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COMMUNICATIONS & TECHNOLOGY

DECEMBER 2001

CQ

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THE RADIO AMATEUR'S JOURNAL

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Everything adds up: Kenwood's new FM Tribander (144/220/440MHz) offers dual-channel RX capability and prime performance in a superbly compact design.

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- Automatic simplex checker
- Wireless remote control function
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[1] Note that certain frequencies are unavailable. [2] 5W output

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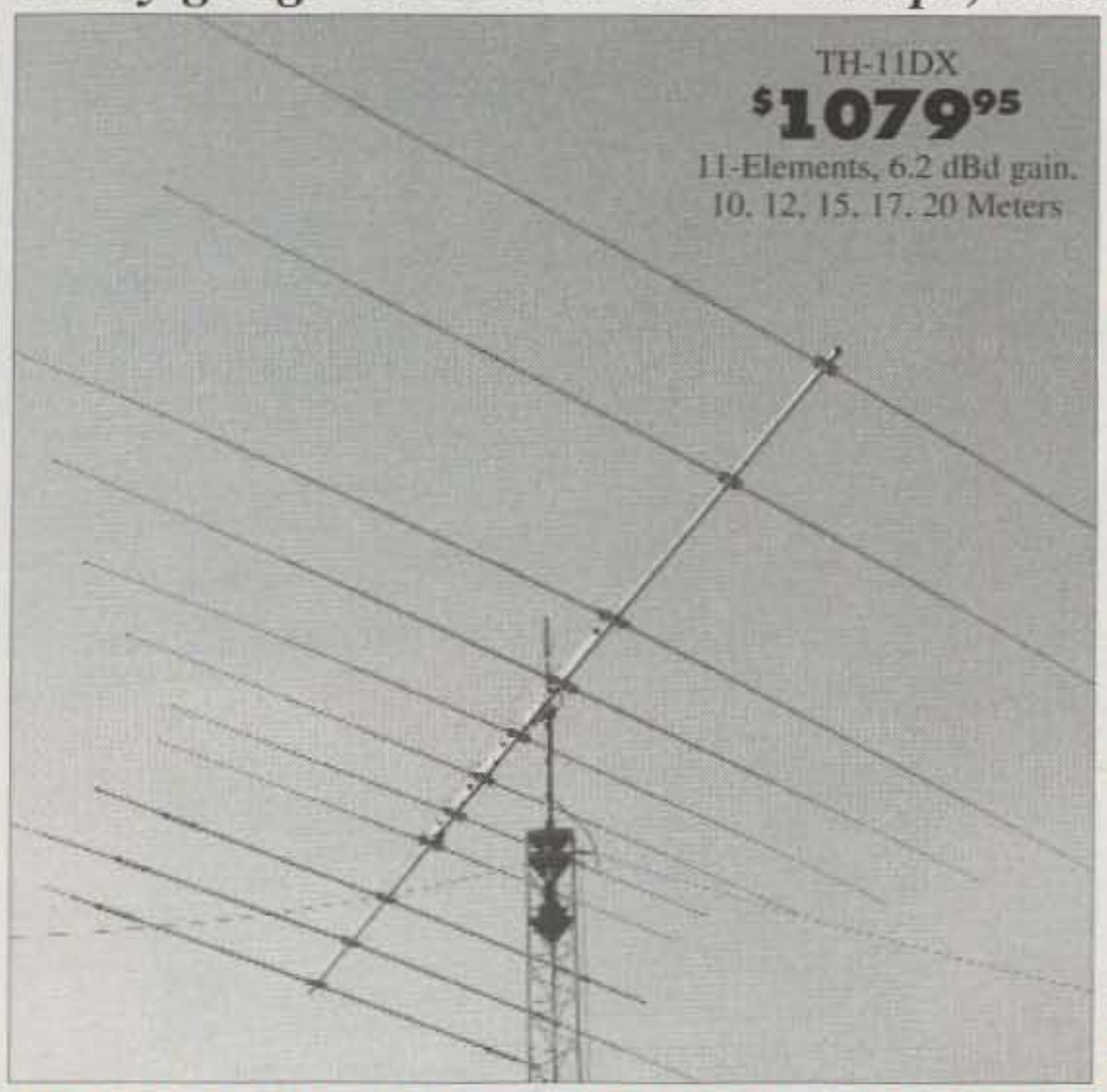
hy-gain HF BEAMS...

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



TH-11DX, $1079.95. 11-element, 6.2 dBd Gain, 10,12,15,17,20M

The choice of top DXers.

With 11-elements, 6.2 dBd gain and 5-bands, the super rugged TH-11DX is *the "Big Daddy" of all HF beams!*

Handles 2000 Watts continuous, 4000 Watts PEP.

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

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

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

TH-7DX, $819.95. 7-element, 6.57 dBd Gain, 10,15,20 Meters

7-Elements gives you an incredible avg *6.57 dBd gain -- the highest* of any Hy-Gain tri-bander!

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

Uniquely combining monoband and trapped parasitic elements give you an excellent 27 dB F/B.

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

TH-5MK2, $699.95. 5-element, 6.1 dBd Gain, 10,15,20 Meters

The broadband *five element* TH5-MK2 gives you an outstanding 6.1 dBd average gain.

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

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

TH-3MK4, $439.95. 3-element, 5.9 dBd Gain, 10,15,20 Meters

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

You get an impressive 5.9 dBd average gain and a whopping 25 dB average front-to-back ratio. Handles a full 1500 Watts PEP. 95 MPH wind survival.

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

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

TH-2MK3, $339.95. 2-element, 3.4 dBd Gain, 10,15,20 Meters

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

For just $339.95 you can *double* your effective radiated power and hear *15-20 dB* (=F/B) better!

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

EXP-14, $549.95. 4-element, 5.9 dBd Gain, 10,15,20 Meters

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

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

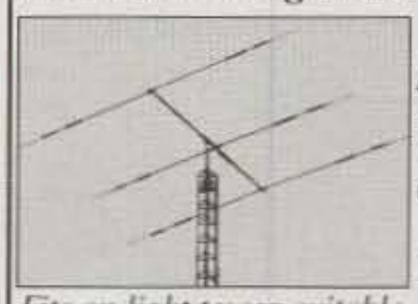
BetaMATCH™ provides DC ground to eliminate static. Includes BN-86 balun. Easily assembled.

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

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

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

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



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

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

Excellent 5.8 dBd gain and 25 dB F/B let *you* compete with the "big guns".

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

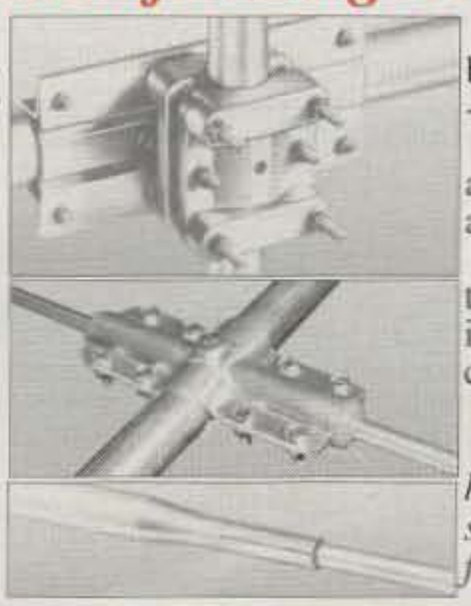
Model No.	No. of elements	avg Gain dBd	avg F/B dB	MaxPwr watts PEP	Bands Covered	Wind sq.ft. area	Wind (mph) Survival	Boom (feet)	Longest Elem. (ft)	Turning radius(ft)	Weight (lbs.)	Mast dia O.D.(in.)	Recom. Rotator	Retail Price
TH-11DX	11	6.2	22	4000	10,12,15,17,20	12.5	100	24	37	22	88	1.9-2.5	T2X	$1079.95
TH-7DX	**7**	**6.57**	**21**	**1500**	**10, 15, 20**	**9.4**	**100**	**24**	**31**	**20**	**75**	**1.5-2.5**	**HAM-IV**	**$819.95**
TH-5MK2	5	6.1	20	1500	10, 15, 20	7.4	100	19	31.5	18.42	57	1.5-2.5	HAM-IV	$699.95
TH-3MK4	**3**	**5.8**	**25**	**1500**	**10, 15, 20**	**4.6**	**95**	**14**	**27.42**	**15.33**	**35**	**1.9-2.5**	**CD-45II**	**$439.95**
TH-3JRS	3	5.8	25	600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$329.95
TH-2MK3	**2**	**3.4**	**15-20**	**1500**	**10, 15, 20**	**3.25**	**80**	**6**	**27.3**	**14.25**	**20**	**1.9-2.5**	**CD-45II**	**$339.95**
EXP-14	4	5.9	25	1500	10,15,20 (30/40)	7.5	100	14	31.5	17.25	45	1.9-2.5	HAM IV	$549.95

Tooled Manufacturing . . . Highest Quality Materials

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

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

3. Thick-wall *swaged* aluminum tubing



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

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

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

Durable precision injection molded parts.

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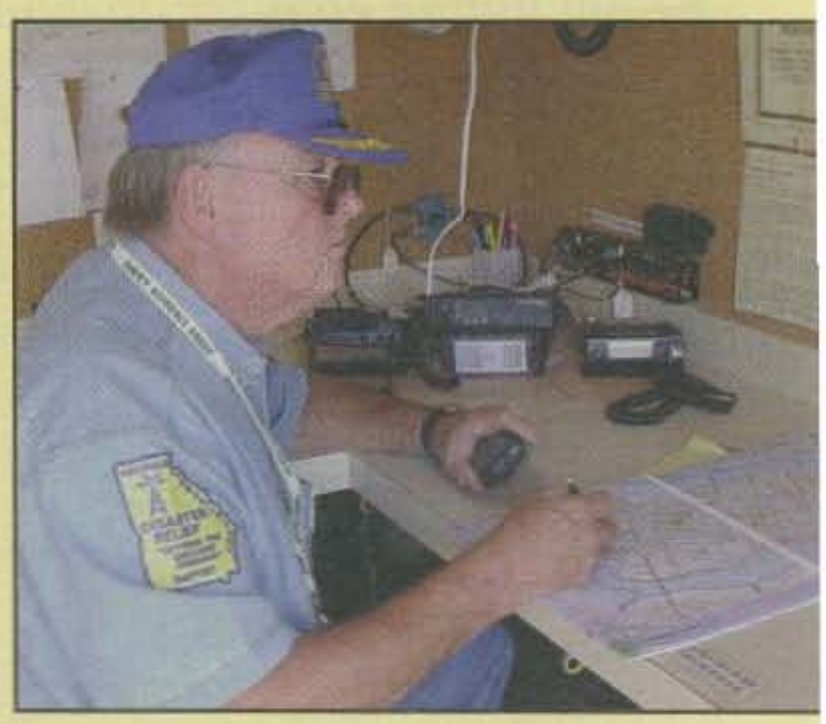
CQ Amateur Radio

DECEMBER 2001 VOL. 57, NO. 12

FEATURES

Special Focus!

100th Anniversary of DXing, 40 Years of Ham Radio in Space



page 31

page 38

DEPARTMENTS

On The Cover: AMSAT Board Chairman Bill Tynan, W3XO, of Kerrville, Texas, led the development of AMSAT's latest satellite, OSCAR-40. OSCAR-1 was launched 40 years ago this month. December also marks the centennial of the first transatlantic radio transmission. (Photo by Larry Mulvehill, WB2ZPI)

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Ham Radio News

From The CQ Newsroom

FCC Limits Paper Documents and Urges Electronic Filing

The Federal Communications Commission announced in mid-October that, as a precaution, it would no longer accept hand-delivered or messenger-delivered documents in envelopes, and that all documents mailed to its Washington, D.C. headquarters would be diverted to an FCC facility in Maryland. It later required that hand-delivered filings go to the Maryland location as well.

"As the Commission continues to balance its efforts to be accessible to its customers with the need for heightened security measures," read the Public Notice, "the Commission encourages its customers to make full use of the Commission's electronic filing systems to facilitate the filing of documents." For more information, see the FCC's main web page at <http://www.fcc.gov>.

CQ Asks That Contest Logs Be E-Mailed

As a security precaution, CQ has asked participants in CQ-sponsored contests to file their logs via e-mail if at all possible. Mailed logs will be held unopened until company management is sure they may be opened safely. For details, see this month's "Zero Bias" column.

Solar Storm Threatens CQWW CW Weekend

There is a high probability of a geomagnetic storm during the CW weekend of the CQ World-Wide DX Contest, according to *CQ* magazine Propagation Editor George Jacobs, W3ASK. In his column in this issue, Jacobs says the severe geomagnetic storm that disrupted HF communications between October 1 and 4 was likely to cause additional disruptions on the last weekends of October (the SSB contest) and November (the CW contest). The storm was caused by eruptions on the sun that sent streams of solar particles toward the Earth. The sun rotates once every 27 days and conditions tend to repeat as active regions again face the Earth. For more information, see George's column on page 100.

IARU Calls for End To Morse Testing

The Administrative Council of the International Amateur Radio Union has called for an end to Morse code testing for amateur licenses with operating privileges below 30 MHz. According to the ARRL, the council said it was "setting aside any previous relevant decisions," and declared that IARU policy supports "the removal of Morse code testing as an ITU requirement for an amateur license to operate on frequencies below 30 MHz." The IARU is the international organization made up of national amateur radio associations around the world. An ARRL bulletin says the Union's Administrative Council also called on member societies—as an interim measure—to seek Morse code testing speeds "not exceeding five words per minute." The Council also said it recognizes that Morse code "continues to be an effective and efficient mode of communication used by many thousands of radio amateurs," but that Morse code proficiency as requirement for an HF amateur license "is no longer relevant to the healthy future of Amateur Radio." The resolution was adopted during the IARU Administrative Council meeting October 6–8 in Guatemala.

FCC Proposes Higher Power For 433 MHz "RFID Tags"

The FCC has proposed permitting higher power and longer signal duration times for unlicensed "RFID tags" operating between 425 and 435 MHz, principally on 433 MHz. These tags are used by shippers to identify and electronically transmit the contents of shipping containers. The proposed rules would permit transmissions of up to two minutes in duration, with a 10-second pause between transmissions, and a maximum field strength of 11,000 microvolts per meter at a distance of three meters, with peaks of up to 110,000 microvolts per meter permitted.

The ARRL had "fiercely opposed" the original filing and promises to do battle over the issue, as it has with "Little LEO" satellites and other attempts by commercial interests to gain access to amateur frequencies. The amateur allocation on 70 centimeters is secondary, but has higher priority than unlicensed devices operating under Part 15 of the FCC rules. Proponents argue that most use of these devices will be in industrial areas, away from most amateur stations. Nonetheless, the ARRL is concerned that a significant interference potential exists. The 433 MHz frequency of the RFID tags is quite close to the amateur weak-signal frequency of 432 MHz, and nearby transmissions can increase the noise floor, making it difficult or impossible to copy very weak signals.

Starshine 3 Telemetry Reports Requested

Ground controllers of the Starshine-3 satellite are seeking volunteer amateur radio operators and students worldwide to monitor and report telemetry from the recently-launched satellite (see this month's "Satellites" column on page 48). Starshine 3 transmits 9600 bps AX.25 packet telemetry every 2 minutes on 145.825 MHz. The satellite's primary mission is to involve and educate school children from around the world in space and radio sciences. Students should be able to visually track the satellite during morning and evening passes by recording its telltale mirror flashes and reporting their observations to Project Starshine. To report Starshine 3 telemetry or to learn more about it, please visit <http://epulation.com/starshine/starshine3/>. More info about Project Starshine is available at <http://www.azinet.com/starshine/>.

Offbeat Enforcement Issues

The FCC's enforcement matters this month have tended to the offbeat side, from going after a Chinese restaurant in New Jersey to a ham allegedly broadcasting on 40 meters.

Best Wok restaurant in Westville, NJ was warned to stop operating without a license on the 2 meter ham band. An Illinois amateur, N9OMJ, received a warning letter for allegedly causing interference on Family Radio Service (FRS) frequencies, transmitting on police frequencies, and using false amateur callsigns.

A ham in Florida, KD2CL, was cited for allegedly broadcasting on 40 meters, reportedly several times since September 2001. A California amateur, KE6HDD, has received a second warning notice about allegedly operating on 20 meters with a Technician Class license, and using a Mexican callsign, XE1HDD, while operating from California.

Finally, the FCC refused to reissue a club callsign to an Illinois amateur after officers of the club filed a statement with the Commission saying the ham in question had been removed from his position as station trustee and was no longer a member of the club.

Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.

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Easily handles 1500 Watts continuous carrier even on 160 Meters . . . High-current edge-wound silver plated Roller Inductor . . . Two 500 pf high capacitance tuning capacitors with 6:1 vernier reduction drives . . . 3 core choke balun . . . Six position antenna switch . . . True peak reading Cross-Needle SWR/Wattmeter . . .

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- ***Handles 1500 Watts carrier***
- ***Super High Current edge-wound silver plated Roller Inductor***
- ***500 pf tuning capacitors with 6:1 vernier reduction drives***
- ***3 core choke balun***
- ***6 position antenna switch***
- ***True peak reading meter***

AMERITRON's ATR-30 *True Legal Limit*™ roller inductor antenna tuner is ham radio's toughest! It'll handle 1500 Watts *continuous carrier output* on *all* modes and *all* HF bands into most antennas -- even on 160 Meters where most antenna tuners fail.

It's perfect for Ameritron's most powerful amplifiers where the ATR-30 just loafs.

All band coverage lets you operate 1.8-30 MHz including all MARS and WARC bands.

Super High Current Roller Inductor

You'll see Ameritron's new *super high current* air core roller inductor. It's *edge wound* from a thick solid copper strip and silver plated. This produces a large surface area and a massive conductor. It can carry huge circulating RF currents and withstand tremendous heat that'll melt or burn ordinary roller inductors.

A gear driven turns counter and crank knob gives you precise inductance control.

Two 500 pf Tuning Capacitors

Two 500 pf -- *the highest of any antenna tuner* -- variable transmitting capacitors give you no-arc wide range impedance matching for true high power performance.

6:1 vernier reduction drives makes capacitor tuning smooth and easy.

Super Balun, 6 position Antenna Switch

Super heavy duty three core choke balun lets you match virtually any balanced feedline antenna without core saturation.

A 6 position antenna switch lets you select your desired operating antenna.

Read *true* Peak Power

Ameritron's active electronic *true* peak reading meter accurately reads forward and reflected power and SWR *simultaneously* on a lighted Cross-Needle meter.

Roomy Cabinet maintains High-Q

Roomy extra-strong .080 inch thick aluminum cabinet gives highest efficiency and lowest loss. 13¼Wx5⅝Hx17½D inches.

AMERITRON ATR-20 Antenna Tuner

ATR-20, $459. Handles full 1.2 kW SSB/600 Watts CW. Handles full SSB power of Ameritron AL-811/811H/80B/ALS-500M/600, other 1.2 kW SSB amps. Roller inductor, turns counter, verniers on capacitors, balun, cross-needle SWR/Wattmeter.

Ameritron has the best selection of *TrueLegalLimit*™ HF Amplifiers

AMERITRON's legal limit amplifiers use Peter Dahl super heavy duty Hypersil power transformer capable of 2500 Watts!

Ameritron's *most powerful* Amp

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Ameritron's *most powerful* amplifier uses the herculean Eimac® 8877 ceramic tube. It's so powerful that 65 Watts drive gives you the full output power -- and it's just loafing because the power supply is capable of 2500 Watts PEP. All HF bands, all modes. 77 pounds, 18½Dx17Wx10H in.

Ameritron's *toughest* Amp

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AL-1200

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Get ham radio's *toughest* tube with AL-1200. The Eimac® 3CX1200A7 has a 50 Watt control grid dissipation and the lowest history of field replacement of any modern transmitting tube that we use. 90 Watts in gives you full power out. All HF bands, all modes. 76 pounds, 18½Dx17Wx10H in.

Ameritron's *classic* Amp

with 2 graphite plate Amperex® 3-500ZG tubes

AL-82

$2395

Suggested Retail

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Most linears using 3-500s can't give you 1500 Watts because their lightweight power supplies *can't* use these tubes to their full potential. AL-82 is ham radio's *only* super 3-500 amp! 100 Watts in gives you full power out. All HF bands, all modes. Hefty 76 pounds, 18½Dx17Wx10H inches.

1.5 *plus* kW SSB HF Amp

with 2 Eimac® 3CX800A7 tubes

AL-800H, $2495 suggested retail. Two Eimac® 3CX800A7 tubes produces 1500 *plus* Watts SSB PEP with 55 Watts drive. 52 lbs., 8½Hx16½Dx14¼W in. **AL-800, $1695** suggested retail, single 3CX800A7, 1250 Watts out with 70 Watts drive.

NearLegalLimit™ Amp

with four Svetlana® 572B tubes

AL-572, $1395 suggested retail. New class of *Near Legal Limit*™ amplifier gives you 1300 Watts SSB PEP power output (70 Watts drive) for 65% of price of full legal limit amps! Instant 3-second warm-up. 40 lbs. 8½Hx15½Dx14½W inches.

1 kW Desktop HF Amp

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AL-80B, $1299 suggested retail. Gives you full kilowatt SSB PEP output (85 Watts in) from a whisper quiet compact desk- top linear. 8½x14x15½ in. Plugs into 120 VAC outlet. Graphite plate *Amperex®* 3-500ZG tube. Nearly 70% efficiency. Weighs 48 lbs.

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AWM-30, $149 suggested retail. Active circuit gives *true* peak/average readings on lighted Cross-Needle meter. 3000/300 Watt ranges. Remote sensor.

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Zero Bias

BY RICH MOSESON, W2VU

An Editorial

More Than a Spot on the Map

Up until September 11, when I'd tell people I met on the air that I live 15 miles (for domestic QSOs) or 25 kilometers (for DX) west of New York City, it was nothing more than a geographic marker, a spot on the map. No longer. Now, quite unintentionally, it has become the catalyst for a QSO topic.

"I have been following quite closely the events in New York and now in Afghanistan," one ham on an island in Sweden told me after I told him where I live, "and all I can say is 'God bless America.' " He went on to tell me that he is a retired minister called back to help with special prayer services for the victims of terrorism and we agreed that amateur radio is a powerful antidote to the ignorance that breeds hatred that breeds terrorists. Our hobby provides us the opportunity to make one-on-one contact with individuals all over the world. We may exchange only pleasantries during a brief QSO, but often that's all that's needed to remind us that that's another *person* there, no matter what his (or occasionally her) nationality, religion, or race.

Just this morning, on 10 meters, I spoke with other *people* in Italy, Finland, Germany, Russia, Estonia, and Lebanon (it was a good morning on 10). In several cases, I'd worked these people before on other bands and, thanks to their computer logging programs, they were able to greet me by name on the first exchange. It wasn't "Hello, OM," but "Hello, Rich." I was not just another American or even another American ham, but an identifiable person. Knowing people who live in a country makes you less likely to want to attack that country. In our case, the people there are no longer just images on a TV screen, but voices of individuals on the radio ... more often than not, friendly voices. We hams don't need governments, religious leaders or anyone else to tell us what we should think of a certain group of people. We have the opportunity to meet all sorts of people, one-on-one, and come to our own conclusions. In this way, ham radio can be and is a beacon to the world.

Bringing the Crisis Home to Hams

The reality of the world right now, though, is that there aren't enough of us out there practicing personal diplomacy to help prevent or defuse the battle between terrorism and civilization. The reality is that the war against terrorism is under way. Some battles in this war are being fought on American soil, battles not between soldiers on opposing sides of an arbitrary line, but battles in which civilians are primary targets and the way of life we take for granted is used as a weapon against us, be it an airplane or a package in the mail.

The reality right now is that some packages in the mail pose grave threats to the health of anyone who comes in contact with them. And the reality is that the mailroom at CQ is as vulnerable as the mailroom at NBC or CBS or American Media in Florida.

Do we think hams are likely to practice bioterrorism? Of course not. People who care enough about their fellow humans to become hams are among the least likely to do anything like this. But between the time a package goes into your mailbox and the time it arrives in ours, no one knows who may have access to it or what might happen to it along the way, especially mail from other countries.

In order to protect our staff and the volunteers who work with us on the contests we sponsor, we are taking a step that will unfortunately inconvenience a few of you. Just as last month's issue was hitting mailboxes and newsstands, we asked that all participants in *CQ*-sponsored contests submit their logs by e-mail if at all possible. Faxing paper logs is also fine. Logs received through the mail at the *CQ* offices will be held unopened until all potential health risks have been evaluated. Since these events are beyond our control, we cannot guarantee when logs submitted by postal mail will be opened. Contesters who want to be sure their scores will be counted should use other means. This policy applies to all *CQ*-sponsored contests and will be in effect until further notice.

We realize that this will make it difficult for some of you to submit logs for our contests, and we're sorry for that. We understand that some of you do not have easy e-mail access, computer logging programs or even computers. On the other hand, over 90% of last year's CQWW logs were submitted by e-mail. We had to weigh the potential inconvenience to a small minority of our contest entrants against the potential hazards to the lives and health of the individuals opening and handling our mail, our friends and coworkers. Lives and health won. Let's be real: contests and contest results are part of the hobby side of amateur radio. They're fun. No one will live or die because they did or didn't participate or because their scores were or weren't listed in a magazine. Unfortunately, a piece of mail carrying a hazardous substance could become a matter of life or death for those who open or handle it. Our contest logs come from all over the world. They pass through many hands. The possibility of tampering is always present. We must take reasonable precautions in this age of unreasonable attacks. We regret any inconvenience but feel we have no choice.

Some people have suggested that we are "giving in to terrorism" by making this request of a small minority of our contest participants. We disagree. Just as airports are now patrolled by National Guard troops with automatic weapons, and fighter jets patrol our skies and escort to the ground any airliner with a *possible* problem, businesses across America are taking reasonable precautions in their mailrooms. This is one of ours.

Again, we regret any inconvenience that results, and any possibility that a few scores may not be counted ... nearly as much as we regret the circumstances that forced us to take these steps.

Our coverage of amateur radio's response to the September 11 attacks on America continues this month and next in WA3PZO's Public Service column.

A Double Anniversary

This is where this month's editorial was *supposed* to begin, before real life got in the way. The month of December, 2001 marks two very special anniversaries in the history of amateur radio. First is what you might call the centennial of DXing—100 years since the first transatlantic reception of radio signals, an event which set the stage for the communications revolution that continues to this day. Second is the 40th anniversary of the launch of OSCAR-1, not only the first amateur radio satellite but the first non-governmental satellite ever placed in orbit. This opened the door for the entire communications satellite industry. Amateur satellites continue to pioneer new frontiers in space communication generally.

We have two features this month that look back to the early days of radio. John Dietz, W2ZF, reviews the scientific progress that led up to Marconi's momentous receipt of the letter "S" on December 3, 1901, as well as early experiments with radiotelephony and the role that amateurs played in discovering and documenting shortwave propagation. Then, Josh Logan, N7XM, takes us with him on a trip to Marconi's receiving station in Newfoundland, and shares a surprising discovery.

Plus, Ted Cohen, N4XX, brings us an exclusive *CQ* interview with ElectroVoice and Ten-Tec founder Al Kahn, K4FW. And we take a look back 40 years to the December, 1961 launch of OSCAR-1, tracing the roots of the amateur satellite program right back to the pages of *CQ*. Also on the topic of history, several of our columns this month take a look back in time, and Computers & Internet Editor Don Rotolo, N2IRZ, reminds us of a third major anniversary this year—the 50th anniversary of the computer age. We will continue our trip back in time next month.

W3ASK's Final Propagation Column

Earlier this year, we celebrated the 50th anniversary of the stewardship of *CQ*'s Propagation column by George Jacobs, W3ASK. At the time, George told us that he'd

like to have more time to travel with his wife and wanted to get away from the all-too-regular deadlines of a monthly column. So we set out to find a successor and, as George announced in his column in October, that successor will be Tomas Hood, NW7US. Tomas begins his run at the helm of our Propagation column next month. Meanwhile, George's 610th and final column appears this month. In addition to his usual propagation reports and predictions, George looks back at his most memorable moments as *CQ* Propagation Editor. George will not be retiring from the *CQ* staff. He will remain on our masthead as Contributing Editor Emeritus and will continue to write articles for us as his travel schedule permits. George, how does someone say "thank you" for more than 50 years of keeping *CQ* and *CQ* readers at the forefront of propagation science? We wish you all the best in your travels and look forward to your next article.

'Tis the Season

It's that time of year again when people traditionally exchange "season's greetings," spend more time with family and try to have a little more patience with themselves and each other (key word: *try*). Normally, it is a season of joy and celebration. This year, it is a season of uncertainty and some of the luster is off the glow of holiday lights. But it is also a season of hope for the future, and I think there is reason for hope.

Terrorism depends on three factors for its success: ignorance, fear, and hatred. Knowledge will ultimately defeat ignorance; understanding will defeat fear, and tolerance will overcome hatred. Amateur radio can be a very effective weapon in the war against terrorism, as it brings together people of all faiths and all nationalities into one big family. It helps us get to know each other, understand each other and appreciate our similarities as well as our differences. As I watched the various memorial services on TV in the days after September 11, I was touched by one thing in particular—the similarity of all of the readings and all of the messages, regardless of the faith of the speaker. There is much more that unites us than that separates us.

This season is also traditionally one of generosity to those less fortunate than we are. Americans in particular responded to the September 11 attacks with an unparalleled outpouring of donations to help the families of the victims. Unfortunately, there were reports that many charities dealing with long-term needs saw a drop in their donations as funds were redirected to the immediate crisis. As you plan your holiday giving this year, please do not forget those with ongoing needs. If you normally donate time or money to a homeless shelter, a food pantry, or one of the many charities seeking cures to diseases and disabilities, please remember that their needs continue.

Season's greetings to you and your family from all of us at *CQ*. May this holiday season bring you comfort and hope for peace in our troubled world. 73, Rich, W2VU

Announcements

Lighthouse Special Event – The Amateur Radio Lighthouse Society, Cinnaminson, NJ, is sponsoring "Lighthouse Christmas Lights" from 0001 UTC Dec. 21 through 2359 UTC Jan. 2. Hams do not have to operate from a lighthouse to participate. All modes, including repeaters. Suggested frequencies: SSB 1.970, 3.970, 7.270, 14.270, 21.270, 28.370 MHz; CW 1.870, 3.570, 7.070, 14.070, 21.070, 28.070 MHz. Call CQ Lighthouse or CQ/LH. Exchange: ARLHS members give callsign, ARLHS membership number, name, and state/province; nonmembers give call, name, year of first license, and state/province; lighthouses give ARLHS light number, name, and state/province (see p. 10 of ARLHS website, <http://ARLHS.com>, for numbers of lights). Certificate for working five or more lighthouses/lightships or ten or member ARLHS stations. Send log info to ARLHS, P.O. Box 2178, Cinnaminson, NJ 08077 (9×12 SASE and $1.00 for return of certificate). For more info check the website or e-mail Jim, K2JXW, <weidner@waterw.com>, or phone 1-856-486-1755. Also see website above for participation prizes.

The 2001 Young Ham of the Year award was presented to Patrick Clark, KC8BFD, at the Huntsville Hamfest in August this year. Vertex-Standard and CQ Communications are the major corporate underwriters of the award, and Amateur Radio Trader *provides free advertising, while the Rosewood Company provides additional prizes. Left to right are Chip Margelli, K7JA, of Vertex-Standard; 2000 YHOTY recipient Christopher Arthur, KT4XA; 2001 YHOTY recipient Patrick Clark, KC8BFD; Arnie Sposato, N2IQO, of CQ magazine; Bill Pasternak, WA6ITF, of ARNewsline; and Cassie Morgan, KG4NFI, of* Amateur Trader Magazine. *(Photo by Joe Eisenberg, KØNEB)*

N1CC, from Number One Christmas Carol, Hickory Creek, Texas; 1200–1800Z Dec. 24 and 1800–2200Z Dec. 25 on 28.475, 21.390, 14.280, 7.240 MHz SSB. QSL with SASE to Jim LaPorta, N1CC/5, 147 Shasta Dr., Hickory Creek, TX 75065; <http://members.aol.com/n1cc/n1cc0.htm>.

N1S, from commemoration of Marconi's first message, Historical Electronics Museum ARC, Baltimore, MD; 1400–2200Z Dec. 15 & 16 CW and SSB on 40, 20, 15, 10 meters. For certificate send QSL and two 34-cent stamps to HEMARC N1S, P.O. Box 746, MS 4015, Baltimore, MD 21203 (more info <w3gr@arrl.net>).

K2U, from NWS/ARRL Skywarn Recognition Day, National Weather Service office, Upton, NY; 0000–2400Z Dec. 1 in the General portion of 40–10 meters. Contact Bob Giglio, N2JJM, Regional Skywarn Coordinator, <bob@gigdot.net>; more info <http://hamradio.noaa.gov/>.

W2W, from commemoration of attack on Pearl Harbor, Baltimore, MD; Historical Electronics Museum ARC; 1400–2200Z Dec. 8 & 9, CW and SSB 40, 20, 15, 10 meters. For certificate send QSL and two 34-cent stamps to HEMARC W2W, P.O. Box 746, MS 4015, Baltimore, MD 21203 (more info <w3gr@arrl.net>).

