3	12-m Driver (slaved)	234	85.9
4	12-m Director	222	119.2

As we did for the individual beams, let's design the dual-band beam a step at a time. The first step is to design it with uniform-diameter elements. Table 4 shows the resulting dimensions for the combination array. Note that the 12-meter driver is spaced from the 17-meter driver by 4.3 inches. This distance is close enough to worry any antenna designer using *NEC* software, because *NEC* has a known problem with closely spaced wires of different lengths. So I ran the problem on *MININEC* as well. It indicated that the slaved 12-meter driver needed to be about one inch shorter and a quarter-inch closer to the master driver than the *NEC* numbers in the table. This is one of several clues we shall later use to field-adjust the beam to perfection.

In good designs using open-sleeve coupling, the upper-band elements have virtually no effect on the impedance for lower-band signals. Hence, once the lower-band elements are set, they require no change as we adjust the upper-band elements. Unfortunately,

Table 5
Anticipated Performance Parameters: 17- and 12-Meter Dual-Band Yagi

Frequency (MHz)	*Free-Space Gain (dBi)*	*F/B (dB)*	*Feedpoint Impedance R ± jX (Ohms)*
17 Meters			
18.068	6.5	11.3	43 + *j*2
18.118	6.4	11.4	46 + *j*6
18.168	6.3	11.5	49 + *j*8
12 Meters			
24.89	6.5	27.1	61 + *j*5
24.94	6.5	31.9	53 + *j*6
24.99	6.6	33.8	44 + *j*8

Note: When remodeling for an element taper schedule, adjust element lengths to achieve these performance figures.

Figure 8—The dual-band beam during mounting to a crank-up mast fixture used at W4RNL for initial testing and adjustment of small arrays. See the text for a technique to keep the two driver elements parallel to each other.

Table 6
Adjusted Stepped-Diameter Element Dimensions for a 17- and 12-Meter Dual-Band Yagi (Two Versions)

All measurements are in inches.

Test-Model Taper Schedule

Diameter	Length
0.625	36 (from element center)
0.5	69
0.375	tip (see below)

Element	Length	Tip Length	Distance from Reflector
1	334.0	62.0	——
2	313.8	51.9	81.6
3	239.0	14.5	85.9
4	225.4	7.7	119.2

Alternative Taper Schedule

Diameter	17-m Length	12-m Length
0.75	48 (from element center)	12 (from element center)
0.625	33	18
0.5	33	48
0.375	Tip (see below)	Tip (see below)

Element Number	Element Length	Tip Length	Distance from Reflector
1	338.4	55.2	——
2	314.4	43.2	81.6
3	241.7	42.8	86.2
4	228.0	36.0	119.2

the rejected schemes did require some changes in the lower-band element lengths, which then required some readjustment of the upper-band lengths—another daunting aspect of their demands for the home builder. The design in Table 4 is quite stable, and adjusting the 12-meter elements leaves the 17-meter elements unaffected.

Table 5 shows the modeled performance of the antenna in free space. Especially important is the column of feedpoint impedance numbers. The spacing of the 17-meter elements was selected as a compromise between obtaining the highest gain for this type of two-element Yagi and having a low 50-Ω SWR. On 12 meters, the impedance magnitude changes direction relative to the 17-meter progression as we raise frequency. In addition, the rate of change is much more rapid. The fast impedance change presents a major challenge to commercial antennas using this feeding technique for 20, 15 and 10-meter Yagis. However, for 17- and 12-meter use, the amount of change is well within tolerances for a good 50-Ω match. All we need to add at the feedpoint is a standard 1:1 choke balun, which can be a coil of coax or a ferrite-bead balun of W2DU design. This precaution suppresses common-mode currents on the feed line.

Because this design uses a reflector for the lower band, we see a distinct difference in the F/B for the two bands. Figure 7 provides the same information in more graphic form by overlaying the azimuth patterns for the two bands. Although not operationally significant, the 17-meter driver-reflector combination has a modicum more gain and better F/B than the beam might have if used independently. The shorter 12-meter elements have a slight director function on 17 meters. Likewise, the 17-meter elements function (although minimally) as reflectors on 12 meters, elevating the F/B on that band relative to the use of the 12-meter elements as an independent beam. The phenomenon has acquired the name "forward stagger," indicating the design principle of placing higher-band elements forward of lower-band elements for best performance.

We are now ready to translate our basic design into a practical one that uses stepped-diameter tubing for the elements. The test model used the same tapering schedule as the independent beams—because it used the same elements with only the tips adjusted. Table 6 gives the required overall element lengths and the tip lengths for each of the elements in the final array.

To quickly illustrate that changing the tapering schedule may also change the element lengths, the table also identifies a second version of the beam. This version has the same modeled performance as the basic and the test models. However, it uses a more aggressive tapering schedule. It begins with $^3/_4$-inch diameter tubing and progresses to $^3/_8$-inch-diameter tubing. The progressions differ for the two bands to yield the strongest elements of each overall length. Note that the required element lengths are all longer than those for the test model, despite the fact that the center element sections have a larger diameter than those of the test model. Moreover, the *NEC* model indicates that the driver spacing should be slightly greater, although field adjustment determines the final spacing.

Construction and Adjustment of the Dual-Band Beam

Construction of the test antenna is simply a doubling of the element mounting tasks described for the monoband driver-director Yagis. If element-mounting plates are used for the two drivers, the plate edges that face each other should be trimmed so that driver spacing can be adjusted to its final value. Because the spacing (depending on the element sizes used) may be less than four inches center-to-center, the plates should extend no more than two inches from the element centers. For 12 and 17 meters, metal or polycarbonate plates need not be more than about four inches wide for good mounting strength.

For this beam, cut and assemble the reflector, master driver and director to length. Then preposition and tighten these elements

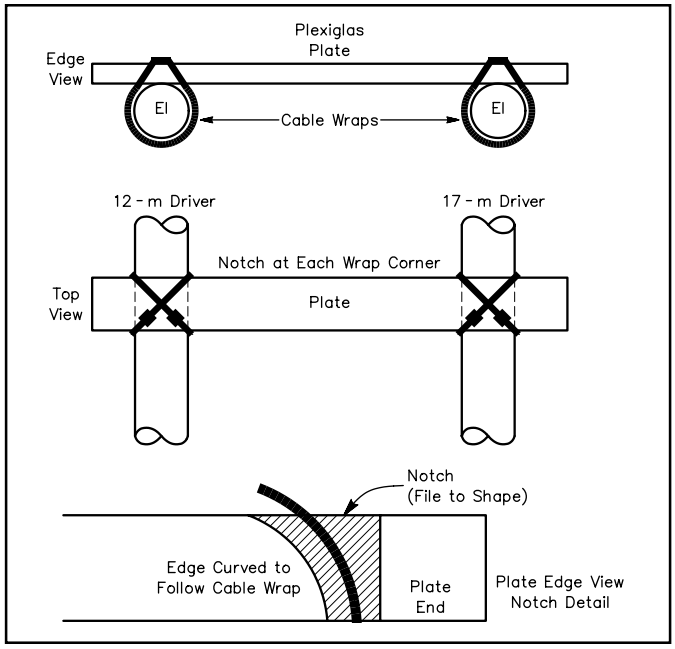


Figure 9—Details of a simple master-slave driver alignment plate with cable-wrap binders.

before installing the slaved driver. The slaved 12-meter driver is the only element that requires patient adjustment. Much of the work can be accomplished with the beam supported by a mast set horizontally so that the reflector is 5 to 10 feet off the ground and the beam is pointed straight up. Check the feedpoint impedance and double-check the element dimensions and spacing. If the feedpoint impedance is close to the modeled values and the beam passes the dimensional checks, then the 17-meter portion of the beam will perform up to the modeled standard. Figure 8 shows the entire two-band array during construction on a crank-up assembly that I use to make adjustments and tests.

Recheck the length and install the slaved driver, but don't lock down the tips or the spacing. Using the modeled spacing as the starting point, measure the feedpoint impedance on the master driver with a 24.94-MHz signal. You may find a resistance that is either higher or lower than the desired level and a reactance that may be either inductive or capacitive. The combination you discover dictates whether you will adjust either the spacing or the element length. Here is the guideline for this particular antenna:

1. Increasing the element length decreases the feedpoint resistance and makes the reactance more inductive (or less capacitive). Decreasing the element length does just the opposite, increasing the feedpoint resistance and making the reactance more capacitive (or less inductive).

2. Closing the spacing decreases the feedpoint resistance and makes the reactance more capacitive (or less inductive). Opening the spacing increases the resistance and makes the reactance more inductive (or less capacitive).

If this is your first open-sleeve coupled beam, be extra patient. It is easy to forget the guidelines and adjust the wrong parameter. If that happens and the feedpoint values appear to be going awry, return the slaved element to its original length and spacing and start the procedure again. Make very small changes between feedpoint measurements until you get a good feel for how much each increment of change affects the feedpoint impedance.

Once you have set the slaved driver to give a proper impedance or SWR curve on 12 meters, recheck the 17-meter feedpoint impedance. It should not have changed by an amount requiring readjustment of the element. Also, check the spacing between the slaved driver and the director. Set the spacing to within about a quarter inch of the model to ensure good performance across the 12-meter band. Moving the driver up to an inch might dictate one more round of slight adjustments to the slaved driver for the best SWR curve.

These adjustments should hold when the antenna is raised to its operating height. However, recheck the feedpoint impedances on both bands to be certain.

Because the spacing between drivers is somewhat critical, you may experience some SWR fluctuations in gusty winds that push the two drivers back and forth. (The difference in element droop between the two drivers, shown in Figure 8, gives an indication of how the wind may also change the element spacing from a parallel set of lines.) You can minimize the fluctuations by locking the two drivers together with a simple Plexiglas or acrylic plate, as shown in Figure 9. The plate can be about an inch or so wide and long enough to allow about one-half inch of overhang past each driver. You can use material up to one-quarter inch thick, but one-eighth inch will normally work well. File notches into the plate so that crossed cable wraps lock the plate in place when tightened. The filing suggestion in the figure is a reminder to avoid a sharp edge where the cable tie bends across the plate. UV-resistant cable wraps are the most durable.

Place these plates about three to four feet from the element center on each side of the array. *Do not* lock the cable ties to the tubes with adhesive. It is important for the tubes to be free enough to move lengthwise in the clamps so that they are never overstressed by winds. The plates simply maintain the spacing between the drivers, forcing them to wobble in the wind in unison.

Like all beams, the dual-band array needs at least annual inspection and preventive maintenance. Check the feedpoint connections, the tubing junctions, all junction plates and hardware and the weather seals you place over coax connectors. While you are up on the tower, check the rotator and its connections as well. If you make your checks by lowering the beam, feel free to clean the tubing as well. Annual maintenance is also a good time to remove old bird and insect nests from any of the crevices they like to use.

Summary

Relatively high performance is easy to obtain on 12 and 17 meters, where beams are light and inexpensive to build. These beams provide some of the highest performance available for their degree of complexity. They require a bit more patient adjustment than simple driver-reflector beams, but the size reductions and performance improvements may make the effort worthwhile.

Notes

[1]*NEC-4* is available in two commercial implementations: *GNEC* by Nittany-Scientific and *EZNEC Pro* by Roy Lewallen, W7EL, PO Box 6658, Beaverton, OR 97007; tel 503-646-2885, fax 503-671-9046; **w7el@eznec.com**; **http://www.eznec.com**. Nittany Scientific, Inc, 1733 West 12600 South, Suite 420, Riverton, UT 84065; **sales@nittany-scientific.com**; **http://www.nittany-scientific.com**. However, a license from the University of California is also required to use either of these programs. In contrast, *NEC-2* and *MININEC* are public domain calculating cores with many commercial implementations.

[2]For a good treatment of tapered-diameter elements and their relationship to uniform-diameter elements, see David B. Leeson, W6QHS, *The Physical Design of Yagi Antennas* (Newington: ARRL, 1992), Chapter 8.

[3]For alternative methods of constructing beam antennas, see any recent edition of *The ARRL Antenna Book*.

*An ARRL Life Member and educational advisor, L. B. Cebik, W4RNL, recently retired from The University of Tennessee at Knoxville to pursue his interests in antenna research and education, much of which appears at his Web site (**http://www.cebik.com**). A ham for over 45 years, his articles have appeared in several League publications including* QST, QEX, NCJ *and* The ARRL Antenna Compendium. *You can contact L. B. at 1434 High Mesa Dr, Knoxville, TN 37938-4443; **cebik@utk.edu**.*

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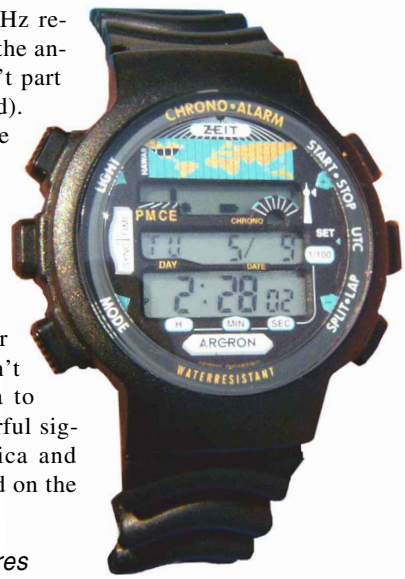
Arcron Zeit "Chrono" Wristwatch

A few years ago we reviewed a desktop alarm clock from German manufacturer Arcron Zeit that calibrated itself by monitoring and decoding time signals broadcast by National Institute of Science and Technology station WWVB at 60 kHz. The clock represented what was then relatively new consumer technology—clocks with built-in WWVB receivers. Each night, usually in the wee hours when WWVB's signal was loud and clear, these ingenious clocks automatically adjusted their time to match WWVB.

Well, "time" marches on. Now the same products that were desk and tabletop units several years ago have morphed into durable water-resistant timepieces that you can wear on your wrist.

Enter the Arcron Chrono

At first glance the Arcron Chrono looks like your run-of-the-mill sports watch—large buttons and all. A closer look at the three-section display gives you a hint that this device is a little different. You have to marvel at how they can squeeze seven functions into a normal-sized watch and have room for a 60-kHz receiver. Where do they put the antenna, you ask? No, it isn't part of the wrist strap (I checked). An internal inspection of the watch didn't provide obvious clues, but my guess is that it is a very small circular loop. I didn't want to disassemble the Chrono further and risk not being able to put it back together again! At any rate, you don't need much of an antenna to pick up WWVB. Its powerful signal blankets North America and could probably be received on the proverbial wet string.



Chrono Time/Date Features

The watch displays local time in easy-to-read numerals in the main window. Just above, in the auxiliary window, you can set the Chrono to display either the date or UTC time. (I was pleased to discover that the Chrono displayed UTC in 24 format.)

This wouldn't be a multifunction watch without an alarm, and the Chrono offers two of them. Your typical "beep" alarm is there to warn you of specific appointments. The second alarm is a little out of the ordinary. It's a "date alarm" that reminds you of important dates by flashing the display continuously to get your attention. Of course, it's up to you to remember *why* the display is flashing (a sked, contest, operating event?).

The stopwatch function includes elapsed time, split time (when you are timing two events simultaneously) and a lap time. The stopwatch readout appears in the main display.

Finally, there is a light. Pressing the **LIGHT** button provides three seconds of soft blue background glow. My 45-year-old eyes can read the local and UTC time displays easily enough, but I squint at the other information. The light does a good job of bringing the displays into sharper contrast under low-illumination conditions.

And What about WWVB?

The Chrono watch is programmed to begin monitoring WWVB at 0100 local time. It will continue to monitor until it receives enough data for a valid time synchronization.

One interesting feature included in the Chrono is manual reception. This means that you can force the Chrono to activate its receiver at any time by pressing and holding a single button. If you are within daytime VLF propagation range of WWVB (most of Colorado and parts of adjacent states), the Chrono will attempt to sync right away. For the rest of us…well, I must confess that I didn't attempt to stay up past 1 AM and manually synchronize the Chrono, but I did give it a shot at about 9 PM local time. Although the Chrono manual doesn't mention this per se, the WWVB sync indicator in the "multifunction display" (the upper third of the watch face) is actually a signal-strength meter. I watched as WWVB's signal rose and fell while the Chrono attempted to decode the data. It was no-go at 9 PM, but an interesting little exercise nonetheless.

The Real World Test

My approach to using the Chrono was to deliberately set it to the incorrect time, then let it sit on my station desk overnight. I live in an aluminum-sided home; it's a virtual RF cage. In my station the nearest window is 12 feet from the desk.

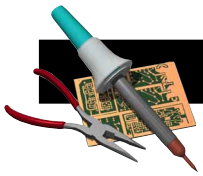
Each morning I was greeted with a tiny triangle on the display next to the radio tower symbol (this is the same area where the signal-strength indicator appears in the manual mode). The appearance of the triangle confirmed that the Chrono had indeed synchronized itself during the night. One evening I accidentally left the Chrono buried deep in a coat pocket in a downstairs closet. Not a problem. The Chrono still heard WWVB's persistent pulses and synchronized as usual.

For practical Amateur Radio applications I found the Chrono very handy for remembering on-air schedules and nets. I was also able to use it very successfully in my satellite operating where precise timing is of particular importance.

Yes, the Chrono costs substantially more than the average sport watch, but how many watches have you seen with built-in 60-kHz receivers that automatically calibrate themselves to atomic clocks? The Chrono is an uncommon and remarkable piece of timekeeping technology.

US distributor: Atomic Time, 1010 Jorie Blvd, #332, Oak Brook, IL 60523; tel 800-985-8465 (orders only); **http://www.atomictime.com**. *$99.95 plus $7 shipping and handling.*

Steve Ford, WB8IMY ♦ QST Managing Editor



By Ray Soifer, W2RS

UO-14: A User-Friendly "FM Repeater in the Sky"

Try an orbiting repeater with a 2000-mile coverage area!

Do you have, or are you considering, a dual-band FM handheld or mobile radio capable of crossband operation at 145 and 435 MHz? Would you like to use it to communicate over distances of up to 3,000 miles or more? One way to do that is to operate through AMRAD-OSCAR 27, as described in my January 1998 *QST* article, "AO-27: An FM Repeater in the Sky." AO-27 has now been joined by a bigger and more powerful "brother," UoSAT-OSCAR 14 (UO-14 for short), which operates 24 hours a day (when passing within range of your station), throughout the world, and is even more user-friendly, especially for those with very simple equipment and antennas.

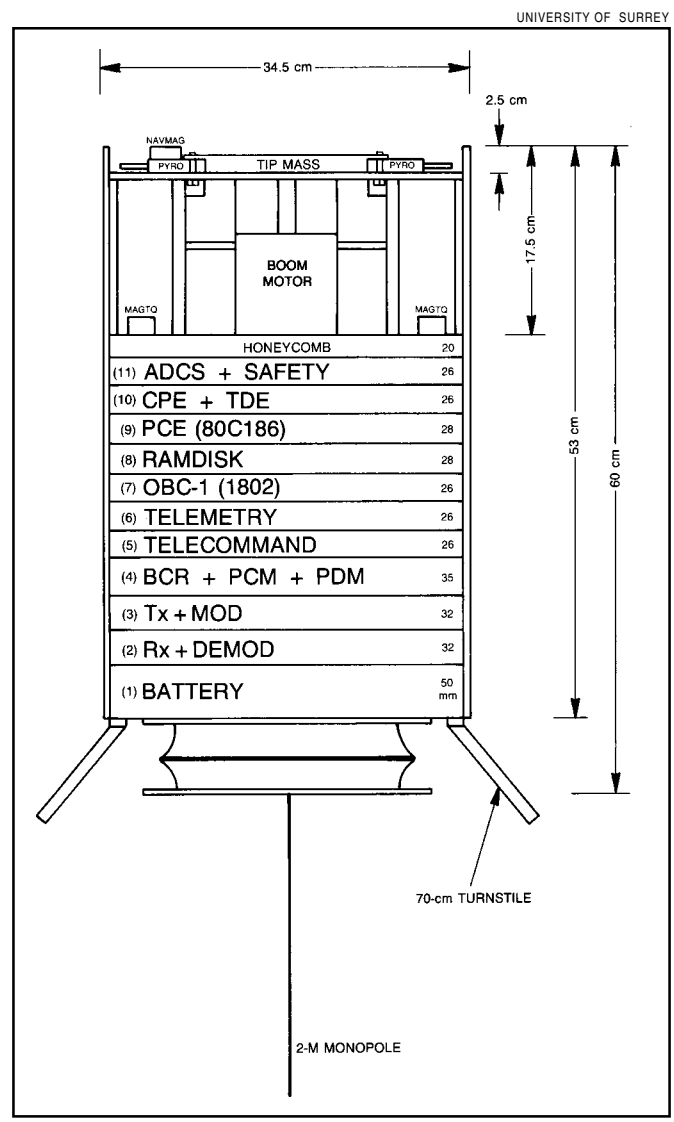
During one recent UO-14 pass, for example, while driving down Interstate 84 east of Hartford, Connecticut, I worked stations in California, Oregon, Utah and Mexico using the same 45-W radio and dual-band mobile whip that I normally use to access local repeaters. During another UO-14 orbit (which passed directly overhead), I worked stations in Ontario, Vermont, Ohio, Kansas and Delaware while sitting in an easy chair in the den of my wood-frame house in northern New Jersey. I was using nothing more than my FT-50R handheld and the standard "rubber duck" antenna that comes with the radio. The next day, feeling more adventurous, I went into my ham shack and carefully aimed my 19-element 2-meter and 16-element 70-cm Yagi antennas at UO-14, which was out over the Atlantic about 1 degree above my horizon. I worked Dave Houlden, G1OCN, about 3,400 miles (5,500 km) away in England. I had worked Dave several times before through AO-27, but only when I, too, was in England—not across the pond!

Like AO-27, UO-14 is currently operating as an FM repeater satellite, 500 miles (800 km) above the earth's surface, capable of hearing stations within a radius of up to 2000 miles from the subsatellite point. Also like AO-27, UO-14 listens on 2 meters (uplink) and transmits on 70 cm (downlink). However, UO-14 is considerably larger than AO-27, a rectangular box approximately 16 × 16 × 25 inches (34.5 × 34.5 × 53 cm) in size, excluding antennas, compared with AO-27's 9-inch (19 cm) cube, permitting it to carry more solar cells with which to provide power. Thus, unlike AO-27, which is turned on only over the Northern Hemisphere and then only on morning passes, UO-14 operates continuously, 24 hours a day, covering the entire globe. Its RF output is higher as well, typically 2-3 W compared with the 0.5-W power level of AO-27.

In short, if you like AO-27, or even if you would like to try it but cannot because you live in the Southern Hemisphere, or are not available to operate during the daytime, you'll love UO-14!

UO-14: A Long and Interesting Life

Amateur FM repeater service is only the latest chapter in what, for UoSAT-OSCAR 14, has been a long and interesting life. Built at the University of Surrey in England (hence the UoSAT name) by a team led by Dr. (now Professor) Martin Sweeting, G3YJO, and former ARRL staffer Dr. Jeff Ward, K8KA, UO-14 was one of six Amateur Radio satellites launched from Kourou, French Guiana, aboard an Ariane 4 rocket by the European Space Agency on January 22, 1990. It was the first of a long series of 9600-baud packet radio store-and-forward satellites, several of which are still



The internal structure of UO-14.

in service forming the backbone of the worldwide Amateur Radio packet network.

In February 1992, UO-14 was replaced in amateur service by UoSAT-OSCAR 22, another 9600-baud packet radio satellite, and transferred to operation outside the amateur bands. During the next seven years, it performed outstanding public service, first relaying medical data in Africa as VITASAT and later demonstrating similar applications over Russia as HealthSat-1. However, its digital systems finally succumbed to the long-term effects of radiation damage. Professor Sweeting also serves as chairman of AMSAT-UK, and at that organization's urging UO-14 was returned to amateur service in February 2000 as an FM repeater in the sky. It is now expected to remain in this mode for the remainder of its operating life.

Recommended Antennas

In my earlier article, I emphasized how weak AO-27's downlink signals are, compared with those from earthbound repeaters, and recommended strongly that you not try to use the "rubber duck" antenna that came with your handheld for AO-27 operation. As I described there, a dual-band whip that operates as a half-wavelength antenna at 70 cm and a quarter-wavelength at 2 meters will produce much better results. Examples of such antennas are the MFJ-1717, the Comet SMA-24 or BNC-24 and the Diamond RH-77CA.

With its higher power output and canted-turnstile 70 cm transmitting antenna, UO-14 is considerably less demanding of receiver sensitivity and receiving antennas than is AO-27. Its downlink signal into a linear (i.e., non-circularly polarized) receiving antenna is approximately 7 dB stronger than AO-27 at the horizon and about 4 dB stronger when directly overhead. In fact, as mentioned earlier, I have made numerous contacts through UO-14 with my Yaesu FT-50R and its original "rubber duck" antenna, something possible with AO-27 only under absolutely ideal conditions.

For better results with UO-14, I still recommend that, whenever possible, you use a dual-band whip that operates as a half-wavelength at 70 cm. Quarter-wavelength and $^5/_8$-wavelength receiving antennas are not recommended, because they require a ground plane to achieve their designed patterns and a handheld transceiver does not provide one. Fixed and mobile vertical antennas also are not recommended because they cannot be tilted to follow the polarization of the incoming signal as can a whip mounted directly on your handheld transceiver. However, even those will produce many contacts through UO-14.

If you are after even more consistent results, the Arrow II dual-band handheld beam is a very popular alternative. Designed for use with AO-27, it provides approximately 10-dB gain over the MFJ-1717 and similar whip antennas on both transmit and receive. I have one, and it works very well on both AO-27 and UO-14. For further information, see the "Short Takes" review in the June 2000 *QST*, or see the Arrow Web page at **http://members.aol.com/Arrow146/index.html**.

Knowing When to Listen

UO-14 and AO-27 are in similar orbits to one another. However, neither comes over at exactly the same time every day, so you will need satellite-tracking software to know when to listen. If you have access to the World Wide Web, go to the AMSAT-NA site at **http://www.amsat.org**. You'll find AMSAT-NA's complete software catalog on line; AMSAT is a not-for-profit organization and all proceeds from AMSAT software go to support the Amateur Radio satellite program. You can telephone the AMSAT-NA office at 301-589-6062. You can also obtain pass predictions up to 24 hours in advance directly on the Web at **http://www.heavens-above.com**. You'll find an informative discussion of satellite tracking software in Steve Ford, WB8IMY's article, "An Amateur Satellite Primer," in April 2000 *QST*.

Programming Your Radio for Doppler Shift

UO-14 has an uplink (input) frequency of 145.975 MHz and a downlink (output) frequency of 435.070 MHz. As with all moving objects, both frequencies are subject to Doppler shift, in this case up to 10 kHz at 435 MHz and up to 3.3 kHz at 145 MHz. At the beginning of a pass, when the satellite is moving toward you, its signal will appear in your receiver above the nominal downlink frequency of 435.070 MHz. Similarly, since Doppler shift also affects the uplink, you should then be transmitting below the nominal uplink frequency of 145.975 MHz. Later in the pass, when the satellite is moving away from you, these relationships will be reversed.

For best results, program your transceiver's memory to take the Doppler shift into account. If your radio tunes in 5 kHz steps as do most FM handhelds and mobiles, program the following five pairs of frequencies into five adjacent memory channels:

Receive (MHz)	*Transmit (MHz)*
435.080	145.970
435.075	145.975
435.070	145.975
435.065	145.975
435.060	145.980

Operating Through UO-14

Begin listening for UO-14 on 435.080 MHz, then gradually move down in frequency to keep the downlink signal as loud and clear as possible. With your radio programmed this way, your uplink will keep up with the Doppler shift automatically as you adjust the downlink. Remember, too, to open your receiver's squelch all the way before you begin listening.

Keep moving your antenna around to follow the direction and polarization of the incoming signal, using your ears as guides. You'll find that it moves a lot during most passes, but with a little practice you'll soon get the hang of it.

Both AO-27 and UO-14 are extremely popular birds. Unless you happen to be operating from the middle of the Pacific Ocean, central Siberia or some other extremely isolated place, you are likely to find them fully occupied whenever they are in range (and, in the case of AO-27, when it is turned on). Please wait until you can hear the other hams who are using it, then give your call sign during an "over," much as you would when joining a conversation on your local repeater. If you detect a carrier but cannot hear voices, do not call CQ. The satellite is probably in use but its downlink signal is simply too weak at your station at that particular time. Don't be an "alligator"! If you transmit under such conditions, you may be interfering with other users.

SUNSAT-OSCAR 35

At this writing, there is also a third FM repeater satellite in orbit: SUNSAT-OSCAR 35, built at Stellenbosch University in South Africa and launched by NASA in 1999. SO-35 carries both Mode B and Mode J capabilities, but is most often in Mode B with uplink at 436.291 MHz and downlink at 145.825 MHz, both plus/minus Doppler shift. Note that SO-35 listens on 70 cm and transmits on 2 meters, the reverse of AO-27 and UO-14. Due to a limited power budget and the demands of other mission requirements, the SO-35 FM repeater is turned on only irregularly. For further information, including the latest operating schedule, check **http://www.amsat.org** or the SUNSAT Web site at **http://sunsat.ee.sun.ac.za**.

Several additional FM repeater satellites are currently in the planning and construction stages, and may even be in orbit when this article reaches print. Keep checking **http://www.amsat.org**, and ARRL bulletins, for the latest information.

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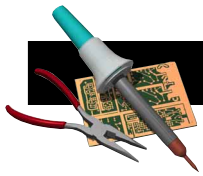

By H. Ward Silver, N0AX

Test Your Knowledge!

The aerial—go figure!

When the soldering iron and cutters come out, and after the rope goes up in the tree, there's a fair amount of pencil scratching that is sometimes needed. Here's some practice.

1. If the impedance of an antenna is 150 Ω, what is the VSWR at the antenna if the feed line's characteristic impedance is 50, 75 or 450 Ω?

2. A delta loop has an impedance of 110 Ω at the design frequency of 7.050 MHz. Your task is to design a quarter-wavelength transmission-line transformer to match the loop to 50 Ω.
a. What should the characteristic impedance of the transformer be?
b. Which type of cable would be suitable: RG-58, RG-59, RG-62 or RG-174?
c. If the selected cable uses a solid polyethylene dielectric, estimate the length of the transformer.

3. In the shack, your wattmeter shows 85 W of forward power and 6 W of reflected power.
a. What is the VSWR?
b. Is the VSWR at the antenna higher or lower than in the shack?
c. If you adjust the antenna and the wattmeter shows 95 W forward and 8 W reflected, is the VSWR closer to 1:1?

4. An antenna made of 1-inch diameter aluminum tubing resonates at a frequency (higher/lower) than one made of #12 copper wire of an equivalent length.

5. Your dipole for the 75-meter state emergency net on 3.987 MHz is resonant at 3.925 MHz.
a. Do you shorten it or lengthen it?
b. How much?
c. If you used the formula 468/f (in MHz) to get dipole length in feet, why is the length wrong?

6. A phased array requires cables precisely one-half wavelength long. You have a signal generator, a 10dB attenuator and an RF voltmeter. How do you cut the cables accurately?

7. Using a short piece of cable at the antenna, the SWR analyzer says that, at the design frequency, your dipole has an impedance of 63 + *j*20 ohms. Is it too long or too short?

8. Your new inverted-**L** is $^{5}/_{16}$-wavelength long. At the feedpoint, should you use a series inductor or capacitor to match the antenna to a 50-Ω coaxial cable?

Bonus: How much additional cable does it take to reduce a 2:1 VSWR to 1:1?

Total Your Score!

There are a total of 16 possible answers, not counting the bonus question. Give yourself one point for each correct answer.

12-16	An antenna master!
7-11	More study is needed, grasshopper
0-6	Better stick to commercial antennas

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Vashon, WA 98070

Answers

1. VSWR for resistive loads equals the ratio of load to characteristic impedance or vice-versa, whichever is greater than one. For 50-Ω, the VSWR is 150/50 = 3:1. For 75-Ω line, the VSWR is 150/75 = 2:1. For 450-Ω line, the VSWR is 450/150 = 3:1.

2. a. The characteristic impedance of a quarter-wave transmission is the geometric mean of the impedances to be matched. In this case $Z = \sqrt{(110 \times 50)} = 74\ \Omega$.

b. Of the cable types listed, the impedances are: RG-58—50 Ω, RG-59—75 Ω, RG-62—93 Ω and R3174—50 Ω. RG-59 ould be the correct choice.

c. Solid polyethylene dielectric cables have a velocity of propagation of 0.66—i.e. the speed of light is two-thirds its free-space value. (Note that RG-62's spec is 85%.) A free-space quarter wavelength at 7.050 MHz is 300/4×7.05 = 10.64 meters (34.9 feet). For this type of cable a quarter wavelength would be 7.02 meters (23.03 feet).

3. a. To calculate VSWR from power, use the formula $VSWR = (1+\sqrt{(Pr/Pf)})/(1-\sqrt{(Pr/Pf)})$. In this case the VSWR = 1.72.

b. The cable loss attenuates the reflected power, making the load look like it's reflecting less power than it really is. VSWR will be higher at the antenna.

c. Using the same formula, VSWR = 1.82. It's worse, even though there is more forward power!

4. The thicker antenna will resonate at a lower frequency.

5. Using the formula 468/f to get the length of a half-wavelength dipole in feet, you know that the length of the 3.987 MHz dipole should be 117.4 feet. Yours is resonant on 3.925 MHz and the formula works out to show a length of 119.2 feet. Apparently, your dipole is about 2 feet too long (a, b). The formula is telling you that your dipole is electrically longer than its physical length. Antennas close to the ground usually resonate lower in frequency than their physical length would indicate because of the additional capacitance of the ground and nearby objects (c). Trim your antenna in 6-inch increments (3 inches on each end) and recheck the resonant frequency.

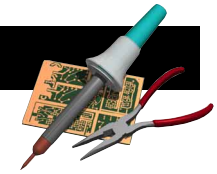
6. Connect the signal generator to the input of the attenuator. Connect the phasing line to the output of the attenuator and short its opposite end with the shortest wire you can. Connect the RF voltmeter to the output of the attenuator. Sweep the generator output frequency to find the lowest frequency at which the RF voltmeter shows a null. This is the frequency at which the cable is one-half wavelength long.

7. The antenna is inductive—it's too long. Either shorten the antenna a little bit or add some capacitance in series at the feedpoint to cancel the inductive reactance.

8. A capacitor. The $^{5}/_{16}$-wavelength inverted-**L** antenna is deliberately cut longer than a quarter wavelength in order to present a feedpoint resistance of around 50 Ω with some inductive reactance, which is cancelled by the series capacitor.

Bonus. An infinite amount! VSWR only changes along a transmission line due to attenuation. If VSWR appears to change with cable length, than RF currents from sources other than the transmitter and load reflections are probably flowing in or on the line (such as current being induced on the outside of the shield).

HINTS & KINKS



HEATH SB-303 MODIFICATIONS

◊ The Heath SB-303 receiver dates back to 1970, but is still popular because of its good performance, low cost in the used equipment market and low power consumption. I modified my receiver for full break-in CW operation by adding a TTL- and CMOS-logic-signal compatible interface circuit for controlling the mute line, decreasing the RF-gain-control time constant and adding an AGC detector output buffer transistor. In addition, I cured a problem with the crystal calibrator.

QSK Muting

The objective of the full-break-in modification is to allow muting by means of a TTL- or CMOS-level logic signal from an electronic keyer while maintaining the original external mute control function and allowing normal receiver operation if the keyer was off or disconnected. Only two transistors are needed in the break-in interface circuit. The first transistor provides the logic interface and controls the second transistor connected to the receiver mute line. The +15 V source for the interface is taken from the receiver's regulated supply. To incorporate the interface circuit into the receiver, we need only break the connection from the mute line to the function switch (S704). Disconnect the purple wire from the mute line to the front panel **FUNCTION** switch at the switch and connect it to the drain of Q2 as shown in the schematic (Figure 1A).

The circuit is built on a small copper-clad board using insulated standoffs to mount the components. A wide range of silicon NPN switching transistors can be used for Q1 (eg, 2N2222, MPS2222, RS 276-2009, RS 276-1617), as long as the dc current gain, h_{FE}, is greater than 20. A MOSFET output transistor yields a lower mute-line operate voltage than the several hundred millivolts typical of a saturated collector-emitter voltage of a bipolar transistor. The measured Q2 sink current in the operate mode is 16 mA. The obsolete Siliconix VMP-2 that I used for Q2 has an *on* resistance of 2 Ω, resulting in a mute-line voltage of 32 mV. Newer devices such as IRFF110, IRFF210, 2N6659 and RS 276-2072A, have lower *on* resistances that will reduce the voltage further. Any N-channel enhancement-mode MOSFET with a turn-on gate voltage between 1 and 4 V and an *on* resistance below 4 Ω is suitable. The board is mounted on the chassis left-side wall adjacent to the **FUNCTION** switch, on metal spacers. The power, logic-input and **FUNCTION**-switch signals are brought to the break-in circuit on twisted wire pairs. A small four-pin male connector for the inputs from the electronic keyer is installed on the receiver back panel in place of one of the spare phono jacks.

Operation of the interface circuit is straightforward. With the keyer input disconnected, Q1 is in the *off* state, which biases the gate of Q2 to +10 V to turn it *on*. In the **OPERATE** and **CALIBRATE** positions of the **FUNCTION** switch, the source of Q2 is grounded. The low *on* resistance of Q2 shorts the mute line to ground and allows the receiver to operate. In the **STANDBY** mode, the source of Q2 is floating, which mutes the receiver regardless of the logic input state. In the **STANDBY** and **MUTE** states, the mute-line voltage rises to +12.8 V. With the keyer connected, a high logic input signal turns Q1 *on,* which lowers the gate voltage of Q2 to 0.1 V, putting it into its high-resistance *off* state. A low logic input keeps Q1 in the *off* state to allow Q2 to be *on*. The original muting operation of the receiver is maintained with the break-in interface. With the receiver in the **STANDBY** mode an external relay can be used to short the mute line to ground, which puts the receiver in the **OPERATE** mode.

Fast QSK Gain Control

Modification of the RF gain control and AGC circuits was necessary to allow fast break-in CW operation. Grounding the receiver mute line takes the receiver from its **OPERATE** mode to its **MUTE** mode in under 10 ms. Fast break-in operation is limited by the transition time (several hundred milliseconds) from the mute to operate states.

A review of the receiver schematic reveals that the high value of R528 in the AGC summing circuit delays the mute-to-operate mode transition. The 1.5-MΩ value of R528 allows the AGC to control the RF gain of the receiver by overriding the manual gain-control voltage. The 0.05 µF decoupling capacitors in the amplifier gain-control circuits and R528 form a time constant of several hundred milliseconds that delays the mute-to-operate mode transition. The effect of this time constant is unnoticeable when going from operate to mute because grounding the mute line quickly disables the first and second mixer stages before the gain of the RF and IF amplifiers is reduced.

The solution to the timing problem is to decrease the value of R528 to 21 kΩ so that the mute-to-operate transition time is less than 10 ms. To allow the AGC to control the RF gain, a single-transistor emitter-follower amplifier is added to the output of the AGC detector (see Figure 1B). The amplifier provides the current gain needed to pull down the RF gain control voltage with a 30 kΩ source resistance without loading the AGC detector. The transistor base-to-emitter voltage drop matches that of the original silicon isolation diode (D701) to maintain the original AGC characteristics. A wide range of silicon PNP general-purpose small-signal transistors can be used in place of the 2N2905 I used for Q3, as long as the dc current gain (h_{FE}) is greater than 50. Suitable substitutes include the 2N2905A, 2N2907, 2N2907A and their plastic case PN-series counterparts The new value of R528 was determined by scaling the original value of 1.5 MΩ by the minimum transistor dc-current gain of 50 and subtracting the 10 kΩ value of R527. A 68 Ω resistor and ferrite bead in the base circuit of the emitter follower prevent parasitic oscillations. Another 68 Ω resistor in the collector circuit limits current and forms a –10 V supply decoupling network with the 0.1 µF bypass capacitor.

The emitter-follower amplifier circuit is built on a small copper-clad board using insulated standoffs to mount the components. The board is mounted on the chassis right-side wall above the crystal filters, on metal spacers. The AGC output, buffer-transistor amplifier output and power signals are brought to the circuit on twisted wire pairs. Three changes to the SB-303 are needed to reduce the RF-gain-control time constant once the amplifier circuit card is installed. First, remove the IF/Audio circuit board and replace R528 with a 21 kΩ resistor. Second, remove the AGC switch (S706) from the front panel, disconnect the AGC summing diode (D701) and connect a twisted wire pair to the two switch terminals where the diode was connected. The connection of the gain-control line (white/black) to the anode of the diode is made on an unused terminal of the switch. Third, connect a twisted wire pair to the –10 V and ground terminals on the power-supply-board connector. Route the two sets of twisted pairs to the amplifier circuit card and connect them to complete the modification.

SB-303 Crystal Calibrator Cure

The built-in crystal calibrator runs at 100 kHz to provide band-edge markers and references for adjustment of the frequency dial. The receiver also has a 25-kHz-marker mode to identify subbands and improved tuning dial accuracy between the 100-kHz markers.

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor

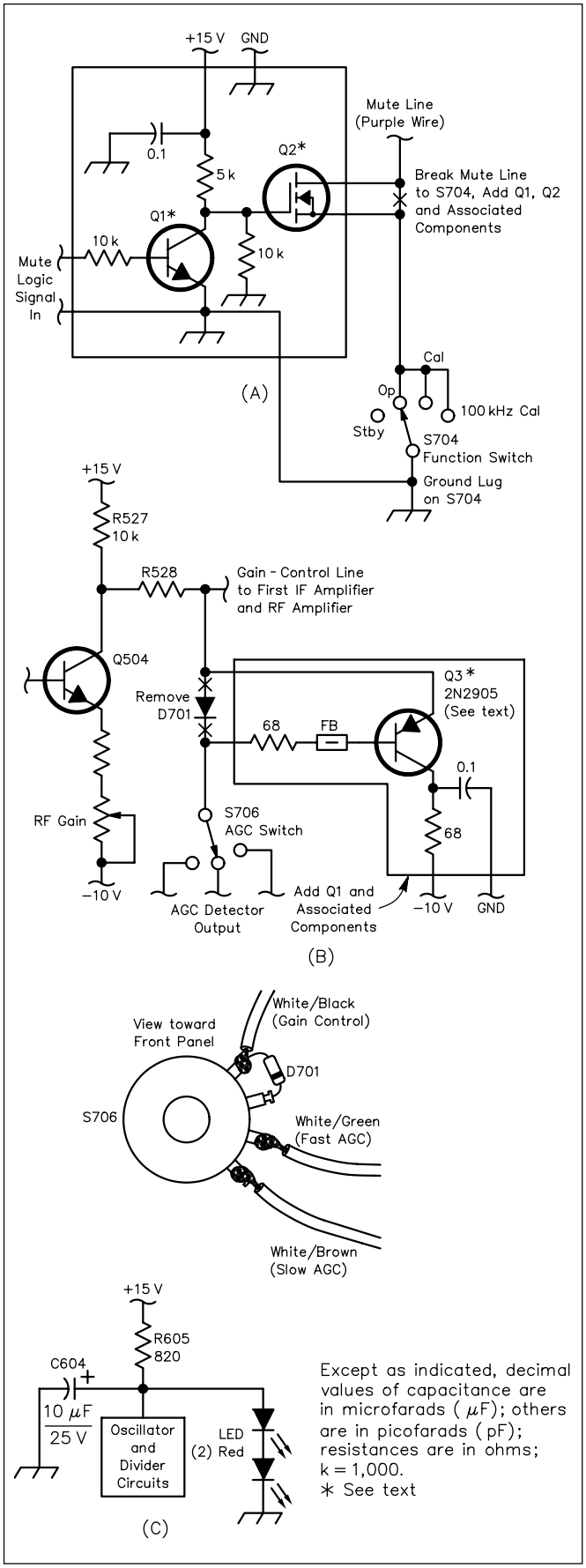


Figure 1—K1MC's modifications for the SB-303. At A, keyer-logic driven muting circuitry. At B, QSK AGC control. At C, two red LEDs act as a shunt voltage regulator for the crystal-calibrator RTL circuits.

The 25-kHz markers are derived from the 100-kHz oscillator output signal by blocking three of each four 100-kHz pulses, rather than by using two flip-flops to digitally divide by four.

The monostable timing for blocking out the correct number of pulses is critical to the proper operation of the circuit because longer timing periods increase the division ratio and shorter timing periods decrease the division ratio. The calibrator uses a resistor-transistor-logic (RTL) quad **NOR** gate IC. Two gates are used for the 100-kHz oscillator and two for the monostable-divider function. An explanation of the circuit is contained in a *QST* (July 1971, pp 48-52) review of the receiver.

I recently purchased a used SB-303 and found that the operation of the crystal calibrator in the 25-kHz mode was erratic. Operation was normal during first half minute after the power was switched on, with markers every 25 kHz. After this short warm-up period, the markers would shift down to a 20-kHz spacing—and then disappear. A quick check of the receiver showed that the +15 V supply to the calibrator is 0.5 V high. Reducing the voltage to its nominal value helped the problem a little, but did not fix it. The measured Vcc for the RTL IC was +4.0 V, well above the specified range of +3.0 to +3.6 V. As an experiment, I lowered the +15 V supply while monitoring the RTL logic supply with a DVM. The 25-kHz markers appeared when the RTL Vcc reached +3.6 V and remained down to +3.0 V. I chose lowering the supply voltage to the IC as the simplest solution.

The calibrator circuit uses an 820 Ω series resistor (R605) to drop the +15 V supply to the RTL operating voltage. The value of the dropping resistor in the circuit measured 854 Ω. With a series resistor already in place, my first thought was to add a 3.3 V Zener diode to form a shunt regulator. A quick check of my junk box and the local RadioShack found only 4.7 V and higher Zener diodes. From a previous digital clock project, I had learned that red LEDs have a junction voltage of about 1.6 V. I series connected two red LEDs and installed them in the calibrator circuit (see Figure 1C). The two LEDs glowed, and the calibrator 25-kHz markers appeared again as the IC Vcc dropped to +3.4 V.

A wide range of LEDs can be used in the circuit; power dissipation in each LED is about 0.8 mW. The computed LED current is 0.5 mA, based on the measured series dropping resistor value, the +15 V supply and the RTL Vcc. Use only red LEDs because other colors have higher junction voltages. An alternative solution would series connect five small-signal diodes to form a shunt regulator.

Increasing the value of the series resistor is not a practical method of lowering the RTL Vcc: The oscillator and monostable circuits draw approximately 13.1 mA and would require a precision resistor with a value of 885 Ω. In addition, increasing the resistor value would not compensate for variations in the +15 V supply that may create new operating problems for the monostable.

If your crystal calibrator operates consistently at 20 kHz, rather than 25 kHz, the problem is most likely the monostable resistor-capacitor time constant. The carbon-composite resistors used in the receiver increase in value as they age and gradually increase the monostable period until the circuit divides by five. Replace the timing resistor (R609) with a 22 kΩ stable metal-film unit to return the circuit to divide-by-four operation.—*Mal Crawford, K1MC, 19 Ellison Rd, Lexington, MA 02421*

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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

A *QST* Roundup: 2-Meter Handheld FM Transceivers

Reviewed by Joe Bottiglieri, AA1GW
Assistant Technical Editor

Well over a year has passed since two of the three transceivers in this "roundup" were released into the US ham radio marketplace.

While I've got to admit that we've corralled somewhat of a "mixed bag" this time around, in the interest of getting a closer look at them before they grow even longer in the tooth, let's gather round, take up a perch on the top fence rail and give due consideration to these unlikely stable mates.

It's important to point out that each of these radios has particular attributes that make them worthy choices for specific applications. Also have a look back at our previous 2-meter handheld reviews, such as those that appeared in the May 1996, December 1997 and October 1998 issues of *QST*. Nearly all of the radios covered in these earlier reviews are still available. Be sure to select the one that best fits your personal operating requirements.

The Alinco DJ-195T

The DJ-195T caused quite a buzz at last year's Dayton Hamvention. Included in the usual list of capabilities touted on the glossy advertising handouts were a couple of eyebrow raisers—a built-in theft alarm and an "experimental mosquito repelling" system.

Additional highlights include 40 memory channels with 6-character alphanumeric naming capability, a dedicated "call" channel, independent CTCSS encode and decode, digital code squelch (DCS) encode/decode, tone burst, 135 to 174 MHz extended receive, 5 W or 800 mW of RF power output with the included battery, nine 16-digit DTMF autodial memories and direct frequency entry from the keypad.

The DJ-195T is noticeably larger—especially in height—than most of the recent handhelds, but these more generous dimensions result in some distinct advantages. The size and spacing of the buttons on the keypad, the readability of the information shown in the display and the audio quality of the built-in speaker all benefit from this added elbowroom.

The LCD window is located at the midpoint of the front panel. Information appears as black segments on a gray field. The frequency digits (or alphanumeric characters), the memory channel number and the various icons are some of the largest—and consequently easiest to read—currently available on an H-T. A comparatively small 6-segment S/RF power meter resides in the lower right-hand corner of the window. Display backlighting is available—the keypad however, is not backlit.

The speaker is mounted above the display and **POWER**, **FUNC**tion/**SET**, and 16 DTMF/frequency input buttons are located below.

Several of the keypad buttons also perform control functions. The labels that appear above these keys—**STEP**, **TSQ**, **SHIFT**, **PO**, for example—make it simple to locate the desired operation.

A set mode menu—accessed by pressing and holding the **FUNC**tion/**SET** key, is used to control 13 of the less often varied operating parameters. These include settings for the battery saver mode, the key beep, the tone burst, the busy channel lockout, the time-out-timer penalty, the theft alarm, the mosquito repelling system and additional choices related to the DTMF autodialer.

A single rotary encoder on the top panel controls several operations. As with most transceivers, the encoder is used to step between the programmed memories in the

Table 1—Alinco DJ-195T, serial number T000799

Manufacturer's Specifications	***Measured in ARRL Lab***
Frequency Coverage: Receive, 135-175 MHz, transmit,144-148 MHz.	Receive, 135-174 MHz; transmit, as specified.
Power requirements: 6.0-16.0 V dc; receive, 50 mA (squelched); transmit, 1.2 A (maximum, high power).	Receive, 0.15 A (maximum volume, no signal); transmit, 1.1 A (with EBP-48N battery pack).
Size (hwd): 4.9×2.2×1.6 inches; weight, 13.2 ounces.	
Receiver	*Receiver Dynamic Testing*
Sensitivity: 12 dB SINAD, 0.2 µV.	For 12 dB SINAD: 0.17 µV.
Two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset from 146 MHz, 58 dB*, 10 MHz offset from 146 MHz, 82 dB.
Two-tone, second-order IMD dynamic range: Not specified.	77 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset from 146 MHz, 58 dB.
Spurious response: Not specified.	IF rejection, 102 dB; image rejection, 92 dB.
Squelch sensitivity: Not specified.	0.07 µV at threshold.
Audio output: 200 mW at 10% THD into 8 Ω.	195 mW at 10% THD into 8 Ω.
Transmitter	*Transmitter Dynamic Testing*
Power output (H / L): 5 / 0.8 W.	5.4 / 0.8 W.
Spurious signal and harmonic suppression: 60 dB.	63 dB. Meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, 180 ms.
Receive-transmit turnaround time ("tx delay"): 96 ms. Not specified.	

*Measurement was noise limited at the value indicated.

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

memory mode, to vary the frequency when in the VFO mode and to change the settings of the various parameters during programming. With the DJ-195T though, this knob also controls the volume and squelch.

This is achieved by pressing the ***/VOL** or the **#/SQL** key first and then rotating the encoder. A two-digit indicator pops up in the lower left-hand corner of the display window and reports the relative setting of the levels as a value between 0 and 20. Approximately 5 seconds after you first hit the key or stop turning the knob, the level indicator will disappear and the encoder will revert back to frequency control.

This arrangement works nicely and virtually eliminates the possibility of accidentally upsetting the volume or squelch levels—a common problem with dedicated rotary controls. It does make it more difficult to adjust these settings when the unit is clipped to your belt though.

A BNC antenna connector and a pair of speaker/microphone jacks are also located on the top panel. A **DC IN** jack, for connecting the included wall transformer battery charger or an external 12 V dc power source is positioned on the right side of the transceiver.

The 9.6 V 700 mAh NiCd battery pack attaches clamshell style to the back of the chassis. A large plastic belt clip snaps into a track on the battery.

Some Unusual Talents

The theft alarm function in the DJ-195T works in conjunction with the dc power jack. Once set, if the dc supply from an external power supply or the wall transformer charger is interrupted, the radio will emit a loud high-pitched squeal. While the level of the alarm tone isn't exactly ear shattering, it will certainly attract attention.

The "experimental mosquito repelling" function is based on the premise that mosquitoes are bothered enough by a very high frequency sound that they will choose to look for their dinner some distance away. I had hoped to experiment with it out on my deck, but was unable to recruit a sufficient number of mosquitoes to formulate any supportable conclusions. I tried to convince the folks in the ARRL Lab to set up one of the exposed-arm-in-the-glass-box-full-of-mosquitoes tests, but they respectfully declined. I'll leave further investigation to others. I did find that when the feature was switched on the sound was annoying enough to *me* that I would choose not to be subjected to it for very long.

An especially interesting feature is an "external control function." When this is enabled, any receive audio that breaks the squelch (or CTCSS or DCS tone squelch) will result in a 5 V output at the ring connector of the microphone jack. This voltage could be used to control an external relay. You could wire the relay so that it switches on a connected tape recorder or activates sounders or lights to indicate an incoming call, for example.

The DJ-195T includes basic memory and VFO scanning capabilities. Selected memory channels can be locked out of a scan and there are two scan resume modes.

VFO scan will search through all frequencies between 135 and 174 MHz—no scan frequency limit settings are available.

The 8×6-inch 38-page *Instruction Manual* is loaded with illustrations, making it especially easy to follow the programming steps.

The operation of this radio seems very intuitive—primarily due to the clearly labeled control assignments for the keypad buttons. Moderately experienced operators should be able to program and operate this transceiver without spending more than a few minutes paging through the written instructions.

The manual includes a wiring diagram for connecting the radio to a packet TNC. A schematic diagram of the transceiver is also provided.

On The Air

Requests for on-the-air signal reports consistently garnered high praise for the quality of the transmitted audio. The level and clarity of receive audio from the built in speaker is more than adequate for handheld applications and is sufficiently loud for all but the noisiest of environments.

ARRL Lab tests (see Table 1) revealed some pretty impressive performance characteristics. Two-tone third-order IMD dynamic range at 10 MHz offset, typically a good indicator of a transceiver's ability to fight off interference from nearby commercial services operating on either side of the 2-meter amateur band, measured 82 dB. This is just 1-dB off the highest figure that we've recorded for a 2-meter H-T. (The Kenwood TH-22A set the high water mark back in '96.)

The IF rejection numbers are quite good—scoring above average for this class. Image rejection performance, while not quite as stellar, still came in considerably better than the running average for similar units.

The Alinco DJ-195T is a good choice for those willing to trade off some of the carry convenience of the smaller H-Ts for an easier to view display, improved control accessibility and intuitive operation.

Manufacturer: USA Alinco Branch, 438 Amapola Ave, Suite 130, Torrance, CA 90501; 310-618-8616; fax 310-618-8758; **http://www.alinco.com**.

Manufacturer's suggested retail price: $289.95. Typical current street price: $160.

The RadioShack HTX-200

The HTX-200 was also initially rolled out at the 1999 Dayton Hamvention. A 70-cm version, the HTX-400 was released shortly afterward.

These very compact low power handhelds (the RF output is specified at 200 mW with two AA alkaline cells installed) are just the ticket for monitoring the action on local repeaters, communicating through the close ones, and for short distance simplex operation—such as at a hamfest or Field Day site.

Granted, 200 mW of RF power won't cover a tremendous amount of real estate over typical terrain, but if shirt pocket carry convenience is what you're looking for, the tiny HTX-200 certainly fits the bill.

This radio also has a hidden talent, however—feed it 9 V dc from an external source and the RF output increases to 2 W (1 W with the 70-cm version)—a level that's suitable for mid-range repeater operation. You can use an optional cigarette lighter cable with a built in dc-to-dc (12 V-to-9 V) adapter to draw power from a 13.8 V dc power supply or a vehicle's electrical system.

The HTX-200 offers a good variety of the basic features—30 memory channels; a "call" channel; CTCSS encode and decode; CTCSS paging capability; extended receive from 136 to 174 MHz; band and memory scan modes with memory channel lockout; and a multistage battery charge indicator.

The front panel sports a small LCD window that shows information as black segments on a gray background. Display backlighting is available. A 10-section S/RF power meter is located along the lower edge of the display. The frequency digits, memory channel numbers and various function icons are very small.

As is the case with the alternative submini 2-meter H-Ts presently on the market, the familiar 16-button DTMF/frequency entry keypad is absent. Seven rubberized buttons on the front panel, **FUNC**tion and **PTT** buttons on the left side panel and concentric rotary **VOL**ume**/OFF** and **SQ**uelch knobs on top control most operations. No arrangements for generating DTMF tones for autopatch or repeater control are provided.

The operating frequency is selected using combinations of the **FUNC**tion button and **▲/T.SET** and **▼/▶** keys. Frequencies are entered by pressing and holding the **FUNC**tion button, selecting the desired digit with the **▼/▶** key, and then pressing the **▲/T.SET** or **▼/▶** keys to step up or down through the numbers. In the VFO mode, you can also use the **▲/T.SET** or **▼/▶** keys to change the frequency by the tuning step. In the memory mode, these same keys are used to step through the memory channels. Although it may seem a little awkward at first, with a little practice you'll soon find that this tuning scheme works quite nicely for moving quickly around the band.

Commonly required operations—such as toggling between the memory and VFO

modes, tuning, changing the duplex setting, programming VFO information into memories, entering the scan mode, accessing the call channel, switching on the backlighting, locking the keys and temporarily opening the squelch—are performed using the front panel buttons or combinations of the **FUNC**tion key and those buttons.

Two menus are used for controlling the more advanced settings. There's a "Main Menu" with items for adjusting the tuning step size, the repeater offset frequency, the time-out-timer, the busy channel lock out, the power save feature and the scan hold delay time. A separate "Tone Set Menu" is used for selecting and activating the CTCSS tones for tone and tone squelch operation. Forty-seven CTCSS tones are available and different tones can be set for transmit and receive.

The provided antenna is about 3¾ inches long and attaches to a female SMA connector. Conventional 2-pin speaker/microphone jacks are located on the top panel. The external power jack is positioned on the right side.

The radio does not include built-in battery charging circuitry. If you decide to employ rechargeable batteries, you'll need to purchase a separate charging system for them.

The 4½×7-inch 47-page *Owner's Manual* provides clear step-by-step instructions and includes lots of diagrams. Tables listing the menu items, with columns for the available settings, brief text explanations and page number references for more detailed information, are provided.

An extremely handy *A Quick Look at the Controls* table proved very helpful on a number of occasions. This would be a good section to photocopy and laminate for field reference.

Table 2—RadioShack HTX-200, serial number 99080659

Manufacturer's Specifications	***Measured in ARRL Lab***
Frequency Coverage: Receive, 136-174 MHz; transmit, 144-148 MHz.	Receive and transmit, as specified.
Power requirements: 3.0-9.0 V dc; receive, unspecified; transmit, 0.9 A.	Receive, 0.05 A (maximum volume, no signal); transmit, 0.8 A, tested at 9 V.
Size (hwd): 2.3×3.4×1.1 inches; weight, 6.0 ounces.	
Receiver	*Receiver Dynamic Testing*
Sensitivity: 12 dB SINAD, 0.22 µV.	For 12 dB SINAD: 0.22 µV.
Two-tone, third-order IMD dynamic range: 60 dB, (spacing not specified).	20 kHz offset from 146 MHz, 57 dB, 10 MHz offset from 146 MHz, 71 dB.
Two-tone, second-order IMD dynamic range: Not specified.	80 dB.
Adjacent-channel rejection: 50 dB.	20 kHz offset from 146 MHz, 58 dB.
Spurious response: 60 dB.	IF rejection, 93 dB; image rejection, 47 dB.
Squelch sensitivity: Not specified.	0.15 µV at threshold.
Audio output: 90 mW at 10% THD into 16 Ω.	83 mW at 10% THD into 16 Ω.
Transmitter	*Transmitter Dynamic Testing*
Power output: 200 mW with batteries, 2 W with 9 V dc.	450 mW with batteries, 2.6 W with 9 V dc.
Spurious signal and harmonic suppression: Not specified.	57 dB. Meets FCC requirements for spectral purity.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, 180 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	6 ms.

Operational Aspects

On the air, the HTX-200 received compliments for its natural sounding transmit audio. Receive audio from the internal speaker is sufficient for most handheld applications, but those pressing this unit into mobile service will definitely want to consider connecting an amplified external speaker.

With just 200 mW of specified RF output power and a stock antenna that measures under 4 inches, I was initially skeptical about how well the HTX-200 would fit my typical operating needs.

Our local club repeater is located on a ridge about 3 miles from my home. While communicating from my basement shack proved to be pushing the limits a bit, nearly any location on the ground or second floor resulted in sufficient signal levels for solid two way communications through the repeater. Handheld use around our small town also provided reasonably good results (the usual RF holes did seem a little "deeper" though). It should be noted however, that our product review unit put out nearly ½-W of RF energy with a fresh set of AA alkalines. Your results—of course—may vary.

Looking over the ARRL Lab data in Table 2 and comparing the numbers posted by the HTX-200 with those of the other subcompact shirt pocket 2-meter handhelds that we've reviewed (Alinco's DJ-S11T and DJ-C1T, and Standard's C108A) reveals an overall level of performance that stacks up nicely against the competition. In several instances, the '200's performance even compares favorably with some of the more deluxe 2-meter handhelds.

We did run into a problem with the original HTX-200 that we purchased for this review. While the unit was still in the very early stages of lab testing the receive audio output disappeared. RadioShack has a 90-day return policy on equipment. They cheerfully (really—*cheerfully*—no kidding!) replaced our defective unit with a new transceiver. We encountered no difficulties with the replacement unit.

The carry convenience of an H-T this small can make it a valuable addition to your communications arsenal. If walking around with a bulkier transceiver hanging off your belt cramps your style, or if it just seems to attract a little too much attention at work or school, perhaps the pocket sized HTX-200 is just what you need to keep 2-meter Amateur Radio communications capabilities close at hand.

Manufacturer: RadioShack Corp, Fort Worth, TX 76102; 800-842-7422; fax 718-415-2303; **http://www.radioshack.com**.

Manufacturer's suggested retail price, $179.99. Typical current street price, $150.

Yaesu's Vertex VX-150

With little (if any) fanfare, the Vertex Standard VX-150, along with a similar but less deluxe version—the VX-110, quietly joined the ranks of Yaesu's usual handheld lineup in one of their ads in the May 2000 issue of *QST*.

These unfortunate little transceivers were robbed of the usual full-page debut bestowed on nearly all of the new Yaesu ham equipment that has made it to market over the last few decades. Perhaps they deserve better.

These two handhelds have managed to slip the surly bonds of Yaesu's Vertex Standard commercial equipment division and escaped into their amateur division without sacrificing their nameplates. Let's have a closer look at the VX-150.

The VX-150 features 199 regular memory channels with 7-character alphanumeric naming capability; a "home" (or call) channel; extended receive from 140 to 174 MHz; dual VFOs; 5 pairs of programmable upper and lower scan or VFO limits; CTCSS and DCS encode and decode with tone scan and page capabilities; automatic repeater shift; and

5 W, 2 W and 0.5 W power output settings with the included battery pack. Also included are two user programmable keys; dual watch; nine 16-digit DTMF autodial memories; and Yaesu's exclusive Smart Search and automatic range transponder (*ARTS*) systems.

The transceiver's slim enclosure consists of a front cover section made of thick black plastic fastened to a chassis/framework of cast aluminum. A flat 7.2 V 700 mAh NiCd battery pack inserts into the back and is secured in place with a pivoting latch. An aggressive spring loaded belt clip is fastened directly to the aluminum framework—not to the battery pack. A rough texture covering the enclosure makes it easy to grip.

The position of the LCD window is unique—it faces upward at about a 45 degree angle. This makes it easier to read the display when the H-T is standing upright on a desktop or when it's clipped to your belt (albeit in this position the view of the window is inverted!).

The LCD is small, but the frequency digits (or alphanumeric characters) and the function icons are large enough for reasonably good legibility. A 7-segment S/RF power output meter is located along the bottom edge of the display.

A female SMA antenna connector, a volume control knob with an integral on/off switch, concentric squelch and encoder knobs and a red/green busy/transmit LED are located on the top panel. A single pin 4-section 1/8-inch speaker/microphone jack and a coaxial-style external dc input jack are located on the right side. Rubberized PTT, monitor and lamp control buttons are positioned towards the top of the left side panel.

The 16-digit DTMF/frequency entry keypad is located in the lower part of the front panel. The number digits, the **MR**, **VFO**, ▲, ▼, **REV** and **F** keys have their labels printed directly on the surface of translucent buttons. Orange-colored illumination for both the display and the keypad can be activated, and is extremely handy for nighttime operation.

Above each key—printed in yellow letters—are their secondary control assignments.

In order to control the wide range of available features, the VX-150 relies heavily on a 38-item "Set Mode" menu. The menu items are identified by a number and alphanumeric titles up to seven characters long—"SHIFT," "SQL TYP," "DCS SET," "SKIP," are some examples. Once you've dialed up the desired feature, a quick press of the **F**unction key and a twist of the encoder will step you through the available settings. While some of the titles may seem a bit cryptic on the first encounter, they soon become familiar.

Loaded

The VX-150 offers virtually every capability—with the exception of extreme wide receive range—that we've seen up 'til now in a handheld Amateur Radio transceiver.

Yaesu has included their exclusive Smart Search and ARTS (automatic range transponder system) features. These have been available in the vast majority of VHF/UHF equipment that they've released over the last couple of years.

The Smart Search system is useful for quickly searching through the band for activity. The system will scan above and below the selected frequency and load up to 31 dedicated memories. A single pass mode sweeps the range once in each direction. A continuous pass mode will search up and down the band until all 31 memories are filled.

While the feature is definitely handy, it does tend to collect a disproportionate number of false signals, and will load strong signals into multiple positions.

The ARTS system works with other ARTS equipped (read "Yaesu") transceivers. This feature automatically transmits and listens for DCS pings. If two radios with this feature enabled move outside of communications range for more than approximately one minute, three beeps will sound and an "OUT RNG" message will appear in the VX-150's display. This capability might be useful in public service or search and rescue operations. A CW ID setting that transmits your call sign at 10-minute intervals identifies these automatic transmissions.

An additional interesting feature is a transmit battery save mode. When this is activated, the transceiver will automatically reduce the RF power output level when the last received signal was very strong.

Yaesu has earned a reputation for providing well-written documentation with their recent transceivers, and the VX-150's *Operating Manual* is no exception. The 41-page 6×8-inch booklet features several diagrams and tables, and clear, concise step-by-step guidelines for programming the various functions. A wiring diagram for connecting the radio to a packet TNC is provided, and a separate foldout sheet with a block diagram and schematic is also included.

Those who have owned and operated other contemporary Yaesu handheld transceivers will find the control arrangements on the VX-150 extremely familiar. Newcomers should have little trouble "learning the ropes" by carefully following the information included in the manual.

With the long list of features available in this transceiver, a "pocket guide" for reference in the field would have been a welcome addition.

The VX-150 has musical talents that should make it a popu-

Table 3—Vertex VX-150, serial number 0C031732

Manufacturer's Specifications	***Measured in ARRL Lab***
Frequency Coverage: Receive and transmit, 144-148 MHz.	Receive, 140-174 MHz; transmit, as specified.
Power requirements: 6.0-16.0 V dc; receive, 130 mA (no signal); transmit, 1.3 A (maximum, high power).	Receive, 0.18 A (maximum volume), transmit, 1.3 A, tested at 13.8 V.
Size (hwd): 4.3×2.3×1.0 inches; weight, 11.5 ounces.	
Receiver	*Receiver Dynamic Testing*
Sensitivity: 12 dB SINAD, 0.16 μV.	For 12 dB SINAD: 0.16 μV.
Two-tone, third-order IMD dynamic range: 70 dB, (spacing not specified).	20 kHz offset from 146 MHz, 65 dB*, 10 MHz offset from 146 MHz, 76 dB.
Two-tone, second-order IMD dynamic range: Not specified.	81 dB.
Adjacent-channel rejection: (specified at 25 kHz offset) 70 dB.	20 kHz offset from 146 MHz, 65 dB.
Spurious response: Not specified.	IF rejection, 122 dB; image rejection, 80 dB.
Squelch sensitivity: Not specified.	0.05 μV at threshold.
Audio output: 400 mW at 10% THD into 8 Ω.	450 mW at 10% THD into 8Ω.
Transmitter	*Transmitter Dynamic Testing*
Power output: 5 W high, medium and low not specified.	4.8 / 1.7 / 0.46 W.
Spurious signal and harmonic suppression: 60 dB.	70 dB. Meets FCC requirements for spectral purity.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, 140 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	116 ms.