WX3MAS, from twin Christmas cities of Bethlehem-Nazareth, PA; Christmas City ARC and Delaware-Lehigh ARC; 1200Z Dec. 15 to 2400Z Dec. 14 on 3.970, 7.270, 14.265, 21.365, 28.465 MHz. For certificate send QSL and 9×12 SASE to CCARC/DLARC WX3MAS, Greystone Bldg., Gracedale Complex, RR 8, Nazareth, PA 18064-9211.

N4C, from commemoration of attack on Pearl Harbor, radio room of battleship U.S.S. North Carolina; beginning 0001 Eastern time Dec. 7 (no ending time given) on 14.260, 7.260, and possibly 28.420, ±QRM. For QSL send QSL and SASE via QSL Manager KA4TFP.

W5P, from commemoration of attack on Pearl Harbor, Fredericksburg, TX; Hill Country ARC; 24 hours Dec. 7 on CW 7.125, 7.235, 14.025; SSB 14.235, 18.133, 21.235, 28.425; plus 146.76, 146.98 MHz. For certificate send QSL and 9×12 SASE (two units first-class postage) to Hill Country ARC, W5P, P.O. Box 2003, Kerrville, TX 78029.

KC7Z, from Pearl Harbor commemoration, Naval Undersea Museum, Keyport, WA; North Kitsap ARC; 1600Z Dec. 7 to 2400Z Dec. 8 on CW 3.530, 7.030, 14.030, 21.030, 28.030 MHz; SSB 3.860, 7.250, 14.250, 21.350, 28.450 MHz; plus 146.52 MHz FM. For QSL (or certificate for a green stamp) send SASE to Bob Tomas, N7KTP, 38119 Vista Key Dr. NE, Hansville, WA 98340. DX cards will be sent via the QSL Bureau. Info <bobtomas@sprintmail.com>.

W8ZQ, from Festival of Lights, Wheeling, WV; NPAR Club; 5 PM local time Dec. 7 to 5 PM Dec. 8 in General section of phone bands. QSL with SASE to Joe McCready, WB8CTC, P.O. Box 192, Blaine, OH 43909.

W9WWI, from Christmas celebration, Bethlehem, IN; Clark County ARC; 1500Z Dec. 14 to 2200Z Dec. 15 in General portion of 75, 40, 20 meters. For certificate send QSL to CCARC, 1805 E. Eighth St., Jeffersonville, IN 47130.

Tampa Bay Hamfest & 2001 ARRL SE Division Convention, Dec. 1–2, Manatee Civic Center, Palmetto, FL. Contact Fred Hendershot, N3BUL, 813-671-9556; e-mail: <n3bul@arrl.net>; <www.fgcarc.org>. Talk-in 145.430– and 442.950+ PL 100.0.

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25 Newbridge Road
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As we celebrate the centennial of transatlantic radio communication this month, W2ZF introduces us to some of the people and events that marked those earliest days of "wireless."

Some Reflections On the Early Days of Radio

BY JOHN J. DIETZ,* W2ZF

The month of December marks the 100th anniversary of Guglielmo Marconi's first spanning of the Atlantic Ocean by wireless telegraphy. It is an opportune time to reflect upon some of the unusual twists and turns in the early history of radio which influenced the application of the revolutionary insights of James Clerk Maxwell, the subsequent discoveries of Heinrich Hertz, and the efforts of Marconi.

A brief look at the state of the wireless art in 1901 will prove helpful. During that year the United States Secretary of the Navy recommended that consideration be given to replacing the homing pigeons, then in use for fleet communications, with a system of wireless telegraphy. All of the major naval powers except the United States had made a start at using wireless, at least experimentally, and the British had claimed communication between ships over distances up to 160 nautical miles.

By mid 1902 the Navy had acquired for testing two sets each of equipment from a number of American and European sources. It is noteworthy that the Marconi company did not participate in bidding on this equipment, as it would not agree to sell, but only to lease, apparatus for test purposes. Later that same year the U.S. Navy began a series of tests between stations set up at the Washington Navy Yard and the Naval Academy at Annapolis, a distance of about 30 miles.

Additional shore testing followed through the winter of 1902, and by April of 1903 the German Von Arco equipment, which had proved to be superior during the early tests, was able to maintain reliable communication with the cruiser *U.S.S Topeka* over a distance of some 52 nautical miles. Von Arco subsequently became Telefunken, a name some old timers will remember. Later that year, after further testing, forty additional sets of the Von Arco equipment were acquired and several ships were fitted with this equipment.

It was to the Navy's credit that, despite its late start, the United States soon took the lead in radio development. By 1911 the renowned naval station NAA, located on the outskirts of Washington, was running 100 kW of both spark and arc power. It was, at the time, believed to be the highest powered station in North America and possibly in the world. NAA, with its landmark triple towers, one 900 and the other two 650 feet tall, came to be known as the "Three Sisters of Arlington" and was listened to for code practice by many pioneering amateurs of the day.

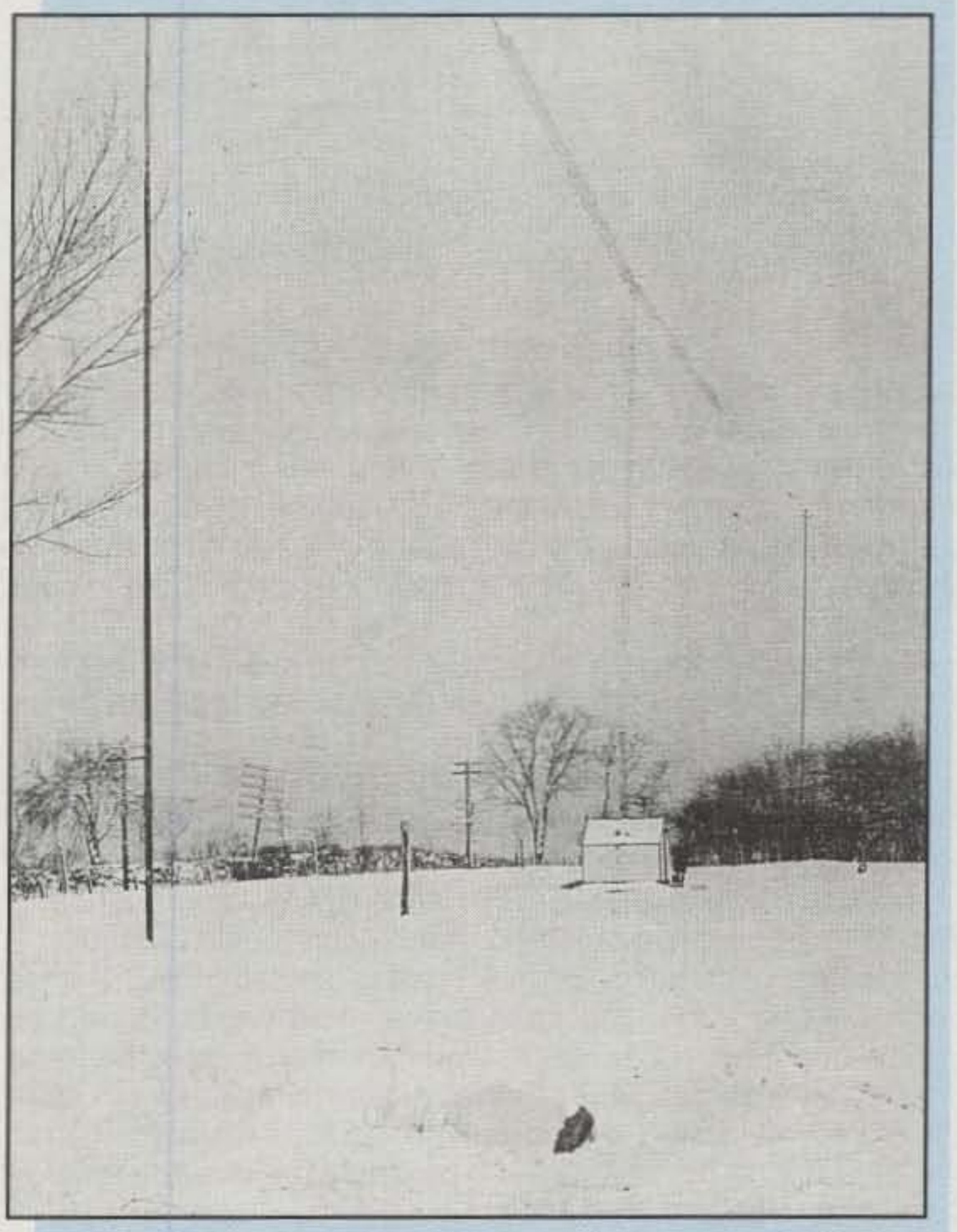

Photo 1– The 1BCG station showing the antenna, counterpoise, and operating shack located on a field of the Elisha P. Cronkhite estate, Greenwich, Connecticut. (Photos 1, 2, and 3 from "The Story of the First Trans-Atlantic Short Wave Message," Proceedings of the Radio Club of America, 1BCG Commemorative Issue, October 1950; reprinted with permission of the Radio Club of America.)

The Earliest Days

It is helpful to briefly examine some of the earlier work leading to the involvement of Marconi. During the 1860s J.C. Maxwell attempted to combine the laws of electricity and magnetism with those related to the behavior of light. These previously discovered laws, while complex, had shown that

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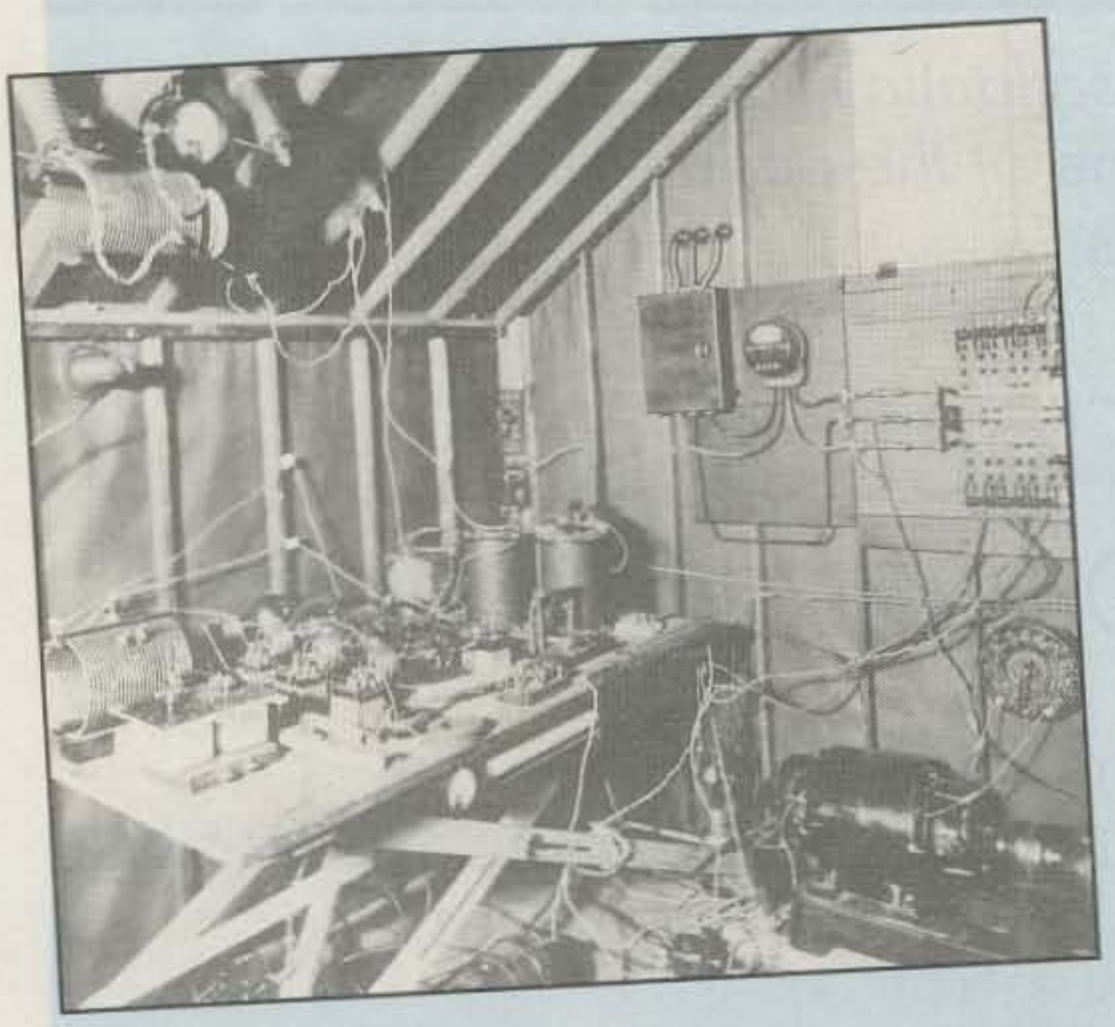

Photo 2– The transmitter section of the 1BCG shack.

the forces of attraction and repulsion between stationary charges all fell off inversely as the square of the distance between them (Coulomb's Law). As a consequence, for sufficiently great distances there is very little influence of one system of charges upon another. Maxwell, however, noted that the equations of the laws that had been discovered up to that time were mutually inconsistent when he tried to combine them.

In order to resolve this difficulty, he had to add another term to his equations. With this new term added there came the unexpected discovery that a part of the electric and magnetic fields would fall off inversely as the first power, rather than as the square of the distance. This surprising development inspired Heinrich Hertz, as well as others, to further experiments in the field of electromagnetic radiation, and ultimately, to its application to long-distance communication.

Hertz, a physicist in Germany, was almost certainly the first to generate controlled, man-made radio waves during his experiments in 1888. He showed that energy could be transferred through free space, thereby confirming Maxwell's work. It is also interesting to note that the radiation which Hertz generated during his experiments probably had wavelengths on the order of two meters.

While engaged in these experiments, Hertz developed the concept of allowing the voltage across a capacitor to build to a value high enough to break down a spark gap. The resulting oscillations generated were inherently discontinuous or damped, starting at a high amplitude and gradually diminishing as the capacitor discharged. The dimensions of the antenna, which was in the form of a dipole connected across the gap, no doubt determined the short wavelengths thus produced. Hertz's receiver was nothing more than a loop of wire with a micrometer gap, across which the sparks could be detected visually. He was able to show, through these remarkable experiments, that the radiation produced obeyed the same optical laws that applied to light, and thus confirmed its electromagnetic nature.

Once Hertz published his results, a number of other workers developed more practical detectors, some based on a phenomenon that had been observed years earlier by Branley, namely the coherer. Oliver Lodge in England used this device during demonstrations presented to the Royal Society in 1894. Still others, including Alexander Popov in Russia, picked up on this work, and before the end of the nineteenth century, Popov had developed crude signaling equipment. His efforts departed from earlier experiments in his use of large vertical antennas. He also seemed to have been aware that his equipment "would have a potential for signal transmission, if a source of such oscillations having sufficient strength were discovered."

Most of the early work on Herzian waves had been done by scientists who had little interest in finding commercial applications for the results of their efforts. What was needed was a technically minded entrepreneur who could exploit these basic discoveries. That man proved to be Marconi. Though not highly trained as a scientist, Marconi had a great interest in physics and chemistry, and according to John A. Fleming, a later collaborator, he was a true utilitarian.

Marconi heard of the work of Hertz and Lodge in 1884, at the age of twenty. He thereafter involved himself almost totally with wireless experimentation. He improved the coherer and the earlier methods of applying it. By 1896 he was transmitting Morse code messages over distances of two miles. Moving to England during the following year, he soon demonstrated that signals could be sent over increasingly greater distances. By 1897 he had formed the British Marconi Company, the first such entity in the wireless field, and he continued his efforts to increase the distance over which signals could be sent. On December 12, 1901, after a series of heartbreaking accidents that had destroyed his tower-supported antennas, Marconi switched to kite support and was able to receive the faint letter "S" transmitted over the 1700 miles between Poldhu in Cornwall, England and St. John's, Newfoundland.

We must note here that there are many to this day, especially in the light of present knowledge of radio-wave propagation, who doubt that those three dots, though repeated continuously, were able to be distinguished from the ever-present level of static. They point out that reception had been reported between 11:30 AM and 2:30 PM Newfoundland time, when this natural noise was at its highest and on a very long wavelength. They claim that if the signals were in fact received, it would have been much more likely that they were harmonics at 100 meters or less, reflected by the ionosphere. It is certain that these harmonics would have been generated by the broad-banded spark equipment, and detected on the crude and virtually untuned receiving apparatus used. There is no doubt, however, that the outcome of the test proved to be a significant milestone in the history of wireless.

Interest in the field was soon to be further stimulated, when wireless messages from the *S.S. Republic* were responsible for the prompt rescue action which saved many lives when that ship went down in the North Atlantic in 1909. The *Titanic* disaster in 1912 served to remove any further doubt regarding the importance of wireless at sea.

It is to Marconi's credit that he was quick to realize that the already existing undersea telegraph cables together with the much higher power requirements and costly antenna systems needed for bridging the Atlantic would severely handicap transoceanic wireless telegraphy. He therefore wisely concentrated his efforts in the field of ship-to-shore and ship-to-ship communications, areas in which there was no practical alternative means available.

At the time of Marconi's transatlantic test in 1901, little was known about radio-wave propagation. However, if there was one thing on which the "experts" agreed during those early

years, it was that radio waves traveled in a straight line and were therefore incapable of following the contour of the Earth over long distances.

Such agreement had come about largely from a belief in the validity of the so-called "Austin-Cohen" equation. This was based on long-term studies of radio propagation at longer wavelengths. These studies had been conducted for the Navy by the National Bureau of Standards, known today as the National Institute of Standards and Technology. The equation had been found to be quite reliable in predicting daytime field intensity at a distance, at the frequencies below a few hundred kilohertz, where most radio communication took place prior to 1920. The equation took into consideration factors such as the wavelengths employed, antenna current, antenna height at the transmitting and receiving sites, and absorption factors, which were arrived at empirically over many years of measurement. Calculations using this equation clearly established the superiority of the longer wavelengths for long-distance work.

Of primary importance, however, were the absorption constants employed, which increased exponentially with distance. What the equation did not take into account, of course, was the existence of sky waves and their reflection and refraction by the ionosphere. It is this phenomenon, of course, which makes long-distance shortwave communication possible.

The unexpected success of Marconi's test soon prompted the first theories related to the existence of an ionosphere. The independent efforts of Arthur Kennelly in the U.S. and Oliver Heaviside in England, during the early years of the last century, led to the beginning of an understanding of the effect on radio-wave propagation of that region of the upper atmosphere. Their work was largely confirmed by a series of upper-atmosphere rocket experiments conducted after World War II. These experiments provided an understanding of "plasma frequency" and its effect on the behavior of the *D, E, F1,* and *F2* regions of the ionosphere.

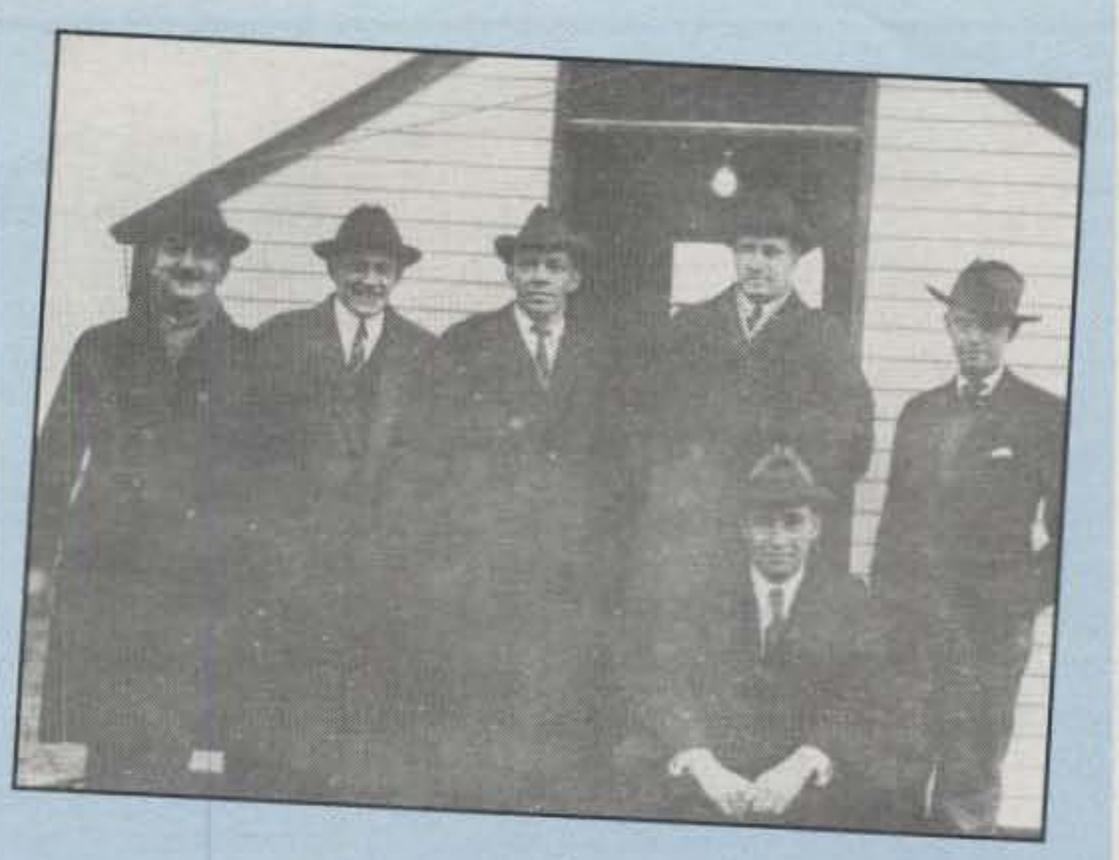

Photo 3– The six man operating and engineering staff of 1BCG outside the transmitter house after sending the historic transatlantic shortwave message to Scotland in December 1921. Standing (left to right): John Grinan, Ernest Amy, Edwin Armstrong, George Burghard, and Minton Cronkhite; seated, front: Walker Inman.

The Beginnings of "Phone"

While many of us think of radiotelephony, or voice communications by radio, as a development of the 1920s, an early and important transatlantic radiotelephone test was conducted by the AT&T Company in 1915. To save time and minimize the cost of the experiment, the U.S. Navy was asked for permission to use the NAA antennas at Arlington for the test. This was at the beginning of the vacuum-tube era, and a special triode had been developed by Western Electric which was many times larger than those used in wire telephony. The tube had an output of 40 watts, and a transmitter was built using some 300 to 550 of these tubes, connected in parallel.

When installed at Arlington, this transmitter provided an output of about two to three kilowatts at a frequency of approximately 50 kilohertz. Observers, equipped with the latest receiving equipment, were sent to Mare Island, California; Panama; Hawaii; and Paris, France. Although World War I was raging at the time, the French government permitted the use of the Eiffel Tower for a short period of time each day. On August 27 music from a phonograph and live speech were successfully received at Darien, Panama. On September 29 speech was transmitted from New York to Arlington by wire, then to Mare Island, and on the following day Arlington was received at Pearl Harbor. In Paris, where the time for reception was severely limited since the Eiffel tower station was almost constantly in use by the French military, only scraps of speech could be heard between October 12 and 21. Only on the last day was verifiable speech received. It is of interest too that many of the transmissions to Paris were also heard at Pearl Harbor.

Great interest in radiotelephony had developed much earlier, and concepts of modulation that had been adopted in the telephone field were considered adaptable for wireless. However, the spark equipment employed after the turn of the century was totally unsuited for the purpose. It was simply impossible to modulate these signals with speech, since demodulation would reproduce not only the speech, but also the irregular sounds in the original damped oscillations.

Experimenters such as Reginald Fessenden and others realized that the difficulty could be overcome through the use of "continuous waves." The problem was how to generate them, especially at high power. Prior to the vacuum tube there were but two means of accomplishing this. One promoted by Fessenden was the rotary high-frequency alternator, the other, invented by Valdemar Poulsen in Denmark (who also invented the magnetic-wire recorder, predecessor of the tape recorder), was the electric arc.

In 1904 Fessenden described the general specifications of a high-frequency alternator that would distinctly function as a wireless transmitter. It was to operate at a frequency of 150 kilohertz with a power output of 25 kilowatts. General Electric agreed to look into developing such machines. Despite inherent difficulties in their construction, most of them related to the extremely high rotational speed, the effort led ultimately to the development and production of two enormous 250 kilowatt machines per month. Their intended use was to serve as "central power stations for radio communication." Their useful life proved to be short, however, and their demise was foretold by the development of very-high-power vacuum tubes.

The Poulsen arc equipment, which was also capable of generating continuous- wave radio-frequency power, had a somewhat longer lifetime. The arc principle made possible the development of low-power radiotelephone transmitters and numbers of these were produced both in this country and in Europe. Results of comparative tests between a 30 kilowatt arc transmitter and a 100 kilowatt synchronous spark set proved the superiority of the arc. These tests conducted

in 1911 between NAA at Arlington and the *USS Salem* during her trip to Gibraltar so impressed the Navy that most ship-board equipment in use for years thereafter was of the arc type. In the end, however, the arc too had to make way for the vacuum tube.

The Role of Amateurs

These reflections on the early days of radio would be incomplete if they did not acknowledge the role played by the radio amateur. From the turn of the century to 1912 activity by amateurs was totally unregulated. The great simplicity of the spark system attracted many amateur experimenters. Almost anyone with a little skill and a few dollars could build a wireless transmitter and receiver. All that was needed was a spark coil from a Ford Model "T" ignition system, a telegraph key, a telephone receiver, a piece of galena, and a miscellaneous collection of tin foil, wax paper, glass plates, copper wire, and empty cereal boxes for the construction of coils, tuning capacitors, etc.

As the amateur ranks expanded, the number of their broad spark signals proliferated and so did the interference with the operations of the Navy and commercial interests. The records show that many amateur stations had better and more powerful equipment than that used by the Navy and by many commercial stations. With these two services accounting for only 15 to 20 percent of the total number of stations in operation, it was the amateur who dominated the airwaves. Understandably, relations with the Navy and the other services deteriorated.

While earlier attempts to restrict amateur activity during 1910 and 1911 had failed, the worsening interference problem finally resulted in the passage of the Radio Act of 1912. This legislation restricted all amateur operations to wavelengths below 200 meters, a region thought to be worthless except for very short-range communication. The Radio Act proved to be a blessing in disguise, thanks to the influence of the ionosphere on radio propagation.

Fortunately, the pioneer amateurs who built and operated amateur station 1BCG at Greenwich, Connecticut in December of 1921 did not believe the "experts" who insisted that wavelengths below 200 meters were useless. That effort succeeded in getting the first short-wave message across the Atlantic to Paul Godley, 2ZE, who had been sent to Androssan, Scotland with his "state of the art" receiving equipment. This memorable event was accomplished with continuous-wave equipment costing less than one thousand dollars and operating at a power level below one kilowatt.

Although almost forgotten today, the successful outcome of this experiment certainly caught the attention of the commercial interests. After all, they had been spending millions of dollars on high-power long-wave equipment, and antenna towers of immense height, to accomplish the same end. No wonder that David Sarnoff, then General Manager of RCA; William Deegan of the Postal Telegraph Company, and others traveled to Greenwich "to see what the boys were doing" (*among the "boys" at 1BCG was Major Edwin Armstrong, inventor of the regenerative receiver, the superheterodyne receiver and FM—ed.*)

The successful transatlantic listening

Photo 4– The 1BCG monument in Greenwich, Connecticut is inscribed with the names of the six men pictured in photo 3 and the following message: "Near this spot on December 11, 1921, radio station 1BCG sent to Androssan, Scotland the first message ever to span the Atlantic on short waves. 1BCG, an amateur station, was built and operated by members of the Radio Club of America. (Illustration from the Fiftieth Anniversary Golden Yearbook, *the Radio Club of America, and reprinted with their permission.)*

tests of December 1921 were followed, a little more than a year later, by the first two-way contacts with Europe. Successful transpacific tests were soon to follow. When amateurs finally were freed from the fixed wavelengths just below 200 meters, record after record was broken, usually at unbelievably low power levels. One record established at the time, which still may remain unbroken, was a contact between 8AZ at Columbus, Ohio and A5BG in Adelaide, Australia. With the Australian station running a UV199 receiving- tube oscillator with a power input of 0.567 watts, and the distance between the stations at 10,200 miles, this translated to 17,990 miles per watt.

Even the U.S. Navy, whose conflicts with amateurs led to the Radio Act of 1912 and amateurs' "banishment" below 200 meters, began to recognize the importance of hams to experimentation on the short waves. Relations with the Navy improved rapidly during the early 1920s and remain excellent today. In the period between 1923 and 1926, when the Naval Research Laboratory started to take a serious look at high-frequency radio communication, it relied heavily on amateur cooperation during many of its tests.

An example of that cooperation may be found in the comments made by Dr. A. Hoyt Taylor, later to become director of the Laboratory, which appeared in his *Radio Reminiscences – A Half Century* (1948). In his memoirs Taylor described "cooperative experiments with the amateurs" that resulted in the discovery of the skip zone, a region where signals from a station are not audible even though they can be received farther away. Taylor referred to this region as a "zone of silence" and described three-way experiments involving himself in Washington, DC; amateur and Naval Reserve Commander John Reinartz outside Hartford, Connecticut; and amateur William Justice Lee (a recently retired Navy Captain) in Orlando, Florida:

> (Lee) repeatedly noticed that after we had reported cessation of Reinartz' signal from Hartford to Washington, they were very successfully received many hundreds of miles farther in Orlando.
>
> Lee reported this to us at once by radio. Thereafter, when all three stations were on the job, we took many observations from which it was soon apparent that a zone of silence existed on certain frequencies. In this zone no signal could be received from transmitting stations, although beyond that zone of silence the signals were very strong. This then was the discovery of the "skip distance" effect. In other words the signals were capable of skipping over a good many miles, in fact, sometimes more than 1500 miles as we found later, then coming down with excellent intensity at points beyond.
>
> This is a phenomenon totally outside of the predictions of the older wave propagation theory, and led to a modification of that theory which was published by Dr. E.O. Hulbert, of the Division of Physical Optics and myself in the *Physical Review* for 1926. Earlier I had published papers on the "skip distance" effect in *QST*, and in the *Proceedings* of the Institute of Radio Engineers.

With the end of these interesting excerpts from Dr. Taylor's "Reminiscences" we reach the end of our reflections on those early halcyon years of radio during which many pioneers, not a few of them radio amateurs, played a significant role in the development of the radio art. One must wonder whether there will ever again be a scientific discovery as capable of inspiring young people to experiment with a new force in nature. ■

He's the man behind one of the most respected names in audio—Electro-Voice—and one of the most respected names in amateur radio—Ten-Tec. Al Kahn, K4FW, recently talked with CQ's N4XX.

A CQ Exclusive Interview with:

Albert Kahn, K4FW

BY DR. THEODORE J. (TED) COHEN,* N4XX

Albert Kahn, K4FW.

While born in LaSalle, Illinois, on July 9, 1906, Albert (Al) Kahn spent his youth in South Bend, Indiana. His father manufactured shirts. Al never attended college, noting that his sister, who graduated from the University of Chicago at the age of 19 and went on to a great career in journalism, got all the brains!

After bouncing around in a few jobs, Al started a radio service company and became deeply involved with sound equipment. It wasn't long thereafter that he began building microphones for public-address use. This led to the creation of Electro-Voice, which rapidly became a major supplier to the public-address, television, and moving-picture industries. When Al left Electro-Voice in 1969, following its merger with Gulton Industries, the company was the leading producer of quality microphones and speakers in the United States.

Not one to sit still for too long, Al soon formed Ten-Tec with Jack Burchfield, K4JU. Today, Al and his wife Anne live in what once was their summer lake cottage in Cassopolis, Michigan, where he signs K4FW/8. Al is a member of the ARRL, QCWA, OOTC, and FOC. It is with great pleasure, then, that we now present an exclusive CQ interview with Mr. Albert Kahn, K4FW. —W2VU

CQ: Al, what triggered your interest in ham radio?

Kahn: My first exposure to ham radio was at the age of 13, when our Boy Scout troop acquired an E.I. Company "Wireless Set." When we took the set out of the box and set it up, it failed to work. I convinced the scoutmaster to let me take it home, where it took about an hour to fix it. Once I got it running, I heard NAA *(an early U.S. Navy station.—ed.)* and was hooked. Less than two years later, when I was 15, I received my first license from the Department of Commerce; my callsign was 9BBI. Fortunately, I found four other friends in high school who were as excited about communications as I was, so as you can imagine that we had a blast.

CQ: What did your first station look like?

Kahn: Well, as you know, there was only one amateur radio band in those days—200 meters. This is roughly at the top of today's AM broadcast band. The five of us bought Ford spark coils and had daily QSOs across town using crystal sets for receivers. Later, in 1922, I acquired a half-kilowatt rotary gap transmitter. Soon thereafter, I built a Hartley oscillator using a UV202 tube. The CW era had arrived! With 400 volts on the plate, I was able to get about 10 watts input, with an antenna current of 1.3 amps. The entire rig was built on a real breadboard. No fancy metalwork in those days!