*Measurement was noise limited at the value indicated.

lar choice for the vision impaired. Each of the 16 keys on the front panel emits a unique note when pressed. This "key beep" function can be disabled in a menu setting if desired.

Operating Impressions

Both the receive and transmit audio clarity of the VX-150 are excellent. Stations contacted reported clear, natural sounding transmissions.

The level and quality of the receive audio are *very* impressive for a handheld unit—and are actually better than that of several of the mobile transceivers that we've looked at recently.

This may be attributable to the VX-150's commercial heritage. Commercial handhelds often find use in industrial and construction environments where competing with background noise can be a major problem.

ARRL Lab test results (see Table 3) reveal a respectable overall level of performance. The 10 MHz offset two-tone third-order IMD dynamic range measurement scores slightly above the running average for similar units. The 122 dB IF rejection figure is the highest we've measured to date in a 2-meter H-T. (The previous holder of this title was Yaesu's FT-10R.)

If 2-meters is your primary band of interest and you need a feature-packed, compact, rugged handheld transceiver, the Vertex Standard VX-150 is worthy of serious consideration.

Manufacturer: Yaesu USA, 17210 Edwards Rd, Cerritos, CA 90703; 562-404-2700; **http://www.yaesu.com**.

Manufacturer's suggested retail price: $239. Typical current street price: $170.

AlphaMax and AlphaRemote for the Alpha 87A

Reviewed by Dick Green, WC1M

For the first few years that I owned my Alpha 87A, I rarely thought about how it could be improved. It's always been a quiet, reliable and versatile workhorse in my station. But about a year ago, Alpha/Power introduced two significant upgrades for the 87A: AlphaMax and AlphaRemote. The former is firmware that transforms the no-tune 87A into a true autotune amplifier. The latter is *Windows*-compatible software for operating the 87A remotely. Both products are now standard features in new 87A amplifiers and are also available as an inexpensive field upgrade for all existing 87A amplifiers. (The Alpha 87A was reviewed in the June 1992 issue of *QST*.—*Ed.*)

What's the difference between "no-tune" and "autotune?" As the term has come to be used in Amateur Radio, a no-tune amplifier uses preset tuning values that can be rapidly selected, either manually or automatically. The venerable Alpha 78 is a good example of a no-tune amplifier that offered manually selected presets: banks of variable capacitors that could be pretuned with a screwdriver to match the output circuit to the antenna impedance in a particular band segment. The main drawbacks were that you still had to remember to change the band switch, and the small variable capacitors had limited bandwidth and limited ability to handle the high values of reflected power that result from a mismatch.

The original Alpha 87A solved these problems with computer-selected presets. Instead of using small tuning capacitors, all tuning is done using the large main tune and load capacitors. At installation, you simply tune up on five frequency segments in each band and store the settings in the 87A's nonvolatile memory. After that, you seldom have to touch anything except the on and off switches. The 87A automatically detects the transmit frequency and activates computer-controlled stepper motors to set the bandswitch and variable capacitors to the values stored for that band segment. The retuning only takes a second or two.

Combine this rapid band change capability with computerized logging software, a computer-controlled rig and band decoders for automatic antenna selection, and you set the stage for high contest scores and some serious fun. For example, while casually operating in the last CQ WPX SSB contest, I worked 327 packet spots on five bands and my hands never left the keyboard!

The biggest drawback to the original 87A design was that you could only store the settings for one antenna in each segment. This was particularly nettlesome when I built an automated single operator two radio (*SO2R*) contest station that has multiple antennas for each band that can be switched between the two radios. This meant that the original 87A's output network could be presented with several different impedance values on a given frequency, but only one could be properly matched.

Operators of stacked antennas are sometimes faced with a similar problem. There can be impedance variations between different configurations of the stack, especially when stacks for multiple bands are mixed on the same tower.

Bottom Line

Available standard in new Alpha 87As and as an upgrade for earlier versions, AlphaMax adds true autotune operation to these popular amplifiers. Updated control software—AlphaRemote—allows computer control of these units in a Windows operating environment.

You can run into mismatch problems even if you have only one antenna for each band. The 87A's band segments are relatively wide: 40 kHz on 160 meters, 100 kHz on 80 through 15 meters and 400 kHz on 10 meters. Normally, you tune up at the center of each segment, and if the antenna's bandwidth is limited, the amp can be somewhat off the correct tuning when operated at either edge of the segment. Sometimes you can compensate for this by redefining the center frequency, but you have to be careful not to allow segments to overlap (otherwise the firmware gets confused).

Here's another common source of single-antenna mismatches: during bad weather many of us have experienced antenna impedance variations resulting from rain, snow or ice accumulation.

In all of these cases, the result of a mismatch is usually a drop in output power and an increase in grid and/or plate current. The 87A has elaborate self-protection circuits, so the tubes are not in danger, but it's annoying when the amp trips in the middle of a QSO. Also, improper tuning can cause distortion, flat-topping and splatter on SSB.

Autotune with AlphaMax

The AlphaMax upgrade solves the multiple antenna matching problem once and for all. Autotune amplifiers traditionally use a phase detector, but this would have significantly increased the cost of the 87A and would have made a field upgrade either impossible or very expensive. Instead, the Alpha/Power engineers came up with an ingenious method for tuning the amplifier in software. Using "fuzzy logic," the AlphaMax firmware simulates what a human operator would do with the tune and load variable capacitors. After doing that, a well-trained human operator would increase the loading a little to prevent clipping, using about a 5% reduction in output power as a guideline. AlphaMax doesn't have to guess—since it has all of the 87A's operating parameters instantly available, it tunes

for the optimum gain point, which results in the greatest efficiency and the least distortion.

How well does it work? Extremely well at my station. On the high bands, I run a Hy-Gain TH7, a Force 12 C3E and sometimes a GAP Titan. In the heat of battle, I parallel the TH7 and the C3E for a bigger footprint (eg, to work Europe and Japan at the same time.) Each of these options presents a different impedance to the amplifier on any given band. What's more, I use switchable bandpass stub filters that can affect the impedance on some frequencies. During the past year, AlphaMax has been able to match all of the antenna and filter combinations on each band almost immediately. When I switch antennas, I usually hear the stepper motors pulse rapidly for a second or two, and the match is complete. Occasionally it takes five seconds or so to find a match, but that's rare.

Of course, there's one variable that AlphaMax can't control, and that's the input power. After AlphaMax finishes tuning, it's not uncommon for me to reach over and either increase or decrease the transceiver's output power to achieve 1500 W output on the 87A (which sometimes causes a brief flurry of retuning by AlphaMax.) The power adjustment is always very small—with my antennas, the power doesn't change by more than a couple of hundred watts.

Because input power is one of the tuning variables, AlphaMax typically takes a little longer to work on SSB. That's because the peak power of the SSB waveform varies more rapidly than CW, and the shifting input power makes it more difficult for AlphaMax to optimize the settings. This has not been an inconvenience for me during SSB contests (perhaps due to my SHOUTING into the microphone…).

AlphaMax begins with the tuning parameters that it finds for the band segment in non-volatile memory. That can be either the factory default (optimized for a non-reactive 50-Ω load) or whatever settings you have stored. I found that AlphaMax was able to tune any of my antennas quite easily when starting from the default values. However, it tuned faster and the match was better when starting from manual settings that I had stored for that antenna. Alpha/Power says that the firmware algorithm has to make certain compromises, so the manual tuning procedure can result in a slightly better match and provides the best starting point for AlphaMax.

AlphaMax will attempt to tune the amp 80 times before giving up. So far, I have never seen it make anywhere near 80 tries and it has never given up. This is no accident. The 87A protection circuits are well-known for tripping at around 2:1 SWR. This is to protect the pin diodes, which are vulnerable to high levels of reflected power. 87A users are therefore forced to have antennas with impedances close to 50 Ω, and then AlphaMax will have a pretty easy time of it.

Installation

Installation of the upgrade kit is straightforward. Alpha/Power provides excellent documentation with step-by-step instructions and a detailed photograph. All you have to do is unplug the amplifier, remove the top cover, remove the screws holding the front panel, unplug a couple of connectors and replace two chips on the motherboard. Be sure to follow the safety instructions in the manual—LETHAL VOLTAGES CAN BE PRESENT INSIDE ANY HF AMPLIFIER. Also, be very careful not to bend the pins when you replace the chips. Finally, carefully record the position of the circuit board connectors that you unplug, and replace them exactly as you found them.

I saw a post on one of the Internet reflectors from a ham who replaced a connector incorrectly and shorted some components on the CPU board. That amp required a trip back to Alpha/Power. The installation is easy, but take it very, very slowly.

Remote Control with AlphaRemote

In addition to AlphaMax, the upgrade includes a copy of the AlphaRemote software. This *Windows*-compatible software lets you control virtually all of the 87A's features from your computer. AlphaRemote is especially useful for those who operate one or more 87A amplifiers remotely (yes, you can do it over a telephone line with modems), or for those who would like to locate the 87A away from the operating desk. With an RS232 cable, you can put the 87A 100 feet or more away from your operating position. Personally, I still have my 87A on the operating desk. It's so darned quiet I'm not motivated to move it!

The 87A has always had a text-based status and command interface accessible via RS232. AlphaRemote provides a much friendlier graphical user interface under *Windows*, while using the text-based interface behind the scenes (ie, it's a "front-end" for the 87A.). Most of the 87A's LED meters are reproduced on the screen as green bar graphs that turn yellow or red when values get close to or exceed maximums. Most of the front panel switches are reproduced as well, allowing you to perform just about any operation that you could do manually, including tune up.

Since my amp is right on the operating desk, I didn't think I would use AlphaRemote very much. But now that I've switched to the *WriteLog Windows*-based contest logging program, I find it very convenient to have status and control of the 87A available right on the screen and accessible with a click of the mouse.

A "Wish List"

There are a few things missing from AlphaRemote. One is that it does not reproduce the LED tuning scale mounted on the front panel of the 87A. This means you can't use the tuning procedure documented in the 87A manual when operating the amp remotely, and must rely on standard procedures for tuning an amplifier. There's nothing wrong with that, but I've come to like the 87A's front panel tuning indicator and find it somewhat quicker and safer to use than the standard method. I think this would be a great feature for people who need to tune the amp remotely, especially over phone lines.

Another shortcoming is that there is no equivalent of the GPIO ON/OFF text command, which gives a continuous display of grid current, plate current, input power and output power. I've found the precise numbers very useful for testing and would like to see them on the AlphaRemote screen. Finally, there's no online help for AlphaRemote.

Installation of AlphaRemote software is straightforward as well, although it does not use the latest *Windows* installation techniques. The first time I installed the software, I got a couple of error messages and the installation did not complete properly. However, reinstalling the software solved the problem.

As one of the first customers for the upgrade, I received a draft copy of the manual. I found some shortcomings in it that I reported to Alpha/Power. A few weeks later I was delighted to receive an unsolicited revised copy of the manual with many of my suggestions implemented. In my experience, the service at Alpha/Power has always been excellent, and this was no exception.

Alpha/Power has created an affordable upgrade for the 87A that significantly extends the useful life of the product line, protecting each owner's substantial investment in this state-of-the-art amplifier. We can only hope that other manufacturers of computer-based gear will follow suit.

If you have an 87A, you owe it to yourself to get the AlphaMax and AlphaRemote upgrade. The AlphaMax and AlphaRemote upgrade package for existing 87A amplifiers sells for $99.

Manufacturer: Alpha/Power, Inc, 14440 Mead Court, Unit B, Longmont, CO 80504; 970-535-4173; fax 970-535-0281; **sales@alpha-power-inc.com**; **http://www.alpha-power-inc.com/**. QST

TECHNICAL CORRESPONDENCE

TOWER IN THE ATTIC

By H. Kaz Soong, K8KS, 902 N Michael Rd, Ann Arbor, MI 48103; **ksoong@umich.edu**

◊ I congratulate George Edwards (K5VUU) for his fine article on a through-the-roof mast installation technique.[1] I have used an almost identical system at my QTH for the past five years and I have been very pleased with the results (my methodology was reported in *The ARRL Antenna Compendium*[2]). There have been no leaks or freeze-ups of the rotatable mast, which passes through the attic roof. The immunity from freeze-ups during cold weather results from a combination of excellent waterproofing, using an indoor rotator and heat rising from the house interior below. Since the publication of my article, I have made two minor improvements to my setup.

Recently I added a second, larger, flexible drain connector (Fernco coupler) in a piggyback, coaxial fashion over the main weather-sealing drain connector. This outer protective skirt acts as a parasol to guard the underlying waterproof rubber seal against eventual photochemical breakdown from the sun's ultraviolet rays. Thus, it is unlikely that the main seal will ever need to be replaced. Because this outer skirt is only a parasol for the waterproof seal, it in itself does not have to be waterproof and will seldom (if ever) need replacement.

After installing the attic tower five years ago, I was bothered by the amount of noise transmitted to the room below the attic during antenna rotation. Consequently, I added several layers of rubber grommets and carpeting under the tower feet to dampen the noise. My family appreciates the silence!

CALCULATING WIRE LENGTHS FOR WINDING TOROIDS

By Robert Olson, WD4OHD, 6838 Hampton Wood Cr, Hixson, TN 37343

◊ Many "homebrew" projects specify use of inductors wound on toroidal powdered-iron or ferrite cores. The articles usually provide the much-needed information on core types and the number of turns needed to approximate a given value of inductance. However, they don't generally tell you the *length of wire* you need to wind each toroid.

Table 1
Core Types and IPT Value Used to Calculate Needed Wire Length

Toroidal Core Type	IPT Value	Toroidal Core Type	IPT Value
T-12	0.163	T-400	3.050
T-16	0.202	T-400A	4.350
T-20	0.252	T-520	3.720
T-25	0.327	FT-23	0.230
T-30	0.412	FT-37	0.438
T-37	0.426	FT-50	0.595
T-44	0.529	FT-50A	0.688
T-50	0.577	FT-50B	1.188
T-68	0.700	FT-82	0.809
T-80	0.800	FT-87	0.835
T-94	1.006	FT-87A	1.335
T-106	1.364	FT-114	1.045
T-130	1.394	FT-114A	1.070
T-157	1.760	FT-140	1.500
T-184	2.30	FT-140A	1.692
T-200	1.850	FT-150	1.250
T-225	1.950	FT-150A	1.750
T-225A	2.850	FT-193	1.930
T-300	2.080	FT-193A	2.180
T-300A	3.080	FT-240	2.000

Here's an easy way to calculate the lengths of wire needed for most commonly used toroidal cores. In Table 1, IPT stands for "inches per turn." Simply multiply your core's IPT value times the number of turns to be wound on the core and add three inches to the result:

Inches of wire needed =
(IPT×turns) + 3 inches (Eq 1)

Then round off the result to the next-larger number. By using the information given in Table1 and Equation 1, you'll be able to conserve wire each time you wind a toroidal inductor.

SWITCHING POWER SUPPLIES? NOT FOR ME!

By James Robert Cherry, W3WGR, 630 Chestnut St, Springdale, PA 15144-1206

◊ A couple of years ago, I purchased an ICOM IC-728 transceiver and PS-85 switching power supply. Although it was a step up from my previous rig, I was never completely happy with it. Why? Because during receive, I could hear many raspy, spurious signals across all of the bands. Initially, I blamed the noisy spurs on my location. It took me almost a year to accidentally discover that the spurious signals were still audible *with the antenna disconnected*!

That discovery made me *really* unhappy, because I then assumed that the noise was being generated within the transceiver! I envisioned a costly repair bill for an out-of-warranty repair. I decided to try and live with the annoyance even though the spurs caused considerable receiver desensitization and frequently made weak-signal CW copy impossible.

Then came the January 2000 issue of *QST*! There—in Figure 4 on page 71—is a spectral plot of the output of the ICOM PS-85 power supply.[3] It took me a couple of days to realize that the noise generated by the *power supply* could possibly be a cause of at least some of the spurious signals. In minutes, I disconnected the PS-85 and hooked the rig to a battery. When I turned on the transceiver and advanced the RF gain control to well above normal, I was greeted by a wonderful *silence*! I attached the antenna and rejoiced in being able to copy weak CW signals! As a double check, I disconnected the antenna, and with the rig still connected to the battery, I turned on the power supply. The spurious signals returned, but now they were weaker.

Now I'm using an older, nonswitching (linear) power supply with the transceiver. It may be a "boat anchor", but the annoying signals and their associated problems are gone.

WHAT IS SSB?

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

Editor's note: Warren is responding to an item that appeared in "The Doctor is IN," *QST*, Jan 2000, page 55.

◊ The definitions of SSB given in professional technical dictionaries are variations of the following: SSB modulation—Modulation whereby the modulating wave (audio) is translated to RF by a specified amount (carrier frequency) either with or without inversion (producing either LSB or USB).

SSB is *not* a form of AM even though it is the same as one sideband of an AM signal because:

- It cannot be demodulated with an amplitude detector.
- It cannot be demodulated with a phase or frequency demodulator.
- It requires a product detector (or mixer) to translate it to audio. This action recovers both the phase and amplitude components.

In contrast to AM, SSB does not have the same envelope wave shape as the origi-

[1]George Edwards, K5VUU, "A Tower in the Attic," *QST*, Feb 2000, pp 46-47.

[2]H. Kaz Soong, K8KS, "Through-the-Roof Antenna Mast System," *The ARRL Antenna Compendium*, Vol 6, R. D. Straw, N6BV, ed., (Newington: ARRL, 1999), pp 147-150.

[3]Joe Bottiglieri, AA1GW, Product Review, "*QST* Compares: Switching Power Supplies," ICOM PS-85, *QST*, Jan 2000, p 71.

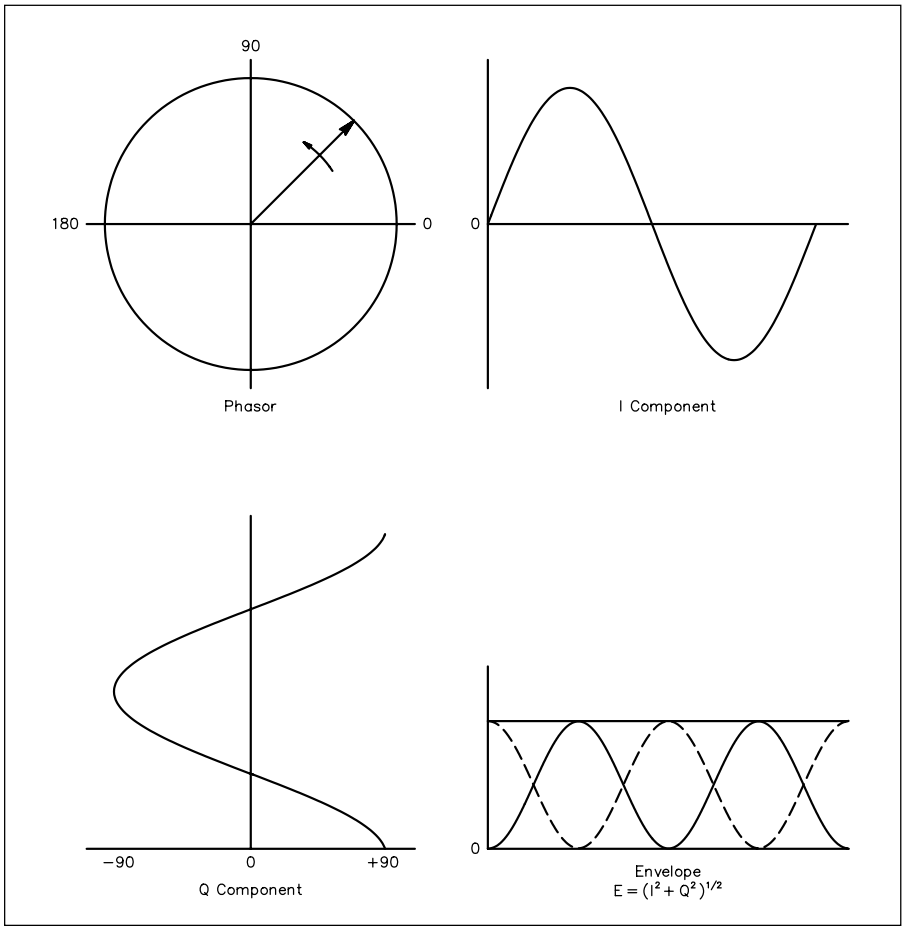


Figure 1—Derivation of the SSB envelope from the audio phasor.

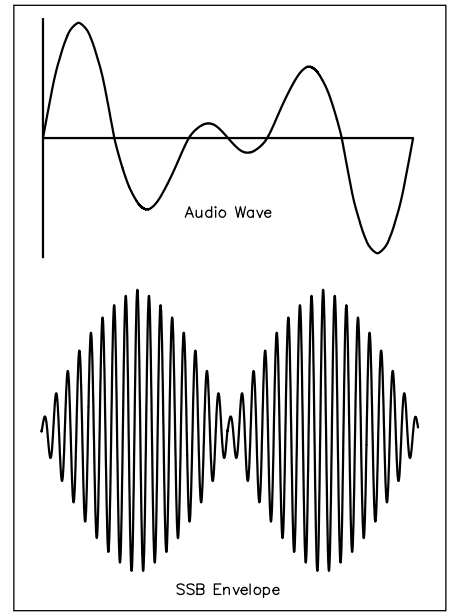


Figure 2—Audio wave and SSB envelope for 1000- and 1500-Hz tones of equal amplitude.

nal audio wave. That is why it can't be demodulated with an amplitude detector.

An audio wave has a phase component as well as an amplitude component. See Figure 1. A phasor representing a single audio tone is shown with its in-phase (I) and quadrature (Q) components. The Q component lags the I component by 90°. The envelope of this tone is:

$$E = (I^2 + Q^2)^{1/2} \qquad \text{(Equation 2)}$$

As illustrated in the diagram, the audio envelope of a single tone is just some value of dc.

When the audio wave consists of two or more frequency components, each has its own phasor, with I and Q components. The sum of the I components and of the Q components are each squared for use in Equation 1 for the envelope.

Figure 2 shows a two-tone audio signal with 1000 and 1500-Hz tones of equal amplitudes. The audio wave and the two-tone envelope are both depicted. Again, the amplitude variation of the audio and SSB envelope are different—proof that SSB is not a form of AM.

The phase component of a SSB wave can be recovered by hard limiting the SSB wave (by 40 dB for example) and removing the RF harmonics.

Because SSB is not a form of AM, it was classified incorrectly with the symbol A3j many years ago by the COIR and ITU.

Approximately 20 years ago, Bob Craiglow, an engineer at Collins-Rockwell, developed a device that solved Equation 1 using analog technology to generate the envelope of the audio signal. This was used for ALC instead of detecting the amplitude of the envelope of the SSB signal at an IF or RF. The envelope remains the same when the signal is translated in steps up to HF for transmission.

It is often stated that the receiver reinserts the carrier for demodulation of SSB. This can be easily misinterpreted to mean that the carrier is reinserted to enable demodulation with an amplitude detector. We can avoid that confusion by not discussing reinsertion of the carrier. The audio is simply recovered by translating the SSB signal to audio with a product detector (or mixer).

Lastly, you infer that SSB does not have the audio quality of AM or FM. This is very misleading because the lack of "quality" is not inherent to SSB. Tuning to exactly the correct frequency is desirable, but a frequency error of ±10 Hz is hard to detect in speech. What you call poor quality is a matter of choice to get more "talk power." It is partly due to a very narrow SSB filter passband (2.1 to 2.5 kHz). This interference keeps transmitted bandwidth to a minimum and rejects nearby interference. Next is the amount of speech processing used to boost the average power and improve intelligibility in the presence of noise and interference. Speech processing usually attenuates the low vowel frequencies, boosts the high consonant frequencies and perhaps employs envelope clipping or compression.

I wish to challenge a DSP expert to build a frequency error detector for SSB receivers. It could be an external unit that samples the receiver audio output. LEDs could indicate which way the receiver tuning needed to be adjusted and by roughly how much. The DSP would sense the harmonic relationship of the frequency components of the vowel sounds. They are harmonically related when correctly tuned. When mistuned, each frequency component is in error by the same number of Hertz. QST

FEEDBACK

◊ In the July 2000 *QST* there is an error in Figure 3 in article "Everything Works" by Thomas Schiller, N6BT. At the bottom of the figure, the right-hand arrow should be labeled "12dB" which, along with the 8dB on the left side, adds up to 20 dB to make the path.

◊ Please refer to Technical Correspondence, June 2000, pp 75-76, "Matching Low-Impedance Antennas," by Albert Weller, WD8KBW. In Figure 4, the longer transmission line should be labeled 72.94°—*tnx Albert Weller, WD8KBW* QST

ARRL to Have Role in Satellite Home Viewer Improvement Act

The FCC has assigned the ARRL a role under the new Satellite Home Viewer Improvement Act. The League will help to determine consumers' eligibility in borderline cases to receive distant network TV signals via satellite. The FCC has designated the League to be the "independent and neutral entity" to identify a party qualified to conduct a signal strength test at a subscriber's household in the event of a dispute between network stations and satellite carriers over who will carry out the testing.

"It's a service we're glad to provide to the public," said ARRL President Jim Haynie, W5JBP. Haynie said the League was pleased to be called upon to play a part in implementing the consumer-oriented legislation. He added that few eligibility disputes are anticipated.

While the activity does not directly involve Amateur Radio, Haynie said the FCC's appointment of the League increases visibility for Amateur Radio and helps to acknowledge its value within the Commission and the telecommunications industry.

In a letter to the League, FCC Office of Engineering and Technology Chief Dale Hatfield expressed the FCC's appreciation to the ARRL. Hatfield called the League "a particularly appropriate choice for this role because it has no commercial connection with delivery of television services." He also noted the ARRL's national field organization, and that many of its members already were engaged in activities related to the measurement of radio field intensity.

Under the SHVIA, a household is eligible to get distant TV signals via satellite if it cannot receive a Grade B signal using a conventional, outdoor TV antenna, but viewers can apply for waivers. The SHVIA provides that if a waiver is denied, a consumer may request a signal test to determine the actual signal strength received. The ARRL's role would be to select an appropriate entity to take the measurement in those rare instances when the satellite provider and the network station cannot agree on one.

Hatfield said the ARRL would review the qualifications of proposed testing entities to determine their competence to take signal strength measurements at a given home site. Factors to be considered would include technical training and background, experience with outdoor field strength measurements, and access to appropriate equipment. He said the FCC anticipates that satellite carriers, broadcasters or other interested parties "will identify for ARRL entities willing to conduct the tests and will provide their qualifications in writing."

League officials point out that participation in the SHVIA will not involve expenditure of ARRL membership funds.

For more information, contact ARRL General Counsel Chris Imlay, **cimlay@arrl.org**.

ARRL, NARTE SIGN MEMORANDUM OF UNDERSTANDING

The ARRL and the National Association of Radio and Telecommunications Engineers Inc have announced a memorandum of understanding to serve as a framework for future cooperation. The two organizations have agreed to work together on mutually beneficial programs or events that are "intended to foster and promote technical awareness, education, and achievement in amateur and commercial telecommunications."

ARRL President Jim Haynie, W5JBP, and NARTE President Jim Wickham formally signed the agreement at ARRL Headquarters in May. The pact could lead to joint recognition of technical education and achievement programs as well as cooperation between the organizations' volunteer examination efforts.

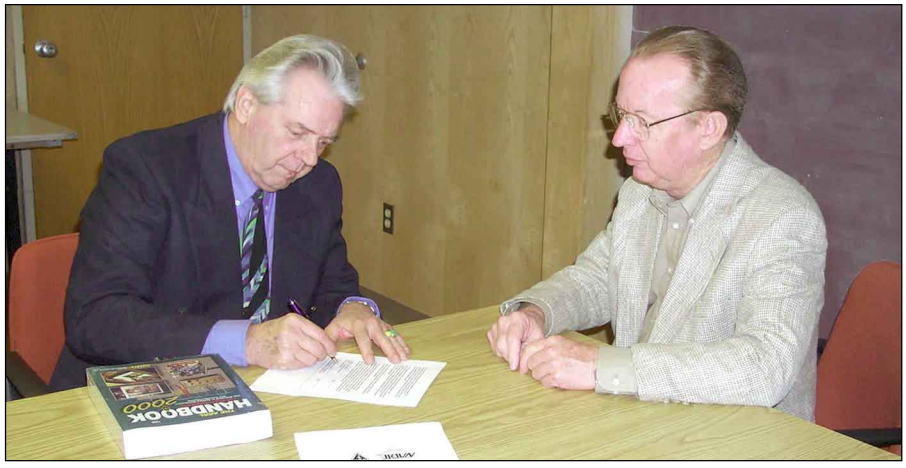
Among other things, the ARRL and NARTE have agreed to cooperate in developing curricula to certify technical personnel "on a vocational and avocational basis" and to introduce them and the general public to Amateur Radio.

Both ARRL and NARTE comprise volunteers and professionals who support educational and technical recognition programs, and both are involved in FCC licensing activities. The MOU opens the door to the possibility of cooperation to develop reciprocal examination opportunities in unserved or underserved areas.

In addition, the League and NARTE will exchange technical articles and cooperate in providing booth space to one another at conventions.

Founded in 1982, NARTE offers an accredited certification program to qualified engineers and technicians, many of them Amateur Radio operators. Its other activities include participation as a commercial operator license examination manager. Its primary mission is to promote professional excellence within the telecommunications industry and related areas.

RICK LINDQUIST, N1RL



NARTE President Jim Wickham (left) signs the ARRL-NARTE memorandum of understanding as ARRL President Jim Haynie, W5JBP, looks on.

RESEARCHER UNDERTAKES STUDY OF RADIO AMATEURS

National Cancer Institute researcher Kenneth Cantor has embarked on an epidemiological study of radio amateurs. Cantor wants to evaluate whether causes of death among amateurs differ from those of the general population. If it turns out that

Rick Lindquist, N1RL ♦ Senior News Editor

they do differ, he then wants to find out whether the individual's "usual occupation" might explain the differences.

Representatives of the ARRL RF Safety Committee met with Cantor at League Headquarters April 28 to discuss the project. On hand were committee Chairman Greg Lapin, N9GL, committee members Robert Gold, WB0KIZ, and Kai Siwiak, KE4PT, and David Sumner, K1ZZ, and Ed Hare, W1RFI, of the ARRL staff.

In addition to identifying ways that the League could assist in improving the study's accuracy, the meeting was aimed, in part, at educating committee members and League staff about the specifics of the proposed study.

Cantor described his investigation as an "inexpensive kind of quick study" that would not yield fine detail. As a result, he told the group, it would be "wrong" to ascribe the deaths to any particular factor.

The session presented an opportunity for Cantor to learn about influences amateurs tend to be exposed to in addition to RF energy. Cantor and the amateurs also were able to gain an appreciation for each other's points of view—Cantor on the public's sensitivity to the words used to explain the results of such an epidemiological study, and the amateurs on the significance of different types of epidemiological studies.

Some discussion at the session focused on a similar study done 15 years ago by Samuel Milham. Wording in that study's conclusions led many to believe that the Milham study had presented evidence that RF energy caused "an excess of leukemia."

Cantor emphasized that his investigation is a preliminary study, based on a statistical comparison of FCC licensing records and State of California death records.The initial "cohort group" for Cantor's study includes more than 100,000 men and women—seven times larger than the earlier Milham study.

Lapin—who's also a research professional—explained that in the event of "apparent associations" in the results of Cantor's study, a follow-up study would be conducted. The followup would involve individual questionnaires and contact with the families of Silent Keys—something the Milham study did not attempt to do.

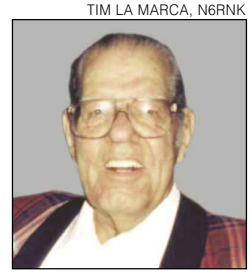
RICK LINDQUIST, N1RL

ARRL RF Safety Committee Chairman Greg Lapin, N9GL (left), discusses the epidemiological study of radio amateurs with principal investigator Kenneth Cantor of the National Cancer Institute during a meeting at ARRL Headquarters.

NOTABLE SILENT KEY

HAMS REMEMBER BIG BAND LEADER "TEX" BENEKE, K0HWY, SK

TIM LA MARCA, N6RNK



Big band singer and saxophonist Gordon L. "Tex" Beneke, K0HWY, of Santa Ana, California, died May 30. He was 86.

Beneke took over the Glenn Miller Orchestra in 1946 after Miller's death during World War II, and he continued to capitalize on the Miller sound throughout his career. He later broke with the Miller estate and formed his own band, billing it as "Tex Beneke and His Orchestra: Playing the Music Made Famous by Glenn Miller."

A native of Fort Worth, Texas, Beneke joined Miller's orchestra in 1938. His southern-style vocals helped make hits out of Miller's "Chattanooga Choo-Choo" and "Don't Sit Under the Apple Tree," among others.

"I will really miss Tex Beneke," said ARRL Great Lakes Vice Director and music professor Gary Johnston, KI4LA. In the late 1970 Johnston toured the South with Beneke's version of the Glenn Miller band. "I played bass trombone for him," he reports. "I remember Tex as being a big man with a friendly, quick smile."

Fred Mason, W5SLT, recalls that Beneke operated 10 meters from his hotel room during his travels around the country, using a wire hanging out the window. Mason also remembers running phone patches in the early 1950s, so Beneke could talk with his parents in Fort Worth.

Tim La Marca, N6RNK—a younger-generation big band leader—says he met Beneke in the early 1990s—first on the air and later in person. A mutual acquaintance had told Beneke about the young musician, so Beneke gave him a call on the local repeater.

A few months later, La Marca got to meet Beneke when his band was performing in Pasadena. "After the performance, we went backstage to meet Tex—one of the highlights of my life," he said.

"You can't mention the Big Band Era without the name of Tex Beneke coming to mind," La Marca said. "Even though his key is silent, we still have the recordings of his wonderful music to remember him by."

PHASE 3D TENTATIVE LAUNCH DATE RESET

AMSAT now says the next-generation Phase 3D Amateur Radio satellite will launch in September at the earliest. Under the latest tentative Arianespace launch schedule, P3D could go up on the Ariane Flight 507 as early as mid-September, but the launch could be as late as the end of October.

Flight 507 had been on the schedule to go into space in July. Arianespace recently announced a resumption of Ariane flights from the European Spaceport. A three-month flight hiatus resulted when several prime Arianespace passengers put their launch preparations on hold until concerns over possibly faulty onboard thrusters could be resolved.

AMSAT-NA President Keith Baker, KB1SF, called the Arianespace announcement "very good news" for the Phase 3D program.

The Phase 3D satellite safely arrived at the European Spaceport in Kourou, French Guiana, last January and has been awaiting the start of its launch campaign.

Arianespace representatives met recently with Phase 3D representatives to discuss preparations for the P3D launch campaign. Launch preparations could take a couple of months or so to complete.

A launch contract accepting Phase 3D as a payload for the first suitable Ariane 5 launch vehicle was signed last October. *—AMSAT-DL and Peter Guelzow, DB2OS, via AMSAT News Service; SpaceNews*

AMATEUR RADIO INDUSTRY MULLS HOBBY GROWTH

Meeting June 8 in conjunction with HAM-COM in Dallas, representatives of the Amateur Radio industry focused much of their discussions on ideas to attract younger licensees. Some of the conversation also centered on ways to boost the number of amateurs.

HAM-COM hosted the meeting and provided dinner. Moderating the session were Gordon West, WB6NOA, and Evelyn Garrison, WS7A.

Those on hand included contingents from the ARRL and from major Amateur Radio manufacturers, suppliers, other publishers and instructors. Representing the League were President Jim Haynie, W5JBP; Field and Educational Services Manager Rosalie White, K1STO; Media Relations Manager Jennifer Hagy, N1TDY; and Advertising Manager John Bee, N1GNV.

Bee, who had attended a similar industry gathering earlier this year in Wisconsin, said he thought the Dallas meeting was, in general, positive. "The industry recognizes that it needs to take an active approach and to undertake, or at least fund, new approaches to increase participation," he said.

During the session, President Haynie spoke on the need for an intensified youth-recruitment campaign—now dubbed "The Big Project." He reiterated his intention to raise $1 million in corporate and foundation donations for the project this year.

JENNIFER HAGY, N1TDY

Gordon West, WB6NOA, addresses the industry group meeting. The ARRL's Rosalie White, K1STO, and President Jim Haynie, W5JBP, are seated at the right.

White reviewed recent Amateur Radio upgrade statistics and discussed various efforts under way in her department that focus on young people and schools.

Hagy outlined the League's extensive public relations efforts, including those associated with the April release of the Amateur Radio-related movie *Frequency* and the Willem van Tuijl story earlier this year. The concept to award amateur equipment as

FCC News

MITNICK RENEWAL TO GET FCC SCRUTINY

The Amateur Radio license renewal application of computer hacker Kevin Mitnick, N6NHG, will get careful FCC scrutiny. But first, the FCC wants more information.

On June 1, FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth told Mitnick's attorney that the FCC needs details regarding the conditions of Mitnick's probation "in order to determine what action to take on his renewal application."

Mitnick was convicted of computer-related crimes and now is on supervised release from prison. Conditions of his release require that he stay away from computers and computerized devices.

Mitnick's attorney, R. Gregory Adlin, told Hollingsworth earlier this year that ham radio operation would not violate Mitnick's supervised release and that he would provide a letter from Mitnick's probation officer to that effect. Adlin noted that Mitnick's case "had nothing to do with any FCC violations" and that his plea agreement only covered some counts dealing with obtaining an unauthorized copy of some source code.

Hollingsworth says that since Mitnick filed a timely renewal application, his General class license remains valid until action is taken on the application. Mitnick's license expired last December 12.

Hollingsworth told Adlin that once he has all the necessary documentation in place, he would refer the matter to the FCC's Hearings and Investigations Division for a determination.

NFCC MEETS WITH FCC OFFICIALS

Members of the National Frequency Coordinators' Council Board met May 17 with D'wana Terry, Chief of the FCC's Public Safety and Wireless Division and other FCC officials. The NFCC said the meeting was arranged to brief Terry about the history and current status of the NFCC and how the organization could be of service to the FCC, as well as to review the status of Amateur Service frequency coordination. The NFCC also wanted to present its ideas on how to deal with the growing number of coordination disputes. NFCC President Owen Wormser, K6LEW, said the meeting provided "the basis for a constructive, cooperative and enduring relationship" between the NFCC and the FCC.—*thanks to Badger State Smoke Signals*

Amateur Enforcement News

• **KV4FZ plans Supreme Court appeal:** Embattled Amateur Radio licensee Herbert L. Schoenbohm, KV4FZ, says he'll petition the US Supreme Court in an eleventh-hour effort to retain his ham ticket. Schoenbohm told the ARRL that he plans to ask the high court to grant a *writ of certiorari*, calling on the justices to request the record of his case from the US Court of Appeals for review. Schoenbohm is not optimistic that his strategy will succeed, however. "But, hope springs eternal that someday someone will see this for what it really is," he said. Schoenbohm claims that he's arbitrarily being singled out for especially harsh treatment on the issue of character, and that the Appeals Court did not have the advantage of all the facts. The Appeals Court recently turned down Schoenbohm's request for a rehearing by the full bench after rejecting his appeal of the FCC's decision to not renew his Amateur Radio license in February. Citing his 1992 felony fraud conviction and character issues, the FCC in 1994 refused to renew Schoenbohm's ticket. "I'm not so sure 'character' is something the FCC should be judging for a hobby type of license," he said, pointing out that the FCC is not challenging his commercial tickets, just his ham license. Schoenbohm has been permitted to continue operating as KV4FZ during his appeals.

• **FCC issues short-term grant:** The FCC has come to terms with Lonnie H. Allen, KC0HJP—at least for now. On May 30, the Commission advised Allen, of Crane, Missouri, that it was issuing a short-term grant of his Technician license. This is the second time around for Allen. As a result of complaints about his earlier operations as N0TBO—subsequently canceled after he failed to appear for re-examination—Allen's later grant of KC0HJP was set aside March 15, and his application reverted to pending status. FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth said the Commission decided to grant Allen a one-year license, which may be renewed for a 10-year term if Allen doesn't run afoul of the FCC again. In his letter, Hollingsworth advised Allen to "thoroughly familiarize" himself with Part 97 of the FCC's rules.

prizes to clubs that developed the most creative Amateur Radio promotions associated with *Frequency* had been a product of the Wisconsin industry gathering.

In an effort to promote greater activity by school clubs, Rick Ruhl, N4GDO, of Creative Services Software offered to donate a copy of *LogWindows* to any school club that wants it.

Those represented at the Dallas industry gathering included: ADI/Pryme/Premier; Alinco; Alpha Power; Aluma Towers; Amateur Radio Trader; Am-Com; ARRL; Austin Amateur Radio; C.G.A. Enterprises; CQ Publications; Creative Services Software; Gordon West; Houston Amateur Radio Supply; ICOM; M^2 Antennas; MAHA; Master Publishing; NCG Companies; Radio City; *73* magazine; W5YI Group; and Yaesu.

Another industry meeting was set to take place at the Huntsville Hamfest in August.

News in Brief:

• **W1AW/8 QSL info:** QSL cards for the Dayton Hamvention-ARRL National Convention 2000 special event station W1AW/8 go to W8BI, Box 44, Dayton, OH 45401. Cards should *not* be sent to ARRL Headquarters for this operation; the logs are in Dayton.

• ***Mir* crew talks to students before heading home:** As it prepared to mothball the aging Russian space station—possibly for good—and head home, the crew of *Mir* spoke via ham radio with youngsters at a school in Pennsylvania on June 12. Handling the earthbound end of the contact was Tom Daniels, N3CXP. Sergej Samburov, RV3DR, of Energia was on-line to assist with translating. Using the R0MIR call sign, cosmonauts Sergei Zalyotin and Alexander Kaleri held a 10-minute conversation with youngsters at the Schnecksville School. At one point, the cosmonauts were asked if they liked it better in space or home on Earth. "When I live at home, I would like to be in space, but now I would like to be home," one of the two space travelers responded. The cosmonauts arrived safely back on Earth June 16 after a 10-week mission financed in part by foreign investors. Russian space officials have not ruled out yet another *Mir* mission, if money can be found.—*Farrell Winder, W8ZCF; press reports*

• **AMSAT 2000 symposium set:** Recent and future development in Amateur Radio satellites will be presented in Portland, Maine, October 27-29, 2000, during the 18th Space Symposium and AMSAT-NA Annual Meeting. The 2000 Symposium Chairman is George Caswell Sr, W1ME. Details are available at **http://www.amsat.org/amsat/symposium** or from **w1me@amsat.org**.—*AMSAT News Service*

• **Hall of Famers announced:** Chod Harris, WB2CHO/VP2ML (SK), and John Kanode, N4MM, have been inducted into the CQ DX Hall of Fame. Kanode is an ARRL Vice President, and Harris was once a member of the ARRL Headquarters staff. The announcement came at the DXers banquet in Dayton May 19. The following evening at the Dayton contest banquet, Larry "Tree" Tyree, N6TR, and Walter Skudlarek, DJ6QT, were announced as the newest members of the CQ Contest Hall of Fame. Congratulations!—*Bernie McClenny, W3UR/The Daily DX*

• **President Haynie among Kenwood "Top Gun" Award winners:** ARRL President Jim Haynie, W5JBP, along with Ed Petzolt, K1LNC, Dr Jim Hirschman, K4TCV, and Hector Godoy, HR3HGB, were named as recipients of Kenwood's "Top Gun" Award. All were cited for their participation in the rescue of young Willem van Tuijl, who was seriously wounded during a pirate attack off the coast of Honduras while sailing with his parents, Jacco and Jannie van Tuijl, KH2TD and KH2TE. Haynie was instrumental in getting the youngster to the US for treatment and rehabilitation. He accepted his award during a Kenwood reception during the Dayton Hamvention.

• **Florida DMV cuts hams some slack on license plate flap:** ARRL West Central Florida Section officials say the Florida Division of Motor Vehicles has agreed to comply with that state's Amateur Radio license plate law. Florida DMV has told the amateurs that the agency will process all Amateur Radio license plate requests and will recall any plate that conflicts with an FCC-licensed applicant's call sign. Section officials plan to continue efforts to get Florida to reserve the entire Amateur Radio call sign pool exclusively for Amateur Radio plates. For more information, visit the ARRL West Central site, **http://www.wcfarrl.org**.—*Dave Armbrust, AE4MR*

Section Manager Election Notice

To all ARRL members in the Eastern Massachusetts, Missouri, Nebraska, New York-Long Island, Northern New York, South Carolina, Southern New Jersey, West Central Florida, and Western Pennsylvania Sections. You are hereby solicited for nominating petitions pursuant to an election for Section Manager (SM). Incumbents are listed on page 12 of this issue.

To be valid, a petition must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are *not* acceptable. No petition is valid without at least five signatures, and it is advisable to have a few more than five signatures on each petition. Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. We suggest the following format:

(Place and Date)

Field & Educational Services Manager, ARRL
225 Main St
Newington, CT 06111

We, the undersigned full members of the _____ ARRL section of the _____ division, hereby nominate _____ as candidate for Section Manager for this section for the next two-year term of office.

(Signature___ Call Sign___ City__ ZIP__)

Any candidate for the office of Section Manager must be a resident of the section, a licensed amateur of Technician class or higher and a full member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination. Petitions must be received at Headquarters by 4 PM Eastern Time on September 8, 2000. Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before October 1, 2000, to full members of record as of September 8, 2000, which is the closing date for nominations. Returns will be counted November 21, 2000. Section Managers elected as a result of the above procedure will take office January 1, 2001.

If only one valid petition is received from a section, that nominee shall be declared elected without opposition for a two-year term beginning January 1, 2001. If *no* petitions are received from a section by the specified closing date, such section will be resolicited in the October 2000 *QST*. A Section Manager elected through the resolicitation will serve a term of 18 months. Vacancies in any Section Manager's office between elections are filled by the Field & Educational Services Manager. You are urged to take the initiative and file a nomination petition immediately.—*Rosalie White, K1STO, Field & Educational Services Manager*

Repeat Nominating Petitions

Since no petitions were received for the Vermont Section Manager elections by the deadline of March 10, 2000, nominating petitions are herewith resolicited. See the above details on how to nominate. QST

Nominees Sought for ARRL Board of Directors

If you're a full ARRL member in one of the following five divisions and are interested in playing a part in the League's democratic organization, here's the opportunity. Nominations are open for the offices of director and vice director for the 2001-2003 term in the Central, Hudson, New England, Northwestern and Roanoke divisions.

ARRL Divisions

The policies of the League are established by 15 directors who are elected to the Board on a geographical basis to represent their divisions and constituents (see page 10 of any recent *QST* for a list of the divisions, directors and vice directors). These 15 directors serve for three-year terms, with five standing for election in each.

Just as in national or state politics, ARRL voters/members have the privilege and responsibility to decide that they like the actions of their incumbent representatives and support them actively for reelection or to decide that other representatives could do a better job, and to work for the election of those persons. Vice directors, who succeed to director in the event of a midterm vacancy and serve as director at any Board meeting the director is unable to attend, are elected at the same time.

Call for Nominations

Nominations are open for director and vice director in the five divisions mentioned above for the three-year term beginning January 1, 2001.

How to Nominate

1. *Obtain official nominating petition forms.* This package consists of a cover letter; a reprint of this election announcement; blank Official Nominating Petition forms and Candidate's Questionnaires for the offices of director and vice director; a copy of the ARRL Articles of Association and Bylaws; and an informational pamphlet for candidates.

Any full member residing in a division where there is an election may request an official nominating petition package. You don't need to be a candidate to request the forms. Your request for forms must be received by the Secretary *no later than noon Eastern Time on Friday, August 11, 2000.* There are separate forms for director and vice director nominations.

2. *Submit petition with statement of eligibility and willingness to serve.* Official forms bearing the *signatures of 10 full members of the division* and naming a full member of the division as a candidate for director or vice director, must be submitted, with a statement *signed by the candidate* attesting to his or her eligibility, willingness to run and willingness to assume the office if elected. These documents must be filed with the secretary *no later than noon Eastern Time on Friday, August 18, 2000.* Only original documents can be accepted; *no facsimiles of any kind are acceptable.* On Monday, August 21, 2000, the secretary will notify each candidate of the names and call signs of each other candidate for the same office. Candidates will then have until Friday, September 1, 2000, to submit 300-word statements and photographs, if they desire these to accompany the ballot, in accordance with instructions that will be supplied.

3. *Election Committee to certify eligibility.* In accordance with the Bylaws, an Election Committee, composed of three directors not subject to election this year, is responsible for the conduct of the election. This year, the Election Committee consists of Frank Butler, W4RH, (chair), George Race, WB8BGY, and Coy Day, N5OK.

The nominee must hold at least a Technician amateur license, be at least 21 years of age and have been licensed and a full member of the League for a continuous term of at least four years immediately preceding nomination. No person is eligible whose business connections are of such nature that he or she could gain financially through the shaping of the affairs of the League, by the Board or by the improper exploitation of his or her office for the furtherance of his or her own aims or those of his or her employer. The primary test of eligibility is the candidate's freedom from commercial or governmental connections of such nature that his or her influence in the affairs of the League could be used for his or her private benefit. The idea behind these rules is to ensure that candidates: (1) possess a lasting interest in Amateur Radio and the League, (2) have the legal capacity to make decisions for the ARRL and (3) are free from conflicts of interest.

Balloting Will Follow

If there is only one eligible candidate for an office, he or she will be declared elected by the Election Committee. Otherwise, ballots will be sent to all full members of the League in that division who are in good standing as of September 10, 2000. (You must be a licensed radio amateur to be a full member.) The ballots will be mailed not later than October 1, 2000 and, to be valid, must be received at HQ by noon Eastern Time on Friday, November 17, 2000. A group of nominators can name a candidate for director or vice director, or both, but there are no "slates," as such. Each candidate appears on the ballot in alphabetical order. If a person is nominated for both director and vice director, the nomination for director will stand and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he or she wishes. Because all the powers of the director are transferred to the vice director in the event of the director's death, resignation, recall, removal outside the division or inability to serve, careful selection of candidates for vice director is just as important as for director.

Absentee Ballots

All ARRL members licensed by the FCC, but temporarily residing outside the US, are eligible for full membership. Members overseas who arrange to be listed as full members in an appropriate division prior to September 10, 2000, will be able to vote this year where elections are being held. Members with overseas military addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal addresses. Even within the US, full members temporarily living outside the ARRL division they consider home may have voting privileges by notifying the Secretary prior to September 10, 2000, giving their current *QST* address and the reason that another division is considered home. If your home is in the Central, Hudson, New England, Northwestern or Roanoke division but your *QST* goes elsewhere, let the ARRL Secretary know as soon as possible, but no later than September 10, 2000, so you can receive a ballot from your home division.

The Incumbents

These people presently hold the offices of director and vice director, respectively, in the divisions conducting elections this year:

Central—Ed Metzger, W9PRN, and Howard Huntington, K9KM

Hudson—Frank Fallon, N2FF, and J. P. Kleinhaus, W2XX

New England—Tom Frenaye, K1KI, and Mike Raisbeck, K1TWF

Northwestern—Greg Milnes, W7OZ, and Jim Fenstermaker, K9JF

Roanoke—Dennis Bodson, W4PWF, and Leslie Shattuck, Sr, K4NK

For the Board of Directors:

May 7, 2000

David Sumner, KIZZ
Secretary

A Massive Fire in Elizabethton

On February 25, 2000 fire broke out in Elizabethton, Tennessee, at the North American Rayon Plant. The facility contained more than one million pounds of toxic chemicals.

Responses came from 54 fire departments in Tennessee, North Carolina and Virginia, plus the Carter County (Tennessee) ARES. Staff at Sycamore Shoals Hospital (SSH), several hundred yards from the rayon plant, prepared for casualties while facing the possibility that existing patients would have to be evacuated.

ARES members were activated to assist with emergency communication. They were also instructed to be ready to help with crowd and traffic control in case of a hospital evacuation. Dr Stephen May, W4IOJ, SSH Physician Advisor and Sullivan County Regional Health Department Medical Director, who participated in the response said, "Carter County ARES was on-site and fully operational. Their help was invaluable to us. It's great to be able to get the word out about their unselfish service." A week later the fire erupted again and Amateur Radio operators answered the call a second time.

Over the past two years the hospital has worked with Carter County ARES to improve emergency communications. This effort has included the installation of a 2-meter rig and antenna. Communication was also established with the Carter County Health Department and Sullivan County Regional Health Department, with both installing ham radio equipment and developing plans for emergencies.

In April, the Carter County ARES, Sullivan East Amateur Radio Club, Sullivan West Amateur Radio Club and Johnson City Amateur Radio Association worked with the health departments and health care systems to plan Tennessee Public Health Week, which included an effort to educate the public about emergency services. An Amateur Radio station was set up to show off ARES and to promote cooperation between all groups involved.

TRISH REID

Awarded for their work during the Elizabethton fire were (left to right) Stephen May, W4IOJ; Carter County Health Department's Marilyn Smailes, and Emergency Coordinator Paul Tolley, KD4INB. Sycamore Shoals Hospital CEO Scott Williams (back) presented the plaques.

THIS IS A DRILL

A recent edition of *Emergency Coordinator*, a Wisconsin ARES/RACES newsletter, carried an article concerning the practice of making announcements every 10 minutes during simulated exercises to clearly identify them as on-the-air drills. A better practice, according to author SEC Stan Kaplan, WB9RQR, is to say, "This is a drill" at the beginning and end of every message, so anyone tuning in will understand that the message isn't part of a real emergency. The author cited his experience during a full-scale exercise in Ozaukee County when a dispatcher transmitting an officer-down message, forgot to qualify his announcement with "This is a drill." The county sheriff, purposefully not pre-warned of the exercise, was beside himself in an effort to get out of his house, speeding to the scene with siren and lights on. Fortunately, the dispatcher quickly contacted the sheriff and remedied the situation.

ARES BOOM BOX

Bob Murdock, WX2NJ, a New Jersey Emergency Coordinator, has built a portable communications center for use during emergencies. Don't miss the series of pictures in "Up Front" in this issue of *QST*. Bob's sturdy yellow plastic box features a 50-W transceiver and a power supply that runs off 120-V ac or external dc. Its gel cells can power the unit at 5 W, 10 W or higher power, and are charged when connected to ac or dc power. The cooling fan circulates air around hot components and exhausts at the rear. A front-mounted speaker can be switched off, and jacks can be used for headphones or audio outputs for packet operation. Flashlights, fuses, pens, adapters, microphone and so on, are stored in the top of the box. In May, Bob operated this ARES Boom Box in a support van for the Sandy Hook-to-Cape May MS-170 Bicycle Tour. According to Bob, "It worked great!"

Check out more photos of the ARES Boom Box, designed by Bob Murdock, WX2NJ, in the "Up Front" section of this issue of *QST*.

AWARENESS DAY EXPANDED

Last fall the Lawrence County, Ohio ARES/RACES group decided to celebrate Amateur Radio Awareness Day in a different way. Emergency Coordinator Michael Love, WB8YKS, conceived a plan to invite all public service agencies that the group worked with to set up public displays. A large section of a shopping complex's parking lot was chosen for the Awareness Day event. Thorough publicity was done to ensure a large crowd would attend. The hams set up under a canopy using generators and battery backup to operate HF, VHF, UHF, packet and ATV. According to ARES member Ken Massie, WN8F, ARRL disaster tapes were played on a VCR and large screen TV, and the public was given ARRL literature for nonhams, plus local ham newsletters. In addition, amateurs handled traffic for anyone wishing to send messages to friends and relatives.

Each service agency used the opportunity to show off its abilities. A medical evacuation helicopter landed and went on static display; Jaws-of-Life were demonstrated; fire departments performed rope rescue and ladder-truck demonstrations; Wayne National Forest's Smokey Bear taught fire safety; Lawrence County Sheriff Marine Patrol displayed splash-test dummies; Lawrence County K-9 Patrol demonstrated a drug search, and the Collins Career Center offered fingerprinting of children. Amateur TV operator Steve Sheers, W8AFX, put his camera, monitor, batteries and other equipment weighing 100 pounds on a heavy duty dolly. He pushed the unit around the lot, transmitting pictures of demonstrations and activities to other ham stations and TVs in the area (including some installed inside the mall).

Amateur Radio Awareness Day became a perfect way to show the public what ham radio is and can do in emergencies and disasters. By involving representatives of service agencies,

Rosalie White, K1STO ♦ Field & Educational Services Manager

all groups became better acquainted with one another, laying the foundation for an easier working relationship during future emergencies.

JUST A MATTER OF TIME

The Minnesota Department of Emergency Management recently provided portable suitcase-installed HF transceivers. ARRL Minnesota Section Manager Randy "Max" Wendel, N0FKU, distributed the rigs to Divison Emergency Coordinators throughout the state.

Max and Section Emergency Coordinator Gary Peterson, N0ZOD, recently met with state officials to discuss communication concerns regarding a forest fire threat involving several million trees that were toppled in winds last summer. One particular blow-down area measures 12 miles wide, 60 miles long. As these trees decay, the fire threat gets more serious; water-dumping planes are already on stand-by. If fires don't become an issue this year, next year only means the downed trees will be even drier. "Just a matter of time," says Max.

HDSCS's 20-YEAR ANNIVERSARY

The Hospital Disaster Support Communications System (HDSCS) is celebrating its 20th anniversary. HDSCS, based in Orange County, California, and headed by Emergency Coordinator April Moell, WA6OPS, specializes in emergency communications for hospitals, and holds practice drills—their most recent one, for 11 hospitals, 2 suppliers and the disaster site.

HDSCS was established when six hams participated in an exercise involving a phone outage at the St. Jude Hospital and Rehabilitation Center. Prior to that time, hospitals and service agencies in the area did not have a radio network in place for emergency situations. HDSCS now supports 34 medical facilities in the county.

CORRECTIONS

In reference to Steve Ewald's item in this column in the June *QST*, page 87, Stan Darmofal's call sign is WD8OWM, rather than WD8OWN as was printed.

ARRL Numbered Radiograms—Continued from April 2000 *QST*

There are two groups of ARRL Numbered Radiograms: Group One for relief emergency use and Group Two for routine messages. See March *QST*, p. 85, and April *QST*, p. 87, for the first thirty nine Numbered Radiograms. The ARRL Numbered Radiograms are also available via the ARRL Web Page at **http://www.arrl.org/field/forms/#fsd-3** in HTML, PDF or Microsoft *Word* formats. (FSD-3 is the form number assignment, and you may request printed copies of this form directly from ARRL Headquarters.)

Group Two — Routine messages— *continued*

*SIXTY TWO	Greetings and best wishes to you for a pleasant _____ holiday season.
SIXTY THREE	Victory or defeat, our best wishes are with you. Hope you win.
SIXTY FOUR	Arrived safely at _____.
SIXTY FIVE	Arriving _____ on _____. Please arrange to meet me there.
SIXTY SIX	DX QSLs are on hand for you at the _____ QSL Bureau. Send _____ self-addressed envelopes.
SIXTY SEVEN	Your message number _____ undeliverable because of _____. Please advise.
SIXTY EIGHT	Sorry to hear your are ill. Best wishes for a speedy recovery.
SIXTY NINE	Welcome to the _____. We are glad to have you join us and hope you will enjoy the fellowship of the organization.

* Can be used for all holidays.

Field Organization Reports

Public Service Honor Roll
May 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

956
NM1K
636
K9JPS
420
N5JZ
366
K4FQU
315
KJ3E
312
W9RCW
286
K5NHJ
238
KA2ZNZ
232
K7BDU
231
KC5OZT
229
WD8V
219
W6DOB
AD4IH
WA9VND
213
WB5ZED

211
K5MC
214
W7TVA
206
KK3F
202
W4CAC
198
N5IKN
196
N2YJZ
193
KF4NFP
192
N2CCN
K2UL
191
N2LTC
KB8ZYY
190
W4ZJY
N0KJ
184
N2OPJ
183
NN7H

179
KB2RTZ
176
KC4TLG
175
WB2UVB
173
WA1TBY
170
W6IVV
K9FHI
N2RPI
169
W4EAT
168
KA2GJV
KR4MU
K6YR
167
KA4FZI
166
WB4GM
WA5I
WX8Y
N8JGS
165
W5ZX
AD4DO

161
N0SU
KB2KLH
159
W6QZ
KC2AHS
158
N0OUJ
KD4GR
KB2VVB
157
W0OYH
156
NY2V
N5NAV
KC2DAA
155
K4IWW
153
WN0Y
N2JBA
K1JPG
152
K4YVX
K8GA
151
W2RJL
W2AKT
N8FPN

150
KB2VVD
W2MTA
149
WA4QXT
AA3GV
N7YYS
148
K2GTS
W3YVQ
WA3HJC
AF4PU
147
KC2EOT
WA1FNM
145
KC4ZHF
144
WD4JJ
K4SCL
NR2F
143
N2KPR
WA4DOX
WD8MIO
KC7ZZB
K4RBR
AF4GF
142
KC4PZA

KB5W
141
KI4YV
N3WK
AC4CS
W9YCV
N8FWA
140
K7GXZ
W0LAW
N3WAV
WB2GTG
KF6OIF
N9BDL
139
KT4PM
WB2ZCM
138
W7GB
WO0A
KD1LE
KB5TCH
W7ZIW
KT6A
137
KA1GWE
WA2UKX
W3VK
N2XJ
KA4UIV
136
KE4JHJ
135
NZ1D
WA4EYU
134
KB2WII
N2WDS
W7NWP
133
WA8EYQ
AA3SB
KC8CON
WD9HII
KE6MIW
132
NN2H
131
K5DPG
K5IQZ
W1PEX
N9MN

130
N3WKE
WB0ZNY
W2EAG
W2JHO
W9CBE
129
WB2QIX
WB2FGL
128
KC7SRL
KC4VNO
WD8DHC
WA0TFC
126
KG2D
N1LKJ
K9LGU
KB2VRO
125
KB2ETO
W1ALE
N2AKZ
WX4H
124
W8SZU
123
KJ4N
AA8SN
W7GHT
122
KE1AI
AG4LB
KC6NBI
N7IAK
121
WA1JVV
AA2SV
120
KA7AID
N7DRP
W6JPH
N5GG
119
N1JBD
W0FCL
KA8WNO
W3OKN
K7MQF
118
KA2DBD
W4CKS
W4NTI

K9GBR
W9ZY
KC5VLW
N9TVT
KA4LRM
117
W2CS
WD0GUF
WA2YBM
116
KB0DTI
115
NC4ML
KA0DBK
K0IBS
KC6SKK
AD6LW
114
AF2K
N3ZKP
W0WWR
W3BBQ
AB4XK
WD9FLJ
K2PB
113
K8JMP
112
W2PII
N9KNJ
WB5NKD
AG9G
111
N2GJ
108
N8DD
AA2ED
N8IBS
WA4EIC
KC8GMT
W2MTO
KT4SJ
106
W3CB
105
KE4GYR
KG5GE
W5GKH
104
WA8SSI
KG4HCW
KJ7SI

103
KG5GE
WB7VYH
AD6HR
102
KE4GYR
K4AIF
WB4ZNB
100
W4XI
99
KC8HTP
K2DN
WA1QAA
98
K4MTX
97
KE0K
W5AYX
W2LC
96
KC7SGM
KF4KSN
WA2CUW
95
W2GUT
94
W4AUN
WB2LEZ
KT4TD
WB4PAM
KF5A
93
AC4ZO
AA4YW
92
WA4GLS
W4CC
91
KA1VEC
90
W4CC
W3IPX
K1SEC
WB2IIV
K3UWO
WI8K
89
N3RB
KE4DNO
88
KC3Y

K8LEN
K8VFZ
87
AE4NW
W7QM
86
WI2G
85
W4PIM
84
KD4GHU
KM5VA
82
K3CSX
KE4VBA
AA4BN
WB9GIU
81
AA4AT
K2VX
80
KC7SGL
79
AF4CD
WA4EYU
77
KE3FL
76
K1UQE
AF4QZ
KD6YJB
75
W7BO
KA7TTY
73
N1IST
KD4PWL
KO4OL
K8ZJU
72
WA8DHB
N4MM
71
N1LAH
AE4MR
KB4WBY
70
N2JRS

The following stations qualified for PSHR during April, but were not listed in last month's column: (Apr) N3WKE 113, WB5NKD 112.

Section Traffic Manager Reports
May 2000

The following ARRL section traffic managers reported: AK, AL, AR, AZ, CO, CT, EMA, ENY, EPA, EWA, GA, IA, ID, IL, KY, KS, LA, MDC, ME, MI, MN, MO, NC, NFL, NH, NLI, NNJ, NTX, NV, OH, OK, OR, ORG, SNJ, SB, SC, SD, SDG, SFL, STX, TN, VA, WCF, WI, WMA, WNY, WPA, WV, WWA, WY.

Section Emergency Coordinator Reports
May 2000

The following ARRL section emergency coordinators reported: AL, AZ, CT, ENY, EWA, IN, KY, LA, MDC, MI, MO, NLI, OH, SD, SFL, SV, TN, VA, WCF, WMA, WV.

Brass Pounders League
May 2000

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
NM1K	813	3887	911	5	2116
WX4H	3	737	606	8	1354
K9JPS	0	533	34	534	1101
N2LTC	0	499	578	23	1100
K7BDU	56	503	505	8	1072
N0KJ	22	497	467	52	1038
KK3F	12	515	462	46	1035
W1PEX	0	83	810	17	910
W6IVV	0	407	452	0	871
N5IKN	0	424	99	325	848
KT6A	0	454	365	0	819
WB5ZED	25	372	392	19	808
KF5A	0	181	599	2	782
W5SEG	34	379	365	0	778
K7VVC	27	306	390	6	729
KJ3E	183	131	356	13	683
WA9VND	40	332	254	11	637
N3QA	0	313	316	2	631
KA2ZNZ	13	298	218	87	616
K4FQU	241	65	290	5	605
W9IHW	1	301	40	259	601
KC5OZT	2	250	233	31	600
W6DOB	7	133	386	84	590
KB5W	2	256	281	2	541
W9RCW	0	230	45	229	513
N5JZ	208	73	216	14	511

BPL for 100 or more originations plus deliveries: K9GU 192, WZ7V 175, K5NHJ 164, AD6IH 109, K8LJG 107, K5MC 101. KJ3E qualified for BPL during the months indicated, but was not listed in the BPL columns: (Dec '99) 612 points; (Mar) 534 points; (Apr) 632 points.

DX Operating Code

Over the last few months I have received many comments about the way Amateur Radio operators have been behaving in the pileups. It's not a new dilemma. In fact, the problem is ongoing and has to be addressed every few years. The apparent misbehavior is a byproduct of several factors. At the top of the list is the fact that we have better propagation with more DXers going after rare stations. There are also a number of new DXers who don't know any better, and some of the old timers, who know *better, are just not following proper procedures. So whether you are new to DXing, on your way to the top of the DXCC or waiting for a new DXCC Entity, take a minute to read this month's column and ponder how you can become a better DXer!*

The DX station is ultimately responsible for how a pileup is run. However, each participating operator in the pileup should do his or her part to ensure that it does not get out of control. The subject of pileup management has been the topic of conversation recently. (It always has been and always will!) Complaining about it won't help. It's going to take some action on everyone's part. In other words, we're all part of the solution.

The DX Station

There are a several key things the DX operator must do to keep control of the pileup. Don't break your own rules. If calling for Europe, work only Europe. If calling for number seven, only come back to those with that number in their call signs. If someone calls out of turn, politely tell them you are only working Europe, or stations with the number seven. Do not log the queue jumpers! By answering stations who violate the rules you send a clear message that you don't take your pileup management seriously. Say what you mean and work only what you say.

The DX station operator should give his call sign as often as possible. When operating split and by call areas, it's important to give this information every few QSOs. This will help control the pileup and keep questions to a minimum. Just listen to Roger Western, G3SXW, when he is on a DXpedition (FH/G3SXW, FW/G3SXW plus many others). Roger gives his call after every QSO!

For more information on this topic pick up a copy of *DXpeditioning Basics* by Wayne Mills, N7NG, which is available for $5 from the International DX Association (INDEXA), PO Box 607, Rock Hill, SC 29731. Your editor recently gave a copy of this to Thor, 4W6MM, who only worked CW. After reading the booklet he learned some new techniques, adopted them to his own style and is now running the pileups on SSB also. It's a great tool.

The DXer

When you discover a pileup in progress, the most important thing you can do is *listen*. The first thing you need to do is determine the call sign of the DX station. Don't rely on information from PacketCluster spots. Is the DX station working by call areas, or only by specific geographical regions? Is he operating split, and if so, from where to where? If you cannot copy the DX station you should not even bother calling, as this will only make the interference worse. It's okay if the copy isn't 100%, but if you don't hear the DX station at all, *don't call!*

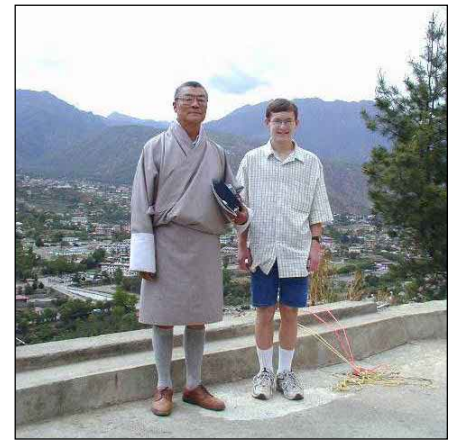
If the DX station is operating split (listening up or down from his transmit frequency) *never* transmit on his transmit frequency—even if someone else is doing so. Avoid the temptation of being a DX Policeman. These are the folks who transmit such gems as "Up! He's listening up!" and so on. They don't understand that by throwing in their bits of wisdom they are simply adding to the problem. Rather than playing frequency cop, let the "offender" figure it out on his own, or send him a talk message on the PacketCluster. We've all transmitted on the DX station by accident. Try to ensure you're not the one doing it.

What to do with Repeat Offenders?

So what is one to do when they run across someone who is just blatantly calling out of turn, or otherwise violating every rule of good DX operating procedures? Whatever you do, don't confront them on the DX frequency. It's unprofessional and will aggravate an already bad situation. Jot down his call sign and send him a note (via e-mail, PacketCluster or postal mail), or have your local club do so. Inform the offending station what you observed. Apathy will only ruin our great DX hobby!

BHUTAN

Amateur Radio in Bhutan was reopened in late April after many years of no activity. Dasho T. Yonten, A51TY, was the first on the air, quickly followed by Jim Smith, VK9NS/A52JS, who has been following Amateur Radio in this Himalayan nation for quite a long time. While in Bhutan for close to a month, Jim made over 20,000 QSOs running just 100 W and a vertical antenna. Perhaps the best part of the Bhutan story is that a local is now active and more Bhutanese will be on soon.



GLENN JOHNSON, W0GJ

Dasho T. Yonten, A51TY, and Mark Johnson, A52MJ, in Thimphu, Bhutan. This was Mark's first DXpedition at age 14. He has a great future ahead of him!

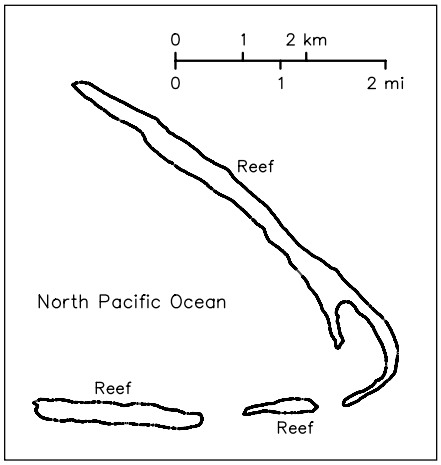
Bhutan is the Land of the Thunder Dragon and not Thunder Signals, as stations from this once rare QTH must make do with a maximum output of 100 W. Glenn Johnson, W0GJ, organized a team that was on the air the first week of April. Check out Glenn's article elsewhere in this issue.

The good news is that several other groups are planning to be active from Bhutan later this year. Members of the Clipperton DX Club have announced their intentions to go in September while Charley, K4VUD, is organizing a group for the December time frame. Keep an eye on your favorite DX bulletin for more news on this one.

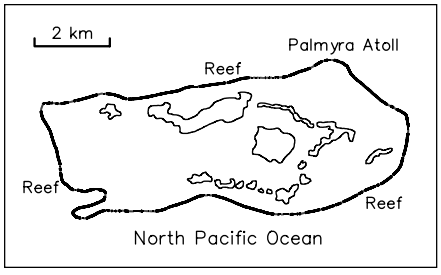
FIVE ISLANDS IN FIVE DAYS

Members of the Aiken Contest Club from South Carolina sponsored a highly successful "3 Islands in 3 Days" expedition in February of this year, making some 4000 QSOs. The group has announced they will operate from five different IOTA groups in five days in mid-September. Look for them between September 14 and 21 from the following islands: NA-067, North Carolina State East Group; NA-112, North Carolina State West Group; NA-110, South Carolina State Group; NA-058, Georgia State Group and NA-138, Florida State East Group. They plan to operate on 10 through 40 meters CW, SSB and

Bernie McClenney, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org



Kingman Reef is a V-shaped coral atoll measuring about 6 miles on each leg. It's about 1,000 feet long and 10 to 20 feet wide, rising about 6 feet above sea level.



Palmyra is only 35 miles away from Kingman Reef.

PSK31. Their goal is to make 10,000 QSOs. Keep an eye on their club Web page at **http://www.duesouth.net/~douggie/** for up-to-date details.

KINGMAN REEF AND PALMYRA ATOLL

In May the Kingman-Palmyra DX Group announced they would be operating in several phases from these two rare island groups throughout the summer and fall, with a full-scale DXpedition scheduled for October of this year. Although the identities of all the team members have not been made public, we know that Tom Harrell, N4XP, and Garry Shapiro, NI6T, are involved. Astronaut Dr. Chuck Brady, N4BQW, and Dave Johnson, WB4JTT, were active from the islands in May.

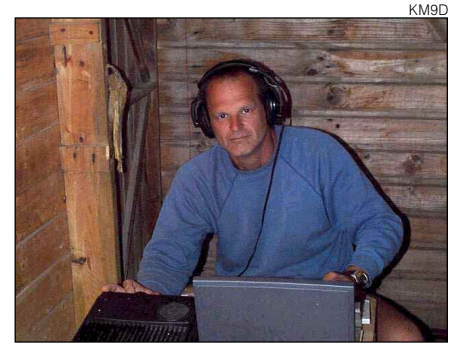
The Fullard-Leo families—current owners of Palmyra—have agreed to sell the island to The Nature Conservancy. This has opened the door for coordination between the Kingman-Palmyra DX Group and The Nature Conservancy, which has temporarily enhanced access to this remote area.

The Palmyra and Jarvis atolls are located about 730 kilometers (395 miles) from each other, but not quite far enough to count as separate DXCC Entities. They currently rank # 52 on the ARRL Most Wanted List and have been slowly working their way up the chart. Palmyra is made up of some 52 small and heavily vegetated islets that are located about 1693 kilometers (1052 miles) south-southwest of the Hawaiian Islands. The islets consist of 680 total acres with an annual rainfall of 175 inches. The American captain Edmond Fanning discovered Palmyra in 1798, but he did not land on any of the islets. In 1802 captain Sawle and his ship *Palmyra* were blown ashore during a storm (hence the atoll's name). In 1974 Palmyra made infamous headlines when a couple was murdered there. The story was made into a novel, and later a TV movie titled "And the Sea Will Tell."

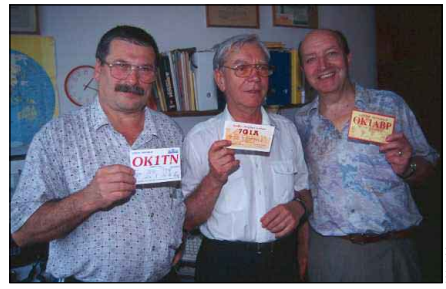
Kingman Reef, Palmyra and Jarvis all belong geographically to the group of Line Islands stretching over 2400 kilometers. Most of the islands belong to Kiribati. Only a few are permanently inhabited. Kingman, under the administration of the US Navy, is about 1000 miles southwest of Hawaii. The reef consists of two **V**-shaped legs, each about 10 kilometers long, which surround a triangular lagoon. Kingman Reef, KH5K, now ranks # 16 on the ARRL 100 Most Wanted List. In the 1930s Pan-American Clippers traveling from New Zealand to the US used the strategic location as an emergency landing spot. The first DXpedition to Kingman Reef was in January 1974 with the call KP6KR. The operators were Bob, W6RJ (ex-K6AHV); Rusty, W6OAT; Pete, W6OOL (ex-WB6OOL) and Jim, N6RJ (ex-WA9UCE).

KM9D

KM9D



Talk about a precarious perch! KM9D's "shack" (left) on Ambrosio Island was just a few feet from the pounding surf. Mike (right) made over 7000 QSOs running 100 W and wire antennas as XR0ZY. He'll be heading for Pitcairn Island and French Polynesia later this year.



W6YA

Do any of you old timers remember Josef, 7G1A, who was the first on from Guinea in 1959? Here is Slavek, OK1TN; Josef, OK1PD (ex-7G1A); and Jiri, OK1ABP.

QSL ROUTE FOR T97M

Recently Phil, K2PG, has been getting a lot of QSL cards intended for T97M in Bosnia. He is not the QSL manager and wishes to remind everyone that K2PF is the manager.

MOZAMBIQUE

Brian Carney, C91DC, is now working in Maputo, Mozambique until the end of September. He is running an ICOM 707 transceiver and a dipole. Look for him during the week between 0500 and 0530Z at around 28.490-28.495 MHz. He can also be found on the Bill Bennett Family Hour net at 14.245 MHz between 1400 and 1500Z. Stations working him from the US should send QSL requests to: Brian Carney, DOS/PC - Maputo, 2201 C St, Washington, DC 20521-2330. All others should send to Brian Carney, c/o US Embassy, PO Box 783, Maputo, Mozambique.

INCOMING QSL BUREAU

Is your information up-to-date with your Incoming QSL bureau? Do you have enough SASE/Money credits on file? For complete information on all US Incoming QSL bureaus check out **http://www.arrl.org/qsl/qslin.html** on the Web, or write the ARRL.

WRAP UP

That's all for this month. Special thanks go to AC4WW, K2PG, KM9D, N7NG, OE1WHC, W0GJ, W6OAT and W6YA for helping to make this month's column possible. Keep sending those articles, pictures and newsletters. Until next month, see you in the pileups!—*Bernie, W3UR* QST

STRAYS

AUGUST IS FOR LIGHTHOUSES!

◊ Last year's lighthouse events in August proved tremendously popular, with over 200 lighthouse stations on the air from 31 countries. In addition, thousands of hams around the world participated in these special events, contacting as many lighthouses or lightships as possible.

The 2000 National Lighthouse Weekend begins August 5 at 1200 UTC and ends August 6 at 2200 UTC. The *International* Lighthouse/Lightship Weekend takes place from 0001 UTC August 19 to 2359 UTC August 20.

For more information go to **http://www.waterw.com/~weidner/lh-ham.htm#2**. For a list of participating stations in both events (updated daily), visit **http://www.waterw.com/~weidner/LH-day-table.htm**. To join the Amateur Radio Lighthouse Society, go to **http://www.waterw.com/~weidner/arls.htmsfd**. (You can also sign up for the Ham Radio Lighthouse newsgroup at this site.)

Next Stray

DXCC HONOR ROLL

*Edited by **Bill Moore, NC1L** • Century Clubs Manager*

The DXCC Honor Roll is earned by Amateurs who submit confirmation for contacts reached within the top 10 of the overall number of entities on the DXCC List. There were 332 entities on the list for the period ending March 31, 2000 with 323 being required for the Honor Roll. The large **boldface** number indicates the total of current DXCC entities. The number beside the call sign represents the individual's overall totals.

MIXED

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DU9RG/339
ES1AR/375
I2KMG/365
IK4DCT/337
JA1BK/371
JA1BRK/368
JA1PCY/348
JA1QXY/352
JA2ANA/341
JA2VPO/344
JA3CMD/348
JA3DY/372
JA4DLP/352
JA4ZA/365
JA6WW/346
JA7WKG/338
JA8EAT/351
JH4FEB/345
JH4GJR/340
JL1ARF/338
JR7TEQ/347
KH6WU/364
N7NG/361
OH2BN/346
OH3YI/361
OH4NS/365
SM3CXS/360
SM3EVR/346
SM5CZY/368

331

4X1FQ/370
4X4DK/382
4X4JU/379
4X6UO/337
9A2OM/338
9A7V/337
AA4R/347
AA4S/354
AB8K/348
AF2C/341
CT1BH/359
CT1DRA/337
CT1ZW/350
CX7BV/340
DF3CB/338
DF4PL/338
DJ2BW/380
DJ2TI/349
DJ4PI/357
DJ4XA/360
DJ4ZB/346
DJ5AI/356
DJ5JH/358
DJ6NI/354
DJ6RX/359
DJ6TK/357
DJ6VM/355
DJ7ZG/365
DJ9ZB/353
DK1FW/354
DK2OC/346
DK5PR/351
DK6NP/345
DL3SZ/360
DL7AFV/337
DL7FT/365
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F6DLM/342
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G3KMA/366
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G3RUV/353
G3SNN/342
G3UML/362
G3ZBA/354
G4BWP/340
G4EDG/338
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GM3ITN/371
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I2PEI/344
I2PNB/348
I2VDX/347
I2ZFD/361
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I4LCK/356
I5ARS/368
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I8KNT/344
I8LEL/349
IK0AZG/337
IK1GPG/337
IK5BAF/337
IK7FPV/337
IK7JTF/337
IK8CNT/337
IN3DEI/344
IT9AF/351
IT9HLR/337
IT9SVJ/337
JA0DWY/345
JA1AAT/359
JA1ADN/370
JA1CHN/342
JA1DM/378
JA1FHK/360
JA1GRM/337
JA1KQX/344
JA1RWE/352
JA1RWI/345
JA1SJV/346
JA1SVP/346
JA1UQP/356
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JA2BAY/347
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JA3KWZ/343
JA4AFT/356
JA4DEN/340
JA4DND/348
JA4MRL/337
JA4XH/345
JA5BLB/344
JA5BSQ/344
JA5IU/348
JA6CNL/352
JA6GXP/348
JA6LCJ/345
JA6YG/358
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JA7MA/358
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JA8DSO/340
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JH4PMV/337
JH4UYB/338
JH5FTY/337
JH8MXH/339
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JJ3AFV/337
JM1VRW/337
JP1NWZ/338
JR1BLX/346
JR1MLU/345
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JR6PGB/339
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K1KI/351
K1MY/341
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K6IR/353
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K6RIM/355
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N5HB/341
N5LZ/338
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N6HR/356
N6JV/348
N6OJ/348
N6XJ/347
N7EF/342
N7UT/344
N9AB/356
NA0Y/374
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VE7SV/364
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K5GZ/343
K5JZ/341
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Microwave Evaporation Ducts

Most VHF operators are probably familiar with long-distance tropospheric ducts. These natural waveguides propagate 144 MHz and higher signals a thousand kilometers and farther when large-scale weather patterns are favorable. The upper part of a duct is usually defined by a sudden increase in temperature with altitude, called a temperature inversion. Useful inversions are commonly several hundred to a few thousand meters (500 to 3,000 feet) above sea level. A duct may be significantly enhanced by a simultaneous sharp decrease in water vapor content.

Evaporation Ducts

In contrast, evaporation ducts are formed almost exclusively as a result of sudden decrease in water vapor content with altitude. Evaporation from lakes, seas and oceans causes the air just above the water's surface to become quite humid, nearly saturated with water vapor. At a somewhat higher altitude, the air is often naturally drier. If the contrast in water vapor content between the humid air near the water and relatively drier air above is large enough, a duct may form along the boundary sufficient to trap microwave radio signals.

Evaporation ducts are almost constant features above extensive bodies of water on sunny days. Evaporation takes place faster over warmer water and thus warmer water is more conducive to the creation of ducts. Nearly all evaporation ducts form between 3 and 30 meters (roughly 10 to 100 feet) above the water. More than half of all evaporation inversions appear between 8 and 16 meters (roughly 25 to 50 feet) altitude.

The more elevated evaporation ducts are usually aided by light breezes, which mix the humid air a bit higher than normal above the water's surface. Stronger winds may mix the air too much and obliterate the sharp, stable boundary between humid and dry air necessary to create the duct. Evaporation ducts are weaker on cloudy days, disappear at night and are destroyed by rainfall.

Frequencies

Evaporation ducts are shallower than the higher tropospheric ducts that commonly trap VHF signals. This makes evaporation ducts useful only in the microwave range. The most effective bands are 5.6, 10 and 24 GHz. Ducting is probably rare at 3.4 GHz, because the duct must be more elevated than what is normally observed. Long-distance ducting at 47 GHz and higher may be limited by water vapor absorption, as the air within an evaporation duct is likely to be nearly saturated.

The best choice to get started using evaporation ducts is probably 10 GHz. This band provides a good compromise between optimal frequencies and available equipment. Ducting could be expected to be more pronounced at 24 GHz for the same overall station performance, but most 24 GHz stations run lower power and have poorer receivers than the typical 10 GHz rigs. Relatively few evaporation ducts reach the height above water level required to trap 5.6 GHz signals.

On the Beach

Microwave stations must be on a boat or set up right on the shore to get into an evaporation duct. This may not be a serious problem, since most microwave operators are prepared for portable operation. It is not clear how far from the water's edge would still be effective—perhaps no more than 10 yards or so. Some professional studies suggest that in many situations, there may be an advantage to raising antennas 10 to 30 feet above the water line and just under the duct boundary.

A shipboard station would be ideal, save that it could be difficult to stabilize high-gain antennas on the horizon. The next best location might be a promontory or low bluff at water's edge. Certainly setting up right on the beach might be the simplest and most direct approach, especially if the antenna can be raised at least 10 feet. There has been very little deliberate amateur work with evaporation ducts, so some experimentation will be necessary to find optimal operating conditions.

Geography

Evaporation ducts are normally stronger over warmer bodies of water, so summertime in southerly areas (such as the Gulf of Mexico) probably holds the greatest promise of success. An ideal location might be one of the Florida Keys, with its clear shot up the west coast of Florida and over much longer distances across the Gulf of Mexico. Indeed, anywhere along the Gulf coast would make an ideal area to experiment with evaporation ducts.

Other promising locations in the East include the east coast of Florida (with its clear over-water path up much of the East Coast), the Outer Banks of North Carolina, Nantucket Island off Cape Cod, and southern Nova Scotia. The Great Lakes are somewhat less desirable, because of cooler waters and shorter potential distances, but they are still worth trying in summertime. Any of the Channel Islands or the great headlands along the West Coast, such as at Point Conception, also hold great promise.

There are some special local weather conditions that may enhance evaporation ducting even further. The presence of warm, dry breeze over warm water would probably be ideal. Such conditions do exist. The Sorocco winds, for example, blow hot, dry air from the North African deserts across the Mediterranean. The similar Santa Ana winds may also enhance evaporation duct formation along the southern California coast.

Experiment

There are few reports of amateur microwave contacts in which evaporation ducts are suspected to have played a major role. Thus it is also not clear what distances might be possible on the various microwave bands. Professional studies (mainly concerned about effects on sea-borne microwave radar) have reported ducting out to several hundred kilometers, at least. Some 10 GHz operators may have already made contacts at similar distances with the aid of evaporation ducts without being aware of it.

A systematic experimental regime might start with a modest path length (say 50 or 100 km) and increase the distance as experience warrants. Use nighttime signal strength across the over-water paths as a standard to gauge any daytime enhancement due to an evaporation duct. If a duct is present, signal strength will be substantially greater than what standard path-loss equations suggest. Try different antenna heights and locations. Remember to set up

This Month

August 5-6	ARRL UHF Contest
August 12-13	Perseids Meteor Shower
August 18-19	EME 2000 Brazil Conference
August 19-20	ARRL 10-GHz and Up Cumulative Contest
August 25-27	Eastern VHF/UHF Conference (Enfield CT)
August 27	Excellent EME conditions

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at water's edge and do not get carried away with elevation above sea level—it is easy to put an antenna higher than the duct.

ON THE BANDS

May provided an extraordinary array of openings. Six-meter F-layer DX continued to provide some excitement around the world, even as the MUF began to decline towards its annual summer minima. Sporadic E got off to a roaring start. There were more than 20 days of 6-meter openings, four days with transatlantic propagation, and three days with 2-meter sporadic E. Several auroral sessions and early-morning auroral-E openings on 50 MHz enlivened activity in the north country. Finally, there were even some tropospheric openings.

Many thanks for the contributions from K1JT, WB2AMU, KC4YOJ, K6LMN, KC7NIF, W8DQ, W8RU, W9FS, VE7AGG, and VK3OT, whose calls were not mentioned separately in the summaries. Dates and times are UTC, as always.

Six-Meter DX from the US

F-layer DX began to slow down through May, as expected, and most contacts were limited to paths reported during previous months. US stations in all call areas and several Canadian provinces had opportunities to make contacts into South America on at least 14 days of the month. Among the prefixes appearing most commonly in North American logs were LU, CX, PY and CE.

The afternoon of May 4 brought especially widespread conditions. Nestor Zucchi, LW5EJU, logged stations in VE3, W1, 2, 3, 6 and 7, as well as VO1TJM. KC7IJ (Idaho) and WX7R (Oregon) found several CE, PY and LU stations that day. Steve McDonald, VE7SL (CN88), made contacts with four Argentines on May 21, one of the few days that stations in British Columbia made it into South America.

Many US stations made their first DX contacts or worked South America with minimal equipment. Patty Phillips, KU0MM (EM28) worked LU2DRV and CE3SAD on May 1, her first time ever outside the US. John Simander, WA3TIH (EL96), was pleased to contact two LU and two CX stations; John was running 100 W to his attic loop antenna. Jon Jones, N0JK/m, made several contacts running just 10 W and his mobile whip.

Transpacific paths opened on at least 10 days, mostly from the West Coast, Texas and Florida to Australia. Several American stations outside the normal coverage for Pacific openings, including WX7R (CN85), W7GJ (DN27), WA7WQD (DN31), K0DU (DN70) and W6AOL/0 (DM79), made VK contacts as well.

The Australians were well represented in American logs, but there was other interesting activity. YJ8UU, YJ8WR and YJ0DWR (running just 10 W and a dipole) created quite a stir from Vanuatu, logging XE2EED, K7ICW, VE7SL, K5AB and three others in south Texas. K7ICW reported FK8CA, and VE7SL (CN88) found V73AT. Finally, Bob Magnani, K6QXY (CM88) pulled out VK9WI (Willis Island) on May 15 for DXCC country #112 and a US first to that entity on 6 meters.

Six-Meter DX in the Rest of the World

Europeans continued to make runs into South America, Africa and even Australia, but there was still room for news. Perennial DXCC leader PY5CC worked FR1AN, 5H3US, 5A1A, LY2FE and YL2JN during May, to bring his tally to 191 countries. He had a spectacular opening to Europe on May 30, when he made 112 QSOs in 19 countries as far east as Estonia (ES), Lithuania (LY) and Latvia (YL). 9H1BT worked J87AB, to raise his total to 179 countries, second only to PY5CC.

Conditions in Asia and the Pacific slowed down noticeably, yet there was some new DX on the band. *Internet Six News* reported that 9N7SZ (Nepal) made over 360 QSOs with Japanese stations and more than 60 contacts with BV, BY, P2, V7, VK, VR2 and YB on May 3 through 8. In addition, EY8MM (Tajikistan) made the first ever 6-meter contacts with Europe on May 28. The initial QSO was with I8LPR, but at least 130 others followed.

It helps to have large antennas if you live hundreds of kilometers from major population centers, say in South Dakota. These are the arrays of Arliss Thompson, W7XU/0 and his wife Holly, N0QJM, all mounted on fully rotating towers. The 140-footer on the left holds eight stacked 2-meter Yagis. The center tower has four Yagis each for 222 MHz (at 140 feet) and 432 MHz (at 100 feet). The tower on the right has four stacked nine-element Yagis for 6 meters, interlaced with two four-element Yagis for 20 meters at 73 and 157 feet.

Six-Meter Sporadic E

Six meters was open for sporadic-E contacts on May 1-4, 8-14 and 20-29 somewhere in the US and Canada and for double-hop across the continent on at least four of those days. In addition, Caribbean area countries, including J8 (J87AB), KP2, KP4, TI, YV, VP5 (VP5/N2GA), made contacts throughout much of the US on five days, many over double-hop paths. Those in the western states worked KH6 via double-hop on at least three days.

There were the usual astonishing feats of operating. Gary Mitchelson, N3PJU (FM19), worked WX7R and N7DB (CN85) over a double-hop path on May 11 around 0130. So what was so extraordinary? Gary was using a 1950s-era Gonset G-50 AM transceiver on 50.4 MHz. There was some unusually northerly E-skip on the evening of May 28. W3EP and others in the Northeast worked VE3/KG0VL (EO30), VE4CPU (EO10), VE5UF (DO61) and VE6TA (DO33). Oscar Morales, CO2OJ (EL83), ran 60 US and Canadian stations in an hour during the morning of May 21 running just 5 W.

Even longer contacts were made into the Caribbean. W7XU/0 (EN13) hooked up with J787AB on the 24th at around 4800 km, and KC7IJ (DN44) worked KP4UK on May 23 at about 5000 km. W7GJ was delighted to find KP4UK on May 27 for a new country. The distance was about 5400 km, or about the same as New York City to London.

Six Meters to Europe via Sporadic E

Yes, there were E-skip contacts across the Atlantic, and not just from the northeastern states, either. The transatlantic season got started on May 19 around 2100, when K1TOL, K1SIX, W3BO and others worked EH8BPX on the Canary Islands. On May 22 between 2120 and 2230, widely scattered US and Canadian stations from Ontario to Missouri worked Spain and Portugal. KA9CFD (EN40) in Illinois found CT1EKF, CT1EEB, EH7GTF and EH7KW. K2SPO (FN13) in western New York copied at least four different Spanish stations. Others making it across the Atlantic included WA0KBZ (EM48) in Missouri and VE3FGU (FN04).

Two days later, southern Florida stations AE3SW, K2RTH/4, and others worked CT1DYX, CT4KQ, EH7GTF and EH7KW for about an hour after 1420. Those in the mid-Atlantic states got an opportunity to work Europeans on May 29, beginning about 1345. Herb Spoots, W3BO (FN20), copied a number of G, F, ON and I stations along with S57A. W3EKT (FM19) reported contacts with ON, PA, F, DL and I. WA2FGK (FN21) hooked up with PA3BLD, while KC2DLD (FN32) found G7OEC and G1YLE. By 1530, it was over.

Two-Meter Sporadic E

Three 2-meter E-skip openings across the US in May are a bit unusual, but the sporadic E season did get off to an incredible start. On May 9 at 2341, Ron Silver, WA4LOX (EL87) made a lone QSO with VE3KKL (FN25). He heard the Canadian for about 20 minutes and heard other contacts as well. Quite a few more stations made 2-meter E-skip contacts between central California and Kansas on May 22, 0235 to 0300. Gary Krenzel, N0KQY (DM98gk), logged N6YM (CM88) and half a dozen others in CM98. W6OMF (CM98) worked N0KQY and N0LL (EM09). On the 31st between 0030 and 0105, several Illinois stations made quick contacts into southern New Mexico and Texas.

Europeans also enjoyed incredible conditions. There were seven distinct 2-meter E-skip openings on five different days—May 18, 19, 27, 28 and 31. The most intense events took place on May 27, when the band opened three times for at least five hours. Dave Butler, G4ASR and author of the VHF column in *Practical Wireless*, made more than 50 QSOs into 10 eastern European countries that day,

222-MHz Standings

Band standings for 222 MHz are compiled June 1st for publication in the August *QST*. Stations must work at least eight states to be included in the standings, except for stations west of the Mississippi River. To ensure that the standings reflect recent activity, information must be submitted within the previous two years. Stations dropped for lack of recent reports will be reinstated with a current update. It is not necessary to have worked additional states or grids, but please confirm your continued activity at least every two years. You can e-mail reports to **standings@arrl.org**, or send them by mail to Steve Ford, WB8IMY, 225 Main St, Newington, CT 06111. Enclose an SASE for a new reporting form.

Call Sign	QTH	Total States	Total DXCC	Grid Squares	Best DX† (km)
W1JR*	NH	47	4	88	2050
K1TEO	CT	24	2	93	1720
AF1T	NH	24	2	—	2019
K1UHF	CT	17	2	65	1938
W1AIM	VT	15	2	41	1223
W1GHZ	MA	15	2	31	1207
K1MAP	MA	13	1	20	1080
K1WVX	CT	9	1	12	973
N2WK	NY	28	3	87	1960
K2AN	NY	20	2	56	1043
WB2VVV	NJ	16	2	29	779
WA2BAH	NY	14	2	32	1740
W2FCA	NY	13	2	28	640
W2CNS	NY	12	3	29	626
W3HHN	NY	12	2	22	1170
WA2ZFH	NY	12	1	19	497
K1JT	NJ	10	1	15	390
KA2MCU	NY	8	2	18	480
W3ZZ	MD	36	2	99	1862
N3XJX	PA	8	2	27	—
K4RF	GA	37	2	105	1968
N4CH	VA	30	1	76	2000
K4ZOO	VA	26	2	82	1438
KC4QWZ	TN	24	1	53	—
AA4H	TN	23	1	62	1737
W4WTA	GA	23	1	57	1485
K9OYD/4	VA	22	2	52	776
K2RTH	FL	15	2	38	1899
W4EUH	VA	14	1	34	725
K4RTS	VA	13	2	43	742
WB4JEM	FL	12	1	47	1647
AD4DG	VA	10	1	18	532
W5LUA*	TX	50	—	—	—
W5FF*	NM	50	—	—	—
K5SW	OK	31	2	117	2051
W5ZN	AR	20	2	50	1940
W5UWB	TX	17	2	54	2197
AA5C	TX	16	2	68	1843
WA5TKU	TX	14	—	28	—
W5HUQ*	AR	9	1	14	1500
N5QGH	TX	8	—	27	—
N5XU	TX	2	1	11	1459
N6RMJ	CA	4	2	22	4017
N6RPM	CA	4	2	22	1431
K6TSK	CA	4	2	16	4125
KR7O	CA	4	1	22	1638
N6ZE	CA	1	1	4	—
W7RV	AZ	9	3	51	1740
NJ7A	UT	7	1	11	1980
KE7SW	WA	3	2	15	409
K7XC	NV	2	1	7	619
WA8WZG	OH	38	2	127	1715
KE8FD	OH	34	2	127	1892
K8MD	MI	28	2	82	1903
W8PAT	OH	27	2	66	1901
KU8Y	MI	24	2	80	1406
N8KOL	OH	24	2	71	1510
WB8XX	OH	21	2	41	1253
K2YAZ	MI	19	2	66	1300
W9UD	IL	40	2	141	1650
WB9SNR	IL	27	2	58	1745
N9NJY	IL	21	2	56	2140
W9JN	WI	18	2	63	2005
KA9CFD	IL	18	2	51	1537
WA1MKE	IN	15	2	56	1800
N0AKC	WI	10	1	17	—
W9EME	WI	8	2	—	—
N0LL	KS	23	2	95	1691
W0FY	MO	23	1	72	—
K0FF	MO	18	1	52	1174
WA0BWE	MN	17	1	56	1264
K0GJX	MN	11	1	36	1074
K0GU	CO	10	1	18	1913
K0RZ	CO	9	1	41	2040
N0UK	MN	8	1	40	735
WA2HFI/0	MN	7	1	21	868
N0KE	CO	6	1	24	1050
K0VSV	IA	6	1	14	675
KR0I	MO	5	1	6	474
WB0LJC	MN	3	1	14	470
W0LD	CO	2	—	3	632
VE3AX*	ON	50	4	62	1892
VE3KH	ON	15	2	51	1093
VE6TA	AB	4	2	10	1655

— Information not supplied
* Includes some EME (moonbounce) contacts
† Terrestrial

including ZA/OK1JR (Albania) for a new country. IT9VDQ made over 130 QSOs in a one-hour period, and there were many contacts over 2200 km. You can bet the Europeans were not all piled up on their calling frequency.

Aurora and Auroral E

The geomagnetic field was just below storm levels on many days, but only two auroral events attracted much notice. N7NT (DN45) in western Montana made 2-meter contacts into Washington and Alberta on May 17 between 0255 and 0335. The disturbance of May 23-24 was much stronger (the K index reached 7 during two consecutive three-hour periods after 0000), but only stations across the northern tier of states reported auroral contacts.

There were relatively more auroral-E openings on 6 meters during the month. On May 16 after 0500, KL7ZZ (BQ60) on the northern Alaskan Arctic coast found VE4RRB, VE4KPU and N9ISN. Stations as far south as Missouri reported widely scattered auroral-E contacts on May 17, 22 and 24.

The big auroral-E event took place on the evening and early morning of May 30-31. OX2K (GP47) made more than 300 contacts across much of western Europe as far south as Italy and distances up to 4000 km. W5EU (EM12) reported a quick contact with OX2K at 2300 and mentioned another Texan also made the 4900-km double-hop link to western Greenland. After 0300, the OX2K expedition station hooked up with VE2PIJ (FN35), W2CNS (FN13), K2SPO (FN13), VA3RU (FN03), W8PAT (EN81) and others in the Northeast and Great Lakes area.

Mike Smith, VE9AA, made his contact with OX2K at 0314. Within an hour, Mike was surprised by a contact with KL7ZZ about 4950 km to the west, for one of the longest auroral-E contacts reported in a long while. W2CNS likewise logged KL7ZZ. K1TOL did not hook up with the Alaskan, but did work N7EIJ (CN85) and heard VE8WD/b at about 3400 km.

Tropospheric Ducting

Several days with above average tropospheric conditions over the central and southeastern states created additional activity. Richard Hart, K0MQS (EN31) in Iowa, heard a new beacon, K0UO (EM07), on May 7 around 2300. He put out some CQs and was rewarded with contacts in Kansas, Oklahoma and Texas as far south as EL19. On May 11, CO2OJ (EL83) worked throughout Florida on 2 meters as far north as KB4TCU (EM81) in southern Georgia. The next morning, K5LLL (EM10) in Texas worked northeast to K4TO (EM77) in Kentucky on both 144 and 432 MHz and heard stations in southern Ohio.

Conditions were also good from May 17 to 20. K5SW (EM25) in eastern Oklahoma found stations as far south as the Texas and Louisiana coasts early on the 17th and even made some rare 6-meter tropo contacts out to 650 km. That evening, AJ4Y (EL97) heard strong 2-meter signals to the north, at least as far as K4QI (FM06) in southern Virginia, but little activity. Russ Holshouser, K4QI, found conditions remained good on the evening of the 19th and the next morning. Russ worked several stations in southern Florida on both 144 and 432 MHz. His longest catches were with W4WHN (EL94), at about 1300 km.

Microwaves

The April RSGB *Microwave Newsletter* reported that I3EME and I0LVA set a new 24 GHz world distance record of 444 km during the winter. Details were not provided, but this is considerably longer than the current North American record of 267 km. Perhaps an evaporation duct might help in bettering this latest mark. The distance between Clearwater and Pensacola along the Florida west coast, for example, is about 550 km.

An Australian 47 GHz record of 45 km was completed on April 23, according to a detailed report by David Minchin, VK5KK, in the June issue of *Amateur Radio*. Al Edgar, VK6ZAY, and Terry Grammer, VK6TRG, completed their contact over a line-of-sight path near Perth, Western Australia. Both stations were home-built and nearly identical. They generated 1 to 2 mW to 0.6-meter dishes with Cassegrain feeds.

The effects of attenuation due to water vapor were quite apparent. Signals were as strong as 40 dB over S9, but deteriorated rapidly as the humid afternoon sea breeze swept across the path. When the wind died down, signals returned to their previous strength. The Australians obviously have a good deal of leeway to extend their range. The current North American DX record is 135 km and the Europeans have exceeded 200 km.

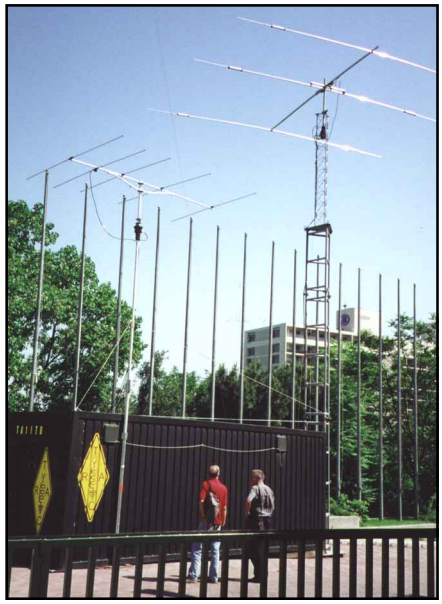
VHF/UHF/MICROWAVE NEWS

The ninth biannual conference devoted to 432 MHz and higher EME will be held this year in Rio de Janeiro, Brazil, August 18-19. For more information, check the conference Web site at **http://www.eme2000.com.br** or e-mail to **eme2000@ineparnet.com.br**.

The 26th annual Eastern VHF/UHF Conference will be held August 25 through 27 at the newly renamed Radisson Hotel, Enfield, Connecticut. The technical program begins Saturday morning and the banquet is held in the evening. Flea market activities and antenna measurements take place Sunday morning. For more information, contact Bruce Wood, N2LIV, at **bdwood@erols.com** or call 631-265-1015. QST

TRAC Showcases Amateur Radio at WRC-2000

Once it became known that Istanbul would be the site of WRC-2000 (page 51, this issue), the IARU member-society in Turkey, Telsiz ve Radyo Amatörleri Cemiyeti (TRAC), began to make plans for a demonstration Amateur Radio station at the conference venue. The station would serve three purposes: to educate delegates who might be unfamiliar with the amateur service, to give licensed delegates an opportunity to get on the air, and to offer amateurs throughout the world a chance to be a part of WRC-2000 by making contact with the special-event station.



The antennas at TA1ITU included a 5-element beam for 50 MHz and a tribander. Hundreds of six-meter contacts were made all over Europe and with parts of Africa and Asia.

TRAC had to overcome many obstacles, the greatest of which were two earthquakes that hit Turkey in August and November 1999. TRAC has about 1,000 members, half of whom are licensed, in 20 chapters located in Turkey's major urban centers. The club's resources were stretched thin by the need to provide disaster communications from the devastated areas for many days after each earthquake. Tragic as they were, the disasters proved beneficial in one major respect. They caused the authorities in Istanbul, a huge metropolitan area with a population of 15 million, to take the threat of an earthquake much more seriously and to recognize that Amateur Radio, and TRAC in particular, would be essential to an effective disaster response.

Tomoo "Yama" Yamamoto, JE9IKG/TA1ZZ, delighted amateurs in Japan by making contacts with TA1ITU available in Japanese.

Some of the TA1ITU staff and visitors: (l-r) TA1E, TA1DF, K1ZZ, TA2ZG/W2AV, TA2DS, VA3SB; (foreground) TA2IJ.

No one is more dedicated to promoting the capabilities of Amateur Radio as a disaster communications resource than TRAC President Aziz Sasa, TA1E. Under his leadership, TRAC has been recognized as a first-response resource and has been provided space at Istanbul's emergency command center. As a related project, TRAC has acquired a portable building and is outfitting it to be brought to the scene of a disaster and used as an emergency command post. TRAC received permission to place the portable building, which became affectionately known as "the container" because of its utilitarian appearance, just outside one of the main entrances to the conference center. The Turkish administration assigned the special call sign TA1ITU for use during the conference.

Between meetings, TA1ITU became a popular gathering spot for licensed delegates and observers. They and their TRAC hosts made several thousand contacts using equipment loaned by Yaesu: a FT-920 transceiver and Quadra amplifier on HF and a FT-847 transceiver on 6 meters.

Those of us who came to Istanbul for WRC-2000 are most grateful to our friends in TRAC for their gracious hospitality and for the hard work that went into making TA1ITU a success.—*David Sumner, K1ZZ*

BRIEFS

• **Australian 75-meter band to expand:** The Australian Communications Authority has announced that the band 3776 to 3800 kHz will be reallocated to the Amateur Service there as of January 1, 2004. —*WIA QNews*

• **One-year extension granted in UK for 73 kHz:** The Radiocommunications Agency in the UK agreed May 4 to an RSGB request for continued use of the 73 kHz band. This UK-only amateur band was due to be withdrawn at the end of last year, but the deadline now has been extended to June 30, 2001—and the RA has not ruled out discussions on an extension beyond that date. Experiments have resulted in several UK stations, running less than 100 mW ERP, being received in Europe at distances of more than 1000 km.—*RSGB*

• **France finally aboard 136 kHz:** A 136 kHz allocation for France now is official. As of April 21, the 135.7 to 137.8 kHz band was made available to French amateurs with a maximum ERP of 1 W. The new ruling includes French territories such as Guadeloupe, French Guyana, Martinique and Saint Pierre et Miquelon, thus making it the first LF allocation in IARU Region 2.—*RSGB*

• **Papua New Guinea approves 5 WPM for full HF access:** Licensing authorities in Papua New Guinea have approved full HF access for Papua New Guinea "K call" holders. The move effectively gives any qualified Technician who can pass a 5 WPM Morse test full HF access, as had been the case earlier with 10 WPM qualifiers. —*Rick Warnett P29KFS via Q-News*

Women and Amateur Radio: Finding a Place in the "Mainstream"

"Where are all the YLs?" was the topic of this column back in 1998. It is still an issue that comes up in discussions about women and their participation in Amateur Radio. It's asked at radio club meetings, on the air (HF and VHF) and sent out via letters and e-mail messages. There is no definitive answer concerning how many women are licensed or have upgraded, because there is no statistical gender breakdown available from the FCC or the ARRL.

DIANE ORTIZ, K2DO

Mary, N3YL and Bob, N3OO, Popella of Tidioute, Pennsylvania enjoyed strolling by the outdoor vendor areas at the 2000 Dayton Hamvention.

DIANE ORTIZ, K2DO

Valerie Stein, N9NMW, of Fort Wayne, Indiana at the Dayton Hamvention wearing her favorite T-shirt (with her husband Mike, WB9NOO).

More on the Way?

Many think that there are more women becoming licensed than ever before. One way to tell is from YL attendance at events like the Dayton Hamvention. "I've seen an overall increase in the YL numbers [at the Hamvention]," commented Mary Popella, N3YL, who was there with her husband Bob, N3OO. "This was the first year we were able to attend since 1988 and in that 12-year span YLs certainly have become more of a presence than before." Mary has been a ham (an avid CW op, both fixed and mobile) since 1974. Her two sons, KA3S and KS3V, both earned their Amateur Extra licenses at ages 11 and 12. "At the Hamvention I even had one male vendor come up to me and grab my arm. He wanted me to try to convince his wife to become a ham. She wasn't buying any of it, though!" Mary said that YL exposure to Amateur Radio still has a long way to go, but that license restructuring might pave the way for more women to become hams.

Are YL Groups Becoming Irrelevant?

One of the regular forums at the Hamvention is hosted by the YLRL (Young Ladies Radio League). Many YLs were at the forum, but they reflected a small percentage of the total women visible around the flea market and Hara Arena. Mary, N3YL, was one of those who didn't go to the YLRL forum. "In my ham career I have never been approached to join any type of group or organization geared solely to females. I think if some YL organization would have asked me to join, I probably would have." she said. "I know there are groups out there to join, but sometimes you need a push to get yourself motivated." Mary lives in a very rural area in Warren County, Pennsylvania in the Allegheny National Forest and enjoys participating in the East Coast Amateur Radio Service net (7.255 MHz daily, mostly for mobile traffic). She said that everyone is very receptive to her as one of the few YLs that check in. "Some even go so far as to feel they have to 'let the YL go first' because of my gender. This I don't agree with. If I'm fifth in line to check in to a net, then I should wait my turn like everyone else,"

A prominent YL ham who asked not to be identified said, "I don't belong to any YL Amateur Radio groups. I just want to be considered a ham, not a YL ham or anything special or different." Another YL echoed those sentiments, "I don't think that YL ham groups are really beneficial to ham radio. They seem to degenerate to recipe exchanges, nontechnical information and are geared to women who just got their tickets to make their husbands happy and are not interested in ham radio as a hobby in itself." She said that if there was a club for YL hams who enjoy building antennas, kits, working for "wallpaper" on HF, CW, contesting and so on, she would consider joining it.

A very active ham, Ann Santos, WA1S, disagrees. "I think YL ham radio clubs give us the opportunity to get together with YLs who have both Amateur Radio and other interests. YLRL, in my opinion, is the best YL organization because it has YL members and hosts conventions which attract YL hams from all over the world. They share not only their different interests, but also a bit of their culture. Many of the predominantly male groups tend to be more technically oriented and this seems to intimidate some YLs, so they quickly lose interest in the hobby."

Bobbie Newman, AA2JO, also views YL groups as a benefit. "Long-time friendships are formed followed by 'eyelash' QSOs along the way. I enjoy repeat contacts, meeting new YLs and working towards YLCC," she said. Bobbie has been a member of YLRL since 1973 and also belonged to WRONE (Women Radio Operators of New England) when she lived in that area.

In Canada, the largest YL group is CLARA (Canadian Ladies Amateur Radio Association). Helen Archibald, VE2YAK, of Pointe Claire, Quebec is an active member and is also a ham radio mentor in the Girl Guides of Canada. Helen feels she is well respected in her local club. "I demand it!" she said.

"I think YL ham radio groups are beneficial because they are an opportunity for YLs to get together," states Barbara Yasson KC7KQI. "Sometimes the YL groups are a bit more like other women's groups, but the radio connection still makes a difference." She said that the active YL hams in her community are treated the same most of the time, but sometimes a YL may have to pay a few more "dues." Barbara commented that after the dues are paid you are "in." "Radio is the thing I do with my spouse, and we have made it clear that we are serious about it. We are all radio operators, and after the preliminaries, that takes over and the motivation is the same," she said.

Whatever your opinion on YL clubs or groups, most YL hams would agree with Valerie Stein, N9NMW, who literally wears her opinion up front. You may have seen her at the Dayton Hamvention wearing her favorite T-shirt: "A Woman's Place Is In The Hamshack"!—*33, Diane, K2DO* QST

Diane P. Ortiz, K2DO ♦ PO Box 296, Bellport, NY 11713 ♦ k2do@arrl.org

Vacation Time and Radio Museums

Many collectors make it a point to visit radio museums when they travel. One of the best is located midway between Boston and New London, Connecticut, in historic Rhode Island. It is the New England Wireless and Steam Museum, situated in East Greenwich, only 10 minutes south of I-95 at exit 8.

Founded by a group led by Bob and Nancy Merriam, it was officially opened in 1964 by then Governor John H. Chafee. It started with a single building on their farm, a converted cow barn, and now consists of five buildings filled to capacity. Bob Merriam, W1NTE, has been a continuous member of the League since 1939 and a Life Member for many years.

Museum Director Bob Merriam, W1NTE, in the Fidelity Amateur Radio Club station, K1NQG, on the first floor of the Massie building.

Some of the early ham radio receivers on display in the wireless building.

What's There

The wireless building shows the span of electric communication from telegraph to TV. It features ham radio receivers and transmitters from the earliest days through to the 1960s. Also on display are keys, sounders, crystal sets, tubes, microphones, ocean cable instruments, spark transmitters, detectors, an 1881 Dolbear receiver, an 1899 Marconi coherer and a jigger, and a Marconi spark set exactly like the one used to call for help on the *Titanic* in 1912.

The foremost exhibit is the Massie Wireless System station, "PJ." Built in 1907, it is the oldest surviving working wireless station in the world! It was moved there in 1981 by museum volunteers to avoid demolition. The original location was on the beach in Point Judith, Rhode Island. Most remarkably, all of the equipment on display in the station is original to the station, except for the changeover switch that was assembled by collector and author Alan Douglas from original parts. The pump handle key, the Massie Resonaphone tuner and the operator call box are sitting on the original table. The condenser cabinet with its helix and straight spark gap are also on display. On the left wall and above the helix there is a hot wire ammeter and anchor gap.

Downstairs at the Massie building you will find a vintage working ham radio station maintained by the Fidelity Amateur Radio Club. Also in the station is the original 160-meter transmitter made famous and built by Stew Perry, W1BB.

In another downstairs room you will find the movie set from the 1999 PBS special, "Rescue at Sea." It is a replica of the steamship *Republic's* wireless cabin, complete with original wireless equipment of the same type used by the *Republic*. It became famous when the *Republic* had to call for help after the collision in 1909 with the steamship *Florida* in dense fog.

Visiting the Museum

The New England Wireless and Steam Museum is run entirely by volunteers. Therefore, their efforts are mainly directed to hosting scheduled groups such as school classes, engineering societies, radio clubs or association meetings, etc. They do not have the staff to handle walk-in visitors except by prior arrangement. Thursday is "Volunteer Day," and there are usually people there between 9 AM and 4:30 PM. They ask you to please call 401-884-0545, fax 401-884-0683 or e-mail **newsm@ids.net** for an appointment.

July 29—Radio Meet at the Museum

The annual radio meet is the "Yankee Radio Tune-Up" on July 29, 2000. The gate opens at 8 AM (no early entry) and the meet runs until 3 PM. Admission is $10 with free parking. There will be an Antique Radio Flea Market with Tailgaters selling a variety of radios and parts. The Fidelity Amateur Radio Club station, K1NQG, will be on the air in the Massie station building. A silent auction will be held during the morning to raise money for the museum, and it will feature some rare items. Coffee, donuts and soda are available. Bring your own lunch. Also, on July 22 the Yankee Chapter of QCWA will meet at the Museum.

Joining or Helping

Generous financial help from individuals supports the museum. So do admissions and proceeds from museum functions. The museum solicits no government grants, although the IRS recognizes it as a 501(c)(3) nonprofit institution. This museum deserves our support.

The 160-meter station of Stew Perry, W1BB.

For more Information

Please write: Robert W. Merriam W1NTE, Director, The New England Wireless and Steam Museum, 1300 Frenchtown Rd, East Greenwich, RI 02818-1424; tel 401-885-0545. You can also visit the museum's Web site at: **http://users.ids.net/~newsm/index.html**.

SEE YOU THERE

I'm planning to attend the Jersey Shore Hamfest in Bayville, New Jersey, with my mobile museum on August 13. See **http://members.aol.com/jsarsfest/.html** on the Web. Look for my call letters on my hat and say hello. —*K2TQN* QST

John Dilks, K2TQN ♦ 125 Warf Road, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

Software Piracy—How it Hurts our Hobby

By Rick Ruhl, N4GDO
106 Heathrow Ct
Florence, AL 35633-1585
n4gdo@arrl.net

Computers have become an integral part of today's ham shack. The modern ham uses his computer as a tool for tasks that involve communication (digital modes, for example), logging, circuit design and even propagation studies, just to name a few. Many software companies are creating products to satisfy this expanding Amateur Radio computer market. After all, a computer isn't terribly useful without software.

Software is created from an idea, like most inventions are. Once the idea becomes reality in software, it becomes a useful product for the end user. Software companies can continue to enhance and update these products, but it takes a team of people to make this happen. For example, there are programmers, quality assurance personnel, customer support personnel, technical writers and sales/marketing professionals. In many small companies some people take on the responsibility of 2 or 3 of these positions. Like you, they work hard and want to get paid fairly for the jobs they do.

Software piracy seriously undermines these legitimate businesses. According to a Software Publishers Association estimate, $2.9 *billion* worth of software was pirated during 1998. This translates into higher prices for software, fewer jobs for those in the software field, and less revenue for local economies (which could ultimately translate into higher taxes for everyone).

It also affects you! If you have pirated software, you won't get technical support, warranties and upgrades. Also, some people trade pirated software that has been modified by others, or that may include computer viruses, non-functioning features, and incompatibilities. The danger to your computer increases dramatically when you use pirated software. The time you spend cleaning up the mess after a computer crash could be better spent making contacts or spending time with your family (or using the computer as the tool it was meant to be!). Isn't your time worth something?

Piracy has entered the world of the Internet, too. According to an SIIA press release, 91% of the software auctioned off on sites like eBay, Excite, Amazon and Yahoo are illegitimate. You, as a consumer, need to protect yourself against this. If you unknowingly receive pirated software, you are a potential victim. You expected to get a piece of great software at a low price and now you've discovered that you can't get support when you need it most, or even an upgrade. Of course, the person who sold it to you is nowhere to be found.

People who wouldn't dare steal a pack of gum feel little guilt about pirating software. Why? For some, it's a lack of awareness of the law. Others consider software piracy to be a "victimless crime" because it "doesn't hurt anyone" and it "isn't really stealing."

Fortunately, software companies are working diligently to debunk these myths. Microsoft's anti-piracy group is probably the most visible. They have been quite aggressive in their measures to thwart piracy by changing their security features often. This is done to protect the consumers and resellers from the impacts of pirated software. Their site at **http://www.microsoft.com/piracy** has information on how to check your collection for pirated software, and how to report people and organizations that are involved in piracy. (Many software companies are now offering rewards to people who turn in pirates. Is it worth $10,000 and 5 years of jail time to break the law?)

Most companies, like Microsoft, have a lenient policy on software used on both a main computer and a laptop. As an example, you can install a (legal) copy of *Microsoft Office* on your desktop computer, as well as your laptop (check your EULA [End User License Agreement] and you'll see it in there). With software sold by my company, Creative Services Software, you can do the same since it's call sign specific.

You do have a choice. There are many good free programs out there as well as good shareware and commercial products. If you don't feel that software needs to be paid for, choose a free program. If you want to support a shareware author, pay him for the work that he did. If you want full support with warranty and a company standing behind a product, buy commercial software.

If you do go the shareware or commercial route, you can be assured that continued development will be performed on the product you've purchased. Over the years so many programs have become orphans since there is no revenue to continue updating them. It literally takes 9-12 months to deliver a quality product from scratch, and development costs can be in the $100,000 to $200,000 range. Programmers are making $60,000-100,000 annually; quality assurance people are pulling down $50,000-75,000 and support personnel are earning $30,000-$50,000. It's easy to see how quickly development costs add up. Once costs are recovered 10%-20% of revenue (not profit) is reinvested in continued research and development—including development of new products.

Amateur Radio needs good software. The hobby has been enhanced tremendously by the products of the many creative minds among us. Help support your fellow hams in their efforts and "don't copy that floppy" (or CD, as the case may be!).

Rick Ruhl is president of Creative Services Software.

QST Op-Ed Policy

The purpose of Op-Ed is to air member viewpoints that may or may not be consistent with current ARRL policy.

1) Contributions may be up to two-thirds of a *QST* page in length (approximately 900 words).

2) No payment will be made to contributors.

3) Any factual assertions must be supported by references, which do not necessarily have to be included in the body of the article to be published.

4) Articles containing statements that could be construed as libel or slander will not be accepted.

5) The subject matter chosen must be of general interest to radio amateurs, and must be discussed in a way that will be understandable to a significant portion of the membership.

6) With the exception that the article need not be consistent with League policy, the article will be subject to the usual editorial review prior to acceptance.

7) No guarantee can be made that an accepted article will be published by a certain date, or indeed, that it will be published at all; however, only articles that we intend to publish will be accepted, and any article we have decided against publishing will be returned promptly.

8) Send your contributions to ARRL Op-Ed, 225 Main St, Newington, CT 06111 QST

A Wattmeter of Your Own

One obstacle the new QRPer must contend with is accurate RF power measurements at or below the 5-W level. While a commercial RF power meter for HF will give you reasonable accuracy on a 0-20 W scale, nothing really beats having a real QRP wattmeter available that measures 0-5 W full scale.

Build It...

The QRP dummy load/wattmeter shown here can be built on a single piece of perfboard available at your local RadioShack. Parts are non-critical and RadioShack should have almost everything you need to complete the project, including the case. The basic circuit is quite simple. A dummy load is constructed from three 150 Ω or four 200 Ω two-watt carbon-composition resistors. The idea is to come up with some combination of resistance that equals 50 Ω, the output impedance of your transmitter. By paralleling three or four 2-W resistors you can achieve a 6- to 8-W 50-Ω dummy load that will work nicely. The only precautionary advice I'll offer is to be sure to turn your high power rig's RF drive control all the way down before transmitting into the power meter. This device will only handle about 6 –10 W and you can seriously damage the meter should you key up with 100 W.

The circuit (see Figure 1) has been around forever. The meter measures the current developed across four 200-Ω resistors (connected in parallel to form an 8-W 50-Ω load). A series-connected diode (1N60, 1N914, or garden variety Schottky) rectifies the RF voltage. R5 is a current limiting resistor and R6 sets the full-scale sensitivity. The .01µF capacitor bypasses any stray RF to ground. The circuit can be housed in a variety of enclosures. Figure 2 shows my 20-year-old QRP wattmeter built inside an old Ten-Tec audio-filter enclosure.

This simple one-evening project is an excellent way to begin homebrewing. To accurately calibrate the unit, connect a 0 to 25-V dc variable power supply to the left end of R5 where it connects to R4. You must isolate R5, so lift this end of the resistor and hook the calibration voltage source between it and ground. By calculating a series of calibrating voltages ($P = E^2/(2R)$ where P = power, E = voltage and R=50 Ω) for various power levels and applying them between R5 and ground, you can plot and record the microamp deflection of the meter. In this way a calibration table can be constructed that very accurately displays wattage as a function of rectified current. This requires a different calibration mark for the R6 knob, depending on the power range.

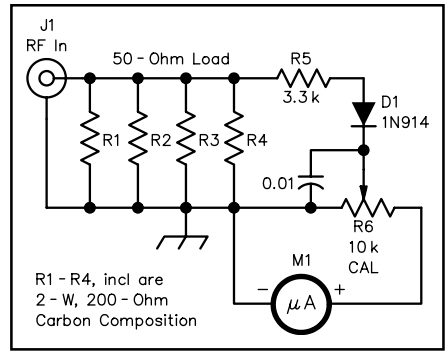


Figure 1— QRP dummy load and RF power meter. Resistors R1-R4 must be 2-W, noninductive. M1 may be a 0-100 or 0-200 µA dc meter.

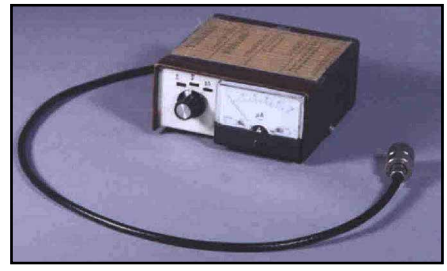
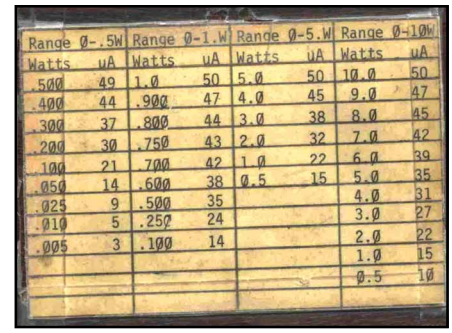


Figure 2—My 20-year-old QRP wattmeter built inside an old Ten-Tec audio-filter enclosure.

...Or Buy It

If you don't want to undertake a complete homebrew project, another solution to the QRP wattmeter problem is to build one from a kit. Ten-Tec's Model 1202 T-Kit HF/VHF wattmeter is a great little beginner's kit that costs only $50, plus shipping, direct from Ten-Tec. I built mine in one night and it worked perfectly. The 1202 has two RF power measurement scales: 0-20 and 0-200 W. The meter face of the 1202 is large enough to easily allow for QRP power adjustments up to the 5-W level on the 0-20-W scale. However, accuracy is only about 10% at full scale and this translates to less accuracy at half scale, where the 5-W mark is placed. The meter shows a 2.5-W mark, but this is almost at the bottom quarter of the meter movement, where accuracy will be highly suspect.

The Ten-Tec 1202 QRP wattmeter.



Range Ø-.5W		Range Ø-1.W		Range Ø-5.W		Range Ø-10W	
Watts	uA	Watts	uA	Watts	uA	Watts	uA
.500	49	1.Ø	50	5.Ø	50	10.Ø	50
.400	44	.900	47	4.Ø	45	9.Ø	47
.300	37	.800	44	3.Ø	38	8.Ø	45
.200	30	.750	43	2.Ø	32	7.Ø	42
.100	21	.700	42	1.Ø	22	6.Ø	39
.050	14	.600	38	Ø.5	15	5.Ø	35
.025	9	.500	35			4.Ø	31
.010	5	.25Ø	24			3.Ø	27
.005	3	.100	14			2.Ø	22
						1.Ø	15
						Ø.5	1Ø

I taped my calibration table to the top of my homebrewed wattmeter for easy reference.

I chose to recalibrate the 0-20 W scale as a 0-5 W QRP scale. This is easily done by slightly modifying the calibration instructions on pages 21 and 22 of the manual. In my case I calibrated VR-3 to read 0-5 W forward power in place of 0-20 watts using my calibrated K2 transceiver as the RF source. I kept the 0-200 W scale intact because my Argosy-II can operate at 5 and 50 W.

The Model 1202 is inexpensive and can be used on HF and VHF, eliminating the need to buy costly VHF wattmeters. The craftsmanship is very nice and the accuracy (especially when you take the time to match the diodes in the RF bridge circuit) is well within acceptable standards. Finally, it provides the QRPer with a chance to build a much-needed piece of test gear. One thing I really like about the 1202 is that the case is made from solid steel!

QRP WebSurf

This month I want to direct you to the oldest QRP club in the US, the QRP Amateur Radio Club International. Cruise on over to **http://www.qrparci.org** and check out this great site. Don't forget to join! Remember, the various QRP clubs exist to further the craft. They can't do this without your support.

Until next time, melt some solder, use your new QRP wattmeter and get on the air! —*72/73, Rich K7SZ* QST

Rich Arland, K7SZ ♦ 25 Amherst Ave, Wilkes Barre, PA 18702 ♦ k7sz@arrl.org

COMING CONVENTIONS

COLORADO SECTION CONVENTION

August 20, Golden

The Colorado Section Convention, sponsored by the Denver RC, will be held at the Jefferson County Fairgrounds, 15200 W 6th Ave (Indiana St Exit); take 6th Ave W from I-25 to Indiana St, S to 6th Ave (Frontage Rd), W to Fairgrounds. Doors are open for setup 7:30 AM; public 8:30 AM to 2 PM. Features include swapfest, vendors, ARRL forum, VE sessions. Talk-in on 145.49 (100 Hz). Admission is $4. Tables are $10 in advance (by Aug 10), $12 at the door. Contact Ron Taylor, K0HRT, 1552 S Yank St, Lakewood, CO 80228-3761, 303-989-3978, **k0hrt@arrl.net**; **http://www.qsl.net/w0tx/**.

MISSOURI STATE CONVENTION

August 26, Columbia

The Missouri State Convention, sponsored by the Central Missouri Radio Assn, will be held at the National Guard Armory, 5151 N Roger Wilson Dr; 4½ miles N of I-70 on Hwy 63N to Prathersville Exit, follow signs. Doors are open 8 AM to 2 PM. Features include forums, vendors, VE sessions, special guest speaker Steve Ewald, WV1X, (Field and Educational Services Dept Public Service Specialist at ARRL HQ). Talk-in on 146.76. Admission is $4. Tables are $10 (includes 1 admission). Contact Dewey Bennett, WM0H, 1621 Highridge Dr, No A, Columbia, MO 65203, 573-445-7030, **dbenne01@coin.org**; **http://www.qsl.net/~cmra**.

WEST VIRGINIA STATE CONVENTION

August 26, Weston

The West Virginia State Convention, sponsored by the WV State AR Council, will be held at the Jacksons Mill and WVU Convention Center, Rte 1, Box 210; I-79, Exit 99, follow signs to Weston and Jacksons Mill. Doors are open 8 AM to midnight. Features include flea market, dealers, forums, educational programs, demonstrations, auction sale (amateur equipment and other items), VE sessions, camping facilities. Talk-in on 145.39. Admission is free. Tables are $5 (first-come, first-served). Contact Ann Rinehart, KA8ZGY, 1256 Ridge Dr, S Charleston, WV 25309, 304-768-9534, **ka8zgy@arrl.net**; **http://www.qsl.net/wvsarc**.

NEW ENGLAND DIVISION CONVENTION

August 26-27, Boxboro, MA

The New England Division Convention, sponsored by the Federation of Eastern Massachusetts AR Assns (FEMARA), will be held at the Holiday Inn Conference Center, Exit 28 off I-495, on Rte 111. Doors are open for convention hall Saturday 9 AM to 5 PM, Sunday 9 AM to 2 PM; flea market Saturday 8 AM to 5 PM, Sunday 8 AM to 2 PM. Features include flea market, major exhibitors and manufacturers, tailgating (tent space $14 per day, outdoor space $9 per day), seminars and forums, demos, meetings, DXCC card checking, Special Event Station, CW contests, foxhunts, VE sessions, banquet (dinner and dance Saturday eve, $30 before Aug 1, $35 after Aug 1 if available; cocktails 5:30 PM, buffet-style banquet 6:30 PM; keynote speaker Riley Hollingsworth, K4ZDH; guest of honor ARRL President Jim Haynie, W5JBP), Wouff Hong ceremony (Saturday at midnight), free parking. Talk-in on 146.61, 146.82. Admission is $6 in advance, $8 at the door. Contact Mel Cole, WZ1Q, Box 8, Prides Crossing, MA 01965, **mel@shore.net**; or call Tony Penta, W1ABC, 617-248-6996 days or 978-887-8887 eves; **http://www.boxboro.org**.

NEW MEXICO STATE CONVENTION

August 26-27, Rio Rancho

The New Mexico State Convention (Duke City Hamfest), sponsored by the New Mexico Hamvention/Duke City Hamfest Committee, will be held at the Rio Rancho National Guard Armory, 4001 Northwest Loop; take I-25 to Bernalillo, W on NM 44/US 550, approximately 5 miles to the Armory. Doors are open Saturday 8 AM to 5 PM, Sunday 8 AM to 1 PM. Features include flea market, tailgating ($5), forums, VE sessions, RV parking (no hookups). Talk-in on 145.33 (100 Hz), 444.0 (100 Hz). Admission is free. Tables are $12 (without power), $17 (with power). Contact Marcus Lieberman, KM5EH, 2300 Hurley Dr NW, Albuquerque, NM 87120, 505-836-1724, fax 505-352-6154, **km5eh@arrl.net**; **http://www.qsl.net/dchf**.

KANSAS STATE CONVENTION

August 27, Salina

The Kansas State Convention, sponsored by the Central Kansas ARC, will be held at the Salina Bicentennial Center, Kenwood Park, 800 The Midway; from I-70 take the Ohio St Exit and turn S, at the 3rd stoplight (Greeley Ave) turn W (right), continue W on Greeley to the Bicentennial Center. Doors are open 8 AM to 4 PM. Features include large indoor air-conditioned flea market, commercial vendors, forums (ARRL, MARS, packet, and more), VE sessions (9 AM), free parking, refreshments. Talk-in on 147.03, 443.9. Admission is $5. Tables are $15 ea for the first 4, $10 for ea additional (includes a ticket for each table and electricity if needed). Contact Ron Tremblay, WA0PSF, 112 N Douglas Dr, Salina, KS 67401-3516, 785-827-8149, **tremblay@midusa.net**; **http://www.qsl.net/w0cy**.

KENTUCKY STATE CONVENTION

September 9, Louisville

The Kentucky State Convention, sponsored by the Greater Louisville Hamfest Assn, will be held at the Bullitt County Fairgrounds, approximately 20 miles S of Louisville on I-65; take Exit 112 and go E. Doors are open for setup Friday afternoon; public Saturday 8 AM to 5 PM. Features include hamfest and computer show, indoor flea market (606-284-9090 or 502-935-7197), outdoor tailgating (car $3, camper $5), commercial vendors ($30, includes electricity, bring your own extension cord), major exhibitors (812-948-0037 or 812-282-7007), forums (502-423-0402), VE sessions (502-969-7332), free overnight camping (Friday night), free parking. Talk-in on 146.7. Admission is $6 in advance, $7 at the door. Tables are $16 (8-ft). Contact Herb Rowe, W4WQD, 5612 Hwy 160, Charlestown, IN 47111, 812-294-4905, **wd4ixl@juno.com**; **http://www.thepoint.net/~glha/**.

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 proce-dures 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

July 28-29
Oklahoma State, Oklahoma City*
South Texas Section, Austin*

July 28-30
Arizona State, Flagstaff/Ft Tuthill*

August 5-6
Eastern Washington Section, Spokane*

September 16
Arkansas Section, North Little Rock
W9DXCC, Rolling Meadows, IL
Hudson Division, White Plains, NY

September 16-17
Alaska State, Anchorage

September 23
Western New York Section, Buffalo/Hamburg

September 23-24
Roanoke Division, Virginia Beach, VA

September 29-30
Microwave Update, Trevose, PA

October 6-8
Southwestern Division, Scottsdale, AZ

October 8
Connecticut State, Wallingford

*** See July *QST* for details.**

VHF/UHF CENTURY CLUB AWARDS

Bill Moore, NC1L
Century Club Supervisor

The ARRL VUCC numbered certificate is awarded to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators (indicated in *italics*) for each band listing. The numbers preceding the call signs indicate total grid squares claimed. The numbers following the call signs indicate the claimed endorsement levels. The totals shown are for credits given from April 18 to June 20, 2000.

The VUCC application form, field sheets and complete list of VHF Awards Managers can be found on the Web at **http://www.arrl.org/awards/vucc/**. Please send an SASE if you cannot download the forms online. If you have questions relating to VUCC, send an e-mail to **vucc@arrl.org**.

50 MHz
100

1058	N3UMA
1059	W0MHK
1060	KD2KS
1061	W9OBG
1062	IW3RI
1063	KB8PNS
1064	W4LNG
1065	N3WAV
EH7CD	305
VE3SYK	200
W1WHL	425
K1WVX	325
K1SIX	775
W2BZY	237
K3HZO	350
K3CWH	250
KD4HLG	200
W4WTA	500
KD4HLG	200
W4LNG	125
W5OZI	800
W5WP	175
AA5C	375
KE6FCT	250
KC8JTK	200
N9NJY	250

144 MHz
100

578	N0QXC
579	N4ION
N0QXC	125
WV2C	125
N2WK	275
K6AAW	125

432 MHz
50

282	N9NJY
W9JN	70

10 GHz
5

AA5C	30

Satellite
100

VE6SWC	175
XE2YVW	225
KK5DO	325
AC5DK	125
WA5VKS	175
KC7QFS	375
N7SFI	600

QST

Gail Iannone ♦ Convention Program Manager

HAMFEST CALENDAR

Attention: The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **August 1** to be listed in the **October** 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.)