CQ: If I remember correctly, that first station was in South Bend, Indiana. You made a contact in 1923 that in many ways changed your life forever. Tell us about it.

Kahn: It was just after midnight on November 17, 1923, when I worked Bob Baird, U8CWR—now W9NN—who at that time was in Dayton, Ohio. Bob was born about the same time I was, so here you had two teenagers staying up later than their parents liked, to play with their radios! *(Some things never change.—ed.)* Bob was running a UX210 oscillator with 1000 volts on the plate and 100 watts input. He accomplished this by using an advanced synchronous rectifier. The result was that he delivered 3 amps to the antenna, making copy on my end easy, to say the least. We went on to become lifelong friends, and even celebrated the anniversary of our first QSO by meeting on 40 meter CW on November 17, 2000.

CQ: So it's fair to say that your early interest in amateur radio led to a rewarding career in communications-electronics?

Kahn: Without a doubt! Radio was *the* technology of the 1920s, sort of like computers and the internet are today. The radio industry—manufacturing and broadcasting alike—was growing by leaps and bounds, and many of us got caught up in the excitement. We wanted nothing more than to work and play with electronics, which, not so surprisingly, led many hams to seek careers in this industry.

CQ: How did you come to start Electro-Voice?

Kahn: I bounced around a bit in my early 20s, not really knowing what I wanted to do. Finally, I started a little radio service company and soon specialized in sound equipment. In those

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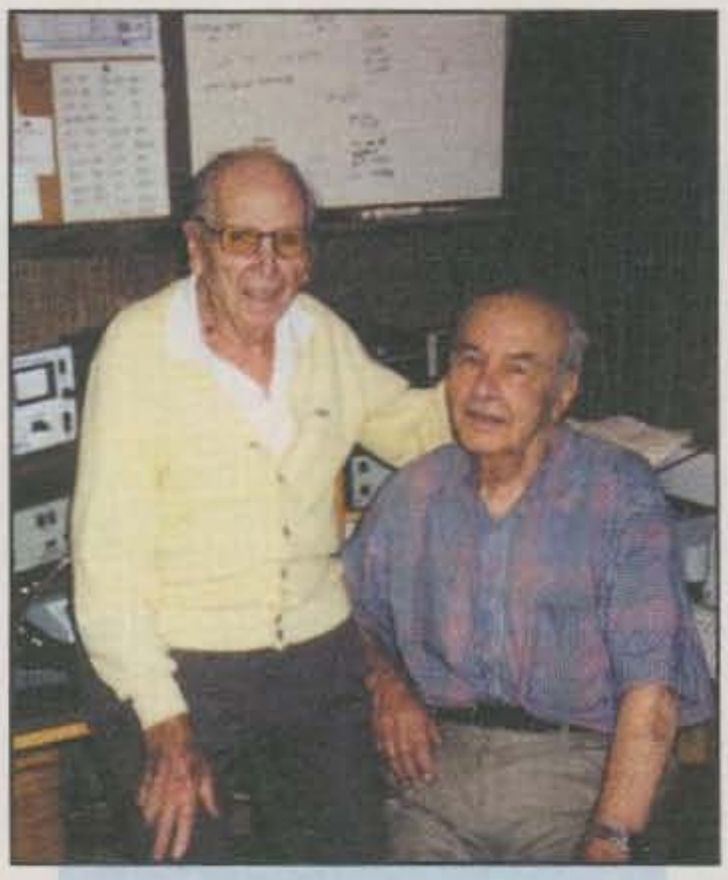

An October 1998 photo of Bob Baird, W9NN (left), and Al, K4FW, at Al's station in Cassopolis, Michigan.

Jack Burchfield, K4JU (left), and Al Kahn, K4FW, co-founders of Ten-Tec.

days, good microphones for public-address systems simply were not available. I thought I could build better mics than those on the market and started to experiment on my own. Soon there was more demand for my microphones than for my service, so I formed Electro-Voice for the purpose of manufacturing quality microphones. It didn't take long before we were the major supplier to the public-address, television, and moving-picture industries.

CQ: How did you happen to seize upon Electro-Voice as the name for your company?

Kahn: Now that's an interesting story. I think it was back in 1929, or so . . . we had built a sound system for Knute Rockne, then coach of Notre Dame. Rockne was in poor health, and he asked us to build the system that had speakers pointing in four directions. That way he could sit on the platform and coach four squads by switching among the various speakers. Mr. Rockne was extremely happy with our system and referred to it as "my electric voice." From there it just seemed natural to name the company Electro-Voice.

CQ: I understand that you are the co-inventor of the "Differential Noise Canceling Microphone," which was widely used during WW II by the U.S. Army and Marines. Who worked with you on this and how did you come to invent this important piece of wartime communications equipment?

Kahn: In 1941, I was in New York City having lunch with Cheney Beekley, then advertising manager of *QST*. "Beek" had some vague ideas about a microphone that would cancel background noise, but he had no idea how to build such an item. He had talked to others about his ideas, but was discouraged by their lack of interest. I thought it could be done. The fact that war was looming on the horizon, with its need for better communications equipment, also stimulated my thinking. Anyway, when I returned home, I began experimenting with the phase relationships between sounds from close and distant sources. It didn't take long for the light to dawn, and I soon had a working prototype of what was to become the Army's T-45 Lip microphone.

CQ: I'll bet that inventing the microphone was easier than selling it to the military?!

Kahn: *(laughing)* You're right. Inventing the microphone was the easy part; getting it accepted by the military was unbelievably difficult. I first approached the people at Fort Monmouth and Wright Field. Both rejected my invention. Then I called an old friend, Col. Web Soules, who was stationed at Fort Knox. Web and who was also W9DCM. He and I kept a ham traffic schedule, and we got to know each other pretty well. He asked me to bring down one of my noise-canceling microphones for testing. I did, and we found that it worked beautifully inside an M2 tank. In the meantime, I worked for Leo Beranek and S.S. Stevens at the Cruft Labs of Harvard University, running exhaustive tests on the microphone. We spent weeks making articulation tests under a wide variety of conditions. When they published and circulated their findings, which gave top ratings to my noise-canceling microphone, the barriers fell by the wayside. It wasn't long before I received an order for 100,000 microphones, now called the T-45, from the Marine Corps. Within a month or two we were producing 2000 microphones a day using three shifts.

CQ: What was the principle behind the T-45 mic?

Kahn: The design was simple. It was worn on the upper lip. Sound coming from the rear was reversed in phase and mixed with sound from the front. The result was noise was cancelled before it could degrade the operator's voice signal. In all, we found that the microphone extended the communications range of the tank by 40%. I shared the patent with "Beek." The Signal Corp thought enough of the invention to place a secrecy order on the patent. After the war, the FAA required all commercial aircraft pilots to use Electro-Voice Differential microphones. As you can imagine, with the microphone such a hot seller, a lot of people tried to break our patent, but none succeeded.

CQ: You, of course, were the president of Electro-Voice. In growing the company, you apparently preferred to hire hams for key positions. Why was this?

Kahn: You're right! In those days, people who held ham tickets had a good understanding not only of the technology, but also of the electronics industry. Almost all of my staff were hams, including W9IOP, who was our vice president of marketing; W8UPN, our purchasing agent; W4OSU, who managed our Sevierville, Tennessee plant; and W9BHI, who was responsible for accounts payable. In spite of the pressures at work in the postwar years, all were active on the bands using both CW and phone.

CQ: All indications are that you grew Electro-Voice's line of microphones and speakers into a premier line of products.

Kahn: Yes, the team was very successful. In the last year that I was pres-

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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 1/2Hx8D 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 1/16Hx9 3/16D 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 1/8Hx8 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 1/8Hx8D 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.

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Ten-Tec's manufacturing facilities in Sevierville, Tennessee.

Since its founding in 1969, Ten-Tec has always enjoyed a reputation for high quality in the amateur radio equipment it manufactures.

ident sales reached $20 million *(in 1969 dollars! —ed.)*. We had 1000 employees, three plants in the U.S., and one plant in England. Our stock was on the American Stock Exchange.

CQ: You and Electro-Voice also were involved with the old Radio Manufacturing Engineers, or RME, company, weren't you?

Kahn: Oh, yes! At the end of World War II, RME had fallen on hard times. I was a very good friend of the president, Eric "Shaw" Shalkhauser, W9CSZ, and so I bought the company. Russ Planck, W9RGH, stayed on as manager. It was my intention to continue and expand the RME line of receivers, and indeed, we did produce several new models. *(For more information on RME, refer to Joe Veras, N4QB's "Radio Classics" column in the August 2001 issue of* CQ.*—ed.)* Whatever we did, it just didn't seem to be enough, and the RME division continued to lose money.

By now, Electro-Voice was a public company on the American Stock Exchange, and we couldn't continue to operate at a loss for our own pleasure at the expense of our 2000 shareholders. At about the same time, we developed and patented a torque-drive phono pick-up cartridge, which was the first cartridge to reproduce stereo signals. Orders were pouring in from almost every phonograph manufacturer in the States, and our Buchanan plant reached full capacity, so we converted the RME plant to the production of these cartridges. While this was happening, I received a call from GC Electronics, offering to buy the name and assets of RME. It wasn't long before we traded RME for their American Microphone division, and that pretty much spelled the end of RME. The last receiver we produced was the RME 6900.

CQ: Electro-Voice was merged into Gulton Industries in 1969, and you left about six months later. Did you plan to retire at that time? After all, you were 63, and no one could blame you if you wanted to turn down the flame a bit, so to speak.

Kahn: Well, truth be told, I just didn't get along with the rest of Gulton's management. But retire? Hell, no; I was just getting started. Jack Burchfield, K4JU, and I decided to start Ten-Tec in Sevierville. Jack, who at that time was W8CRD, was an engineer in the Electro-Voice engineering department. He had a Masters degree in engineering from the University of Michigan, and it didn't take him long after joining Electro-Voice to become our Chief Engineer for Consumer Products. Jack was a great CW operator, and like me, he loved contests. We frequently spent the evening before a contest plotting optimum propagation paths. Needless to say, we became very close friends.

CQ: When you left Electro-Voice and formed Ten-Tec, it seemed logical that Jack should join you.

Kahn: Of course! The Ten-Tec plant was completed in the summer of 1969, and in September of that year Jack joined me to launch our new line of amateur products. Our first product, the Power Mite PM-1 transceiver, was aimed at the QRP crowd. This little CW transceiver ran 2 watts output on 80 and 40 meters and sold for $49.95. We even sold the basic PM-1 circuit modules, tuning dial, etc., separately; completely wired, it sold for $29.95. Both the modules and the transceiver were big sellers.

CQ: How did Ten-Tec's product line evolve from there, and to what do you attribute your success?

Kahn: We produced some great equipment over the years, including the TX-100, RX-10, Argonaut, Century, Corsair, and others. Did you know that Ten-Tec had a number of significant "firsts" in the industry? We had the first all-solid-state transceiver, the first solid-state linear amplifier, and the first multiband QRP transceiver, the Argonaut. Today, the OMNI VI Plus, Jupiter, Scout, and Pegasus carry on the company's great tradition. The Japanese are serious competitors of ours, of course, but I think the reason we have been so successful is that we build the kind of gear that we ourselves would like to use, and we build this gear to the highest standards found in our industry today. I think, too, that hams like our direct sales policy. Not only does it provide them with cost savings, it also forges a closer connection with the factory.

CQ: Ten-Tec's products always have garnered the highest approval ratings among amateur, commercial, and military users. To what do you attribute this?

Kahn: There are several reasons. First, I learned early in my career that

equipment should be designed to require a minimum of service. Second, if service is needed, it should be accomplished quickly and at the lowest possible cost. To my mind, superior service is the key to satisfied customers. Finally, we always felt that if a customer had faith enough to buy our products, we should not, under any circumstances, take advantage of him or her.

CQ: There's no question, Al, that Ten-Tec's generous service policies have endeared the company to generations of amateurs! But let's change the subject a bit. We understand that you are quite an avid contester.

Kahn: Oh my, yes! I have participated in most of the major contests held over the years, many times from an offshore location. Some of your readers probably worked me during various contests when I was signing calls such as HV1CN, J37M, G5BBF, GW5BBF, K4FW/KL7, K4FW/V4, W8DUS, and XEØDUS. By the way, W9IOP and I activated the Vatican station, HV1CN, for the first time in the CQ WW contest, and a second time, two years later. Everything since then has been anticlimactic.

CQ: Speaking of the CQ World-Wide DX Contest, you played a pivotal role in keeping that event alive in the early 1950s. Could you tell us about that?

Kahn: Well, it was really a group effort by four of us. After Larry LeKashman left *CQ* in 1949, the new editor *(Perry Ferrell—ed.)* didn't have much interest in contesting and kind of let the CQ WW slide. At about the same time, Larry resigned a rather high-level job with RCA and joined me as sales vice president and a member of the board of Electro-Voice. However, he never lost his high regard for *CQ* and his friends there, and he often visited with them. When it became obvious that *CQ* wasn't interested in the contest anymore, Larry contacted Vic Clark, W2KFC *(later W4KFC—ed.)*, Hal Brooks, W9VW, and me. My call at the time was W8DUS. Together we made up the "International DX Club," and took on the task of running the World-Wide DX Contest.

During those years, Electro-Voice was growing fast and had not yet gone public, so financing the contest was no problem. Fortunately, we had an office staff to handle details. Larry tore into the contest effort as if we were introducing a new product. He sent rules to every QSL Manager and to all U.S. and foreign clubs. Total saturation! It worked. Logs arrived at Box 73, Buchanan, Michigan and were sent on to the Potomac Valley DX Club, as arranged by Vic Clark. The effort was a success, and it was fun, but all of the credit should go to Larry LeKashman for arranging and implementing the contest. All I did was supply the funds and clerical help.

We ran the contest for two years, after which time *CQ* got a new editor who understood the value of contests. He called me up one day and asked, "Could we have our contest back?" The rest is history.

CQ: We know that you still are active on the air today. What equipment do you use and what modes and bands do your favor?

Kahn: Oh, yes, I'm still active! I have an OMNI VI Plus, a Hercules, and a 6N2. You'll find me on all of the HF bands plus 6 and 2 meters. I prefer CW, but I do keep a few skeds on SSB.

CQ: As we draw this interview to a close, what are the kinds of things for which you want to be remembered by generations to come?

Kahn: That's a tough one, Ted. It would be enough to be remembered for bringing some measure of enjoyment to the thousands of amateurs worldwide who used, and are using, Electro-Voice and Ten-Tec products.

CQ: Al, you've had a remarkable life. Thanks for sharing it with us.

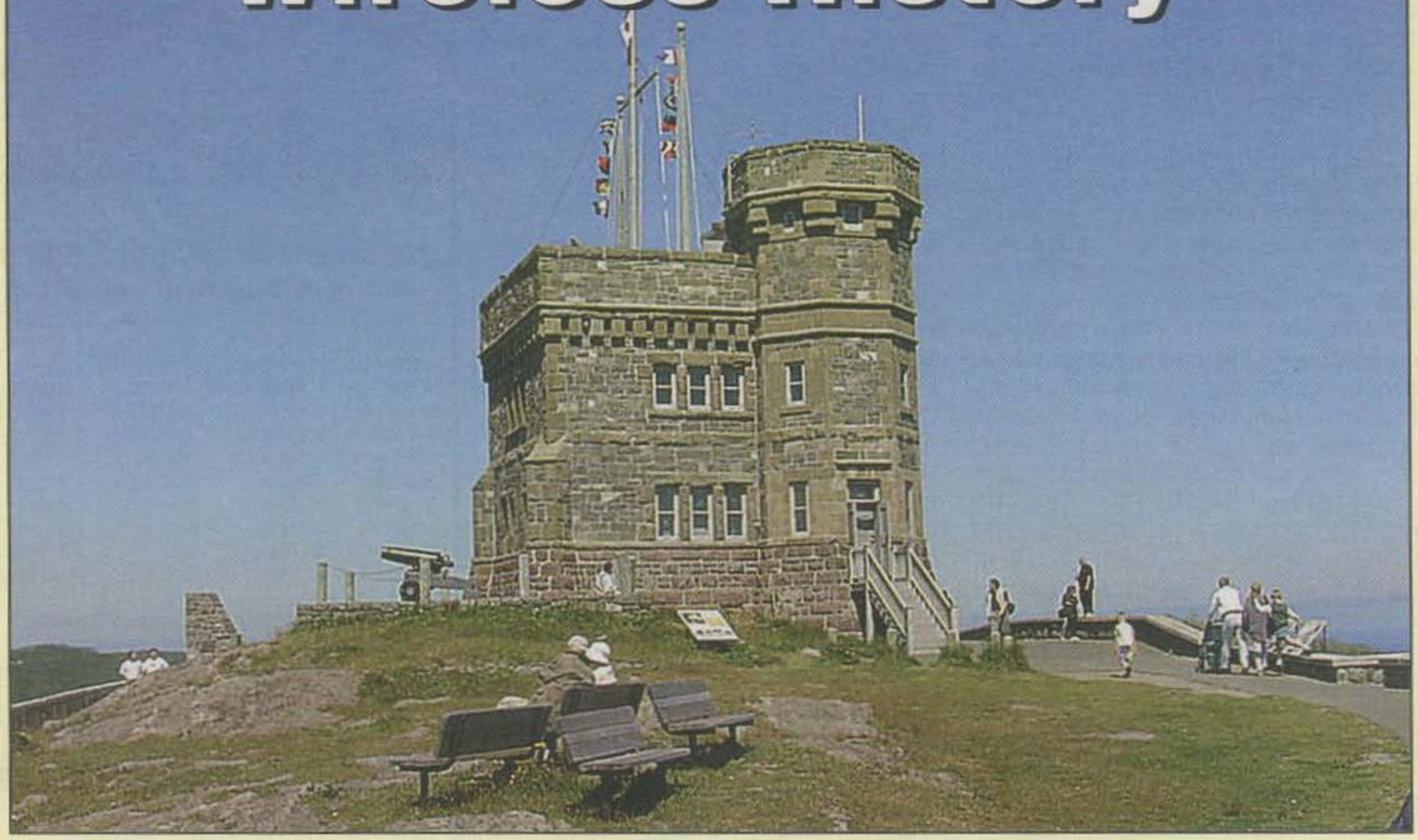
Kahn: Thank *you*.

Al Kahn, K4FW, in his shack in Cassopolis, Michigan. He remains an avid contester to this day.

Acknowledgement

The author thanks Mr. Jack Burchfield, K4JU, for his assistance in gathering material for this interview.

In the Footsteps of Wireless History



Cabot Tower at the peak of Signal Hill in St. Johns, Newfoundland. Amateur station VO1AA is located on the second floor and uses a large dipole the apex of which is at the top of the stone tower. (Photos by VO1ST)

As we celebrate the centennial of the first transatlantic wireless transmission, N7XM visits the North American end of that one-way radio test that shrank the world, and he finds ... a ham station!

BY JOSH LOGAN*, N7XM

In August 2000 I decided to visit the Maritime provinces of Canada. Newfoundland was high on my list, as I wanted to visit Signal Hill in St. Johns, where in 1901 Marconi established the first transatlantic wireless contact. The letter "S" was transmitted from a site in England, and it was received at Signal Hill. St. Johns is the most easterly point in all of North America and is one-and-a-half times zones east of New York City! It has a sheltered harbor that opens directly into the Atlantic Ocean. I expected nothing more than a monument. Quite pleasantly, I was wrong!

I drove overland to the northernmost tip of Nova Scotia and took a 14-hour ferry ride with my vehicle to Argentia, Newfoundland (approximately 270 miles). From there it was an hour-and-a-half drive to St. Johns (the oldest city in North America).

Newfoundland is a very large island with 500,000 people, 40% of whom live in the greater St. Johns area. Many signs tell drivers that moose have "right of way." Driving to St. Johns revealed a landscape of short, weathered pine trees and meadows that appeared to be tundra with many lakes. St. Johns is located on a large natural harbor inside a large "bowl" which shelters the people and vegetation from the harsh elements; trees grow as tall as 50 feet.

Oddly enough, I drove directly to the heart of town and saw a sign for Signal Hill. I soon arrived at the site. Signal Hill is about 575 feet above the Atlantic to the east; directly to the west is the harbor and St. Johns. The view takes your breath away! The wind will take your hat away! A signpost at a lookout shows mileage to foreign cities (i.e., 2150 miles to London). The are two stone buildings there. The larger is Cabot Tower, a medieval-looking tower about 40 feet tall. In the tower is a gift shop, and the Marconi display is on the second floor. There I saw a ham station behind glass. What a surprise!

**c/o CQ magazine*
e-mail: <n7xm@qsl.net>

I asked the attendant (a young lady) about possible operation, and quickly found myself talking on the landline to Ken, VO1ST. That evening Ken picked me up and we returned to Cabot Tower. The TS-450 club rig was down. However, I quickly got on the air with my own ICOM 725 (no amp). The antenna is a low-profile dipole for 160 through 10 meters, with its apex about 40 feet. Using my tuner, I was up and running quickly. I began running Europeans on 15 meters using the site call—VO1AA! The next day, in late afternoon, I got on 30 meters and quickly generated a pile-up of Europeans again. Boy, the Europeans were *loud!* Then I got on 40; the band was noisy and the loud Europeans began calling again. I heard almost no U.S. stations!

During the following days I was allowed further operation, although I was not permitted to operate past 9 PM, when the facility was closed to the public. I continued to log CW contacts in the VO1AA log—90% Europeans!

I made a few contacts on 80 meters, and exchanged 449 reports with Mike, VK6HD, in Australia. I was using 80 watts output! This path was over Europe. The assistance of Ken, VO1ST, at Signal Hill was invaluable.

I also met some locals. I had lunch with Dave, VO1TK, a good CW op whom I had worked previously. I was invited to the home of Gus, VO1MP, for dinner (with the XYLs). His QTH is out in the country, and his hill is 200 feet higher than Signal Hill. He had a 40 meter inverted-Vee up 30 feet on the hilltop and 3-element 20 meter monoband Yagi up about 50 feet down below the hill—very simple antennas, but the location is pure dynamite! Gus explained in detail just how severe the winters can be at his location, with high winds and heavy icing. In the evening a quick call on 40 meters received a 599 from a UA3 using 100 watts out to the inverted-Vee. Gus is one of the prime movers behind contest operations at VO2CQ (zone 2) and is a fantastic all around contest operator!

Back to the Mainland

After more travels in Newfoundland, I returned to the mainland. After the ferry ride back, we landed in Sydney, Nova Scotia. I heard that there was a small museum at another Marconi site (1902) in nearby Glace Bay, so off I went. A short ride later I arrived at Glace Bay. This site is again adjacent to high cliffs above the Atlantic. I could see a small 30 foot tower and small Hy-Gain triban-

Plaque in the parking lot at Signal Hill describes Marconi's reception here of the first transatlantic radio signal in 1901.

der mounted outside. The building was small and very solid.

In I walked to find historic exhibits and a wonderful scale model of the original antenna installation for the 60,000 watt spark-gap transmitter in the 1.8 MHz region (shortwave was considered useless at the time). I would love to see someone computer-model this web of wire! Tucked in the corner was, would you believe, a ham station! A gentlemen was there operating. I introduced myself, and he told me his name and call letters—Jim, VE1ALZ. I realized we had spoken the month before on 30 meters. He had been portable using 5 watts. We quickly got down to operating.

I got my keyer (CMOS 3) and paddle (G4ZPY VHS) and plugged into the TS-940 driving a TL 922 amp. With 750 watts out to the tribander on top of the cliff, we quickly had an awesome pile-up going on 15 meters CW! The call was VE1VAS (sometimes VA1VAS), Voice of the Atlantic Seaboard. The incoming signals were very loud, again mostly Europeans. Using a beam heading of approximately northeast, we had both Japan and Europe calling us in the morning, and later mostly Europe. We also worked Israel, deep Russia, Indonesia, and Thailand, all with the beam fixed northeast!

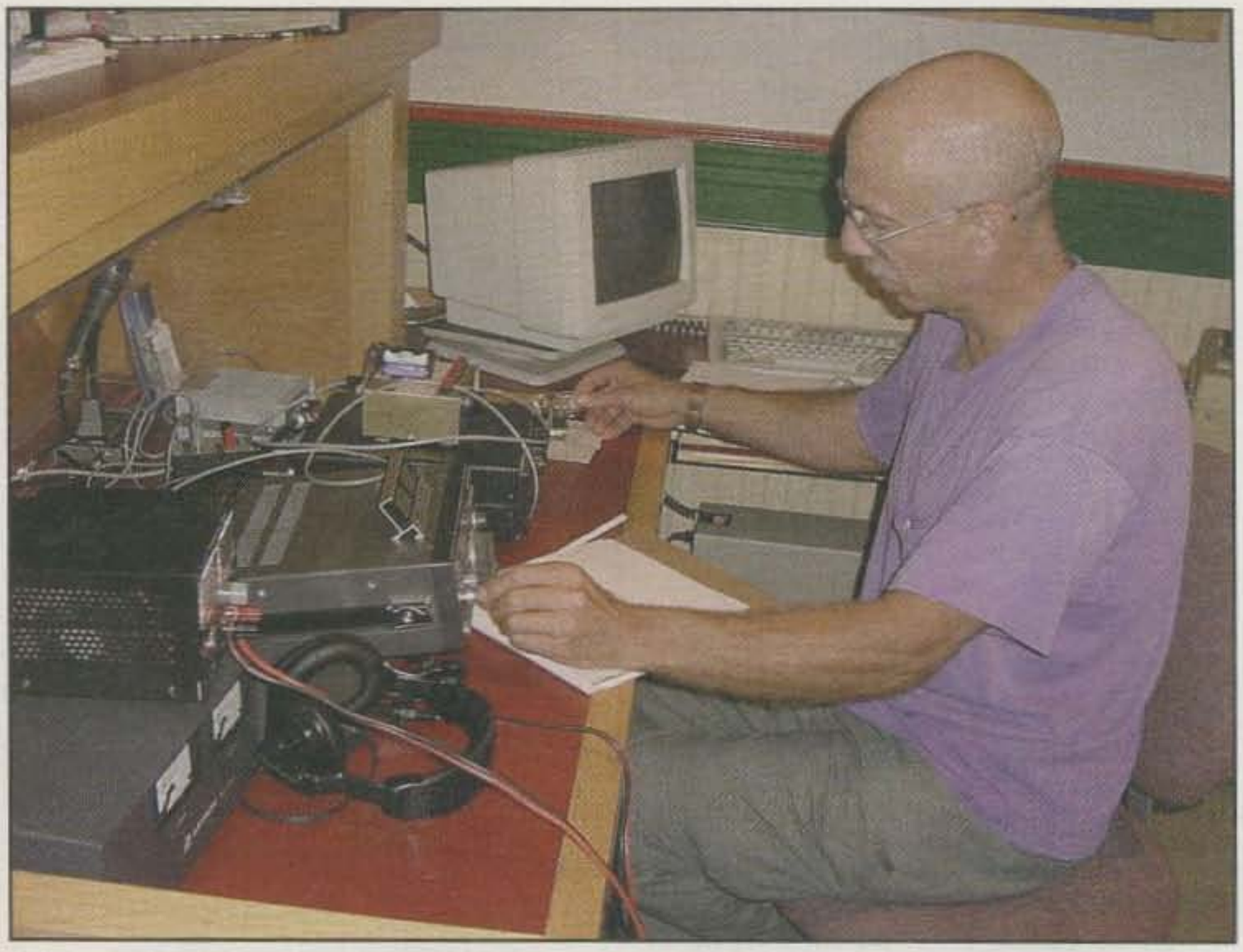
I sat for about five hours writing calls in the log and giving out quick reports on CW. Jim was talking to tourists about Marconi and ham radio. We were like young, excited teenagers. The pile-ups were large. It was nice to be popular!

Jim invited me back, so the next day I returned for more of the same. Again we stayed on 15 CW during the daytime, and the pile-ups were huge.

Into the Present

After Glace Bay, I left for New Brunswick. In Sackville, right at the border of Nova Scotia and New Brunswick, I saw many huge towers on flat land with salt water nearby in two directions. A road off the highway led into the complex. Here was Radio Canada International (RCI). A young gentlemen granted my wife and me a private tour.

Many were curtain antennas on towers from 80 to 135 meters tall! They had many dual curtains that could be phased for transmission in either of two directions. They could also do some "steering" of the main lobes—up to 250,000 watts output on AM! With multiple transmitters I shudder to think what their monthly electric bill must be. I couldn't help wonder what such cur-



The author operating from Cabot Tower using club callsign VO1AA. As only low-profile antennas are permitted at the site, the station uses a large dipole as its only antenna. However, as N7XM points out in the text, that doesn't seem to be a problem!

tains would sound like on the "ham bands." That is one of many questions that will remain unanswered.

Off we went again, this time to nearby Prince Edward Island, which is approachable by a bridge (an extremely long causeway) or short ferry ride. PEI is a summer playground for eastern Canada. We were there after Labor Day, so much of the "traffic" had come and gone. Charlottetown has a lot to offer, and many areas are devoted to rural farming. There are also some wonderful long, sandy beaches.

We decided to camp in a national park campground on the north shore that offered AC power. Here I quickly installed a 40 meter Windom up about 35 feet (the height of the pine trees), using 300 ohm ladder line as feedline. It was broadside to Europe, and the salt water was about 150 meters to the north. Using my IC-725 with tuner barefoot, I quickly got on the air as VY2/N7XM. The pile-ups on 30 and 15 meters were huge, with mostly loud Europeans calling.

More than a few callers asked if I was "Zone 2." Nighttime on 40 meters was fun, but I was getting "eaten alive" by the "no see 'um" mosquitoes. After all, I was outside operating on a picnic table. Early on, I began operating in the "split mode," transmitting on one frequency and listening on another, to avoid getting buried under the waves of European callers. Mostly I said, "up 2," or if things got really unruly, I just said "up."

Notable contacts on 30 meters were 4K9 (Azerbaijan) and 4Z5 (Israel). I also got on 10 meters where there was not a lot of activity, but signals were loud. My last caller was ZS5ME in South Africa, and he was extremely loud!

Back to the US

Next I headed south. In Maine I installed the 40 meter Windom vertically in some tall trees on hilltops overlooking the Atlantic Ocean. I remember getting 599 from Andy, F2MA, on 40 from France in the late afternoon. This was with 90 watts output! Lesson learned: Do *not* underestimate the value of hilltop over salt water locations!

All in all, I would recommend visiting the Marconi sites at St. Johns, Newfoundland and Glace Bay, Nova Scotia. If the facilities are open when you visit, you might get the same chance to operate that I did. Also, at Signal Hill you can still get on the air even if VO1AA is closed. Many mobile visitors operate with their own callsigns from the parking lot with great success.

Would I return? You bet!

From a "throwaway line" in a CQ column to an essential part of modern amateur radio, we look back 40 years to the beginnings of the amateur satellite era.

40 Years of Amateur Radio in Space

BY RICH MOSESON,* W2VU
EDITOR, *CQ*

"Does anyone have a spare rocket for orbiting purposes?" wrote *CQ* Semiconductor Editor Don Stoner, W6TNS, in a 1959 column. He'd been experimenting with a transistorized transmitter on 2 meters and found he could hear it 120 miles away. He wondered in print about the possibility of putting such a transmitter in orbit. A throwaway line, Don called it ... but some readers took it seriously and Project OSCAR—Orbiting Satellite Carrying Amateur Radio—was born. Forty years ago this month, on December 12, 1961, OSCAR-1 was launched aboard a U.S. Air Force rocket and hams everywhere listened for its Morse code message to the world: Di-di-di-dit Di-dit – HI.

In this look back, we'll bring together reminiscences of three *CQ* writers who were heavily involved in Project OSCAR—Don Stoner, W6TNS (SK); Bill Orr, W6SAI (SK); and George Jacobs, W3ASK (alive and well!)—as they recounted them in the January 1995 Golden Anniversary issue of *CQ*. We'll also bring things up to date to cover the seven years since those articles were written. Since it all started with Don, we'll start with his recollections of "the story behind the story."

Di-Di-Di-Dit Di-Dit

Each of us, at one time or another, has said something, made a recommendation, or taken an action that has had a profound effect on others. Some, like myself, know the inner thrill of affecting history with nothing more than a simple statement.

In the late '50s, I was the Semiconductor Editor of *CQ* magazine. The gigahertz-busting devices we employ in our SHF preamps today were just a gleam in the eyes of physicists back in the "good ole daze." In fact, when I started writing the *CQ* column, silicon and gallium had not been used in those tiny, metal miracles. Germanium

Starting small – the late Bill Orr, W6SAI, and CQ Propagation Editor George Jacobs, W3ASK, hold the OSCAR-1 satellite shortly before its launch 40 years ago this month.

Growing up: CQ Editor Rich Moseson, W2VU, stands next to the OSCAR-40 satellite at the AMSAT Phase 3D Laboratory as it was being prepared for its November 2000 launch. Not exactly something you could hold in your hand!

was the element *de jour*, and getting a transistor to work at 144 MHz required an equal mix of skill and black magic incantations (as in "oscillate, dammit!").

As the decade came to an end, I had pushed up my various transmitter designs from 5 or 10 milliwatts to a rock crushing 50 milliwatts (yes, all of 0.05 watts). On a nice summer weekend, my bride and I piled into the family jalopy and headed for WA6EJI's home away from home in the San Bernardino mountains at Running Springs, California. Tony had offered to let me put the tone modulated beacon and a 38 inch dipole antenna up on the roof of his cabin as an experiment.

Lo and behold! My germanium gargantuan was heard in San Diego, 120 miles south, and with an S9 signal strength! Now you don't have to be a propagation guru to realize that signals from 120 miles straight up should be as good as, or better than, signals from 120 miles over land!

And so it came pass that I published the circuit for the tiny transmitter in *CQ* magazine along with the cutesy comment, "Does anyone have a spare rocket for orbiting purposes?" And someone did!

No sooner had the magazine hit the mailboxes than I received a call from Fred Hicks, W6EJU, up in Sunnyvale, south of San Francisco. Fred was involved with the Lockheed Amateur Radio Club. He excitedly told me that Lockeed, which had an excellent working relationship with the Air Force, just might be able to inject a beacon into orbit.

Talk about skeptical city. Lockheed made and orbited top secret goodies for the government. Share a ride with something that didn't officially exist? No way, I thought. But thanks to the influence and perseverance of those too numerous to mention, it did happen. And, as they say, the rest is history.

The moral of the story, guys, is: *Watch what you say. Someone might just take you seriously.*

Bill Orr, W6SAI, wrote about the history of ham radio from 1945–1974 for *CQ*'s 50th Anniversary issue. The following is excerpted from those articles:

OSCAR I: The World's First Ham Radio Satellite

In December 1961 an event occurred that made a deep impact on amateur radio and its place in the world of communication. The first amateur satellite, OSCAR I, a 2 meter beacon, was launched successfully! It was the first non-governmental satellite ever placed in orbit.

The road to that launch started almost immediately after Sputnik's launch in 1957. Hams in the aerospace world began thinking about launching an amateur communication satellite. Thoughts were turned into action in 1959 after *CQ* semiconductor columnist Don Stoner, W6TNS, wrote about a transistorized, 50 milliwatt, 2 meter transmitter that he'd designed. "Does anyone have a spare rocket for orbiting purposes?" he asked. That column led directly to the formation of Project OSCAR by hams in the San Francisco Bay area. Their goal was to launch ham radio into space.

The launching process was a painful and complex task. It required the know-how to build the satellite; the approval of the ARRL in order to gain political clout; the OK from the FCC (which was bemused by the idea of an unattended U.S. amateur transmitter circling the globe); and finally, the agreement of the U.S. Air Force to launch the satellite on a regularly-scheduled space mission. All of this took time and the devotion of many hams, both in and out of government.

The OSCAR launch was from an air base in California and an agonizing period elapsed until hams at KC4USB in Antarctica heard the satellite on its first pass around the globe! Reception reports poured in from many countries and the attendant publicity of the experiment encouraged Project OSCAR (and others) to start thinking about a translator (linear repeater) that would permit two-way VHF communication over great distances.

OSCAR I was the forerunner of a spectacular series of ham satellites, growing in complexity and sophistication over the years, as hams worldwide joined AMSAT (the Radio Amateur Satellite Corporation), the offspring of Project OSCAR.

Even though relatively few amateurs took part in the early satellite experiments, their long-term results were profound. The Amateur Satellite Service was recognized internationally, giving stature to amateur radio as a whole. Gradually other nations, led by the Soviet Union, built and launched amateur satellites, leading eventually to live amateur radio in space, with the advent of the continuing series of manned space station launches.

CQ Propagation Editor George Jacobs, W3ASK, reminisces about the launch of OSCAR-1 in his column this month, but he wrote about it at greater length in our 50th anniversary issue:

CQ in the Space Age

All of us in amateur radio were very excited over the Soviet launching of the first Sputnik satellite in October 1957. Shortly after the Sputnik launch, Don Stoner, W6TNS, in a classic article in *CQ* challenged radio amateurs to develop and have launched for them a piggy-back radio amateur satellite. An outstanding group of licensed radio amateurs living in California, including some of America's leading satellite engineers and scientists at the time, formed the OSCAR committee in 1959 to meet this challenge. The name was derived from *Orbiting Satellite Carrying Amateur Radio*. I joined the OSCAR team as publicist and government contact. This gave birth to *CQ*'s Space Communications column, which made its debut in December 1960 and appeared monthly for six years. This was another first for *CQ*, for no other publication took OSCAR seriously at that time.

One of my biggest thrills in amateur radio was the successful launch of OSCAR-1 on December 12, 1961. I still "tingle" today as I recall hearing the satellite's beacon peep out *HI* from space in the 2 meter band.

A second OSCAR beacon satellite was successfully launched in 1962. On March 9, 1965 OSCAR-3, the first amateur radio two-way communication satellite, was launched successfully. Amateur radio had now truly entered the age of space communications. OSCAR-3 made history right from the start with worldwide contacts being made through it. This erased any doubts that amateur radio had an important role to play in space communications.

In 1969, I reviewed the success of the OSCAR program with a group of east coast space scientists and engineers near Washington, D.C. It was evident to me at that time that with the design and building of larger and larger satellites, and with worldwide participation, the OSCAR concept had to be enlarged. As a result of my comments at this meeting the AMSAT-OSCAR organization was formed, with the official name *Radio Amateur Satellite Corporation*. The first satellite launched for AMSAT was dubbed AO-5. It was designed and built by students at the University of Melbourne in Australia. It contained beacon transmitters on 2 and 10 meters. The rest is history. AMSAT-OSCAR to date has had ten communications satellites launched that were designed and built by its members. Affiliated AMSAT organizations in Russia, Japan, Germany, France, United Kingdom, South Korea, and Italy have also designed, built, and had launched several additional radio amateur satellites. The amateur radio satellite program has not only provided new ways for long distance communication, but it also clearly demonstrates the purpose of amateur radio: voluntary contributions of communication knowledge and time motivated only by personal satisfaction.

I am especially proud to have been a part of the radio amateur satellite program from its inception. It has touched my life in a very positive way, as I am sure that it has also touched the lives of the thousands of radio amateurs and others who have voluntarily participated in amateur radio space communications during the past 34 years. What better way is there to learn about space communications than by participating in it?

OSCAR-II, a near-twin of OSCAR-I, was launched in 1962 and operated for 18 days before re-entering the atmosphere. W6SAI continued his chronicle of the early days of ham radio in space with the 1965 launch of OSCAR-III, the first two-way amateur satellite.

DX QSOs via Satellite!

OSCAR III was launched in March 1965. This satellite was a VHF translator which permitted 2-way QSOs on the 2 meter band. Any two hams who could "see" the satellite could QSO through it. The

first QSO was between HB9RG and DL6EZA. Soon, a Transatlantic QSO followed! The success of this satellite prompted formation of new satellite clubs and groups on the east coast, as well as in Europe. Would WAS (Worked All States) and DXCC (DX Century Club) be possible via satellite?

The next step came in December 1965 with the launch of OSCAR IV. This was a frequency translator supporting two-way communication over a 10 kHz span on the 2 meter band (uplink) and 432 MHz (downlink). Due to a misfire of the top-stage rocket, the satellite was ejected into an unplanned orbit and the useful life of the bird was quite short. Even so, the first USA-USSR satellite QSO (K2GUN and UP2ON) was logged, as well as other DX contacts. This opened up a new challenge to amateur radio and raised a number of regulatory questions that would be partially resolved at the next International Telecommunications Conference.

The amateur satellite program received a big boost in June 1969, when AMSAT (the Radio Amateur Satellite Corporation) was formed in Washington, D.C. to advance various Oscar projects that would require a nonmilitary launching platform. No one could foretell the rapid growth of AMSAT and the worldwide interest in amateur satellites that was to come in the future.

In 1970, *CQ* celebrated its 25th anniversary with a gala January issue. There were other things to celebrate, too. The OSCAR 5 satellite was in orbit, and it was first heard by 5R8AS. This was the first "bird" made outside the U.S.A.—in Australia, to be exact.

OSCAR-5 turned the amateur satellite program international. It has remained that way ever since, with entire satellites being built in diverse locations such as Thailand, Mexico, Portugal,and Israel. Russian amateurs joined the ham radio space race in 1978 and have since built and launched 17 amateur satellites. The most recent major satellite project, AMSAT-OSCAR 40, launched on November 16, 2000, involved amateur satellite organizations from many different countries, each group responsible for designing and building a specific system or group of systems. While AO-40 has had more than its share of problems in the year since its launch, it remains a shining example of international cooperation in amateur radio, and of amateur radio innovation.

OSCAR and the Satellite Industry

The amateur satellite program has been responsible for many advances in satellite technology in general. First, the entire concept of a non-government satellite industry was born with OSCAR-1. Prior to its launch, it was thought that only governments would have the resources to build and launch satellites. OSCAR-3, the first two-way amateur satellite, preceded by about a month the launch of Early Bird, the first commercial communications satellite. The launch of the "microsats," OSCARs 16–19, in January 1990 paved the way for an another entire industry—small, low Earth orbit satellites, or "Little LEOs." Last year's launch of even smaller amateur radio "picosats" took things a step further.

OSCAR-40 is the first satellite to carry and use a Global Positioning System (GPS) receiver *outside* the constellation of GPS satellites. Initial tests indicate that it works fine. In the true amateur tradition, every ham radio satellite has been designed and built by volunteers and is open to use by anyone with the proper equipment (in some cases, a complex station; in others, nothing more than a dual-band handheld).

Hams In Space

Since 1983 ham radio in space has meant more than satellites. Between November 28 and December 8, 1983 astronaut (and amateur) Owen Garriott, W5LFL, operated a ham station from Earth orbit and began what is known today as SAREX, the Space Amateur Radio Experiment. Hams have operated from over a dozen NASA shuttle flights, and most notably from the Soviet Mir space station, where amateur radio provided a lifeline for the crew when an on-board fire briefly cut off their normal radio channels. Today, amateur radio is a permanent part of the International Space Station. Levels of operation vary from crew to crew, based on interest and available time.

Happy Anniversary!

As the amateur satellite program enters its fifth decade, we offer our congratulations from where it all began to the AMSAT organizations and the radio amateurs around the world who volunteer their time, talent, and energy to designing, building, launching, and, perhaps most important—using—our large fleet of amateur radio satellites. ■

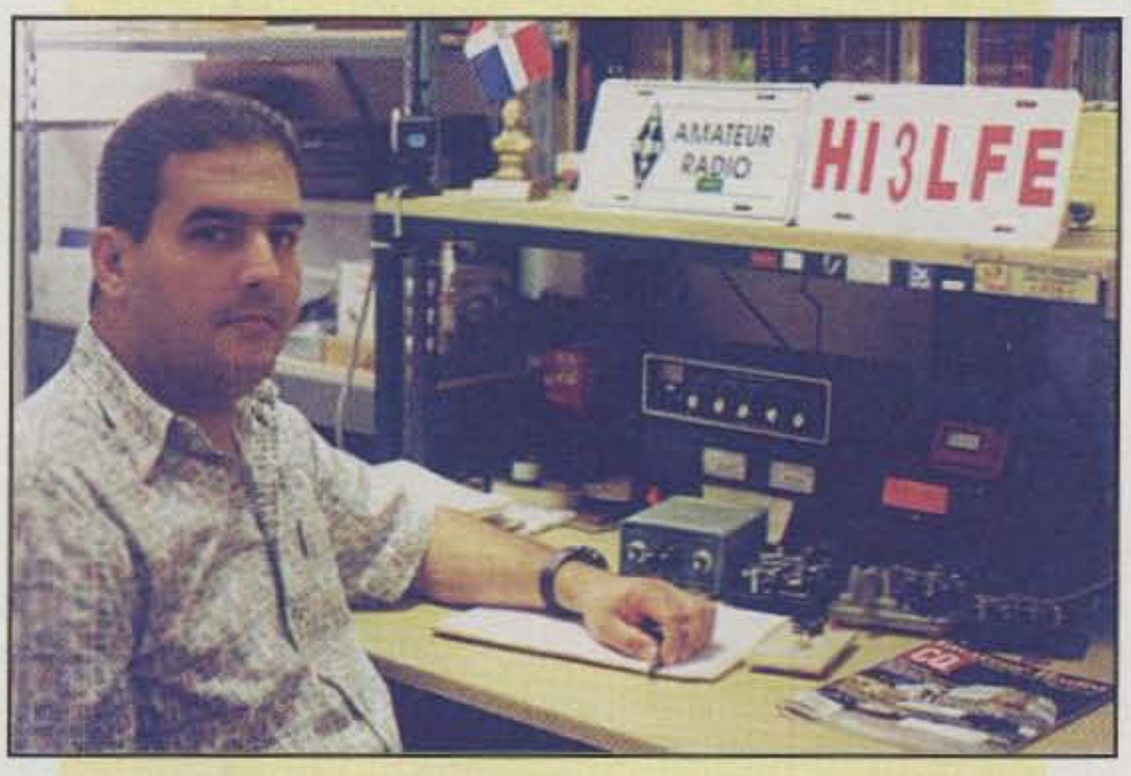
Results of the 2001 CQ WW DX 160 Meter Contests

BY DAVID L. THOMPSON,* K4JRB

Conditions were excellent for the CW weekend of the 2001 WW 160 Meter Contest, although absorption was very evident on multi-hop DX. The SSB weekend started out fairly well in North America, but by 0600Z QRN took over and DX contacts became very scarce. By Saturday night the contest became an endurance test, with only loud signals heard over the static. Larry, W0ETC, told me every year that static could get no worse on SSB, but 2001 takes the prize. The scores on SSB were down, but surprisingly the number of logs received was up nearly 8 percent. The number of logs on CW increased by the same percent, and this must be attributed to being able to e-mail the logs rather than go to the expense of mailing them. Hand logs still account for 20 percent, but e-mail logs hit 62 percent on CW and 59 percent on SSB. I only filled one shoebox with diskettes this year, which is down from three boxes just three years ago. *(See "Zero Bias" in this issue for a special request on sending in logs for the 2002 contest.—ed.)*

The master CW log database contains 4701 calls and the SSB log 4685 calls. This is the first time in a number of years that CW accounted for more calls. There were 132 countries on CW and 129 on SSB, so the potential for DXCC in a weekend remains. The SSB count probably was down due to better checking of the many unique Russia and Ukraine callsigns that appear in some logs. A tip of the hat to several friends in Russia and the CIS for helping weed out the calls. The number of entries claiming low power was amazing, and this year the number of QRP entries increased dramatically. A reminder that there is no Assisted category for the CQ 160 Contests, so please mark your logs as Multi-Operator for packet or web spot assists. I did find a few who still try to count the USA and Canada as countries as well as individual states and provinces. Remember to count DXCC and WAE countries for multipliers. UA1N (Karelo-Finnish Republic) has not existed since 1993, even though one RN1 ham sent this as his location. Make sure you have the up-to-date lists so your score will not be adjusted down!

Missouri regular K0JPL, who recently updated his station.



HI3LFE made several CW entrants very happy.

CW

On CW, C4A (5B4ADA) moved up to first place, beating out EA8/OH2BYS and OT1T (ON4UN). CT3FN and 4X3A (4X4NJ) rounded out the top Single Operator DX scores. Jack, KH6CC, was outscored by KH6ND, so the Oceania plaque will be going to someone else for the first time in a number of years. Bill, W4ZV, had the top USA score, with AA1K and W4MYA rounding out the top three. WK3I again was the world high QRP station, and HG1S (HA1TJ op.) took the world high Low Power score. The British gang set up field-day style at ZC4A and won the world Multi-Operator plaque. Their score was the second highest on CW. There was a dogfight for the top USA Multi-Op. plaque, with the WW2Y gang at K2TOP winning by a scant multiplier over W8JI. The USA gang placed 4th and 5th worldwide. Things are back to normal in Canada, with John, VE3EJ, taking home the plaque. Twenty stations broke 1000 QSOs on CW. W8JI put 1377 QSOs in the log and led the pack. WB9Z and the gang at VP5F broke 1200 QSOs for second place. Top Single Operator was AA1K with 1176 QSOs. Four stations (UU7J, OM7M, OT1T, and I5JVA) tied with 71 countries worked. The top USA station was W8JI with 61. 41 stations topped 60 countries this year.

Expect conditions in 2002 to be about the same for the CW contest, as sunspots are at a plateau with a slight downturn. Join the fun, and be sure to submit your log no matter how small your score.

SSB

In North America the SSB weekend was almost a wipeout due to QRN. Jeff, K1ZM, worked through the gloom with his excellent receiving antennas and took home the world high Single Operator score. He narrowly beat RA4PPA/9, who left his Tartar, Russia home QTH to put western Siberia on the air. Jeff won by a mere 736 points. Workhorse W4MYA took second and the USA plaque, followed by K9NR. UA2 contest club member UA2FB came in second for the DX, with LY5W (LY1DR op.) taking third. Low power winner TA3J placed 4th, a mere 1900 points behind LY5W. VY2MGY/VE3 repeated again as world high QRP. Boy, he must have some patience! TA3J easily won the world high Low Power, with HG1S (HA1TJ) coming in second. KB1EAX (WA1LNP) was high USA Low Power. Another workhorse, he lost a close one to K1PX on CW. Radio Club Satellite, XE1RCS, has been close in the past, but this year they stuck it out for world high Mult-Operator, beating UU7J. Congratulations to Vic and the XE gang. Only two stations surpassed 1000 QSOs in 2001. UU7J recorded 1049 contacts and Bob, W4MYA, logged 1039 QSOs. N8TR just missed with 999. S59KW worked 59 countries to lead all stations. Eighteen stations worked more than 50 countries. The USA leader was K1ZM with 39.

*4166 Mill Stone Court, Norcross, GA 30092
e-mail: <thompson@mindspring.com>

PLAQUE WINNERS AND DONORS

SINGLE OPERATOR
CW

WORLD BY K5AAD (W5MBB MEMORIAL): Winner Ivo Pezer, C4A (5B4ADA)
USA BY K4TEA: Winner William R. Tippett II, W4ZV
CANADA BY K2UFT: Winner John Sluymer, VE3EJ
ZONE 3 BY N5IA: Winner Larry Pace, N7DD.
ZONE 4 BY K4WA: Winner John W. Battin, K9DX
ZONE 5 BY N4XMX: Winner Jon Zaimes, AA1K
AFRICA BY K4MZW: Winner Mauri Leppala, EA8/OH2BYS
ASIA BY K4SX: Winner Riki Kline 4X3A (4X4NJ).
EUROPE BY K9UWA: Winner John Devoldere, OT1T (ON4UN)
OCEANIA: Winner Michael Gibson, KH6ND
SOUTH AMERICA BY W4NU (W4UUH Memorial): Winner Jacob Oduber, P43P
JAPAN BY W4ZV (JA1XAF Memorial): Winner Masaki Okano, JH4UYB
NORTH AMERICA by CQ (N4IN Memorial): Winner Laurent Bellay, FM5BH

SSB

WORLD BY K5AAD (W5MBB Memorial): Winner Jeffrey T. Briggs, K1ZM
USA BY K4JRB: Winner Robert S. Morris, W4MYA
CANADA by WØETC: Winner Carleton Styan, VE3BY
ZONE 3 BY N4TMW: Winner:Jacks Peak Amateur Radio Assn., N7GP (N5IA Op.)
ZONE 4 BY N4PN: Winner Don Kerouac, K9NR
ZONE 5 BY K4ODL: Winner Joseph A. Gagliardi, Jr., AA1BU
AFRICA BY WB4ZNH: Winner Luis Gomes, CT3DL
ASIA BY NT4TT/AH2BE: Winner Ilshat Samigullin, RA4PPA/9
EUROPE BY N4NX: Winner Dimitri Gorchkov, UA2FB
OCEANIA BY N4PN: Winner No Entry
SOUTH AMERICA BY K4EA: Winner Edgar Jose Ochoa, YV2IF
NORTH AMERICA by CQ (K2EEK Memorial): Winner Alex Aimette, V47KP (W2OX)

MULTI-OPERATOR
CW

WORLD BY N4RJ: Winner Radio Group ZC4A
USA BY W8UVZ and K8GG: Winner Garden State Top Band Club, K2TOP (at WW2Y)
Zone 3 by 4X4NJ: Winner Jim Wilson, N7JW

SSB

WORLD BY SOUTHEASTERN DX CLUB: Winner Radio Club Satellite, XE1RCS
USA BY WB9Z: Winner Peter F. Michaelis, N8TR
Zone 3 by 4X4NJ: Winner Gary D. Elliott, K7OX

Hopefully, conditions for the 2002 SSB weekend will be better (just say no to QRN!). This is an excellent opportunity to finish off the WAS award and add a country or two to top band DXCC.

Clubs

The Potomac Valley Radio Club (PVRC) got out the troops this year and took first place by a wide margin over the Yankee Clipper Contest Club (YCCC). The Frankford Radio Club (FRC) had several members missing from the CW weekend and fell to third. The Slovenian Contest Club placed 4th, with the Rhein Ruhr DX Association rounding out the top 5. Sixteen clubs topped 1 million points, down slightly from 2000. The club contest is a friendly but competitive portion of the CQ 160 Contests. To enter the club competition at least three logs must be submitted.

Logs

Again in 2002 a cabrillo log should be submitted. If a cabrillo log cannot be produced please submit an older .all or.log format with summary sheet. I plan on converting all non-cabrillo logs, so please help us by sending a cabrillo log. One axiom that was discovered this year is "If a homebrew cabrillo log is made it will not meet cabrillo specs." Please try to use the cabrillo log produced by your logging program. A tip of the hat to Bruce, WT4I, for his log checking program and cabrillo converter. Bruce made many modifications on the fly to assist the director finish the log checking.

The CQ 160 Committee approved continuing the rule that all logs with over 3 percent uniques will be accepted and all contacts between 3 and 7 percent be removed from the log. Over 7 percent can mean disqualification. The norm for uniques is less than 1 percent (1.1 percent in the largest log ever received). Many of the unique stations actually turn out to be busts, and we feel the 3 percent rule gives a station the ability to stand above the others without penalty for building a great station. Major logging errors noted included logging the wrong state (guessing?), typing errors, and timing errors causing "not in log" (NIL). This happens to us all at one time or another.

Certficates and Plaques

Every so often we need to spell out the rules for certificates and plaques. The top station in the USA, Canada, or continent usually wins the plaque, but if that station wins world high then the runnerup wins the USA/Canada/continent plaque. No plaque is awarded for less than a score of 30K. Certificates are awarded to the high-scoring station in each state, province, or country. Certificates are also awarded to the top Low power and QRP station provided there are at least three entries or the score is above a certain value (5K for Low Power and 1K for QRP). Overall second-place winners are noted if the score is 100K plus and there are at least eight entries. Please have patience, as all plaques and certificates are handled by volunteers; hopefully we will get caught up by the 2002 contest.

2003 Change Coming

Starting with 2003 the CQ 160 Contests will be changed to 48-hour contests to conform with most other worldwide contests. The starting and will be 0000Z on Saturday and the ending time 2359Z on Sunday. This gives stations in all areas of the world two night openings. The CQ 160 Committee is considering limiting everyone to a maximum of 30 hours so the need to keep the keyer running all day will not be necessary. Send your comments along with your logs (agree or disagree).

The 2002 Contests

The dates for the 2002 CQ WW 160 contests are set for CW January 25–27 and SSB February 22–24. The contests runs from 2200Z the first date to 1600Z the second date. Logs are preferred in cabrillo format via e-mail. As a last resort you may send older ASCII logs, but be prepared for a message back to try to send a cabrillo log. We must hold everyone to our required deadlines of February 28, 2002 for CW and March 31, 2001 for SSB. The exception is if both are submitted together and then the date is March 31, 2002. Please send all logs via e-mail to <cq160@kkn.net> and again see the message regarding log submission in "Zero Bias" in this issue, on the CQ website (<www.cq-amateur-radio.com>), and on the CQ contest websites. Good Luck!

73, Dave, K4JRB

W/VE Soapbox CW

It was great to see the JA's down in the lower part of the band. My first time to break 300 QSOs...*WO7Y*. Best conditions in years. Biggest thrill was working all 48 continental states...*W5CWQ*. Worked eight stations with great ears...*KB3AFT/9/QRP*. Unfortunately work must come first...*AC5SU*. Moved again after 13 years in Virginia...*K4BAM*. Finally getting close to 160 WAS after four seasons...*K4LQ*. Band was wide open this year. Thanks to the west coast ops for hanging in there...*N4XMX*. Got a new dipole up 120 feet to assist my boatanchor QRP effort. Stayed home this time...*W7DRA/QRP*. 80 meter inverted V worked well in my first 160 test...VE6BF. Borrowed a new Yaesu FT817 so had fun this year...N8XA/QRP. Not much of a log but believe all logs should be submitted...*VE7RCN*. Stateside QSOs in the DX window...*W1OP*. First time reporting a contest outside of the ARRL Field Day...*WA4AOS*. Time was limited due to working a full schedule over the weekend...*K3VOA (rare DC; op. K3NJ)*. No NE USA heard at this location...*K6MO*.

Worked 45 states with a mediocre antenna and low power...*N2FY*. Paper logging for the last time!...*N6LL*. It's fun to work DX with a KW rather than low power...*N8II*. I live in a nation-

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MFJ's *tunable* super DSP filter automatically eliminates heterodynes, reduces noise and interference *simultaneously* on SSB, AM,CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX, weak signal VHF, EME, satellite.

You get MFJ's *tunable* FIR linear phasse filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 57 dB attenuation 75 Hz away.

***Only* MFJ gives you 5 *tunable* DSP filters. You can tune each lowpass, highpass, notch, and bandpass filter including optimized SSB and CW filters. You can *vary* the bandwidth to pinpoint and eliminate interference.**

***Only* MFJ gives you 5 *factory* pre-set filters and 10 *programmable* pre-set filters that you can customize. Instantly remove QRM with a turn of a switch!**

MFJ's *automatic notch* filter searches for and eliminates *multiple* heterodynes.

You also get MFJ's advanced *adaptive noise reduction*. It silences background noise and QRN so much that SSB signals sound like FM.

The *automatic* notch and *adaptive* noise reduction can be used with *all* relevant tunable pre-set filters.

***Automatic gain control* (AGC) keeps audio level constant during signal fade.**

U.S. Patent D374,010
MFJ-784B
$249.95

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in MFJ's exclusive *tunable* FIR bandpass filters.

You can tune the center frequency from 300 to 3400 Hz, and vary the bandwidth from 30 Hz to 2100 Hz -- from super-tight CW filters to wide razor-sharp Data filters.

You can use two tunable filters together. For example, tune one to mark, one to space and set bandwidth tight for a super sharp RTTY filter.

Tunable highpass/lowpass filters

You can tune the lower cutoff frequency 200 to 2200 Hz and the upper cutoff frequency 1400 to 3400 Hz. This lets you create custom filters for voice, data and other modes.

Signals just 75 Hz away literally disappear -- they are reduced 57 dB!

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MFJ's automatic notch filter searches for and eliminates multiple heterodynes in milliseconds. It's so fast, that even *interfering* CW and RTTY signals can also be eliminated.

You can *selectively* remove unwanted tones using the two *manually tunable* notch filters -- an MFJ exclusive. Knock out unwanted CW stations while you're on CW.

Adaptive Noise Reduction

Noise reduction works in all filter modes and on all random noise -- white noise, static, impulse, ignition noise, power line noise, hiss.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

15 *pre-set* filters -- factory set or you custom program

You can select from 15 *pre-set* filters. Use for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode.

If you don't like our pre-set filters, you can program your own -- an MFJ exclusive! Save center frequency/bandwidth, lowpass/highpass cutoffs, auto/manual notch, noise reduction -- all filter settings -- in 10 programmable filters.

Plus more . . .

A push-button bypasses your filter -- lets you hear the *entire* unfiltered signal.

2½ Watt amplifier, volume control, input level control, speaker jack, PTT sense line, line level output. 9½x2½x6 inches.

Plugs between your transceiver or receiver and external speaker or headphones. use 12 VDC or 110 VAC with MFJ-1315, $14.95. Cable Pack, MFJ-5184, $7.95, includes receiver cable, DC cable, 2 open-end TNC cables.

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$179.95

Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

It's *more effective* than a noise blanker because interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an *adjustable phasing network*. You can combine two antennas to give you various directional patterns. You can null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312B, $14.95. 6½x1½x6¼ inches.

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Plug a MFJ-780 "brick wall" DSP filter into your MFJ-1278/B multi-mode and you won't believe your eyes when you see solid copy from signals completely buried in QRM! MFJ-1278/B automatically selects the correct DSP filter for Packet, AMTOR, Pactor, RTTY, ASCII, FAX, Color SSTV, Navtex or CW. Plug in a MFJ-780 and copy signals that other multi-modes can't. *Some soldering needed.*

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W4MYA	390,220	K9NR	144,360
K9DX	373,890	AA1BU	120,400
W4WA	344,820	K5RX	114,523
N1EU	276,400	W3TS	10,885
W3GH	273,728	WØ ETC	103,883
KR1G	267,744	W3BGN	100,270
K4VX	266,580	ND8DX	97,965
W3TS	228,420	KB1EAX	96,950

VE (TOP 5)

CW		SSB	
VE3EJ	602,217	VE3BY	219,356
VA3UZ	422,740	VA5DX	126,614
VE3PN	231,487	VE3PN	121,451
VE3KP	152,574	E6JY	37,077
VE3CSK	45,596	VE7SL	36,624

QRP (TOP 5)

CW		SSB	
WK3I	74,586	VY2MGY/3	15,390
SP4TKR	60,865	SP9CQU	15,008
NØ TT	55,912	SP9W	12,059
SP9W	52,962	UA9OMT	9,988
UA9CR	51,952	W1TW	5,070

DX CW		DX SSB	
C4A	878,292	RA4PPA/9	238,272
EA8/OH2BYS	834,808	UA2FB	198,368
OT1T	759,699	LY5W	177,282
CT3FN	665,354	TA3J	175,344
4X3A	630,105	HA/WØYR	152,020
OZ7YY	553,482	S5Ø S	151,515
P3A	502,167	LZ8T	149,340
SP7GIQ	452,016	S57M	137,057
F6BEE	428,730	OMØ 0WR	25,610
KH6ND	416,975	CT3DL	125,433

LOW POWER (TOP 5)

HG1S	281,592	A3J	75,344
RW4UU	211,428	HG1S	121,770
HA8IH	203,328	EK6CC	97,020
TA3D	183,051	KB1EAX	96,950
EU6EU	182,404	UR7M	89,804

USA LOW POWER TOP 3

K1PX	181,355	K8FC	152,369
KB1EAX	181,020		

TOP 10 SCORES MULTI-OPERATOR

CW (WW)		SSB (WW)	
ZC4A	855,123	XE1RCS	256,248
VP5F	703,310	UU7J	247,740
G3N	659,834	RW2F	241,528
K2TOP	572,271	LX9UN	161,200
W8JI	570,609	N8TR	156,730
RW2F	537,382	HG3DX	154,185
RU1A	527,496	LY7A	139,702
I5JVA	523,320	GU8D	137,704
IV3YYK	517,572	S59KW	134,624
9A1A	468,778	VE3DC	130,760

In the CW contest 20 stations broke 1000 QSOs. VP5F (Ops. K9NR, WB9Z, AK9F) had the second highest number of QSOs, breaking 1200.

al historic district so have to hide my antenna...*NZ5A*. Not sure if it was my reworked inverted-L or just good conditions this year... *W4TMR/QRP*. Still remains a gentleman's band...*W8FDN*. It's been 25 years since I participated in one of these contests. I ran into a lot of old friends...*W9UCW*. Never did hear a USA station calling CQ in the DX window... *WA9TZE*. Could not believe that I worked 23 countries in a relaxed effort . . . *K2UOP*. Had a great time. Its been 10 years since my last serious effort...*K4DLJ*. Lots of DX worked but only a fraction of DX heard...*K2CDJ*. After good first night conditions old man Murphy visited with weather-related antenna problems...*K8FC*. Conditions seemed to favor stations with gain antennas, such as W8JI, K2TOP, or W1FJ... *W2GD*. Added wire to the 80 meter Vee. Trying to teach this old dog new tricks...*W6TK*.

Good opening to Africa, and FY5KE was a new one. Still I am a long way from 160 DXCC and WAZ from the mobile...*KH6DX/W6 Mobile*. Conditions were great. ZF2NT was 20 over 9 on a quarter-wave wire 6 meters high... *KN5H*. Great fun. The lack of a receiving antenna probably cost us contacts...*VE3DC*. Good conditions Friday night and little local QRM...*KB1EAX (op. WA1LNP)*. Much better conditions than the December 160 contest... *N3UM*. Very little Pacific activity...*NY4A*. I worked 200 more QSOs, two more countries, and one more W/VE mult than last year and even got more sleep...*K8ND*. Worked Hawaii and Alaska to complete 160 WAS...*N2BJ*.

DX Soapbox CW

My first contest on 160; sorry for the bad antenna...*OK1IF*. I liked my first contest on top band...*IK4AUY*. Really exciting to get on top band. I expected to contact JA but the VQ9 QSO was a bonus...*4F2KWT (DU)*. I did not know that you could work stations during daylight until the last few minutes...*IK2AIT*. No suitable computer in the shack so computer at work served as a typewriter...*OH3TZ*. Age 70, licensed since 1957...*SP6LV*. Nobody told me about the QRN you have to endure. It's summer in VK...*VK2AYD*. No JA or Europe the first night here...*YCØLOW*. Four new DXCC countries worked...*YL2GN*. Great to work "W" land in the early mornings...*GM3CFS*. Remember JA now has 1800 to 1825. Look for us about 1810...*JE1SPY*. Very good conditions to North America...*JK2VOC*. No chance to work North America with my QRP...*RA9CTK/QRP*.