†**Arkansas (Mena)—Sep 8-9.** *Spr:* Queen Wilhelmina Hamfest Assn. Queen Wilhelmina State Park, 13 miles W of Mena on Hwy 88. Flea market, dealers, Skywarn meeting, VE sessions (Saturday, 10:30 AM), BBQ (Friday, 6 PM), banquet (Saturday, 6:30 PM at the lodge; special guest speaker ARRL First Vice President Joel Harrison, W5ZN), RV and tent camping, refreshments. *TI:* 146.79 (100 Hz), 146.49. *Adm:* Free. Tables: bring your own tables; space under tent $10, outside space $5. Charlotte Lee, KC5DOR, 415 Crosstrails Rd, De Queen, AR 71832, 870-642-7656, **blee@ipa.net**; **http://qwha.intrastar.net**.

British Columbia (Prince George)—Aug 18-20. Keith Powell, VE7GDH, **ve7gdh@rac.ca**.

†**California (Chico)—Aug 5.** *Spr:* Golden Empire Radio Society. CSU University Farm, Hegan Ln, just S of Chico. Swapmeet, VE sessions, RDF demo, refreshments. *TI:* 146.85. Ray Watkins, KO6TW, 6986 County Rd 6, Orland, CA 95963, 530-898-6343; **ko6tw@w6rhc.org**.

†**California (Santa Barbara/Goleta)—Aug 13,** 8 AM to 3 PM. *Spr:* Santa Barbara ARC. Elks Picnic Grounds, 150 N Kellogg Ave; take Hwy 101 to Patterson Ave, N to Calle Real, W to Kellogg Ave. Vendors, ARRL booth and bookstore, displays, contests, VE sessions (8:30 AM), Santa Barbara Tri-Tip BBQ. *TI:* 146.79 (131.8 Hz). *Adm:* Free. Al Soenke, WA6VNN, 497 Camino Talavera, Goleta, CA 93117, 805-562-2694, **wa6vnn@sbarc.org**; **http://www.sbarc.org**.

Colorado (Golden)—Aug 20, Colorado Section Convention. See "Coming Conventions."

Connecticut (Enfield)—Aug 25-27. Bruce Wood, N2LIV, 631-265-1015 or 631-263-9600.

†**Florida (Melbourne)—Sep 9-10.** *Spr:* Platinum Coast ARS. Melbourne Auditorium, 625 E Hibiscus Blvd; E 2 blocks from US 1 and Hibiscus. Commercial vendors, tailgating ($15 per spot, includes 1 admission, good both days, limited; first-come, first-served). *TI:* 146.85. *Adm:* advance $5, door $6. Tables: swap $25, commercial $80. Tim Madden, KI4TG, 1450 Creel Rd NE, Palm Bay, FL 32905-3857, 321-724-9339; **hamfest@pcars.org**.

†**Illinois (Peotone)—Aug 13;** 6 AM to 3 PM (flea market), 8 AM to 3 PM (exhibits). *Spr:* Hamfesters RC. Will County Fairgrounds; take I-57 to Peotone Exit 327 (E). Flea market, exhibitors. *TI:* 146.64, 146.52. *Adm:* advance $4 (with double stub), door $5 (with single stub). Tables: advance $15, door $20. Christine Mack, K9RFY, 124 N York Rd, PMB 164, Elmhurst, IL 60126, 708-358-1786; **christine1@mediaone.net**.

†**Illinois (Quincy)—Aug 12,** 8 AM to 2 PM. *Spr:* Western Illinois ARC. Eagles Alps, Eagles Alps Grounds, 3737 N 5th St; 4.5 miles N of downtown Quincy. Ham Radio and Computer Swapfest, indoor flea market, outdoor tailgating (free), VE sessions (12:30 PM, all license classes), card checking for ARRL awards, plenty of convenient parking, refreshments. *TI:* 147.03. *Adm:* advance $4, door $5, under 12 free. Tables: $10 (first table), $16 (for 2 tables), $21 (for 3 tables); each additional table after 3 is $5. Jim Funk, N9JF, Box 3132, Quincy, IL 62305-3132, 217-336-4191, **jfunk@adams.net**; **http://www.qsl.net/w9awe/swapfest.htm**.

†**Illinois (Westville)—Aug 27;** indoor vendor setup 6-7 AM, flea market setup 7 AM; public 7 AM to 3 PM. *Spr:* Vermilion County ARA. Disabled American Veterans Hall, 3027 Georgetown Rd; I-74 to US Rte 1 S. Flea market, vendors, electronics, computers, tailgating, free parking, refreshments. *TI:* 146.82. *Adm:* $5. Tables: $5. Curtis Chambers, WX9EMA, 217-431-0684, **wx9ema@soltec.net**; **http://www.soltec.net/~wx9ema/VCARA**.

Illinois (Woodstock)—Aug 27. Bob Grosse, N9KXG, 847-217-7052.

†**Indiana (Greentown)—Aug 13;** set up Saturday 6-8 PM, Sunday 6-8 AM; public 8 AM to 1 PM. *Sprs:* Kokomo and Grant County ARCs. Lions Club Fairgrounds; 15 miles E of Kokomo, 25 miles W of Marion, 3 blocks N of Hwys 22/35, follow signs. Vendors, tailgating ($3 per space), VE sessions (sign up by 8:30AM), handicapped parking. *TI:* 146.91. *Adm:* advance $4, door $5, under 13 free. Tables: $8. L. B. (Nick) Nickerson, K9NQW, 517 N Hendricks Ave, Marion, IN 46952-2319, 765-668-4814, **ka6nqwnick@netusa1.net**; **http://www.netusa1.net/~ka6nqwnick/hamfest.html**.

Indiana (Lafayette)—Aug 20. Bob Martin, W9YE, 765-423-1035.

Indiana (LaPorte)—Aug 27. Neil Straub, WZ9N, 219-324-7525.

†**Indiana (Spencer)—Sep 9.** *Spr:* Owen County ARA. Owen County Fairgrounds. VE sessions. *TI:* 146.985. Kathryn Smith, K9INU, Rte 1, Box 368D, Poland, IN 47868; 812-829-2140.

†**Iowa (Amana)—Aug 13,** 7 AM to 2 PM. *Spr:* Cedar Valley ARC. Amana Convention Center; I-80, N on US Rte 151, right at "T", left at 4-way at Amana, right before Lily Pond, follow signs. Forums (contest, DX), VE sessions. *TI:* 146.745. *Adm:* $5. Tables: $10. Chuck Bassett, N0UTS, 207 7th Ave, Hiawatha, IA 52233, 319-378-0448, **n0uts@rf.org**; **http://cvarc.rf.org/**.

Kansas (Chanute)—Aug 19. Charlie Ward, WD0AKU, 316-431-6402.

Kansas (Salina)—Aug 27, Kansas State Convention. See "Coming Conventions."

†**Kentucky (Lexington)—Aug 20,** 8 AM to 4 PM. *Spr:* Bluegrass ARS. National Guard Armory, Airport Rd; from I-75 Exit 115, Newtown Pike S 1.6 miles, New Circle Rd W 4.5 miles to Exit 5, Versailles Rd W 1.4 miles, Man O' War Blvd S 1.2 miles, Parkers Mill W 1.2 miles to the Armory. Large indoor flea market, tailgating, commercial vendors, forums, meetings, electrical safety demonstration, VE sessions, special-event station, free parking. *TI:* 146.76. *Adm:* advance $5, door $6. Tables: 8-ft, advance $15, door $25. John Barnes, KS4GL, 216 Hillsboro Ave, Lexington, KY 40511-2105, 606-253-1178, **KS4GL@juno.com**; **http://www.qsl.net/k4kjq/**.

Kentucky (Louisville)—Sep 9, Kentucky State Convention. See "Coming Conventions."

†**Maine (St Albans)—Aug 12,** 8 AM to noon. *Spr:* Piscataquis ARC. SnoDevils Snowmobile Club, 3 miles N of St Albans on Rte 152. VE sessions, camping spaces available on site, refreshments. *TI:* 147.39, 146.52. *Adm:* $4. George Dean, WA1JMM, Box 365, Brownville Junction, ME 04415, 207-965-8864, **wa1jmm@midmaine.com**; **http://www.qsl.net/parc/**.

Massachusetts (Boxboro)—Aug 26-27, New England Division Convention. See "Coming Conventions."

Massachusetts (Cambridge)—Aug 20. Nick Altenbernd, KA1MQX, 617-253-3776.

†**Massachusetts (Orange)—Aug 13,** 7 AM to 3 PM. *Spr:* Mohawk ARC. Athol/Orange Elks No 1837, 92 New Athol Rd; Rte 2 to Exit 16, then Rte 202 to Athol, at junction of Rte 2A take left on Rte 2A to Orange, Elks is 3/4 mile on left. Refreshments. *TI:* 145.37. *Adm:* $3, under 12 $1. Tables: advance $8, door $12. John Dould, AE1B, 22 S Athol Rd, Athol, MA 01331, 978-249-5905; **ae1b@gis.net**.

Massachusetts (South Dartmouth)—Sep 10. Bill Miller, K1IBR, 508-996-2969.

†**Michigan (Grayling)—Sep 9,** 8 AM to noon. *Spr:* ARA of Hansen Hills. Hansen Hills Recreation Center, 7601 Old Lake Rd; M-72 W from Grayling to M-93, S on M-93 approximately 1 mile, left on Old Lake Rd, follow signs. Computers, electronics, VE sessions (10 AM, all classes; walk-ins welcomed but preregistration appreciated). *TI:* 145.13. *Adm:* $2. Tables: $5 (6-ft). John Schultz, N8YSS, 3729 E Branch Rd, Grayling, MI 49738, 517-348-4966, **jschultz@i2k.net**; **http://www.arahh.org/swapshop.html**.

†**Michigan (Jackson/Vandercook Lake)—Aug 13;** set up Saturday 7-10 PM, Sunday 5-8 AM; public 8 AM to noon. *Spr:* Cascades ARS. Jackson Community College, 2111 Emmons Rd; US 127 to M-50, M-50 W to Hague Rd, S on Hague to Emmons, W on Emmons to college entrance. Vendors, trunk sales ($5 per space), VE sessions, refreshments. *TI:* 146.88. *Adm:* $5, under 12 free with adult. Tables: 8-ft $15 (wall), $10 (regular). Dennis Byrne, KC8IJZ, 10265 Mack Island Rd, Grass Lake, MI 49240, 517-522-4058, **byrneda@voyager.net**; **http://www.qsl.net/cars-jxn**.

†**Michigan (Lapeer)—Aug 27;** set up Saturday 6-9 PM, Sunday 7-8 AM; public 8 AM to 4 PM. *Spr:* Lapeer County ARA. Lapeer County Center Building, 425 County Center St; from I-69 take Exit 155, N on M24 to McCormik, E (right) on Court, N (left) to County Center St, W (left) to parking lot, follow signs. VE sessions, free parking, refreshments. *TI:* 146.62. *Adm:* $5. Tables: 8-ft $10. Charles Conley, N8RVG, 3873 Lippincott Rd, Lapeer, MI 48446, 810-245-0347, **cconley@bigfoot.com**; **http://www.lapeer.com/lcara**.

Minnesota (Rush City)—Sep 9. Larry Jilek, KA0MEN, 320-358-4205.

†**Minnesota (St Joseph)—Aug 13;** set up 8 AM; public 9 AM to 2 PM. *Spr:* St Cloud ARC. Del-Win Ballroom, 195 88th Ave; State Hwy 75 to 88th Ave. Indoor dealers, outdoor flea market ($5 per parking space, no tables), VE sessions (1 PM), free parking, free coffee, refreshments. *TI:* 147.015, 146.94. *Adm:* $5. Tables: $10. Linden Scott Hall, KA0DAQ, 3001 8th St N, St Cloud, MN 56303, 320-252-4498, **lscotth@aol.com**; **http://www.w0sv.org/hamfest.html**.

Missouri (Columbia)—Aug 26, Missouri State Convention. See "Coming Conventions."

†**Missouri (St Charles)—Aug 27** 6:30 AM to 1 PM. *Spr:* St Charles ARC. Blanchette Park, 1900 W Randolph St; 3 miles N of Hwy 70 on St Charles 5th St Exit, left on Randolph St. Flea market, vendors, tailgating ($8 per space), new and old ham-related equipment, electronics, demonstrations (AMSAT, packet), free forums, ARRL representative, ample free parking, refreshments. *TI:* 146.67. *Adm:* Free. Tables: $15 (8-ft, inside air-conditioned hall). Ken Fieser, KB0VLN, 2315 Entity, St Louis, MO 63114-1835, 314-428-4383, **kfieser@aol.com**; **http://www.qth.com/wb0hsi/**.

†**Nebraska (Omaha)—Aug 27**, 8 AM to 1 PM. *Spr:* Ak-Sar-Ben ARC. Millard Social Hall, 10508 S 144th St; I-80 to Hwy 50 (Exit 440), go S 1/2 mile, W side of Hwy. Amateur Radio, electronics, computers. *TI:* 146.94. *Adm:* $1. Tables: advance $7, door $10. Gerald Gross, WA6POZ, 402-891-2481 (phone and fax), **wa6poz@arrl.net**; **http://www.qsl.net/k0usa**.

†**New Jersey (Bayville)—Aug 13;** set up 6 AM; public 8 AM. *Spr:* Jersey Shore ARS. Bayville Firehouse, Rte 9 S; Garden State Parkway to Exit

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Gail Iannone ♦ Convention Program Manager

80, take Rte 9 S to Bayville, approximately 5 miles S of Toms River. Vendors; VE sessions (registration 10:45 AM, exams 11 AM); John Dilks, K2TQN, Mobile Radio Museum; refreshments. *TI:* 146.91 (127.3 Hz). *Adm:* $5, nonham spouses and under 15 free. Tables: $15 (includes 1 admission). Bob Murdock, WX2NJ, 534 Princeton Ave, Bayville, NJ 08721, 732-269-6379, **JSARSFEST@aol.com**; **http://members.aol.com/jsarsfest/jsarsfest.html**.

†**New Jersey (Mullica Hill)—Aug 20,** 8 AM to 2 PM. *Spr:* Gloucester County ARC. 4-H Fairgrounds, Rte 77; from Commadore Barry Bridge follow Rte 322 E to Rte 45, then follow Rte 45 S to Rte 77, continue S for another 1 1/2 miles, Fairgrounds are on left. Mobile radio museum, VE sessions. *TI:* 147.18. *Adm:* advance $4, door $5. Tables: $10. Robert Budd, KB2EAH, 434 Monroeville Rd, Monroeville, NJ 08343, 856-358-6316; **johovah@voicenet.com**.

†**New Jersey (Oakland)—Aug 19;** set up 6 AM; public 8 AM to noon. *Spr:* Ramapo Mountain ARC. American Legion Hall, 65 Oak St, I-287 to Exit 58, US 202 S, turn right onto Oak St. Vendors. *TI:* 146.49, 146.52. *Adm:* $4, nonham spouses and kids free. Tables: $10 (advanced reservations accepted). Anthony Cassera, N2KDZ, 72 Smokey Ridge Rd, Ringwood, NJ 07456, 914-732-2731 (days) or 973-839-3564 (eves), **n2kdz@arrl.net**; **http://www.intac.com/~hansen/rmarc.htm**.

New Mexico (Rio Rancho)—Aug 26-27, New Mexico State Convention (Duke City Hamfest). See "Coming Conventions."

†**New York (Ballston Spa)—Sep 9,** 7 AM to 3 PM. *Spr:* Saratoga County RACES. Saratoga County Fairgrounds, Prospect Ave; follow signs. Tailgating ($5 per space, includes admission), vendors, foxhunt, VE sessions, free parking, refreshments. *TI:* 147.0, 147.24. *Adm:* $5. Tables: $5 (reservations and pre-payment welcomed and encouraged; first-come, first-served basis). Darlene Lake, N2XQG, 314 Louden Rd, No 84, Saratoga Springs, NY 12866, 518-587-2385, **lake@capital.net**; **http://www.capital.net/users/lake**.

†**New York (Bethpage)—Sep 10,** 8:30 AM to 2 PM. *Spr:* Long Island Mobile ARC. Briarcliff College, 1055 Stewart Ave. Long Island Hamfair and Electronics Flea Market, tailgating ($15 per space), equipment, computers, power supplies, accessories, ARRL info, VE sessions, free rig tune-up, refreshments. *TI:* 146.85 (136.5 Hz). *Adm:* $6, under 12 free. Tables: $15. Ed Muro, KC2AYC, Box 392, Levittown, NY 11756-0392, 516-520-9311 (24-hour info line), **hamfest@limarc.org**; **http://www.limarc.org**.

†**New York (Cheektowaga)—Aug 13.** *Spr:* Lancaster ARC. Leonard Post VFW, Walden Ave; 1 mile E from I-90, Exit 52E. Greater Buffalo "Summer" Hamfest, indoor vendors, outdoor flea market, demonstrations, VE sessions. *TI:* 147.255. *Adm:* $5. Tables: $8. Luke Calianno, N2GDU, 1105 Ransom Rd, Lancaster, NY 14086, 716-683-8880, **lcalianno@freewwweb.com**; **http://hamgate1.sunyerie.edu/~larc**.

†**New York (Farmingville)—Aug 6 (rain date Aug 13),** 8 AM to 1 PM. *Spr:* Radio Central ARC. Take the Long Island Expressway to Exit 63, go N on Rte 83, make the first left into Independence Plaza (K-Mart) Parking Lot; hamfest is in the small lot adjoining Burger King facing Rte 83. "Summerfest" outdoor swap and shop (tailgating only). *TI:* 145.15 (136.5 Hz). *Adm:* $5, under 12 free. Neil Heft, KC2KY, 631-737-0019; **nheft@attglobal.net**.

†**New York (Rome)—Aug 12.** *Spr:* Rome Radio Club. Westmoreland Fire Department; NYS Thruway to Exit 32, after toll booth turn right, then left onto Rte 233. Commercial vendors, seminars, QRP contest, refreshments. *TI:* 146.88. *Adm:* $5. Tables: $5 each (vendors 6 tables for $25). Russell Schorer, KB2MAS, Box 327, Clark Mills, NY 13321-0327, 315-853-8739; **w4bny@juno.com**.

†**New York (Yonkers)—Aug 27;** sellers 7 AM; buyers 8:30 AM to 2 PM. *Spr:* Yonkers ARC. Saunders High School, 145 Palmer Rd. Indoor Hamfest/Computerfest; ham radio, computers, and accessories; commercial dealers; ARRL information; tune-up clinic; VE sessions (9 AM, cutoff time 11 AM; walk-ins accepted; bring original and copy of FCC license and any valid CSCE, $6.65 fee); free parking; unlimited free coffee; refreshments. *TI:* 146.865, 440.15. *Adm:* $5, under 12 free. Tables: advance $15 per table (includes 1 admission), door $20 (first table, includes 1 admission), additional tables $10 each; AC power available. John Costa, WB2AUL, 195 Woodland Ave, Yonkers, NY 10703, 914-969-6548; **wb2aul@aol.com**.

†**North Carolina (Shelby)—Sep 2-3;** 6 AM. *Spr:* Shelby ARC. Cleveland County Fairgrounds, on Hwy 74 Business; I-85 S to Hwy 74 Bypass, W to Hwy 74 Business. Forums, VE sessions. *TI:* 146.88. *Adm:* advance $5, door $6. John Ledford, W4JL, 3410 Oakcrest Dr, Shelby, NC 28150, 704-482-4507, **w4jl@shelby.net**; **http://www.shelby.net/n4fan**.

†**Ohio (Warren)—Aug 20;** set up Saturday 5-9 PM, Sunday 6-8 AM; public 6 AM (flea market), 8 AM (inside sales). *Spr:* Warren ARA. Kent State University Trumbull Campus, Rte 45 (4314 Mahoning Ave) and Rtes 5/82 Bypass; entrance will be at Educational Highway which is the second road N of the By-Pass off Rte 45 to the right. Flea market ($3 per 10-ft outside space), commercial exhibitors, forums (antenna, VHF, packet, computer), CW contest, VE sessions, refreshments. *TI:* 146.97, 443.0. *Adm:* $5. Tables: advance $8 (8-ft, inside, before Aug 1), door $10. Renee McCaman, KB8SVF, 451 8th St, Struthers, OH 44471, 330-755-2433, **mccaman@cboss.com**; **http://www.onecom.net/wara**.

Ontario (Carp)—Sep 2. Greg Danylchenko, VE3YTZ, 613-236-9291.

†**Pennsylvania (Butler)—Sep 10,** 8 AM to 3 PM. *Spr:* Butler County ARA. Butler Farm Showgrounds, Rte 68 S, 3 miles SW of Butler. Two large vendor buildings for indoor displays, five acres for flea market, separate building for forums, VE sessions, plenty of parking, refreshments. *TI:* 147.36. *Adm:* $5. Tables: $15 (8-ft, all have electricity available); outside $2 per set-up. Gerald Wetzel, W3DMB, 784 Mercer Rd, Butler, PA 16001-1108, 724-282-6777, **W3DMB@arrl.net**; **http://www.cfcorp.com/bcara/**.

Pennsylvania (Lewistown)—Aug 5. Richard Yingling, WB3COB, 717-242-1882.

†**Pennsylvania (New Kensington)—Aug 27,** 8 AM to 2 PM. *Spr:* Skyview Radio Society. Skyview Club House, 2335 Turkey Ridge Rd; from the intersection of Rtes 380 and 366, take 366 W toward New Kensington, go approximately 1 mile and turn right onto Whitten Hollow Rd, go 1/2 mile, turn right onto Turkey Ridge, Club House is on left at top of hill. Flea market ($5 per spot). *TI:* 146.64 (131.8 Hz). *Adm:* Free. Robert Livrone, N3WAV, 116 Arizona Dr, Lower Burrell, PA 15068, 724-339-9607; **n3wav@arrl.net**.

†**Pennsylvania (Shrewsbury)—Aug 13,** 7 AM. *Sprs:* York ARC, Southern PA Comm. Grp, Hilltop Transmitting Assn. Shrewsbury Firehall and grounds, 25 W Forrest St; Exit 1 off I-83, take Rte 851 W, go 1/2 mile to Firehouse on right. Ham and Computer Swapfest, mid-morning fun auction, tailgating ($3 per space), VE sessions (Saturday, Aug 12, Shrewsbury Borough Building, 35 W Railroad Ave; Carol, 717-235-2738), refreshments. *TI:* 146.7. *Adm:* $5. Tables: $10. Cecil Mundorff, K3DCU, 2085 Delta Rd, Felton, PA 17322-7979, 717-927-6662, fax 717-927-9282; **k3dcu@juno.com**.

†**Tennessee (Lebanon)—Aug 27,** 7 AM to 2 PM. *Spr:* Short Mountain Repeater Club. Cedars of Lebanon State Park, 328 Cedar Forest Rd; I-40 Lebanon Exit 238, 6 miles to US 231 S to park; I-24 Murfreesboro Exit 78, US 96 E to US 231 N, 20 miles to park. Large tailgate party, refreshments. *TI:* 146.91. *Adm:* Free. Patsy Pierce, K3PAT, 8278 Patterson Rd, College Grove, TN 37046, 615-395-4488; **kq4an@aol.com**.

†**Texas (Gainesville)—Aug 26;** set up Friday 4-9 PM, Saturday 5-7 AM; public 7 AM to 5 PM. *Spr:* Cooke County ARC. Gainesville Civic Center; I-35 N, Exit California St, E to Weaver St, turn right on Weaver St, 1 block to Civic Center on right. Flea market, tailgating ($6, first-come, first-served), dealers, programs, VE sessions (Gainesville Public Library; written exams 10 AM to noon, code exams 1:30-3PM; bring current license, CSCEs and copies, correct change for $6.65 fee, and photo ID). *TI:* 147.34, 443.125 (both 100 Hz). *Adm:* advance $5 (by Aug 12), door $6. Tables: advance $8 (by Aug 12), door $10, electrical hookup $5 extra. James Floyd, N5ZPU, 1704 E California, Gainesville, TX 76240, 940-668-7511, **jfloyd@cooke.net**; **http://HOME1.GTE.NET/rperkins/ccarc.htm**.

Texas (Sulphur Springs)—Sep 2. Steve Heller, WA0CPP, 903-945-3659.

†**Vermont (Burlington)—Aug 12;** set up 6:30 AM; public 8 AM to 3 PM. *Spr:* Burlington ARC. Burlington Elk's Club, 925 North Ave; from I-89 take Exit 14W, proceed to Main St, follow to intersection of Battery St, turn right, proceed up hill and go past Battery Park, bear left then right on North Ave, Elk's Club is on left, just past the junction of Rte 127. Flea market, dealers, forums, vendors, tailgating (free with paid admission), VE sessions (Ralph, KD1R, **kd1r@together.net**), paved parking, refreshments. *TI:* 146.61. *Adm:* $5, under 12 free. Tables: $20 (indoor, air-conditioned). Renee Berteau, N1UXK, 802-893-7660, **n1uxk@juno.com**; **http://www.together.net/~kd1r/fest00.htm**.

†**Washington (Longview)—Aug 19,** 9 AM. *Spr:* Lower Columbia ARA. Cowlitz County Expo Center, corner of 7th Ave and Washington St; take either Exit 36 or Exit 39 off I-5, go W, follow signs for the County Fairgrounds, now known as the Expo Center. Tailgating ($6 per space), APRS demonstration. *TI:* 147.26 (114.8 Hz). *Adm:* $4. Tables: $16. Bob Morehouse, KB7ADO, 2437 Allen St, Kelso, WA 98626, 360-425-6076 (after 6 PM weekdays); **kb7ado@aol.com**; **http://www.qsl.net/nc7p/swapmeet.htm**.

†**West Virginia (Huntington)—Aug 12,** 8:30 AM to 2 PM. *Spr:* Tri-State ARA. Veterans Memorial Fieldhouse, 2590 5th Ave; I-64 to Exit 11 (Hal Greer Blvd), right (N) on Hal Greer to 5th Ave, right on 5th Ave to corner of 5th Ave and 26th St, on left just before the intersection. Hamfest/Computer Show, flea market, dealers, vendors, forums, VE sessions (registration 10 AM, exams 10:30 AM, all elements; Garry Ritchie, W8OI, 304-733-1300). *TI:* 146.76. *Adm:* $5. Tables: advance $8, door $10 (electricity $10 per plug). Dwight Smith, WB8JPJ, 817 W 13th St, Huntington, WV 25704-2413, 304-522-7865, **wb8jpj@juno.com**; **http://www.qsl.net/tara**.

West Virginia (Weston)—Aug 26, West Virginia State Convention. See "Coming Conventions."

Attention All Hamfest Committees!

Get official ARRL sanction for your event and receive special benefits such as free prizes, handouts, and other support.

It's easy to become sanctioned. Contact the Convention and Hamfest Branch at ARRL Headquarters, 225 Main St, Newington, CT 06111. Or send e-mail to **giannone@arrl.org**.

QST

STRAYS

HAM RADIO UK

◊ A new Internet resource for radio amateurs and shortwave listeners has just been launched. Ham Radio UK offers free e-mail accounts; unlimited free Web space to build your own Web site; a free subdomain (yourname.myqth.com); bulletin boards and chat rooms; classified ads and more. Ham Radio UK has been developed on a voluntary, nonprofit basis by Gordon Hudson, GM4SVM. Visit Ham Radio UK at: **http://www.ham-radio.co.uk/**.

Next Stray

SILENT KEYS

It is with deep regret that we record the passing of these amateurs.

W1APC, Robert J. Welch, Enfield, CT
W1BBK, Anthony P. Capelle, Marstons Mills, MA
K1EFZ, Robert N. Harnois, Ormond Beach, FL
W1EKJ, Vernal G. Charles, Killen, AL
W1GOZ, James W. Momberg, Stamford, CT
W1JH, G. D. Fenton, Sun City West, AZ
N1JSR, Lee Jones, Biddeford, ME
K1JZN, Victor St Laurent, Cumberland, RI
W1RPT, Wayne H. Merrill, Cumberland Center, ME
N1SKH, Herbert L. Tripp, Beacon Falls, CT
KA1ST, Francis J. Ritchie, Glastonbury, CT
W1VNE, Leo H. J. Brodeur, Ludlow, MA
K1WNZ, David G. Stuart, Dover, NH
*WB2DTY, William Epperhart, Brooklyn, NY
WA2HPV, Arnold L. Albin, Palm Harbor, FL
K2HQ, Philip T. Morrissey, Summit, NY
K2IMF, Donald L. Ismert, Kenmore, NY
NA2L, Frank Szabo, Lake Huntington, NY
W2MIJ, William R. Jones, Verona, VA
WA2PLK, Ernest E. Mintel, Canandaigua, NY
W2PLX, Richard F. Smith, Rhinebeck, NY
W2PYT, Arthur R. Sullivan, Lockport, NY
KB2QGD, Herbert Kline, Adams, NY
N2TTE, Kurt Rieder, North Tonawanda, NY
KA2WHG, Henry T. Valliere, Canaan, ME
WA2YXO, Harry V. Kloos, Hartsdale, NY
W3BAS, Donald H. Saunders, Washington, DC
W3BAV, Robert F. Mack, Delmar, DE
WB3BGI, Louis J. Shamberger, Doylestown, PA
WA3CWV, Daniel L. Birx, Mechanicsburg, PA
W3EFZ, Richard P. Scott, Longboat Key, FL
W3OMG, John Hranichny, Roselle Park, NJ
W3PLI, George B. Kabroth, Mechanicsburg, PA
KD3TI, Amy H. Zimmerman, Lehighton, PA
KG4BLD, Austen D. Strawderman, Bergton, VA
W4CLU, George E. Dively, Springfield, VA
AC4EK, Francis E. Rock, Herndon, VA
W4FD, Harry A. Mills, Sr., Dry Branch, GA
KB4HGU, William T. Free, Welaka, FL
K4ILQ, Patricia A. Elrod, Duluth, GA
WD4ITE, Virgil R. May, Richmond, VA
K4JN, Robert Arrowsmith, Lakewood, OH
W4KTJ, Joseph R. Paradis, Lake Worth, FL
WD4LIT, Samuel H. Huston, Oak Ridge, TN
N4MLG, James G. Wohlford, Atlanta, GA
WB4MLV, Ed Parks, Andalusia, AL
*WA4NTG, Leonard J. Burke, Camden, TN
WB4NTM, Laurence E. Roberge, Nashville, TN
W4NVE, Floyd D. Kinser, Danville, KY
KE4OAV, Glenden E. Teems, Apopka, FL
KF4PDM, Michael Z. Smith, Pewee Valley, KY
K4STL, Earl E. Bates, Punta Gorda, FL
K4TTL, Neel T. Martin, Marion, KY
*W4TZU, Sherman R. Starnes, Saint Augustine, FL
K4UNT, C. E. Brown, Marianna, FL
WD4V, Lawrence Myers, Saraland, AL
W5COE, John E. Dalby, Oklahoma City, OK
W5DAJ, Tice Barnett, Garland, TX
K5DCQ, Vic Armstrong, Dallas, TX
KC5DER, William P. Ellis, Silver City, NM
W5EIF, James R. King, Pampa, TX
W5HKE, Dewey W. Miles, Houston, TX
K5ISJ, Robert J. Modern, Albuquerque, NM
WB5KWF, Nash H. Miller, Temple, TX
K5MUS, William H. Riley, Galveston, TX
W5NKQ, Thomas A. Patterson, Cameron, TX
*WB5OEX, John T. Jennings, Houston, TX
KB5OPN, Louis P. Baudoin, Socorro, NM
W5POR, Douglas W. Tyler, Holloman Afb, NM
KC5PQU, Felton T. Robbins, Temple, TX
KE5QX, Jack E. Block, Houston, TX
AC5RM, Lois E. Jeter, Albuquerque, NM
N5RMO, Raymond L. Bethel, Coleman, TX
*K5SDF, Leslie A. Lines, Bosque Farms, NM
KC5TRJ, Louann Wilcoxson, Tulsa, OK
W5UOP, J. J. Bresenham, Temecula, CA
NX5V, Chuck Goble, Cleveland, TX
*WB5WEM, Raymond J. Roy, Bunkie, LA
NK6D, T. R. Nisbet, Menlo Park, CA
N6DMX, Stanley K. Weitkamp, Glendale, CA
KB6FLX, Holden S. Sanford, Fresno, CA
WA6FNE, Robert B. Press, Boynton Beach, FL
‡W6GBC, Frank Phillips, Palo Alto, CA
KH6HKK, Ronald H. Bafetti, San Diego, CA
W6NZ, Harold Bourell, San Diego, CA
W6ONX, Charles H. Kerney, Capitola, CA
WA6PNM, Orson J. Capps, Vista, CA
KA6RHE, Richard A. Moseley, Lakeside, CA
K6SLP, Lawrence J. Moore, Riverside, CA
W6SRQ, Robert H. Clark, Los Angeles, CA
W6TRD, Joel Medina, San Francisco, CA
W6UVU, Rudolph Fregoso, San Francisco, CA
KH6YU, Julius M. Vetter, Honolulu, HI
W7AIF, Steven L. Jarvis, Colville, WA
W7COK, Ralph E. Sims, Cheyenne, WY
W7DIB, Ralph Kline, Yuma, AZ
W7IDD, Walter L. Ayres, Seattle, WA
KC7IEG, Frank R. Raney, Burlington, WA
K7IY, Robert J. Davis, Reno, NV
W7PS, Marcus D. Chilcote, Sun City, AZ
W7TZO, Ray A. Schall, Coos Bay, OR
K8AGO, Ray G. Augustine, Lapeer, MI
KB8BV, Richard E. Siekemeyer, Cincinnati, OH
W8ED, Clarence E. Polmanteer, Eloy, AZ
W8ER, Robert V. Austin, Beverly Hills, FL
KA8GMO, James P. Galm, Chardon, OH
*W8OFE, Robert A. Galbraith, Bluefield, WV
W8SFA, Richard B. Pennington, Lansing, MI
KB8YGB, William J. Adams, Cincinnati, OH
K9BMP, Elizabeth C. Lerch, Wausau, WI
K9DFK, Donald L. Lecklitner, Frankfort, IN
W9DTL, Charles R. Miller, Galesburg, IL
K9DXB, Robert L. Kennedy, Merom, IN
W9EFS, Edward H. Nielsen, Riverside, IL
KC9EV, Gerald R. Melotik, Milwaukee, WI
WD9HVY, Marguerite G. Bear, Sacramento, CA
W9LNX, Lendel J. Cook, Franklin, IN
WN9NDU, Michael L. McCauley, Syracuse, IN
W9NGT, Sherman C. Carr, Hartford, WI
WA9NKP, Millard L. Thurman, Bedford, IN
W9PFO, Esther N. Clifton, Fort Wayne, IN
W9PJV, Jack D. Williams, Lake Geneva, WI
W9QAL, John M. Foxworthy, Waynetown, IN
KA9TTE, Paul A. Wilson, Greencastle, IN
K9YLR, William J. Voors, Fort Wayne, IN
KC0DNA, Gene A. Schell, Woodland Park, CO
W0NNS, Lewis O. Coleman, Longmont, CO
N0FKK, Eugene D. Sandberg, Duluth, MN
KE0HC, Robert J. Wintle, Sr., Parsons, KS
WB0KYS, Nelson K. Simmons, Ames, IA
W0NUJ, Edward B. Caldwell, Cold Spring, MN
*W0QNH, Robert S. Erickson, Deerwood, MN
K0RH, Ronald B. Harder, North Port, FL
K0UDW, Weldon M. D'allemand, Arapahoe, NE
W0WBE, Ritchie T. Wakeman, Republican City, NE

*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

RITTY IS BACK!

◊ *RITTY 4.0* allows you to use your PC's sound card and simple audio connections to your transceiver to encode and decode RTTY—a multimode TNC in not required. The software is *DOS*-based and will run full-screen under *Windows*. A 486 or better processor is required.

The program employs signal-processing algorithms that are specifically tailored for the vagaries of FSK modulation and HF propagation. Special detectors are provided that are designed to handle polar flutter and multi-path propagation. *RITTY* can correct garbled repeated text (such as call signs), maintain copy during deep selective fades and synchronously decode asynchronous RTTY.

Price, $100. Upgrades from *RITTY 3.0*, $60; *RITTY 2.0*, $80. The software is delivered via e-mail. For postal delivery on 3.5-inch diskette add $5.

Accepted payment methods are check, money order or cash only. For more information or to order your copy contact Brian Beezley, K6STI, 3532 Linda Vista Dr, San Marcos, CA 92069; **k6sti@n2.net**. QST

STRAYS

LOOKING FOR AN UNSUNG HERO

◊ I was assigned to the US Embassy in Freetown, Sierra Leone, as a Communications Officer from '96-'97. On May 25, 1997 elements of the Armed Forces of Sierra Leone staged a coup and overthrew the government within hours.

With our telephone and satellite links down, I managed to get on the 40-meter amateur band using the Embassy's old offsite Transworld (TWC) 500-W HF station. I called "CQ emergency/mayday any US station, this 377 US Embassy Freetown, Sierra Leone, requesting phone patch assistance." I was answered by an Amateur Radio station in the States who asked if I had a local amateur call sign that I could use. I advised the station that I did—9L1HK. For the next 12 hours, while our Embassy was smashed by stray rounds and our compound looted, this US station passed phone messages to the US military and the State Department.

Three days later we received orders to evacuate the Mission and execute emergency destruction procedures. In the process, my station log was destroyed and I lost the call sign of the operator who assisted me in the early hours of the coup. If you were that operator, or you know who it might be, please e-mail **KenealyH@state.gov**.—*Henry Kenealy, KB2GND*

Next Stray

75, 50 AND 25 YEARS AGO

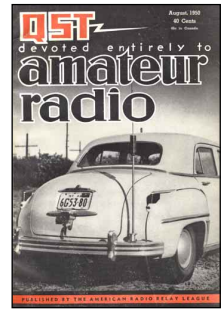
August 1925

◊ The cover art by Clyde Darr, 8ZZ, foresees three radio aficionados—an amateur, an experimenter, and a broadcast listener—trooping off to the Third National A.R.R.L. Convention, to be held in Chicago, August 18-21. The editorial addresses the concern of many hams with regard to the possibility of losing the amateur spectrum between 150 and 200 meters to broadcasters.

"Come to Chicago!" is the issue's lead article, telling of all the interesting plans for the League's third national convention. John Clayton, *QST*'s assistant technical editor, discusses "Plug-In-Coil Receivers," telling how to make plug-in coils for the station receiver that are mechanically sturdy and, therefore, more frequency-stable. "MacMillan Shoves Off" announces the departure of the schooner *Bowdoin* and the SS *Peary* from Wiscasset, Maine, on the latest voyage of Arctic exploration. John L. Reinartz will operate WNP aboard the *Bowdoin*, and Paul J. McGee will be at the key of WAO on the *Peary*. "The Mysterious WJS" describes radio support of another scientific expedition—the Hamilton Rice Expedition, which is exploring the upper Amazon River in Brazil. "NRRL Homeward Bound," by A. L. Budlong, advises hams to make every attempt to work NRRL, on the USS *Seattle*, as the ship starts steaming home to the USA from Australia. This is truly an era of the expansion of mankind's knowledge, and Amateur Radio is helping at every turn!

A Stray points out that Tennessee has been taken from the 5th Inspection District and placed in the 4th. Thus, the "5" call signs of all Tennessee stations have been canceled and replaced with "4" call signs, thereby creating 46 new 4's.

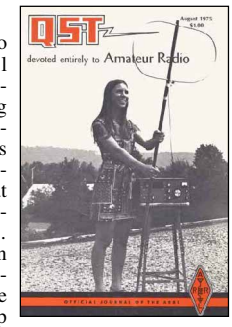
August 1950



◊ The cover photo shows W2ABS's homebrew 75-meter mobile antenna on the rear of his new Plymouth. The editorial points out the value of ARRL publications, citing the one-dollar price of the current *ARRL Antenna Book* as an example. A second topic addressed is the call for nominations for director and alternate director in half of the League's divisions, with the editorial urging members to take part in the electoral process.

Ed Tilton, W1HDQ, presents receiver and transmitter ideas for the U.H.F. experimenter in "Better Results on 420 Mc." Ed also discusses "Basic Operating Procedure, Part II—Radiotelephony," in the ARRL series on amateur operating. C. Buff, W2ABS, describes "A Tunable 75-Meter Mobile Antenna," this issue's cover story. Vernon Chambers, W1JEQ, tells about "A Two-Control VFO Rig with Bandpass Exciter," a rig that will help the contest operator make rapid band changes. Charles Faulkner, W6FPV, uses a military surplus 4-Mc. BC-454 receiver as the tunable IF to follow "A Two-Tube Crystal-Controlled Converter for 10 Meters." "QRRR Winnipeg" tells how Canadian amateurs assisted with emergency communication support to that flood-stricken city. Phil Rand, W1DBM, presents his ideas for improved 2-meter mobile reception in "A Mobile Converter for 144 Mc."

August 1975



◊ The cover photo shows HQ staffer Gail Machowski demonstrating the direction-finding techniques and equipment described in this issue. The editorial discusses the plain fact that "…the public's awareness of amateur radio… will play a large part in the future of amateur radio," and tells how the League is ready to help hams and ham clubs increase that awareness.

"The Accu-Memory," by James Garrett, WB4VVF, and D. A. Contini, W4YUU, describes an add-on memory for the popular Accu-Keyer that was detailed in August 1973 *QST*. Doug DeMaw, W1CER, tells about "A Simple Field-Strength Meter and How to Calibrate It." Then Doug co-authors, with Jay Rusgrove, WA1LNQ, "Learning to Work with Semiconductors—Part IV." Tony Dorbuck, W1YNC, discusses "Radio Direction-Finding Techniques." Ed Tilton, W1HDQ, presents Part II of "The DXer's Crystal Ball." R. P. Haviland, W3MR, talks about "Interstellar Communications." "ARRL National Convention 1975" tells the reader of the excitement ahead, with talks scheduled from astronaut Owen Garriott, W5LFL; FCC senior member Robert E. Lee; and USAF Major General Robert E. Sadler, director of communications-electronics for the Joint Chiefs of Staff. In the "FM Repeater News" column, a report of recent FCC actions on repeater linking and repeater automatic control are presented. The FCC has relaxed the rules to allow repeater linking (but not cross-banding) and automatic repeater operation, with the provision that all automatic operations must be either monitored in real time or recorded for later review. 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, $7\frac{1}{2}$, 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 W6OWP, with K6YR as an alternate. At the beginning of each code practice session, the schedule for the next qualifying run is presented. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. Send a 9×12-inch SASE for a certificate, or a business-size SASE for an endorsement.

♦ Teleprinter transmissions:

Frequencies are 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.

Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Fridays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

♦ Voice transmissions:

Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ Miscellanea:

On Fridays, UTC, a DX bulletin replaces the regular bulletins.

W1AW is open to visitors from 10 AM until noon and from 1 PM until 3:45 PM on Monday through Friday. FCC licensed amateurs may operate the station during that time. Be sure to bring your current FCC amateur license or a photocopy.

In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

Headquarters and W1AW are closed on New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the following Friday, and Christmas Day.

CONTEST CORRAL

Feedback

In the **1999 ARRL International EME Contest** results, the call sign **JH5FOQ** was reported as JH5FPQ, **JH8LLE** as JA8LLE and **JF4TGO/8** as JF4TGD/8. **IK2DDR** should be shown as a Single Op Single Band (144 MHz) entry with 254,100 points from 77 QSOs and 33 multipliers. The score for **DK5YA** should show 105,000 points on 42 QSOs and 25 multipliers, Single Band, 144 MHz.

In the **1999 ARRL November Phone Sweepstakes** results, the second operator at **W4WS** was **KU4BP**.

W1AW Qualifying Runs are 10 PM EDT Monday, August 7, and 4 PM EDT Tuesday, August 22. The K6YR West Coast Qualifying Run will be at 9 PM PDT on Wednesday, August 2. Check the W1AW schedule for details.

August

5-6

ARRL UHF Contest, see July *QST*, page 92.

North American QSO Party, CW, sponsored by the *National Contest Journal*, from 1800Z Aug 5 until 0600Z Aug 6 (phone is 1800Z Aug 19 until 0600Z Aug 20). Single op (no spotting nets) and multi-two. Single ops may have only one transmitted signal at a time; multi-twos have a 10-minute rule. All entries must use <150 W output power. Multiops may operate for the full 12 hours, Single ops may operate 10 hours, with off times at least 30 min long and marked in the log. Work stations once per band. CW in CW subbands only (phone in phone sub bands only). Exchange name and state/province/DXCC country. If your name or location change during the contest the change must be clearly marked in the log. Multipliers are states (including KL7/KH6), provinces, and other North American countries. Non-North American stations may be worked for QSO credit, but not multipliers. Final score is QSOs × multipliers. Team competition. Awards. Electronic logs accepted. Send CW logs to Bob Selbrede, K6ZZ, 6200 Natoma Ave, Mojave CA 93501; **cwnaqp@ncjweb.com**. Send phone entries to Bruce Horn, WA7BNM, 4225 Farmdale Ave, Studio City, CA 91604; **ssbnaqp@ncjweb.com**.

Ten-Ten International Net Summer Phone Contest, sponsored by Ten-Ten International, 0000Z Aug 6 to 2400Z Aug 6. Single op, phone only, 10 meters only. Exchange call sign, name, state/country and ten-ten number (if member). Score 1 pt./QSO w/nonmember, 2 pts/QSO w/member in contiguous US, 3 pts/QSO w/DX. Final score is QSO points. Send logs by Aug 23 to: Bob Madorin, KB0MZE, MO-KAN Chapter,7815 Westgate St, Lenexa, KS 66216-3151; **http://listserv.lehigh.edu/lists/tenten-l/.**

QRP ARCI Summer Daze SSB Sprint, sponsored by QRP ARCI, 2000Z to 2400Z Aug 6. Entries may be All Band, Single Band, High Band (40, 20, 15, 10, 6), Low Band (160, 80, 40), Multi-op or DX. Work stations once per band. Exchange signal report, state/province/country and Power or ARCI number. 1.860 3.865 7.285 14.285 21.385 28.385 50.128. One point per QSO. Bonus points, per band, for using homebrew (you built it) equipment. 500 pts for transmitter, 500 points for receiver, 1000 points for transceiver. Final score is total QSO points (all bands) multiplied by total of states/provinces/countries (all bands) times power multiplier (> 10 W PEP out = × 1; 2-10 W PEP out = × 7; 500mW-2 W PEP out = × 10; < 500mW PEP out = × 15). Include a description of equipment and antennas used. Mail entry within 30 days to: Randy Foltz, K7TQ, ATTN: Summer Daze, 809 Leith St, Moscow, ID 83843, or e-mail to: **rfoltz@turbonet.com**; **http://www.qrparci.org/.**

YO-DX Contest, sponsored by the Romanian Amateur Radio Federation (RARF). 0001Z to 2000Z Aug 6, 80 40 20 15 10 meters, phone and CW. No cross-mode QSOs. Classes: single op, single band; single op, multiband; multiop, multiband. Exchange RST and ITU Zone. YO stations will send two letters indicating their county. Count 0 pts/QSO with own country, 2 pts/QSO with own continent, 4 pts/QSO with different continent and 8 pts/QSO for YO stations. Multiply by sum of YO counties and ITU zones worked per band. Mail entries by Sept 3 to Romanian Amateur Radio Federation, PO Box 22-50; R-71100 Bucuresti, Romania. E-mail **yo3fwc@qsl.net**; **http://www.qsl.net/yo3kaa/**

12-13

Maryland-DC QSO Party, sponsored by Antietam Radio Association, 1600Z Aug 12 to 0400Z Aug 13 and 1600Z Aug 13 to 2359Z Aug 13, phone and CW (CW in subband/no cross mode QSOs). Work stations once per band/mode, portable/mobiles can be worked again in each county. No packet, repeater or net QSOs, MD-DC stations work everyone, others work only MD-DC. Exchange: QTH and category (Club, QRP, Mobile, Novice/Tech and Standard). CW—3.643 3.701 7.035 7.126 14.040 21.115 28.040; phone —3.920 7.230 14.268 21.370 28.380 50.150 (VHF/UHF on CW/phone also). Count 5 pts/mobile QSO, 4 pts/QRP QSO, 3 pts/CW or RTTY or ATV QSO, 1 pt for all others. Highest single point applies. Final score is total QSO points × overall different mults (MD counties + Baltimore City + DC). MD-DC stations include states/provinces/DXCC countries. Awards. Club competition. Send logs by Sept 1 to: Antietam Radio Association, PO Box 52, Hagerstown, MD 21741-0052.

W/VE Island Contest, sponsored by the US Island Awards Program, from 1600Z Aug 12 through 2359Z Aug 13. 160 80 40 20 15 10 meters. Eight categories: W/VE island phone, W/VE island nonphone, W/VE nonisland phone, W/VE nonisland nonphone, island rover phone, island rover nonphone, DX all mode, and SWL all mode. Island stations exchange RST and US/VE island name and number. Nonisland W/VE and DX stations exchange RST and state/province/country. Scoring: 5 points for each W/VE island. Island stations also score 1 point for each nonisland contact. Multipliers are US states and VE provinces. Awards. Send logs by September 9, 2000 to Ray Phelps, AD4LX, 1440 SW 53rd Terrace, Cape Coral, FL 33914, or to **ad4lx@arrl.net**; **http://eng.mu.edu/usislands/.**

Worked All Europe DX Contest, CW, sponsored by the Deutscher ARC, 0000Z Aug 12 to 2400Z Aug 13, (phone is Sep 9-10; RTTY is Nov 11-12). 80 40 20 15 10. Single op (PacketCluster or spotting nets allowed; 36 hours max, up to three off periods 1 hour min.) and multi-single (only one signal/band). Send RS(T) and serial number. Score 1 pt/QSO and 1 pt/QTC. Noneuropean stations must work Europe only (except on RTTY, where everyone works everyone, but QTCs are not allowed within your own country). Final score is QSOs + QTCs × EU countries/band. (except on RTTY: WAE countries + DXCC countries). 3.5 MHz QSOs, × 4; 7 MHz, × 3; 14-28 MHz, × 2. A QTC is a report of confirmed QSOs that took place earlier in the contest that is sent back to a European station. QTCs may be sent only by noneuropean stations to European stations. A QTC contains the time, call sign and QSO number of the station being reported (e.g. 1307/dl1aa/346). A QSO may only be reported once, and not back to the originating station. A maximum of 10 QTCs can be sent to the same station, the same station can be worked several times to complete this quota. Only the original QSO has QSO point value. Keep a list of QTCs sent. For example, QTC 3/7 would indicate that this is the third series of QTCs sent, and seven QSOs are reported. Awards. Club competition. E-mail entries to **100712.2226@compuserve.com**. Deadlines: CW—Sep 15; phone—Oct 15; RTTY—Dec 15. Send logs to WAEDC Contest Committee, PO Box 1126, 74370 Sersheim, Germany.

19-20

ARRL 10 GHz and Up Cumulative Contest, see July *QST* page 93.

New Jersey QSO Party, sponsored by Englewood ARA, 2000Z Aug 19 to 0700Z Aug 20, 1300Z Aug 20 to 0200Z Aug 21. Phone and CW. CW contacts may not be made in phone band segments. 3 pts/QSO. Out-of-state stations, QSO pts × NJ counties worked. NJ stations, QSO pts × states (but not NJ)/provinces/NJ counties (max, 40+12+21 = 82). Logs must show UTC date and time, call sign, exchange, band and claimed multiplier. Awards. Logs and comments (incl. SASE for results) must be received no later than Sep 16 at: Englewood ARA, PO Box 528, Englewood, NJ 07631-0528

North American QSO Party, phone, see Aug 5-6 listing.

SEANET Contest, sponsored by the Radio Amateur Society of Thailand, from 1200Z Aug 19 until 1200Z Aug 20. Single op, single/multi-band, mixed mode/single mode and multi-single. CW, SSB/FM and digital. Work stations once per mode. Use 160 80 40 20 15 10 meters. All stations may use spotting nets / packet DX spotting. Send RS(T) and serial no. Non-SEANET stations work SEANET stations only. SEANET stations are defined as stations operating from the following ITU zones: 41, 42, 43, 44, 45, 49, 50 51, 54, 55, 56, 58, 59, 60 64, 65 and 90. Contacts count 10 points each. Multipliers are DXCC entities in the SEANET area. Final score is QSOs × multipliers. Awards. Send logs by Oct 31 to: SEANET Contest 2000, Ray Gerrard HS0/G3NOM, PO Box 1300, Bangkok, 10112, Thailand; **g3nom@ibm.net**.

26-27

TOEC WW Grid Contest, CW, see June *QST* page 104.

Ohio QSO Party, sponsored by the Mad River Radio Club, from 1600Z Aug 26 until 0400Z Aug 27. Categories: single-op, multi-op and mobile rover. Ohio stations exchange serial number and county. Stations outside Ohio exchange serial number and state or province. Suggested frequencies: CW 3.545, 7.045, 14.045, 21.045, 28.045; SSB 3.850, 7.225, 14.250, 21.300, and 28.450. Work stations once per band and mode. Score 2 points per CW QSO and 1 point per phone QSO. For Ohio stations multipliers are 49 US states, 13 VE provinces and 88 Ohio counties. For stations outside of Ohio, multipliers are 88 Ohio counties. Multipliers are counted once per mode. Final score: Multiply QSO points by total multipliers. Send logs to Jeff Clarke, KU8E, 2896 Minerva Ave, Columbus, OH 43231; **ku8e1@yahoo.com**; **http://www.qsl.net/mrrc/oqp.html.**

CQC Summer QRP QSO Party, sponsored by the Colorado QRP Club, from 1800Z Aug 27 until 2359Z Aug 27. Single band, multi-band and portable. QRP only. Exchange RS(T), state/province/DXCC country, first name and CQC number or power output. CW 1.825 3.560 3.710 7.040 7.110 14.060 21.060 21.110 28.060 28.110; phone 1.910 3.985 7.285 14.285 21.385 28.385. Score 6pts/4 pts/CW QSO with member/nonmember; score 3 pts/2pts/phone QSO w/member/nonmember. Final score is QSO pts times states/provinces/DXCC countries times number of first names worked (one/letter of the alphabet, 26 max). One thousand bonus points for working W0CQC. Awards. Send logs to Colorado QRP Club, PO Box 371883, Denver, CO 80237-1883; **contest@cqc.org**. See the Colorado QRP Club site on the Web at **http://www.cqc.org/**.

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

SPECIAL EVENTS

Waterford, MI: Oakland County Amateur Radio Society, W8TNO, 2100Z **Aug 4** to 2300Z **Aug 5**, during the Waterford Summer Fest. 14.245 21.375 28.350. Certificate. John H Shearer Sr, KC8CMQ, PO Box 431244, Pontiac, MI 48343-9998.

Grand Haven, MI: North Ottawa ARC, W8CSO, 1600Z **Aug 4** to 1600Z **Aug 5**, celebrating the Grand Haven Annual Coast Guard Festival. 14.200 7.200. QSL. North Ottawa ARC, Box 44, Ferrysburg, MI, 49409.

Tupelo, MS: KK5K, 2100Z **Aug 4** to 2000Z **Aug 6**, during the Elvis Presley festival—from Elvis' birthplace. 28.350 21.350 14.265 7.275. Certificate. Wayne Cox, 116rd 1708, Faltillo, MS, 38866.

Mio, MI: Michigan Section Amateur Radio Public Service Corps, N8N, 0000Z **Aug 4** to 0000Z **Aug 14**, for the Paul Bunyon Scout Reservation Year 2000 summer camp. 3.932 7.232 14.232. Certificate. John N. LaRock, K8XD, 3019 Timber Dr, Lansing, MI, 48917.

Pemaquid, ME: Lincoln County Amateur Radio Club, K1LX, 1200Z **Aug 5** to 2200Z **Aug 6**, National Lighthouse Weekend from Pemaquid Light. 3.965 7.265 14.265 21.365. Certificate. LCARC, PO Box 171, Bristol, ME 04539.

Heislerville, NJ: The Delaware Bay Ham Radio Lighthouse Association, W2D, 1400Z **Aug 5** to 2200Z **Aug 6**, operating from the Miah Maull Lighthouse. 3.960 7.260 14.260 18.117 21.360. Certificate. John Calhoun, KC2ATK, PO Box 265, Heislerville, NJ 08324.

High Point, NC: High Point Amateur Radio Club, W4UA, 1400Z **Aug 5** to 2100Z **Aug 6**, during the second annual North Carolina Home Furnishings Festival. 7.240 14.240 147.165 (+). Certificate. HPARC, PO Box 4941, High Point, NC 27263-4941.

Fort Monmouth, NJ: Garden State Amateur Radio Association, W2GSA, 1200Z **Aug 6** to 2000Z **Aug 7,** for the 75th anniversary of the dedication of Fort Monmouth. 7.240 14.240 21.240 28.340. QSL. GSARA, PO Box #34, Fair Haven, NJ 07704.

Barnegat Light, NJ: Old Barney ARC, N2OB, 1300Z **Aug 5** to 2300Z **Aug 6**, for National Lighthouse Weekend. 14.265 21.365 28.465 7.265. Certificate. Old Barney ARC, N2OB, PO Box 345, Tuckerton, NJ 08087.

Hawley, PA: Camp Watonka Amateur Radio Club, KB3BUM, 1330Z **Aug 5** to 2130Z **Aug 6**, and 1200-0100Z **Aug 12** to **Aug 13**, during the third annual event at Camp Watonka Science Camp for Boys. 7.240 14.240 21.340 28.440. Certificate. Camp Watonka Amateur Radio Club, PO Box 127, Hawley, PA 18428.

Chesapeake Bay, MD/VA: Amateur Radio Lighthouse Society, W3L, 0001Z **Aug 5** to 2359Z **Aug 20**, for National and International Lighthouse/Lightship Weeks. 3.968 7.268 14.268 28.368. QSL. Jim Weidner, PO Box 2178, Riverton, NJ 08077.

Buffalo, NY: Western New York DX Association, K2L, 0000Z **Aug 6** to 2359Z **Aug 20**, operating form the Buffalo Lighthouse and Harborfest. QSL. WB2YQH, PO Box 73, Spring Brook, NY 14140.

Hamburg, NY: South Towns Amateur Radio Society (STARS), WB2ELW, 1400Z **Aug 10** to 0300Z **Aug 20**, during the Erie County Fair. 3.925 7.240 14.295 28.340. Certificate. Richard A. Kashdin, 136 Westcliff Dr, West Seneca, NY 14224.

South Bend, IN: Michiana ARC, K9F, 1400-2200Z **Aug 12**, during the annual College Football Hall of Fame Enshrinement Festival. 7.250 14.250 21.330 28.440. Certificate. Burt Jaffe W9BJ, 1105 N. Ironwood Dr, South Bend, IN 46615.

Fall River, MA: Pilgrim Amateur Wireless Association, KA1GG, 1400 to 2000Z **Aug 12**, operating from aboard the submarine USS *Lionfish* located at Battleship Cove. 7.240 14.240 21.240 28.340. QSL. Phil Medeiros, N1PM, 10 Chase St, Taunton, MA 02780.

Northport, MI: Cherryland Amateur Radio Club, W8TCM, 1200 to 2400Z **Aug 12**, during the annual Grand Traverse Lighthouse Celebration. 28.440 21.340 14.240 7.240. QSL. Dave Erlewein, N8CN, 2738 Ra-Wa-Si, Traverse City, MI 49684.

West Union, OH: DeForest Amateur Radio Club, K8GE, 1700to 2300Z **Aug 13**, celebrating the bicentennial of the State of Ohio. 7.225 7.300 14.225 14.350. Certificate. DeForest Amateur Radio Club, PO Box 73, West Union, OH 45693.

Centralia, IL: Centralia Wireless Association, W9HAB, 2000Z **Aug 18** to 1800Z **Aug 20**, during the Centralia Balloon Fest. 7.245 14.250 18.130 21.325. Certificate. Centralia Wireless Association, PO Box 1166, Centralia, IL 62801.

New York, NY: USS *Intrepid* Association of Former Crewmembers, WA3KEY, 1600Z **Aug 19** to 0100Z **Aug 20**, operating form the flight deck of the USS *Intrepid*, commemorating their 17th Annual Reunion, 7.240 14.275 21.375 28.575. Certificate. WA3KEY, PO Box 498, Quakertown, PA 18951.

Fairborn, OH: Upper Valley Amateur Radio Cub, W8F, 1700Z **Aug 19** to 2100Z **Aug 20**, celebrating the 50th anniversary of Fairborn, Ohio. 3.860 7.260 14.260 28.360. Certificate. Upper Valley ARC, PO Box 2000, Fairborn, OH 45324.

Minden, ON: Minden Amateur Radio Club, VE3MIN, 1500Z **Aug19** to 2200Z **Aug 20**, operating at the 136th Haliburton County Fair. 14.190. Certificate. MARC c/o Wally Bunn, PO Box 392, Minden, Ontario K0M 2K0 Canada.

Tuckerton, NJ: Old Barney ARC, W2T, 1200Z **Aug 19** to 2300Z **Aug 20**, for the Tucker's Island Lighthouse/Tuckerton Seaport opening season. 7.265 14.265 21.365 28.465. Certificate. Bob Schenck, N2OO, PO Box 345, Tuckerton, NJ 08087.

Newport, OR: Idaho-Oregon DX Group, N7L, 0001Z **Aug 19** to 2359Z **Aug 20**, during International Lighthouse Weekend from Yaquina Bay Lighthouse. 3.860 7.260 14.260 14.080. Certificate. Vince Van Der Hyde, Box 12941, Salem, OR 97309.

Ellsworth Air Base, SD: Black Hills Amateur Radio Club, N0VJ, 0100Z **Aug 19** to 0100Z **Aug 21**, commemorating the end of WWII in the Pacific. Operating out of a B-29 bomber. 21.350 14.250 7.250 3.850. Certificate. Keith B. Raihala, 10008-A Spearfish Ave, Ellsworth Air Base, SD 57706.

Fire Island Lighthouse, NY: Great South Bay ARC Islip ARES, Suffolk County Radio Club and Fire Island Lighthouse Preservation Society, W2GSB, 1400Z **Aug 19** to 2000Z **Aug 20**, operating from Fire Island Lighthouse located on Fire Island National Seashore Preserve. 7.260 1.260 21.260 28.460. QSL. W2GSB/LH, PO Box 1356, West Babylon, NY 11704.

Southold, NY: Peconic Amateur Radio Club, W2AMC, 1400Z **Aug 19** to 2100Z **Aug 20**, for International Lighthouse/Lightship Weekend. 7.249 14.245 21.345 50.125. Certificate. Peconic ARC, PO Box 113, Peconic, NY 11958.

St George, ME: Androscoggin Amateur Radio Club, W1NPP, 0000Z **Aug 19** to 2100Z **Aug 20**, operating from Marshall Point Lighthouse at Port Clyde Harbor. 3.960 7.260 14.260 21.360. QSL. AARC, PO Box 1, Auburn, ME 04210.

San Pedro, CA: United Radio Amateur Club, K6AA, 0001Z **Aug 19** to 2359Z **Aug 20**, operating from Point Fermin Lighthouse during International Lighthouse/Lightship Weekend. 28.373 21.373 14.273 7.273. Certificate. Douglas L. Dowds, 415 East 238th St, Carson, CA 90745.

Boothbay Harbor, ME: Yankee Amateur Radio Club Inc., KA1RFD, 0001Z **Aug 19** to 2359Z **Aug 20**, operating from Burnt Island Lighthouse for International Lighthouse/Lightship Weekend. 7.255 14.255 21.355 28.455. QSL. Rod Scribner, RR 4 Box 6770, Gardiner, ME 04345.

Delaware City, DE: Delaware County Amateur Radio Association, W3P, 1600Z **Aug 19** to 2100Z **Aug 20**, during Fort Delaware Garrison Weekend on Pea Patch Island. 14.260 21.260 28.260. QSL. Dan Cashin, N3LMY, 1335 Harrington Rd, Havertown, PA 19083

Geneva, IL: Fox River Radio League, W9CEQ, 1500Z **Aug 19** to 2200Z **Aug 22**, operating from the Fabyan Island Lighthouse. 7.250 14.250 28.450. Certificate. FRRL, PO Box 673, Batavia, IL 60510.

Barrington, IL: Schaumburg Amateur Radio Club, N9RJV, 1300 to 2100Z **Aug 20**, during the annual club family picnic. 80-10 meters. Certificate. Twenty-fifth Anniversary, Schaumburg Amateur Radio Club, PO Box 68251, Schaumburg, IL 60168-0251.

Bristol, TN: The Bristol Tennessee Amateur Radio Club, W4B, 0001Z **Aug 21** to 2359Z **Aug 27**, celebrating the 39th anniversary of the Bristol Motor Speedway and the 52nd anniversary of NASCAR. 3.860 7.245 14.237 21.305. Certificate. William D Price W4CZ, BARC, 232 Cherry St, Blountville, TN 37617.

Green Bank, WV: NRAO Amateur Radio Club, W9GFZ, 1600Z **Aug 25** to 2000Z **Aug 27**, for the dedication of the Green Bank Radio Telescope. 7.245 14.275 21.375 28.350. QSL. W9GFZ, PO Box 2, Green Bank, WV 24944.

Core, WV: Greene County Amateur Radio Assn, N3GC, 1300Z **Aug 26** to 2100Z **Aug 27.** 14.250 14.050 7.250 7.050. Certificate. Roger Swanson, KC8GOJ, 319 Happy Ln, Fairview, WV 26570.

Hanover, KS: Crown Amateur Radio Association, K0ASA, 1500 to 2100Z **Aug 27**, operating from Hollenberg Station during the Pony Express 140th anniversary. 7.125 14.040 18.085 18.140. Certificate. Crown Amateur Radio Association, Honeywell, MD 40, 23500 W 105th Street, Olathe, KS 66061.

Pikes Peak, CO: Colorado VHF Group, K0YB, 1500Z **Aug 27** to 1800Z **Aug 27**, during the Colorado 14er Radio Event—Amateur Radio operation from the summits of Colorado's 14,000 foot mountains. 146.55 14.260 21.330 28.350. QSL. Colorado VHF Group, K0YB, 21060 Cappella Dr, Monument, CO 80132.

Sacramento, CA: River City ARCS and the Sierra Foothills ARC, W6F, 1700Z **Aug 31** to 0500Z **Sept 1**, during the California State Fair. 7.250, 14.245, 21.350, 28.450, 147.555, 446.000. Certificate. Patrick Schamun, N6PBM, 8009 Hartwick Way, Sacramento, CA 95828-4220.

Special Events Announcements: For items to be listed in this column, you must be an Amateur Radio club, and use the ARRL Special Events Listing Form. Copies of this form are available via Internet (**info@arrl.org**), or for a SASE (send to Special Requests, ARRL, 225 Main St, Newington, CT 06111, and write "Special Requests Form" in the lower left-hand corner. You can also submit your special event information on-line at **http://www.arrl.org/contests/spevform.html**. Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; ie, a special event listing for **Jan** *QST* would have to be received by **Nov 1**. Submissions may be mailed to George Fremin III, K5TR, at the address shown on this page; faxed to ARRL HQ at 860-594-0259; or e-mailed to **events@arrl.org**. QST

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

By **Dan Henderson, N1ND**
Contest Branch Manager

2000 ARRL January VHF Sweepstakes Results

Some of you may remember the old W.C. Fields movie where he keeps opening the door to the cabin, saying "It's not a fit night out for man nor beast," and gets left with a face full of snow. The most rugged VHF contesters will attest that in the dead of winter, during the ARRL January VHF Sweepstakes, you sometimes experience conditions not fit for "man nor beast."

A series of harsh mid-winter storms affected many regions of the US and Canada for the year 2000 ARRL January VHF Sweepstakes. Ice, snow, and power outages across much of the eastern and southeastern US deterred a few, but didn't stop the 1000+ operators at the 820 single and multi-operator stations that submitted entries.

Y2K brought about a major entry category change in ARRL VHF / UHF events. There are now Single Op High and Single Op Low power categories. Three hundred and eighty-two entered as Single Op High Power and 300 as Low Power. If your entry did not designate a power level, you were entered as a High Power entry. All Single Op records prior to 1999 are designated as High Power.

K1TEO, a constant force in VHF contest the past few years, emerged as the Single Op High Power winner. Jeff posted a New England division record of 465,535 points in his victory, missing the overall record by just 2177 points. Ron, W3RJW, a Top Ten regular in VHF SS for many years with the Mt. Airy VHF Pack Rats finished a strong second and set a new Atlantic division record in the process. Another familiar call, WA2FGK, operated by Herb, K2LNS, finished a close third. Other Single Op High Power division records were set by KD7SW (Northwestern), N6AJ (Pacific), W4RX (Roanoke) and K6TSK (Southwestern).