I dream of working W/K with my QRP... *UY5VA/QRP*. My 18th CQ 160 CW contest entry...*YU7SF*. Thanks to HA5JJ/7 for initial checking of HA logs...*K4JRB (Contest Director)*. 81 years old and have not missed a 160 test in 30 years...*KH6CC*. 41 of my 42 QSOs were with new multipliers...*PA3AFF*. My favorite contest. Worked SU9ZZ for a new one...*DJ2NX*. No JA worked this year. It's hard to hear JA through the local stations in the new JA band from 1810 to 1825...*DL3DXX*. My KI6O loaded sloper performed nicely... *EA3ALV*. Discovered strange propagation where I could hear DX that did not hear me and my inverted Vee...*F6GOX*. YZ6A and I became friends chasing XE1V...*LY5W (op. LY1DR)*. Used packet but nodes were out of order for the contest...YU1EXY (multi-op.)

Excellent conditions but low turnout this year. Improving the transmitting antenna sure helped...*4X3A (4X4NJ)*. Glad I edited my log, as my old CT 8 logging program had several difficulties... *EA8/OH2BYS*. Conditions down from last year. How about giving us 48 hours so we can have two sunrise and sunset conditions?...*ZL6QH (ZL1AZE)*. Poor conditions and bad CW operator...*G3NAS*. Murphy was my guest second op. I could have done better alone...*FM5BH*. Usually look after QSLs for our DXpeditions, but wanted to try out our new 85 foot top-loaded vertical...*G3LZQ*. Surprised with my 5 watts and bum antenna...*I2WIJ/QRP*. Thanks for the patience as we are both newbies at CW contesting...*LX1NO*. Finally packet paid off in a new country...*OE2VEL*. Hard to compete limited to 10 watts and only 20 kHz...*ON6TJ*. I got a real kick out of my QSO with KØRF. He called me for 10 minutes with his signal slowly rising out of the noise...*OT1T (op. ON4UN)*. Great fun from a field-day style setup...*ZC4A*.

W/VE Soapbox SSB

Terrible conditions. I only worked two Europeans...*N3HBX*. Barely made 50K this year... *AA4MM*. I appreciate the patience the gang had with pulling out my low power signal in the static...*AA5CH*. Not only was the QRN bad but the weather did not allow us to deploy the balloon...*N7KQ*. Even with all the problems and QRN we had fun...*VE3DC*. My first multi op. We had a great time...*W2MF*. Mine was an

CLUB SCORES

Minimum of 3 entries required for listing

CLUB	SCORE
POTOMAC VALLEY RADIO CLUB	4,236,107
YANKEE CLIPPER CONTEST CLUB	3,840,457
FRANKFORD RADIO CLUB	3,250,046
SLOVENIAN CONTEST CLUB	3,008,858
RHEIN RHUR DX ASSOCIATION	2,876,078
CONTEST CLUB FINLAND	2,854,970
SOCIETY OF MIDWEST CONTESTERS	2,834,376
BAVARIAN CONTEST CLUB	2,747,921
UA2 CONTEST CLUB	2,425,127
CROATIAN CONTEST CLUB	1,977,216
HA DX CLUB (HUNGARY)	1,457,840
NORTH COAST CONTESTERS	1,435,556
SOUTH EAST CONTEST CLUB	1,378,006
MARCONI CONTEST CLUB (ITALY)	1,213,193
UKRAINIAN CONTEST CLUB	1,203,522
KTU RADIO CLUB (LY)	1,163,325
CRIMEA CLUB	663,610
TOEC (SM) CONTEST GROUP	660,382
URAL CONTEST CLUB	655,666
KIEV CONTEST GROUP	566,838
FLORIDA CONTEST GROUP	508,350
LNDX (FRANCE)	458,340
HAMILTON RADIO CLUB	451,439
SOUTHERN CALIF CONTEST CLUB	424,360
SP DX CLUB	395,970
LITHUANIAN DX GROUP	391,380
LATVIAN CONTEST CLUB	382,711
CAROLINA DX ASSOCIATION	370,675
DARC (GERMANY)	342,150
LYNX (SPAIN)	324,559
NO. CALIF CONTEST CLUB	315,564
DAUBERVILLE DX ASSOCIATION	294,244
SOUTHEASTERN DX CLUB	277,050
MINNESOTA WIRELESS ASSO	273,086
NORTH TEXAS CONTESTERS	256,159
SKY CONTEST CLUB (YU)	245,614
HUDSON VALLEY CDX	228,849
BELARUS CONTEST CLUB	215,523
GRAND MESA CONTESTERS	188,567
OZARK CLUB	178,873
LZ9A GROUP	171,714
ROHESTER DX ASSOCIATION	162,793
MVDXCC (MISSOURI)	160,179
KENTUCKY CONTEST GROUP	154,124
FOX CONTEST CLUB	150,104
ARI (ITALY)	120,204
SW OHIO DX ASSOCIATION	97,293
WESTERN WASHINGTON DX CLUB	96,287
WKARC (WISCONSIN)	85,802
URE (SPAIN)	85,668
YO DX CLUB	77,794
WEST PARK RADIO OPS	75,075
NO. ARIZONA DX ASSOCIATION	65,828
GREEN VALLEY ARS	35,430

FM5BH, the CW Single Op. North America plaque winner.

honest QRP effort. Sorry for the low score... *K3TW.* Used a second tee antenna as a noise nuller for receiving...*W3TS.* My first SSB contest and just learning to use logging programs...*AF4OD.* Saturday night was a complete QRN wipeout...*K1EY.* My modest station made a fair showing the CW weekend, but on SSB it was no contest...*N2FY.* SSB was a challenge with 100 watts...*W4AMP.* Spent the entire second day CQing to static...*AC5SU.* Thanks to those who pulled my 5 watts out. A wonderful bunch on top band...*N5YYX.* Static crashes blanked most signals...*K6MO.*

Credit to all those who copied my signal... *AF7E.* Best contest yet...*WB9NOO.* Contest was enjoyable in spite of the static...*WA9TZE.* My first contest on 160. Plan on putting in more time next year...*N9AW.* WA9TZE got me on 160 and I did not stop until I made 71 QSOs... *NK9G.* Thunderstorms are the enemy of top banders...*KØJPL.* Still not up to par on this computer stuff...*KKØQ.* Only had one half hour...*VE7RCN.* No ice again this year... *W4DMB.* Every year I say the band can't be any noisier and again this year I was wrong... *WØETC.* Tough conditions. Sure helped as A61AO answered my CQ...*K1ZM.* USA should stay above 1840 and work the DX split. There is also a lot of room above 1900 kHz for USA...*AA1K.* No Europe heard. There is a challenge to working top band SSB in the face of heavy QRN...*N3UM.* Where was the DX? Worked YV and XE and heard V47...*K4TMC.*

Conditions started okay on Friday but went downhill fast on Saturday...*K9HUY.* Surprised to hear EI8GS and GU8D ride over the QRN...*K5RX.* Conditions have got to be better next time...*VE2OWL.* If Smoky Bear will let us use his 130 foot fire tower next year we promise not to start any forest fires...*K4YFR.*

GUEST OPERATORS

CW

Call	Op.
4X3A	4X4NJ
9A5Y	9A3LG
9A5Z	9A3LM
C4A	5B4ADA
DKØNS	DJ9MH
EA9LZ	OHØXX
EO6F	UXØFF
ER6A	ER1LW
FY5KE	FY5FY
HG1S	HA1TJ
K2UG	WA2JQK
K3VOA	K3NJ
K4VX	N9JF
K9WJU	W9CG
KD7AEE	NC7W
LY5W	LY1DR
M4T	GØVQR
LY3MR	LY1FF
MU2K	G3SQX
OH1F	OH1NOA
OH2U	OH2JTE
OH9W	OH2BCI
P3A	UA2FB
RD4M	UA4LU
RK9CZO	RX9CAZ
SM4Z	SM4CAN
SM6R	SM6HRR
SP4Z	SP4EEZ
SP9W	SP9HMN
UV5U	UX1UA
UW7IDG	UX9IO
VQ9PO	W3PO
VQ9SS	N6SS
W1AA	K1VV
W4WA	K9AY
W5YA	KT5X
W7RMA	KI7Y
WD5R	N5ECT
ZF2CM	KØBJ

SSB

Call	Op.
4U1WB	AJ3M
8SØW	SMØNJO
CT9L	DJ6QT
DLØSHZ	DL1ASR
EO6F	UXØFF
ER6A	ER1LW
FY5KE	FY5FY
HG1S	HA1TJ
KB1EAX	WA1LNP
LY5W	LY1DR
LY9A	LY3BA
LZ8T	LZ2CJ
N7GP	N5IA
SK4UW	SM4JHK
SM6R	SM6HRR
SN8M	SP8MI
UV7D	UZ5DZ
V47KP	W2OX
W1CRS	W1CTN
W7UQ	KL9A
YO5KTK	YO5CYG
YU1AST	YT1CA

DX Soapbox SSB

The severe frequency restrictions on EA top band licenses make it very hard to make contacts with 100 watts...*EA3ALV*. Russian language skills sure help in my location. Only North America heard this year was AA1BU... *LY5W (op. LY1DR)*. It's hard digging through S9+10 city noise...*OE5OHO*. Semi field day operation. We froze in a small van...*S59KW*. This was my first 160 meter contest but not my last...*DK7JQ/Mobile*. My logging program cabrillo did not work. Sorry for the old format but I did not want to disappoint my Cuban friends... *VE3ESE for T48RAC*. Too much QRM for such a small band...*PAØIJM*. Will make a better effort next time...*RA3AD*. Four watts to a dipole. Sorry for my weak signal...*RN1AO*. One day I will work North America...*TA3J*. An enjoyable contest...*UR7M*. Long live the CQ 160 contests...*UU7J*. In the CW part we worked 500 stations. On SSB there was no USA opening and we got tired of calling CQ ...*EA5BY*. Used K9AY receiving loops, but sometimes the 450 foot beverage to NA was better...*GU8D*. First snow of the year brought 20 dB over 9 snow static...*S50A*. Record number of QSOs the first night and then QRN!... *XE1RCS*.

Station Ops CW Multi-Op

9A1A: 9A5W, 9A3GW, 9A6A, 9A7R. **9A7A**: 9A4RX, 9A3TR, 9A6DM. **AA4V** & N4SF. **AB7RW** & packet. **DF3CB** & packet. **DFØNF**: DL8UD, packet. **DJ8QP** & DF3CB, DJ5IW. **DKØFFO**: DL2BWM, DL1BZA, DL5BTE, DK3WG, DF4AE, DL1BQG. **DKØIW**: DL1VU, DL6KO, DL9CHR, DJ9WH. **DK1II &** DL5EBE. **DL2MDZ** & DH1NHI, packet. **DL3ARM** & DL1RNW, DL1WA, DL2ARD. **DL3DXX** & packet. **DL5RBW** & DJ5MN, DK5MV, DL6RDR. **DL6RAI** & DH1TW. **DL9YX** & DF1HF, DK9HN. **EA5BY** & EA5GRV, EA5KW. **EN7Z**: UR7GW, UT4ZO. **ES2X**: ES2RJ, ES2NA. **G3LZQ** & G4BYG. **G3N**: G3RVM, GØORH, MØCUK, GØVQR. **HG3DX:** HA3XW, HA3MY, HA3UU. **HG5A:** HA5IW, HA5OM, HA6GK, HA5FM, HA6WX, HA5ML, TIBOR. **HSØAC**: JA2DOU, JR3XMG, JR5XPG. **I5JVA** & IK2QEI, IK4MTF, IZ2AAJ. **IV3YYK** & IV3TAN, IK2NCJ, IK2PFL, IK2JUB, IZ8AJQ. **JAØZRY**: JRØBQD, JAØDGK, JGØEBW, JP1NOM, JP1QGO, 7K2DBH, 7L1FOH, JI3SCY, JP3KKV, JS3JSB, JE5UMJ, 7M3GTW. **KØRF** & WØUA. **KØTV** & packet. **K1TTT** & KB1W. **K1VR** & S53ZO, S53MM. **K2TOP**: WW2Y, K1ZM, K2WI, N2NC, N2NT. **K3KO** & packet. **K7ZB** & AB7E. **K8KSN** & packet. **K8XXX:** K8AQM, K8BK, N8CC, W8MJ, K8JM. **KD9SV &** KA9A. **KF2EW** & packet. **KS3F** & NE3F. **LX1NO** & LX1NO, F5PBL. **LY7A**: LY2MV, LY4AA, LYR-346. **LZ8T**: LZ1UQ, LZ2CJ, LZ2FV, LZ2HM.

N1RR & WM1K, N1LH. **N2WM** & K2BM. **N5IA** & WA6CDR. **N7JW** & W7UT, K7CA. **N7KA** & AA5B. **N8PR** & packet. **NP2S**: K8GG, W8UVZ. **NS7K** & K7OA. **NU4Y** & K4EL, K4EB, WR4K, N4KE. **NY4A**: N4AF, W2CS. **NZ1U**: KB1H, N1XS, NB1U, K1EBY, K1GX. **OE2VEL** & packet. **OH6K**: OH6XX, ex-OH6NU. **OK5W**: OK1CF, OK1JKT, OK1FKD. **OL1F:** OK1DZR, OK1JOK, OK1VWK. **OL5Q**: OK1FFU, OK1FLC, OK1HRA. **OL5T**: OK1TC, OK1DJG, OK1WWJ, OK1FLM. **OL7R**: OK1XUV, OK1WMV, OK1ZMS. **OL7W**: Operators. **OM7M**: OM3PA, OM3TZQ, OM5RM, OM5RW, OM5ZW. **PA3BAS &** PAØPFW, PA3AUC, PA3BFL, PA3CLH, PA3DSB. **PI4ZLD**: PA5KT, PA5KM. **RF9C**: RA9CKQ, RX9CO. **RK3AWK**: RU3BH, RV3UK, RA3AAT. **RK9JWV**: V Klyucherov, V Grigoriev. **RM6A**: Operators. **RN2FA** & packet. **RU1A**: RW1AC, EV1AW, RX1AA, UA1ARX. **RV2FW** & RA2FW. **RW2F**: RA2FA, UA2FF, UA2FM. **RZ6LZL:** RN6LG, RV6LSS, RA4AJF, UA6LP. **S5ØX** & S54X, S56MVU. **S52M**: S51TE, S51UE, S52CW, S53XX. **SL3A:** SM3BDZ, SM3CVM, SM3AVW, SM3FXO, SM3JLA. **SM7GIB** & packet. **SP9KRT** & SP9ADU, SP9EMI, SP9-1753. **UA2FZ** & packet.

UT3IZZ: US3IMZ, UT3IW, UT5SI. **UT7L:** UR4LRG, UR4LTX, UR4LUG, US4LGM, UXØLL, UY5LW. **UU7J**: UU2JQ, UU4JMG, UU4JGR, UU5JBO, UU6JM, UU8UJK, UUØJM, UU7079. **VE2OJ** & VE3NJ, VE3EDR, VE3FFK, VE3OP. **VE3DC**: VE3BK, VE3OZO, VE3RZ, VE3STT, VE3VZ, VE3VMO. **VP5F**: K9NR, WB9Z, AK9F. **W1AA**: K1VV, packet. **W1FJ** & NB1B, W1KM. **W1OP**: W1GS, W1IUX, K1JNJ, K1DT. **W2GD &** W1GD, K2TW, W2CG, W2NO, W2RQ, K8NZ. **W2XL** & K4HA. **W3AP** & packet. **W6TRW**: KØDI, W3CRI, KS4IS. **W6YRA**: WA6AYI, KU6T, KC6TZX. **W7CW** & WU7Y, W7CA. **W7MCU** & packet. **WS4Y** & K4WA. **YC1ZTC**: YB1BOD, YD1WAE, YD1VBH, YCØKNK/1. **YU1EXY:** YT1XX, packet. **YU2ØØA**: YU1RA, YU1UA. **YZ7A**: YU7CM, YU7JDE, Tibi, Robi. **ZC4A**: 5B4AGN, 5B4AGC, 5B4FL. **ZL6QH:** ZL2BSJ, ZL2AKW, ZL2BCW, ZL1AZE.

Station Ops SSB Multi-Op

AA1K & packet. **AB2DE** & KC2AVE. **EA5BY** & EA3ALD, EA5ED, EA5FID, EA5GRV, EA5IK, EA5KW. **EI8GS** & EI8IR. **ES2X:** ES1LAA, ES2QH, ES2RJ, ES2TGO, ES2NA. **F5CWU** & F5MOO. **GU8D**: G3SJJ, G3SVL, G3UEG. **HB9CXZ** & HB9BLQ, HB9BYT, 4F3CV, HB9OCR, Nicola. **HB9LC** & HB9HLV, HB9HLI. **HG3DX**: HA3KW, HA3MY, HA3UU. **IV3BVK** & IV3TDM, IV3JVJ, FM5GU, IV3YDD, KB7OZT. **KØXG** & K2DRH. **K1KY** & NY4N, W1ADE. **K2FL** & packet. **K2YEH** & K2CDJ, AB2HS. **K3DI** & packet. **K3IXD** & packet. **K3WW** & packet. **K4UZ** & KB4IUJ. **K4YFR** & W4AVN. **K7OX** & KE7AJ, packet. **K8EI** & packet. **KS4YT** & KV4T. **KW9H** & packet. **LX9UN**: LX1UN, LX1KC, LX1AQ. **LY7A:** LY3IT, LYR-346, LY3NUT. **N1RK** & packet. **N4UK** & NC4NC, AA4S, KN4EK. **N4VV** & packet. **N7DF** & packet. **N7KQ**: W7GNP, KJ7TX, N1KQ. **N7PWZ** & W7EFQ, N7IZM, KB7YEB. **N8TR** & N8TR, operators. **NØKOV** & NØUJQ, WBØSRP. **OE5OHO** & packet. **OL1F**: OK1DZR, OK1JOK, OK1OFF. **ON4WW** & packet. **RV2FW** & RA2FW. **RW2F**: RA2FA, UA2FC, UA2FF. **S59KW &** S55M. **T44RAC**: CO8KL, CO8LY, CO8DM, CO8WS, CO8DD, VE3ESE. **UA2FZ** & packet.

UU7J: UU4JMG, UU4JDD, UU5JBO, UU6JM, UU8JK, UUØJM, UUJ079. **VE2UMS**: VE2FAB, VA2FRU. **VE3DC**: VE3AHQ, VE3BK, VA3DJ, VE3OZO, VE3RYI, VE3RZ, VE3STT, VE3VMO, VE3VZ. **WØGJ** & packet. **W2MF** & WJ2D, KN2T, KN2L, K2ORM. **W3AP** & packet. **W3FV** &packet. **W4HJ** & packet. **W4WA** & packet. **W5ACS** & W4YBY, W5DJW. **W5TM** & W5AO. **W6TRW:** KS4IS, KI6GM, KE6ZWZ, KØDI. **W9IU** & packet. **WB8TCT** & KC8FCZ. **WD5R** & N5ECT. **WY3T** & KA3PVA. **XE1RCS:** XE1JG, XE1KK, XE1ME, XE1VIC, XE1YJY, XE1YAW.

(Continued on page 106)

MFJ 1.8-170 MHz SWR Analyzer™

Reads complex impedance . . . Super easy-to-use

***New** MFJ-259B reads antenna SWR . . . Complex RF Impedance: Resistance(R) and Reactance(X) or Magnitude(Z) and Phase(degrees) . . . Coax cable loss(dB) . . . Coax cable length and Distance to fault . . . Return Loss . . . Reflection Coefficient . . . Inductance . . . Capacitance . . . Battery Voltage. LCD digital readout . . . covers 1.8-170 MHz . . . built-in frequency counter . . . side-by-side meters . . . Ni-Cad charger circuit . . . battery saver . . . low battery warning . . . smooth reduction drive tuning . . . and much more!*

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Check SWR outside the ham bands without violating FCC rules.

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Public Service

BY BOB JOSUWEIT, WA3PZO

Public Service and Emergency Communications

"This Couldn't Be Real"

Last month we reported on some of the early response to the attack on America on September 11. This month we'll take a look at some of the people and organizations that responded to the "big one" that hit the east coast.

The response included over 500 amateur radio operators supplying vital communications for the New York City Office of Emergency Management, the American Red Cross, the Salvation Army, and other volunteer organizations active in disasters. ARRL New YorkCity/Long Island Section Manager George Tranos, N2GA, said it best: "Each and every one of you who played a role in this are to be commended for your efforts. You should be proud of what you did to help. Amateur radio is proud of you and thankful for your efforts."

For 12 continuous days amateur radio operators from eight of the surrounding ARRL sections supplied 25 to 35 operators for each 12 hour shift. Many hams worked more than 12 hours, so there were at least 50 communicators on duty each day. Tom Carrubba, KA2D, NYC/LI Section Emergency Coordinator, estimated that over 14,000 man-hours were logged providing emergency communications. "This was a difficult operation," said Carruba, "because ops had to haul their own equipment/supplies using public transportation. ID processing was long and security was on high alert."

During the first 24 hours after the attack on the World Trade Center ARES and RACES nets were activated in New York City and Westchester County, New York. Nets were also activated in Bergen, Morris, and Union counties in northern New Jersey. Each was taking check-ins as to who might be available. Some were sent to Red Cross offices. Others were asked to stand by.

By Tuesday evening hams were being dispatched to 12 Red Cross shelters in Manhattan and Brooklyn. They were conducting logistics communications, helping to get buildings unlocked and supplies delivered. By Wednesday morning hams were on duty at the triage center (Chelsea Piers) and several hospitals, including St. Vincent's (the main hospital where casualties were taken), and the Red Cross Headquarters and shelters.

So Close, Yet So Far

For Pennsylvania amateurs as well as many others there were days of sitting by the radio, watching television, and wanting to drive to one of the three crash sites to help. From Philadelphia, it's only 90 miles to New York City, about 125 miles to Washington, DC, and some 200 miles to western Pennsylvania.

Word had gone out to get prepared. In a bulletin to local hams, Somerset County (PA) RACES Radio Officer Jim Crowley, NJ3T, said, "I also wanted to remind everyone that now is the time to fix that antenna on your vehicle or at your home. Charge your HTs and batteries, fix that microphone or whatever might need your attention to ensure all your ham radio equipment is operating properly. Be prepared if called upon to help in communications." The call came. Somerset County was where United Flight 93 crashed into an open field after passengers fought back against the hijackers.

In the Allentown, Pennsylvania area Barry Vogt, N3NVA, waited for a call. Barry and a few others worked through their RACES unit and offered to go to New York. Barry is a firefighter and a member of the local EMS unit. As soon as he heard about the attack, he want-

Amateurs and other disaster workers had to protect themselves from the dust near ground zero. N3NVA stands near a window at the temporary OEM looking towards the World Trade Center. (Photo courtesy Barry Vogt, N3NVA)

Many a ham commented it looked like a war zone. (Photo courtesy Barry Vogt, N3NVA)

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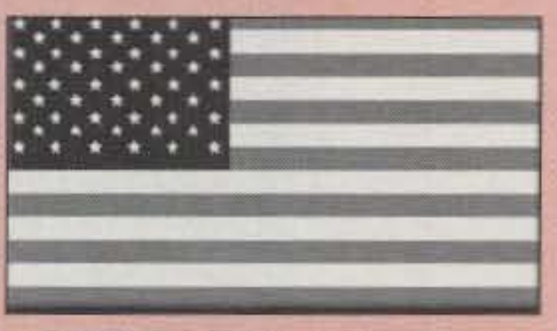

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Meal preparation was coordinated from Baptist feeding units in New York. (Photo courtesy Terry Jones, W4TL)

W4TL coordinates requests from the feeding units in New York. (Photo courtesy Terry Jones, W4TL)

ed to do something. Two days later Barry got the call to go to New York City the following day. "That was what I was waiting for," said Barry, "a way to do something."

New York, New York

Barry headed for New York along with Bruce Bobo, Jr., KB3FIH, and Chris Kelly, N3RPV. As they passed Newark, NJ they could see the New York skyline. "That was when the real shock hit me," said Barry. "To see no World Trade Center buildings that should be standing high above lower Manhattan, but just smoke rising from the scene with military F-15s flying over Manhattan."

The group reached the Red Cross Headquarters in Brooklyn. There they registered and were given assignments. Vogt told the registrars that he was a past Fire Chief and a member of the Emergency Medical Services unit. When asked to go to "Ground Zero," he jumped at the chance.

Only in the Movies

The group began to approach Ground Zero, site of what was left of the World Trade Center. As they got close to the scene there were thousands of people in the center of the street cheering and handing out water, food, and face masks or just clapping and giving the thumbs up to all of the workers going in. They were applauding the rescuers.

As they entered the blocked off area, they had to pass six checkpoints. The team stopped two blocks from Ground Zero at the IE89 Elementary School. The school was now serving as the New York City Office of Emergency Management (OEM). The original OEM had been destroyed in the World Trade Center collapse. The New York State Police issued additional identification for the OEM. This was where every firefighter, steel worker, and rescue worker received security passes to enter Ground Zero.

"All the vehicles—fire, ambulances, rescue, maybe 75 dump trucks—in line were entering and leaving the area right there," said Vogt. "Again, this was like a movie or dream. This couldn't be real."

Getting to Work

Neither the landline nor the cellular telephone systems were working well. Vogt's job was to help with communications for the Red Cross at the OEM and pass traffic requests for supplies. As many hams found out, an HT did not work. Vogt used a 2 meter mobile radio and a 1/4-wave magnet mount antenna with 20 feet of extra cable.

Vogt described what he saw as he looked out the window at Ground Zero: "I was looking at the famous huge steel beam that ran across the destroyed area. I had a ladder truck outside the window with the ladder missing because it was extended at the time of the collapse and it had snapped off. The cab was smashed down to the steering wheel. As a fireman, that was enough right there to get to you, but that wasn't all I saw that day. Out on the window sills there was about two inches of the gray dust that was everywhere downtown. I remember seeing on TV the film from an off-duty doctor who took his camera to the scene where the cloud came on top of him as he ran across the street, saying he had to hide beside a car. I was looking out at that same corner. I saw the children's bikes parked on the school rack as I was thinking what it was like for them to be there. Paper had blown everywhere, and then just two blocks south from me a war scene, a scene of destruction words cannot explain. Buildings down to the ground, and other 50-story high buildings with no front walls. You could see offices with chairs with computer monitors still sitting on the desks. In the school building I went into a room that had a window open where the room was thick with that gray dust covering everything from the desks to computer keyboards. You barely could see the keys through the dust. As I looked out the window, I tried to imagine what it had been like being there as the disaster unfolded. It had to be hell."

When Vogt's shift ended some 16 hours later, he walked out of the area past volunteer workers who handed out food and drink. Thousands of people were clapping and cheering as the firemen and other workers made their way down the street.

"I remember a small child running up to me to give me a stick of gum," said Vogt. "He wanted to thank us for our efforts in maybe finding his father. This part of the experience hit me the hardest. I cried for about two more blocks. I wasn't alone."

Vogt and Bobo returned to New York City four days later. They supplied additional communications for the Red Cross. Their 12 hour shifts ended up being at least 15 hours. Vogt said he slept on the USNS Comfort hospital ship. Vogt would wake up, shower, eat

CQ and now... the 2002 CQ calendars

better than ever, all digitally photographed, and still 15 months of value.

The new 2002/2003 CQ Radio Classics Calendar features fifteen magnificent photos of some of the memory-jogging, heart-tugging gear that so many of us treasure or aspired to years ago. (Publisher's Note: They're making antiques a lot newer than they used to!) This year's Radio Classics Calendar features some of the great equipment of the '50s and '60s, with a smattering of the 1940s and 1930s.

Here's what's featured this year:

Collins 75S-3 Receiver, 1961; Lakeshore Bandhopper VFO, 1957; Gonset Commander II Mobile HF Transmitter, 1955; Gonset 913A 6 meter amplifier, 1964; Technical Materiel Corporation (TMC) GPR-92 Receiver, 1964; Hammarlund HQ-170 Receiver, 1958; McElroy Model 100 Straight Key, 1941; Sonar XE-10 Modulator, 1947; National NC-300 Receiver, 1955; Hallicrafters S-85 Receiver, 1954; Heathkit SB-500 VHF Transverter, 1969; Sideband Engineers SB-34 Transceiver, 1965; Swan 400 Transceiver, 1964; Drake TR-3 Transceiver, 1963; Utah UAT-1 Transmitter, 1937.

How many do you recognize? How many did you own? How many did you wish you owned?

The 2002/2003 CQ Amateur Radio Calendar brings you fifteen spectacular digital images of some of the biggest, most photogenic Amateur Radio shacks, antennas, scenics, and personalities. These are the people you work, the shacks you admire, the antenna systems you dream about having, all digitally captured by the talented Larry Mulvehill, WB2ZPI, CQ's own roving cover photographer. Larry's travels this year took him to Colorado, Montana, Wyoming, Texas, Florida and New York, capturing some of the greatest Amateur Radio photos of the year especially for this annual favorite calendar. From winter scenes of the frosty northeast to pedestrian mobile in the Rockies, you'll love this traveling Amateur Radio photo show.

All calendars include dates of important Ham Radio events such as major contests and other operating events, meteor showers, phases of the moon, and other astronomical information, plus important and popular holidays. The CQ calendars are not only great to look at, but they're truly useful, too!

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on board, and then walk back to OEM for additional communication duty.

Georgia Baptist Hams Respond

Hams from around the country responded to the attack on America. Feeding the rescue workers was a major job at all of the crash sites. In New York City and Washington, over 238,717 meals were prepared by the Southern Baptist Convention Relief effort during the first 17 days of the operation. The feeding units are perhaps the best known of the Baptists' disaster relief activities. In a major disaster the Baptist feeding units prepare and cook 95% of all meals served by the American Red Cross. In addition, they provide clean-up and recovery units, child care units, water purification units, shower units, and communications units. There are two communications units in Georgia, one in Gainesville and the other in Moultrie.

Terry Jones, W4TL, says "Our role is to support the Georgia Baptist Disaster Relief Operations during a local or state disaster and to support the Southern Baptist Convention Relief effort in a national disaster when called upon. Members of our communications unit are no strangers to working in disaster areas. We have served in numerous local and state disasters and have traveled to different parts of the southeast and even Puerto Rico in national disasters since our unit was organized in 1996. Our communications unit is tasked with the responsibility of setting up and maintaining a reliable communications link complete with equipment and amateur radio operators at each of our disaster relief unit locations in a disaster area to provide invaluable logistical support for these units."

The communications unit is equipped to respond to all types of disasters. Their 18 foot trailer has two completely portable commercial-grade UHF repeaters, and several 50 watt VHF/UHF base and mobile units complete with antennas, power supplies, etc., so they can set up base units at several locations. In addition, the unit contains masts, a generator, antennas, HF radios, a computer, fax, and telephone equipment.

Jones explained that the amateurs use the callsign W4CBA when they are in the field. The vanity call is synonymous with their sponsor, the Chattahoochee Baptist Association of Gainesville, Georgia. The group also sponsors the W4CBA (444.625 MHz) repeater located on Sawnee Mountain in Cumming, Georgia. All of their equipment was bought by and is financially supported by the CBA, which is a group of organized Baptist churches in the Gainesville, Georgia area.

Time to Respond

Early afternoon on September 11 Jones received a phone call from the Georgia Disaster Relief Task Force asking that the communications unit be placed at OPCON 4. This is a notification that there has been an incident and there may be a need to respond.

"At 10:30 PM I received another call placing our unit at OPCON 1 (GO) for deployment to New York City," said Jones. "Our group spun into action and the next morning Ed Cravey, KF4HPY, Phil Loggins, K4PDL, and I were readying the unit for deployment when we discovered that someone had stolen the battery from the unit and had stripped some of the electrical wiring." The unit was ready to go by Wednesday afternoon.

Jones picks up the story:

> While all of this was going on, our Unit Off-Site Director, Peggy Parrish, K4PEG, began soliciting volunteers for this deployment. We knew it would be at least a week's commitment for this mission and that was explained to our volunteers. Ed, Phil, and I packed our bags and were on the road early Thursday morning, the 13th. After driving non-stop for 18 hours, except for fuel and to eat, we arrived at the Raritan Valley Baptist Church in Edison, NJ, which had been selected as a staging area for our volunteers to report to for this operation."
>
> Also responding were Jackie Whitlock, N4JJW, his wife Terri, and Ray Fowler, KE4UWX. Others in our group came to New York to fill 'gaps,' and relieve those who had to return home during mid-week. They included Howard Griffin, KD4CPK, Jim Hadder, KE4ZX, Eddie Moore, W4REV, Clyde Thomason, N4FCL, and Ed Henry, W3EDH.