Fred, N1DPM, sets the first record in the Single Op Low Power category, finishing with a score of 126,060. Close on his heels was Paul, W0UC, and Rich, N0HJZ. All three broke the 100 K point barrier. Each of the division winners are recorded as the record holders in this first year of competition. Congratulations to K1JT, W0UC, N0HJZ. KD4HIK, K8RMR, W1BQ, KM0T, N1DPM, N7NGO, K6MI, K4RTS, NJ7A, K2OY, KQ6QW, K5HP and VE3KZ.

Ed, K1ZE led the way with 27,206 points in the QRP Portable category, followed by John WX3P, and Barry N2EZS. No records were set among the eighteen entries received in this category.

WA8WZG continued to dominate the Multioperator category in 2000. Their 891,165 points set a new overall record as well as the

Affiliated Club Competition

	Score	*Entries*
Unlimited Category		
Mt Airy VHF Radio Club	2,759,047	57
Potomac Valley Radio Club	1,073,511	18
Medium Category		
North East Weak Signal Group	1,595,238	31
Rochester VHF Group	1,107,742	32
Mobile Sixers Radio Club	894,700	10
Northern Lights Radio Society	513,316	26
Murgas ARC	351,690	4
South Jersey Radio Assn	146,216	12
Yankee Clipper Contest Club	113,484	6
Badger Contesters	110,104	16
Society of Midwest Contesters	99,326	3
Crawford County ARC	96,127	16
Western States Weak Signal	74,306	4
Downey ARC	64,718	3
Six Meter Club of Chicago	38,323	22
Keystone VHF Club	36,662	3
Warminster ARC	24,258	11
Rocky Mountain VHF Society	22,446	5
Quaboag Valley ARC	18,809	4
Burlington County Radio Club	10,608	4
Bears of Manchester	5,688	13
Local Category		
Delaware Valley VHF Society	176,505	7
Bergen ARA	69,946	4
Hudson Valley Contesters and DXers	39,008	4
ARA of Southwest Florida	29,396	3
Schenectady Museum ARA	17,069	8
Green River Valley ARS	10,441	3

Top Ten

Single Op Low Power		**Multioperator**	
N1DPM	126,060	WA8WZG	891,165
W0UC	114,381	N2PA	399,916
N0HJZ	104,550	W2UR	351,876
K1JT	77,469	W0RSJ	323,172
W3KM	72,160	K3MQH	229,400
K5MA	70,599	K2AXX	217,038
KU3T	66,672	K2TVI	208,772
AF1T	64,954	K8GP	169,248
KM0T	64,413	WA2OMY	104,104
AA3GN	61,110	N3DQZ	95,095
Single Op High Power		W3HZW	79,120
K1TEO	465,535	**Limited Multioperator**	
W3RJW	317,702	W3IP	115,794
WA2FGK(K2LNS,op)	304,196	N2BJ	104,566
K1RZ	228,046	W2ODH/6	101,545
WA3NUF	226,590	W1QK	83,600
WZ1V	165,876	K8EB	81,238
K2SMN	152,421	N8KOL	69,222
KA1ZE	146,730	W1VHF	47,902
K3DNE	145,768	W2EA	43,837
K1GX	140,672	KV4I	36,036
QRP Portable		W3YOZ	19,032
K1ZE	27,206	**Rover**	
WX3P	13,728	W5DF	128,865
N2EZS	7,425	K2TER	95,612
K6LMN	5,060	N6TEB	71,037
N8XA	4,602	W9FZ	65,337
WB2AMU	2,380	NE8I	53,452
NM1K	2,320	N2OPW	44,310
KQ6EE	1,650	AA2UK	42,891
W1QT/6	1,113	WO2P	42,470
WA7VHF	481	N2KXS	41,536
		N6DN	33,600

Are N1XKT and K1DS trying to operate or find a way to stay warm with the microwave dish?

K7RJ running as a Limited Multiop at Antelope Island in Utah, grid DN31.

Multiplier Leaders By Band

Single Operator

50 MHz		144 MHz		222 MHz		432 MHz		902 MHz		1296 MHz		2304 MHz		3456 MHz	
KB2ZVP	100	WA2FGK		KE8FD	33	NC1I	41	K1TEO	17	K1TEO	20	K1RZ	10	KA1ZE	5
K8MD	75	(K2LNS,op)	71	K1TEO	33	KE8FD	36	K3DNE	15	K3DNE	18	WA2FGK		K1TEO	5
WG2E	74	W8ULC	70	WA2FGK		K1TEO	35	WA2FGK		WA2FGK		(K2LNS,op)	9	WA2FGK	
W0UC -A	73	KE8FD	64	(K2LNS,op)	28	K8TQK	33	(K2LNS,op)	15	(K2LNS,op)	17	W3RJW	8	(K2LNS,op)	5
N0HJZ -A	70	K8TQK	55	K8TQK	28	WB9Z	30	K1RZ	14	K1RZ	16	N1DPM	7	W3RJW	5
K1TEO	68	K2YAZ	53	WB9Z	26	WA2FGK		W3RJW	13	K2TXB	16	K5IUA	7	WA3NUF	4
W9RM	67	K1TEO	51	KA1ZE	25	(K2LNS,op)	30	WZ1V	12	K4QI	15	N3EXA	6	WA3DRC	4
K2YAZ	64	W2KV	49	WA4GPM	24	K1RZ	29	K1GX	11	WA4GPM	15	K1GX	6	WA1MBA	4
K9KL	64	K2TXB	49	K1RZ	24	WA4GPM	28	W4RX	11	W3RJW	14	N3NGE	6	N3NGE	4
W3EP	64	W0UC -A	48	K3DNE	23	KM0T -A	28	WA3DRC	11	KA1ZE	13	WA1MBA	6	W2PED	4
		KM0T -A	48	WA3NUF	23	K3DNE	26	N1DPM -A	11	WA3DRC	13	KA1ZE	6	W2SJ -A	3
								N3NGE	11	WZ1V	13			N1DPM	3
														AA3GN –A	3

-A denotes Single Op Low power

Multioperator

50 MHz		144 MHz		222 MHz		432 MHz		902 MHz		1296 MHz		2304 MHz		3456 MHz	
WA8WZG	91	WA8WZG	79	WA8WZG	47	WA8WZG	47	WA8WZG	23	WA8WZG	35	WA8WZG	13	WA8WZG	8
N2PA	80	K3MQH	63	K3MQH	35	N2PA	35	N2PA	11	N2PA	18	W2UR	7	W2UR	5
W0RSJ	61	N2PA	58	N2PA	34	K3MQH	31	K8GP	11	W2UR	12	K8GP	6	K2AXX	4
N2BJ -L	61	K2AXX	53	W0RSJ	29	W2UR	28	N3DQZ	9	K8GP	12	K2AXX	5	NQ2O	3
N8KOL -L	60	K8EB -L	49	W3IP -L	24	N2BJ -L	27	W2UR	9	W3HZW	9	W0RSJ	5	W0RSJ	3
K2AXX	58	N8KOL -L	48	W2UR	23	W0RSJ	26	W0RSJ	9	W0RSJ	9	K3MQH	4	K2TVI	3
W1VHF -L	56	W0RSJ	46	N2BJ -L	22	W3IP -L	25	K2AXX	8	N3DQZ	9	NQ2O	4	K3MQH	2
K8EB -L	56	W2UR	41	K2TVI	22	K8EB -L	25	K2TVI	8	K2AXX	9	N2PA	4	WA2OMY	2
K3MQH	51	W2ODH/6 -L	37	W2ODH/6 -L	22	K2TVI	23	K3MQH	7	NQ2O	9	WA2OMY	3	N2PA	1
W3YOZ -L	48	N2BJ -L	37	K8GP	21	K8GP	23	NQ2O	6	K2B -L	9	K2FK	2	K8GP	1
		NQ2O	37	K8EB -L	21										

-L denotes Limited Multioperator

QSO Leaders By Band

Single Operator

50 MHz		144 MHz		222 MHz		432 MHz		902 MHz		1296 MHz		2304 MHz		3456 MHz	
KB2ZVP	433	K2TXB	464	K1TEO	120	NC1I	247	W3RJW	52	W3RJW	72	W3RJW	35	W3RJW	21
K1TEO	358	K1TEO	407	WA3NUF	106	KE6GFF -A	176	WA3DRC	48	K2TXB	65	W2PED	24	WA3NUF	17
WG2E	352	W2KV	383	W3RJW	101	K1TEO	170	K1TEO	44	WA3DRC	62	N3NGE	24	WA3DRC	13
W2BZY	273	W3EME -A	350	N3FUJ	87	K1FO	160	WA3NUF	43	WA3NUF	60	W2SJ -A	23	KA1ZE	12
W3EP	267	WA2FGK		N3EXA	85	N3FUJ	142	N3EXA	40	K1TEO	59	WA3NUF	23	AA3GN -A	12
W4RX	261	(K2LNS,op)	315	WZ1V	84	WA3DRC	133	N3NGE	37	N3NGE	57	N3EXA	23	K1TEO	11
WB2WIH	243	N3FUJ	277	K1JT -A	84	W3RJW	130	WA2ONK	35	N3EXA	49	KU3T -A	21	W2PED	11
K1JT -A	237	WA3NUF	263	K2SMN	79	WZ1V	120	WZ1V	35	K2SMN	49	AA3GN -A	20	W2SJ -A	11
N0HJZ -A	211	KB0LYL -A	251	W2PED	79	KU3T -A	117	K1RZ	35	K1GX	48	KA1ZE	18	N3NGE	10
K8MD	210	WB2CUT -A	248	N2SCJ -A	79	WA3NUF	116	K3DNE	33	WZ1V	48	K1RZ	16	WA2FGK	
		W3RJW	246	WA3DRC	77			W2PED	33			K1TEO	16	(K2LNS,op)	9
								WA2FGK				WA3GFZ -A	16		
								(K2LNS,op)	33			W3KM -A	16		
								N1DPM -A	32						

-A denotes Single Op Low power

Multioperator

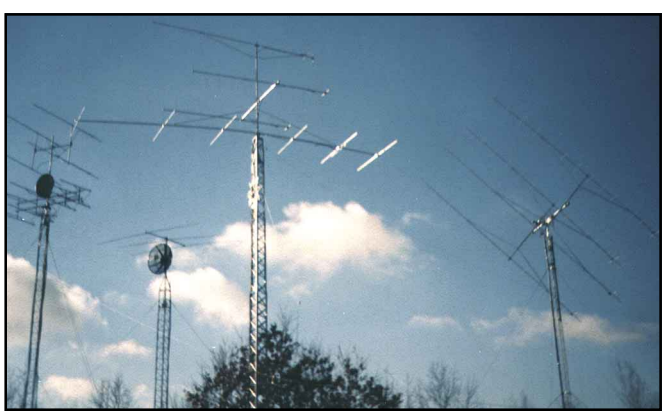
50 MHz		144 MHz		222 MHz		432 MHz		902 MHz		1296 MHz		2304 MHz		3456 MHz	
K2TVI	389	W0RSJ	469	K2TVI	120	K2TVI	170	WA8WZG	46	WA8WZG	72	W2UR	29	W2UR	15
W0RSJ	356	WA8WZG	410	W0RSJ	114	WA8WZG	159	W2UR	44	W2UR	59	WA8WZG	27	WA8WZG	14
WA8WZG	347	W2UR	398	N2PA	111	N2PA	153	N3DQZ	32	N2PA	43	W0RSJ	13	K2AXX	7
N2PA	343	K3MQH	365	WA8WZG	110	W0RSJ	135	W0RSJ	28	N3DQZ	39	WA2OMY	12	WA2OMY	7
W1VHF -L	304	K2TVI	357	W2ODH/6 -L	103	W3IP -L	132	K8GP	28	K8GP	37	K8GP	10	W0RSJ	6
W2UR	264	N2PA	328	K3MQH	97	W2UR	131	K2FK	26	WA2OMY	37	K2AXX	10	K2TVI	4
W1QK -L	244	W1QK -L	310	W2UR	94	K3MQH	125	N2PA	25	W6TOI	34	N2PA	9	NQ2O	3
K8GP	239	W3IP -L	306	N3DQZ	87	W3HZW	124	WA2OMY	23	W0RSJ	33	NQ2O	6	K3MQH	2
W2ODH/6 -L	214	K8GP	267	W6TOI	80	K8GP	119	K2AXX	19	W3HZW	28	K2FK	6	K8GP	2
K2AXX	196	K2AXX	252	W3IP -L	80	W6TOI	115	K2TVI	19	K2B -L	28	K3MQH	4	N2PA	1

-L denotes Limited Multioperator

Great Lakes division record. Finishing a solid second was the crew at N2PA with the ops at W2UR finishing third. New division records were set by K8GP (Roanoke) and W6TOI (Southwestern).

The limited Multioperator for 2000 was W3IP with a score of 115,794. Second place went to N2BJ with W2ODH/6 in hot pursuit from the West Coast. No division records emerged from this year's entries in this category.

A total of 48 rover teams braved severe elements, led by Dan W5DF (with John AB5SS) who set a West Gulf division Rover scoring record in winning the category. Bill K2TER (with Tom KV2X) finished second while Dave N6TEB's new Southwestern division record was good for a solid third place showing. Special congratulations to Russell



Seventy-one grids on 144 using the WA2FGK station was the highlight of 40 years of East Coast contesting says operator K2LNS.

K4CHE and KA3EKH operating overlooking the Delaware Bay while roving. Rule number one: Don't touch metal pipes without gloves in –10° weather.

Regional winners

Northeast Region (New England, Hudson and Atlantic divisions; Maritime and Quebec sections)

N1DPM	126,060	A
K1JT	77,469	A
W3KM	72,160	A
K1TEO	465,535	B
W3RJW	317,702	B
WA2FGK (K2LNS,op)	304,196	B
K1ZE	27,206	Q
WX3P	13,728	Q
N2EZS	7,425	Q
N2PA	399,916	M
W2UR	351,876	M
W0RSJ	323,172	M
W3IP	115,794	L
W1QK	83,600	L
W1VHF	47,902	L
K2TER	95,612	R
N2OPW	44,310	R
AA2UK	42,891	R

Southeast Region (Delta, Roanoke and Southeastern divisions)

K4RTS	20,164	A
K2OY	18,975	A
K0VXM	17,250	A
W4RX	116,156	B
K4QI	46,096	B
W2BZY	38,218	B
N3AWS	63	Q
KP4/KF0GX	1	Q
N4OFA	6,516	R
K9OYD	2,289	R

Central Region (Central and Great Lakes divisions; Ontario section)

W0UC	114,381	A
VE3KZ	26,936	A
N9TF	19,947	A
KE8FD	122,760	B
K8TQK	116,982	B
WB9Z	88,404	B
N8XA	4,602	Q
WA8WZG	891,165	M
AK4U	2,139	M
WD9DSN	1,860	M
N2BJ	104,566	L
K8EB	81,238	L
N8KOL	69,222	L
NE8I	53,452	R
VE3OIL	18,939	R
KF9US	18,148	R

Midwest Region (Dakota, Midwest, Rocky Mountain and West Gulf divisions; Manitoba and Saskatchewan sections)

N0HJZ	104,550	A
KM0T	64,413	A
WA0BWE	58,468	A
W0ZO	65,856	B
K5IUA	63,050	B
W8CM	42,453	B
WB0LJC	372	Q
N7GXD	16	Q
KK5IH	14,276	M
WD5AGO	13,340	M
N5XU	9,225	L
N0POH	4,260	L
WA5BU	2,860	L
W5DF	128,865	R
W9FZ	65,337	R
KF0UK	21,094	R

West Coast Region (Pacific, Northwestern and Southwestern divisions; Alberta, British Columbia and NWT/Yukon sections)

KQ6QW	16,188	A
K6MI	7,410	A
KC6SHE	6,358	A
N6AJ	48,576	B
K6TSK	46,588	B
WB6NTL	38,332	B
K6LMN	5,060	Q
KQ6EE	1,650	Q
W1QT/6	1,113	Q
W6TOI	54,272	M
K6WLC	20,160	M
AA6PA	3,888	M
W2ODH/6	101,545	L
KB5MY	5,208	L
K6OUE	4,200	L
N6TEB	71,037	R
N6DN	33,600	R
KF6FZZ	26,950	R

A = single op, low power; B = single op, high power; Q = QRP; L = Limited Multioperator; R = Rover

KI4M is shown de-icing the antenna at the KV4I station.

VE3OIL for setting a new Canadian Rover mark at a very tough time of year.

Once again the Club Competition ended up with the Mt Airy VHF Radio Club taking the Unlimited Category honors with a score of 2,759,947 point from 57 entries. The New England Weak Signal Group took top honors in the Medium Club category while the Delaware Valley VHF Society won the Local Club competition. A total of 329 participants sent in club competition scores. Congratulations to the gavel winners and the members who make it happen!

Remember: One sure way to increase your score is to add the number of bands you utilize. QSO points at the higher bands translate into a fast way to increase your position. Why not visit the Technical Information Service's Web Page of VHF/UHF/Microwave resources and use your talents to build a transverter to add a band? You will find a mountain of useful information at **http://www.arrl.org/tis/info/microwave.html**.

The 2001 running of the ARRL January VHF Sweepstakes will take place January 20-22. We can't predict whether it will be "a fit night out for man nor beast" but we expect lots of participants to be making plans to participate. Whether you are roving, gunning for a new section or division record, or just trying to find a few new grids for your VUCC, don't miss this opportunity to get on and accept the VHF / UHF challenge.

VE3IEX put out a potent signal with this rover station.

Scores

Each line score lists call sign, score, stations worked, multipliers, category (A = Single Op Low, B = Single Op High, Q = QRP Portable, M = Multi-Operator, L = Limited Multi-Op) and band (A= 50 MHz, B = 144 MHz, C = 222 MHz, D = 432 MHz, 9 = 902 MHz, E = 1296 MHz, F = 2304 MHz, I = 10 GHz, J = 26 GHz, P = 300 GHz+). Single Op Low and High Power Band winners are show in bold.

1

Connecticut

N1JMM	10,164	203	42	A	**A**BD
K1IM	9,766	214	38	A	**BD**
W1NWE	5,264	118	28	A	**B**C**DE**
WB1GIC	1,206	101	9	A	BCD
N1SSM	546	64	7	A	BD
N7IAL	336	7	7	A	**9EFGHIJ**
W1VT	336	7	7	A	**9EFGHIJ**
N1SPI	300	37	6	A	BCD
N1QVQ	276	39	6	A	ABD
K1SW	228	40	4	A	BD
N1RIO	224	30	7	A	ABD
N1ZXL	184	37	4	A	BD
N1TUP	180	33	4	A	BD
N1ZNA	96	27	3	A	BD
K1TEO	465,535	1186	235	B	**ABCD9EFGI**
WZ1V	165,876	651	138	B	ABCD9EFG
K1GX	140,672	595	128	B	ABCD9EFG**H**
K1FO	48,150	482	75	B	ABD
W3EP	36,855	405	91	B	AB
K1UHF	35,445	309	85	B	ABCD9EF**I**
W1COT	25,086	238	74	B	ABCDE
N1NQD	19,032	211	61	B	ABCD9E
K1WVX	4,901	123	29	B	ABCDE
W1WHL	4,384	137	32	B	A
WA1VOA	315	45	7	B	B
KE1LE	252	31	7	B	ABD
K1ZE	27,206	300	61	Q	ABCD9E
NM1K	2,320	115	16	Q	ABCD
N1TUJ	20	10	2	Q	B
K1NCO (+N1KOH,KB1CRM)	16,830	279	51	M	ABD
W1QK (+AA1MY,K1XS,K1PHG,N1ABY)	83,600	717	95	L	ABCD
KB1H (+N1XS,KB1DFB)	14,000	317	40	L	ABD

Eastern Massachusetts

K5MA	70,599	525	101	A	**ABCD**
W1PM	49,329	341	87	A	ABCD**9E**
WG1Z	14,837	269	37	A	ABCDE
KA1EKR	8,568	149	36	A	BCDE
K1UR	7,595	192	31	A	ABCD
KV1J	6,688	160	32	A	ABCD
W1DYJ	2,268	108	21	A	AB
N1ZZN	2,205	96	21	A	ABD
N1BC	770	63	10	A	ABD
N1VQR	590	58	10	A	ABD
K1EP	561	47	11	A	ABD
KB1VC	180	20	9	A	AB
W1GHZ	72,468	486	99	B	**ABCD9EI**
N1GJ	23,870	235	55	B	ABCD9**FJ**
WA1LBK	8,676	169	36	B	ABCDE
N1EKV	2,478	89	21	B	ABD
K1NKR	2,420	83	20	B	ABCDE
WA1ENO	1,728	96	18	B	AB
N1YQE	1,326	71	17	B	ABD
K1DAT	672	56	12	B	B
K1QM	638	57	11	B	ABD
WA1OFR	342	32	9	B	ABD
AD1B	328	41	8	B	AB
N1JOY (+KE1LI, N1TZM)	29,748	326	67	M	ABCD9E
N1FDX (+N1FYZ)	2,002	88	22	L	ABD
KB1EGF (+KB1DFD)	576	61	8	L	ABC

Maine

K1DY	43,442	274	107	B	**ABCD9E**
N1RWY	22,796	219	82	B	ABCDE

New Hampshire

AF1T	64,954	385	94	A	**ABCD9EFGI**
WA1HOG	35,328	327	69	A	ABCD**9**E
N1XOQ	6,290	134	37	A	ABD
K1PDY	1,560	60	20	A	ABCD
KB1DXD	132	9	6	A	B9EI
WA1YHO	85,565	477	109	B	**ABCD9EF**
KU2A	52,380	324	97	B	ABCD9EF**G**
AC1J	8,760	169	40	B	ABCD
WW1Z	5,292	117	36	B	ABCD
K1TR	4,704	108	32	B	ABCD
N1JHJ	3,456	105	27	B	ABCD
KW1DX	2,604	108	21	B	ABD
N1HO	1,640	82	20	B	A
W1OA	1,420	64	20	B	ABCD
W1MRQ	798	57	14	B	AB
W1ZC	576	36	12	B	BC

Rhode Island

KM1X	13,974	230	51	A	**ABD**
K8BGZ	1,206	61	18	B	**ABD**
W1CPC	645	29	15	B	**ABD**
W1VHF (K1DAM,K1AST,K1RWK,W1JJM,ops)	47,902	487	86	L	ABDE

Vermont

K1LPS	15,870	156	69	A	A**BCD9E**
N1MJD	3,255	84	31	A	ABCD
N1ZUK	2,800	78	35	A	A**B**D
W1AIM	34,440	261	105	B	**ABCD9E**
W1FN (WA1ZCN,N5IEP,W1ECT,N1JEZ,N1JIF, K1IB,KB1EFB,KB1EGH,KB1DXA,ops)					
	15,624	229	56	M	ABCDE

Western Massachusetts

N1DPM	126,060	478	132	A	**ABCD9EFG**
K1ISW	13,724	226	47	A	ABCD
K1MAP	5,456	96	31	A	ABCD9F**J**
N1MHH	4,428	103	36	A	ABCD
N1MIA	3,360	89	30	A	ABCD
N1RWC	1,197	58	19	A	ABD
K1TS	660	60	11	A	AB
W1NMQ	528	48	11	A	AB
N7CCF	108	23	4	A	ABC
NC1I	55,209	470	77	B	A**B**D
WA1MBA	54,188	326	76	B	BD**9EFGHI**
N1MUW	16,335	205	55	B	A**BC**D9E
N1SIF	9,300	251	30	B	ABD
N1FUS	6,660	171	30	B	ABD
WA1NYV	940	94	10	B	B
N1MUV	595	71	7	B	ABD
K1AE	320	32	10	B	A
K0XP(+net)	13,364	183	52	L	BCD
KB2SAE (+N1ISB)	1,036	70	14	L	ABCD

2

Eastern New York

KA2BSA (N2ZQF,op)	3,111	137	17	A	A**BCD**
WA2BAH	2,576	126	16	A	ABCD
KA2MCU	1,582	90	14	A	ABCD
WA1RKS	1,504	83	16	A	A**B**CD
KC2DTJ	763	97	7	A	ABD
W2FW	336	41	6	A	BD
WD2AJS	300	45	5	A	BD
W2BEJ	294	35	6	A	ABCD
KB2ZZC	6	2	2	A	BD
W3HHN	40,278	329	98	B	AB**CD9E**
WG2E	26,048	352	74	B	**A**
W2FCA	20,698	165	79	B	ABC**DE**
W2XL	13,824	173	64	B	ABCD**9**
N2MCI	10,199	209	47	B	ABCD
W2GKR	8,580	156	55	B	A**B**
W2ENY	5,883	155	37	B	ABD
W2IR (W2JHO,op)	2,786	151	14	B	ABCD
WA2IWW	784	76	8	B	AD
AA2CW	235	42	5	B	BCD
K2TVI (KC2EBH,K2ZVI,N2DHH,N2DVQ,N2FMC, N2GKM,N2HTT,N2GCZ,N3EMF,WB2NHC, WB2NVR,WA2VQW,ops)					
	208,772	1088	134	M	ABCD9EGH
KY2J (KA2TIP +logger)	9,102	202	41	L	ABD
N2TY (KC2DZB,KC2FCQ,KC2BJC,KB2UUC, KB2SPM,NW2D,op)	7,722	188	33	L	ABCD
KB2TSA (+N2PEQ)	2,940	86	28	L	ABCD

NYC-Long Island

K2OVS	1,311	50	23	A	**ABD**
W2QK	40,248	314	78	B	A**BCD9E**
N2LIV	32,026	272	67	B	A**B**CDE
WA2ZFH	20,451	229	51	B	AB**C**DE
KF2XF	2,023	119	17	B	B
WV2C	546	42	13	B	AB
WB2AMU	2,380	74	28	Q	ABD

Northern New Jersey

W1BQ	47,508	451	74	A	**ABCDEF**
K2KIB	35,568	313	78	A	ABCD**9E**
K2YSY	3,630	121	30	A	AB
N2CSF	3,567	123	29	A	AB
KO2OK	3,225	100	25	A	ABD
K2MVW	1,000	40	10	A	DE
WB2MBM	189	27	7	A	B
KA1ZE	146,730	513	134	B	AB**CD9EFGH**
WA2VUN	37,762	400	79	B	**ABCD**
N2WM	9,476	206	46	B	AB
K2ZD	8,400	130	48	B	ABCDE
WB2CUT	6,200	248	25	B	**B**
WA2BKN	1,909	81	23	B	ABD
W2JEK	495	45	11	B	AB
K2B (K2AMI,J2ZB,WA2QHL,WI2W,W2MSK, NA2AA,N2PBY,KC2HL,K2YLH,KF1ID,ops)	18,718	249	49	L	ABDE
N2OPJ (+KB2YZA)	1,372	85	14	L	ABD

Northern New York

WZ2T	442	26	17	A	**AB**
KB2ZVP	43,300	433	100	B	**A**
K3KYR	18,091	208	79	B	A**B**D
WA2AEY	7,198	103	61	B	ABD
N2WIG (+N2TJQ,N2UZQ)	6,549	164	37	L	ABCD

Southern New Jersey

K1JT	77,469	643	93	A	**ABCD**
N2SCJ	42,978	480	57	A	ABCDE
W2SJ	35,160	313	40	A	ABCD**9EFGH**
W2PAU	12,874	258	41	A	ABD
KA2WRE	8,456	235	28	A	BD
W2TTG	4,082	131	26	A	ABD
N2RF	3,888	131	24	A	ABCD
WB2VLA	1,696	74	16	A	ABCD9
N2DEQ	1,309	112	11	A	BC
WA2QZQ	1,030	103	10	A	AB
N2VW	954	105	9	A	ABD
WA2NBL	440	88	5	A	AB
N2MPU	408	51	8	A	AB
KC2FWC	339	113	3	A	B
WA4FRA	284	61	4	A	BD
KR2T	267	81	3	A	BD
N2IZM	255	85	3	A	B
W2ORA	200	40	5	A	AB
WA3RHW	168	56	3	A	B
KK2CW	40	20	2	A	B
KD2P	24	12	2	A	B
KX2CW	18	9	2	A	B
K2SMN	152,421	680	141	B	**ABCD**9E
W2PED	116,788	558	97	B	ABCD9E**FG**
K2TXB	53,958	537	69	B	**BCEI**
WA2ONK	53,270	400	70	B	ABCD**9E**
KD2KS	40,656	477	66	B	ABCD
W2KV	18,767	383	49	B	B
KA2KFO	513	57	9	B	B
W2UR (+WR3P,K3IPM,WF3W)	351,876	1048	177	M	ABCD9EFGHI
K3EOD (+WR3P,K3IPM,WF3W)	34,362	417	69	M	ABCDE
W2EA (KC2AZU,KC2AZT,KF2YZ,N2XYZ, K2WB,ops)	43,837	569	59	L	ABCD

Western New York

NS9E	26,675	268	55	A	A**BCD9EFG**
N2UIO	10,836	238	36	A	ABCD
K2AS	8,466	166	51	A	**AB**
N2HJD	8,096	251	22	A	ABCD9**I**
K2OEQ	6,888	139	41	A	ABD9
KG2NI	6,648	223	24	A	ABD
N2USB	3,078	130	19	A	ABDE
W2WGL	2,013	50	33	A	BD
KB2NFS	1,860	114	12	A	ABCD
KA2JRK	665	77	7	A	ABD
W2TX	396	33	12	A	B
K2CF	112	16	7	A	A
W2EV	76	16	4	A	BCD
W2AAA	1	1	1	A	A
N2JMH	63,365	376	115	B	**ABCD9E**
KA2ENE	13,489	266	41	B	ABD
AF2K	12,597	247	51	B	AB
W2FE	10,252	173	44	B	ABCDE
N2WK	9,100	175	52	B	**A**
WA2ZNC	7,038	158	34	B	ABCDE
KE2T	5,190	144	30	B	ABCD
WY2Z	3,024	142	18	B	ABCDE
N3TJD	3,008	146	16	B	ABD
N2WVK	2,475	97	25	B	ABD
W2UAD	2,109	111	19	B	B
K2OS	2,070	69	30	B	AB
K2JIQ	1,716	66	26	B	B
W2FU	750	35	15	B	B9
N2UM	448	50	8	B	ABD
KB2WEV	292	59	4	B	BD
KB2KJV	50	5	5	B	ABCDE
N2VTC	4	4	1	B	B
WX3P	13,728	119	52	Q	ABCD9EFIP
N2EZS	7,425	218	25	Q	ABCD
N2PA (N2JQR,N2KG,N2YB,W3OAB,ops)	399,916	1024	244	M	ABCD9EFGIJP
K2AXX (+K2UA,K2DH,AA2WV)	217,038	676	183	M	ABCD9EFGHIJP
NQ2O (+N2ULL)	52,074	296	99	M	ABCD9EFG
WA2AAZ (N2JC,N2MKT,N5THV,ops)	6,417	169	31	L	ABCD

3

Delaware

WA3WUL	490	35	14	A	**A**
W3OR	86,152	447	121	B	**ABCD9EFG**
W3HZW (N3YMS, N3FZP, N3KRX, K3BY, KB8QOO, KE3UY, N3YTH, ops)	79,120	566	92	M	ABCD9E

Eastern Pennsylvania

W3KM	72,160	446	80	A	ABCD**9**EFG
KU3T	66,672	452	72	A	ABC**DEF**
AA3GN	61,110	437	63	A	ABCD9F**GH**
AA3RE	47,144	432	71	A	**ABCD**9E
WA3GFZ	42,276	438	52	A	ABCDEF
WA3EHD	23,220	346	36	A	ABCDEF
N3AOG	17,655	205	33	A	ABCD9EFGHI
W3DFM	16,280	208	44	A	ABCD9EF
W3EME	16,100	350	46	A	**B**
WA3AQA	15,428	315	29	A	ABCD9E
WA3RLT	12,206	238	34	A	ABDE
N3PLM	11,424	228	32	A	ABCD9EF
K3EBZ	11,072	212	32	A	ABCD9
W3SZ	7,712	115	32	A	BCDEF
NA2T	7,654	142	43	A	ABD
WS3C	6,318	136	39	A	ABD
W2SK	6,216	89	24	A	ABCD9EFGH
K3DMA	6,035	233	17	A	ABCDE
KB3XG	3,926	47	13	A	C9EFGH**I**
N3VOW	3,534	159	19	A	ABD
K3PHY	2,868	151	12	A	BC9
W3VU	2,700	87	20	A	ABCDE
W3GAD	2,604	121	14	A	ABCD
AI3W	2,376	88	27	A	AB
K3JJZ	2,064	127	12	A	ABC
KU3A	1,280	60	16	A	ABCDE
WR3P	1,095	60	15	A	ABC
N3JNX	848	43	16	A	ABD
N3GSA	840	41	15	A	ABCD
W1SD	462	49	6	A	BCD
K3KEL	420	21	10	A	D
K3URT	252	14	18	A	AB
KA3MGB	114	19	6	A	B
K3VEQ	86	43	2	A	B
W3RZU	38	19	2	A	B
W8IJ	15	5	3	A	AB
N3EVV	12	6	1	A	C
W3HMU	4	2	1	A	C
W3RJW	317,702	851	154	B	ABCD**9EFGHIP**
WA2FGK (K2LNS,op)	304,196	775	226	B	**ABCD**9EFG
WA3NUF	226,590	778	130	B	**ABCD**9EFGHI
N3EXA	129,438	655	102	B	ABCD9EF
WA3DRC	121,716	587	92	B	ABCD9EFG
N3NGE	120,183	533	97	B	ABCD9EFGH
WA4GPM	94,860	422	155	B	ABCDE
K3GNC	60,192	468	72	B	ABCD9E
N3FUJ	56,768	658	64	B	ABCD
N3ITT	50,184	431	68	B	ABCD9E
N3RN	48,442	321	106	B	ABCD9EF
N3XJX	28,730	255	85	B	ABCD
N3FA	28,500	264	75	B	ABCD9EF
K3MFI	26,418	360	42	B	ABCD9EF
N3NFB	26,015	322	55	B	ABCDE
KB3ZS	25,728	375	48	B	ABCDE
K3IUV	22,365	338	45	B	ABCDE
K3ZMA	21,720	350	40	B	ABCDE
KB3IB	15,570	193	45	B	ABCD9E
K3WIK	14,993	286	47	B	ABD
N3FTI	13,250	210	53	B	ABCD
NE3I	12,093	251	29	B	ABCDE
N3DHI	11,732	300	28	B	ABCD
W3GXB	11,696	206	34	B	ABCD9E
K3HZO	8,968	119	38	B	ABCDE
WA3CSP	6,519	123	53	B	A
W3CHP	4,864	128	38	B	A
WU3I	4,344	128	24	B	ABCD
W3IIT	4,212	160	18	B	ABCDE
K3XF	3,729	85	33	B	ABCD9E
N3VJH	2,430	130	15	B	ABCD
W3AWA (WA3KFT,op)	1,703	118	13	B	ABCD
N3FKR	672	82	7	B	ABD
N3AHP	570	55	10	B	ABCD
KB3DHU	497	62	7	B	ABD
WA3KIO	256	55	4	B	BD
N3EMA	236	40	4	B	BCD
N3YXW	192	24	8	B	AB
KC3LE	126	14	9	B	A
N3MXT	122	61	2	B	B
WI3S	115	23	5	B	B
KA3VTQ	105	21	5	B	B
K2QBV	96	27	3	B	BD
N3VUF	88	22	4	B	AB
KD3DI	56	28	2	B	B
N3LJE	54	27	2	B	B
WG3S	24	24	1	B	B
KB3ENH	12	6	2	B	AB
W3TDZ	3	3	1	B	B
W0RSJ (+WB2ONA,W3DFM,N2EOC,N2IX)	323,172	1154	188	M	ABCD9EFG
K3MQH (+K3RA,K3MM,W3EKT,AI3M,N3EYB)	229,400	811	200	M	ABCD9EFG
WA2OMY (+WA3YUE)	104,104	591	91	M	ABCD9EFGHI
N3DQZ (+W1SD)	95,095	590	95	M	ABCD9E
N3ADC (+KB3HE)	40,870	370	67	M	ABCD9E
K2FK (+W3GAD)	30,702	344	51	M	ABCD9F
W3RT (+N3HTZ)	21,160	288	46	M	ABCD9E
W3HZU (AD3E, N3JDQ, KB3EBV, N3ZCW, KB3DBT,ops)	15,351	253	51	L	ABDE
K3GAC (KA3FQS,KA3WXV,K3GM,ops)	6,974	214	22	L	ABCD
W3JG (W4RFJ,N3KWQ,ops)	747	77	9	L	ABD
N3YVH (N3YNX,N3ZVF,ops)	525	100	5	L	BD

Maryland-DC

K3IXD	13,750	196	50	A	AB**CDE**
N3II	10,535	215	49	A	**AB**
N3YPJ	5,360	134	40	A	AB
W3EKT	4,864	120	32	A	ABCD
N3UMA	4,795	137	35	A	AB
WA4PRR	2,204	70	29	A	ABD
N3VOP	1,904	101	16	A	ABD
N3SOK	1,848	74	24	A	ABD
K2AVA	1,320	66	20	A	AB
K3BPP	476	28	17	A	A
W3OU	232	29	8	A	A
W3VP	165	33	5	A	A
W3FG	85	16	5	A	ABC
K3DI	28	14	2	A	B
K1RZ	228,046	698	182	B	**ABCD**9**EFI**
K3DNE	145,768	574	152	B	AB**CD9E**
K3ZO	32,760	364	90	B	**AB**
N3ZTZ	16,640	255	65	B	ABD
K3HCE	14,934	206	57	B	ABD
W3VRD	9,680	177	40	B	ABCD
KA3TCC	4,305	105	35	B	ABD
N3KNI	3,894	93	33	B	ABD
W3GN	602	43	14	B	AB
K3UAL	378	42	9	B	AB
WB3KDB	160	32	5	B	B
WA3GYW	176	22	8	Q	AB
WA3ZKR (+KC3VD, KA3EJT)	4,186	104	26	M	ABD9EI
W3IP (+K3MLA,K3YDX,KF3FT,WG3R,N6OBP)	115,794	707	126	L	ABCD

Western Pennsylvania

KA3SDP	21,510	173	90	A	A**BCD**
W3HDH	1,827	63	29	A	**A**
N3PUR	29,545	294	95	B	**ABC**
N3WVB	12,078	157	66	B	ABC**D**
AA3GM	510	26	17	B	ABCD
W3KJM	288	24	12	B	A
W3ZA	35	7	5	B	AB
W3YOZ (+K4VV)	19,032	244	78	L	AB
W3YA (N2DSS,N3EB,K3EZS,ops)	5,977	125	43	L	ABD
K3MJW (N3WAV,N3MRU,N3OEX,N3NOS,ops)	2,144	61	32	L	ABD
K3CR (KB3KJ,N3YAV,KB3AFT,N3XSF, KE3HL,ops)	559	38	13	L	ABC

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Alabama

KV4T (@KF4DGS)	2,320	80	29	A	**B**
KU4WW	1,584	60	24	A	**BD**
W4NTI	286	26	11	A	**AB**
N4ION	5,880	108	49	B	**ABD**
KU4IU	3,675	105	35	B	**AB**
WB4WXE	1,260	60	21	B	AB

Georgia

W4KXY	1,292	62	19	A	A**BD**
K4BAI	140	20	7	A	**A**
KD4HLG	9,457	150	49	B	**ABCDE**
KD4K	1,334	45	23	B	ABCD
W4ATL	209	19	11	B	AB
K4SZ (+W4RLW)	1,407	49	21	M	ABCDE

Kentucky

AD4ZW	13,135	140	71	B	A**BCDE**
KC4JGS	6,985	112	55	B	**AB**D
KF4RAV	828	46	18	B	AB
AK4U (+K4ITF)	2,139	58	31	M	ABD

North Carolina

W4FAL	27	8	3	A	**BD**
K4QI	46,096	237	134	B	**ABCDE**
NG4C	31,104	246	108	B	**ABCD**
N4AJF	3,306	83	38	B	ABD
KV4I (AF4HX,KI4M,KF4TDY,KF4TDZ, KG4CHM,ops)	36,036	370	78	L	ABCD

Northern Florida

KU4WD	7,803	144	51	A	A**BC**
N4JK	3,942	146	27	A	AB
KE4YYD	1,350	46	25	A	A**BD**
W2BZY	38,218	350	97	B	**ABCD9E**
KQ4PI	16,100	182	70	B	AB**C**D9E**F**

Puerto Rico

WP4LNY	8	8	1	B	**B**
KP4/KF0GX	1	1	1	Q	A

South Carolina

AC4Q	4,462	82	46	A	A**BCD**
N4JZH	2,508	66	38	A	A**B**
N4UFP	1,595	43	29	A	ABCD
KR4QO	14,362	137	86	B	**ABCD**
W4KSC (+KC4DVB)	3,420	60	45	L	ABCD

Southern Florida

K0VXM	17,250	181	69	A	**ABCD9EF**
N4AOE	1,200	67	16	A	ABD
WB2WIH	27,440	352	70	B	**ABCD**
KF4YOX	14,278	222	59	B	ABD
N4BG	3,162	92	34	B	ABD
WA3TIH	756	39	18	B	ABD
WA4OFS	161	12	7	B	ABCD**E**

Tennessee

KD4HIK	4,070	95	37	A	**ABCD**
KG4CKX	480	31	15	A	ABD
K5OGF	98	14	7	A	AB
K4AR	25,438	251	79	B	**ABCD**
AA4H	9,405	120	57	B	ABCD**9E**
KG4BMH	3,626	98	37	B	**B**
AD4F	2,494	76	29	B	ABCD

Virginia

K4RTS	20,164	167	71	A	AB**CD9E**
K4FTO	14,750	193	59	A	ABCD
K4SO	9,660	210	46	A	**AB**
K4WWA	6,466	104	53	A	ABD
KB4OLM	4,294	108	38	A	ABD
AD4TJ	3,220	108	28	A	ABD
K4FJW	2,125	85	25	A	AB
AD4DG	480	19	16	A	ABCD9
W4RX	116,156	567	142	B	**ABCD9EF**
N4MM	1,320	60	22	B	AB
K8GP (W4XP, K8ISK, ops)	169,248	784	129	M	ABCD9EFGHIP
WA3OFC (+N3ZYU)	288	24	12	L	A

West Central Florida

K2OY	18,975	269	69	A	**ABD**

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Arkansas

KB5EKX	1	1	1	A	**A**

Louisiana

N5MYH	2,304	55	36	A	**ABD**
K5CZD	476	25	17	A	ABD
WA5RT	5,762	121	43	B	**ABD**

Mississippi

N5YLS	874	46	19	A	A**B**
KJ5RC	828	36	23	A	**AB**
KB5ZEA	154	14	11	A	AB
N3AWS	63	9	7	Q	A

New Mexico

KB5GY	2,430	58	27	B	AB**CD9EI**
N5XZM	2,028	52	26	B	ABCD**9E**
K5RHR	2,016	53	28	B	AB**C**D
KB5ZSK	531	35	9	B	ABCDE
W5IXR	260	20	10	B	ABCD
K5AM	40	10	4	B	AB

North Texas

N5NL	1,550	54	25	A	**ABD**
W8CM	42,453	312	89	B	**ABCD9E**
K5LOW	5,670	112	45	B	ABD
W5KQJ	3,104	61	32	B	BCD9E
WA5BU (N5VHO,KC5AMA,KC5QYO,KD5IMS,ops)	2,860	94	26	L	ABD

Oklahoma

K5HP	1,888	54	32	A	**ABD**
K5SW	3,040	67	40	B	**ABC**
WB5YWI	912	31	24	B	A**B**D
WD5AGO (+K4YA)	13,340	143	58	M	ABCDEHP

South Texas

AJ4F	250	25	10	A	A**B**
W4EUH	216	27	8	A	**B**
K5IUA	63,050	262	130	B	A**BCD9EFHIP**
K5VH	33,615	218	83	B	AB**C**DEF**H**
N5HHS	26,132	246	94	B	A**B**D
W3XO/5	14,560	143	65	B	ABCD9F
W5UWB	5,166	85	42	B	ABCDE
N5BA	1,600	46	25	B	ABC
K5DYY	1,176	35	24	B	ABDE
N5XU (KB5LBN,W5JLP,N3TNN,K5TR,KM5FA,ops)	9,225	172	41	L	ABCD

West Texas

N5WDZ	60	10	6	A	**AB**
KK5IH (+KK5KK)	14,276	131	86	M	ABCDE

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East Bay

KE6QR	976	52	16	A	**ABD**
W6OMF	19,158	207	62	B	**ABCDE**
K6HEW	6,392	108	34	B	ABCDE
KQ6DI	512	32	8	B	**C**

Los Angeles

KQ6QW	16,188	326	38	A	**ABCD**
KE6AXJ	4,160	174	16	A	ABCD
N5BF/6	504	27	14	A	ABCD
KD6RUH	14,706	289	38	B	**ABCD**
WB6JCD	3,280	97	20	B	BCD**9**
KF6YAL	1,846	117	13	B	ABD
W6GGV	930	38	15	B	BCD**E**
KF6EOJ	280	29	8	B	ABD
K6LMN	5,060	179	23	Q	ABCD
KQ6EE	1,650	67	15	Q	ABCD9
W6TOI (KB6WKT, KE6HPZ, N6WZI, ops)					
	54,272	536	64	M	ABCD9E
W2ODH/6 (+K6KWQ,KF6UBB,N6RMJ,W6PPT, WA6DJS)					
	101,545	671	115	L	ABCD
KB5MY (+K6FQ,NF6L,KC2CHN)					
	5,208	168	31	L	AB
K6OUE (+KF6YYV)					
	4,200	124	20	L	ABDE

Orange

KE6GFF	3,872	176	11	A	**D**
N6HC	2,325	155	15	A	**AB**
KN6VR	2,106	90	18	A	BE
KJ6JO	441	43	9	A	ABD
KE6QCB	368	37	8	A	BD
W6ERO	138	21	6	A	BD
K6TSK	46,588	372	76	B	**ABCDE**
K6IBY	3,808	89	34	B	ABCD
KR6VV	3,686	147	19	B	ABCD
KF6YJU	336	42	8	B	B
KQ6BS	330	55	6	Q	B

Pacific

NH6YK	144	19	6	A	**ABD**

Santa Barbara

KC6NBI	1,323	63	21	A	**AB**
KE6RCI	1,177	87	11	A	**BD**
N6ZE	882	55	14	A	AB**C**
W9EC	644	33	14	B	**ABCDE**
N6NL	220	17	11	B	**BD**
K6WLC (+AB6CF,K6NDV,K0BGL)					
	20,160	233	45	M	ABCD9EP

Santa Clara Valley

NR6CA	2,873	106	17	A	**ABCDE**
KF6IIU	66	22	3	A	B
N6JET	7,104	142	37	B	**ABCDE**
N6RZ	2,128	76	28	B	AB
AA6W	1,836	68	18	B	ABCDE
KF6A	1,536	96	16	B	**B**
KD6PAO	1,104	92	12	B	B
K6RFM	400	32	8	B	BCDE
W1QT/6	1,113	50	21	Q	ABD
AA6PA (+KA7TXV)					
	3,888	120	27	L	ABDE
K6PVJ (KF6MXK, K6HSV, WA6PYN, K6GWV, KE6HCK, KO6MX, ops)					
	2,236	117	13	L	BCD

San Diego

W6OYJ	540	34	12	A	**ABDE**
K6IAH	51	16	3	A	ABD
KF6JBB	7,178	155	37	B	**ABCD**

San Francisco

WA6KLK	9,555	200	39	B	**ABD**

San Joaquin Valley

K6MI	7,410	118	38	A	AB**CD9E**
N6MU (@N6NB)					
	3,740	187	20	A	**A**
N6AJ	48,576	321	88	B	**ABCD9E**
KM6WO	611	47	13	B	B
KF6CNV	287	41	7	B	B
WA6QYR	280	40	7	B	B

Sacramento Valley

KC6SEH	6,358	139	34	A	ABC**D**
KD6VNQ	4,768	126	32	A	AB**C**D
WB6NTL	38,332	324	74	B	**ABCDE**
KC6TEU	31,289	311	67	B	AB**CDE**
N6KBX	22,506	212	66	B	ABCDE
KC6ZWT	13,631	219	43	B	BCD
W6DHN	2,261	92	19	B	ABCD

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Arizona

KE7FC	5,940	106	45	A	**ABCDE**
KE7NR	10,020	120	60	B	**ABCDE**
WB7OHF	1,950	53	30	B	ABCD
W7ZT	850	50	17	B	AB
WA7VHF	481	30	13	Q	ABD

Eastern Washington

K7XW	10,175	146	55	B	**ABCD9E**
N7AU	1,134	44	21	B	ABC**E**

Idaho

N7EIJ	6,480	113	54	B	AB**D**
W7USB	4,017	96	39	B	AB**D**
KC7IJ	2,346	69	34	B	**AB**

Montana

K7VK	680	30	20	A	AB**D**
W7YM	500	25	20	A	**AB**
W7GJ	7,316	114	62	B	**ABD**
WA7PDC	527	31	17	B	A

Nevada

K7ICW	4,674	92	38	B	**ABCDE**
KB6KQ/7	1,606	55	22	B	ABC**D**

Oregon

W7DSA	2,158	64	26	B	AB**CD**
N7DB	2,024	79	22	B	**AB**CD
K7HSJ	595	23	17	B	ABCD**E**
W7MQY	250	25	10	B	B
W7LT (KC7AOI,KC7PDI,KC7BRJ,WB7UFJ,ops)					
	3,174	122	23	L	ABD

Utah

NJ7A	4,321	103	29	A	**ABCD9E**
N7DBW	1,360	66	16	A	AB**D**
K7LNP	4,008	110	24	B	**ABCD9E**
N7MLD	912	45	16	B	ABCD
KC7OLP	18	5	3	B	BD
N7GXD	16	4	4	Q	AB
K7RJ (+WJ7L,KK7SB)					
	1,312	63	16	L	ABCD

Western Washington

N7NGO	1,680	72	20	A	**ABD**
KW7R	1,580	76	20	A	ABD
AE7EE	304	38	8	A	AB
WA1IED/7	266	33	7	A	ABD
KE7SW	20,458	236	53	B	AB**CD9EF**
N7EPD	19,779	269	57	B	**ABCDE**
K7ND	13,158	148	51	B	ABCD**9**EF
N7CFO	2,816	102	22	B	ABCDE
W7SZ	1,128	45	12	B	CDE
W7/JR1NKN	96	24	4	Q	A
WB7DHC (+KA7GKK)					
	2,832	94	24	M	ABCDE
KD7BZX (+N4SL,WB7FJG)					
	1,615	72	19	L	ABD

Wyoming

KI7WB	110	11	10	A	**B**
WA7KYM	6,878	109	38	B	**ABCDE**

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Michigan

K8KD	7,854	139	51	A	AB**D**
N8AIA	7,611	139	43	A	AB**CD**
N8JFH	5,936	112	53	A	AB
N8SDQ	2,960	74	40	A	**AB**
N8ZVB	2,233	77	29	A	AB
N8DGD	528	43	11	A	ABD
KC8DRK	495	37	11	A	ABD
KD4DLA	44	9	4	A	BD
K8MD	82,400	425	160	B	AB**CD**9E
K2YAZ	72,744	345	168	B	**ABCD9E**
WZ8T	34,112	268	104	B	ABCD
K8KX	20,020	203	91	B	ABD
KB8U	12,804	164	66	B	ABCD
W8WNX	3,888	108	36	B	A
KG8ZF	559	36	13	B	BD
K8EB (+K8PZ,N4SC,KF8QL,KG8BK)					
	81,238	437	151	L	ABCD
WA8RLI (+N8OEO)					
	2,484	91	23	L	ABD

Ohio

K8RMR	12,789	181	63	A	AB**D**
KC8CCD	12,411	136	63	A	AB**CD9E**
KC8CSD	7,370	108	55	A	ABCD
WB8AUK	7,105	107	49	A	ABC**D**
K8FFO	6,048	112	54	A	AB
KB8UUZ	5,040	112	45	A	**AB**
N8BJQ	4,848	101	48	A	AB
W8DD	4,368	101	42	A	ABD
K8WW	1,694	59	22	A	ABCD
K8USA	1,309	58	17	A	BD
N8QQB	1,258	57	17	A	ABCD
W8IDM	658	43	13	A	ABD
KC8CFI	153	13	9	A	BD
KE8FD	122,760	405	198	B	AB**CD9EF**
K8TQK	116,982	414	194	B	AB**CD9**EF
W8ULC	15,400	220	70	B	**B**
KB8LFA	14,388	188	66	B	ABD
WD8AML	7,644	129	49	B	ABD
K8MR	6,860	116	49	B	ABCD
WA8RCN	4,960	124	40	B	AB
KT8U	3,959	90	37	B	ABD
WM8I	3,500	79	35	B	ABD
N8GHZ	3,276	69	39	B	ABCD
W8AIT	3,136	98	32	B	AB
WA8GMT	3,096	82	36	B	ABD
W8PLZ	2,144	60	32	B	ABD
W8DEL	1,496	61	22	B	ABD
W8BAE (KF8VB,op)					
	1,445	76	17	B	ABD
N8TQT	852	58	12	B	ABD
N8DOT	812	54	14	B	ABD
N8LIS	780	52	12	B	ABD
N2DPF	576	41	12	B	ABD
WB0IQK	432	35	12	B	ABD
KB8WZZ	330	25	11	B	ABD
N8QWJ	200	38	4	B	ABD
N8QQA	164	30	4	B	ABD
W8DQ	39	13	3	B	AB
N8VEA	20	5	2	B	D
N8WS	6	3	2	B	B
N8XA	4,602	67	39	Q	ABCD9E
WA8WZG (+N2CEI,K1WHS,WA8RJF,N5QGH, W5LUA)					
	891,165	1230	363	M	ABCD9EFGHIJKP
N8KOL (+KA8ROX)					
	69,222	425	139	L	ABCD

West Virginia

WB8TFV	6,006	121	42	A	**ABD**
W8TN	620	31	20	A	AB
K8KFJ	25	5	5	A	A
W8ZA	1,680	67	20	B	**BD**
WA8WV	198	18	11	B	B
K8JF (WA8DQR,WD8AFJ,K8LG,N8DIR,WF8X, WA8YCG,ops)					
	5,757	101	57	L	AB

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Illinois

N9TF	19,947	235	61	A	AB**CD**E
K9YR	16,864	209	62	A	**ABCD**
KE9NA	12,267	208	47	A	ABCD
K2DRH	5,616	108	52	A	AB
K0PG	4,172	103	28	A	ABCD**E**
KG9PF	4,094	142	23	A	ABCD
WB9WNZ	3,724	101	28	A	ABCDE
NN9K	2,905	83	35	A	**B**
K9PPW	248	31	8	A	B
WB9Z	88,404	453	159	B	**ABCD**
W9IIX	13,776	202	56	B	ABCD
W9RM	10,251	153	67	B	**A**
WA9FIH	8,547	185	37	B	ABCD
W9JGV	6,929	169	41	B	B
WA9CCQ	4,002	144	23	B	ABCD
W9JXN	3,844	106	31	B	ABD
N9WKW	3,838	98	38	B	ABD
WB9SNR	3,250	75	25	B	BCD**9E**
WA9RIJ	1,800	100	15	B	ABD
N9VKE	1,462	74	17	B	ABD
N9TUQ	1,372	83	14	B	ABD
W9NHX	1,248	92	12	B	ABD
WA9CJZ	776	79	8	B	BD
N9OWR	714	45	14	B	ABD
W9CEJ	680	68	10	B	B
KB9KDC	680	68	10	B	B
WO9S	671	61	11	B	AB
W9NSP	540	49	9	B	BCD
K9LPL	192	48	4	B	B
WA9SOV	96	24	4	B	AB
KA9UZH	96	24	4	B	B
AK9Y	68	34	2	B	B
K9DKI	52	26	2	B	B
W9ZZU	42	14	3	B	B
WN9GWC	18	9	2	B	B
N2BJ (+ops)					
	104,566	511	154	M	ABCD9E

Indiana

W9DZ	11,952	144	72	A	ABD
WA1MKE	11,340	123	70	A	**ABCD**
KB9NKM	5,830	110	53	A	AB
K9RQ	4,635	87	45	A	ABD
WB9DRB	546	24	21	A	ABC
K9EA	23,368	203	92	B	**ABCD**
K8LEE	8,450	169	50	B	**A**
KB9OMW	348	29	12	B	B
WD9DSN (+WD9DSP)					
	1,860	56	30	L	ABD

Wisconsin

W0UC	114,381	439	179	A	**ABCD9EFGHI**
K9VHF	14,504	169	74	A	ABD
WA1UJU/9	10,044	162	62	A	AB
K9MAL	8,083	117	59	A	ABCD
KB0LGB	2,204	58	38	A	AB
N9NDP	954	52	18	A	ABD
W9YCV	165	12	11	A	ABD
K9KL	71,632	373	148	B	**ABCDE**
W9GA	30,660	234	105	B	ABCDE
N9DG	13,260	173	68	B	ABCD
ND9Z	8,379	101	57	B	ABCDE
KB9TLV	8,008	134	56	B	ABD
N0AKC	6,579	81	51	B	ABCD**9E**
WA9LZM	5,076	89	54	B	ABD
W9PHJ	3,914	103	38	B	AB
W9JN	2,772	58	36	B	ABCD
N9LIA	888	33	24	B	ABD
N9UDX	840	37	21	B	ABD
WB9MXX	588	42	14	B	AB
N9HF	120	15	8	B	AB

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Colorado

N0VSB	32,490	237	95	B	**ABCDE**
W0ETT	9,464	133	52	B	ABCDE
K0RZ	8,440	108	40	B	ABCDE**I**
W6OAL	3,825	85	45	B	**A**
K0GU	2,769	55	39	B	ABCD
K0CS	2,128	64	28	B	ABD
N0NKG	243	27	9	B	AB
N0POH (+KB9YRX)					
	4,260	111	30	L	ABCD

Iowa

KM0T	64,413	307	153	A	**ABCDE**
N0SPP	5,130	84	57	B	**ABD**
W0YPT	4,972	77	44	B	**BCD**
NE0P	1,920	51	32	B	ABCD
AB0HF	1,120	40	28	B	AB

Kansas

N0LL	24,531	164	111	B	**ABCD**E
N0KQY	18,308	138	92	B	ABCD**E**
W0RT	4,094	78	46	B	ABD
W0EKZ	2,176	64	34	B	AB
KC0AHN (KB0YHU,KC0EMK,KC0GAA, N5CLU,ops)					
	1,650	55	25	L	ABDE

Minnesota

N0HJZ	104,550	509	150	A	**ABCD**E
WA0BWE	58,468	367	94	A	ABCD**9EFHI**
KB0ZEV	20,252	268	61	A	ABCD
W0KKN	19,593	258	63	A	ABD
KB0TZA	14,784	210	48	A	ABCDE
WA2VOI	13,920	201	40	A	ABCD9E
KA0PQW	13,090	145	77	A	ABCD
N0UK	10,620	149	45	A	ABCD9E
KB0LYL	4,518	251	18	A	B
KC0EPV	2,568	85	24	A	ABD
N0NAS	1,188	89	9	A	ABCD**I**
N0QHP	1,176	102	8	A	ABCD
W0EPZ	996	68	12	A	ABD
KC0GXO	531	48	9	A	ABD
KC0BVM	414	19	18	A	ABCD
N0RUC	328	68	4	A	BD
W0VB	135	15	9	A	AB
W0ZQ	65,856	366	112	B	**ABCD9E**
KB0VUK	25,245	191	85	B	ABCDE
WA2HFI/0	23,856	244	84	B	**A**BCDE
K0GJX	14,760	179	60	B	ABCDE
W0OHU	4,017	75	39	B	ABD
W0LCP	1,491	62	21	B	ABD
KA0NAN	1,440	114	9	B	ABCD
N0TXU	156	26	6	B	B
KB0OLI	96	48	2	B	B
WA0RLY	44	9	4	B	ABD
WB0LJC	372	41	6	Q	ABIJ

Missouri

N0PB	13,530	135	82	A	**ABD**
K4SSO	300	20	15	A	AB
W0JRP	325	24	13	B	**ABC**

North Dakota

NT0V	2,660	62	35	B	AB**CD**
WB0OAJ	2,491	53	47	B	**AB**

Nebraska

WD0BQM	3,240	65	36	A	**ABCDE**
N0YNP	8	2	2	A	D
W3PRR/0	6	2	2	A	BD
W0FRN	49	7	7	B	**AB**

South Dakota

WB0HHM	7,650	113	50	B	**ABCD**
WB0ULX	902	35	22	B	ABD

Quebec

VE2ZP	192	24	8	A	**AB**
VE2JWH	2,232	43	36	B	AB**CDE**
VE2VLJ	468	39	12	B	**B**
VE2PIJ	40	6	5	B	ABCD

Ontario

VE3KZ	26,936	278	91	A	**AB**D
VE3TMG	13,303	211	53	A	AB**D**
VE3FHU	4,264	83	41	A	AB**CDE**
VE3SXE	3,400	89	34	A	ABD
VE3NPB	2,184	45	26	A	ABCD**9EIP**
VE3BHW	608	32	19	A	B
VE3CVG	570	31	15	A	ABDE
VE3NPC	540	26	18	A	ABDE
VE3TLT	170	17	10	A	AB
VA3ST	30,685	234	95	B	**ABCD**
VE3BFM	2,812	52	37	B	ABCD

Manitoba

VE4KQ	1,830	54	30	B	**ABCD**

Saskatchewan

VE5SF	54	9	6	A	**AB**

British Columbia

VE7XF	4,429	90	43	A	**ABD**
VA7MM	420	42	10	A	A
VE7AGG	3,528	93	36	B	**ABD**

Rovers

Atlantic

K2TER (+KV2X)						
	95,612	527	82	R	ABCD9EFGHIP	5
N2OPW (+KB2VGH)						
	44,310	259	61	R	ABCD9EFGHIJP	9
AA2UK	42,891	252	51	R	ABDEFGHI	3
WO2P	42,470	306	54	R	ABCD9EP	8
N2KXS	41,536	322	51	R	ABCD9EP	8
N1XKT	9,720	174	27	R	ABCD9EFIP	2
K1DS	8,100	134	27	R	ABCD9EFIP	2
K4CHE (+KA3EKH)						
	3,200	69	32	R	ABCD9E	2
K2LDT (+N2TYQ)						
	2,538	85	27	R	ABCD	7
N3EMY	28	7	4	R	B	2

Central

KF9US	18,148	226	45	R	ABCD9E	7
N9YZK	15,190	175	62	R	BD	6
KA9WBT	11,340	159	45	R	ABCDE	6
N8KWX	1,582	81	14	R	BCD	3
K9TMW	572	44	13	R	B	4
K9ENZ	108	18	6	R	B	2
AK9Y/R	68	17	4	R	B	1

Dakota

W9FZ	65,337	409	87	R	ABCD9EF	8
KF0UK	21,094	262	53	R	ABCD9E	8
KC0P	5,460	166	26	R	ABD	6
WB0VHF	2,114	120	14	R	ABD	2
WJ0M	1,012	40	23	R	ABD	3

Delta

N4OFA	6,516	154	33	R	ABD	3

Great Lakes

NE8I	53,452	153	92	R	ABCD9EFGHIJK	8
KC8DRK/R	132	25	4	R	ABD	1
N8TQT/R	20	4	4	R	BD	2

Midwest

N0DQS	9,120	148	48	R	BD	15
KB0QGT	7,527	131	39	R	ABCD	8

New England

N1SSM/R	54	9	6	R	B	2
K1SW/R	15	4	3	R	BD	1

Northwestern

KA6T	852	54	12	R	ABCDE	3

Pacific

N6IV	324	27	6	R	BD	3

Roanoke

K9OYD	2,289	36	21	R	BDFI	4

Rocky Mountain

N3EUA	2,112	53	22	R	BCDE	2

Southwestern

N6TEB	71,037	486	81	R	ABCD9E	12
N6DN	33,600	352	60	R	ABCDE	8
KF6FZZ (+KF6FZY)						
	26,950	293	43	R	ABCDE	12
KC6UIX (+N6DQW)						
	15,249	168	69	R	ABD	4
N6VHF	13,579	254	31	R	ABCD	6
KE6MAS	13,515	166	53	R	ABCDE	4
WB6JDH	7,854	229	22	R	BCDE	4
NK4Q	4,770	74	53	R	ABD	6
AD6AF	2,592	112	16	R	ABD	4

West Gulf

W5DF (+AB5SS)						
	128,865	324	121	R	ABCD9EFGHIJP	12
K0MHC (+KE9IT)						
	14,448	208	48	R	ABCDE	8

Canada

VE3OIL	18,939	207	59	R	ABCD9EFIP	6
VE3IEY	1,680	50	28	R	ABD	5

QST

1999 ARRL 160-Meter Contest Results

By Dan Henderson, N1ND
Contest Branch Manager

Some call it "The Top Band." Others refer to it as "The Gentleman's Band." All who play on the 160-meter band call it something magical. Propagation and conditions can make it a challenge to any that tune their radio to 1.8 MHz. It offers a wide array of challenges. Those like me who reside on small city lots often shy away from it because of the demands of space a good antenna require. The aficionados of the band go to great lengths to excel at the challenges it presents.

Some looked to the 1999 ARRL 160 Meter Contest, held the first weekend in December, as a way to find a few new ones on for their DXCC or WAS goals. Others viewed it as a chance to test their mettle against some of the finest our hobby has to offer. A total of 604 entries, representing a total of 720 hams across the US, Canada and from 22 DXCC entities, were received.

When the smoke cleared, and the log checking was finished (with thanks to K8CC and K9TM for their hard work in that area), it was no surprise to see Jeff, K1ZM, once again reigning as the Single Op High Power champion. Jeff showed no signs of letting up in this event, as he once again raised the New England division record, which now stands at 395,300 points. Jeff is a repeat winner from 1998. He easily outdistanced runner-up Jon, AA1K, who scored a great total of 295,210. The third place finisher Bob, W4MYA, set a new Roanoke division record with his 269,063 point total.

Gordon, WA1LNP, operating club call KB1EGB, paced the Single Op Low Power category with 171,535 points. Gordon jumps to the top after a third place finish in 1998. Bill, AA4GA, operating from W4WA, placed second in this category while setting a new Southeastern division record of 132,799. Jim, K1PX, finished a strong third with 129,040.

Dick, WK3I, combined the challenges of 160 meters with the demands of QRP to accumulate 70,776 points and win a relatively close contest against Jess, K8LJQ, in the Single Op QRP category. Dick is a repeat champion in the category from 1998. Jess's 65,664 points were enough to set a new Great Lakes division record in this category. Dana, W3TS, finished a strong third. All total there were at least 14 of the 1998 Single Op Top Ten finishers that made a return trip to the boxes in 1999.

Ray, WA4KEJ, adjusting the inverted L tuning unit at the K4ZM station.

Charlie, W4TMR, and a wide assortment of QRP gear in his shack.

Don, KH6DX/6's, "mobile base" used a screwdriver antenna to make a respectable showing from the LAX section.

The top of the multi-op box isn't a reprint of 1998 scores: it is a repeat performance by both the first and second place finishers. Leading the way again among some strong multi-operator entries were the team at W8JI with a final score of 295,704. K8XXX's operators score of 236,964 was good enough to take second place overall, while K9NR's efforts led to a third place finish. Congratulations to all of the participants.

The club scores also showed spirited competition among many of the top-contesting clubs. The Potomac Valley Radio Club fended off a challenge from the Frankford Radio Club to take top honors in the Unlimited Category 2,681,778 to 1,525,454. In the medium club category, the Society of Midwest Contesters held off the Yankee Clipper Contest Club 1,549,795 to 1,417,884. The Hudson Valley Contesters and DXers triumphed in the Local Category over the Central Texas DX and Contest Club 650,113, to 308,095. Congratulations to the gavel-winning clubs.

You will probably notice some reduction

Affiliated Club Competition

	Score	Entries
Unlimited Category		
Potomac Valley Radio Club	2,681,778	44
Frankford Radio Club	1,525,454	31
Medium Category		
Society of Midwest Contesters	1,549,795	20
Yankee Clipper Contest Club	1,417,884	27
South East Contest Club	807,879	8
Minnesota Wireless Assn	717,321	17
Rochester (NY) DX Assn	462,314	8
Tennessee Contest Group	375,486	12
Kentucky Contest Group	317,546	4
North Coast Contesters	298,144	7
Mad River Radio Club	278,833	5
Mile High DX Assn	212,905	4
Grand Mesa Contesters	162,738	3
Texas DX Society	147,505	3
North Texas Contest Club	132,840	3
Florida Contest Group	83,157	4
Southern California Contest Club	75,825	6
Western Washington DX Club	44,296	4
Mother Lode DX/Contest Club	40,005	3
Northern California Contest Club	37,785	4
Local Category		
Hudson Valley Contesters and DXers	650,113	5
Central Texas DX and Contest	308,095	6
West Park Radiops	21,864	3

Top Ten

Single Operator, QRP

WK3I	70,776
K8LJQ	65,664
W3TS	45,472
N4ROA	34,692
W4TMR	30,651
N7IR	27,830
N9NE	23,520
WA8RCN	22,231
N4BP	21,805
W9PNE	18,400

Single Operator, Low Power

KB1EGB (WA1LNP, op)	171,535
W4WA (AA4GA, op)	132,799
K1PX	129,040
K1KY	109,368
K9AY	107,600
K7CA	102,641
K9OT	101,602
N0AT	98,842
K4AO	97,090
K3JT	90,798

Single Operator, High Power

K1ZM	395,300
AA1K	295,210
W4MYA	269,963
W9LT (at W8LRL)	251,992
AA8U (W8MJ, op)	212,220
KE9I	207,450
K1VW	205,088
K9DX	204,336
N4AF	204,300
W9RE	200,695

Multioperator

W8JI	295,704
K8XXX	236,964
K9NR	206,115
K2UG	202,752
N1RR	189,600
K3WW	179,000
W0UCE	156,816
W0AH	130,216
WN9O	129,504
K8FC	118,179

of your entry. This is the first year that the log checkers reviewed 160-meter contest electronic entries. If you would like a copy of your report, drop an e-mail to **K8CC@contesting.com**. In the subject line put your call sign and "1999 ARRL 160 Meter UBN request." Bear in mind that those reports must be manually generated, so be patient after your request. Your report will be on its way to you as soon as possible.

The year 2000 ARRL 160-Meter Contest will take place on the weekend of December 1-3. If the great operating conditions of the past 12 months are any indication, we suspect that there will be a large contingent of operators looking to make their mark on the "top band." In the next several months we all have a chance to do some prep working getting the stations ready for what is always a true challenge. Remember that electronic entries to the ARRL for this contest must be in the Cabrillo file format. Good luck as you prepare to take on the "Gentleman's Band" in December.

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)		
WK3I	70,776	A	N4ROA	34,692	A	K8LJQ	65,664	A	KI0G	17,118	A	N7IR	27,830	A
W3TS	45,472	A	W4TMR	30,651	A	N9NE	23,520	A	K0RI	16,377	A	KU7Y	18,377	A
K2DW	12,028	A	N4BP	21,805	A	WA8RCN	22,231	A	WA7LNW	7,075	A	KJ7WY	8,604	A
AA3GM	10,200	A	K4MJ	14,160	A	W9PNE	18,400	A	KI0II	6,685	A	N6WG	6,120	A
N1TM	9,216	A	KV8S	12,888	A	K8SM	18,228	A	N0UR	5,640	A	N7VY	3,564	A
KB1EGB (WA1LNP, op)	171,535	B	W4WA (AA4GA, op)	132,799	B	K9OT	101,602	B	K7CA	102,641	B	W7RM (KI7Y, op)	71,568	B
K1PX	129,040	B	K1KY	109,368	B	K4AO	97,090	B	N0AT	98,842	B	K7QQ	50,388	B
K1NK	87,516	B	K9AY	107,600	B	WA8TMK	88,448	B	W0UO	86,260	B	W7LD	46,116	B
NA2AA	72,288	B	K3JT	90,798	B	K9MMS	75,331	B	K0BJ	47,390	B	N6NF	42,640	B
NY3A	72,102	B	WJ9B	84,774	B	WA8YRS	74,624	B	K0XQ	27,816	B	VE7SL	29,169	B
K1ZM	395,300	C	W4MYA	269,963	C	AA8U (W8MJ, op)	212,220	C	W0SD	170,720	C	N7GP	115,419	C
AA1K	295,210	C	W9LT (atW8LRL)	251,992	C	KE9I	207,450	C	N0AC (at WA0ROI)	163,163	C	N6SS	92,264	C
K1VW	205,088	C	N4AF	204,300	C	K9DX	204,336	C	K5NA	135,124	C	KH7R (KH6ND, op)	85,701	C
K3SV	196,224	C	K4IQ	151,962	C	W9RE	200,695	C	NR0X	120,888	C	KG7H	72,150	C
W1ECT	189,042	C	K4EA	138,591	C	K8ND	190,193	C	WA0QMU	90,576	C	W7GG	71,496	C
K2UG	202,752	D	W8JI	295,704	D	K8XXX	236,964	D	W0AH	130,216	D	K7RAT	89,096	D
N1RR	189,600	D	W0UCE	156,816	D	K9NR	206,115	D	W0TM	116,880	D	N6KB	45,500	D
K3WW	179,000	D	W4MR	101,634	D	WN9O	129,504	D	N0MJ	96,368	D	W6AW	39,710	D
K8FC	118,179	D	K3KO	101,634	D	NZ9R	82,745	D	N5TW	88,776	D	W6YRA	36,660	D
N2SA	106,470	D	K4HA	87,075	D	VE3EJ	74,868	D	NA5B	71,250	D	VE6JY	6,765	D

Scores

Scores are listed by DXCC Countries and ARRL/RAC section. Within each Country or section, scores are listed in descending order, by power categories, followed by multi-operators. Line scores list call sign, score, QSOs, multipliers, power (A = QRP, B = Low Power, C = High Power, D = Multioperator).

Asia

Japan

JR3EOI	500	25	10	B
JE1SPY	224	16	7	B
JF2FIU	2	1	1	B
JA7NI	984	41	12	C
JA1YNE(JP1OGL, op)	528	24	11	C
JA4YPE (JF3EBO, op)	8	2	2	C
JH0ZHQ (JH1BBT,JH1GNU,JH1KLA, JH1SBE,JH1MDJ, JK1GKG,JJ1VKL, JA0VSH, ops)	1,564	46	17	D

Europe

Croatia

9A7V	308	14	11	B
9A2TW	3,900	78	25	C

Fed. Rep. of Germany

DF2PY	5,580	90	31	C

Belarus

EW3LB	360	9	8	C

France

F5RZJ	1,716	39	22	C
F5JBR	98	7	7	C

Italy

I3VHO	7,440	120	31	C
I0KHP	20	2	2	C

Lithuania

LY2VAD (LY1FZ,LY3BS, ops)	812	29	14	D

Finland

OH2BO	630	21	15	C

Czech Republic

OK2PWJ	608	19	16	B
OK1AEZ	3,432	66	26	C
OK2EQ	390	15	13	C

Slovakia

OM5KM	1,152	32	18	B
OM5RW	480	20	12	B
OM2XW	2,622	57	23	C

Belgium

ON4WW	2,000	50	20	C

Netherlands

PA0CLN	3,654	63	29	C

Slovenia

S57M	4,644	86	27	C

Poland

SP5CJQ	442	17	13	C

European Russia

RA6AX	72	6	6	C
RU1AO	32	4	4	C
RV1CC	32	4	4	C
RA4NW	20	2	2	C

Ukraine

UU7J (UU8JK,UU4JMG,UU0JM, ops)	18	3	3	D

Yugoslavia

YU1RA	520	20	13	B

North America

Saint Martin

FS/W2QM (W2JB,N2BIM, K2CO, ops)	13,630	145	47	D

Turks & Caicos Islands

VP5/KN4UG	15,744	198	41	B

Mexico

XE2/N7NC	40,672	328	62	B

Cayman Islands

ZF2AH	59,008	461	64	B

Oceania

Australia

VK6VZ	1,512	36	21	C

US

1

Connecticut

N1TM	9,216	144	32	A
NM1K	4,998	72	34	A
N1TKS	2,112	48	22	A
K1PX	129,040	760	80	B
WB8IMY	10,656	144	37	B
NX1Q	9,620	130	37	B
K1BTD	7,872	123	32	B
K5GMX	6,888	123	28	B
W1CTN	4,920	82	30	B
K1VW	205,088	866	104	C
N1RL	56,196	425	63	C
NT1N	41,418	330	59	C
N1MD (+packet)	5,100	75	34	D

Eastern Massachusetts

K1QM	3,312	72	23	A
K1DC	31,747	289	53	B
W1VIV	30,573	351	43	B
K1NTR	24,080	280	43	B
N1DM	18,396	210	42	B
NZ1Q	16,400	200	41	B
K1HT	13,440	162	40	B
K1JE	4,480	80	28	B
N1XYR	1,080	30	18	B
K1ZM	395,300	1357	118	C
K5MA	49,436	305	68	C
K2LP	15,503	205	37	C
K1VV	7,420	106	35	C
WO1N	7,161	107	33	C
KR1B	5,478	83	33	C
N1RR (+N1XS,WM1K)	189,600	857	96	D
K1TWF (+packet)	41,106	315	62	D

Maine

W1CEK	50	5	5	B
K1FK	63,674	482	62	C
K1PQS	22,100	209	50	C
N1CGP	18,286	223	41	C
K1MY (+packet)	10,004	119	41	D

New Hampshire

AA1SB	1,560	39	20	A
KB1EGB (WA1LNP, op)	171,535	851	91	B
W1ECT	189,042	825	98	C
N1KWF (+packet)	14,616	171	42	D

Rhode Island

AB1BX	21,608	292	37	B
K2MN	12,768	168	38	B
W1OP	70,361	467	71	C
K1DFT	54,243	399	63	C

Vermont

W1SJ	164,815	920	85	C

Western Massachusetts

W1CSM	8,448	128	33	A
W1TO	70,226	451	73	C
K5ZD	26,460	162	60	C
KZ1M	22,815	240	45	C
K1AE	6,314	62	41	C
NC1I (+W1QA)	89,856	522	78	D
K1TTT (+packet)	6,400	100	32	D

2

Eastern New York

K2DW	12,028	194	31	A
KG2H	3,224	62	26	A
K2YR	14,282	193	37	B
W2ENY	11,020	145	38	B
WB2PUH	1,178	31	19	B
W2RE	179,543	892	91	C
W2XL	150,328	817	86	C
N1EU	65,262	420	73	C
K2UF	40,969	370	53	C
NA2M	32,536	280	56	C
K2UG (WA2JQK,KY2J, ops)	202,752	975	96	D
N2SA (+AB2CE)	106,470	663	78	D

NYC-Long Island

W2HLI	28,944	265	54	B
W2KTF	11,088	168	33	B
W2JGQ	7,920	126	30	B
KA2D	6,014	97	31	B
WB2DLA	2,592	54	24	B
N2GA	2,392	52	23	B
K2OVS	2,000	50	20	B
W2LK	10,224	142	36	C
WB2TPS	1,584	44	18	C
K2QMF (+packet)	20,592	183	52	D

Northern New Jersey

W2JEK	3,700	74	25	A
K1NK	87,516	642	66	B
NA2AA	72,288	481	72	B
N2CG	7,272	101	36	B
K2SZ	3,422	59	29	B
N2LK	3,266	71	23	B
N2KJM	1,554	37	21	B
N2ED	108,888	671	78	C
W2YR	47,286	312	71	C
W2HCA	7,480	110	34	C
K5KG (+packet)	101,816	529	88	D
NO2R (+packet)	78,964	485	76	D
K2TW (+packet)	48,836	400	58	D
W2NO (+packet)	23,226	237	49	D
W2GD (+packet)	15,705	173	45	D
N2WM	4,522	65	34	D

Northern New York

WZ2T	144	9	8	A
W2IB (+N4TW)	54,065	490	55	D

Southern New Jersey

WK2G	62,118	478	63	B
K3OX	18,614	227	41	B
K2JF	7,632	106	36	B
W2TO	21,896	185	56	C
W2GE	11,766	159	37	C
K2PT (+K1JT)	80,109	564	69	D
N2VW (+packet)	14,064	145	48	D
K2SB (+packet)	13,350	123	50	D

Western New York

N2CU	37,024	353	52	B
W2TZ	35,024	398	44	B
KA2CDJ	31,680	258	60	B
W2TX	13,542	183	37	B
K2CF	13,468	182	37	B
WA2QKF	10,800	150	36	B
WA2RZJ	8,806	119	37	B
KG2NO	7,200	100	36	B
K2AXX	188,046	936	93	C
K2FU	109,731	672	79	C
N2WK	57,975	376	75	C
N2UM	14,448	172	42	C
KX2H	9,576	126	38	C
K8FC (+packet)	118,179	692	81	D
W2RW (+WB2KAO,K9EEE)	31,866	339	47	D
W2SEX (K2YW,K2ZR, ops)	7,000	100	35	D

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Delaware

AA1K	295,210	1211	106	C
W3PP	9,994	118	38	C
NW3Y	36,765	306	57	D

Eastern Pennsylvania

W3TS	45,472	461	49	A
NY3A	72,102	582	61	B
N4XU	39,744	414	48	B
WF3M	33,570	370	45	B
WA3IIA	12,040	149	40	B
N3RM	11,286	147	38	B
W3JS	3,408	71	24	B
W3ZMN	864	24	18	B
W8IJ	560	20	14	B
K3SV	196,224	947	96	C
W3BGN	177,312	805	96	C
N3FA	45,320	412	55	C
W3FV	42,060	334	60	C
K3NW	35,380	287	58	C
K3QIA	31,536	286	54	C
AA3B	31,410	349	45	C
K3OO	25,334	221	53	C
K4JLD	24,957	180	59	C
K3OQF	19,008	195	48	C
WT3W	15,456	152	48	C
W2OX	3,556	62	28	C
K3WW (+packet)	179,000	805	100	D
W3OV (+packet)	59,776	419	64	D
K3NZ (+packet)	23,052	220	51	D
W3MF (+ops)	13,860	151	45	D
NE3F (+KS3F)	11,886	134	42	D
KE3VN (+packet)	9,630	98	45	D
K3PP (+packet)	9,476	97	46	D
K3ZA (+packet)	6,758	109	31	D

Maryland-DC

WK3I	70,776	481	72	A
N1WR	46,255	416	55	B
K3SA	26,166	258	49	B
W3CP	24,581	260	47	B
W2GG	23,112	211	54	B
WD3A	14,350	175	41	B
NV3V	12,876	174	37	B
K3DI	11,766	159	37	B
W3UL	8,568	119	36	B
N3II	7,557	113	33	B
K3NJ	756	21	18	B
W3GN	68,943	510	67	C
K3ZO	38,114	320	59	C
N3AM	35,784	309	56	C

N3NT	30,750	303	50	C
N3HUV	29,925	331	45	C
K3MM	80,344	442	83	D
N3OC (+packet)	34,221	270	61	D

Western Pennsylvania

AA3GM	10,200	150	34	A
WW3S	34,424	328	52	B
NA3V	18,146	211	43	B
AA3LX	14,100	150	47	B
K3MJW (KA3JWJ, op)	13,376	152	44	B
NB4J	11,610	135	43	B
W3IA	5,530	79	35	B
WA3GQU	45	9	5	B
W3GH	122,550	675	86	C
K3MD	94,217	656	71	C

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Alabama

W4DEC	3,050	61	25	A
K4ZM	2,254	49	23	A
K4KJP	700	25	14	A
K4WI	68,809	509	67	B
W4NTI	7,210	103	35	B
K4XR	69,642	468	73	C
AF4OD	39,780	306	65	C
KS4YT (+KV4T)	67,275	480	69	D

Georgia

K4MJ	14,160	177	40	A
W4WA (AA4GA, op)	132,799	821	79	B
K9AY	107,600	647	80	B
N4DU	29,376	303	48	B
K4BAI	16,928	184	46	B
K4EA	138,591	762	87	C
W8JI (+WA4TT,N8VW)	295,704	1170	111	D

Kentucky

K4AO	97,090	689	70	B
K4FDK	12,900	150	43	B
KC4WQ	9,680	121	40	B
W4PDZ	7,480	110	34	B
N4AR	174,600	931	90	C
N4GN	36,176	320	56	C
K4JMN (+K2YJL,N4HT,WA4CET,K4IE)	64,052	472	67	D
KG4BIG (+KT4ZX)	22,313	209	53	D

North Carolina

W4TMR	30,651	299	51	A
W2VMX	3,240	60	27	A
WJ9B	84,774	576	71	B
KS4S	47,432	416	56	B
K4JYS	29,484	225	63	B
KE4QZB	7,260	110	33	B
N4AF	204,300	906	100	C
N4XD	105,327	606	83	C
AA4S	45,175	334	65	C
N4UH	25,764	220	57	C
W0UCE (+packet)	156,816	935	81	D
K3KO (+packet)	101,634	635	78	D
W4MR (AA4NC,K4MA,K4HA, ops)	101,634	635	78	D
K4HA (+AA4NC,K4MA)	87,075	540	75	D
K4PB (+packet)	46,920	336	68	D

Northern Florida

K4LDR	40,565	319	61	B
W4ROM	26,160	215	60	B
WB4IHI	11,320	140	40	B
KN4Y	4,862	92	26	B
W7QF	15,925	158	49	C

South Carolina

W8PC	41,460	338	60	B
N1CC	1,440	36	20	B
AA4V	45,761	334	67	C

Southern Florida

N4BP	21,805	215	49	A
K4CXX	5,644	83	34	B
W4OX	20,706	174	58	C
K2OY	11,934	111	51	C
K4LQ	8,073	102	39	C

Tennessee

K1KY	109,368	749	72	B
NA4K	52,864	445	59	B
N4ZI	39,600	360	55	B
W4DAN	31,605	321	49	B
K4AMC	13,038	159	41	B
W4NZ	12,546	153	41	B
WO4O	12,276	138	44	B
AC4JI	11,520	144	40	B
N4PQV	11,076	142	39	B
WB3JKQ	5,742	87	33	B
W4YGE	4,773	129	37	B
W4TDB	216	12	9	B
K4WX	48,240	402	60	C
K0EJ	28,404	263	54	C
K4RO	26,076	240	53	C
W9WI	23,300	233	50	C
W4CBX (+W4FXO)	80,230	553	71	D

Virginia

N4ROA	34,692	354	49	A
AD4TJ	61,110	479	63	B
AB4I	36,840	301	60	B
W4YE	36,570	342	53	B
W4UQ	28,652	241	58	B
N4MM	17,950	175	50	B
K4ORD	17,673	204	43	B
W4HM	17,618	190	46	B
K4YT	12,480	156	40	B
W2YE	11,309	130	43	B
K4UK	6,936	102	34	B
N3ZYU	1,496	34	22	B
W4MYA	269,963	1156	103	C
K4IQ	151,962	837	86	C
K4OAQ	105,450	696	74	C
N4RV	56,525	298	85	C
N3JB	43,098	310	66	C
K4IX	14,592	152	48	C
K1GG	12,624	130	48	C
K4VV	12,432	148	42	C
K4UX	11,546	124	46	C
K4FOY	11,357	134	41	C
WA4QDM(+packet)	29,328	312	47	D
N3RC (+packet)	9,553	115	41	D
W4HZ (+packet)	3,875	58	31	D

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Arkansas

KJ5WX	37,721	277	67	B
W5HUQ	33,096	294	56	C
W5KL	5,530	79	35	C

Louisiana

K5MC	32,142	242	66	C
W5WMU	19,344	200	48	C
W5DDX (WM9M,W5FKX,WD8LLR, K1DW, ops)	76,516	511	74	D
W5OT (WA5TWL, op) (+packet)	31,436	271	58	D

Mississippi

AB5YY	11,200	140	40	B
WA5NYG (+AB5XP,KC5FQZ,KD5GCG)	25,245	228	55	D

New Mexico

W5JRP	7,380	90	41	B
W6PU	79,500	524	75	C
N5UL	31,124	248	62	C
N6ZZ	18,179	178	49	C

North Texas

W0UO	86,260	560	76	B
W5CWQ	16,362	147	54	B
WK5K	8,930	116	38	B
KY5S	2,912	52	28	B
K5RX	41,795	314	65	C
N5KB	4,785	71	33	C

Oklahoma

K5HP	65,205	471	69	C
N5OT	19,764	183	54	C
NA5B (+W5AO,K3LR)	71,250	466	75	D

South Texas

K4NR	16,416	149	54	B
AF5Z	11,088	123	44	B
N5AFV	4,356	66	33	B
K5TR	598	23	13	B
K5NA	135,124	796	83	C
N5CQ	70,445	472	73	C
K5XR (W5ASP, op)	57,368	404	71	C
K5NZ	37,076	296	62	C
AC5AA	7,600	100	38	C
NA4M	2,064	43	24	C
N5TW	88,776	609	72	D
K5IUA (+WA5SNL,WA4TQS,K5QLP)	53,061	371	69	D

West Texas

NV5S	2,256	47	24	A
N5DO	15,768	143	54	B
NZ5M	50	5	5	B

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East Bay

N6WG	6,120	126	24	A
WA2BHJ	2,750	61	22	B
KE6QR	1,872	52	18	B
K6TS	12,455	131	47	C

Los Angeles

KU6T	1,843	47	19	A
W6ZH	1,106	38	14	A
K0INT	10,767	144	37	B
W6LX	4,602	87	26	B
N6GL	4,378	98	22	B
K6ASK	240	15	8	B
KH6DX	57,456	366	76	C
N6ED	16,146	204	39	C
KQ6ES	13,377	170	39	C
W7RF	8,052	90	44	C
N5BF	2,000	50	20	C
W6YRA (WA6AYI,KC6LDO,AC6YV, KU6T, ops)	36,660	301	60	D

Orange

N6BM	15,752	176	44	B
N6CMF	15,394	176	43	B
N6HC	5,852	103	28	B
W6QZ	897	69	13	B
N6PE	21,168	196	54	C

Pacific

KH7R (KH6ND, op)	85,701	510	77	C

Santa Barbara

W6VM	13,005	143	45	B
W6WQC	5,330	101	26	B
W6ND	5,049	153	33	B
W6JEO	2,147	55	19	B
W7CB/6	26,660	206	62	C
N6KB (+KF6TQI,K6SUY,WB6YPR)	45,500	307	70	D

Santa Clara Valley

KB6FPW	2,205	51	21	A
N6NF	42,640	325	65	B
K6GL	4,560	76	30	B
K6MO	20,500	193	50	C
K6XX	10,277	112	43	C
K6III (+packet)	2,448	68	18	D

San Diego

W8QZA/6	528	21	11	A

San Joaquin Valley

K6MI	3,456	54	32	A
WA6YEE	19,826	214	46	B
K6YK	7,004	100	34	B
WA6FGV	3,363	87	19	B
KI6PG	2,136	43	24	B
K6SE	68,941	469	71	C

Sacramento Valley

W6UT	26,100	258	50	B
W6RKC	13,005	143	45	B
N6AFI	1,056	33	16	B
N6JV	55,964	395	68	C
N6RK	26,488	232	56	C
K6DB	24,864	216	56	C
W6AW (+WB6RVR,K6PW,WA6USI, K6LQ)	39,710	349	55	D

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Arizona

N7IR	27,830	247	55	A
KJ7WY	8,604	118	36	A
N7VY	3,564	66	27	A
AC7A	27,360	234	57	B
K7NU(WA2DFI, op)	20,470	215	46	B
NN7A	18,768	172	51	B
N7GP	115,419	693	79	C
N6SS	92,264	577	76	C
W7YS	27,405	204	63	C
K7ON	16,942	194	43	C
W7ZT	2,184	44	24	C

Eastern Washington

W7UB	30,030	273	55	C

Idaho

W7UQ (K7TQ, op)	2,256	47	24	A
WX7G	24,539	230	53	B
K0TO	9,040	113	40	B
KK7A	3,712	64	29	B
KG7H	72,150	475	75	C

Montana

AB7CE	864	24	18	A
K7BG	54,250	386	70	C
KS7T	40,016	325	61	C

Nevada

KU7Y	18,377	194	47	A
N7PU	22,568	200	56	B
NW7O	2,530	56	22	B

Oregon

W7GG	71,496	486	72	C
K7AW (K5ZM, op)	9,890	115	43	C
K7RAT (K7EW,K7NT,W7NX,N6TR, ops)	89,096	578	74	D

Utah

WA7LNW	7,075	140	25	A
K7CA	102,641	656	77	B
W7HS	23,705	214	55	B
K8EI	6,432	99	32	B
KO7X	11,836	133	44	C
WA7ADK	10,878	128	42	C
NS7K (+NS7B,N6GDS,KB7RUQ, W0YSE)	24,336	231	52	D

Western Washington

W7RM (KI7Y, op)	71,568	467	72	B
K7QQ	50,388	366	68	B
W7LD	46,116	363	63	B
AD7U	9,920	121	40	B
N7LOX	9,028	119	37	B
N7ETC	7,511	100	37	B
NM7M	7,035	96	35	B
NK7V	5,032	74	34	B
AB7RW	1,748	38	23	B
W7QC	48,750	366	65	C
KB7N	24,168	209	57	C
N6HR	23,600	200	59	C
K7UU	11,176	124	44	C
W7LGG	1,590	41	15	C
K1LOG/7	754	29	13	C

Wyoming

W7SE	62,977	433	71	C
K7EY	40,296	289	69	C

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Michigan

K8LJQ	65,664	510	64	A
W8RU	11,890	145	41	A
K8CV	9,724	143	34	A
NE8O	41,384	359	56	B
K8VT	30,345	296	51	B
W8IC	18,180	202	45	B
N8IA	14,924	182	41	B
K8IR	13,616	148	46	B
K8SIA	11,600	145	40	B
N8KR	11,275	136	41	B
W8WVU	9,960	166	30	B
KT8X	7,104	96	37	B
N8VEN	5,888	92	32	B
W8ROS	4,422	67	33	B
AA8U (W8MJ, op)	212,220	1140	90	C
N8EA	124,666	721	83	C
ND5S/8	104,784	699	74	C
K8XXX (N8CC,NU8Z,K8AQM,K8KS, K8JM,KG8CO,W8MC,K8AEM, ops)	236,964	1235	93	D
W8DCQ (+WB8GUS)	17,248	196	44	D

Ohio

WA8RCN	22,231	235	47	A
K8SM	18,228	217	42	A
KD8FW	12,160	152	40	A
N8XA	11,438	133	43	A
WA8TMK	88,448	688	64	B
WA8YRS	74,624	580	64	B
N8AA	30,360	250	60	B
W8DHG	18,480	162	56	B
KC8IYG	15,170	185	41	B
W8IDM	10,890	165	33	B
W8PN	9,100	130	35	B
K8LN	8,466	123	34	B
AF8C	3,186	59	27	B
K8ND	190,193	1034	89	C
WA8TNO	13,038	159	41	C
N8WS	7,788	118	33	C

West Virginia

KV8S	12,888	179	36	A
K8OWL	2,668	58	23	A
K3JT	90,798	600	74	B
W8ZA	19,035	210	45	B
WA8WV	7,412	109	34	B
W9LT (at W8LRL)	251,992	1051	104	C
K8OQL	124,915	718	83	C
K2UOP	94,800	596	75	C

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Illinois

W9PNE	18,400	200	46	A
K9OM	17,000	170	50	A
N9DT	3,840	60	32	A
K9PG	2,288	52	22	A
K9MMS	75,331	529	71	B
K9LU	51,480	468	55	B
WO9S	47,488	424	56	B
KJ9O	28,392	252	56	B
W9YS	21,889	205	53	B
K9MOT (K9PW, op)	18,200	182	50	B
K9PPW	15,648	163	48	B
N9TF	9,744	116	42	B
W9LNQ	9,240	110	42	B
K9JE	7,000	100	35	B
K9DX	204,336	1134	88	C
N9JF	111,296	749	74	C
NO9Z	111,188	721	76	C
KI9A	56,140	398	70	C
K9CC	31,928	307	52	C
K9AB	15,210	166	45	C
W9CA	13,590	151	45	C
K9NR (+K9CS,WB9Z,K9IFO)	206,115	1098	91	D
K9HMB (+packet)	72,930	390	85	D
K9QVB (+K9PG)	38,272	368	52	D

Indiana

WB9CIF	65,736	452	72	B
W9SMC(KJ9C, op)	39,058	331	59	B
WD8DSB	38,340	355	54	B
K9AF	29,436	217	66	B
K9WX	7,400	100	37	B
K9CUN	304	19	8	B
KE9I	207,450	1115	90	C
W9RE	200,695	1096	89	C
WN9O	129,504	843	76	D
NZ9R (+KG9AP,WA2KVX)	82,745	613	67	D
+K9MI (+packet)	19,656	189	52	D

Wisconsin

N9NE	23,520	245	48	A
AF9J	1,800	50	18	A
K9OT	101,602	682	74	B
WA1UJU	47,226	463	51	B
NI9C	44,172	409	54	B
K9DAF	39,102	343	57	B
K9OSH	9,282	119	39	B
WD9GWH	7,700	110	35	B
W0AIH(K0TG, op)	145,920	903	80	C
WT9Q	106,272	732	72	C
WA9IRV	65,024	508	64	C
WA9TZE	10,252	115	44	C
WI9M	5,580	90	31	C

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Colorado

KI0G	17,118	157	54	A
K0RI	16,377	153	53	A
KI0II	6,685	94	35	A
W9KV	8,970	96	46	B
K0UK	28,740	238	60	C
K0MP	24,249	204	59	C
W0CP	18,144	162	56	C
W0AH (+KD7MD)	130,216	776	82	D
W0TM (+N0KE,K0CL)	116,880	717	80	D

Iowa

KB0SK	12,936	147	44	B
K0SRL	7,252	98	37	B
WB0B	3,120	60	26	B
NE0P	3,080	55	28	B
N0AC(atWA0ROI)	163,163	1052	77	C
NR0X	120,888	822	73	C
WA0QMU	90,576	609	74	C

Kansas

K0BJ	47,390	334	70	B
K0RY	14,335	151	47	B
KI6DY	10,140	130	39	B
W0WPL	3,366	51	33	B
W0UY	20,150	200	50	C

Minnesota

N0UR	5,640	94	30	A
N0AT	98,842	677	73	B
K0XQ	27,816	244	57	B
W0UC	21,831	190	57	B
W0ZQ	18,044	172	52	B
K0AD	15,250	151	50	B
KN0V	5,688	79	36	B
W0HW	89,744	632	71	C
W3FAF	85,058	599	71	C
K0IR	24,614	197	62	C
N0IJ	11,029	133	41	C
N0MJ (+packet)	96,368	628	76	D
KR0B (KS0T,N0RA, ops)	47,458	389	61	D
W0JH (N0MR,W0SEI, ops)	41,820	306	68	D
WA0RBW(+W0DC)	40,077	327	61	D
KT0R (+packet)	37,620	312	60	D
WR0DK (+packet)	24,948	231	54	D

Missouri

WD0FLJ	2,700	54	25	A
W0TY	15,456	161	48	B
WB0QLU	8,268	106	39	B
N0TT	88,410	630	70	C
K0OU	30,628	244	62	C
K4VX	11,868	138	43	C
NS0B	2,760	46	30	C

Nebraska

K0NC	2,346	51	23	B
W0UVC	200	10	10	B

South Dakota

W0SD	170,720	1058	80	C

Canada

Maritime

VE1KB	6,798	103	33	B
VO1WET	2,112	44	24	B

Quebec

VE2ZP	47,850	402	58	B
VE2AWR	17,360	217	40	B
VE2OJ (VE2FLD,VE3FFK,VE3NJ, VE3OP,VE3WCE, ops)	69,630	630	55	D

Ontario

VY2MGY/3	6,200	100	31	A
VE3KP	71,980	587	61	B
VE3OSZ	55,380	451	60	B
VE3UZ	27,168	280	48	B
VE3STT	25,431	258	49	B
VE3WZ	12,090	155	39	B
VE3BNO	8,695	116	37	B
VE3PN	91,134	507	83	C
VA3IX	4,380	73	30	C
VE3EJ (+packet)	74,868	537	68	D
VE3MIS (VA3UA,VE3XAP, ops)	13,680	171	40	D

Manitoba

VE4AAU	6,120	90	34	B

Saskatchewan

VE5SF	15,337	155	49	B
VE5MX	476	17	14	B

Alberta

VE6EX	10,450	136	38	B
VE6JY (+packet)	6,765	81	41	D

British Columbia

VE7SL	29,169	230	63	B
VE7CVM	10,535	121	43	B
VE7VV	11,750	125	47	C

Checklogs: VE9DX, N4PL, K4KPJ, K8PL, W7GSW, EA5BY, AA1SU, N3NT, K1EP, W7LR, W7YB, W3ZA, YO6LV

2000 ARRL September VHF QSO Party Rules

By Dan Henderson, N1ND
Contest Branch Manager

1. Object: To work as many amateur stations in as many different 2° × 1° grid squares as possible using authorized frequencies above 50 MHz.

2. Date and Contest Period: The second full weekend of September. Begins **1800 UTC Saturday and ends 0300 UTC Monday (September 9-11, 2000).**

3. Entry Categories:

3.1 Single Operator.

3.1.1 Low Power

3.1.1.1 50, 144 MHz—200 W; 220, 432 MHz—100 W; 902 MHz and up—10 W.

3.1.2 High Power

3.2. Single Operator, QRP Portable.

3.3. Rover.

3.4. Multioperator.

3.5. Limited Multioperator.

4. Exchange: Grid-square locator (see April 1994 *QST*, p 86 or **http://www.arrl.org/locate/gridinfo.html**).

4.1. Exchange of grid square is required. Exchange of signal report is optional.

5. Scoring:

5.1. QSO points:

5.1.1. Count one point for each complete 50- or 144-MHz QSO.

5.1.2. Count two points for each 222- or 432-MHz QSO.

5.1.3. Count three points for each 902- or 1296-MHz QSO.

5.1.4. Count four points for each 2.3-GHz (or higher) QSO.

5.2. Multiplier: The total number of different grid squares worked per band. Each 2° × 1° grid square counts as one multiplier on each band it is worked.

5.3. Final score: Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score.

5.4. Rovers only: The final score consists of the total number of QSO points from all bands times the sum of unique multipliers (grid squares) worked per band (regardless of which grid square they were made in) plus one additional multiplier for every grid square activated (made a contact from)

Rovers are listed in the contest score listings under the Division from which the most QSOs were made.

Rovers who submit scores for the club competition must submit a second log and summary sheet indicating QSOs and score *if they make any contacts from outside of the club territory*. Indicate clearly on the summary sheet and in log if the log is the total entry or that portion to be counted for the club score

6. Miscellaneous:

6.1. Stations may be worked for credit only once per band from any given grid square, regardless of mode. This does not prohibit working a station from more than one grid square with the same call sign (such as a Rover).

6.2. Only one signal per band (6, 2, 1¼, etc) at any given time is permitted, regardless of mode.

6.3. Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station (transmitter, receiver and antenna) must exist for each QSO made under these conditions.

7. Awards:

7.1. Certificates will be awarded in the following categories.

7.1.1. Top High and Low power single operator in each ARRL/RAC Section.

7.1.2. Top High and Low power single operator on each band (50, 144, 222, 432, 902, 1296 and 2304-and-up categories) in each ARRL/RAC Section where significant effort or competition is evident. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band endorsements.) For example, if WB0TEM has the highest single-operator all-band score in the Iowa Section and his 50- and 222-MHz scores are higher than any other Iowa single operator's, he will earn a certificate for being the single-operator Section leader and endorsements for 50 and 222 MHz.

7.1.3. Top single-operator, QRP portable in each ARRL/RAC Section where significant effort or competition is evident. (Single-operator, QRP portable entries are not eligible for single-band awards.)

7.1.4. Top rover in each ARRL Division and Canada where significant effort or competition is evident. (Rover entries are not eligible for single-band awards.)

7.1.5. Top multi-operator score in each ARRL/RAC Section where significant effort or competition is evident. (Multiop-erator entries are not eligible for single-band awards.)

Top limited multi-operator in each ARRL/RAC Section where significant effort or competition is evident. (Limited multi-operator entries are not eligible for single-band awards.)

7.1.6. Top scoring club in each club competition category will be awarded a gavel.

See General Rules for all ARRL Contests for club competition information.

7.2. Participation Pins

7.2.1. Available, while supply lasts, to all who make at least 25 contacts (any combination of bands and modes) during the contest. This includes all operators of qualifying multi-operator efforts.

7.2.2. Order at: ARRL Contest Branch, 225 Main St, Newington, CT 06111.Price is $5 for each pin. Make check or money order payable to the ARRL. Pins will be shipped only after the contest results are verified and are prepared for publication in *QST*.

8. Submission:

8.1. All submissions must be e-mailed to SeptemberVHF@arrl.org **or postmarked no later than October 11, 2000. Paper logs should be mailed to ARRL Contest Branch, attn. Sept VHF QSO Party, 225 Main St, Newington, CT 06111. Logs mailed or e-mailed after the submission deadline may be designated as check logs.**

8.2. Stations that use computers to log must send the electronic log file for log checking purposes. Electronic logs must be in ARRL Standard File Format. Submitted electronic files must be in ASCII/text readable format. A paper printout of an electronically generated log is not an acceptable substitute for the required log file

8.3 All entries must include a properly completed summary sheet, or facsimile of the current summary sheet. Electronically submitted summary sheets are considered signed.

9. Other:

9.1 See "General Rules for All ARRL Contests" and "General Rules for ARRL Contests on bands above 50 MHz (VHF)" November 1999 *QST* or at the Contest Branch Web site at: **http://www.arrl.org/contests**.

For queries contact **n1nd@arrl.org** or 860-594-0232.

9.2. Forms may be obtained by:

9.2.1. Downloading from the Internet at the Contest Branch Web site: **http://www.arrl.org/contests/forms**.

9.2.2. Sending an SASE to September VHF Form Request, ARRL, 225 Main St, Newington, CT 06111.

9.2.3. Send an e-mail request to **info@arrl.org** with the text as follows:

HELP
SEND SEPVHF.FRM
QUIT

STRAYS

WORK A 1.6-MEGAWATT STATION!

◊ Cliff Appel, K7CJA, will celebrate the 210th birthday of the US Coast Guard by operating from the most powerful LORAN C transmitting station under USCG control. (Cliff will be operating at amateur power limits, of course!) Listen for K7CJA at approximately 14.080 MHz on RTTY, PACTOR and AMTOR from 1700 UTC August 4 to 0100 UTC August 5. For additional information e-mail: **cjappel @juno.com**.

LOOKING FOR NAVY TYPEWRITER

◊ Looking for a source for a US Navy Communications Mill (manual typewriter—all capital letters). Please e-mail **w1ro@aol.com**.

SECTION NEWS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Randall K. Carlson, WB0JJX—e-mail: **WB0JJX@arrl.org**. For those of you reading this who are ARRL members, Thank You! For those of you that are life members, a really big Thank you! That's something we in leadership positions tend to forget to do every once in a while, and that to express our thanks to you for your membership support. Without member support, this organization really would not exist. Member support is more than just dollars, it's involvement. Unlike most other national organizations, the ARRL president, officers, board of directors, and section managers, all serve as unpaid volunteers giving of their time to help give something back to the organization and Amateur Radio. But it is the little things, done by individual members that are so very important and are the strength of this organization. This can be anything from checking into an NTS traffic net, to sharing a *QST* with a prospective ham or just getting on the air to have a nice chat with the ham down street or across the world. It's these little things done by individual members to support Amateur Radio that really make a difference. So once again, thank you for being a member and thank you for your support of Amateur Radio. Tfc (May): DTN: QNI 176 QTC 4 in 23 sess. DEPN:QNI 25 QTC 2 in 4 sess. K3JL 31. 73, Randall.

EASTERN PENNSYLVANIA: SM., Allen R. Breiner, W3TI—SEC: Eric Olena, WB3FPL. ACC: Steve Maslin, N3ORH. OOC: Alan Maslin, N3EA. STM: Paul Craig, N3YSI. SGL: Allen Breiner, W3ZRQ. TC: Lawrence Thomas, AA3PX. ASMs: Ron Creitz, KB3CFV, Paul Craig, N3YSI, Vince Banville, WB2YGA, Dave Heller, K3TX, George Law, N3KYZ, J. Yogi Bear, WB3FQY, Harry Thomas, W3KOD. AA3PX volunteered to take over Technical Coordinator. If you did not receive your TS appointment certificate, please contact Lawrence, AA3PX, at 929 Old Reading Rd, Catawissa, PA 17820. New Field Service appointments were made to the following: WA3HGT, N3PFF, N3UXF are OES. N3PFF and AA3PX are TS. N3LEQ is LGL. The new EC appointed for Northampton Co is KA3MOU. W3PYF, the EC for more than 40 years, resigned. KUDOS and thanks, Clarence, for those many years of service and a job well done. Summer is tower and antenna erection time. As a precaution and to save you time, money and frustration, did you take time out to check with your Local Government Liaison before starting your antenna project regarding building codes and local restrictions? Our SGL, W3ZRQ, has indicated there are numerous local ordinances and restrictions that might prevent you from proceeding with your antenna project. He also noted, there are literally hundreds of towns and municipalities in Eastern PA who are still without an LGL official to assist when and where required. An LGL appointment is available to interested amateurs. The month of May was real busy for the Chester Co ARES/RACES group. The following members supplied communications for March of Dimes, Chester Co Cerebral Palsy and Peach Bottom Nuclear Power Station exercise: WB3GCK N3JKL N3LRA W3MYP N3SAM KQ6TWO N3LUD KE3HG KB3EFN AA3EO W3TTW N3MXB N3HLJ N3VZG KC3XL WB3ITC N3YGW N3AO W3STA WA3DMW K5HAL W3QT N3YXW KC3IA KA3CIM WB3DMF KB3DU W3GSC K3JV N3LMY WA3MME N3QGO KE3RJ N4SEN. Those who participated in the Montgomery Co RACES group Muscular Dystrophy walk were KB3CXD W3RED W3BNQ KB3CYE KB3DXS N3OMA W3GSC KB3DQH KB3DVJ. If your club had an activity or supplied communications for any recent public service events, why not let us know and other amateurs know about it. give the name of the event and call letters of those who participated, and we'll be glad to list them for you. We want to thank the Murgas ARC and 74 members in attendance who welcomed us as a guest speaker at their recent club meeting. Tfc (May): N3YSI 303, W3IPX 221, N3EFW 153, W3IVS 102, W3HK 100, W3UAQ 91, K3AEB 66, N3SW 46, K3TX 40, W3NNL 30, W3JKX 29, N3IRN 20, W3TWV 19, N3HR 15, KB3DCT 12, AD3X 11, KB3BBR 11, KB3CEZ 9, W3TI 8, W3DAB 7, KA3LVP 7, KB3CVO 6, N3AS 6, K3ARR 6, KB3CKD 5, N3KYZ 5, W3KOD 4, N3ZXE 3, KB3DDL 3, W3BNR 2, W3ROQ 1. Net reports EPA 118, EPAEP&TN 165, PFN 52, PTTN 33, SEPTTN 13, MARCTN 13, K3ARES 11, D4ARES 4, LCARES 2.

MARYLAND/DC: SM, Bill Howard, WB3V, 410-551-6775 **wb3v@arrl.org—** MDC Section Web homepage **http://users.erols.com/wb3v/mdc/**. FRED EC N8AAY reports 10 members, and 5 net sessions on 146.640 (-) repeater. Frederick Club (FARC) had 2-new antennas installed at our EOC. One for the K3ERM .64 (-) repeater, and the other, a dual-bander, for ARES/RACES use. HOWA EC K3EF reports 22 members, 4 sessions of the HOWA AREA/RACES net in 147.135 with liaison to MEPN and BTN. ANAR EC N3QXW reports 38 members, 4 sessions of the ANAR ARES Net on 146.805 with liaison to EPA, NCAC, MEPN, WVA, BTN and MDD, 1 training session, and 1 drill. Several ARES members supported the Bay Bridge walk on 7 May, and the NOAA Oyster Reef Diving Expedition on 20 May. GARR EC K3JW reports 7 members, 4 sessions of the Garrett County ARES Net on 147.105 with liaison to MEPN. WASH EC KD3JK reports 41 members, 3 sessions of the ARES/RACES NET and 3 sessions of the Four States Net on 146.94, Tuesdays at 1900 and 147.090, Thursdays at 1900 hours local time; 1 session of SKYWARN Net. PRGE EC WI3N reports 32 members. Members participated in: 1 COMEX, 1 MEMA declared 72 hour RACES drill, 1 debrief meeting. 22 ARES/RACES members participated in a FEMA/MEMA sponsored unannounced terrorism drill on 22 May from 0830 to 1800 and on 23 May a debrief was held at the EOC. Jim is setting up a phone tree and has selected the GMRA 146.61 repeater as the repeater to monitor in case of emergency. GMRA is installing emergency power on the repeater by mid-July. Jim reported details of the RACES drill, Operation Topoff. You may see the details at **http://www.arrl.org/field/pubservice.html,** News and Views segment. CARR EC N3JIA reports 64 members, 4 sessions of the CARET Net on 145.410 MHz with liaison to MEPN, MDD, and MSN by KE3FL and to BTN, WVPN, DTN, MEPN, Central Net, and Western Net by KG6TU. OES reports received from N3JIA KE3FL and WX3F. Author of this article is Bill, WB3V. With the nets: -Net/NM/QND/QTC/QNI: MSN/KC3Y/31/58/258, MEPN/N3WKE/32/54/452, MDD/WJ3K/60/358/763, MDD Top Brass, KJ3E/200, AA3GV/167, AA3SB/172, BTN/AA3LN/no report, SMN/KE3OX/no report, Apr MEPN/N3WKE/29/136/452. Tfc: KK3F 1035, KJ3E 683, N3QA 631, AA3GV 231, AA3SB 150, W3YVQ 99, N3WK 86, N3DE 73, KC3Y 57, N3WKE 57, W3CB 47, N3KGM 36, N3EGF 16, WA1QAA 12, W3VK 12, K3CSX 8, N3ZKP 8, WA3GYW 6, KE3FL 0. Mar WB3FDT 110. Apr N3WKE 109,WB4FDT 96. PSHR: KJ3E 315, KK3F 206, AA3GV 149, W3YVQ 148, N3WK 141, W3VK 137, AA3SB 133, N3WKE 130, N3ZKP 114, W3CB 106, WA1QAA 99, KC3Y 88, K3CSX 82, KE3FL 77, Apr N3WKE 113.

SOUTHERN NEW JERSEY: SM, Jean Priestley, KA2YKN (@K2AA) e-mail **ka2ykn@voicenet.com**—ASM: W2BE K2WB W2OB N2OO N2YAJ. SEC: N2SRO. STM: K2UL. ACC: KB2ADL. SGL: KB2WKY. OOC: K2PSC. TC: W2EKB. TS: W2PAU WB2MNF AA2BN KD4HZW WB3IJB WA2NBL KA1AOR N2QNX N2XFM. June is proclaimed Amateur Radio Month. The Proclamation was signed by Gov. Whitman on June 15, 2000. Each year Steve Anderson, K2SMA, from NNJ submits the paperwork. We want to thank Steve and NNJ for a fine job. JSARS sadly mark the passing of John Wilhem, K2OZW. John was Net Control for JSARS Traffic Net on Sundays. GCARC and I sadly report the passing of Miriam Kravitz, KB2EUA. I knew Miriam for years and also I feel a personal loss. Bob Budd is bringing together the Gloucester County ARC Hamfest for 2000 on Aug 20 in Mullica Hill at the 4-H fair grounds. Bob is planning new ideas. Aug 13 is the Hamfest by the Shore. Check *QST* for details. On Nov 4 look for a new face for the DVRA hamfest. It's moving indoors. Traffic, QNI reports: NJPN 174 NJSN 139 NJM 168 NJN/E 229 NJN/L 197 JSARS 352 SJVN 362. Personal reports: AA2SV 73, K2UL 72, WB2UVB 63, K2UL-4 55, KB2RTZ 49, WA2CUW 20, W2AZ 19, N2WFN 16, KA2CQX 7, N2VQA 6, N2ZMI 3, KC2ETV KB2VSR KB2YBM 1. Work some traffic today!

WESTERN NEW YORK: SM, Scott Bauer, W2LC—How is your antenna work going? Not much time left. The sun spot cycle is at its peak this year! Take advantage, ten meters is really hopping and 15 m is open almost all night on many days. A great time for you newer hams on 10 m, but remember to upgrade so you can operate on the lower bands when the sun spot number starts to decline to a minimum in 5 or 6 years. Ever hear long path signals? How about hearing both long and short path at the same time? Over the pole signals with echo? The south pole stations? Lots of fun operating is waiting for you! Hey old timers! Nothing like sun spots to make you feel young again! Please welcome new western district DEC Karl N2NJH, also Erie Cty EC, thanks for taking the DEC post. HAMFESTS: Aug 5 Ithaca Hamfest, at Tompkins Cty Airport; Aug 12 Rome Hamfest, at Westmoreland; Aug 13, Greater Buffalo Summer Hamfest, at Depew; Sept 17, Auburn at Emerson Park on Owasco Lake; Sept 23, Buffalo at Erie Cty fairgrounds; Sept 23, Margaretville; Sept 30, Elmira at Chemung County fairgrounds, Horseheads; October 7, RAGS Hamfest, at the Pompey Hill Fire Dept. Net Summaries:

Net		NM	Sess	QNI	QSP
BRVSN	WB2OFU	31	269	6	
CNYTN	WA2PUU	31	341	60	
ESS	W2WSS	31	283	55	
NYPON	N2YJZ	31	363	167	
NYS/L	W2YGW	31	231	145	
NYSCN	W2MTA	4	12	2	
OARCN	N2KPR	4	39	5	
OCTEN/L	KA2ZNZ	31	643	211	
STAR	N2NCB	29	381	16	
VHFTHIN	KB2VVD	00	00	0	
WDN/L	W2GUT	31	458	48	
TIGARDS	W2MTA	4	23	3	

Net		NM	Sess	QNI	QSP
CHN	W2EAG	30	153	25	
EBN	WB2IJZ	23	448	0	
NYPHONE	N2LTC	31	209	257	
NYS/E	WB2QIX	31	337	177	
NYS/M	KA2GJV	28	169	88	
NYSPTEN	KD2V	31	376	50	
OCTEN/E	KA2ZNZ	31	1672	251	
OMEN	K2DYB	2	16	3	
STTHN	N2WDS	0	0	00	
WDN/E	N2JRS	31	511	86	
WDN/M	KB2VVD	31	480	42	

Traffic (May 00), * indicates PSHR, # for BPL: N2LTC*# 1100, KA2ZNZ*# 616, KA2GJV* 349, W2MTA* 284, NN2H* 260, WB2QIX* 167, N2KPR* 125, KC2EOT* 107, W2FR* 107, WI2G* 107, KB2VVD* 94, NY2V* 87, N2CCN* 85, K2GTS* 83, KG2D* 78, KA2DBD* 72, KB2YEN 61, W2PII* 56, W2LC* 47, W2GUT* 39, KB2WII* 36, KB2ETO* 31, N2JRS* 29, AF2K* 27, N2WDS* 25, K2DN* 24, WB2IJH 22, AA2ED* 19, WA2UKX* 10. Digital; Stn Rx/Tx: N2LTC 268/152, KA2GJV 42/3, K2DN 0/0, NY2V 0/8.

WESTERN PENNSYLVANIA: SM, John Rodgers, N3MSE. ASM-ARES: WB3KGT. SEC: N3SRJ. ASM-Packet: KE3ED. ASM-Youth & Education: KE3EE. OOC: KB3A. PIC: W3CG. STM: N3WAV. TC:WR4W. DEC-SO: KD3OH. DEC-N1: N3QCR. DEC-N2: KA3UVC. DEC-S1: KA3HUK. DEC-S2: N3BZW. DEC-Rapid Response: N3HJY. There has been quite a bit of activity by the amateurs in the various areas helping in the bicentennial celebrations in the local communities. This is a perfect opportunity for us to demonstrate the service that we are able to provide to the people in our communities. Thank you to the many amateurs that participate in these and the many other public service events throughout the year. SEC Rich Beaver, N3SRJ, will soon be appointing a DEC for coordination of the Official Emergency Stations (OES) in the section. These stations should be recommended by the local EC, and should set high standards of emergency preparedness and operating. A similar position is that of the Official Relay Station (ORS). This position is for those stations that take an active part in traffic handling regardless of mode. This position is one in which amateurs often distinguish themselves in their service to the country or community. Contact the section traffic manager if interested. Members of the section staff can be contacted via e-mail by going to the WPA Web site at **http://www.bfdin.com/wpasec/index.htm** and follow the link to the section staff. Those without web access, my information is in the front of *QST* and please contact me directly. A final thought for the month is a request that each of you would encourage others to join the league and help increase their voice to represent all of us. 73, John Rodgers, N3MSE, WPA-SM, n3mse@arrl.org

CENTRAL DIVISION

ILLINOIS: SM, Bruce Boston, KD9UL—SEC: W9QBH. ACC: N9KP. STM: K9CNP. PIC: N9EWA. TC: N9RF. OOC: KB9FBI. DEC-Central: N9FNP. DEC-S/W: KB9AIL. The Egyptian RC has been working on plans for a club picnic and preparing for the annual Field Day event. They also provided communications for the March of Dimes Walk America and the Tour de Cure events. The club marked its 70th anniversary last year. The Schaumburg ARC provided communications for the MS Walk, Hike for Life, Tour-de-Cure, the Hoffman Estates Fourth of July Parade, and the Schaumburg Triathlon. The Fox River Radio League has modified their rules for the Broken Paddle Award due to a large number of ties between competitors. The prize will now be based on an accumulation of points gained through participation in public service events as well as other FRRL activities. The club members are planning to help with Walter Payton Sweetness Run and the horse trials at the Pratt Wayne Woods Forest Preserve. The club will also operate a special event station August 19-20 in conjunction with International Lighthouse/Lightship Weekend 2000. The group will operate from the island in Fabyan Park where there is a small lighthouse. The Rockford ARA recently formed a FISTS CW group within the club, and is now forming groups for satellites and ATV. One possible project being considered is a balloon launch with assistance from high school students. RARA has been working on a number of community service projects including the American Lung Association Clean Air Challenge and the Ramp Wheel-a-thon. Members of the Western Illinois ARC have been gearing up to help with the annual kart races in Quincy. For the twelfth consecutive year, the Wheaton Community Radio Amateurs provided communications support for the MS Walk-a-thon. More than 1,600 walkers participated in the event. The Peoria Area ARC had an interesting field trip to the FAA control tower at the Peoria airport. May traffic: W9HLX 57, WB9TVD 37, NN9M 29, NC9T 20, W9FIF 12, WA9RUM 7. 9RN report de KF4UBX sessions 62, traffic handled 185, average per sessions 2.98, rate 2.5, IL representation 91% NN9M W9HLX NS9F N9PLM. ISN de WB9TVD QNI-194, QTC-93, Sessions-29. Ninth region C4 traffic 242, sessions 62, time 415 min, average 3.90, rate .583 ILN K9CNP KF9ME NS9F. W9VEY Memorial Net report de K9AXS 7 with 266 check-ins.

INDIANA: SM, Peggy Coulter, W9JUJ—ASM for Resources & Recruitment, W9IH. SEC: K9ZBM. ASEC: WA9ZCE. STM: N9ZZD. OOC: KA9RNY. SGL: WA9VQO. TC: W9MWY. BM: KA9QWC. ACC: N9RG. Sympathy extended to the families and friends of Silent Key Louis W. Horvath, KC9VN, Mishawaka. Early one Sunday morning the EC was put to the test when an explosion that could be heard five miles away rocked the town of Whiting. A Catalyst Cracker had exploded during the charging process. Parts of the Cat Cracker made of thick armor plate steel went flying through the air like frisbees. One piece as big as a barn door sailed across the street and crashed through the roof of a home, severing a leg of a sleeping boy. Another section cut through a gasoline storage tank spilling gasoline onto the ground. The resulting fire threatened the entire refinery and the city of Whiting. Communication was essential for traffic control and inner communications between services. Since local radio communications was inadequate, the local hams were quick to fill in the void. The Lake Co. Radio Club quickly responded with mobile units and a control station was set up in the Whiting Community Center. Those who witnessed or participated in the ordeal can only appreciate the challenge of the time. The SEC reported the number of net sessions, drills and tests of 185. Total man-hours reported 3033. This due to the severe weather causing many SKYWARN nets to be activated. 9 members of the Shelby Co. ARES and Blue River Valley ARS provided communications for a March-of-Dimes Walk-a-thon. Vigo County ARES is building a new communications trailer. Welcome to Chuck Crist, W9IH, who has joined my staff as Asst SM for Resources & Recruitment. Sorry to receive the resignation of Paul Fisher, N9PF as QIN manager. We will miss you, Paul. We are looking for a new manager, if interested please contact N9ZZD STM. The Michiana ARC has been officially renewed as a SSC. This has to be done every two years. Check your club status if it is a SSC to make sure you are up to date. NMs ITN/W9ZY, ICN/K8LEN, WN/AB9AA,VHF/N9ZZD.

Continued on page 122.

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- 100W HF/6M
- Newly designed 32 bit DSP
- 5 inch TFT color LCD
- Digital IF filter with 41 passband widths
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IC-207H Dual Band Mobile

- 2M/440 MHz
- Wide band rx (includes airband)
- 45W VHF (2M), 35W UHF (440 MHz)
- Remote head capable

IC-2800H Dual Band Mobile

Mounting Kit Included

- 2M/440MHz
- Band scope
- 3" TFT LCD disp
- NTSC video input
- CTCSS encode/decode
- Selectable RF attenuator
- 232 alphnumeric memories
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$25 COUPON

- 100W (AM 40W)
- 12V Operation
- Simple to Use
- CW Keyer Built-in
- One Touch Band Switching
- Auto Tuning Steps (TS)
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IC-T7H 6W, Dual Band Transceiver

Dual Bands at a Single Band Price!

- 2M/440 MHz
- 70 memories
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Shirt Pocket Small

- Easy to use
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- Wide Rx coverage
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Worlds First 4-bander HT

- 50, 144, 440 MHz & 1.2 GHz bands
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- Ultra compact
- Monitor function
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- Tone squelch with pocket beep
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- Advanced 2M/440 MHz
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- 200 memories w/alpha naming
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- Enhanced Digital Signal Processing
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- Collins SSB filter built-in
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FT-100 HF/6M/2M/70CM Transceiver

- Compact Transceiver w/detachable front panel
- Rx 100kHz to 970mHz (cell blocked)
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- Built-in DSP, Vox, CW keyer
- 300 Memories

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- Compact 2M 60W mobile • 12000/9600 baud
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- CTCSS/DCS built-in
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- .5W output
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- Alpha numeric display
- Wide Band receive
- Battery Saver
- 112 Memories
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- Less than 4" wide!

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- 300 MW Tx output
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- Built-in Lithium-Ion battery
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440 Tiny HT 2Mtr Tiny HT

- 340 mw
- 21 memories
- Uses 3 "AA" Batteries
- Encode built-in
- Pivot antenna
- Less than 5" high and 2 1/4" wide (DJ-S41T)

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40M-70cm Mobile Antenna

40/*20/*17/15/10/6/2M/70cm
* optional coils

A 6M/2M/70cm whip that accepts 1,2 or 3 HF coils for up to 6 band operation. Simply screw on any combination of HF coils you choose.

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Length: 39 inches	Length: 43 inches
Max Pwr: 150W	Max Pwr: 150w
Conn: PL-259	Conn: PL-259

NEW!

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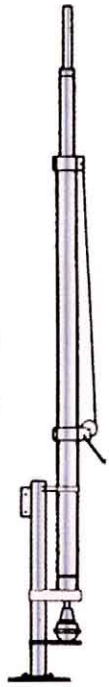

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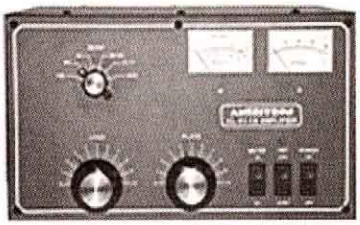

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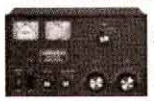

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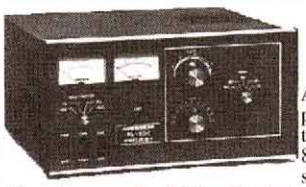

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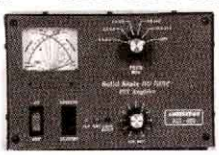

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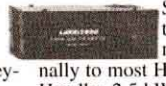

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Net	Freq	Time/Dy/UTC	QNI	QTC	QTR	Sess
ITN	3910	1330/2130/2300	2341	532	1349	93
QIN	3656	1430/0000		no report		
ICN	3705	2315	87	12	331	24
IWN	3910	1310	2964	—	610	31
IWN VHF Bloomington			517	—	465	31
IWN VHF Kokomo			690	—	155	31
IWN VHF Northeast			1189	—	620	31
Hoosier VHF nets(7 nets)			503	13	1044	35

D9RN Total QTC 185 in 62 sessions represented by K9GBR, W9UEM, WB9QPA, N9KNJ and KB9NPU. 9RN Total. QTC 242 in 62 sessions represented by KJ9J, KO9D, K9PUI, WB9UYU, and W9FC. Tfc: W9FC 383, W9UEM 144, W9ZY 99, WB9QPA 83, KO9D 65, N9ZZD 65, K9GBR 56, AB9AA 48, W9JUJ 42, K9PUI 40, KA9EIV 38, K9SXM 31, K9RPZ 20, W9EHY 17, KB9NPU 16, K9ZBM 7, AB9A 7, K9OUP 4, WB9NCE 4, N9AJM 3, K9CIV 1. (Apr) KO9D 149.

WISCONSIN: SM, Don Michalski, W9IXG—BWN 3985 0600 W9RCW. BEN 3985 1200 KE9VU. WSBN 3985 1730 WB9WHQ. WNN 3723 1800 KB9OCZ . WSSN 3645 1830 N9BDL. WIN-E 3662 1900 WB9ICH. WIN-L 3662 2200 W9UW. It is with deep regret that I inform you of the passing of Bill Komistra, W9OVZ. Bill was a ham for 65 years, member of QCWA and Racine Megacycle Club. KC9IS reports the Racine Megacycle Club, QCWA chapter 162, and Lakeshore Repeater Association had a successful Safety Day Fair in Racine with numerous HF & VHF demonstration contacts made for the public and emergency services. The theme was "amateur radio provides emergency communications when normal communication is lost". Good work, team! This is a great example of clubs working together for the Common Good. Let's see more of these activities! The Wisconsin Valley Radio Association recently received a $7500 grant from The Wausau Area Community Foundation for replacement of the aging W9SM repeater and antenna system. The individuals involved were Kim Kunze (N9SDL), Jim Salkowski (N9SDI) and Greg Barr (KB9MCZ). Well done! The May 9RN net report shows 96% Wisconsin attendance. Good to hear W9RCW back home from the hospital and on the BWN, again! Congratulations to the Fond du Lac ARC on winning the WQP 2000! They had 523,399 points- shy 3.4% of the record. There were 205 entries. Excellent! W.A.R. is working on a Band Plan for Wisconsin. Suggest you go to **www.wi-repeaters.org/bandplan.pdf** for details on this proposal. Input is welcome. Send comments to Dave Karr**, KA9FUR@wi-repeaters.org**. All Wisconsin ECs will receive an official ARRL badge to help you in the field. 73, Don, **w9ixg.eboard.com**. Tfc: K9JPS 1101, W9IHW 601, W9RCW 513, WZ7V 446, K9GU 422, W9YPY 372, N9TVT 363, W9CBE 183, K9FHI 158, N9CK 154, K9LGU 118, N9BDL 86, W9UW 72, AG9G 65, KE9VU 54, N9KHD 52, W9YCV 49, KB9ROB 39, K9HDF 33, W9BHL 29, WB9ICH 25, KA9BHK 16, KB9QPM 15, N9JIY 10, W9ODV 9, K9UTQ 6,WD9FLJ 6, AA9BB 3, K9GDF 2.

DAKOTA DIVISION

MINNESOTA: SM, Randy "Max" Wendel, N0FKU—Sorry to report SK Louis Guerre, KØOGI, of Wahkon on May 13. Louis was an ARES EC, OES, and NCS on PICO Net. Early June heavy rains set the scene at Gary and Gladys Petersons' town of Spring Valley where the creek overflowed and several businesses and homes filled with water. Gary, N0ZOD our ARES SEC, and Gladys, KB0TUT, Fillmore County ARES EC, along with ARES members from Rochester and Winona sprung into action to help provide logistical and shadow links. Just a few days later, a planned tornado drill went ahead as scheduled in Spring Valley with the State EOC in St. Paul linked via HF/VHF to provide support comms to the city on behalf of the Dept. of Emergency Mgmt. Several agencies were involved including regional coronars' office and Mayo One to name a few. It was not only a show of communications support to local officials, but also that for our State DEM. Everyone involved did a great job! The more we involve ourselves with these drills, the more fluent and familiar we develop our skills with the services we can provide. Soon we even find ourselves on a first-name basis with many key people who represent served agencies that we stand ready to provide our communications resources for. It's a great reward to know that we can and are willing to do our job at a critical time when people are affected by natural or man-made disasters. We should feel privileged to be looked upon to provide a helping hand!

Net	Freq	Time	QNI/QTC/Sess	Mgr
MSPN/E	3860	5:30 P	708/66/31	W0WVO
MSPN/N	3860	12 P	399/103/31	WA0TFC
MSSN	3710	6 P	N/A	vacant
MSN/1	3605	6:30 P	197/89/31	W0HPD
MSN/2	3605	10 P	132/34/31	K0PIZ
PAW	3925	9A-5P	1870/72/73	KA0IZA

SARs: WA0TFC, W0LAW, KB0OHI, KB0AII, W0GRW, WO0A, W0HPD, K0WPK, K0PIZ, W3FAF, KN9U, KB0AIJ, W0WVO, K0PSH, WD0GUF, KA0IZA, N0JP.

NORTH DAKOTA: SM, Bill Kurtti— Fargo hams provided communication for the MS walk. A busy summer is planned there with Field Day, annual Picnic in July & the MS bike tour in August. I am happy to hear several newly upgraded regularly on the Data & Wx nets. Twelve Grand Forks hams look part in the MS walk providing communications. The total money raised was 150 % on what was expected. They helped with communications for the VFW convention in East Grand Forks. A MS walk was also held in Bismarck was also planning with take a kid fishing Buggies & Blues Field Day & the Wally Byram Caravan coming to town. Dickinson area Hams are planning on helping with the Taylor Horsefest, Peace Garden Hamfest & their annual Picnic which has developed into a 3 day event. Tfc: N0RDJ 5. Goose River Net 4/48 /0, Data Net 30/635/6. WX Net 27/665/24 KE0XT hf nets mgr.

SOUTH DAKOTA: SM, R.L. Cory, W0YMB—The year 2000 Dakota Division Convention is now history. It was an excellent convention and the food was good. Make plans to attend Sioux Falls Convention on Sept 30. Contact Willis

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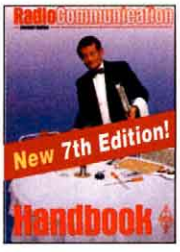

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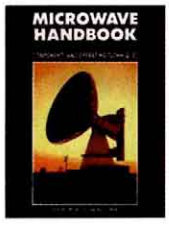

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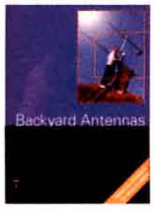

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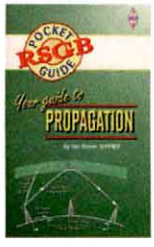

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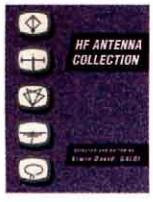

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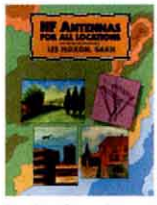

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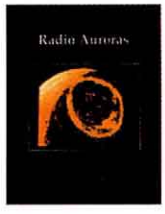

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Gravning, KE0Z, Box 92, Sioux Falls 57031. 65 registered guests attended the Black Hills ARC Annual Auction. The club made $300 and took in $190 in dues. All had a great time. They will operate a special event station Aug 19-20 commemorating VJ Day. Look for N0VJ on the General bands and obtain their certificate. The novice net has been put on vacation for the summer. Look for it again in the fall. Six Black Hills hams were recognized by ARRL HQ for outstanding work in advancing the hobby with their VE work. Once again, we need to write our Congressmen to support the Amateur Radio bill HR 783. It is non-partisan and only asks that if frequencies are taken from us they must be replaced. Black Hills ARC provided emergency communications for the Crazy Horse Annual Volksmarche. 12,400 people started up the mountain. Hot weather caused some to get sick and some had to have transportation to get down.

DELTA DIVISION

ARKANSAS: SM, Roger Gray, N5QS, e-mail n5qs@arrl.org - I finally made it to Dayton, and now I believe all the preposterous stories I have heard about it. They are all true. We spent 1 day (from opening time till they threw us out) walking in the flea market area and did not see it all. We spent the next full day seeing the indoor exhibits. The amount of "stuff" was unbelievable. I heard one person say that if it exists, it is here, if you can find it. We visited with hams from at least 5 countries. Needless to say, we had a wonderful time, met a lot of new people and saw several old friends from home. One item of interest was the section manager meeting. Some suggestions discussed may affect some of the programs we have here in the field. I will report soon if I learn any final details. Everything so far is just ideas that will be kicked around some more. I have been preparing for Field Day since returning and hope everyone has (had when you read this) a good, safe time. May activity reports. Tfc: K5BOC 100, K7ZQR 93, K5DEL 47, AB5AU 32, N5SAN 16, AB5SG 14, AB5ZU 14, KA5MGL 8, W5HDN 7, W5SET 4, W5LZQ 3, W5RXU 3, KC5UEW 2, ARN 94, OZK 31, APN 28, AMN 10.