Getting Set Up

The Red Cross had asked for four Southern Baptist kitchens to support the New York relief operations. The following kitchens were activated: NY, VA, TN, and KY. The NY and VA kitchens set up together as one at the Navy Shipyard in Brooklyn. The TN kitchen set up at the UPS Terminal in Manhattan, and the KY kitchen set up underneath the Brooklyn Bridge on the Brooklyn side. Communicators and equipment were set up at these locations to provide the much needed logistical support for this massive feeding operation. The Southern Baptist Feeding Coordinator was stationed at the Mass Care Office at the Red Cross in Brooklyn and communications were set up at this location as well. This installation presented us with somewhat of a challenge for communications, as we could not get to the top of the building to erect a suitable antenna. In this case amateur ingenu-

ity sprang into action, and we were able to erect a cantilever antenna to fit the need.

It was necessary that all of these locations be able to communicate over a distance of approximately 30 miles back to Edison, NJ, and this required that we all have gain antennas at a respectable height. HTs were totally useless in our operation because of their limited range and all of the intermod in New York and Brooklyn. Most of the repeaters in the New York area were busy with other traffic (ARES, Red Cross shelters, etc.), so it was hard to find a repeater that we could really depend upon.

I managed to locate a repeater on 147.225 which was owned and operated by the New Jersey Institute of Technology Amateur Radio Club . . . After making contact with those responsible for the repeater, they relinquished this frequency for our use, of which we are very appreciative. We also made use of 146.565 simplex and were able to use this frequency for most of our traffic.

We maintained a reliable communications link with the four units in Brooklyn and Manhattan and the staging area in Edison, NJ. I had doubts as to whether this would work because many of the antennas were much lower than surrounding buildings, but the gain antennas and an average height of 35 to 40 feet with 50 watts did the trick. We were not able to utilize our portable UHF repeaters because there were others in the area on the same frequency. Making our portable repeaters operational would have caused interference to NY repeaters. Intermod in New York City and Brooklyn was terrible and was the worst I had ever experienced in my 35 plus years of amateur radio. Being able to provide communications in these conditions proves that amateur radio is still an integral part of disaster and emergency communications. We are able to utilize what resources we have at our disposal to get the job done.

The Georgia Baptist Communications Motto is: "Getting the Message Through," and that is exactly what members of our group did.

The entire group returned home on September 23rd.

Jones's role in this effort was to coordinate and supply communications operators for the various units in the affected area. He explained how it was done:

"We set up our communications unit (KF4HPY) at the 'staging area' at Raritan Valley Baptist Church in Edison, NJ. Operators were placed at the three feeding units, which were located in Manhattan, Brooklyn (N4JJW and KE4EWX) and one at the Red Cross (KE4UWX) to 'shadow' the 'white hat.' The 'white hat' is the designated on-site coordinator for the Southern Baptist operation.

According to Jones, "Our 'white hats' are by design feeders. They realize that they need us to be able to communicate with our units in a disaster. This put everyone in contact with each other."

All volunteers (feeding, shower, and communications) reported to the Edison staging area. Here they were briefed as to operations and what to expect and provided with maps and directions to get into the area.

"I made daily trips into the affected area to ensure that equipment and personnel were operating at maximum efficiency," said Jones. "We had to make equipment changes a couple of times to get our system perfected."

The group did not work with the local ARES/RACES operators in this case. An offer was made to the local District Emergency Coordinator and Emergency Coordinator telling them that the group's assistance was available if they got into a pinch. According to Jones, "Our operators were quite busy the entire operation providing logistical communications for our operations."

Support from Near and Far

It was apparent that this was going to be a long-term operation. Amateurs supported the Red Cross for 15 days, and the Salvation Army was still being supported in early October as we went to press. In fact, a new appeal for help went out on October 5th.

Amateur radio support was required both day and night. It was critical to know who was available on what day and at what time. Initial availability reports were taken via radio, e-mail, and telephone, but then the ARES/RACES operation got a boost with a website set up for them by a ham in Florida.

Joe Tomasone, AB2M, lives in Florida but was an Emergency Coordinator when he lived in New York. He just could not sit at home and do nothing. Contacting the ARRL leadership in New York, he offered to set up an online database where volunteers could register their availability. District Emergency Coordinator N2NFI outlined a volunteer database and worked with Tomasone to get this tool operational. It was approved by the New York City ARES leadership and went into production five days after the attack. This reduced the phone-line traffic to all the recruiters and streamlined the recruiting routine.

Tomasone says the database was developed in PHP (www.php.net) with a MySQL database (www.mysql.com). "The EC (or Red Cross, in this case) just goes to a pretty flexible query page," says Tomasone. "It allows a search on any field, sortable by any field. You can view the results in a browser or download them as a comma delimited file to use in Excel, etc."

The website told prospective volunteers what was expected of them in New York City. It said:

Before you register, please understand the following:

Operators are still needed, but this is a difficult assignment.

- ***At this time, you must be 18 or older to volunteer.***
- Volunteers must be able to get to NYC on their own and provide their own lodging.
- Amateurs are working in 12-hour shifts (***6am to 6pm*** and ***6pm to 6am***)
- This duty requires a serious commitment.
- Parking is available, but be advised that it is on the street.
- A half-day is required prior to scheduled shift for orientation and ID procedures.
- ***Please do not report for duty unless you have been assigned to a shift by telephone.***
- ***Please be patient.*** The scheduling folks will be referencing this database to match volunteers to tasks. You may be called immediately. You may be called in a few days. You may not be needed at all. This is especially true the farther away you are from New York City.

Required Items:

- Government Issued ID (with picture—driver's license, passport, etc.)
- Amateur Radio License or a photocopy thereof
- Dual Band Mobile Radio (at least 25w). Dual Band capability is required
- Dual Band HT as a spare radio—with extra batteries
- Power Supply for above (AC)
- Headphones
- Mag-mount dual band antenna
- 25–50 ft. heavy-duty power extension cord
- Power Strip with multiple outlets
- At least 25 ft. coax for antenna
- Appropriate connectors
- Cigarette lighter plug power adapter cable in case you are assigned to a vehicle
- Small suitcase or hand truck to lug everything around
- Snack bars
- Medication if you need it.

Suggested Items:

- Tools, fuses, other items to effect repairs as applicable (suggested by a fellow amateur)
- Operator Manuals for radios

Tomasone reported that "570 amateurs registered themselves, their time, their equipment, and their expertise to serve their fellow man." Hams from 35 states, including some on the west coast, and two Canadian provinces registered to help.

"I've received near rave reviews both from the ARES leadership in NLI and from the ARC (American Red Cross) staff," says Tomasone. "Some of their requests were added. These included a 'Worked Job' field which indicated they had been assigned to a location on a previous day." In addition, he added the capability of downloading a comma separated value (CSV) or flat file.

"Based on the logs, they are using it quite extensively," said Tomasone. "I don't have complete details on how they are using it, but I do know that they look for volunteers for a given shift (say, for the night shift on the 24th) by searching the Available field for '24.'"

They use the Status field to mark who has been called/e-mailed, etc. Rob Mather, N1XSS, of Shelton, CT, is querying the database from home for scheduling purposes and making telephone calls from there.

Tomasone said, "The 'rave reviews' caught me quite by surprise. This is no rocket science here. I must admit to being surprised that something similar hasn't been developed before. Guess no one had the idea."

According to Mather, "The web site has been very helpful. It allows us to call people for assigned shifts and fill them in advance. This has kept Net traffic down to only priority traffic. With the number of radio operators needed per day this has made the job of keeping shifts filled without the confusion of who is on and who is off."

In mid-October Tomasone was notified by the Library of Congress that it intended to include his website in a collec-

tion of digital materials created in response to the September 11 attacks.

Memories

"Some things that will be in my memory forever," said Jones, "are the heavy smoke that continued to rise from the site a week after the event and the smell of smoke as you got closer to Ground Zero. You could even smell the burning as far away as Edison, NJ, the staging area. Seeing the faces of the rescue workers, with a look of emptiness, such as you would see if someone had lost their best friend, which in many instances was exactly what happened."

He continued, "The high visibility of increased security in the area. Everyone in New York City was in a somber mood. There were no auto horns blowing as you would expect as you travel down streets in Manhattan."

"Our thanks go out to each of you who helped out," said N2GA. "We should be proud that our 'hobby' really does become a 'service' in times like these. I am proud to be an amateur radio operator and an American."

Tranos offered some advice to all involved with public-service events: "It is extremely important that you have a structure in place that can be activated at a moment's notice with little direction. It should be set up in a way in which the absence of any one individual does not prevent the call-up and activation. In addition, it is important to be able to request additional aid up the chain of command when events become so large that local jurisdictions are overwhelmed.

"Our system works," says Tranos. "Local ECs and AECs who normally deal with events on their own passed requests for assistance to the DEC and then SEC. They in turn worked with their counterparts within the section and between sections. The concept of mutual aid and cooperation is important. It is most important that you have effective leaders in key roles. My section SEC, Tom Carrubba, KA2D, showed the way and was instrumental in the administration, organization, and logistics of the operation."

Carrubba extended a thank you to all those who served, in whatever capacity, during this disaster. He emphasized, "ARES must continue to train, drill, and be at the ready."

Amateur Response Continues; So Does Our Coverage

As we go to press amateurs from around the country are still supporting the Salvation Army in New York City. There are still stories to be told of amateurs helping at the Pentagon and in western Pennsylvania. We'll focus on their experiences next month as we continue our coverage of this tragic event. This month we want to thank N3NVA, W4TL, N2GA, AB2M, and N1XSS, for their assistance with this story.

Do You Have a Story to Tell?

We would like to hear how you are serving in the public interest in your community. As always, it's a pleasure to be able to help tell your story to other ham radio operators around the world. Drop us a note. The best to all in the new year. Until next time . . .

73, Bob, WA3PZO

Amateur Satellites

BY PHILIP CHIEN, KC4YER

Ham Radio in Space

OSCAR-1's 40th Anniversary

December 12th marks the 40th anniversary of active amateur radio transmitters in space. OSCAR-1 (Orbiting Satellite Carrying Amateur Radio) was launched on a Thor-Agena B launch vehicle, along with the Discoverer 36 spacecraft. Officially, Discoverer was an Air Force research program with various biology experiments and capsules which would return the completed experiments back to Earth. However, it actually was just the code name for the top-secret Corona spy satellites. Instead of mice and frogs, the capsules contained thousands of feet of film filled with photographs of strategic targets in the Soviet Union and other adversary countries.

OSCAR-1 was the first secondary payload to fly on any rocket, and it helped pave the way for future small satellites. It was built by hobbyists who donated their own time and skills. Eventually, after getting asked one too many times, one of the team members calculated that the out-of-pocket cash outlays totaled about $26, including the retractable tape measure used for the antenna. Of course that doesn't include things such as contributed time, access to laboratories and resources, travel, or other expenses necessary to make the project happen.

By today's standards OSCAR was a rather unsophisticated satellite. It was about the size of a toaster and only had a 2 meter beacon which transmitted "HI" in Morse code. The speed of the transmissions was proportional to the spacecraft's temperature, providing a crude form of telemetry. The two-transistor transmitter generated 140 milliwatts at 145 MHz—not much, but 14 times the power of the first U.S. satellite, Explorer 1, launched just three years earlier.

All together OSCAR-1 was heard 570 times by hams in 28 countries during its 22 days in space. A mockup of OSCAR-1 was donated to the Smithsonian in 1963. It's in the Air and Space Museum's permanent collection and currently in storage in Building 24 at the Garber facility in Suitland, Maryland.

Discoverer 36 with its KH-3 (Keyhole) camera was also successful. It spent four days in space before its film capsule was recovered in the Pacific Ocean. In 1995 the U.S. government declassified the Corona program and released the images to the National Archives.

In the 40 years since OSCAR-1's launch, worldwide groups have built about 50 amateur radio satellites (the exact number depends on whether you count various satellites which failed to ever transmit anything and pirate satellites using ham frequencies). They have ranged from simple beacons with primary batteries to extremely sophisticated satellites with multiple linear transponders and large solar arrays. In addition, ham radio has

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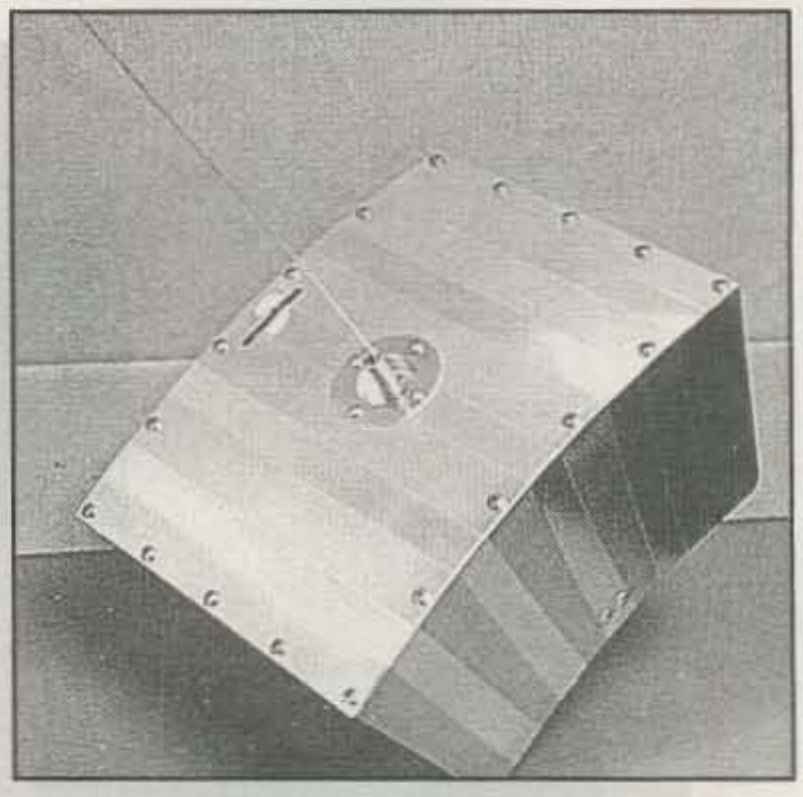
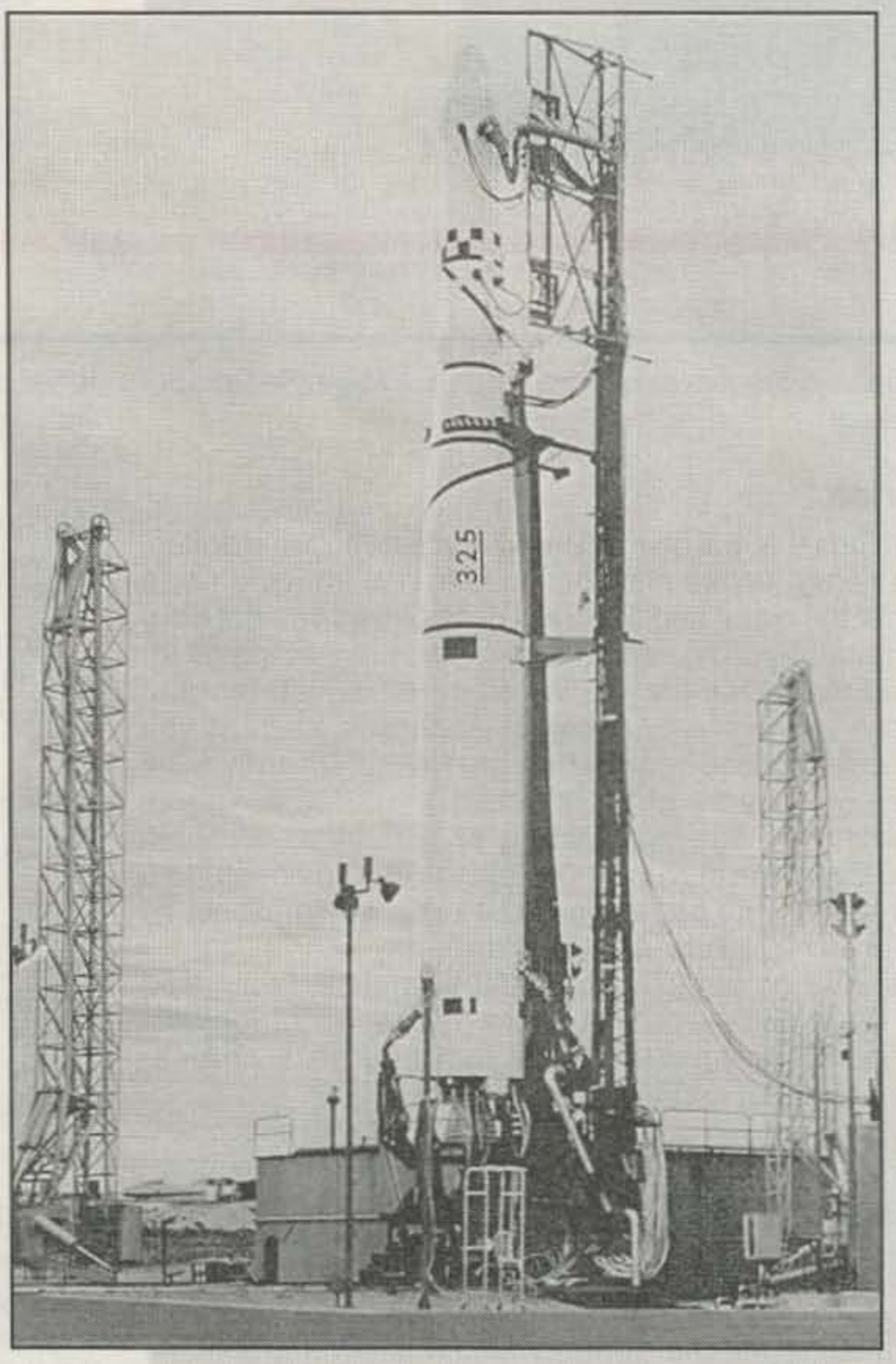


This mockup of the OSCAR-1 satellite is part of the permanent collection of the National Air and Space Museum. (Photo via KC4YER)



A rare photo of the Discoverer 36/OSCAR-1 launch vehicle. (Photo via KC4YER)

been flown on over 20 shuttle missions and had permanent presence on the Russian Mir and International Space Station projects.

From the Past to the Present

The most recent ham satellites placed in orbit are Starshine, PCsat, and Sapphire. They were launched with the non-amateur Air Force Picosat on the Kodiak Star launch on September 30, 2001 at 02:40 UT. What's significant is the launch location—Kodiak Island, Alaska. With high hopes, the state of the Alaska paid for a launch facility. Alaska hoped to attract customers interested in putting small satellites into polar orbits, but they highly overestimated the market by using only the most optimistic projections for a giant increase in aerospace spending and ignoring more realistic projections. Thus, with extreme embarrassment, the Kodiak Star will almost certainly be the only launch ever from the "Alaska Spaceport" instead of the eight to ten launches per year originally projected.

Why a conglomeration of four very small payloads? That story goes back to some of NASA's earliest "Faster, Better, Cheaper" satellites which didn't live up to their expectations. NASA's Clark spacecraft was supposed to have a hyperspectral imager, collecting thousands of frequencies of light instead of a typical Earth Resource satellite's seven to ten bands. With a hyperspectral imager you can tell apart different species of plants, which can improve agriculture. Clark went far over budget, though, and was given the axe, so NASA had a spare launch vehicle. It was assigned to the Vegetation Canopy LIDAR (VCL) mission, which had outgrown its planned Pegasus XL launch vehicle. However, VCL was behind schedule and over budget and clearly could not make its planned launch date. Meanwhile, the Athena launch vehicle originally built for Clark, and then assigned to VCL, was sitting in storage—and an extremely expensive storage. Lockheed-Martin was charging NASA $9 million each year to keep the Athena launch team together, since that vehicle was the only remaining Athena customer. NASA had to decide whether or not to use the $38 million it had already invested in the launch or cut its losses. A call was made to find suitable satellites which could be finished quickly to use the leftover Athena launch from Alaska (previous Athenas had flown from Florida and California).

NASA's Starshine 3 satellite is technically a 470 nanometer band CW passive re-transmitter—or in less geeky terms, it flashes every now and then when the sun angle between the satellite and observer is correct. Starshine has often been called a space disco ball, a pretty accurate description. Unlike the previous Starshine 1 mission, Starshine 3 has a 2 meter telemetry transmitter. While 9600 bps FSK is overkill for Starshine's needs and beyond the capabilities of many hams, the hardware was available off-the-shelf. It's the backup of a similar system for the SEDSAT satellite. Starshine transmits telemetry on 145.825 MHz and there are instructions on the Project Starshine web page for how to decode the telemetry.

The Department of Defense contributed $9 million to fly three satellites—Picosat, PCSat, and Sapphire. Picosat is an extreme misnomer. It's actually a standard University of Surrey UoSAT 50 kg mini-satellite, the same model used for many ham radio satellites, including UO-14, UO-22, KO-23, etc. However, it was smaller than most Air Force satellites, so they decided to name it "Picosat." The Air Force purchased the satellite from Surrey as a

September 30, 2001 launch of Kodiak Star mission from Alaska. The rocket carried three amateur satellites into orbit—Starshine, PCsat, and Sapphire. See text for details. (NASA photo)

Notes:

Russian cosmonaut Yuri Usachev uses the ISS's ham radio transceiver.

Due to a production error, a photo in the October "Amateur Satellites" column was cropped incorrectly, showing the wrong cosmonaut and leaving out the ham radio rig completely. Shown above is the complete photo.

Other URLs related to this month's column:
Project Starshine: <http://www.azinet.com/starshine/>
PC Sat: <http://www.ew.usna.edu/~bruninga/pcsat.html>
Sapphire: <http://ssdl.stanford.edu/aa/projects/squirt1/sapphire_overview.html>

testbed for several experiments, but U.S. law requires the purchase of American launch vehicles (which makes sense; why should the U.S. taxpayer give money to a foreign aerospace firm instead of a U.S. firm?). That's also far more expensive. Clearly, UoSATs have flown many times on Ariane 4 launch vehicles and have also flown on Russian vehicles and at a far less expense. That's what happens when politics and nationalism combine. Picosat will be operated by students at the U.S. Air Force Academy.

Sapphire was built by students at Stanford University with the hopes of eventually obtaining a ride to space. None was available, though, so it sat in storage for several years and the team dispersed and went on to different projects. Sapphire was ready to fly and a deal was made for the U.S. Naval Academy to operate and maintain the satellite in orbit.

The Naval Academy had wanted to put its own APRS (Automatic Position Reporting System) satellite into orbit for some time. APRS enthusiasts put heavy pressure on other satellites to permit the use of APRS for experiments and operations. At one point Bob Bruniga, W4APR, encouraged APRS users to digipeat APRS through Mir over the objections of Mir's control operators and only backed down after strong opinion against his attitude.

So far APRS via satellite has not impressed anybody other than the die-hard APRS crowd. While they're claiming great successes, the statistics they report have not shown any significant improvements over non-APRS transmissions. Only 19 contacts on a trans-continental pass is not something to crow about! However, the Naval Academy now has its own satellite dedicated to APRS and time will show whether or not it is practical. In theory, it can be a useful tool, especially for mobile users interested in telling the rest of the world where they're located—in theory. That assumes everybody obeys the rules, including the restrictions on transmission power and how often you transmit. In the real world there are many pirates in the 2 meter satellite band, including countries where radio restrictions are lax and many areas where hams don't realize 145.800 to 146.000 MHz has been allocated to amateur satellites by internationally agreed upon band plans.

The PCSat website has a "contract" outlining the "required" transmission levels and procedures. The site instructs you to sign the agreement if you want to use the satellite. Supposedly, the requirement to sign the contract was made tongue in cheek. Obviously, there's no way the PCSat control operators could ever expect to enforce such a contract in a court of law.

Of course, if the Naval Academy control operators expect PCSat users to follow their recommendations for maximum power and transmission frequencies, it would be nice if they set a good example by using the same procedures on ISS. The Naval Academy station is one of the heaviest "alligators" on ISS's packet rig with frequent high power transmissions whenever ISS is in range. Maybe now that they have their own satellite, they'll back off on ISS and lower power stations attempting to send packets through ISS will have a better chance of getting through. In any case, for those who have wanted to use APRS via satellite there's now a dedicated resource available.

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SS-12	10	12	1⅛ x 6 x 9	3.4
SS-18	15	18	1⅛ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅝	4.2
SS-30	25	30	3¼ x 7 x 9⅝	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅝	4.2
SS-30M*	25	30	3¼ x 7 x 9⅝	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅝	6.5
SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅝	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30-2	25	30	3½ x 19 x 9⅝	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
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VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

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SS-12EFJ
SS-18EFJ
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SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

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*ICS – Intermittent Communication Service

Washington Readout

BY FREDERICK O. MAIA, W5YI

Regulatory News In The World Of Amateur Radio

United Kingdom Restructures its Amateur Radio Licensing

New Foundation License Basically Ends Morse Testing for Beginning HF Operation

"The aim of the Foundation License is to facilitate a simple entry into Amateur Radio as a hobby where you will be able to make friends from all walks of life. We hope that as experience and confidence increase, Foundation licensees will progress up the Amateur Radio ladder to obtain a more advanced Amateur license, with all its attendant privileges."

. . . RSGB statement

On September 21, the UK's Radio Society of Great Britain and its Radiocommunications Agency jointly announced a series of changes to amateur radio licensing designed to make amateur radio more attractive to beginners. The RSGB is the national amateur radio society in Great Britain; the RA its government telecommunications regulatory agency.

The RSGB and RA, which had been working on restructuring their Amateur Service for some time, de-emphasize Morse code at the beginning level. In fact, they basically eliminate it in the new Foundation license—even for HF operation!

The restructuring includes lowering the Morse code speed requirement to 5 words per minute for full licensees, combining some license categories, allowing trainees to operate while supervised before passing an examination, and the introduction of a new Foundation Class license for newcomers. The changes had been widely rumored for months, but there were some surprises.

Summary of the New UK Ham Radio Lineup

Under the old rules there were three license classes in the United Kingdom. The "Full" license had two versions—Code and No-code. The Class "A" (all band) Full required a 12 wpm Morse exam, while the Class "B" Full (VHF and above) had no code requirement. Both permitted 400 watts output power. Their Class A/B level (with a 5 wpm code proficiency requirement) yielded all band privileges at reduced (100 watt) power output. The 10 watt Novice Class also had two variations—(all band) 5 wpm code and (VHF and above) no code (see Table I). There are no CW-only segments in Great Britain, and the RA says it has no plans to set aside some parts of HF for exclusive Morse operation.

Previous License Class	New License Class
	Full
Class A – 400 W	A – 400 W all bands, 5 wpm Morse test
Class A/B – 100 W	A – 400 W all bands, 5 wpm Morse test
Class B – 400 W VHF	B – 400 W VHF and above (effective October 2001)
	Intermediate
Novice A – 10 W	A – 50 W all bands, 5 wpm Morse test
Novice B – 10 W VHF	B – 50 W VHF and above (effective October 2001)
	Foundation
	10 W most bands from 135.7 kHz to 440 MHz, Morse assessment (effective January 2002*)

**Anticipated implementation date.*

Table I– Summary of the new UK license classes.

Earlier this year the European Conference of Postal and Telecommunications Administrations (CEPT) recommended that the Morse requirement for their Class 1 license (equivalent to a UK Full Class A) be reduced from 12 to 5 wpm. CEPT is a federation of telecom agencies across Europe. This has provided the Agency with an opportunity to review the amateur licensing structure.

In line with the CEPT recommendation, effective October 1, 2001 the UK Full Class "A" and "A/B" was combined into the 400 watt Full Class "A" license and the Morse code testing requirement was reduced to 5 wpm. Class A/B license holders are being offered the choice of either retaining their existing M5 callsign or change to an MØ prefix.

The current 400 W Class B does not change. It still will authorize 400 watt operation on all bands 6 meters and higher. The current 10 watt Novice (all band) "A" and "B" (VHF and above) class has been renamed the Intermediate Class and output power to the antenna has been increased to 50 watts.

The big news, however, is the establishment of a new beginning "Foundation" Class level. Although primarily aimed at

UK Foundation Class License		
Frequency Band	**Power**	**Mode**
135.7–137.8 kHz	1 W erp	
1810–2000 kHz	10 W output	
3.5–3.8 MHz	10 W output	
7.0–7.1 MHz	10 W output	
10.10–10.15 MHz	10 W output	(All bands)
14.000–14.35 MHz	10 W output	Morse
18.068–18.168 MHz	10 W output	Telephony
21.00–21.45 MHz	10 W output	(AM/FM/SSB)
24.89–24.99 MHz	10 W output	RTTY
50–52 MHz	10 W output	Data
70–70.5 MHz	10 W output	Facsimile
144–146 MHz	10 W erp	SSTV
430–432 MHz	10 W output	(FSTV –
432–440 MHz	10 W erp	above 50 MHz)

Table II– Frequency, power, and mode privileges accorded to the United Kingdom's new Foundation Class license.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (telephone 817-461-6443) e-mail: <w5yi@cq-amateur-radio.com>

youngsters in the 9- to 11-year-old age bracket, the new license class is available to anyone. It essentially yields 10 watt all mode, all band operation between 135.7 kHz and 440 MHz—except 10 meters (see Table II).

The Agency and the RSGB hope that by introducing this new license level amateur radio will become more attractive and accessible to both young and old, and that by taking this first step onto the licensing ladder, Foundation licensees will be motivated to undertake a process of self-training to acquire higher license privileges.

The absence of 10 meters is intended to discourage CB operators from operating with increased power in the amateur 10 meter band. Foundation license equipment is required to be commercially manufactured transceivers or kits which do not provide access to 10 meters. If CBers want long-distance communication privileges, they must be trained for the Foundation license by other radio amateurs.

At present, the UK Radio Amateur Exam (RAE) program is administered by the City & Guilds Institute, a London-based vocational testing operation. The RAE is held twice a year and is a two-part multiple-choice exam that tests electronic theory, license conditions, interference, and operating procedures. The Novice RAE is held four times a year at City & Guilds exam centers.

Future plans are, however, for the RSGB and ham radio clubs to assume the amateur radio training and testing function. Thought is being given to using "new examination technology" (otherwise known as computers), with each candidate being administered a unique examination. Also being considered is "e-licensing" (or electronic authorization).

Since "G" prefix callsigns have run out in England, amateur radio licensees are now issued callsigns beginning with the letter "M"; Novices get "2E" prefix callsigns. (Scotland ham prefixes are MM and 2M for Novices; Wales MW and 2W; Northern Ireland MI and 2I; Isle of Man MD and 2D; Jersey MJ and 2J; and Guernsey and other possessions MU and 2U.) UK Foundation Class callsigns will come from the "M2" prefix series. (A Scottish Foundation license would have an MM2 prefix.) You will even be permitted to select your own suffix if it is available, such as M2JIM.

The UK's New "Foundation" License

The new amateur radio restructuring was formally announced in a joint presentation by the RSGB and the UK's Radiocommunications Agency at the Leicester Amateur Radio Show and Convention held September 21 and 22, 2001 in Leicestershire, England.

Commenting on the new Foundation license, Martin Cain, Head of the Radiocommunications Agency's Specialist Sectors Unit said, "There has long been a need to stimulate further interest in amateur radio in the UK. My colleagues and I firmly believe that the Foundation license, coupled with the support of existing radio amateurs, will go a substantial way to achieving this aim."

Don Beattie, G3BJ, president of the RSGB, warmly welcomed agreement on the new Foundation license. "We now have a more accessible entry point for those who want to become radio amateurs," he said. "Hopefully many will go on to grow in technical skill and competence through qualifying at the more advanced levels of licensing."

He asked all UK amateurs " . . . to help make the new Foundation license the success it deserves to be." The new UK ham radio licensing structure will be the final change prior to the World Radiocommunication Conference in 2003. The Foundation license will be introduced at the beginning of 2002. The RA said that a revised integrated structure of qualifications and examinations for the various licenses is planned to be implemented on January 1, 2004.

It is widely expected that WRC2003 will remove the Morse requirement. If it is

abolished, the "A" and "B" class distinction in the current Novice/Intermediate and Full licenses will be removed.

Obtaining the Beginner's License

Study for the Foundation license will be able to be completed over a weekend or even a single day. The training, based on an 8 to 10 hour course conducted by radio amateurs, will focus on supervised on-the-air operation, practical "hands on" instruction on operating procedures, essential regulations, avoiding interference, simple construction practices, basic radio theory, and safety.

In addition, to encourage the practical aspect of amateur radio training, unlicensed trainees in a registered training course may operate a station and contact other UK licensed amateurs when supervised by full license holders.

The concept is basically one of "apprenticeship" overseen by amateurs and/or school teachers utilizing a course textbook. The focus will be on knowing "what to do" and "what not to do" on the air. The RA is also considering relaxing the rules on supervised operation where there is no licensed school teacher.

At the end of the course, a simple 20-question multiple-choice examination will be administered by the instructor or some other "registered body," such as the local ham club. There will be a fee to take the exam, but the cost has not yet been determined. Anyone can take the test; there are no age restrictions. As with all UK ham licenses, there is also an annual fee of £15 (about $23 U.S.), but the license will be free to those under age 21 or 75 years or over. Pilot lessons are already being run to evaluate the syllabus and training material.

The RA expects the new entry-level system to be operational in January 2002. The RSGB will be handling much of the routine administration of the training and examination process. At the end of the course the examinee applies to the RA for the license, enclosing a copy of his or her "Foundation License Training Course Completion Slip." All UK ham operators are required to keep a log of all transmissions, except those being made while operating mobile.