LOUISIANA: SM, Mickey Cox, K5MC—ACC: KM5YL. OOC: WB5CXJ. PIC: K5IQ. SEC: K5ER. STM: KG5GE. LCW NM: W4DLZ. LTN NM: WB5ZED. Happy to announce that Carolyn Morris, KM5YL, is the section's new ACC. K5WGQ and AC5VN are new OES appointments. Our SEC is now K5ER (ex N5MYH). Special recognition is due the Acadina ARA for its very generous contribution ($2000) for WARC. NG5T and W5EXI presented the check on behalf of the club to Delta Division Director K5UR during the ARRL Forum at the Baton Rouge Hamfest in May. Remember that ARRL is the only effective voice we have to defend our frequencies in the war for RF spectrum. If your club hasn't made a donation recently, urge it to do so. If there's no club in your town, make a donation yourself (and try starting a club!). We can also be more active on the air. As pointed out by K1ZZ in May *QST*, heading up our list of activities should be emergency and public service communications. Regular participation is not expected of everyone, but each of us should know enough of the basics to be effective if the need arises. Try out new modes and bands. Serve as an Elmer to new hams coming on the air. The following have earned section net certificates: K5AZR, N4BF, WA5CAV, W5CDX, N5CM, WB5CXK, W4DLZ, K5DPG, K1DW, KD5FIW, KG5GE, K5IQZ, K5KV, N0KWA, W5LA, WA5LHL, WA5LQZ, K5MC, W5NK, K5OKR, KC5QAY, KA5SUR, WA5WBZ, K5WOD, WB5ZED. Tfc: WB5ZED 808 (BPL), K5MC 286 (BPL), K5IQZ 168, K5DPG 31, KG5GE 28. PSHR: WB5ZED 213, K5MC 211, K5DPG 131, K5IQZ 131, KG5GE 105. Net Reports: sessions/QNI/QTC. LTN: 31/340/73.

MISSISSIPPI: SM, Malcolm Keown, W5XX—Section Web Page: **www.arrlmiss.org**. Web Master: K5IBM at **k5ibm @arrl.net**. ASM: N5JCG, N5EZX. ACC: N5JGK. BM: W5EPW. SGL: AB5WF. STM: KJ5YY. Mississippi Hams turned out in record numbers for the Y2K ARRL National Convention and Dayton Hamvention. Those Mississippi Hams seen enjoying the world's largest hamfest were NN5AF, KF5C, AE5DX, W5EHM, KD5FCJ, K2FF, W5FI, K5FLU, N5JGK, KB5JNZ, K5JZ, KB5KTQ, AA5MT, KC5NIS, KC5NSZ, KC5RC, K5SVC, AC5TF, W4UDH, KB5UVL, KC5VTN, K5VVA, W5XX, K5YG, KB5YJH, WB5YKR, KG5YV, and KB5ZIA. Probably missed a few. It was a good one! The Tupelo ARC is now KK5K honoring recently deceased member Duane Tutor. Thanks to the Jackson County ARC under the chairmanship of N5XGI for putting on another great Pascagoula Hamfest! PIO Report: W5KWB. EC Reports: KD5CKP, K5DMC, KD5FUO, WB5OCD, N5ZNT. Net Reports: sessions/QNI/QTC. MSPN: 31/2823/64, MTN 31/97/67, MSN 31/970/6, PBRA 31/725/18, Jackson Co ARES/RACES 31/494/21, MSSN 23/56/1, Hancock Co ARES 13/134/9, MAEN 5/72/0, NW MS ARES 5/43/0, MCARA 5/60/0, Lowndes Co ARES 5/78/0, Laurel ARC 5/44/0, Stone Co ARES 4/35/0, Attala Co ARES 4/35/0, MBHN 3/21/0. PSHR: N5XGI 152, KB5W 142, K5DMC 128, K5VV 128, W5XX 115, KJ5YY 71. Tfc: KB5W 541, K5DMC 154, N5XGI 67, K5VV 29, W5XX 6. Compilation of traffic statistics provided by KJ5YY, Mississippi STM.

TENNESSEE: SM, O.D. Keaton, WA4GLS—ACC: WA4GLS. ASM: WB4DYJ. PIC: KE4CES. SEC: WD4JJ. STM: WA4HKU. TC: KB4LJV. The Chattanooga RACES coordinators KR4SL, KJ4RC & KE4CTQ appreciated all the help from the local hams, KG4AIH, W4AME, KF4AWP, KC4BBU, KE4BZR, KG4CKY, KD4CSM, KG4DIE, KG4EJF, KE4FGW, KG4FNC, KD4FXK, KD4HIK, K4IOQ, KE4MBP, N4MKG, KE4QOC, KE4SWZ, N4XSH, KD4SZM, N4TQW, KA6UHV, WX8V, KU4VR, KF4VMA, KR4WK, KE4YMQ, 4ZAG, KC4ZEU, KE4ZPH & KG4CIC for assisting with communications for their air show. WAVES, May 2000 edition, gave some advise and operating practices for the recent upgrades to use on the HF bands, access http://www.arrl.org/field /regulations/bandplan/html for further information. The Oak Ridge hamfest was a rousing success thanks to the following OARCers for their assistance: KC4RHW, KR4EP, KF4ROX, KD4MEX, AE4NG, KF4YUX, W4CEK, KA4UOV, K4UHV, KF4VZO, WB3EFS, W0BUH, KF4ATA, KD4PQP, KE4TG, N4CHD, WB4CTW, W4YBY, K4UVB, N4PWO, WB4DYJ & club pres N1CWR. WD4PIW thanks all the BARC members & others who helped in the March of Dimes drive. The Transponder list the following net: Rhea Co ARES/RACES net on Sat 9 PM on 147.39+; Meigs Co ARES/RACES net Sat at 8:30 PM

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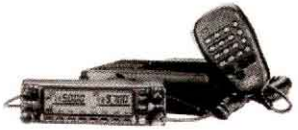

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on 145.13 - & Ocoee ARS net on Tues at 9 PM on 147.18+, PL 118.8, everyone in the area should enjoy those activities. Mid-South SKYWARN was alerted on May 27 to report inclement weather as it approached west TN. Great service was provided by these hams because telephone communications were out: KD4TJO, KE4GYR, KE4GPR, KA4BLL & W4GMM. Thanks to DARC for the use of W4BS repeater. DRN-5 rpt 60 sess, 972 msg, TN rep 90% by W4OGG, K4WWQ, KE4GYR. Net sess/QTC/QNI: TCWN 23/22/168; TEMPN 22/37/694; TEPN 27/92/2103; TWCWN 19/0/71. Tfc: NZ4O N4PU 85, W4SQE 48, KE4GYR 46, WA4HKU 46, WB4DYJ 31, WD4JJ 12, WA4GLS 11, W4SYE 10, KI4V 6.

GREAT LAKES DIVISION

KENTUCKY: SM, Bill Uschan, K4MIS— ASM: Tom Lykins, K4LID. SEC: Ron Dodson, KA4MAP. SGL: Bill Burger, WB4KY. ACC: Todd Schrader, KF4WFZ. PIC: Steve McCallum, W2ZBY. TC: Scotty Thompson, KI4AT. STM: John Farler, K4AVX. BM: Ernie Pridemore, KC4IVG. I want to take this opportunity to thank all the Hams that keep NTS working and all the ARES participants in the Section. August 20, 2000 is the date for the Central Kentucky Hamfest in Lexington, KY, and on September 9 is the Greater Louisville Hamfest, held in Bullit County. Mr. George Race, Great Lakes Division Director, WB8BGY, is planning a conference in July for all the ADs in the Great Lakes Division and more on that later. Still no word on the Bowling Green Hamfest. Field Day will be over when this is published and I hope Field Day was an eventful weekend for all who participated. The dates for the Hazard Swapfest should be out soon.

Net	*QNI*	*QTC*	*Sess*	*Mgr*
KRN	757	23	23	N4AFP
KTN	2186	67	62	K4LID
KSN	297	41	31	KO4OL
TSTMN	465	19	31	KG4EAB
CARN	343	26	29	AD4EI
4ARES	470	31	31	WA4RRR

MICHIGAN: SM, Dick Mondro, W8FQT (**w8fqt@arrl.org**)— ASM: Roger Edwards, WB8WJV (**wb8wjv@arrl.net**). ASM: John Freeman, N8ZE (**n8ze@arrl.net**). SEC: Deborah Kirkbride, KA8YKK (**ka8ykk@arrl.net**). STM: James Wades, WB8SIW (**wb8siw@arrl.net**). ACC: Sandra Mondro, KG8HM (**kg8hm@arrl.net**). OOC: Donald Sefcik, N8NJE, (**n8nje @arrl.net**). PIC/SNE: David Colangelo, KB8RJI, (**dcolangelo @ameritech.net**). SGL: John LaRock, K8XD (**k8xd@voyager .net**). TC: Dave Smith, (**DSmith@smithassoc.com**). Youth Activities: Carl Hillaker (**carln8zdw2@juno.com**). BM: Thomas Durfee, Jr. WI8W (**wi8w@arrl.net**). Congratulations to George Stevens, W8MAC, of Dearborn on his appointment as HF Awards Manager for the Motor City Radio Club. George accepts the responsibility of validating the WAS and 5 band WAS awards. If you need someone local to verify your cards for this prestigious operating award, you may contact George through the club. Thanks George for accepting this responsibility and to the Motor City Radio Club Board of Directors for their nomination. Congratulations also go out to Wilbur A. Jones, Jr., N8KF of Waterford, on his appointment as DXCC Card Checker for the Great Lakes Division. Wilbur is a member of the Oakland County Amateur Radio Society and is now certified to check your QSL Cards for the DXCC Operating Award. Wilbur can be reached through the club or at **n8kf@arrl.net** and thanks to Wilbur and the support of the club for his involvement in this important responsibility. Although not everyone is interested in contesting and awards, many are. I feel that the nice thing about the Amateur Radio service is the fact that we can all enjoy the many aspects of this hobby and not be criticized for having our own interests. Working together and allowing each person the freedom to "do his or her own thing" is what makes it so great. I would like to recognize the folks shown below, our traffic handlers, which we simply could not do without. They are the folks that get the traffic moved when it is important and their dedication to the NTS Program to keep their skills honed is to be commended. Thanks folks for being there and giving up your time to keep the nets going. Traffic reports for May 2000: AA8PI 368, KB8ZYY 271, K8GA 193, WX8Y 133, W8RTN 124, K8LJG 116, WB8SIW 83, N8JGS 62, N8FPN 61, K8KV 57, K8AE 56, AA8SN 54, W8RNQ 46, K8UPE 35, WI8K 25, K8ZJU 20, W8YIQ 19, N8TDE 17, K3UWO 16, N8OSC 15, WA8DHB 10, KB8EIW 8, WB8WJV 6, K8AI 4, N8EXS 2. Please support the following Section Traffic Nets: May 2000 NTS Net Reports.

Net	*QNI*	*QTC*	*Sess*	*NM*	*Freq*	*Time*	*Day*
QMN	651	267	61	WB8SIW	3.663	6:30&10 PM	Daily
MACS	204	88	29	W8RNQ	3.953	11 AM Daily (1 PM Sun.)	
MITN	396	190	31	N8FPN	3.952	7 PM	Daily
UPN	1040	27	35	AA8SN	3.921	5 PM Daily (Noon Sun.)	
GLETN	505	89	31	VE3SCY	3.932	9 PM	Daily
SEMTN	456	68	31	WI8K	146.640	10:15 PM	Daily
WSSBN	673	36	31	K8JRE	3.935	7 PM	Daily
D8 ARES	14	0	3	VE3EUI	3.932	7:30 PM	Friday
VHF Nets	458	11	22	KB8ZYY	Various		

OHIO: SM, Joe Phillips, K8QOE, Fairfield, (to contact me, see page 12)—In Ohio, marathons and bicycle races are the events which help us to sharpen our communications skills. The Cleveland/CVS Marathon, The Columbus Marathon, Flying Pigs Marathon (Cincinnati) are local major events, and include the 20-county Great Ohio Bicycle Adventure (GOBA) in June. Add to this the six-county Tour of the Scioto River (TOSRV) over the Mothers' Day weekend where 87 hams from 6 counties assisted in the 110 mile bicycle tour. Hams from Franklin, Ross, Pickaway, Pike, Scioto and Hamilton counties provided communications along the route.....Hope everyone had the same great time I had at Hamvention this year which was also an ARRL National Convention. Special thanks to the Dayton Amateur Radio Association (DARA) for their excellent handling of both events this year. And, of course, congrats to General Chairman Jim Graver, KB8PSO. Please keep Saturday, September 16th open for the Ohio Section Conference in Columbus. Same place as last year with many new events. More details in the next edition of the Ohio Section Journal. In case you're interested, the next Ham Radio National Convention in Ohio will be August, 2002 when

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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.

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Adjust your antenna tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259B is a complete ham radio test station including -- frequency counter, RF signal generator, *SWR Analyzer*™, RF Resistance and Reactance Analyzer, Coax Analyzer, Capacitance and Inductance Meter and much more!

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MFJ-99, $54.85. Accessory Package for MFJ-259/B/249/B/209. Includes *genuine* MFJ-29C carrying case, MFJ-66 dip meter adapter, MFJ-1315 110 VAC adapter. ***Save $5!***

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MFJ-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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(662) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

MFJ-224 **$159.95**

MFJ 2 Meter *FM SignalAnalyzer*™

Measure signal strength over 60 dB range, check and set FM deviation, measure antenna gain, beamwidth, front-to-back ratio, sidelobes, feedline loss in dB. Plot field strength patterns, position antennas, measure preamp gain, detect feedline faults, track down hidden transmitters, tune transmitters and filters. Plug in scope to analyze modulation wave forms, measure audio distortion, noise and instantaneous peak deviation. Covers 143.5 to 148.5 MHz. Headphone jack, battery check function. Uses 9V battery. 4x2½x6¾ in.

More hams use MFJ SWR Analyzers™ than any others in the world!

we welcome the Young Ladies Radio League (YLRL) to Cleveland. OHIO SECTION CONGRATS TO: (A) New officers for DARA; Reuben Meeks, W8GUC, pres; David Coons, WT8W, veep; Don Dubon, N6JRL, sec; Lori Damewood, N8BAN, tres; and Ken Allen, KB8KE, new trustee. (B) Winners of the Hugentober CW proficiency at OHKYIN ARS (Cincinnati), Otto Bielefld, AA8KK, Nathan Ciufo, KA3MTT and Al Hall, KC8FJO. (C) Jay Bookwalter, KC8GNL, IRAC 1999 Ham of the Year at Mansfield, (D) SKYWARN of Medina County which received great public notice with an excellent story in the local newspaper. (E) All Field Day Chairmen in Ohio. You not only kept a tradition alive but introduced this excellent PR tool for putting Ham Radio on public notice…THE AUGUST HAMFESTS; Voice of Aladdin ARC, Columbus (5); Warren ARC (20) de K8QOE. Now for our May traffic reports.

Net	*QNI*	*QTC*	*QTR*	*Sess*	*Time*	*Freq*	*Mgr*
BN (E)	136	48	250	31	1845	3.577	WD8KFN
BN (L)	187	65	319	31	2200	3.577	NY8V
BNR					1800	3.605	W8LDQ
OSN	151	54	517	31	1810	3.708	WB8KQJ
OSSBN	1764	466	2259	92	1030, 1615, 1845	3.9725	KF8DO
OH Section ARES					1700 Sn	3.875	WD8IHP

Tfc: WB8KFN 155, N8IXF 143, N8FWA 130, WD8MIO 127, KD8HB 119, WA8SSI 84, KA8FCC 74, KC8HJL 72, N8DD 67, WA8EYQ 67, W8BO 60, N8POV 60, N8CW 51, N8TNV 50, WA8HED 49, KF8DO 47, NS8C 42, KB8RGY 42, K3RC 38, KI8IM 38, N8YWX 34, KD9K 33, WD8KBW 31, NY8V 29, KC8DVM 28, KC8HTP 25, WB8HHZ 24, W8RG 23, KI8O 17, W8JMP 15, N8IBR 15, KB8TIA 15, N8GP 14, N8RAK 12, KB8SBK 10, N8WLE 10, N8GOB 7, KC8JKE 7, N7CEU 6, KC8KYP 6, AA8XS 6, KX8B 4, KE8FK 3, W8GDQ 3, KC8HFV 3, N8HIA 1, K8QIP 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 (May 2000) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 62/12 CDN 329/86 CGESN 57/0 ESS 283/110 HVN 577/161 SDN NR NYPHONE 209/514 NYPON 363/334 NYS/E 337/368 NYS/M NR NYS/L 231/359. Section News: Now is the time to start thinking about ARES and the SET (Oct.) Are you ready? Congrats to Adam, KC2DAA, the new Dutchess Cty. EC! Hudson Convention is 9/15 and 16 in Westchester. See you there! 73 de Rob. PSHR: N2YJZ 196, KC2DAA 156, N2JBA 153, W2AKT 151, WB2ZCM 139, W2JHO 130, WA2YBM 117, WB2IIV 90. Tfc: N2YJZ 262, KC2DAA 83, N2JBA 77, WA2YBM 52,WB2IIV 49,W2JHO 48,WB2ZCM 41, W2AKT 38, W2CJO 7, KL7JCQ 6,WA2BSS 4, K2AVV 1, N2MCS 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. Lighthouse/Lightship weekend is August 19. Area hams will be operating from Fire Island and Horton's Point Light. ARRL Hudson Division Awards dinner is Sept. 15 in New Rochelle, NY. Contact W2XX or see the Hudson Division Web Page (**www.arrlhudson.org**) to submit a nomination. Convention is Sat. Sept. 16 at Westchester County Center in White Plains. Please write or e-mail your NY State Assemblyman to support A9947 and Senator to support S7324, the NY State PRB-1 Bill. Check the NLI Webpage at **www.arrlhudson.org/nli** for more information on upcoming events. NYC/LI VE exam list follows: Manhattan: BEARS, ABC Cafeteria, 125 West End Ave at 66th Street, Contact Jerry Cudmore W2JRC at 212-456-5224 for dates & times; East Village ARC, 2nd Friday at 7 PM, Laguardia HS, Amsterdam Ave and West 65th Street, Manhattan. Contact Robina Asti KD2IZ at 212-838-5995; Columbia University VE Team, 3rd Monday at 6:30 PM, Watson Lab, 6th Floor, 612 West 115th Street, Manhattan. Contact Alan Crosswell, N2YGK, at 212-854-3754; Queens: Hellenic ARC, 4th Tuesday at 6:30 PM, Pontion Society, 31-25 23rd Ave, Astoria, NY. Contact George Anastasiadis, KF2PG, at 516-937-0775. Nassau County: Grumman ARC (W5YI), 2nd Tuesday at 5 PM, Northrop-Grumman Plant 5, South Oyster Bay Road via Hazel Street, Bethpage, NY. Contact Bob Wexelbaum, W2ILP, at 631-499-2214; LIMARC, 2nd Saturday at 9 AM, NY Institute of Technology, 300 Building, Room 311, Northern Blvd, Greenvale, NY. Contact Al Bender W2QZ at 516-623-6449. Suffolk County: Great South Bay ARC, 4th Sunday at 12 noon, Babylon Town Hall, ARES/RACES Room, 200 East Sunrise Hwy, North Lindenhurst. Contact Tom Carrubba at 631-422-9594; Larkfield ARC, 2nd Saturday in Feb, May, Sep, Nov, Huntington Town Hall, Room 114. Contact Stan Mehlman, N2YKT, at 631-423-7132; Peconic ARC, exams held January, April, July, and October on next to last Friday at 6:30 PM at Southold School, Oaklawn Ave, Southold, NY. Contact Ralph Williams N3VT at 631-323-3646. Mid Island ARC, last Weds of each month at 7 PM at 36 Dew Flag Rd, Ridge NY 11961, Contact: Mike Christopher W2IW at 631-924-3535. Report all changes to N2GA before the 12th of the month. Tfc: WB2GTG 418, N2AKZ 144, KB2KLH 102, W2RJL 90, WA2YOW 24, KB2RED 8.

NORTHERN NEW JERSEY: SM, Jeff Friedman, K3JF—By the time you read this, several things will have occurred in regards to the Ham License Plate Bill which has been introduced in the NJ Assembly, A-1593. I have had a brief meeting with Senator Anthony Bucco who has sponsored a companion Bill in the NJ Senate. That Bill is S-1341. Senator Bucco indicated that it will take some letter writing on our part to the Senators, asking for their support. He believes that with this support we may have a reasonable chance at passing after the summer recess. It becomes very important for all New Jersey Hams to write their Senators and ask for their support in passing this Legislation. I will have met with Governor Whitman during this

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MFJ-989C *Legal Limit* Antenna Tuner

MFJ uses super heavy duty components to make the world's finest legal limit tuner

MFJ uses super heavy duty components -- roller inductor, variable capacitors, antenna switch and balun -- to build the world's most popular high power antenna tuner.

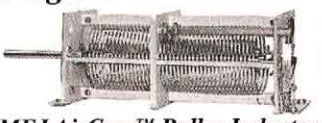
MFJ-989C **$359.95**

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. 1.8 to 30 MHz. 10¾Wx4½Hx15 in.

MFJ-962D *compact* Tuner for Amps

MFJ-962D **$269.95**

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10¾x4½x10⅞ in.

MFJ-969 300W *Roller Inductor* Tuner

MFJ-969 **$199.95**

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. 3½Hx10½Wx9½D inches.

MFJ-949E *deluxe* 300 Watt Tuner

MFJ-949E **$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.

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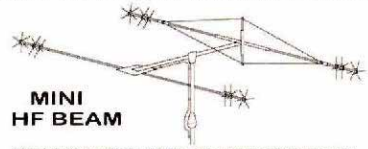


same period. Governor Whitman has signed the Proclamation naming the Month of June as Amateur Radio Month. During that meeting I asked for her support on S-1341 as well. On another subject I would like to thank Steve Adell, KF2TI, and Steve Saposnik, KB2ENF, for their communications work in the dedication of the first new Torah Dedication in 100 years for the Morristown Temple. Again Ham Radio and the local Law Enforcement agencies worked together closely building much goodwill in the Town of Morristown. By the time you read this news, Field Day 2000 will be a memory for all of us. I hope that with all the new Hams and upgrades that have taken place since the new Regulations went into effect there was a good deal of "Elmering" going on and our new contributors learned a great deal about operating.

Net	*NM*	*Sess*	*QNI*	*QTC*	*QSP*
NJM	WA2OPY	31	168	55	44
NJPN	W2CC	35	174	21	15
NJN/E	AG2R	31	229	67	59
NJN/L	AG2R	31	197	69	58
NJVN/E	N2RPI	31	306	37	29
NJVN/L	N2OPJ	31	346	45	38

Tfc: N2XJ 101, KC2AHS 68, N2OPJ 52, W2MTO 41, K2VX 37, KB2VRO 36, K2PB 35, N2RPI 32, N3RB 26, N2GJ 13, N2ATJ 1.

MIDWEST DIVISION

IOWA: SM, Jim Lasley, N0JL—ASM: N0LDD. SEC: NA0R. ACC: N0IJP @ KE0BX. BM: K0IIR @ W0CXX. SGL-K0KD. As I write this FD is not yet and as you read this, FD is past. I know now that I will not get as much travel done this year as I would (have) liked. But my work schedule intervened. Sioux City was more relaxed for me this year. N0LDD and I added a day and went on Thursday. That made it a very nice trip. By now the new repeater at Beresford may be up and running. The word I have says it is awaiting final wiring. And TSARC sent me a nice picture of some of their members and their van. Mahaska ARC had a bunny hunt on June 11. OARC has moved their meeting place to the N0SM palatial estates overlooking metropolitian Ottumwa due to security at the high school over the summer. N0SM notes that VHF has been hopping. SEITS will be helping with RAGBRAI. Are you close to the route? Will you be helping? OARC is also working on a new set of by-laws. NIARC had a barbeque at FD! Looks like a new repeater in the Quad Cities area. WB0BBM/R should be on 444.475 with tone on 186.2. CVARC it is time for SummerFest! Looks like DMRAA and ARCS will do a 5A for FD. I hope all of you have your new tickets from April 15th by now. And if you do... is it time to upgrade again? 73 til next month. de N0JL. Newsletters were received from SARES/SW, TSARC, MARC, OARC, SEITS, NIARC, CVARC, DMRAA. Traffic: W0SS 177, KA0ADF 74, N0JL 15.

KANSAS: SM Orlan Cook, W0OYH—ASM/ACC/OCC: Robert Summers, K0BXF. SEC: Joseph Plankinton, WD0DMV. STM: Ron Cowan, KB0DTI. SGL: Marshall Reese, AA0GL. PIC: Scott Slocum, KC0DYA and TC: Frank Neal, N8FN. ARRL KS State Convention August 27 at Salina. Section meeting and Kansas Amateur of the year presentation by W0TQ at 10 AM. Pse welcome Terry, WA0DTH as he joins us as an Official Bulletin Station; and Ken, W0NXS, as Official Relay Station. Ken has been active on our CW tfc net as a net control for some time. We need an Emergency Coordinator in the Wichita area. Please let me know if interested. EC Rick Reichert of Dist 4 Zone 2 is not continuing for another 2 yr. Rick has put together a great example of a full service ARES group with HF capabilities to reach out nation wide for his community. Scott Crawford, KC0CIG, has accepted the EC position. A big TU to all for supporting NTS, ARES, Field Svc Apr Kansas Nets: sessions/QNI/QTC, KSBN 30/1083/82 KPN 22/307/34 KMWN 29/578/502 KWN 29/808/536 CSTN 25/1704/94 QKS 56/276/81 QKS-SS 11/26/5 SEC 12/233/3 QNS KB0AMY N0BTH K0BXF WD0DVM/SEC AA0IQ W0PBV WA0SSR KB0WEQ. TEN 294 msgs 60 sessions Kansas 67% KB0DTI AC0E KX0I AA0OF K0PY W0WWR NB0Z WB0ZNY W0SS mgr. BBS reports: W1AW Bul/Per/NTS AA0HJ 6/316/0 N0OMB 26/324/0. Ks Stns tfc N0JK 1038, W0WWR 74, WB0ZNY 62, W0OYH 48, K0RY 30, NB0Z 30, KX0I 21, N0RZ 13, N0ZIZ 12, W0FCL 2. PIC/PIO KC0DYA, PIO KB0DTI reports w/published news clips.

MISSOURI: SM Dale Bagley, K0KY—ASM: John Seals, WR0R. ACC: Keith Haye, WE0G. BM: Brian Smith, KI0MB. OOC: Mike Musick, N0QBF. PIC: Dennis McCarthy, AA0A. SGL: E.B. DeCamp, KD0UD. STM: Charles Boyd, KE0K. SEC: Patrick Boyle, K0JPB. TC: Wayland McKenzie, K4CHS. Cliff Ahrens, K0CA, from Hannibal, MO has been appointed the Section DXCC Card Checker. To address question about the program to Cliff, e-mail him at **ahrens@nemonet.com**. On Aug 5th the SMARC Hamfest in Springfield, MO, will be held. Woody Moore, W0ODY is Chairman for the event. The CMRA Hamfest/ARRL MO State Convention will be held Aug 26, in Columbia, MO with Dewey Bennett, WM0H, serving as the HAMFEST/CONVENTION chairman. All ARRL MO Section Members and appointees are encouraged to attend and hear Steve Ewald, WV1X speak at the ARRL Forum. Another great Hamfest happens Aug 27th when the St Charles ARC host their annual Hamfest will take place in Blanchette Park in St Charles. The Hamfest chairman is Ken Fieser, KB0VLN. I visited the PHD ARA in Kansas City in May. PHD ARA Chris Taylor, KC0AFO, and the membership were a pleasure to meet. They were planning for Field Day and are working hard to increase interest in Amateur Radio. Bob Roske, AC0L, one of the Midwest Division Asst. Directors was of great help in learning about the Club program. 73.

Net	*Sess*	*QNI*	*QTC*	*NM*	
QCWA	35	4	78	0	N0UYN
RollaBillboard	30	344	2		NA0V
MTN	31	389	49		K0IPM
Jackson Co ARES	5	54	0		K0UAA
WAARCI	4	96	0		KB0VZP
Paul Revere	4	398	0		N0IWA
Macon Co ARES	4	52	0		K0KY

Tfc: KE0K 57. PSHR: KE0K 97.

NEBRASKA: SM, Bill McCollum, KE0XQ—ASMs- W0KVM,

MFJ *Switching* Power Supplies

Power your HF transceiver, 2 meter/440 MHz mobile/base and accessories with these new 25 or 45 Amp MFJ MightyLite™ Switching Power Supplies!

No RF hash . . . Super lightweight . . . Super small . . . Volt/Amp Meters . . .

MFJ's new adjustable voltage switching power supplies do it all! Power your HF or 2M/440 MHz radio and accessories.

MFJ's *MightyLites*™ are so light and small you can carry them in the palm of your hand! Take them with you anywhere.

No more picking up and hauling around heavy, bulky supplies that can give you a painful backache, pulled muscle or hernia.

MFJ's 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- that's *5 times lighter* than an equivalent conventional power supply. MFJ's 45 Amp is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . . Your buddies won't hear *any* RF hash on your signal! *None* in your receiver either!

Some competing switching power supplies generate objectionable RF hash in your transmitted and received signal.

These super clean MFJ *MightyLites*™ meet all FCC Class B regulations.

Low Ripple . . . Highly Regulated

Less than 35 mV peak-to-peak ripple under 25 or 45 amp full load. Load regulation is better than 1.5% under full load.

Fully Protected

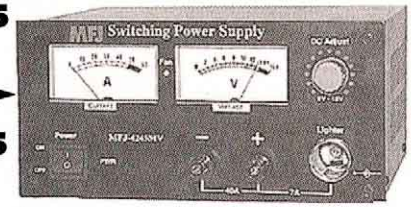
You won't burn up our power supplies!

No RF Hash!

← MFJ-4225MV
25 Amp
$149.95
plus s&h

MFJ-4245MV →
45 Amp
$199.95
plus s&h

No RF Hash!



They are fully protected with Over Voltage and Over Current protection circuits.

Worldwide Versatility

MFJ *MightyLites*™ can be used anywhere in the world! They have switchable AC input voltage and work from 85 to 135 VAC or 170 to 260 VAC. Replaceable fuse.

MightyLites™ . . . Mighty Features

Front-panel control lets you vary output from 9 to 15 Volts DC.

Front-panel has easy access five-way binding posts for heavy duty use and cigarette lighter socket for mobile accessories. MFJ-4245MV has two sets of quick-connects on the rear for accessories.

Brightly illuminated 3 inch meters let you monitor load voltage and current.

A whisper quiet internal fan efficiently cools your power supply for long life.

Two models to choose from . . .

MFJ-4225MV, $149.95. 25 Amps maximum or 22 Amps continuous. Weighs 3.7 pounds. Measures 5¼Wx4½Hx6D in.

MFJ-4245MV, $199.95. 45 Amps maximum or 40 Amps continuous. Weighs 5.5 pounds. Measures 7½Wx4¾Hx9D in.

NEW! 25 Amp *MightyLite*™

Super light, super compact switching power supply delivers 25 Amps maximum/22 Amps continuous at 13.8 Volts DC. Low ripple, highly regulated. ***No RF Hash!*** Five-way binding posts for high current. Quick connects for accessories. Over voltage/current protection. 110 or 220 VAC operation. Meets FCC Class B regs. 3.5 lbs. 5½Wx2½Hx10¼D in.

MFJ-4125
25 Amp
$109.95
plus s&h

MFJ 35/30 Amp Adjustable Regulated DC Power Supply

Massive 19.2 pound transformer . . . No RF hash . . . Adjustable 1 to 14 VDC . . .

MFJ-4035MV
$149.95
plus s&h

MFJ's heavy duty conventional power supply is excellent for powering HF or 2 Meter/440 MHz transceiver/accessories.

A massive 19.2 pound transformer makes this power supply super heavy duty! It delivers 35 amps maximum and 30 amps continuous without even flexing its muscles. Plugs into any 110 VAC wall outlet.

It's highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- it's super clean!

Fully protected -- has over voltage protection, fold back short circuit protection and over-temperature protection.

You get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

Three sets of output terminals include a pair of heavy duty five-way binding posts for HF/VHF radios, two pairs of quick-connects for accessories and a covered cigarette lighter socket for mobile accessories.

A front-panel fuse holder makes fuse replacement easy. Whisper quiet fan speed increases as load current increases -- keeps components cool. 9½Wx6Hx9¾D inches.

MFJ *High Current* Multiple DC Power Outlets

Power two HF/VHF transceivers and six or more accessories from your 12 VDC power supply

MFJ-1118
$74.95
plus s&h

MFJ-1116
$49.95
plus s&h

MFJ-1112
$34.95
plus s&h

New!
MFJ-1117
$54.95
plus s&h

MFJ-1118, $74.95. This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. Lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC supply.

Two pairs of super heavy duty 30 amp 5-way binding posts connect your transceivers. Each pair is fused and RF bypassed. Handles 35 Amps total.Six pairs of heavy duty, RF bypassed 5-way binding posts let you power your accessories. They handle 15 Amps total, are protected by a master fuse and have an ON/OFF switch with "ON" LED indicator.

Built-in 0-25 VDC voltmeter. Six feet super heavy duty eight gauge color-coded cable with ring tongue terminals. Binding posts are spaced for standard dual banana plugs. Heavy duty aluminum construction. 12½x2¾x2½ in.

MFJ-1116, $49.95. Similar to MFJ-1118. No 30 amp posts. Has "ON" LED and 0-25 VDC voltmeter. 15 amps total.

MFJ-1112, $34.95. Similar to MFJ-1116. No on/off switch, LED, meter, fuse.

NEW! MFJ-1117, $54.95. For powering four HF /VHF radios (two at 35 Amps each and two at 35 Amps combined) simultaneously. Tiny 8x2x3 inches.

Free MFJ Catalog
and Nearest Dealer . . . 800-647-1800

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• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

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FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

All are protected by MFJ's famous No Matter What™ one year limited warranty.

NØMT, WYØF, WBØULH & WBØYWO. It was great seeing many of you at the Dakota/Midwest Convention in S. Sioux City. The 3900 Club did a great job of putting on this event. I am pleased to announce that NØVUB has been appointed EC for Dawson County. Several blind hams provided communications for the Walk for Independence. This walk was a fund raiser for the National Federation of the Blind. I hope everyone had a successful Field Day. Remember Field Day gives us chance to set up and operate under adverse conditions. It is not a contest. We are starting to see many license upgrades now. Do a little Elmering and get these hams pointed in the right direction. Most of all make them feel welcome on the HF bands. The OOC (WBØART) reminds me that OO reports can be sent to him via email. His email address is: wb0art@nque.com . Net Reports: Lincoln/Logan ARES: QNI 161, QTC 2 & 14 sessions. MIDNE ARES: QNI 363, QTC 4 & 31 sessions. NE Storm Net: QNI 727, QTC 20 & 31 sessions. NE 40M Net: QNI 299, QTC 13 & 27 sessions. MARES: QNI 216, QTC 1 & 5 sessions. NMPN: QNI 1632, QTC 10 & 31 sessions. Tfc: KØPTK 128, KEØXQ 36, WØRWA 16, WDØBFO 10, WYØF 10, KAØDOC 4, WØUJI 4, KAØDBK 4, WØEXK 2, NØUUZ 2, WBØART 2. PSHR: KAØDBK 115, KBØYTM 47.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Betsey Doane, K1EIC—I regret to inform you that Mel Card, W1CUH, a longtime traffic handler became a Silent Key in May. Mel was an avid CW op and NCS on CN, CT's CW Section NTS traffic net for between 35 and 40 years. He did this job faithfully 50 of 52 weeks each year only missing his vacation time. This year is the 50th anniversary of NTS so it is fitting to remind ourselves that NTS is based on volunteers representing their Section or Region once a week and keeping that sked. Mel was 100% loyal to this task. Our condolences to his family and friends. With only four and a half days notice Kevin, KA6PDG, succeeded in putting together a team of eight Amateurs to provide communications for the BKM/Steel Case/MS Tour For the Cure off road bike ride on Sunday, June 4th in Hurd State Park just south of Cobolt. Many thanks to N1PYY, WA4QXT, N1YFA, N1PTB, K1BIY, N2XN, KB1DZC, KA6PDG, and to the Middlesex Amateur Radio Society for donating the use of their mobile emergency communications trailer. N1YFA and N1PYY set up a crossband repeater on top of Split Rock, a high point overlooking Haddam Neck and most of Hurd Park. Congrats-the effort was a real success. KA6PDG and N1PTB founded the Training Information and Public Service Net (TIPS Net) which meets each Tuesday 1930 on many repeaters. Contact **kharkins1@juno.com** or **n1ptb@arrl.net** for more information or send them traffic. Hope to see many of you at Boxboro August 25-27-meet our new ARRL President, W5JBP, and hear Riley Hollingsworth, K4ZDH! Listen for FARA ops August 19-20 operate the International Lighthouse / Lightship QSO Party from the Nantucket Lightship as a special event station. Net sess/QNI/QTC/NM: NVTN 31/112/110/KB1CTC; ECTN 31/243/35/WA4QXR; WESCON 30/252/63/KA1GWE; CN 31/97/37/N1AEH; CPN 31/240/65/N1DIO; NCEN 4/59/43/NM1K; BOMN 27/310/411/NM1K. Tfc: NM1K 965, KA1VEC 349, KB1CTC 154, KA1GWE 137, KE1AI 120, K1UQE 51, WA4QXT 48.

EASTERN MASSACHUSETTS: SM, Joel Magid, WU1F—Nets and traffic report submitted by STM Bill, NZ1D.

Net	*Sess*	*QTC*	*QNI*	*QTR*	*NM*
EMRI	62	141	208	641	K1SEC
EMRIPN	31	107	161	476	WA1FNM
EM2MN	31	94	278	445	N1LKJ
HHTN	31	60	240	460	N1IST
CITN	31	81	302	543	N1SGL
WARPSN	4	12	54	NA	K1BZD
NEEPN	3	8	10	NA	WA1FNM
CHN	31	25	153	289	W2EAG

Tfc: WA1TBY 263, NZ1D 129, W2EAG 120, N1LKJ 101, WA1FNM 94, K1SEC 57, NG1A 53, WA1LPM 52, N1AJJ 32, KD1LE 30, K1BZD 28, N1TPU 28, N1IST 23, N1LAH 21, N1TDF 21, KB1EB 17, WA1VRB 17, N1BNG 12, N1XQC 4.

MAINE: SM, Bill Woodhead, N1KAT—ASMs: WA1YNZ, KA1TKS. STM: N1JBD. BM: W1JTH. SGL: W1AO. ACC: KA1RFD. OOC: KA1WRC. PIC: KD1OW. SEC: N1KGS. Asst. Dirs: W1KX, KA1TKS, K1NIT. Web Site: N1WFO. The job of Section Traffic Manager has gone through a change; BarneyReynolds, NX1A, has retired, and on behalf of all the amateurs in the State of Maine, I would like to thank Barney for his years of dedicated service. Peter Lewis, N1JBD, has offered to take over as STM. We all look forward to working with Peter in his new endeavor. With most of the frantic schedule this past summer has offered, it will be nice to look forward to a respite. A good way to enjoy some free time would be to get involved with the AMSAT. Their upcoming convention is Oct 27 & 29, 2000. Fellow Hams from all over the world will be in attendance. This event will be a great way to demonstrate how we as amateurs are involved with cutting edge technology, especially to the younger generation, to show them where tomorrow's technology will take them. Looking forward to seeing everyone at the AMSAT Convention. 73, Bill, N1KAT.

NEW HAMPSHIRE: SM, Mike Graham, K7CTW—ASMs: WW1Y, WB1ASL, W1NH. TC: WA1HOG. STM: WA1JVV. PIC: KA1GOZ. OOC: WS1E. SGL: K1KM. BM: KH6GR. ACC: AA1QD. SEC (acting): WW1Y. Received a call from Alvah Buckmore, K1TMA, Manager of 1RN for reps from New Hampshire. They are desperately needed. If you can assist, e-mail Alvah at **K1TMA@juno.com**. Cliff, N1RCQ, reports that folks from CNHARC will most likely be participating again this year in the Mt. Washington Auto Road Bicycle Climb scheduled for August 19th. Visit CNHARC Website **www.cnharc.org** for more details. Licensed amateur radio volunteers are needed to staff the amateur radio booth at the "Big E" - Massachusetts State Fair. Participating clubs can put up a banner to promote interest in their club, and there's free admission and parking for participants. Here's your chance to see one of New England's largest Fairs. For more info, contact Tammy Krauss, KB1CYN, at e-mail

MFJ Contest Voice Keyer

Brand New design . . . Microprocessor controlled

Transformer-coupled -- No RFI, hum or feedback . . . 75 seconds total, 5-messages . . . Can be computer-controlled by CT, NA, etc . . . Records received audio . . .

Let this *new* microprocessor controlled MFJ *Contest Voice Keyer*™ call CQ, send your call and do contest exchanges for you in your own voice!

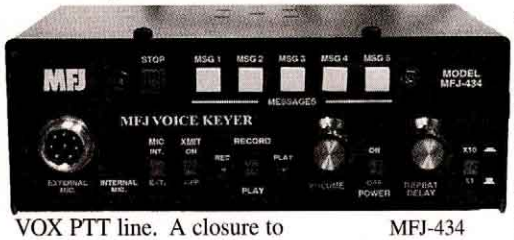
Store frequently used phrases like "CQ Contest this is AA5MT", "You're 59" . . . "Qth is Mississippi" and more! Contest by pressing a few buttons and save your voice.

You can record and play back five natural sounding messages in a total of 75 seconds. EEPROM technology keeps messages stored for up to 100 years -- no battery backup needed.

Repeat messages continuously and vary the repeat delay from 3 to 500 seconds. Makes calling CQ so easy and it's also a great voice beacon.

A receive audio jack lets you record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "*Please repeat*".

A playing message can be halted by pressing the *Stop Button*, your PTT mic button or by your



VOX PTT line. A closure to ground via remote control or computer can also halt messages.

MFJ-434 **$179.95** plus s&h

Has jack for remote or computer control (using CT, NA or other program and its interface). Lets you select, play and cancel messages.

The MFJ-434 is transparent to your microphone -- your mic's audio characteristics do not change when your MFJ-434 is installed. Dual controls make it easy to tailor audio level to match your voice.

All audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

It's easy to use -- just plug in your 8 pin microphone cable and plug the MFJ-434 shielded cable into your transceiver's mic connector. Internal jumpers let you customize it to Kenwood, Icom, Yaesu, Alinco or Radio Shack rigs. Use your station or built-in microphone for recording.

Built-in speaker-amplifier lets you monitor stored messages. 3.5 mm speaker/headphone jack. SMT technology. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312B, $14.95. 6½Wx2½Hx6½D inches.

MFJ-73, $29.95. Remote Control Head with cable for MFJ-434.

MFJ *Professional grade* Boom Mic Headphones

For marathon contesting, DXing, traffic nets, ragchewing . . . These lightweight, fully padded Boom Mic Headphones make operating superbly comfortable! Flexible gooseneck microphone boom and speech frequency tailored microphone cuts through noise and QRM!

This *professional grade* MFJ Boom-Mic Headphones set is designed for contesting, DXing and traffic nets. Features *total comfort* design with leatherette padding for operating long hours.

Superb 3/4 inch thick padding on each ear and headband lets you wear your headset all day long! So super lightweight, you won't even know they're there! Headband adjusts for a perfect fit to keep out external noise.

The headphones' frequency response is enhnanced for communications to bring out speech fidelity that you never knew existed. Signals never sounded so crystal clear.

The flexible microphone boom lets you position the mic comfortably at an optimum distance to minimize silibant sounds.

MFJ's frequency tailored microphone element lets you bust through noise and QRM!

Extra-long 9⅔ feet of cable lets you move about your ham shack!

Has standard 1/4 inch jack for headphones and 3.5 mm jack for microphone. Build your own adaptor or use MFJ's pre-wired adaptors to match your transceiver. **Order** MFJ-5396 Y/K/I (YAESU, KENWOOD, ICOM respectively). $15.95 each.

Even casual operators will appreciate the advantages of MFJ's superbly crafted Boom-Mic headphones for *hands-free* operating at an incredibly low price.

MFJ-392, $19.95. Communication Headphones only. Great for ham radio, shortwave listening -- all modes, SSB/FM/AM/ Data/CW.

Each phone has individual volume and speech enhancement control. Superb leatherette padding.

Both MFJ-392 and MFJ-396 have MFJ *No Matter What*™ one year limited warranty.

MFJ Communications Speaker

MFJ-281 **$12.95** Ship Code A

SSB, FM, AM, and CW never sounded so crystal clear! Plug in this MFJ-281 *ClearTone*™ speaker and bring out communication speech fidelity that you never knew existed. Restores the smooth sinewave sound that CW naturally generates and makes copying easier. It was carefully designed to improve intelligibility of speech in the frequency range of 600 to 4000 Hz while reducing undesirable noise, static and hum. A top grade 3" Mylar cone speaker is mounted in a well designed baffle. Its fine mesh metal grille allows sound to radiate without muffling. 8 Watts, 8 Ohms. Six foot cord. 3.5 mm mono plug. 3¾x3x2¼ inches.

MFJ 12/24 Hour *DXers Watch*

MFJ-181 **$39.95** plus $6 s&h

This *MFJ DXers Watch* lets you quickly check 12 hour local time and 24 hour time in time zones around the world. By noting day and night areas around its rotatable bezel, you can estimate which bands are open each hour to different parts of the world. You can even estimate best times of gray line propagation. It features a highly accurate *Japanese* quartz movement. Turn out the lights . . . *NiteGlo*™ hour, minute and second hands show up in the dark! Has date display. Well-known world cities encircle it's attractive world map face to indicate time zones. A durable stainless steel band adjusts to fit. Attractive giftbox has felt padding. A great gift!!!

MFJ 12/24 Hour LCD Clock

MFJ-108B **$19.95** plus $6 s&h

Dual Clock with separate 24 hour UTC and 12 hour local time displays. Large 5/8 inch LCD numerals, heavy brushed aluminum frame, sloped face, battery included. Synchronizable to WWV. 4½x1x2 in.

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kb1cyn@aol .com. Next month a report on Field Day events around the state. For now, best 73. Net NM/Sess/QNI/QTC: GSFM N1RCQ 31/265/30; GSPN WB1GXM 30/136/42; VTNH WA1JVV/30/152/131. Tfc: W1PEX 910, N1NH 124, WA1JVV 88, WB1GXM 57, W1ALE 43, N1CPX 11.

RHODE ISLAND: SM, Armand Lambert, K1FLD—Greetings fellow radio operators. We must issue an appeal for volunteers to handle traffic on HF coming into RI. Please contact Bill, KA1JXH, at 401-333-3058 to join this exciting group. This year's Canoe and Kayak race organized by the Friends of the Blackstone River provided our radio volunteers with unanticipated suspenseful moments as some of the boats capsized while navigating treacherous water currents. Our volunteers responded quickly and alerted Fire and Rescue personnel. Our thanks to the BVARC members and friends: Ginny, N1WWG, Bob, WB1P, John N1MIU, Rich N1ZJH, Tom N1ZFA, Craig N1XAC, and Becky, Dick, N1DO, Simone, KA1YVF, and Armand, K1FLD. Net control and a well documented log of events as provided by Joe KB1CMD. BVARC antenna committee has successfully completed emergency communications antenna installation at the Landmark Hospital in Woonsocket. Thanks to Tom AA1KH, Dick N1DO, Bob WB1P, Jack KD1UA, Conrad K1KEE and Norm W1AUT who organized the event. You're invited to visit the Website for the PVARC, **http://www.pvarc.freeservers.com/** Site courtesy of Mike, N1VVR. Till next time, thanks to all our volunteering radio operators. 73 Armand, K1FLD.

VERMONT: SM, Bob DeVarney, WE1U—As of June 30th, my term as Section Manager will expire. After much thought, I have decided to run for a second term after all. You have already received the July issue of QST which has a resolicitation for applicants. Lastly, I want to thank all the people who have helped me for the past two years, but in particular Joe Armstrong who did yeoman's work as SEC. As you may know, Joe has had to step down due to poor health, but has been filling the position until I can find a replacement. Starting with the next Section News, I (I hope) will start posting the section traffic stats as we now have an STM again.

WESTERN MASSACHUSETTS: SM, William C. Voedisch, W1UD, **w1ud@arrl.org—** ASM: N1NZC. ASM (digital) KD1SM. STM: W1SJV. SEC: K1VSG. OOC: WT1W. When you read this, Field Day will have passed. I hope all had an enjoyable and safe day. The MARA group and myself spent the two days on the summit of Mt Wachusett. That is always an experience—operating with the lightning and thunder crashing around you. It is never warm at the top of the mountain. We will have many tourists in WMA during the summer. If you should hear a non-familiar call sign on your local repeater, make a concerted effort to answer and greet your fellow ham. It has been said that New Englanders are not very friendly. Make that a myth and over extend yourself. Remember, you may be in their area and would want reciprocal treatment. How about sending an e-mail and tell the WMA group what you are doing or planning. If not by e-mail, then by phone. The machine is on 7/24 for your use. 978-537-2502. I have no plans to travel and the coffee pot is always on. Drop by if you're in the area. Above all, be careful. 73, Bill.

NORTHWESTERN DIVISION

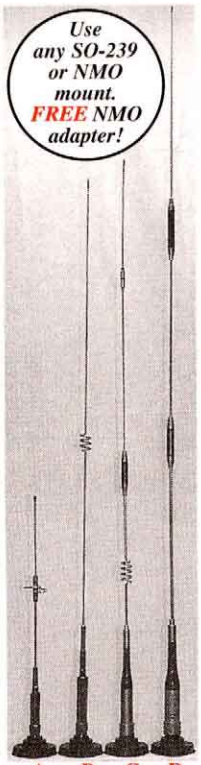
ALASKA: SM, Kent Petty, KL5T — Welcome new field organization members: Alaska Morse Wire NM Lake "Ed" Trump (AL7N), ACC David W. Stevens (KL7EB). Thanks to George Meacock (NL7RD) for his service as ACC. APRS effort stepping up. Contact WL7BF or KL5T in Anchorage, and AD4BL in Fairbanks. Look for opportunities to demo this technology to our served agencies. Alaska HF Pactor Gateway project underway. Stations needed for hub locations throughout the section. Contact Pete Marsh, AL7PI for info. Contact Rob Wilson (AL7KK) for input to state PRB-1 effort. Encourage section-wide check-in to HF nets: Sniper's Net 3920 daily 1800 AST, bush Net 7093 daily 2000 AST, Motley Group 3933 daily 2100 AST, and Alaska Pacific Net 14292 M-F 0830 AST. Please report communication drills and exercises, emergency communication activations, and public service activities on FSD-157 to KL5T. Traffic: AL7N, 17. PSHR: AL7N 45.

EASTERN WASHINGTON: SM, Kyle Pugh, KA7CSP—Don, K7BFL, Gordon, WA7LNC, and Bernie, N7YQQ, originated 68 messages on May 15 during the Wallace, ID, Days Festival from the old RR station. Relaying stations picking up the traffic were K7GXZ, WB7VYH, W7GHT, and KA7EKL. I attended the Dayton 2000 Hamvention for the 1st time along with Don, W7ZNN. We had a great time looking at products you see in the ham magazine ads, and I enjoyed meeting ARRL president Jim Haynie, W5JBP, and other ARRL staff people and a number of Section Managers. We also had dinner with our good DX friend Elvin, JA3CZY, who visits Dayton frequently from Japan. The Original Spokane Hamfest is August 5-6. There were 8 out of 12 OO reports for May. 73, KA7CSP. Net Activity: WSN: QNI 936, tfc 338; Noontime Net: QNI 8962, tfc 283; WARTS: QNI 3375, tfc 87. Tfc: K7GXZ 425, W7GB 213, K7BFL 184, KA7EKL 115, KK7T 20. PSHR: W7GB 138, K7GXZ 140.

IDAHO: SM, M.P. Elliott, K7BOI — OOC: N7GHV, SEC: AA7VR, STM: W7GHT. ARRL's major 2000 initiative is education – that's education for hams and education within schools. It is imperative that this hobby attracts young members. Ideas or suggestions are always welcome - please contact Rich Dees, W7BOI (Education ASM). Stay tuned for results from WARC 2000. A prime mission for ARRL is spectrum protection. This meeting addressed mobile communication needs, Little LEOs, and 40-meter broadcast allocations. Wallace Days, a telegraphy display, was held again this year. A Spokane PBS station even produced a 30-minute show around the event. 73 — Mike, K7BOI. Tfc: W7GHT 362, WB7VYH 99, KB7GZU 86, and N7MPS 20. PSHR: W7GHT 123, WB7VYH 103, and N7MPS 58. Net (Sess/QNI/QTC/Mgr.): FARM-31/2208/13/W7WJH; NWTN-31/1143/67/KC7RNT; IDACD-23/ 491/26/K7UBC; IMN-31/385/169/W6ZOH.

MONTANA: SM, Darrell Thomas, N7KOR—It has been a pleasure hearing so many new hams and up-graded hams becoming very active on the various nets during the month. I congratulate all of you who made the effort and received your first license or up-graded to a higher level. Also wish to thank you for your patience in waiting for a new call or

MFJ *RuffRider*™ High Gain Mobile Antennas



Shown on mini mag mounts, not included.

Each MFJ RuffRider™ mobile antenna comes with MFJ's unique 90 degree "fold-over" feature -- lets you pull into your garage without knocking your antenna over!

MFJ's heavy duty bases are extremely strong to handle super rugged rides and day-to-day highway abuse.

MFJ's *RuffRider*™ High Gain dual band 144/440 MHz mobile antenna series is for the serious mobile ham who demands the highest quality, premium products at reasonable prices.

They feature the finest quality construction using precision machined components. *RuffRiders*™ battle the elements, handle rugged rides and day-to-day highway abuse.

Stacked elements with high-Q phasing coils give you outstanding gain. Stay in solid contact!

Phased Radiators

Phased radiators flattens the radiation pattern and concentrates your power to give you *super gain.*

High-Q phasing coils are housed in weather proof high-tech plastic insulation. They're attached to stainless steel stacked radiators by solid metal end sections.

Heavy Duty Base

Rigid, heavy duty solid metal base reduces SWR flutter due to wind vibration. Two Allen set screws securely fastens radiator.

Specially treated center pin provides excellent electrical connection.

Quickly screws off -- helps prevents theft of your expensive rig.

Use SO-239 or NMO Mounts

RuffRiders™ have a PL-259 base mount for quick installation to your heavy duty SO-239 magnet, trunk/hatch, gutter or mirror mount.

A *free* NMO adapter is included for use with an NMO mount.

MFJ mounts are recommended.

All MFJ *RuffRiders*™ are dual band 144/440 MHz antennas and factory tuned for SWR less than 1.5:1 and have 50 Ohm impedance.

MFJ's *No Matter What*™ Warranty

All *RuffRider*™s are covered by MFJ's famous *No Matter What*™ one year limited warranty. MFJ will repair or replace (at our option) your antenna for one full year.

Choose from several different length and gain antennas . . .

A. ***RuffRider Junior***™**.** Premium, short 16½" antenna fits in any garage on any auto. ¼ Wave on 2 Meters, ½ Wave, 3 dB gain on 440 MHz. 100 Watts. No fold-over.
MFJ-1402 **$34.95** add s/h

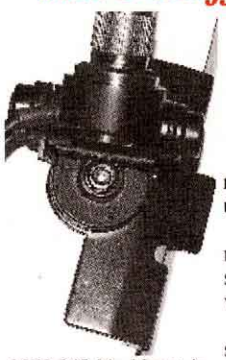
B. ***RuffRider High Power***™**.** Just 40" long handles full *200 Watts.* Great for high power mobile amp. ½ Wave, 3 dB gain on 2 Meters, ⅝ Wave, 5.5 dB gain on 440 MHz.
MFJ-1412 **$49.95** add s/h

C. ***RuffRider High Gain***™**.** 41½" long antenna gives extra gain with little height increase. Handles 150 Watts. ½ Wave, 3.2 dB gain on 2 Meters, ⅝ Wave, 5.7 dB gain on 440 MHz.
MFJ-1422 **$49.95** add s/h

D. ***RuffRider Hyper Gain***™**.** 62½" brute gives a whopping 5 dB gain on ⅞ Wave 2 Meters, ⅝ Wave, 7.6 dB gain on 440 MHz. Our highest gain antenna. Handles 150 Watts.
MFJ-1432 **$69.95** add s/h

144/440 MHz Antenna Tuner with built-in SWR/Wattmeter
Covers 136 to 175 MHz. Handles 150 Watts. Compact 4x2½x1½". *New!* MFJ-922 **$79.95**

MFJ *RuffRider*™ super heavy duty Antenna Mounts



MFJ-345 Lip Mount is shown mounted vertically to a mini-van's angled hatchback lip. Note extra-wide mount with reinforcing tab at right -- safely secures heavy antennas. Swivel mount is adjusted so antenna is near vertical away from mini-van to clear luggage rack.

Trunk/Hatchback *Lip* Mount

MFJ-345 **$34.95** add s/h

MFJ's *RuffRider*™ super heavy duty solid steel Trunk/Hatchback *Lip* Mount mounts to any lip on your vehicle.

Extra-wide *four* inch lip and large reinforcing tabs on each side safely distributes the load over your vehicle's lip.

Two large set screws on each end of the mounting lip locks your mount in place. A scratch-proof rubber guard protects your vehicle's finish.

Secures large VHF, UHF and medium size HF antennas even at highway speeds.

Mounts on lips at any angle. Two axis of rotation lets you position your antenna vertically, horizontally or at any desired angle. Serrated swivel joints locks securely in place with huge 3/8 inch set screw.

Has SO-239 base mount. Use adapter for NMO. Includes low loss coax with PL-259 connector, Allen wrenches and protection caps for SO-239 and locking screw, One year MFJ *No Matter What*™ limited warranty.

Mirror/Luggage *Pipe Clamp* Mount

MFJ-340 Pipe Clamp Mount is shown clamped solidly to vertical mirror support rod on a pickup truck. Antenna is slightly swiveled to the left and positioned about 30 degrees from vertical to clear cab of the pickup truck.

MFJ-340 **$34.95** add s/h

MFJ's *RuffRider*™ Mirror/Luggage *Pipe Clamp* Mount mounts on support rod of mirror, luggage rack or spare tire carrier of your truck, van, RV or SUV. Mounts on any horizontal, vertical or angled rod or pipe up to 5/8 inches in diameter.

Secures VHF, UHF and medium size HF antennas even at highway speeds.

Two axis of rotation lets you position your antenna to any desired angle. Serrated swivel joints locks securely in place with huge 3/8 inch set screw.

Convenient *Thumb and Finger* turn knob makes fold-over operation quick and easy. Locks in twelve positions.

Fold down your antenna at night when pulling into your garage and quickly put it back up to its operating position in the morning.

Has SO-239 base mount. Use adapter for NMO. Includes low loss coax with PL-259 connector, Allen wrenches and protection caps for SO-239 base mount and locking screw, MFJ's famous One year *No Matter What*™ limited warranty.

MFJ's *MaxStrength*™ Hi-Flux Antenna Magnet Mounts

MFJ's *MaxStrength*™ high-flux magnet mounts give you maximum pull strength -- your antenna stays on top of your vehicle at highway speeds.

MFJ-333 **$14.95** add s/h

MFJ-335 **$19.95** add s/h

Base is *Euro-style*, black poly or chrome finish with a Mylar protective undersheet.

MFJ magnet mounts come with 17 feet of tough RG-58 coax with a PL-259 connector. Easily reaches operating position.

Choose your favorite antenna to go with these fabulous low-profile mounts for outstanding mobile performance.

MFJ-333 BS/BM, $14.95. Light to medium duty magnet mount. Low profile 3.5 inch diameter black base weighs 1½ lbs. For small to medium size antennas.

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license while the extremely heavy back log of paper work is being processed. There were several planning meetings in preparation for Field Day 2000. Members from the clubs in Bozeman, Helena and Great Falls are putting together a combined field day operation with any active ham in the Montana Section invited to participate. It is going to be very interesting to see the outcome of this operation. Net/QNI/QTC/NM: MTN 1704/60/N7AIK. PSHR: N7AIK 122.

OREGON: SM, Bill Sawders, K7ZM—ASM: KK7CW. SEC: WB7NML. STM: W7IZ. SGL: N7QQU. OOC: NB7J. TC: AB7HB. ACC: K7SQ. VE testing is finally slowing down. With all the upgrades, used ham equipment is selling extremely fast and at higher prices on the Internet. Even old "tube type" equipment is going for top dollar. It seems that most of the ham magazines assumed the Oregon QSO Party was going to be in May (again). Not so. The ONLY announcement that was released (in January) said it would be held on Saturday, August 19th from 1400Z to August 20th, 1400Z. Locally, the Oregon QSO party will run from 7AM, Saturday (19th), to 7AM Sunday (20th). Sponsored by the Central Oregon DX Club, Oregon stations work everyone. No repeaters QSOs. Work as many stations as you can in that 24-hour period. 1 pt/SSB QSO. 2 pts/CW QSO. Oregon stations multiply QSO pts by OR counties worked (max 36), states, provinces, and DXCC countries worked. 100 bonus points for working club station, K7ZZZ. Use any and all bands, depending on band conditions. Lots of special awards. Send logs by Sept 1 to: CODXC, K7ZZZ, 19821 Ponderosa St. Bend, Or. 97702. I hope you can join the party, and keep in touch. NTS PSHR totals for May: KC7ZZB 143. KC7SRL 128. KA7AID 120. N7DRP 120. KC7SGM 96. KC7SGL 80.

WESTERN WASHINGTON: SM, Harry Lewis, W7JWJ—The new EC for Clallam County is Dave Tyler, N7DRT, who may be reached via **tyler2@olypen.com**. We wish to thank outgoing EC Bob Stearns, KI7ZC, for his years of fine service. SEC issues this report. During the SeaPac convention held in Seaside, Oregon, Chris Imlay, W3KD, ARRL General Counsel, reminded us that if you get permission to put up a tower, you have a much better chance of success if you can document community service. Read that as, active in ARES, NTS, Red Cross, etc. When you get recognition in the form of letters and certificates, keep them. You never know when they'll come in handy. Training, training, training. That's how to get practice to make perfect. Clark Co recently had a call out that caused several teams to set up a Field Day type of site and pass traffic to and from the ECC. Dist. 4 put a slightly different spin on it by passing traffic through all four counties using only simplex. They did have 2 aeronautical mobiles to help. We note that the Official Observers of Western Washington only logged ten out-of-band transmissions by the new Generals who have recently upgraded. You might want to be an OO and help keep your fellow ham out of trouble by sending kindly advisory notices when you hear a discrepancy. Applications accepted via **aa7ke@arrl.net**. Is there anyone out there in radio land that can beat George, K7BDU, in traffic handling? On occasion he reports more traffic handled per month than most other traffic handlers combined. Look for a new Washington State RACES plan that will incorporate DECs as wide range RACES Radio Officers covering the same area of responsibility. There will be a seminar scheduled to discuss this plan at the Spokane hamfest scheduled for August 8th. Welcome to all of you who have upgraded!

PACIFIC DIVISION

EAST BAY: SM, Andy Oppel, KF6RCO—ASMs: KC6TYB, KE6QJV. SEC: KE6NVU. DECs: WA6TGF/Alameda County, KO6JR/Contra Costa County, WA7IND/Napa County, K6HEW/Solano County, N6UOW/Training, W6CPO/Technical Services, KQ6TM/Section Plans and Administration. STM: K6APW. OOC: W6NKF. Check out the EB WWW Page at **http://www.pdarrl.org/ebsec/**. Webmaster is KB6MP. Please welcome new ASMs KC6TYB and KE6QJV. Contact information is on the Web site. SARS members KE6RYN and K7KLL are producing a Ham Radio series to be aired on Channel 28 Napa Public Access; KA6GUR, WA6JKP, KA7CQH, KF6QZM and KD6WAB upgraded to General; New Member KG6AWV is now a Tech. MDARC provided communications for a trial ride event using 2-radio crossband repeaters built by KO6RO and KE6ZIW; they welcome new members WB6FBB, KF6TTB, KA6AOR and KM6QX. EBARC is planning Field Day at the Berkeley Marina. ORCA is planning Field Day for Joaquin Miller Park and welcomes new members N6WTY and KE6WPJ. CCCC mourns the loss of W6SRZ and welcomes new members KG6AEE, N1FW, KF6OBM and KG6AWT. LARK congratulated KA6KZV for upgrading to General, and AD6MF, W6RMR, W6VIB and KH6KH for upgrading to Extra... KH6KH, licensed since age 10, passed the Extra exam at 89 years of age! May tfc: W6DOB 590, WB6UZX 53. 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—Dick, W6OLD. SEC: Paul, NN7B. TC: Jim, STM: Bruce, DEC: KC7JLS, Bill. NM: Bobbie, AB7WZ. Newest appointee' are AEC: Dick Grady in Pahrump, AC7EL. EC: Glenn Hale, KB7REO, Las Vegas. AEC: Norman Lizotte, Las Vegas. OES: Joe Giraudo, N7JEH. Field Day in Reno and Las Vegas area look like they're supported by many clubs. Our leadership roster can be found at **www.pdarrl.org/nevsec/officers.html** courtesy of W6OLD. Check with Paul,NN7B at **nn7b@powernet.net** for the NV ARES Webpage address. Looking forward to seeing Nevadans at the SNARS hamfest up in Reno area on July 29th. FARS, Spec Serv Club in SNV repeater sounds good since maintenance done. Rural Amat Rad Assn gathering help for the Jarbidge Shovel Brigade July 4th. e-mail **www.jarbidgeshovelbrigade.com** to volunteer and get info. I'm on the road and wont get back to NV till end of month. W6OLD is minding the store until then at **w6old@arrl.net** 73 to all, Jan.

PACIFIC: SM, Ron, Phillips, AH6HN—ASMs: Harry Nishiyama, KH6FKG; Lee Wical, KH6BZF; Jim Reid, KH7M; Stu Johnston, NH6DR; Dennis Niles, KH6XT; Dan Spears, NH7UW. SEC: Dennis Carvalho, KH7H. TC: Chuck Cartwright, AH7Y. PIC: Russ Roberts, KH6JRM. ACC: Bob Schneider, AH6J. Please welcome aboard our two new

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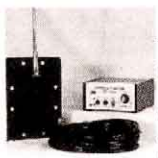

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Cross-Needle SWR Meter

MFJ-815B
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Peak/Average Cross-Needle SWR/Wattmeter shows SWR, forward/reflected power in 2000/500 and 200/50 Watt ranges. 1.8-60 MHz. Mechanical zero. SO-239 Connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, $14.95.

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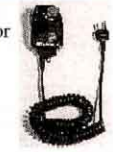

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MFJ-264, $69.95. Versatile UHF/VHF/HF 1.5 kW load. Low SWR to 650 MHz, usable to 750 MHz. 100 Watts/10 Minutes, 1500 Watts/10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 inches. *MFJ-264N, $74.95, N connector. MFJ-5803, $4.95, 3 foot patch coax cable with PL-259.*

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Suppress TVI, RFI, telephone and other interference by reducing unwanted harmonics going to your antenna. 9 poles, MFJ's exclusive *Teflon® Dielectric Technology*™ capacitors, hi-Q inductors, ground plane shielding, RF tight cabinet gives excellent TVI/RFI protection. Full legal power 1.8-30 MHz. Has handy mounting tabs.

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Don't let harsh TVI ruin your DXing and your wife's favorite soap opera! Keep peace with your family and your neighbors. MFJ's exclusive *ShieldBreaker*™ high pass filter effectively suppresses annoying TVI! Wipe out TVI caused by broadcast, commercial, two-way, amateur and CB radios operating below 30 MHz. Use between cable, antenna and TV/VCR. For 75 Ohm cable or 300 Ohm twin lead.

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Covers 2 Meters and 220 MHz. 30 and 300 Watt scales. Relative field strength 1-250 MHz, SWR above 14 MHz. 4½x2¼x3 in.

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MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable. 9-Volt battery or 110 VAC with MFJ-1305, $14.95. Earphone jack, tone and volume controls, speaker. Adjustable key. Sturdy. 8½x2¼x3¾ inches.

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Use your rig's 12 VDC power supply to power two HF/VHF rigs and six more accessories with this MFJ high current multiple DC outlet. 2 pairs of 30 amp 5-way binding posts separately fused for rigs. 6 switched, fused pairs for accessories. DC voltmeter, "on" LED, RF bypassed, 6 ft. of 8 gauge power cable. 12½x2¾x2½ inches.

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ASMs, Dan Spears on Oahu and Dennis Niles on Maui. Tnx, Mel (KH6H), for your many years of service to ARRL. It is with deep regret that Greg, WB6FZH, reports our friend and fellow Radio Amateur Len Young, KH6NFN is now a Silent Key. Len passed away from a heart attack on Thursday, May 25th. Len was working in his yard in Kailua when it happened. Len had been a member of the Koolau Amateur Radio Club for many years, and had been its treasurer as long as anyone can remember. He will be greatly missed. Dean Manley, KH6B, reports the HI QRP Club held their Spring picnic camp and tail-gate swap meet at Milolii Beach Park, May 19-21. Participants were KH6BMM, NH6WW, KH6KT, KH6AFQ, NH6XB, AH6HB, AH6NK and KH6B. I'm pleased to report that the Hawaii Chapter of the Armed Forces Communications-Electronics (AFCEA) has selected and awarded Mr. Lee R. Wical (KH6BZF), Distinguished Life Member, as their chapter Executive of the Month. Lee is a Senior Telecommunications Engineer with Lucent Technologies Services Co, Inc in Honolulu. He previously was with AT&T before his work group was transferred to Lucent in Sept 1996. He had previously retired after 32-years from DoD's Defense Communications Agency-Pacific Area. Aloha & Mahalo, Ron, AH6HN.

SACRAMENTO VALLEY: SM, Jerry Boyd, K6BZ—Congratulations to new District 2 DEC, WO6P. Congratulations also to K6OQC for receiving the National Defense Industrial Association Hall of Fame award for his development of military munitions. Congratulations to new Amateur Auxiliary member Rita Gordon, W6RG. Anyone interested in expanding the use of APRS in the northern part of the Section, please contact W1SAR via call book address. Several counties are currently without Emergency Coordinators. Check the Section Website for vacancies and, if interested, contact your SEC (North or South depending upon your county). There have been some recent applicants for Official Observer —thanks for the interest. Congrats to KQ6PO on appointment as President of River City ARCS. EMCOMM-2000 (hopefully to be an annual event) was sponsored for all ARES (and other emergency communicators) in our Section as well as the adjacent Nevada and Oregon Sections. Thanks to K6SOJ and WA6SLA for organizing the event. Tehama County ARES is being revitalized and needs members. If interested, please contact Tehama EC KF6KDD via cba or **KF6KDD@arrl.net**. For further info regarding such future ARES training conferences please contact them. Until next month 73 de K6BZ.

SAN FRANCISCO: SM, Len Gwinn, WA6KLK— ASM: KH6GJV. SEC: KE6EAQ. Many many thanks to the volunteers of the section and the adjoining sections for their help and participation in the San Francisco Bay to Breakers run. It went great. Special thanks to the members of W6PW, K6TW, W6TP, and W6GG for the use of their repeaters and assistance. All volunteers are the ones that make it work. The USS Pampanito had a Memorial Day service aboard ship that was televised in part on local news. The Humboldt area hams did a three-day session with the Kinetic Boat race in the Eureka area. Many hours were put in and a great job done with this event. SCRA has a fleamarket coming up soon. Please check their Website for details as to date and location. Make your plans now for Pacificon. Things are starting to happen and go fast at this time. KE6MWX did very well at the California Science Fair with Fractal Antenna Modeling. ASM Bill and SEC Lee will be visiting clubs in the south end of the section the next couple of months. Your SM will be down shortly to visit also. Sorry to report that K6DFM, Willits, is SK.

SAN JOAQUIN VALLEY: SM, Donald Costello, W7WN—SEC Kent LeBarts, K6IN, and myself had the opportunity to visit CARS radio club in Angels Camp in May and had a great time meeting with the members regarding ARES and other matters. Thank you Ed Ule, KØYOG, for having afforded us the chance to speak to the club membership. Welcome to all of the new General Class and Extra Class license holders who, have upgraded due to license restructure. Those who have been on the HF bands for many years now have the opportunity to elmer, by example and patience, the new fellows moving onto the HF bands. Speaking of elmering, Kent LeBarts, K6IN, has been teaching a group of individuals studying to be Amateur Radio operators. I would encourage others to teach classes as well. Thanks, Kent, for your dedication to Amateur Radio. Pacificon will once again be taking place in Concord on October 20-22. So, now is the time to make preparations to attend. More information about Pacificon may be found at **http://www.pdarrl.org/**. I hope everyone has a wonderful summer and work that DX.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: KM6GE. BM: WB6MRQ. TC: WA6PWW. OOC: KB6FPW. Reminder - the Foothill Flea Markets are in full swing. Remember, second Saturday each month at Foothill College in Los Altos. KB6BA reports making successful contacts via the venerable AO-10 satellite. The Naval Postgraduate School ARC heard from John, VE4ADS, on ham radio in Canada. They sure have a lot of activities going! The NPGARC meets the 2nd Thursday of the month at 7 PM local in Spanagel Hall Room 400 at the school. They also have a monthly "Eyeball Breakfast" (!?!) 0800 on the first Saturday at the Marina Village Restaurant in Monterey. The Lockheed-Martin ARC is busy planning for Field Day. They meet at the Sunnyvale Town & Country Round Table on fourth Thursdays, 5 PM for dinner, 6 PM for meetings. Contact Terry, WB6PVU, for details. WVARC heard from Dean, N6DE, about his DXpedition to the US Virgin Islands. WVARC meets the 3rd Wednesday, 7 PM at the Campbell Community Center. See **http://www.wvara.org** for details. The Santa Cruz County ARC is to hear from Ron W6WO on "the Poor Mans frequency spectrum analyzer. SCCARC meets at 7:30 PM on the third Friday at (temporarily) the Dominican Hospital Main building, 1515 Soquel Dr, Santa Cruz. The Garlic Valley ARC meets at 8AM on the LAST Saturday of each month, at the Little House Restaurant in Gilroy on Monterey Avenue. The South County ARES net is held each Tuesday at 7:30 PM on K6THR/R (147.825 -.600, no PL). The Saratoga ARA meets at 7:30 PM every second Wednesday at the Saratoga Fire Station. The club/ARES net meets every Tuesday at 7:30 PM on 28.4 MHz (SSB) and 146.655- (114.8pl). 73 de Glenn WB6W. Tfc: W6PRI 2.

ROANOKE DIVISION

NORTH CAROLINA: SM, John Covington, W4CC—SEC: KE4JHJ. STM: NØSU. BM: KD4YTU. TC: K4ITL. PIC: KN4AQ. OOC: W4ZRA. SGL: AB4W. ACC: vacant. **http://www.ncarrl.org**. Recent license statistics show that we have had a very noticeable increase in the number of General and Amateur Extra class licensees in North Carolina since the license restructuring rules went into effect April 15th. If you have recently upgraded, please consider participating in our HF section nets. It's a great way to be of service to your community and to make friends across the state at the same time. NTS/ARES SSB Net frequencies/times (local) are: North Carolina Morning Net 3927 kHz, 7:45 AM; North Carolina Evening Net 3923 kHz, 6:30 PM; Tar Heel Emergency Net 3923 kHz, 7:30 PM. The combined NC/SC NTS CW nets are: Carolinas Net, 3573 kHz, 7:00 PM (early session) and 10:00 PM (late session); Carolinas Slow Net 3695 kHz, 8:00 PM. All are welcome no matter what your experience level is. We have many new / AG and /AE callsigns present. Make sure yours is one of them! Shelby Hamfest September 2-3 with a lunch meeting of the National Traffic System participants held nearby on Saturday. Won't you join us? Make sure you are involved in the upcoming Simulated Emergency Test in your county. Sad to report some Silent Keys: Jack AB4XE, Fred N2DOK, Art WB4WZH. May Traffic: W4EAT 338, AB4E 268, KI4YV 180, W2CS 163, K4IWW 141, NC4ML 140, KE4JHJ 119, AA4YW 81, AC4DV 77, W3HL 65, N0SU 48, W4IRE 44, KE4AHC 41, K4AIF 36, AD4XV 25, W4CC 23, WA4SRD 22, KL7NL 16, WD4MRD 14, AC4ZO 11, KF4OZF 9, NT4K 9, KB8UCZ 8, KE4YMA 7, KT4CD 7, KF4YHG 6, W4DYW 5, KF4KZD 5.

SOUTH CAROLINA: SM, Patricia Hensley, N4ROS— As I write this report I am thinking ahead to what August probably will be like. It certainly will be hot. Most of those who upgraded their licenses in April are beginning to be comfortable with their new privileges. The new equipment ordered at the Dayton Hamvention will be old by now. However, the thrill of Amateur Radio can be new for many more. August in South Carolina indicates the end of summer and the beginning of the school year. Students return with new clothes and an open mind for new experiences. They are ripe for exposure to the pleasure of Amateur Radio. As many of you know the average age of most amateurs is in the fifth decade and increasing. We need new, younger participants if our great hobby and public service is to continue. We have that opportunity this month. As amateurs, we can offer to schools a solution to the challenges educators face today while also investing in the future of Amateur Radio. The advantages and rewards of working with young people are many—from enhancing their communication skills, to broadening their knowledge of geography, and acting as mentors and role models. Tfc: KT4SJ 178, KA4LRM 73, W4DRF 63, WA4UGD 51, KA4UIV 19, AF4QZ 32, W4CQB 9.

VIRGINIA: SM, Lynn Gahagan, AF4CD—ASM/A: KE4NBX. ASM/B: W4TLM. ASM/C: TC, W4IN. ASM/D: KC4ASF. PIC: W2MG. OOC: KR4UQ. STM: W4CAC. Well, I am pleased to announce that Carl Clements, W4CAC, has taken up the challenge of being our Section Traffic Manager. The STM is responsible for management of traffic handling programs at the Section level. This involves the coordination of all traffic nets, both NTS nets and independents. The STM establishes or maintains routing within the Section and liaison with other nets to effect an orderly and efficient traffic flow into, out of, and within the Section. Carl has been very active in our traffic system. He has been serving as the Net Manager for the Va. Late Net and at this time still holds that position. If you would like to give Carl a hand, or are interested in NTS, contact him. He can be found almost any evening on the VTN at 10:15 PM on 3.947 MHz. **w4cac@compuserve.com.** Please forward all of your Net, ORS, and PSHR reports to Carl by the 5th of each month so he can get them to HQ in time to make the month's *QST*. I would like to thank Bob Lewis, N4SCK, for the many years that he handled the PSHR reports for the Section. Bob had indicated a couple of years ago that he would like for someone else to relieve him of that responsibly. Sorry, Bob, it took so long and many thanks for your service. Well, as many of you may already know, Frank Mackey, K4EC, has decided to step down as our SEC. Frank was appointed our SEC in December 1996. He assembled an outstanding team of Assistant SECs, DECs and ECs, which in turn took our ARES organization from almost nil to one of the best in the country. Frank spent countless hours traveling around presenting the "Introduction Program of ARES/RACES" throughout the Section. After a job change and an accident where his wife sustained severe injuries as a result from a fall down some stairs Frank states"...my present job does not allow me the time or availability to perform the many duties required as the SEC. Therefore, after careful consideration and 7 years in ARES as a DEC and SEC, I have decided to step aside as the Virginia Section Emergency Coordinator. I plan to stay active in ARES/RACES as time permits, but not in a leadership role." Thank you Frank for the privileges of having you serve in the SEC position during my watch. My best wishes to both you and Kate. Very 73 de AF4CD. Tfc: WA4DOX 220, W3BBQ 199, N4ABM 140, W4CAC 103, K4MTX 94, KR4MU 89, K4YVX 88, KR4MA 86, W4UQ 80, WB4ZNB 73, AA4AT 54, AF4CD 47, KØIBS 37, W4VIC 13, WB4UHC 11, N4FNT 8, KB4CAU 6, W4JLS 6, W4YE 5, W4MWC 2, K4JM 2, W4IN 2.

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 FCC and the VECs are rapidly catching up on the backlog of the restructuring upgrades and changes, and by the time you read this should be current. A lot of the new call signs are appearing on the air. In particular, many of the newly upgraded Generals. From what I have personally heard on the air, I am encouraged that the "Elmer" and on air activities of Amateur Radio are working to assure our continuing pleasure of the hobby. Congratulation to so many of you existing Hams that have made this possible. Please keep up the good work. Profanation with the horrendous solar flares has been drastic and my congratulation to you Net Managers, NCS and traffic handlers for displaying you expertise and circumventing the problem areas. Early or late "Good Luck" WVQSO Party operators and "clubs and groups" with

Field Day. Looking forward to receiving your Section Manager Report. Try 7.2350, @1145 and 3.8650, @ 1800 local. Don't forget - mark you calendar for the WV State ARRL Convention at "The Mill" August 26, 2000. We have the entire Lodge reserved as well as several cabins. For Lodging and Meals contact The Kiblers, K8WMX, Jack or K8GAK-Garry. 73. Tfc: KA8WNO 264, WD8V 157, WD8DHC 30, W8WWF 79, KC8CON 63; PSHR: WD8DHC 128, KA8WNO 119, WD8V 229, KC8CON 133, N8IBS 108.WVFN 950/93/31 KC8CON; WVMDN 584/13/31 KC8CON; WVN E 108/71/31 W8WWF; WVN L 131/73/31 W8WWF.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Tim Armagost, WB0TUB—ASM: Jeff Ryan, N0WPA. SEC: Mike Morgan, N5LPZ. STM: Mike Stansberry, K0TER. ACC: Ron Deutsch, NK0P. PIC: Erik Dyce, W0ERX. OOC: Karen Schultz, KA0CDN & Glenn Schultz, W0IJR. SGL: Mark Baker, KG0PA. TC: Bob Armstrong, AE0B. BM: Jerry Cassidy, N0MYY. Public Service season is in full swing as we wind our way through the summer months. Not only is this excellent training for emergencies, it's great fun! Contact your local club or emergency services group and signup to participate. Cheryl, N0WBV, and Ben, KB0UBZ, with John, KT0F, as coach, participated in the Dayton Hamvention Fox Hunt, competing against teams from all over the country. The Colorado team finished third, finding 11 out of a possible 16 transmitters. Congrats and well done! The BARC JRs, represented by Amory, KC0BPB and Jimmy, KB0VXC, were also at Dayton presenting to the Youth in Amateur Radio Forum. Well done to them also. Colorado was represented at the Dayton YLRL forum by District 10 YL rep Cheryl, N0WBV and Colorado YL president Ann, KA0ZFI. Have you seen the ARRL EMCOMM forum? Pat, W0IPL, has been leading the way (again!) in capturing and summarizing what's needed to have an effective emergency communications presence using Amateur Radio. Stop by the forum at the ARRL Web Site. Any items for the column? Please email them to me: **n0wpa@arrl.net**. 73, de N0WPA. NTS traffic: K0TER 108, N0UOD 41. CAWN: W0WPD 920, AA0ZR 461, W0GGP 451, WB0VET 441, K4ARM 439, W0LVI 424, N0NMP 411, K0HBZ 394, N0JUS 368, W0NCD 335, KI0ND 211, N0FCR 186, WD0CKP 77.

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 137 msgs with 1149 checkins. New Mexico Breakfast Club handled 248 msgs with 1052 checkins. Yucca Net handled 24 msgs with 578 checkins. Caravan Club net handled 5 msgs with 57 checkins. SCAT Net handled 10 msgs with 522 checkins. Four Corners Net handled 40 msgs with 412 checkins. GARS Net handled 4 msgs with 33 checkins. Rusty's Net handled 113 msgs with 829 checkins. Valencia Co Net handled 14 msgs with 152 checkins. Our sincere thanks to all who helped in any way with communications during the fires all over NM. Some fires are still burning and our thanks also to those who are still on the job! We have received "thanks" from the Red Cross, the Los Alamos Co EOC and many others around the state. We have received some rain in the last 2 days, but that brings lightning and strong winds. I believe we are on the road to recovery from the worst disaster NM has ever had. Very sorry to report the passing of W5YSJ, W5HJM, KA1LEO and KD5EFE. They will certainly be missed! The Roswell Hamfest is set for Aug 5 and ARRL NM State hamfest is to be Aug 26-27. Check the Web page qsl.net/dchf for info on our state convention. Many thanks to KC5NZR for a fine job on the Web site. Bill Cross, W3TN, of the FCC, will be our featured speaker at the banquet. Best 73, W5PDY.

UTAH: SM, Mel Parkes, AC7CP—Notice the new call sign. I finally have a seven call! I am writing this while visiting ARRL HQ. I had the opportunity to spend a whole day at the headquarters and the folks here really are neat. I also got to operate the W1AW station for a while too. If you ever have the chance to be out on the East Coast and have the time to visit ARRL HQ, it is well worth the time to stop by. Hats off to all the clubs and groups who set up a Field Day event this year. I sure enjoyed the Utah Hamfest 2000, if you missed this one plan on attending it next year. I would like to express my appreciation to everyone who attended and offer special thanks to the members of the Utah Hamfest committee who made this event a success. Before you know it summer will be over, check with your club and get involved with the activities going on in your area. 73 de Mel Parkes, AC7CP.

WYOMING: SM, Bob Williams, N7LKR—The Casper ARC certainly put on a superior end-of-the-millennium hamfest over Memorial Day weekend! The dealers were super, and best of all, they are planning to come back next year. We appreciate that, as it's difficult to find dealers who will come to these small hamfests. This one typically draws about 200 hams, plus some family members. Highlights of the weekend included an NWS Weather Spotters Class, a talk on 2 m and 6 m propagation, and the ever-exciting DX Forum with WS7W, Rev Morton. Twenty-two swap tables offered plenty of bargains, although there was a bit of a shortage of boat anchors. The dinner speaker was Jay Ostrem, W7CW, who told a hilarious story about an amplifier construction project. The Ham of the Year award went to Dave Riegert, K7YE, who always has time to help a fellow ham with an antenna problem, or a computer problem, or a radio problem, or ... The grand prize, an Alinco dual-bander, was won by KD7ASO. The 2001 hamfest will be sponsored by the Tri-Counties ARC. The location will be announced within the next month or so.

SOUTHEASTERN DIVISION

ALABAMA: SM, Bill Cleveland, KR4TZ—ASMs: W4XI WB4GM KB4KOY. SEC: KC4PZA. STM: K4JSJ. BM: KA4ZXL. OOC: WB4GM. SGL: KU4PY. ACC: KV4CX. TC: W4OZK. PIC: KA4MGE. The Huntsville Hamfest will be held August 19-20. This year's hamfest will be the ARRL Alabama State Convention. I hope to see you there. While enjoying the Huntsville Hamfest, please attend the Alabama Section Forum. As discussed at the Birmingham Hamfest, I hope to utilize the ARRL affiliated amateur radio clubs to handle local affairs. If you are an officer of an Alabama ARC please attend our Section forum. Jack Evans (KC4PZA), our SEC, is working hard to

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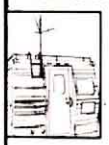

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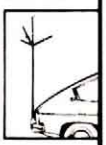

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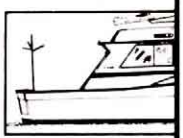

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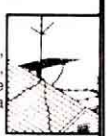

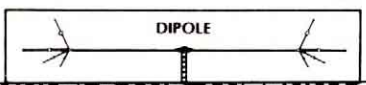

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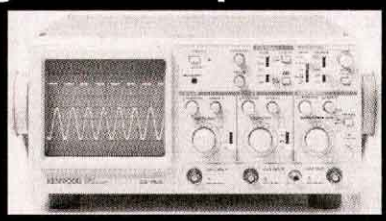

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expand ARES into counties that don't have an EC appointed. If you belong to a radio club in a county with no EC, please encourage your club to participate in ARES and contact Jack by phone (205) 663-4497 or by e-mail **KC4PZA@hiwaay.net**. I would like to remind everybody that Net Reports, SARs and PSHRs are due by the 5th of the month. Please send these reports to me (e-mail **KR4TZ@arrl.org**) and Shane Jackson, K4JSJ (e-mail **Jack728@mindsring .com**). ECs don't forget to send your ARES reports to the SEC Jack Evans. We need these reports to demonstrate how active Amateur Radio is in Alabama. You can find more up-to-date information about what is going on within the Alabama Section at www.qsl.net/al-arrl. 73, Bill Cleveland, KR4TZ. Tfc: (May): W4ZJY 250, WB4GM 168, W4CKS 128, W4PIM 85, KC4TLG 41, W4DGH 20, KC4VNO 19, AC4CS 18, W4XI 11, W4NTI 7, WB4TVY 2. PSHR: W4ZJY 190, KC4TLG 176, WB4GM 166, KC4PZA 142, AC4CS 141, KC4VNO 128, W4CKS 118, W4NTI 118, W4XI 100, W4PIM 55.

GEORGIA: SM: Sandy Donahue, W4RU— ASM/South Ga: Marshall Thigpen, W4IS. ASM/Legal: Jim Altman, W4UCK. SEC: Tom Rogers, KR4OL. STM: Jim Hanna, AF4NS. SGL: Charles Griffin, WB4UVW. BM: Eddie Kosobucki, K4JNL. ACC: Bob Lear,K4SZ. OOC: Mike Swiderski, K4HBI. TC: Fred Runkle, K4KAZ. PIC: Matt Cook, KG4CAA. I have moved. My new address is 15010 Briarhill Lane, Atlanta Ga 30324. My new phone # is 404-315-1443. A reminder of the Ga QSO Party on July 22 and 23. The SECC Web page has all the details **secc.contesting.com**. The only hamfest in Georgia in August is in Elijay on August 19. After that look to Rome on Oct 7, and Augusta Oct 14. In the past month, I visited the Statesboro hamfest sponsored by STARS and the venerable Atlanta Hamfest produced by the Atlanta RC. Despite renewed interest in our hobby after the license restructuring, hamfest attendance seems to be down. I regret to report the death of Don Nipper, KE4RJL, Albany. Also the Ga Tech Radio Club lost a good friend with the passing of Jim Wohlford, N4MLG. He was retired head of the Co-op program at the Institute. Many a successful engineer got a head start on their careers with the help of Wohlford's program. Our condolences to the families of these fine men. Buck Cheves, KC4GCK, EC of Lumpkin County has free software:Netman and Netref. Both programs help with net control and traffic handling duties and can be found at **http://home.syclone.net/~kc4gck/index.html**. 73 Sandy. Tfc April: WB4GGS 294, W4WXA 213, AF4NS 92, WU4C 53, AF4PX 47, K4WKT 30, KA4HHE 28, K4ZC 27, K4BEH 25, K4JNL 20, K4BAI 3.

NORTHERN FLORIDA: SM, Rudy Hubbard, WA4PUP—ASM-WPAN: KO4TT. ASM-APRS: WY8O. ASM-ECEN: K1CE. ACC: WA4B. BM: N4GMU. OCC: AF4EW. PIC: KF4HFC. SEC: WA4NDA. SGL: KC4N. STM: WX4H. TC: KO4TT. Packet: N4GMU. Florida Dept or Revenue has been asked for clarification on sales tax State collected at hamfests and tailgates. NOFARS, the Balanced Modulator will file an official inquiry asking for a clarification. The NOFARS stated, "If the questions produce unsatisfactory answers, then we will be able to make proposals to modify the laws or the interpretation of such laws. Petitions could be routed to legislators and administrators." State License Plates for Amateur Radio operators has been a major concern, but apparently has been resolved. The DMV has agreed to issue call sign plates to amateurs. This may require the State recalling the license plate from individuals that are not amateurs. The words "amateur radio" will be on the license tags. The Northern Florida Section along with other ARRL officials have joined in getting this matter resolved. Our appreciation for his efforts goes to ARRL State Government Liaison, John Hills, KC4N. A word of praise goes a long way. The newsletter "Keyed UP" included along with other items a comment that is much appreciated. Thanks to Ken Christenson, General Chairman, Orlando HamCation for his remarks. The Northern Florida ARES Net has several people that are recognized for their support. Jim Giles, K4VRT, the Net Manager, and for those checking-in on the Net. However, special mention goes to WA4EUY, and K4VRT missing 1 day, N4BOY, KS4CD, and W4ROW missing 2 days, WD4NFG, and AF4PU missing 3 days, WB4FGL, K4HL, WA4NDA, and AB4OB missing 4 days. Many stations were in the high teens and low 20s during the month. The Nets are valuable in identifying dependable resources in times of emergency. It would be great to shake each person's hand, but this is impossible, so please accept my personal thanks for your support. 73, Rudy. Tfc: WX4H 1354, KE4DNO 224, KF4NFP 206, K1JPG 190, AF4PU 163, NR2F 108, KD4MH 102, W5MEN 96, WB2FGL 70, N9MN 63, KG4EZQ 60, AF4GF 58, AB4PG 50, AD4DO 44, W4KIX 40, KB4DCR 27, KC4FL 26, KG4HBN 24, KM4WC 20, N4JAQ 15, WD4IIO 10, KJ4HS 10, W8IM 8, KF4WIJ 8, WX4J 6, WA4EYU 4, WB2IMO 1.

PUERTO RICO: SM, Víctor Madera, KP4PQ — Disfrutamos del hamfest que celebró la FRA en Ponce, P.R. Un buen grupo de radioaficionados disfrutó de exhibiciones, rifas y otras amenidades. El PRARL celebró el ARRL Field Day en las facilidades de Bacardí. Felicitaciones a Pablo Soto-KP4SJ y Jaime Barceló-KP4DR organizadores del mismo. Fue un gran éxito y las visitas del público fueron abundantes. La próxima actividad será el "Lighthouse Weekend" desde la Isla de Caja de Muertos en el Caribe. Nuestro pésame a los familiares de KP4CKY, W4GC, KP4IX y NP3MS todos SK. Las clases preparatorias para "Technician" comien-zan el 12 de julio de 2000 en la Universidad de Puerto Rico. Se celebrarán todos los miércoles en el Edificio de Ciencias Naturales, Salón C-204 a las 8 PM. Agradezco los muchos e-mails y cartas recibidas de compañeros de toda la isla y los EE.UU. en relación con mi nuevo nombramiento como Section Manager por los próximos dos años. Seguiré sirviendo a todos los radioaficionados de Puerto Rico. Se pueden comunicar conmigo vía email a **kp4pq@arrl.org**.

SOUTHERN FLORIDA: SM, Phyllisan West, KA4FZI – SEC: W4SS. STM: KJ4N. ACC: WA4AW. PIC: W4STB. TC: KI4T. OOC: K4GP. BM: KC4ZHF. SGL: KC4N. DEC/ASM: N4LEM, WB9SHT, AA4BN, KD4GR, WB2WPA. The Southern Florida ARES teams sponsored a SFL Section SET (Simulated Emergency Test) organized under the direction of Jim Goldsberry, KD4GR. Hurricane Willie, a category-4 storm, made landfall near Vero Beach. When the request for ham operators and CAT's (Communications Assistance Teams) went out on the SFAN (Southern Florida ARES Net) 3940 MHz frequency, the Martin Co team assisted the Broward Co CAT, Hollywood

ARC CAT, and Indian River DCAT as they arrived. The Vero Beach DCAT is equipped with satellite communication equipment and a new completely self-supported 60-foot Aluma crank up tower mounted on a converted ambulance. Thirty-one ham operators reported to support this SET. The Motorola ARC in Plantation and Boynton Beach linked their repeaters and had coverage from the Florida Keys to Ft Pierce. Jim summarized the exercise by the one word, co-operation. It was cooperation between ARES and NTS operators and between operators in all three Florida sections that assured the remarkable success of the exercise. During an actual emergency this type of cooperation would be expected, but for an exercise it was outstanding. (Full report on **www.sflarrl.org**). Note: The Indian River ARC's new e-mail address in **w4nlx@arrl.org**. K2ZEL had an excellent article on PSK31 in the ARASWF Newsletter from Collier County. He not only explains the mode, but also the results of his tests on several software packages (psk31sbw by G3PLX, Logger, Digipan. WinPSKse, Mix32w, and RCKRTTY) for operation and logging. He also covers the necessary hardware options and interfacing cables/connectors. The club's Home Page is **http://naples.net/clubs/amradio**. Traffic by KJ4N: WA9VND 637(BPL), K4FQU 605, W7AMM 449, KD4GR 213, KB4WBY 208, KC4ZHF 201, KA4FZI 146, KD4HGU 137, KE4IFD 125, WB4PAM 118, AA4BN 94, WA4EIC 92, KJ4N 87, W8SZU 70, WA4CSQ 61, KD4JMV 44, KE4IDG 34, KG4HCW 25, W4WYR 21, W3JI 14, KE4WBI 9, AF4NR 8, W6VIF 8, K4OVC 6, WA8EXA 5, K4ENA 2. 73 de KA4FZI.

VIRGIN ISLANDS: SM, John Ellis, NP2B, St Croix—ASM: Drew, NP2E, St Thomas. ASM: Mal, NP2L, St John. SEC: Duane, NP2CY, St Thomas. PIC: Lou KV4JC, St Croix. ACC: Debbie, NP2DJ, St Thomas. NM: Bob, VP2VI/W0DX, Tortola. Wishing the best for a speedy recovery to Drew, NP2E. Your assistance is required in the next RTTY contest! New ham radio class on St Croix, headed up by Cleo, NP2BW. 22 students - not bad for a small island! St Croix hams will be helping Cleo throughout the class. Caribbean Maritime Mobile net (NCS KV4JC) meets every morning at 1100Z on 7241 kHz. Digital Q&A session on Sunday at 1130Z on the net. Looking forward to return of George, KP2G, who provides comprehensive weather reports each day at 1115 on same net. St Thomas / St. John ARES net quite active on Tuesday on 146.81 machine under leadership of Tony, KP2Z. Al, KP2CF, will be taking over as liaison VE on St Croix. Now into "hurricane season", everyone making preliminary preparations. Section Website managed by Jeanette, NP2C, check it out at **www.viaccess.net/~jellis**, e-mail to SM at **np2b@arrl.org.** 73 all, John, NP2B.

WEST CENTRAL FLORIDA: SM, Dave Armbrust, AE4MR—**ae4mr@arrl.org**, **http://www.wcfarrl.org**. ASM: NA4AR. ASM Web: KR4YL. ASM-Legal: K4LAW. SEC: KE4MPQ. TC: KT4WX. BM: KE4WU. OOC: W3BL. STM: AB4XK. SGL: KC4N. ACC: AC4MK. PIC: AB2V. The following have received certificates of merit for assistance with the Sarasota fires: WX1JAD, W1ROX, KG4EWL, K4AKL, N4LML, KG4DVD, WD4AHZ. The Section Picnic had over 80 attending to congratulate all the new upgrades and VEs. When necessary the FL DMV has agreed to pull license plates from non-hams in order to issue it to a ham operator. Governor Jeb Bush has declared June Amateur Radio Month. Once again I will join the WCF Section Caravan as it travels to all field day sites in the section. I have also agreed to run another term as Section Manager. MAY:

Net/NM	*QNI*	*QTC*	*QND*	*Bulls*	*Sess*
AIN/WA4ATF	70	4	97	4	3
ARES/KE4VBA	93	2	118	0	5
SPARC/KF4FCW	461	33	819	0	31
Turtle/KT4TD	391	114	516	0	31
HCAN/KD4CQG	79	4	89	4	5

Be sure to check in to the WCF Section Net at 7:30 PM Sundays on 3.9725 MHz. The Turtle Net was one year old on May 10th, congratulations. PSHR: AD4IH 219, K4SCL 144, K4RBR 143, KT4PM 139, AB4XK 114, KF4KSN 96, KT4TD 94,W4AUN 94, WB2LEZ 94, KE4VBA 82, AE4MR 71. Tfc: AB4XK 400, K4SCL 292, AD4IH 263, K4RBR 63, KT4PM 45, KT4TD 20, KF4KSN 18, KE4VBA 17, W4AUN 11, AE4MR 6, KG4CYY 5, WB2LEZ 4, WD4BEK 1, KG4DUF 1. 73, Dave, AE4MR.

SOUTHWESTERN DIVISION

ARIZONA: SM, Clifford Hauser, KD6HX—Here it is the middle of summer and it is hot. Most of the public service events have ceased so now is the time to start studying for your upgrade license (if not already done). You can also use the time to stay in the radio shack and communicate to the world. I am using the cool mornings (prior to 0900 hours) to do some antenna work along with normal yard work. I hear many people on the bands using foul language and being very discourteous. I hope you are not one of these people. Amateur Radio is a worldwide hobby and how we talk and act over the airwaves shows the world our true attitude. If you are unsure how to talk to another DX station, then please. This state has many experienced people and anyone would be glad to help. Most important, talk to others as you would want them to talk to you. Another topic is the many VHF and UHF repeaters that are positioned around the state. We are out of 2-meter repeater frequencies and will soon be 440 frequencies to coordinate for new machines. If you know of any repeaters that are not being used or permanently off the air, please let me know. These frequencies can be re-used. As a whole, our repeater coordination council is doing a good job and with the help of everyone, we can stay out of the repeater wars that other states are presently seeing. Remember that repeater coordination is a volunteer method of making sure that your machine will not interfere with another system already in place. Don't forget that the ARRL Southwestern Division Convention will be October 6-8, here in Scottsdale. I hope to see all of you there and enjoying the many programs that will be given. Charles Ellis, W6PNM, has announced that the Kingman hamfest will be on 16 September 2000. The Old Pueblo Radio Club is planning for their hamfest in October. 73, Clifford Hauser, KD6XH. Net: ATEN 849 QNI, 20 QTC, 31 sess. Tfc: K7VVC 729, W7EP 35.

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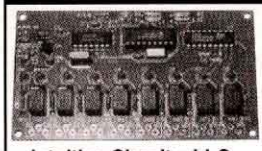

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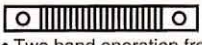

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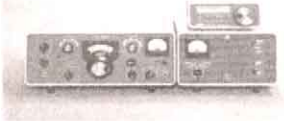

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LOS ANGELES: SM, Phineas J. Icenbice, Jr., W6BF— On 15 meters last week, I had a great home spun discussion with W7MAD, Ed, we talked about our experience as young Ham's, in the Poweshiek County, Iowa, an area east of Des Moines. Soon after our QSO, the following family-farm-wisdom and news from Deep River was published in the "Montezuma Republican." It was not surprising to learn, that, out of the great cornfields of Iowa, they have published, the modified, "Golden Rule." Give unto others the advice that you cannot use yourself."—This sage mid western advice seemed most appropriate, especially after listening to many well-meaning personalities on Radio and TV.—Use our Web Site: **www.qsl.net/arrlsw/lax** and please send me any additional information that you would like to see on our Web Site.—Our SEC, Hank Magid, K6YMJ, is always waiting for more potential ARES members to call and volunteer. If you are on the Internet, you can reach Hank at the following: **hmagid@aol.com**. FCC action in California is on the rise. Our OOC is Joe Provenza, W6UPN, at **w6upn@arrl.net**. Joe always has an almost unlimited list of new and old jokes available for the asking. The Southwestern Division, Section Managers net is on the air every Sunday at 8 AM on 3,965 kHz. Drop in and hear the latest news and new ideas from the Southwestern Division Managers and all of their visitors and guests. Vy 73 de W6BF, Phineas.

ORANGE: SM, Joe Brown, W6UBQ—IECARO NEWS- A "member-only" $2,000. Ham Radio Shopping Spree was won by Riverside County ARA member Van Noty, AA6DD, whose head is now filled with dreams of wondrous radios and gadgetry. CORONA NORCO ARC- A Farewell Dinner was held for charter member John Miller, NF6Y, who packed up and moved to Hemet. CNARC's loss is Lee DeForest ARC's gain. SAN GORGONIO PASS ARC- The club is rapidly completing a ham shack at their meeting spot thanks to some heavy lifting by Ron, WB6MSS; Ray, KA6MGB and Glenn, AB6PA. Equipment donations of radios, computers, copier, coax, etc. from them and from Bob, W6VWD; Bruce, WA6KAI; Gavin, KD6VAC; Louis, KA6RHA; Charlene, KQ6HG and Ray, W6UEQ; will result in a first-class club station. INLAND EMPIRE ARC- Sad news, Harry Kozlowski, KM6LO, is SK. He was known in the club as "Mr. Field Day" and for his Elmer activities. CITRUS BELT ARC- Plans are afoot for participation with a Special Event Station in the annual Route 66 event celebrated each September in cities along the route. FULLERTON RC- The annual "Antennas in the Park" BBQ was a great success and 25 on-foot T-hunters pursued six 2M cycling foxes located somewhere on the 60 acre site. An added feature was an 80 M hidden T. SM- Why not lend a spare HF rig to one of the new General Class operators in your club? Help with a dipole, show the op how it works, then sit back and watch for the big smile after the first QSO. 73, Joe Brown, W6UBQ.

SAN DIEGO: SM, Tuck Miller, NZ6T—619-475-7333. Let's get first things, first. HAPPY BIRTHDAY EVELYN, N6EVE. Sorry folks, but that is just something you have to put up with. For those of you who don't know, Evelyn is my YL—the one who stands by me, and gives me all the support. To forget her would be like committing suicide. Have questions on PRB1 in San Diego, and how it could influence you? Contact John Goodrich, KM1V, at 619-619-234-2525. John is a Volunteer Counsel for the San Diego area for the ARRL. He has been helping with an odd case recently in Poway, so he has a lot of war stories to tell. Yes, I have changed my call sign once again, but barring unforeseen circumstances it will be the LAST time. I enjoy both contesting and DXing, and it is easier to throw out a one-letter suffix instead of three. So if you hear some one yelling TURKEY, it could be me. It does get attention. Have you been getting my weekly newsletter each week by e-mail? If not, you need to go to the Members only Website to sign up. Go to **www.arrl.org** and go to the Members Only site. If you have not already signed up, please do. This is the place where you will find out a lot of info before others do, and being a League member, well, you deserve it. There should be a place that you can modify your info, and sign up for various "benefits" for being a League member. Amongst those are getting both the ARRL Letter and the Section News. ILACSD Beach Cleanup again on Aug 19. PCT Run on Aug 5, contact Walt, WA6ODQ at **wa6odq@arrl.net**. Miramar Air Show now scheduled for sometime in November. Should be cooler. Traffic: KT6A 819, KD6YJB 145, WA6IIK 1 BPL KT6A 819 PSHR: KT6A 138, KD6YJB 76. 73, Tuck, NZ6T.

SANTA BARBARA: SM, Rob Griffin, K6YR, 805- 543-3346 & **k6yr@arrl.org**—SEC: Jack Hunter, KD6HHG (**kd6hhg@arrl.net**). ACC: Michael Atmore, KE6DKU (**jatmore@telis.org**). OOC: Howard Coleman, W6HQA (**w6hqa@pacbell.net**). PIC: Jeff Reinhardt, AA6JR (**jreinh@ix.netcom.com**). TC: Warren Glenn, KM6RZ (**wglennrz@ix.netcom.com**); ASM Ventura, Don Milbury, W6YN (**w6yn@juno.com**). ASM: Internet, Jack Bankson, AD6AD (**jackbankson@jps.net**). DECs: Santa Barb-Dave Lamb, WA6BRW (**dlamb@silcom.com**); SLO-Bill Peirce, KE6FKS (**ke6fks@arrl.net**); Ventura –Dave Gilmore, AA6VH (**aa6vh@arrl.net**) Under the new ARRL field DXCC Card Checker Program, each Section is authorized two qualified Card Checkers. I am pleased to announce that John, W6KFV (nominated by CCCC DX Club), and Jim, W6OUL, (nominated by the Section Manager) have been appointed Section DXCC Card Checkers. Congrats! Join the Section Reflector: Send a blank e-mail to: **http://www.egroups.com/subscribe/arrlsb** and be part of the Info Hotline. Receive instant updates on Section news-FREE! SB Sec Web: **wwww.qsl.net/arrlsb**. Join in our Section NTS traffic nets: SCN slow speed NTS Net, M-F, at 1915 local on 3598 kHz & SCN/SB at 2100 local on 147.000+(131.8), 224.90- (131.8) & 448.875-(100). PSHR/Tfc: K6YR 168/255, KF6OIF 140/71, KE6MIW 133/33, KC6NBI 122/6 & AD6LW 115/-. 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. AAC: WN5PFI. ASMs: KX5K, K5RE, KK5QA, KK5NA, N5JZ, KB5LWZ, KD5HIS, AD5X, W5GPO. Visit the section Web page at (**http://www.lsic.net/net/ntexas.html**) for the most

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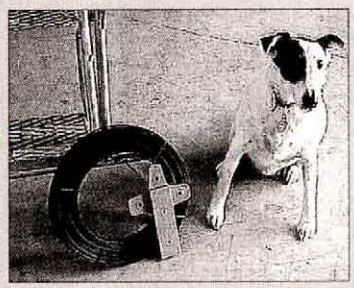

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RG8 MINI(X)95% BRAID UV RESISTANT JACKET 2.0dB/875 WATTS @ 30MHz	.15/FT	.13/FT	.12/FT
RG58/U 95% BRAID UV RESISTANT JACKET 2.5dB/400 WATTS@ 30MHz	.15/FT	.13/FT	.11/FT
RG58A/U STRD CENTER 95% TC BRD UV RESISTANT JKT 2.6dB/350 WATTS @ 30MHz	.17/FT	.15/FT	.13/FT
RG214/U STRD SC 2 95% BRD NC/DB/UV JKT 1.2dB/1800WATTS @ 30MHz	.25FT/UP	1.75/FT.	
RG142/U SOLID SCCS 2-95% SILVER BRAIDS *Teflon®* JKT 8.2dB/1100WATTS @ 400MHz	.25FT/UP	1.50/FT.	

COAX (75 OHM GROUP)

	100FT/UP	500FT	1000FT
RG11A/U STRD BC (VP-66%) 95% BRAID NC/DB/UV JKT 1.3dB/1000WATTS	.44/FT	.42/FT	.40/FT
RG6/U CATV FOAM 18GA CW FOIL + 60% ALUM BRAID	.20/FT	.13/FT	.11/FT
RG6/U CATV FOAM 18GA CW FOIL *QUAD SHIELD*	.25/FT	.18/FT	.16/FT

LADDER LINE GROUP

	100FT/UP	500FT	1000FT
"FLEXIBLE" 450 OHM 16GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT+)	.20/FT	.18/FT	.16/FT
"FLEXIBLE" 450 OHM 14GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT++)	.25/FT	.24/FT	.23/FT
300 OHM 20GA STRD (POWER: FULL LEGAL LIMIT)	.15/FT	.13/FT	.12/FT

ROTOR & CONTROL CABLES

	100FT/UP	500FT	1000FT
5971 8/COND (2/18 6/22) BLK UV RES JKT. Recommended up to 125ft	.20/FT	.18/FT	.16/FT
1618 8/COND (2/16 6/18) BLK UV RES JKT. Recommended up to 200ft	.35/FT	.34/FT	.32/FT
1418 8/COND (2/14 6/18) BLK UV RES JKT. Recommended up to 300ft	.47/FT	.45/FT	.43/FT
1216 8/COND (2/12 6/16) BLK UV RES JKT. Recommended up to 500ft	.78/FT	.74/FT	.70/FT
1806 18GA STRD 6/COND PVC JACKET Recommended for Yaesu Rotors	.23/FT	.21/FT	.19/FT

ANTENNA WIRE

	100FT/UP	300/FT	500FT	1000FT
14GA 168 STRD *"SUPERFLEX" (great for Quads & Portable set-ups etc.)*	.19/FT	.16/FT	.12/FT	.10/FT
14GA 7 STRD *"HARD DRAWN" (perfect for permanent Dipoles etc.)*	.15/FT	.12/FT	.08/FT	.06/FT
14GA SOLID *"COPPERWELD" (for long spans etc.)*	.15/FT	.12/FT	.08/FT	.06/FT
14GA SOLID *"SOFT DRAWN" (for ground radials etc.)*	.15/FT	.12/FT	.08/FT	.06/FT

ANTENNA & TOWER SUPPORT ROPE

	100FT/UP	250/FT	500FT	1000FT
3/32" DOUBLE BRAID *"POLYESTER"* 260# TEST WEATHERPROOF	.075/FT	.06/FT	.045/FT	.04/FT
1/8" DOUBLE BRAID *"POLYESTER"* 420# TEST WEATHERPROOF	.10/FT	.08/FT	.07/FT	.057/FT
3/16" DOUBLE BRAID *"POLYESTER"* 770# TEST WEATHERPROOF	.15/FT	.12/FT	.09/FT	.08/FT
5/16" DOUBLE BRAID *"POLYESTER"* 1790# TEST WEATHERPROOF	.20/FT	.17/FT	.14/FT	.13/FT

FLEXIBLE 2/COND RED/BLK DC POWER "ZIP" CORD

8GA (rated:40 amps)	50FT $24.50	100FT $44.50	250FT $107.50
10GA (rated:30 amps)	50FT $15.50	100FT $28.00	250FT $65.00
12GA (rated:20 amps)	50FT $10.50	100FT $19.00	250FT $42.50
14GA (rated:15 amps)	50FT $8.50	100FT $15.00	250FT $32.50
16GA (rated:12 amps)	50FT $5.50	100FT $10.00	250FT $22.50
18GA (rated: 8 amps)	50FT $4.50	100FT $8.00	250FT $17.50

COAX CABLE ASSEMBLIES

with USA made Silver/Teflon® Gold Pin PL259 connectors.

FLEXIBLE 9913 strd BC cntr foil+95% braid 2.7dB 400MHz NC/DB/UV JKT.
200' $129.95 175' $114.95 150' $99.95 125' $84.95 100' $69.95 75' $54.95 50' $39.95
25' $24.95 15' $21.95 10' $18.95 6' $12.95 3' $11.95 1' $10.95

RG213/U strd BC Mil-Spec NC/BD/UV JKT. 1.2dB 2500 watts @ 30MHz.
200' $89.95 175' $79.95 150' $69.95 125' $59.95 100' $49.95 75' $39.95 60' $34.95
50' $29.95 25' $19.95 15' $17.95 10' $15.95 6' $11.95 3' $9.95 1' $8.95

RG8/U strd BC foam 95% braid UV resistant JKT. 0.9dB 1350 watts @ 30MHz.
200' $81.95 175' $74.95 150' $64.95 125' $54.95 100' $44.95 75' $34.95 50' $24.95
25' $14.95 15' $15.95 10' $13.95 6' $11.95 3' $9.95 1' $8.95

RG8 MINI(X) strd BC foam 95% braid UV resistant JKT. 2.0dB/875watts@ 30 MHz
200' $47.95 175' $41.95 150' $34.95 125' $29.95 100' $24.95 75' $19.95 50' $15.95
25' $10.95 (18' $10.95 6' $9.95 3' $8.95 clear PVC JKT)
(18' clear PL259-Mini UHF Fem & PL259. $21.95/ea.

LMR 400 SOLID CCA CNTR FOIL + BRAID 2.7dB @ 450MHz WP/UV JKT 100' $72.95

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FLEXIBLE 9913 strd BC cntr foil+95% braid 2.7dB 400MHz NC/DB/UV JKT.
200' $147.95 175' $129.95 150' $110.95 125' $95.95 100' $80.95 75' $67.95 50' $54.95
35' $45.95 25' $39.95 15' $32.95 10' $25.95 6' $16.95 3' $15.95 1' $14.95

With USA made Silver/Teflon®/Gold Pin PL259 to male "N"

FLEXIBLE 9913 strd BC cntr foil+95% braid 2.7dB 400MHz NC/DB/UV JKT.
200' $139.95 175' $123.95 150' $104.95 125' $89.95 100' $74.95 75' $59.95
50' $44.95 25' $29.95 15' $26.95 10' $23.95 6' $14.95 3' $13.95 1' $12.95

RG142/U 50 OHM COAX ASSEMBLIES

Double Silver Braid Shields, High Power Teflon® Dielectric & Jacket

Assemblies are 3ft long (except were noted).
PL259 ea end $12.95ea ● 6ft PL259 ea end $14.95ea ● 18ft PL259 ea end $24.95ea ● "N" male ea end $19.95 ● R.A. BNC Male-"N" Male $19.95ea ● R.A. BNC Male-"N" Female $19.95ea ● SMA Male-BNC Female $19.95ea ● SMA Female-"N" Female $19.95ea ● R.A. SMA Male-"N" Female $19.95ea ● SMA Female-"N" Male $19.95ea ● SMA Male-"N" Male $19.95ea.

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current information. If you would like to be on the Section Newsletter mailing when issued, send me an e-mail: dmathis@lsic.net. I am looking for someone that would be willing to work with me to get the section newsletter going again. I am finding that I simply do not have the time to do the job correctly. Have been spending most of the time this month on getting ready for HamComm in Arlington and for field day. By the time that you receive this, both will have been committed to history. There will be a summary of both these activities in next month's column. The club visits have been going well. It has been a very pleasant part of this job in being able to get out and visit with the different members within the section. We have tried to get to as many as possible. Tfc: KC5OZT 516, N5JZ 511, K5NHJ 359, K5AO 224, W5AYX 161, KC5VLW 108, WA5I 107, KB5TCH 81, N5GG 54, K5MXQ 53, AC5UZ 2, KB5YAM 2, N8QVT 1. Brass Pounders League: KC5OZT 600, N5JZ 511, K5NHJ 164 orig./ deliveries. 73, Don, KB5YAM.

OKLAHOMA: SM, Charlie Calhoun, K5TTT—ASMs: N6CL, W6CL. SEC: W5ZTN. ACC: KB5BOB. PIC: WA9AFM. OOC: K5WG. SGL: W5NZS. STM: K5KXL. Field day was a whole lot of fun. I had a blast taking traffic and working from the mobile. The Tulsa ARC had the largest FD event ever and included other emergency organizations such as Tulsa Fire, Tulsa EOC, Tulsa Sheriff Reserve and Mounted Equestrian Patrol, Life Flight, D-Mat, Creek County EOC, Salvation Army, Berryhill Fire, National Weather Service and 2 food vendors. The first ever Broken Arrow Hamfest will be held Oct. 6, 7, and 8, check **http://www.qsl.net/broken_arrow_hamfest** for more details. We lost two dear hams in the section recently. Jim Null, N5GMA (Good Morning America) and Johnnie Fish, K5GBN. Johnnie was very active in HF nets and traffic handling. Both will be missed, our prayers go out to their friends and families. Tulsa Repeater Organization held a SKYWARN Weather Symposium on June 3. They received a lot of good publicity for the event. Thanks to our new section Public Information Officer, Mark Conklin, N7XYO, who has been doing a fantastic job of getting the word out about ham radio in our community. I will be running unopposed in the upcoming SM election. I would like to take this opportunity to thank you all for your overwhelming support. I have enjoyed serving you and the section over the past two years and look forward to another two years. I would also like to thank my wife Mary, and my two year old twin boys, Blake and Brock for their cooperation in allowing me to serve in this capacity. 73 for now, Charlie. Tfc: (May) N5IKN 848, KF5A 782, K5KXL 162, KE5JE 127, WB5NKC 125, KI5LQ 119, KM5VA 94, WA5OUV 86, KK5GY 57, WB5NKD 56, K5CXP 39, W5REC 29, N5FM 3. (Mar) KF5A 1524, N5IKN 698, K5GBN 484, KE5JE 262, WB5NKD 230, WB5NKC 200, KM5VA 130, K5KXL 112, WA5IMO 109, K5CXP 105, KI5LQ 92, WA5OUV 88, KK5GY 64, W5REC 35, N5FM 6. (Feb) KF5A 1241, N5IKN 792, K5GBN 377, WB5NKC 165, KJ5JE 144, K5CXP 88, WA5OUV 86, WA5IMO 84, KK5GY 76, KM5VA 57, WB5NKD 55, W5REC 30.

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. August is upon us and we have yet to see the change of leaves. This leaves a few things that we as ham operators can do for our communities. Educate them as to the things ham radio can do for them before and during an emergency, providing communications for the Red Cross, National Weather Service, Salvation Army, and all the agencies involved. Maybe then you will be able to put up an antenna. June 1 a lady called for emergency help on 7290 at 12:10 PM. She was alone in the Gulf and a storm was approaching. I checked with NWS in New Braunfels, we had 1 cell 79 miles SSE of Beaumont, TX. I called the Coast Guard, while W5AYX kept her talking. She had no idea where she was. The name of her vessel was Piloteer. The Coast Guard searched the area and found nothing. If anyone knows of a boat by that name, please notify me. The Coast Guard found no boat by that name listed in the U.S. on their computers. She could have been from South America, or Cuba. We closed at 5:48 PM. In the future, we will notify the FCC first, to get a true location.I want to thank all those who helped during this emergency. We had a great time at Ham Com 2000. It was my great pleasure to meet Rosalie and Jennifer from the league. This confirmed that the League has live people, not computers, doing all the hard work. We had one of the best turn outs at the ARRL booth, and membership applications, in the history of Ham Com. I hope a lot of those new members were from South Texas. It was good to meet David Woolweaver. Jim Haynie, Coy, David, Rosalie, Jennifer, and Stacy kept the ARRL booth humming. KM5MQ, W5WIA, and I enjoyed some quality time with Bill Cross, from the FCC, over breakfast Saturday. W5ZX and I had an extensive planning meeting for ARES, Friday night, until 11:30 PM. Jim Haynie has done a great job as our new President of ARRL. Read about his big project on page 71 of the July issue of *QST*. It was great to meet so many at Ham Com 2000. Have a great month. 73 for now. Tfc: W5SEG 778, W5KLV 254, W5TUK 200, N5OUJ 78, W5ZX 70, W5GKH 46, N5NAV 42, W5ZIN 42, W5NRJ 28, W5OYY 11.

WEST TEXAS: SM, Charlie Royall, WB5T, 915-944-0469—**WB5T@arrl.org**. ASMs: Cley, K5TRW; Ron, KB5HGM. Jerome, K5IS. Fred, W6VPI. Sandy, W5MVJ. SEC-Alex, N5LRH. OOC-John, KO5D. OBM-Frank, N5WT. Midland ARC helps New Mexico fire victims. After an agreement with Wal-Mart Super Center to use their parking lot, they secured a Mayflower Moving Van and drivers to load and haul donations to Los Alamos. United Way of Midland assisted with PSA radio and TV advertisements. They accepted donations 19-21 May 10 AM-6 PM. The first day it rained, but club members persisted and donations started coming in. By Sunday, the 18-wheeler was full of linens, household goods, dishes, bedding, furniture, hygiene items, clothes, toys, and lost of Visine for the smoke-filled eyes. Teachers at Abel Jr. High took up collections to purchase items. Wal-Mart set up donation centers inside the store, making announcements every 10-min. Big Spring ARC assisted with the loading of the truck. Just shows what can be done on short notice if you want to make a difference! Thanks, Midland and Big Spring ARCs! Until next time, 73 de Charlie, WB5T.

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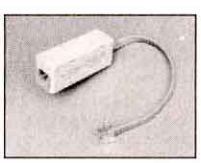

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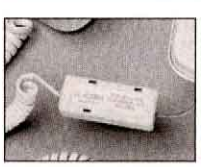

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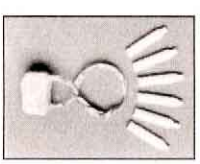

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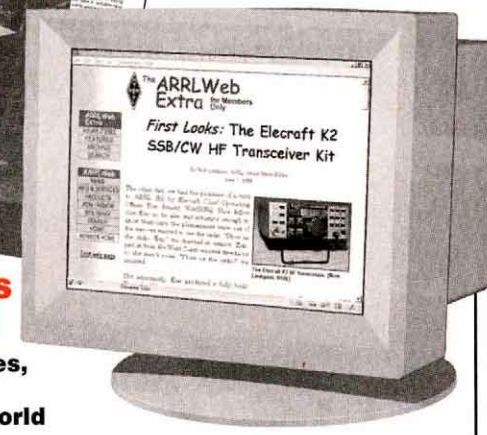

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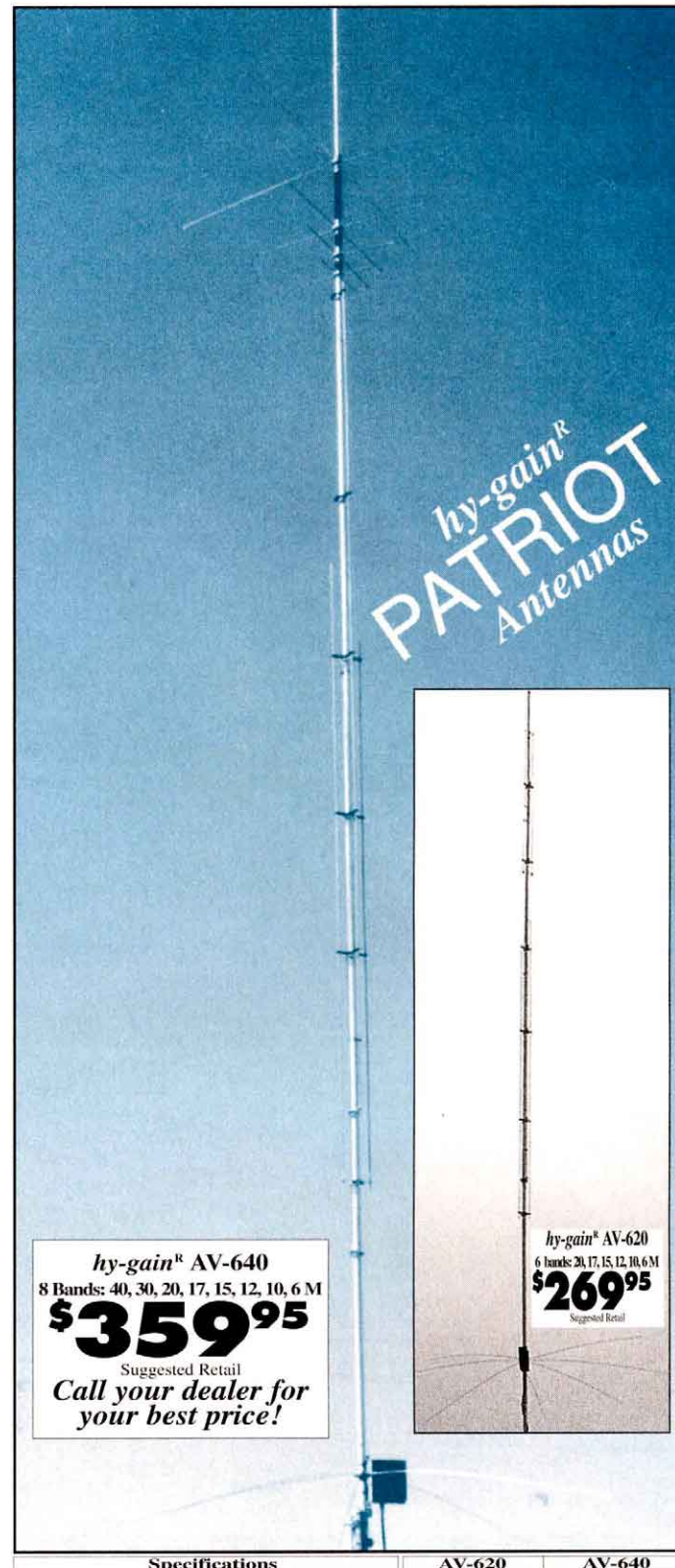

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30M	N/A	175
20M	500	500
17M	500	500
15M	500	500
12M	500	500
10M	1500	1500
6M	2000	1500
VSWR at resonance (typical)	1.5:1	1.5:1
Power handling (watts output) key down 2 minutes	1500	1500
Vertical radiation angle (degrees)	17	17
Horizontal radiation angle (degrees)	360	360
Height (feet)	22.5	25.5
Weight (pounds)	10.5	17.5
Wind surface area (square feet)	2.4	2.5
Wind survival (mph)	80	80

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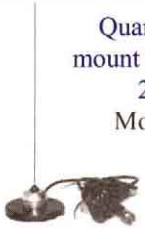

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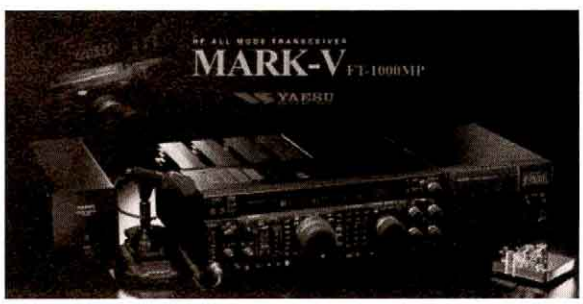

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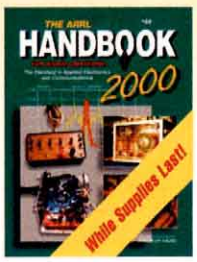

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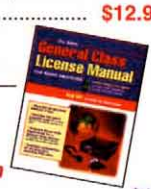

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6M5X/6M7	$199/279
6M2WLC/6M2.5WLC	$419/529

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'	$859/1289
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/X300A	$129/159
X500HNA/700HNA	$229/369
X510MA/510NA	$189/189
X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

More Diamond antennas in stock

MFJ ANTENNAS

259B Antenna Analyzer	$219
1798, 80–2m Vertical	$239
1796, 40/20/15/10/6/2m Vert.	$179
1793, 80/40/20m Vertical	$159
1792, 80/40m Vertical	$145
1788, 40–15m Loop	$399
1786, 30–10m Loop	$349
1780, 14–30 MHz Loop	$229
1768, 2m/70cm Beam	$65
1762, 3 Element 6m Beam	$65

Big MFJ inventory–please call

COAX CABLE

RG-213/U, (#8267 Equiv.)	$.36/ft
RG-8X, Mini RG-8 Foam	$.19/ft
RG-213/U Jumpers	Please Call
RG-8X Jumpers	Please Call

Please call for more coax/connectors

TIMES MICROWAVE LMR® COAX

LMR-400	$.59/ft
LMR-400 Ultraflex	$.89/ft
LMR-600	$1.19/ft
LMR600 Ultraflex	$1.95/ft

TOWER HARDWARE

3/8"EE / EJ Turnbuckle	$10/11
1/2"x9"EE / EJ Turnbuckle	$15/16
1/2"x12"EE / EJ Turnbuckle	$17/18
3/16" / 1/4" Preformed Grips	$4/5

Please call for more hardware items

HIGH CARBON STEEL MASTS

5 FTx .12" / .18"	$35/59
10 FT x .12" / .18"	$65/110
15 FT x .12" / 17 FT x .18"	$95/180
20 FT x .12" / 22 FT x .18"	$120/219
12 FT x .25" / 17 FT x .25"	$189/267

GAP ANTENNAS

Challenger DX	$259
Challenger Counterpoise	$25
Challenger Guy Kit	$14
Eagle DX	$269
Eagle Guy Kit	$22
Titan DX	$299
Titan Guy Kit	$22
Voyager DX	$389
Voyager Counterpoise	$49
Voyager Guy Kit	$38

Please Call for Delivery Information

LAKEVIEW HAMSTICKS

9106	6m	9115	15m
9110	10m	9117	17m
9112	12m	9120	20m
9130	30m		
9140	40m		
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 ..... In Stock!
Competition class HF DSP transceiver.

FT-1000D ..... In Stock!
The FT-1000D is a competition class HF XCVR featuring true dual RX, automatic tuner, 200 watts RF output, and more.

Quadra System ... Lower Price!
Solid state 1 kW autotuning amplifier.

FT-847 ..... Yaesu Special!
The Yaesu FT-847 is an all mode transceiver covering HF/6m/2m/70cm! The radio is perfect for satellite operation, and features digital signal processing, built-in RS-232 interface, tone encode/decode, and more. Supplied with an up/down microphone and DC power cord.

FT-920 ..... Yaesu Special!
The Yaesu FT-920 is an all mode HF/6m transceiver featuring digital signal processing, automatic antenna tuner, CW memory keyer, CTCSS tone encode/decode, 127 memories, and more. Supplied with up/down hand mic and DC power cord.

IC-706MK2G ..... Icom Special!
The Icom IC-706MK2G is a compact HF/6m/2m/70cm all mode transceiver with digital signal processing, automatic repeater offset, built-in CW keyer, built-in CTCSS tone encode/decode/scan, 107 memory channels and more. A detachable front panel offers convenient mounting, even in compact vehicles.

IC-718 ..... New!
The Icom IC-718 is an all mode HF transceiver featuring a front panel mounted speaker, IF shift, optional DSP module, multiple scanning modes, noise blanker, RIT, and more.

IC-2800H ..... Icom Special!
The Icom IC-2800H is a 2m/70cm dual band mobile FM transceiver with a 3" color TFT display. The radio features a separate control face, video input, bandscope display, 9600 bps Packet jack, CTCSS tone encode/decode/scan, 232 memories, cross band duplex, and more. With DTMF hand mic, mounting brackets, and power cord.

IC-2100H ..... Great Low Price!
The IC-2100H is a rugged 2m mobile XCVR with CTCSS tone encode/decode/scan, DTMF paging/squelch, 113 memory channels, switchable display color and more.

FT-90R ..... New!
New ultra-compact 2m/70cm dual band mobile transceiver with detachable control panel, and huge extended RX range.

FT-2600M .. New Lower Price!
Rugged 2m mobile with intermod-proof receiver, big display, and an illuminated DTMF mic. Built to MIL-STD 810.

FT-8100 ..... New Lower Price!
Great 2m/70cm dual band mobile, 45/35 Watts, removable front panel, and more!

FT-100D ..... New!
The Yaesu FT-100D is an ultra-compact all mode transceiver for HF/6m/2m/70cm operation. The radio features a removable control panel, digital signal processing, CW memory keyer, built-in RS-232 interface, tone encode, 200 memory channels, VOX, and more. Supplied with a DTMF hand mic, DC power cord and mounting bracket.

FT-840 ..... New Lower Price!
The Yaesu FT-840 is an all mode HF transceiver with 100 watt output, optional FM unit.

IC-W32A ..... New Lower Price!
IC-Q7A ..... Icom Special!
IC-T7H ..... Icom Special!
IC-T81A ..... New QuadBand HT!
IC-T2H ..... Amazing Low Price!
IC-R3 . Video RX, Coming Soon!

IC-207H ..... Great Low Price!
The Icom IC-207H is a 2m/70cm dual band mobile transceiver featuring CTCSS tone encode/decode, 182 memory channels, removable front control panel, and more. Supplied with a back-lit DTMF hand mic, mounting bracket, and a DC power cord.

IC-PCR1000 ..... Icom Special!
IC-PCR100 ..... Icom Special!
IC-R8500 ..... In Stock!
IC-R75 ..... New, In Stock!
IC-R2 ..... In Stock!
IC-R10 ..... Icom Special!

G-2800SDX $1069
Heavy duty antenna rotator handles 34 sq. ft. of antenna load, and features 450° rotation, preset and variable speed.

G-1000DXA $479
G-800SA/DXA $319/399
G-450A $239
G-5500 ..... $589
G-550 ..... $289

VX-5R ..... Now In Stock!
Tiny 6m/2m/70cm triband HT, with CTCSS tone encode/decode/scan, high capacity Lithium-Ion battery pack, extended RX with AM/FM and FW Wide modes, and more.

FT-50RD ..... Yaesu Special!
VX-1R ..... Yaesu Special!

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"Brick-Wall" Selectivity

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

I. IDBT: Interlocked Digital Bandwidth Tracking System

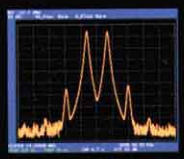
The IDBT feature greatly simplifies operation by matching the bandwidth of the DSP (Digital Signal Processing) system to the net bandwidth of the 8.2 MHz and 455 kHz IF stages. The IDBT system accounts for the settings of the IF WIDTH and SHIFT controls, and automatically sets a DSP bandwidth which matches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

II. VRF: Variable RF Front-End Filter

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

III. 200 Watts of Transmitter Power Output

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



Class A 75 W PEP IMD

IV. Class-A SSB Operation

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

V. Multi-Function Shuttle Jog Tuning/ Control Ring

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

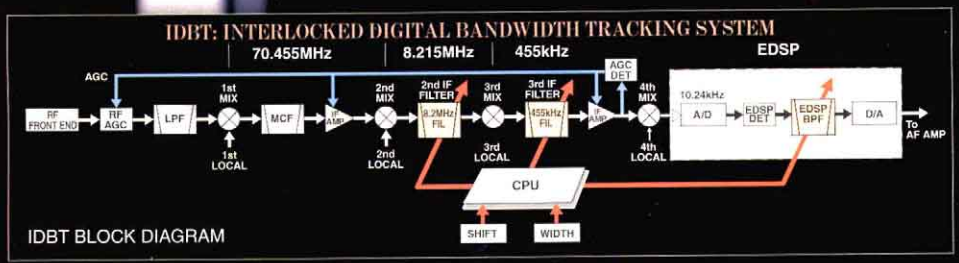
IDBT: A Breakthrough in Selectivity!

DC 30 V / 13.8 V
Power Supply FP-29

Photo shows optional MD-100A8X Deluxe Desk Microphone

HF 200 W All-Mode Transceiver

MARK-V FT-1000MP



IDBT BLOCK DIAGRAM

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Choice of the World's top DX'ers℠

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Visit us on the Internet! http://www.yaesu.com

An APRS® transceiver built for tomorrow's communication needs with advanced features available today.

TM-D700A DATA COMMUNICATOR 144/440MHz FM Dual Bander

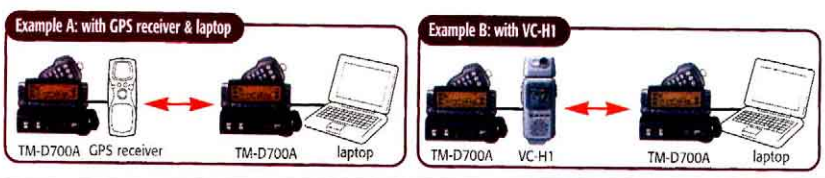
Conspicuous with its extra-large amber & black display, Kenwood's new TM-D700A is fully equipped to make the most of the exciting opportunities offered by SSTV, GPS and APRS® (the Automatic Packet/Position Reporting System that is rapidly gaining popularity worldwide), and other innovative features. This mobile transceiver with built-in TNC offers a wide range of data communications options, including simple packet operation using the AX.25 protocol. You can also send and receive SSTV images using Kenwood's VC-H1. Ham radio is truly entering a new era.

APRS® (Automatic Packet/Position Reporting System)

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

FEATURES

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



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