The Foundation license started out as a 25 watt VHF/UHF class using only commercially-made equipment. However, the RSGB wanted a way for trainees to be able to operate HF and assemble home-built "QRP kits," and this has been approved by the RA. The kit must be commercially available and not require test equipment or extensive electronic construction practices to be completed.

The use of home-built transmitters (that is, equipment constructed by the amateur without using commercially produced kits) will not be allowed under the Foundation license. The reason for this is that greater technical knowledge is required to properly construct home-built equipment than the Foundation course would provide, and there is a risk that the equipment may cause interference to other radio users.

The Foundation license is designed to compete with internet chat that has no exams and no restrictions at basically "zero cost."

HF Operation with Essentially No Code

Realizing that one of the greater interests in ham radio is the ability to contact amateurs in other countries, the RSGB and RA wanted to find a way for beginners to be able to operate HF voice without learning the code. The International Radio Regulations require that to operate on the HF frequencies an amateur operator must "... prove that he is able to send correctly by hand and to receive correctly by ear, texts in Morse code signals." There is no speed requirement, nor do the international rules specify how this proficiency must be demonstrated.

The RA and RSGB have now agreed that this requirement will consist of a "simple assessment" whereby the examinee will be permitted to use crib sheets to encode messages into Morse. For example, one of the 20 examination questions might be: "What is the letter 'A' in Morse code?" The applicant would look at the chart of alpha/numeric characters and corresponding dot-dash sequences and write down the text—the single letter "A" as a dot and a dash—and then send it. The same would work in reverse when decoding a series of dots and dashes. You would hear and write down the dot-dash sequence and then, using the look-up crib sheet, translate them into letters. This is to comply with current international amateur HF access regulations until after WRC- 2003, when it is assumed that the Morse testing requirement will be removed.

This means that anyone with absolutely no knowledge of Morse code would easily be able to pass the telegraphy "assessment." This Morse code proficiency "test" is not just a proposal. It is exactly how the United Kingdom will be administering code exams to Foundation Class applicants.

Impact on the United States?

Will the UK's new approach to amateur licensing have any effect here in the United States? It is doubtful, at least for the near future. The FCC, having just restructured the amateur licensing system here, is not likely to revisit anything to do with licensing for several years, and certainly not before 2003's World Radiocommunication Conference and any changes that come out of that. However, the FCC will no doubt be watching to see how well it works.

73, Fred, W5YI

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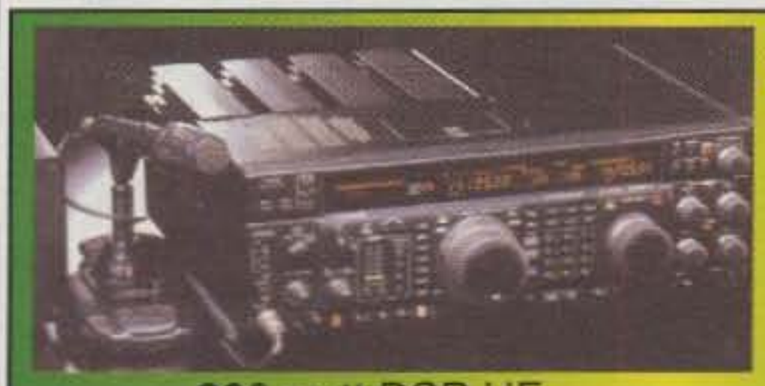

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Computers and Internet

BY DON ROTOLO, N2IRZ

Ham Radio's Online Connection

Fifty Years into The Computer Age

The year 2001 marks not only the 100th anniversary of transatlantic radio communication and the 40th anniversary of the amateur satellite program, but also the 50th anniversary of the computer's influence on our lives. N2IRZ looks back at the history of computers. —W2VU

In the beginning there was ENIAC. Before the beginning there were abacusses (abaci?), Pascal, Babbage, and von Neumann, but the first *electronic* computer was the Electronic Numerical Integrator And Computer, fondly known as ENIAC.

ENIAC was built for the United States Ballistics Research Lab during World War II to calculate ballistic tables. I couldn't find the clock speed, but it could perform 5000 additions or subtractions every second, a blazingly fast speed in the mid-1940s, and over 100 times faster than any mechanical system.

ENIAC was built with hollow-state devices—nearly 18,000 tubes—and barely fit into a very large room. It was programmed by hard-wiring modules to perform tasks in a specific sequence. It could perform nested loop programs (such as FOR N = 1 to 25), and the programmers (mostly females) discovered that they could perform a "magnitude discrimination" operation, which we know as the IF...THEN or conditional branch, a key instruction in modern programming languages. Punch cards and printers were used to get data into and out of the machine. To read a copy of the user manual and then operate a simulated ENIAC to get a better sense of what it was like, visit <http://www.seas.upenn.edu:8080/~museum/qman/node2.html>.

The first commercial computer was the Universal Automatic Computer, or UNIVAC (photo A), introduced a half-century ago, in 1951. The first UNIVAC was used by the U.S. Census Bureau, and later customers included the U.S. Air Force, U.S. Army, the Atomic Energy Commission, General Electric, U.S. Steel, and Metropolitan Life. UNIVAC became a household word when UNIVAC I correctly predicted Eisenhower's landslide victory in the U.S. Presidential election; most thought it was going to be a lot closer election than it was.

Photo A– The UNIVAC. The control console is on the left, I/O in the middle, and a small part of the main frame is on the right. Note the oscilloscope at the far left, used for diagnosis and monitoring. (Photo courtesy John W. Mauchly Papers, Rare Book & Manuscript Library, University of Pennsylvania)

The UNIVAC I was a huge device, nearly 1000 cubic feet and 15 tons, running with an 8 kHz clock and 9 kb of memory. It was this computer that is generally credited with bring computers into regular business use, a fact for which Unisys humorously apologized on the 50th anniversary of its public introduction last June. Browse to <http://www.unisys.com/news/releases/2001/jun/06148026.asp>.

However, even the UNIVAC was still built with vacuum tubes. In 1952 the transistor was a costly and still rare device, with most of the commercial offerings being of the point-contact type, virtually hand-made (see photo B). The first computers built with transistors entered the market in 1956, dramatically altering the fledgling computer industry.

Until the early 1970s only businesses bought computers. Some hobbyists were designing their own computers, or adapting obsolete models—witness the founding of the American Computer Society in 1966—but only a few chipsets were available, mandating considerable effort to build anything. In 1973 the first complete kit, the Scelby-8H, was sold by Scelbi Computer Consulting Company for $565 with 1 kb memory. A 15 kb upgrade was available for $2700.

By 1974 both *Radio Electronics* and *Popular Electronics* featured computer construction articles, the latter for the Altair 8800, arguably the first "home" computer. Offered by MITS in kit form for $439, actual hardware and software—Paul Allen and Bill Gates' BASIC

Photo B– An early point-contact transistor, type A1768. This example was made during the early 1950s in Allentown, Pennsylvania and was given to me by Richard Wujciak, K2RW. Transistors made it possible to reduce the size of computers from building-size to desktop-size.

545 Baylor Ave., River Vale, NJ 07675
e-mail: <n2irz@cq-amateur-radio.com>

Correction

In the September column the resistors in fig. 3 are shown reversed. Thanks to Tom Simko, WB2IVM, for pointing out my error. I've included an improved circuit this month.

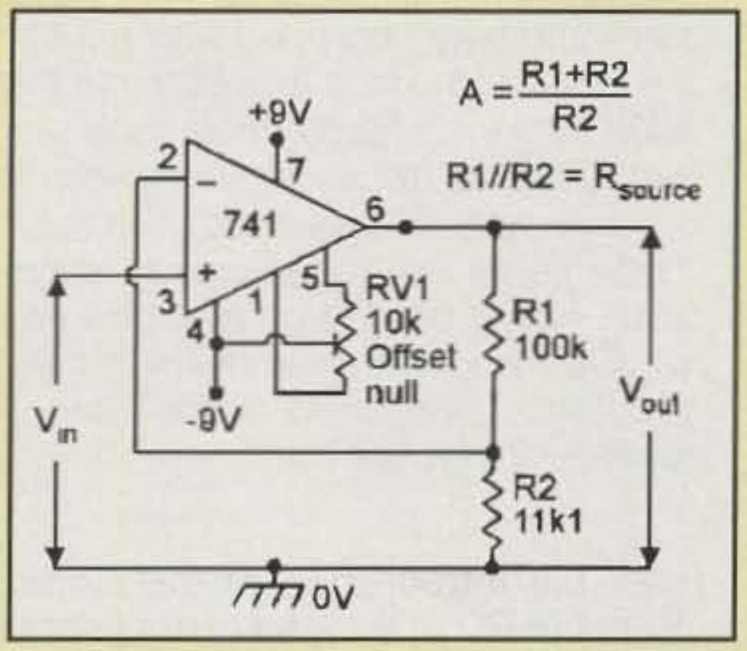

Fig. 3– A nice non-inverting DC instrumentation amplifier with a gain of 10 and the ability to null the DC output offset. This circuit was found in the August 2001 issue of Nuts & Volts, *in an article by Ray Marston and is reprinted with permission. This is a far better circuit than the very basic one I published in the September edition of this column. Gain = (R1 + R2) / R2.*

—wasn't available until the second quarter of 1975. MITS sold thousands of these. *(Students of computer history will correctly note that BASIC, the Beginners' All-purpose Symbolic Instruction Code, was actually developed by Dartmouth University Professors John Kemeny and Thomas Kurtz; however the BASIC included in the Altair was a version written by Allen and Gates.—ed.)*

Around this point is when the computer industry really took off. On April 1, 1976, Steve Jobs and Steve Wozniak formed the Apple Computer Company. In early 1977 Commodore showed prototypes of the PET, Microsoft became a company, and during the year Apple introduced the Apple II for $1300 and Radio Shack came out with the TRS-80 for $600.

At this point, you had a dozen or more companies competing for the home computer market. Only a few used a common Operating System (OS); most were standalones, requiring that you either wrote your own software applications (usually in BASIC), or bought whatever your computer's maker offered. Commercial applications such as Wordstar and VisiCalc had just come on the market, ported to a few popular machines, but there was no unified marketplace. The market included Hewlett-Packard, Sinclair, Apple, Radio Shack, Commodore, Osborne, Xerox, and, of course, IBM.

Then came the revolution: In August 1981 IBM introduced the first Personal Computer, the IBM PC, which ran the venerable Intel 8088 at a clock speed of 4.77 MHz. For only about $3000 you could get a single-floppy (5.25 inch, 160 kB) version with 64 kb of RAM, along with PC-DOS 1.0, BASIC, VisiCalc, Pascal, and Easywriter 1.0. If you had $6000 to spend, you could upgrade to the fully loaded version which included color

Photo C– My Heath-Zenith kit PC. Built by my colleague Aram Setian, it was the only way for me to get an IBM-compatible computer in 1988 for under $2000. It has a 20 MB hard disk, 640 kb RAM, a Paradise EGA video card, and was upgraded with a 720k 3.5 inch floppy drive in addition to the 360k 5.25 inch floppy drive. I still use it regularly as my packet computer. It is now nearly 20 years old, and in all those years it has failed only once, when I blew out the parallel port driver IC playing with a stepper motor driver. Since everything is socketed, I repaired it in a half hour.

graphics. The operating system was the Disk Operating System (DOS) from a little start-up called Microsoft, run by some guy named Bill Gates. IBM wanted to buy DOS from Microsoft, but Gates decided only to license it to IBM, a business decision with well-known results.

The entry of the IBM-PC and, in 1983, the PC-XT (with a 10 MB hard disk, $4995) was the start of the explosion of the PC industry. Despite the availability of well-known offerings such as the Timex Sinclair 1000 (under $100), the Commodore C64, and the Kaypro II, it was the introduction of the Compaq Portable PC at the end of the year that really made a splash. It was one of the first that advertised "IBM-PC Compatible." Compaq spent a million dollars to create an IBM-compatible ROM-BIOS that didn't violate IBM's copyright. Although "portable" can be argued ("Luggable" was more popular), it could run the software for the popular IBMs, offerings which included WordPerfect and Lotus 1-2-3.

In the mid to late 1980s even the word "explosion" didn't cover it. Along came the IBM PCjr, MS Word, Turbo Pascal, Apple's famous "1984" commercial and the Mac II, Amiga, C128, CD-ROMs, Intel's 80386DX, PS/2, OS/2, VGA, pre-3.0 Windows, and Excel. The 1990s saw Windows 3.0, Video Toaster, AMD's 386 clone chips, Mac system 7.0, laptops, 64 bits, Zip drives, Palm Pilots, and 1 GHz Intel Pentiums. Visit some of the websites listed in the Resources box if you're interested in the details. I just can't fit them here.

So went the birth of the personal computer industry.

Now that the brief history lesson is over, I'd like to reminisce about what it was like to actually use those early 1980s computers. In 1980 I was halfway towards my degree in Electrical Engineering, and the IBM-PC was way out of reach for a college student. We used an IBM System/370 (I think!) for our computer science studies, with punch cards for program input and wide green and white paper for the printed output. Our worst fear in those days was "dropping the stack," where you dropped your carefully ordered stack of punch cards. It meant a few hours of sorting, at best. It could reduce you to tears.

That wasn't the first computer I used, however. In high school we had access to another school's Hewlett Packard HP

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2000 time-shared system, running BASIC (which we were then told stood for *Bad Acronyms Sicken Intelligent Computers*). We typed in our programs on a teletype terminal and saved them by having the terminal punch out a paper tape.

My first computer was a Timex Sinclair 1000. This computer cost only $99.99 with the standard composite video output and 1 kb of RAM. For another $99 you could get the 16 kb RAM upgrade module, an option beyond my budget. Data storage was on a cassette recorder, and it ran BASIC. I don't recall being able to print, but I imagine it was because I just couldn't afford a printer. This computer was handy for doing calculations and learning about BASIC, but I lost interest after a few months, since it was so limited.

Once I got out into the real world (1983), I got a job where I pored over paper warranty claims and updated a regular report on failure types. The form was drawn, the data entered, and even the pie charts were all drawn by hand, every month. After a year the department got a Panasonic *Senior Partner,* an IBM-compatible portable that was competing directly against the Compaq. It weighed about 20 pounds, but was self-contained, including a thermal dot-matrix printer. We entered the data into Lotus 1-2-3 version 1.0 (I still have a copy!) and plotted out the graphs in color using an HP-75 plotter. Those plots took nearly 5 minutes, and we made probably a half-dozen every month. However, we were grateful, as the computer turned a week-long job into one that took only a day.

For fun, I wrote a program based on an article on Fractals that appeared in *Scientific American.* It was a simple BASIC program, less than ten lines, that drew beautiful fractal images on the screen. The more points that were computed, the more intricate the detail. We were limited to three colors plus black, and I remember that 100,000 points was about the practical limit, a run which took a few hours. I once tried a million points, letting it run over the weekend, but it didn't look much better than the smaller ones. One of these days I'm going to re-write that program and run it on my modern machine, just to see how many seconds it will take.

In 1987 I started getting interested in owning my own computer. My colleague at work was upgrading to a 286 and offered to sell me his 8086 machine (with 8087 math coprocessor and color monitor!) for only $1000 (photo C). I jumped at the bargain, and still use it regularly for packet.

I've also owned a C64, a C128, a zillion 386 and 486 machines, and even a genuine Pentium (100 MHz). The machine on which I'm writing this column —a 300 MHz AMD K6-3D—is a workhorse, but its age is starting to show when the kids play some of their games. I suppose I will keep it as my work computer and get something new for the kids to play on. To earn enough money to afford a new computer, I keep writing columns for *CQ.*

I'm writing this only a week after the attack of September 11. I'm sure that by the time this gets into print, most of us will have come to terms with the events of that terrible, terrible day and we'll be still coping with the aftermath. Right now it's still difficult to deal with, and 6000 people are still missing somewhere in the rubble. In my December columns I have always offered my best wishes to all my readers for peace, health, and prosperity in the New Year, but this year it takes on a more significant meaning. Let's all try, really try, to keep alive throughout the whole year the good feelings we get by being kind and generous this time of year.

vy 73, Don, N2IRZ

Resources

A superb chronology of modern computers (mid-1960s to present), compiled by Ken Polsson, can be found at <http://www.islandnet.com/~kpolsson/comphist>.

A wonderful site on older computers, with a lot of photographs, historical details, and even a help line, can be found at <http://www.obsoletecomputermuseum.org>. If you have a unique old computer and are looking for a nice home for it, visit this site.

Play a game of "Spacewars," the first computer game, at <http://el.www.media.mit.edu/groups/el/Projects/spacewar/>. You can have a lot of fun with this game, but it's best with two players.

For a humorous look at computers, visit <http://rinkworks.com/stupid/>. I found myself laughing out loud quite often, much to the puzzlement of my XYL.

A comprehensive listing of computer history sites can be found at <http://www. hitmill.com/computers/computerhx1.html>.

Another listing of computer history sites, and considerable original content, can be found at <http://www.blinkenlights.com/>.

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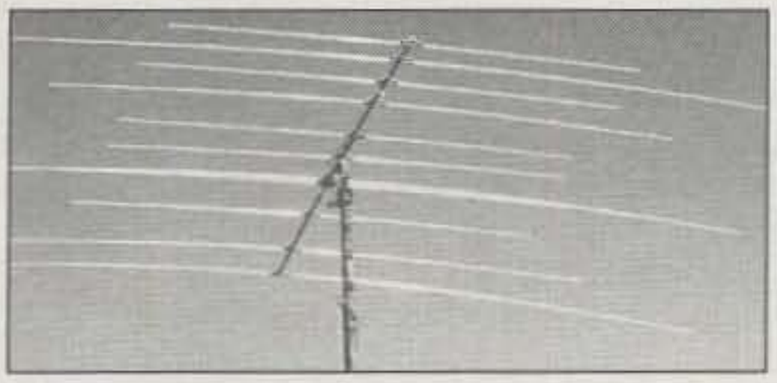

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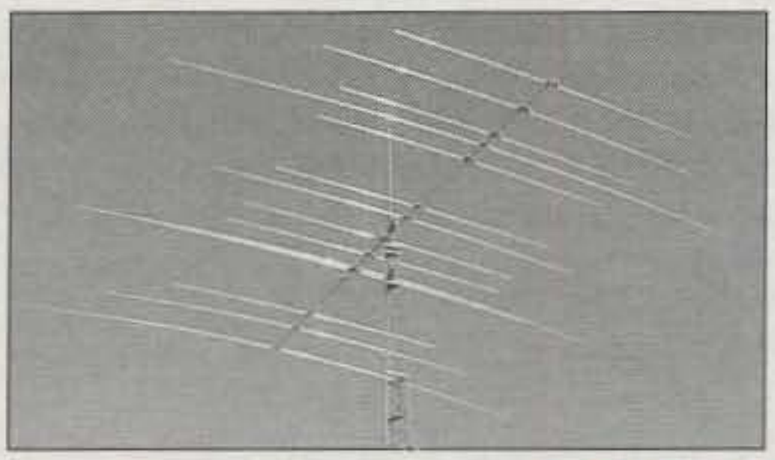

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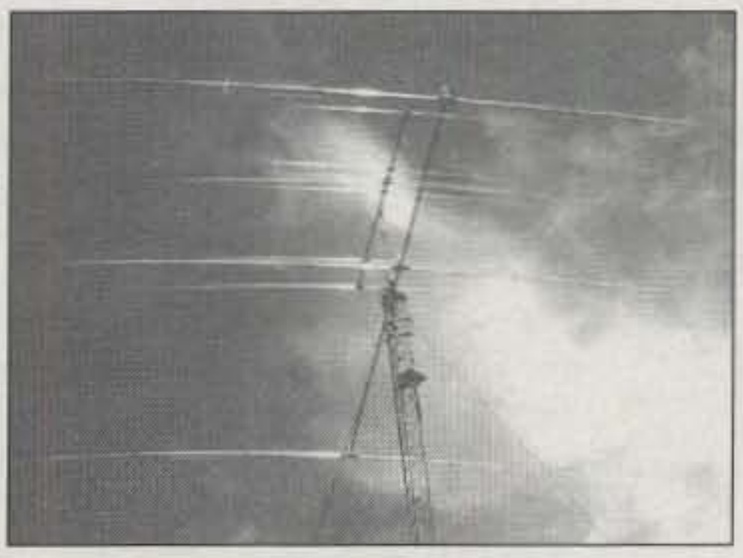

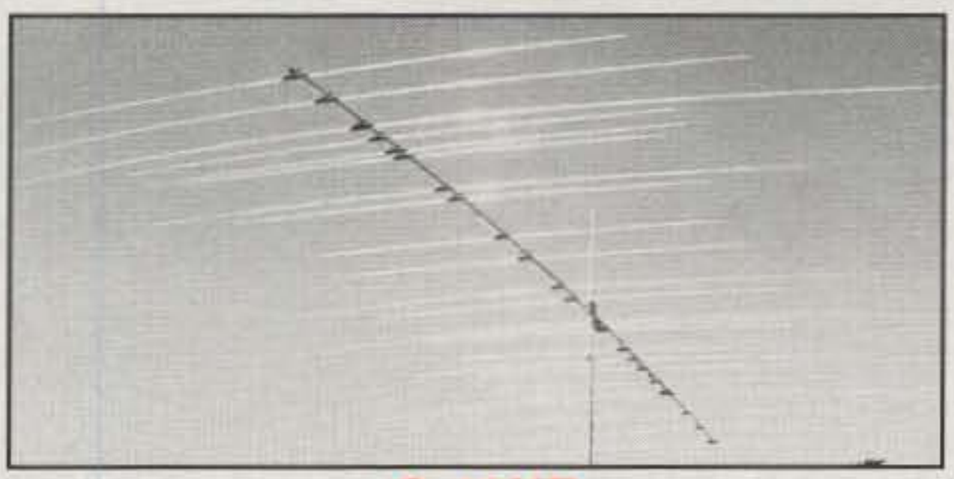

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Digital Wireless

BY STEVE STROH, N8GNJ

Packet Radio and Beyond

Some Thoughts on Amateur Radio Digital History

My "historical" stack of amateur packet radio papers is about fifteen inches high these days. I've been collecting advertisements, articles, etc., relating to amateur radio digital communications dating back to the beginning of packet radio. I have fantasies of scanning each page and linking all the image files via a simple Hypertext Markup Language (HTML) document, and then storing them all on a big hard disk, later possibly a CD for easy reference. However, there are insufficient "Amateur Time Units" for such things these days, and the stack waits patiently.

I had to move the "archives" recently and actually again looked at some of the things I have in the pile. In this month's column I'll offer some remembrances to go with this issue's historical theme.

Digital History

Early amateur radio was, of course, purely digital (CW). There have been some interesting experiments conducted with high-speed, computer-generated CW, and the data rates that can be achieved using digital signal processing to receive are surprising.

Radio Teletype (RTTY) in amateur radio remains popular to this day, although it has been supplanted to a great degree by a number of new HF digital communications systems, such as PSK-31.

Most older amateurs forget, and most newer amateurs never knew, that the modern era of amateur radio digital communications did not begin with the introduction of the TAPR TNC-1. Experiments in Canada predate the formation of TAPR by several years. Quoting liberally from one of the many X-NEDA pages (<www.cam.org/~burt/neda/pranni html>) maintained by Burt Lang, VE2BMQ:

> At around 9 pm on May 31, 1978 the first known transmissions of packet over amateur radio were sent. The place was the upstairs banquet hall of Bill Wong's Restaurant on Decarie Blvd. in Montreal, Quebec, Canada. The event was a special meeting of the Montreal Amateur Radio Club (MARC) called to discuss and debate proposed changes to the Canadian amateur frequency allocations that were being contemplated at the time by the Canadian Government Dept. of Communications (DOC). In attendance were several DOC officials from Ottawa, including the Director General – Regulations, Dr. John deMercado. Dr. deMercado is considered by some to be the "father" of amateur packet radio due to his persistent pressure to open up an exclusive portion of amateur band to experiment with the new mode and due to his early experience on the Aloha project in Hawaii. Others take a less charitable view of his role in the matter.
>
> The first packet message was reported to have been "From John deMercado to the Montreal group—Bravo, well done!" or something like that. As is common with many historical events, the participants did not bother to record the particulars and memory now is less than perfect.
>
> The Montreal Packet Net group consisted of: Bob Rouleau, VE2PY; Norm Pearl, VE2BQS; Fred Basserman, VE2BQF; Bram Frank, VE2BFH; Jacques Orsali, VE2EPH; Ted Baleshta, VE3CAF; Ian Hodgson, VE2BEN; and others not mentioned.
>
> A detailed description of the Montreal Protocol and hardware used in the experiments is given in the TAB book #1345 *PACKET RADIO* by Bob Rouleau and Ian Hodgson published in 1981. An interesting note is that the Montreal Modem design used the Exar XR-2206/2211 chip set. I am told that a sample of the Montreal Modem was sent to the Vancouver group (VADCG) in the fall of 1978 and it is probably no coincidence that the same chip set appeared in the TAPR TNC modem of which Doug Lockhart of VADCG had a hand in designing.
>
> It is ironic that none of the members of the original Montreal Packet Net group are presently in amateur packet radio. After an initial spurt of activity in amateur packet, Bob Rouleau and several others in the group turned to commercial applications for packet radio. The resulting company, DataRadio Inc., today is building and marketing commercial packet radio systems around the world. A typical application is the Canadian Weather Radio packet service introduced some years ago using DataRadio equipment specially designed for the application.
>
> We should congratulate these early pioneers in amateur packet radio for the work they did in getting the hobby started. It is through their early efforts that today's worldwide packet system has grown, often chaotic, seldom planned but with a continuous forward progress due to the efforts of countless others in the intervening years to advance and refine the technology. In the words of the first packet message: *Bravo, Well Done!!*

The commercial counterparts of amateur packet radio experimentation are too numerous to mention. PacComm and Kantronics (and to a lesser extent AEA and MFJ) come immediately to mind as having achieved notable success in commercial packet radio communications. CLOVER, one of the first of the modern HF data communications systems, was pioneered in amateur radio by the late Ray Petit, W7GHM. Refined by HAL Communications, CLOVER later went on to be used extensively in marine HF data communications which enabled boaters to send and receive e-mail using their marine HF radios.

Phil Karn, KA9Q (and Dewayne Hendricks, WA8DZP, for the Macintosh version), deserves special mention for the advocacy of TCP/IP in amateur radio. When Phil's proposals weren't taken seriously (enough), he took the unusual step of developing NET, a fully standards-compliant TCP/IP stack that ran on a DOS PC. Phil set the tone of amateur radio software development when he released NET complete with the source code. He brooked few complaints about NETs features and shortcomings, pointing the complainer to FTP sites where the source code could be downloaded.

The closest equivalent to NET was a less-capable, poorly documented commercial TCP/IP stack that cost hundreds of dollars. NET sparked a new generation of amateur radio networkers who learned about TCP/IP networking many years before TCP/IP gained wide recognition as the "protocol that runs the internet."

P.O. Box 2406, Woodinville, WA 98072
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In 1987 I was in the crowd when Dale Heatherington, WA4DSY, first demonstrated his 56 Kbps modem at the Dayton Hamvention®. It was amazing how quickly it could move data, and it was a true next-generation system. Only a few networks were built using the 56K technology.

APRS has revolutionized packet radio by returning to simpler, easier to understand and maintain digipeater networks. It's truly unfortunate that much of the "institutional knowledge" of digital networking seems to be completely lost. There are good reasons not to concentrate all packet radio activity on a single channel, as many popular regional APRS networks are discovering, and many networking solutions were developed over the years that would seem to be applicable to the problem of congestion (and congestive collapse) on APRS networks.

There has been no shortage of networking systems either, including:

- Packet Bulletin Board System message forwarding
- Net/ROM
- TexNet
- ROSE
- Flexnet

I continue to be impressed with just how much direct and indirect crossover there is between amateur radio and commercial technology. The deeper you delve into all that amateur radio digital communications has to offer, the more you find yourself prepared for commercial wireless systems. I continue to recommend getting involved in amateur radio as a way for technically minded youth to become self-trained for careers in wireless and other technical careers.

If you're interested in reading more about packet radio's rich history, a lot of good information is contained in the various *Proceedings* of the ARRL, and later ARRL and TAPR Digital Communications Conferences. Most years' *Proceedings* are still available from TAPR.

As always, comments and questions on these and other topics are welcome and greatly appreciated.

73, Steve, N8GNJ

Correction

The internet address for the Puget Sound Amateur Radio TCP/IP Group (WETNet) mentioned in my October 2001 column is now <www.seatcp.net>.

Math's Notes

BY IRWIN MATH, WA2NDM

What's New And How To Use It

A Unique, Simple Low-Power Transmitter

When we described several low-cost, simple transmitters last month, we neglected to mention a new offering from MICREL, Inc. which fits into the same category. This is a 300 to 470 MHz UHF transmitter basically designed for remote-control applications such as opening a garage door or remote automobile keyless locks. However, it is a great device to experiment with.

The MICRF102, as it is called, consists of an 8-pin surface-mount chip (SOIC package) that is designed to operate into a loop antenna. Fig. 1 is a schematic of the suggested hook-up from the data sheet. As with all of the companion MICREL receivers, you will note that the external parts count is at a minimum.

The tiny chip contains an oscillator, phase lock loop, and RF amplifier stage. Tuning and matching to the antenna are done automatically, and the type of modulation used is ASK, or amplitude shift keying. This means that a digital input will directly turn the carrier on and off at the digital data rate, which is specified to be between 100 bits/second up to 20 Kb/s. Although a minimum data rate is specified, the data sheet implies that operation with a continuous carrier is also possible by tying the ASK input to Vdd (more on this later). The operating frequency is determined by the crystal used and is 32 times higher than the resonant frequency of the crystal. For operation at 420 MHz, for example, you would use a 13.125 MHz crystal. As one would expect, power output is quite low and is controlled by the voltage applied to the PC input. By selecting values in conjunction with the data sheet, it may be set as high as about 1 mw, but not much more. The MICRF02 also has a shutdown input which can be used to conserve power when the transmitter is not in operation.

As is, the device is really only suitable for very-short-range remote data transmission applications. However, experimenters should be able to adapt the device for amateur use. Fig. 2 shows how one might use the unit for CW applications. Here we simply connect a key between +5 V and the ASK input and "brass pound" to our heart's content. The 1K resistor, by the way, allows the ASK input to go to a logic 0 when the key is up.

Fig. 3 shows how AM may be achieved by modulating the power control input. Here you will need about a half volt of audio. A carbon microphone is a simple way to get this, but you might experiment with a crystal or electret microphone if that is more convenient. Please note, however, that these circuits have not actually been tried experimentally; that is up to you.

The antenna used with the MICRF102 is a loop antenna, usually fabricated directly on the printed circuit board. The data sheet gives details on how to design this (with practical examples) and even shows how you can couple to a simple whip. The interesting thing about the antenna is that the chip automatically adjusts matching. You only have to have the correct impedance.

c/o CQ magazine

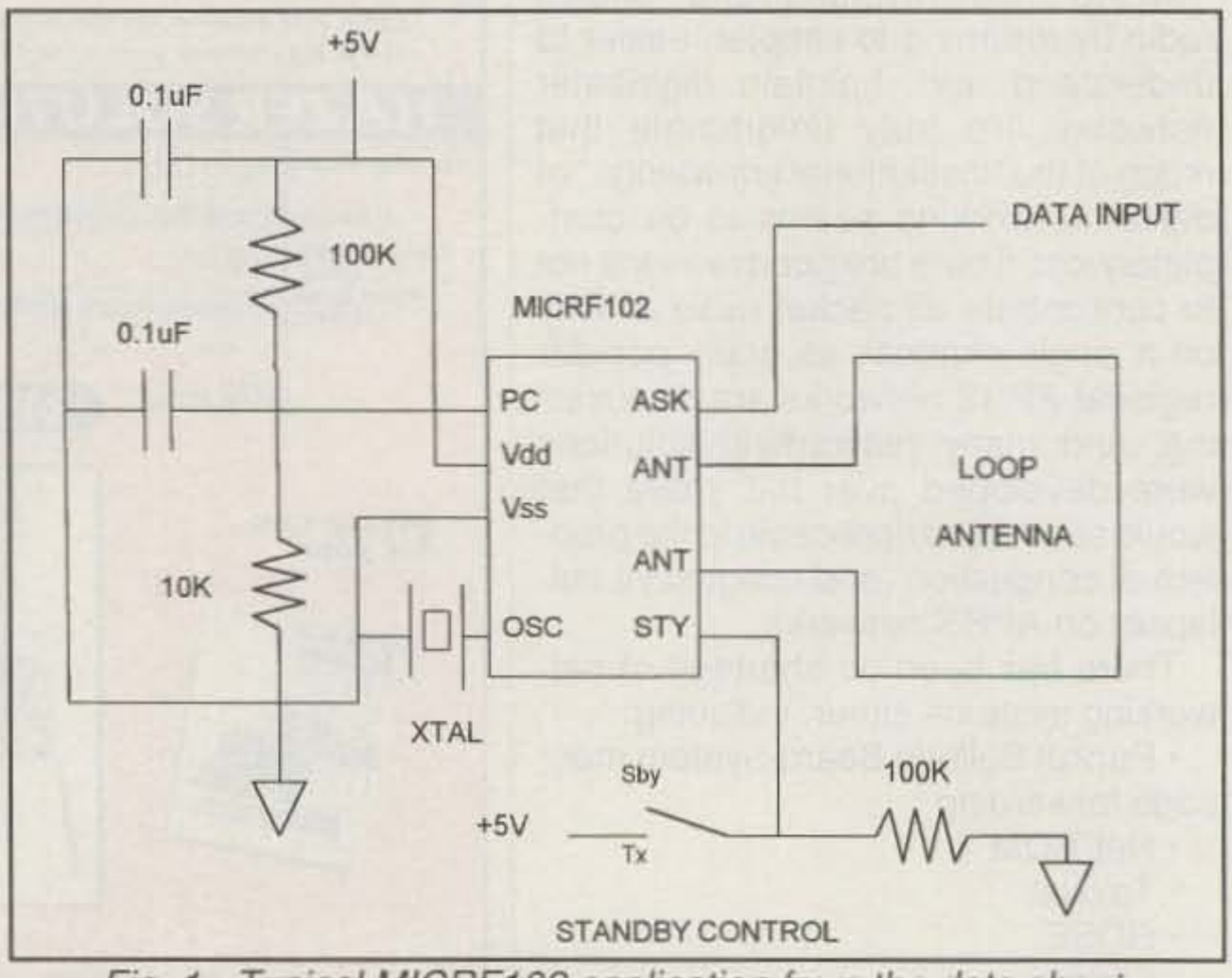


Fig. 1– Typical MICRF102 application from the data sheet.

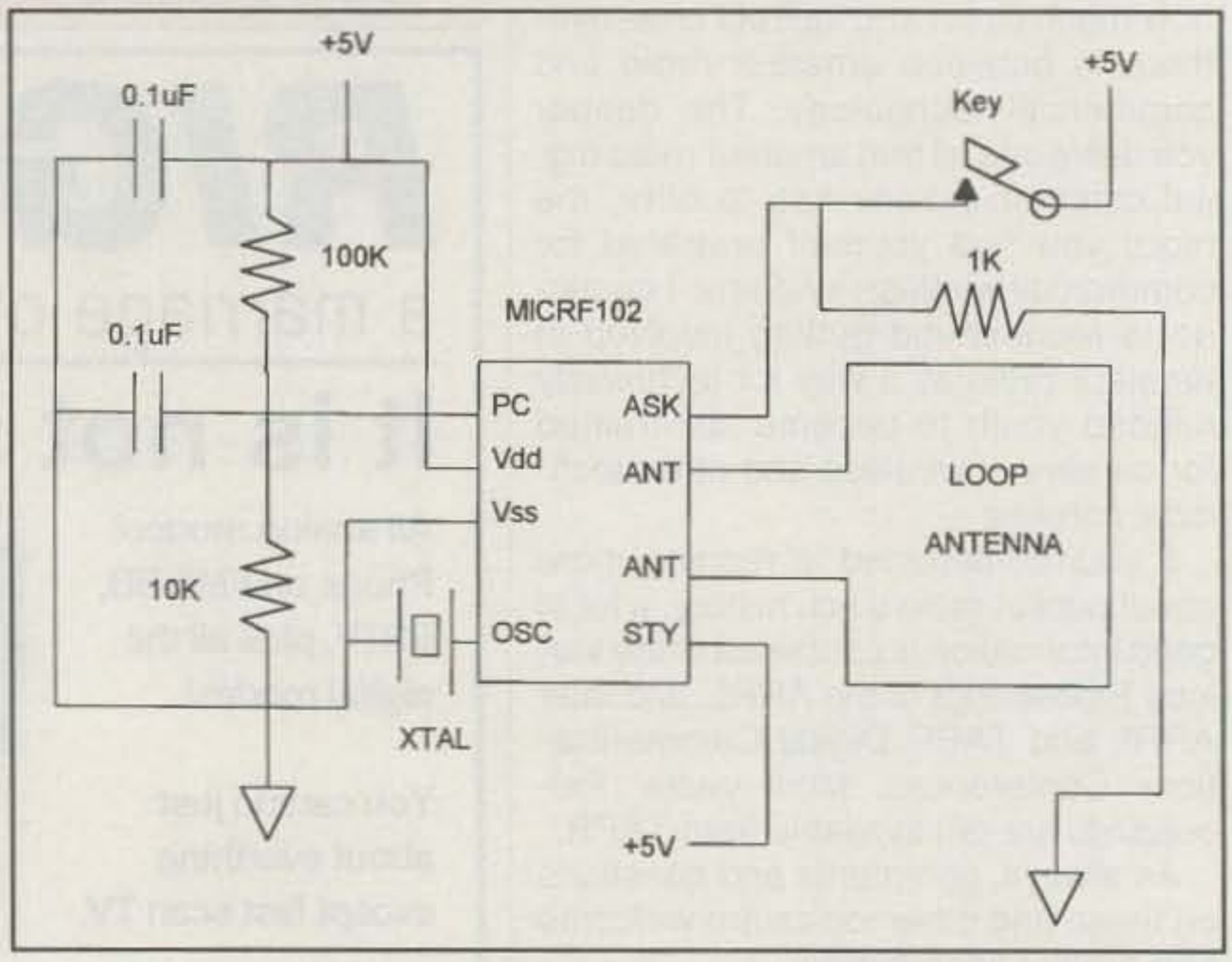


Fig. 2– CW operation of the micro-transmitter.

Although the power output is quite low, for short-range operation such as at a convention or hamfest this type of circuit might be just the ticket. For more power an amplifier will be needed, but the basic phase lock loop in the chip may be ideal as the starting point for a more robust transmitter. Best of all, the quoted cost is less than $2.00 each per thousand quantity, so small amounts will be quite inexpensive.

For further details, contact MICREL at 1849 Fortune Drive, San Jose, CA 95131 or on the internet at <www.micrel.com>. The website contains the full data sheet as well as additional

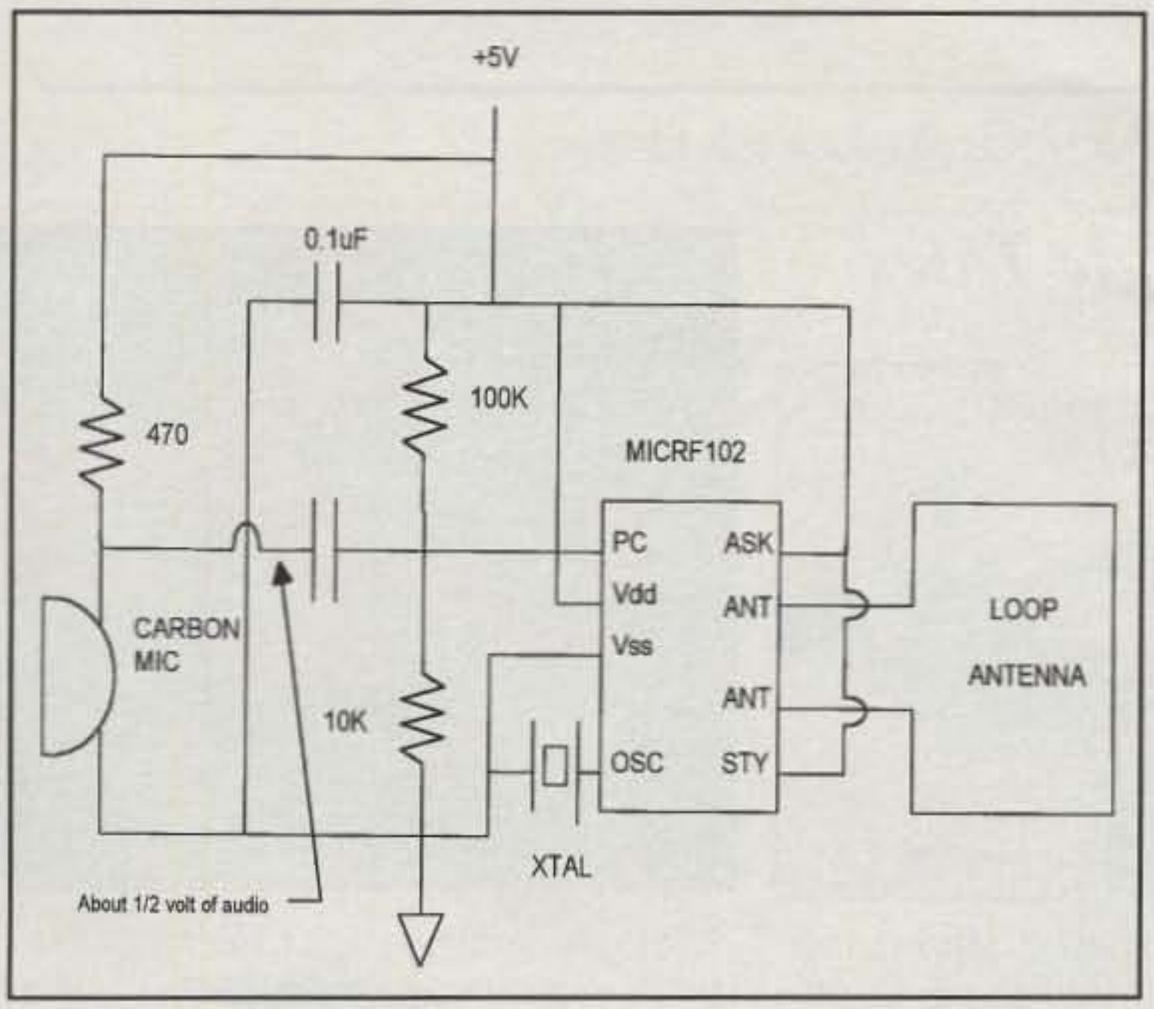


Fig. 3– AM operation of the micro-transmitter.

information on the firm's matching receivers. Please let us know what you come up with if you experiment with the chip and we will be glad to pass along the information.

In conclusion, the very best wishes for a very happy Holiday Season and New Year, and as I always say "May the coming year be the one in which all of your wishes and dreams come true."

73, Irwin, WA2NDM

World Of Ideas

BY DAVE INGRAM, K4TWJ

A Look At The World Around Us

Christmas Goodies and Nostalgic Tales

Season's Greetings! Here's wishing you good health, happiness, and the best of everything, friends, both now and during the new year ahead. Yes, and the present holiday season is an ideal time to relax, reflect on your life, and enjoy some special personal rewards, such as more new amateur radio treats and goodies!

In light of those cheerful thoughts, we once again make our traditional diversion from usual column topics to feature some new and totally irresistible gifts especially for hams. Need I also point out there has never been a better time to enjoy amateur radio? I am serious! Sunspot counts are still favorably high, QRM is still low, all the HF bands are doing great, and you can have a ball working the world regardless of your setup or location. A few extra-special touches always make the big difference however, and that is precisely what we have lined up to show you. What else can I say except get comfortable, check out our following delights, and remember to order appealing items early to avoid holiday shipping delays or sold-out dilemmas. Remember also to order featured items directly from the manufacturer or dealer, not from me. I am only your tour guide on this shopping spree. There's more. This year I included a couple of true nostalgic tales from our proud past I am sure you will find captivating. Now let's bring on the goodies!

Photo 1– Making its grand debut in this holiday goodies column is the captivating NF7E-produced Wind Key, or Ham Whirligig. Wind turns the propeller, which moves the hand up and down to operate the key and simulate sending CW. Every radio amateur needs one of these attention grabbers in the yard! Complete Whirligigs or a full set of plans for homebrewers are available from NF7E.

Photo 2– Close-up view of the key on the NF7E Whirligig reveals remarkable beauty. Key sports an extra-tall spring and wide gap so you can see it work from across the yard.

New and Unique Items

First in our spotlight is a special new item every devoted radio amateur will surely want marking or complementing his or her QTH—the unique Wind Key or Ham Whirligig shown in photos 1 and 2. This work of art is a wind-driven hand and telegraph key. It measures 9" × 24" and mounts atop a wood post in your yard or beside the house to let the world know you are all ham and proud of it. As wind turns the Whirligig's propeller, its attached driveshaft (a metal rod or section of screwstock with a slight offset at its far end) rotates. A push rod attached to the driveshaft's offset then moves the wooden hand up and down, causing it to operate the key. Even basic-style Whirligigs are eye-catching items, but this ham version with its fully operational brass-and-wood camel-back key, miniature beam antenna, and exquisitely detailed parts blows 'em away! I put mine in the side yard, and it is a real attention-grabber.

These Wind Keys are available in two versions from designer Bob Wertz, NF7E/7Echo Enterprise, 6315 East Townsend-Winona Road, Flagstaff, AZ 86004; e-mail: <Bob6315@earthlink.net>. First is a full set of "easy-to-build" 1:1 ratio plans for homebrewers (sale priced this month only for $14.95 plus $1.50 postage in U.S.). Second, fully assembled and ready to mount (on your post) Wind Keys are $99 plus $7 shipping. Bob makes these Whirligigs as spare time permits, so order early and understand if he is "bogged down." The old boy is huffing, but he too needs time to enjoy Christmas.

Photo 3– Nothing says Christmas better than a new key, especially if it is a brilliant-gold-plated, limited-production miniature such as this delight from Morse Express. Its base is engraved with "Christmas 2001," a serial number, and the Morse Express logo. Nice! (Photo courtesy Marshall Emm, N1FN, Morse Express)

Telegraphic Treats

Call me a hopelessly addicted ham or a Morse junkie, if you wish, but I am firmly convinced nothing promotes good enthusiasm for CW like a new key. The experience is particularly gratifying when the key is a marvelous little miniature such as the dazzling, gold-plated gem shown in photo 3. This tiny tapper measures only .9" × 1.75"; includes gap, tension, and trunion bearing adjustments; has a smooth, sculptured wood knob; and the base is engraved with "Christmas 2001" plus the Morse Express logo. It looks like a piece of jewelry and also produces a traditional click-clack sound (well, actually a tick-tack sound here because of its size) during use. What a charm!

This limited edition key was designed by Marshall Emm, N1FN, and made by Llaves Telegraphicas Artisanas in the Balearic Islands. Only 200 of these beauties have been made (each is engraved with a serial number), so when they are gone, they are gone—permanently! The Christmas 2001 keys are priced at $49.95 plus shipping and are available from Morse Express, 2460

4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

Nostalgic Notes

While on the subject of keys and CW, incidentally, and since we presently are celebrating the 100th anniversary of Marconi's first transatlantic (DX) communication, I would like to share some special nostalgic tales from the days of spark with you. Old-time spark operators told me these true tales many years ago when I represented the promising "next generation" of radio amateurs. Now I pass on the tales to you with the wish that you too will pass them on to next-generation amateurs in the future with a similar "pass on" request. Through such endeavors our proud history will live on forever and transcend the annals of time.

During the early 1900s and prior to the introduction of vacuum tubes, even before specific frequency ranges or bands were allocated for amateur radio use, "King Spark" ruled the airwaves. A typical "wireless" setup of the era consisted of a hefty spark-generating transmitter and a galena-crystal-set-type receiver plus a big four- wire antenna. A close equivalent of that transmitter today might utilize a vicious high-voltage neon-sign transformer with a hand key connected in its "primary" line and its secondary line connected to a resonating circuit plus a big spark gap and antenna. During operation the key literally flamed with high voltage and current. (Have you heard of "flameproof" keys? Yes, they were real!)

The antenna emitted an eerie blue glow, and sparks flying off its end occasionally started brush fires. Inside the radio room, the operator's hair stood up with static electricity, the smell of ozone filled the air, and visitors were frightened out of their wits as large arcs (bolts!) of static electricity jumped toward them. Bands and frequencies were not established or allocated during that era, so all spark operators heard one another as if they were in a big conference room and concentrated on the buzz or raspiness of various tones for single signal reception.

Shipboard spark operators, or "radio officers," were especially sharp chaps. While ashore, they collected galena rocks from small streams to use as detectors in their crystal-set receivers. Back aboard ship, the operator checked and marked the best detection points on each galena rock so they could be quickly replaced as necessary. Both operator and equipment were usually put to the test before the ship even left port.

While wearing headphones, copying messages, and being unaware of activities outside of the enclosed radio room, another large ship would pass nearby while leaving port. Hopefully, the other ship operator would maintain radio silence until in "clear waters"—hopefully. Otherwise, that full-power transmission would blow the earphones off our hero and destroy his hand-picked galena's sensitive detection point. Incidentally, the classic term *Rock Crusher* used to describe high-power rigs evolved from this true-life situation. A really sharp operator could quickly tap his key (stop that!), pop the zapped galena from its holder, snap in another, reset its fine "catwhisker" wire to a pre-marked point, and never miss a full word of copy in an incoming message. No doubt about it, those "great grandpappies of radio" were real operators of the best kind. May their memories and inspirations live forever.

South Moline Way, Aurora, CO 80014-1833; telephone order line 1-800-238-8205 or via <www.MorseX.com>.

Now for all of our friends who appreciate neat little keys and CW but experience difficulty copying Morse code, we highlight the stand-alone MFJ-461 Morse Reader and portable MFJ-495 Programmable Morse Keyer shown in photos 4 and 5. This compact combo make operating CW as easy as using a computer or working packet, and it works with any transceiver, anywhere, anytime. Just place the reader by your rig's speaker, and it displays incoming CW on its 32-character/2-line readout. Connect one cable from the keyer to your transceiver, and it will send your prepro-

Photo 4– Having problems copying those high-speed CW stations on the air? Want to work some CW contests or chase DX on CW and need a "back-up op" to help copy Morse? Just place this little MFJ-461 Morse Reader by your rig's speaker; it deciphers the dots and dashes and displays the text in fine style. (Photo courtesy Richard Stubbs and MFJ Enterprises)

Photo 5– Transmitting "usual QSO info" and contest exchanges on CW is a push-button cinch with this MFJ-495 Programmable Morse Keyer. You can also monitor transmitted text on its 32-character display. (Photo courtesy MFJ Enterprises)

grammed messages or contest exchanges with the press of a button (while displaying outgoing messages on its LCD readout). You can load the keyer's memories from your key, paddle, or computer's keyboard, and you can also intermix operating from memory or from your own special key as desired.

Does this "code light concept" really work? Yes indeed. In fact, a no-code operator in a recent worldwide CW contest used a similar arrangement and turned in a top score. Even if contesting is not your favorite pursuit, adding a CW reader and keyer to your station can put you right in the middle of some terrific DX action. Give it a go and see for yourself! MFJ readers and keyers are available from amateur radio suppliers nationwide.

Artistic Antenna

Did I hear you say our featured items and nostalgic tales piqued your enthusiasm for working CW (and even SSB!) on a favorite HF band? Great! Neighborhood restrictions on large outdoor antennas stifling your plans? Fret not! An ideal quick and easy answer to your quest is using a world-famous Isotron® (see photo 6). This remarkable little radiator can be mounted almost anywhere—on an upper floor condo's deck or balcony or slightly above a roof—or you can just hang it in a tree, paint it in unique colors, and tell non-hams it is modern art.

You probably have seen the Isotron® advertised in monthly ham magazines (designer Ralph Bilal, WDØEJA, is presently celebrating 21 years of making the little gem) and questioned if it actually reaches out to distant areas. Yes, and quite well for its size, I must say. I have been using one on 30 meters the last two weeks, and am having a ball with it. I have worked amateurs in Australia, Japan, New Caledonia, Russia, Switzerland, and more, and that's while running only 50 watts. Yes, and the antenna is only 5 feet above my roof. That is impressive performance from any point of view! I have also worked several other folks using the Isotron®

Photo 6– Antenna problems keeping you from having fun on HF? Beat the odds and have a ball with a world-famous Isotron®. A 40 or 30 meter version measures only 22" × 16" × 15", can be installed quickly (hidden?) almost anywhere, and works very well for its size. (Details in text.)

on 30 meters (such as WA8KOQ with his Isotron® on a 6 foot pole inside his garage), and they all sounded good. This is a neat antenna!

In running various tests and comparisons, I find performance of the Isotron® generally on par with a mini-dipole (those 12 foot antennas made by butting together a pair of 6 foot mobile whips). As a familiar reference here, I also find performance of a mini-dipole and an Isotron® approximately 3 dB, or one "S" unit, below a full-size dipole. That 3 dB drop could be "made up" by running 100 watts rather than 50 watts, but I am doing fine at the 50 watt level, and you probably will enjoy even better results.

The Isotron® presents a 50 ohm load to your coax and rig, it is broadbanded, and it does not require a tuner. More details on it are coming in my next (February) "QRP" column, but don't postpone your HF fun any longer. Ring up Ralph Bilal now at 719-687-0650, write to him at 137 Manchester Dr., Florrisant, CO 80816, or e-mail him at <www.rayfield.net/isotron> and get QSOing with your own Isotron®!

AMSAT OSCAR Salute

As most *CQ* readers know, I continuously encourage radio amateurs of all license classes to expand their horizons and check out new areas of interest. Since we presently are celebrating the 40th anniversary of the launch of OSCAR-1, the first ham radio satellite, taking a closer look at communicating via OSCAR satellites is a terrific idea. Expensive? Not if you take the "FM repeater in the sky" approach and work through a low-orbiting satellite with your dual-band 2 meter/70 cm talkie and a mild-gain-type antenna. It is genuine fun on a budget, and you can join the action from almost anywhere—and in a fully time-predictable manner.

Where to start? First check to ensure your dual-band rig will operate full duplex (simultaneously transmit on one band while receiving on the other band). Next, cable the talkie to a small dual-band beam antenna you can position or rotate by hand. Then check with the AMSAT net (14.282 MHz, Sundays at around 1845 UTC) or website <www.amsat.org> for operating schedules and uplink/downlink frequencies of FM-active OSCARs. You will be having a ball in no time flat. It is a blast!

One of the most clever beam antennas I have seen for portable satellite operation, incidentally, is the breakdown "Arrow II" made by Allen Lowe, NØIMW, and available from VIS Amateur Supply (photo 7). The antenna sports three elements on 2 meters and

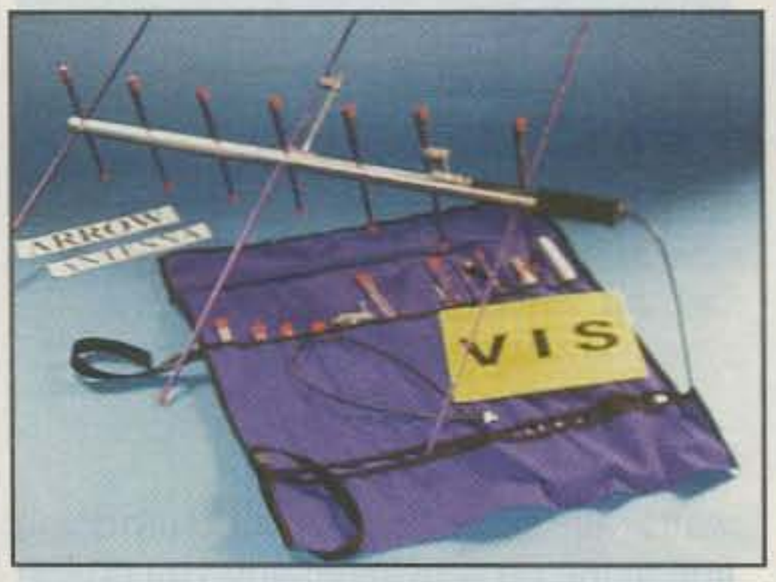


Photo 7– Handheld OSCAR'ing is a snap with this 2 meter/70 cm Arrow II beam antenna from VIS Amateur Supply Company. It has seven elements on 70 cm, three elements on 2 meters, a rear hand grip for on-the-spot use, plus it breaks down and all sections store in its optional tote bag. Taking satellite capabilities everywhere you go has never been easier!

Photo 8– Want to expand your amateur radio horizons and enjoyment during the holidays? Check out this triple collection of terrific reads available autographed and directly from author K4TWJ. They are hot!

seven elements on 70 cm, is pretuned to favor the FM satellite ranges of 146 and 437 MHz, and has good gain. A cushioned rear grip is included on the boom so you can hold the antenna in one hand and operate your talkie with the other hand.

Arrow II antennas are made in limited quantities and are sometimes difficult to find, but VIS Amateur Supply has a good supply on hand for the holidays. Just call Van or Carolyn at 1-800-OKKHAMS or write to them at 2595 Turner Road-West Bend, P.O. Box 284, Coffeeville, AL 36524. You will emerge a winner!

Closing Views

Space is now tight, so let's briefly spotlight some great reads to help expand your horizons and enjoyment of amateur radio (photos 8 and 9). First are my popular self-published books *Your Guide To HF Fun*, *QRP Now!*, and *KEYS II*. Next are every amateur's favorite magazines, *CQ* and *Popular Communications*.

Photo 9– Like to stay abreast of the latest happenings and dink with a few fun projects along the way? A year's subscription to CQ and/or sister publication Popular Communications *puts you right in the middle of the action. They are akin to a hamfest by mail, and they can be delivered right to your door twelve times a year.*

The *Guide To HF Fun* contains a gold mine of information on understanding gear, setting up a top-performance station, and operating like an old pro. It is written especially for newer amateurs and is akin to a "helping Elmer" in printed form. *QRP Now!* covers the full QRP scene for today— the clubs, gear, kits, homebrew projects, and much more. It is loaded with ideas, tips, and circuits for QRP fun. *KEYS II* contains photos and details on keys, bugs, paddles, and miniatures few folks have ever seen. Numerous rare, exotic, and new keys plus all models of Vibroplex made are also featured. Each book is $16 plus postage ($3.50 Priority Mail or $1.75 book rate) and available autographed directly from me; Dave Ingram, K4TWJ, 4941 Scenic View Drive, Birmingham, AL 35210.

Finally, a year's subscription to *CQ* and/or its sister publication, *Popular Communications,* is "the gift that keeps on giving"—12 times a year. Subscriptions to both *CQ* and *Popular Communications* are available by telephoning 516-681-2922 or the toll-free order line 1-800-853-9797; by writing to CQ Communications, Inc., 25 Newbridge Road, Hicksville, NY 11801; or on the web at: <www.cq-amateur-radio.com> or <www.popular-communications. com>. Go for them!

That's it for column space this month, so *Happy Holidays!* and I will be listening for you on 30 meters weeknights.

73, Dave, K4TWJ

What's New

BY KARL T. THURBER, JR., W8FX

A New Column for A New Century

Holiday Goodies and More

This month in your "What's New" column we'll focus on some noteworthy hamshack gear and accessories; antennas; software; books; net news; and other goodies, gizmos, and resource information we think will be of interest to you in this holiday season. Let's begin.

Accessories for the Shack

Audio Processing Products from Symetrix. Symetrix, Inc., which is devoted to professional audio signal processing, now offers a high-end line of front-end audio processors for amateur radio. It seems their use is exploding as more SSBers add signal processing to improve their sound and increase their modulation.

Symetrix products feature audio processing technologies such as compression, limiting, and equalization. Popular products include the new Model 528E Voice Processor, a complete, six-function, self-contained processor. Other featured products suitable for amateur radio use include the 551E 5-band Parametric Equalizer, 301 Low Distortion Compressor/Limiter, and 302 Dual Microphone Preamplifier (photo A). Picture some of these high-tech accessories under the tree this holiday season!

Contact Symetrix, Inc., 14926 35th Avenue, West Lynwood, WA 98037-2303 (425-787-3222; e-mail: <sales@symetrixaudio.com>);website: <http://www.symetrixaudio.com>. The ham radio portion of the Symetrix website is easily reached from a home-page icon.

Multi-Megger® Insulation Tester. The Biddle Multi-Megger is an all-in-one insulation tester/multi-tester distributed by Jensen Tools. Besides extremely high sensitivity insulation testing, it offers complete multimeter test functionality and the ability to view the insulation measurement in terms of leakage current. All three meter series (photo B) feature a mV range that lets them use many types of transducers, such as current clamps, thermocouples, and more. All meters—the Models BMM2000, BMM2500, and BMM80 series—offer analog-digital backlit displays.

For more details and pricing on the Biddle Multi-Meggers, contact Jensen Tools, Inc., 7815 S. 46th Street, Phoenix, AZ 85044-5399 (phone 1-800-426-1194; e-mail: <Jensen@stanleyworks.com>; web: <http://www.jensentools.com>).

Antennas and Accessories

RFL-100 Dummy Load from Oak Hills. Oak Hills Research has emerged as a good source for high-quality QRP transceiver kits and accessories. Recently, proprietor Marshall Emm, N1FN, told us of the new RFL-100, a 100 watt RF dummy load kit for QRP (and not-so-QRP) rigs (photo C). The new load kit provides a a 50 ohm resistive load to 144 MHz, and it offers 100 watts continuous power dissipation. The unit is air convection cooled through a specially-vented enclosure, painted and printed to match other Oak Hills Research gear. Twenty metal-oxide resistors share the power and heat dissipation loads within 2 percent of a nominal 50 ohms—reportedly more accurate than other, single-resistor loads. The RF-100 comes with an SO-239 coax connector and a high-temperature printed circuit board with two-ounce copper traces. It's $34.95.

For more information, contact Oak Hills Research, a division of Milestone Technologies, Inc., 2460 S. Moline Way, Aurora, CO 80014-1833 (1-800-238-8205; e-mail: <qrp@ohr.com>; web: <http://www.ohr.com>). You'll find lots of QRP gear on the OHR website, or check out the related Morse Express website at <http://www.MorseX.com> for keys, bugs, paddles, and other interesting Morse goodies (also see this month's "World of Ideas" column).

New Product News from The Wireman. We've covered the legendary "Wireman," Press Jones, N8UG's coax, wire, and antenna accessory products in several columns. Recently, Press updated us on several cables he's been working on and testing this past year, and which he now has released in final form.

Photo A– Shown is a "stacked rack" with some high-end Symetrix audio processing products installed in the radio hamshack of David Boehner, K5HOT, as posted to the Symetrix website. The photo shows the Symetrix 528E Voice Processor and 551E 5-Band Parametric Equalizer, used with the AKG microphone and a Kenwood TS950SDX transceiver. (Photo from Symetrix website)

Photo B– The Biddle Multi-Megger® is an all-in-one insulation tester/multitester. Besides extremely high sensitivity insulation testing, it offers complete multimeter test functionality and the ability to view the insulation measurement in terms of leakage current. (Photo courtesy Jensen Tools)

*289 Poplar Drive, Millbrook, AL 35054-1674
e-mail: <w8fx@cq-amateur-radio.com>

Photo C– Oak Hills Research's RFL-100 is a 100 watt RF dummy load kit for QRP (and not-so-QRP) rigs. The load kit provides a 50 ohm resistive load to 144 MHz, and offers 100 watts continuous power dissipation. (Photo from Oak Hills Research website)

One of the new "Certified Quality" cables Press offers is designated CQ113PE. It's an RG-213 type coaxial cable specifically designed to be directly buried. The center conductor, solid polyethylene dielectric, and 97 percent copper braid follow the specification for Mil Spec RG-213/U and its predecessor RG-8A/U. However, the new cable also includes a moisture-blocking material and adds a UV-resistant, abrasion-fighting, moisture-impermeable, black polyethylene jacket.

Press also offers a new, flexible RG-217 heavy-duty cable manufactured to the specifications of Mil Spec RG-217/U, with two changes—a stranded center conductor and a tough, UV-resistant, black polyethylene jacket. It's said to solve the "around the rotor" problem faced in full-power stations. The cable is ideally suited to crank-up tower use due to the lubricity of the jacket, allowing it to slide easily through eyelets and guides and to coil neatly. The overall stiffness precludes conductor damage, but allows easy rotation over a lifetime of more than 20 years.

For more information, contact The Wireman, Inc., 261 Pittman Road, Landrum, SC 29356 (1-800-727-9473; e-mail: <info@thewireman.com>; web: <http://www.thewireman.com>).

Software and Computers

PowerDesk 4 AND PowerDesk 4 Pro from Ontrack. Ontrack Data International offers a truly powerful and feature-packed Windows® file manager (photo D and fig. 1) that features many new capabilities over Microsoft's Windows Explorer file manager, which comes standard with the various versions of Windows.

There are two versions of PowerDesk® 4. The basic PowerDesk 4 is a free download with no time or usage limits on the user, one designed to help you make Windows work the way you do. It includes the PowerDesk File Manager, claimed to be "the world's best file manager." The file manager provides you with single- or dual-pane file management windows, a powerful file finder, Zip and unZip capabilities, a dialog helper, and many other features. If you have Quick View or Quick View Plus on your PC, you can view many different files directly in the PowerDesk viewer pane (Quick View comes with Window 95, 98, and NT).

PowerDesk 4 Pro has all the features and functionality in PowerDesk 4, plus integrated FTP (file transfer protocol), a customizable toolbar for fast access to your favorite files and applications, extensive file viewing capabilities for over 200 types of files, a tool that helps you convert graphic files from one format to another, a "size manager" that shows you which files are cluttering up your drive, free technical support, and more. I have PowerDesk 4 Pro on my PC, and it works like a charm, especially when one considers the price—$19.95 plus $6.95 s/h.

Contact Ontrack Data International, Inc., 5480 Valmont Road, Suite 100, Boulder, CO 80301 (phone 1-800-645-3649; e-mail: <info@ontrack.com>; on the web: <http://www.ontrack.com/powerdesk>). You can download the free version or order the Pro version from the Ontrack website.

New on the Net

Ham Radio Market Web. The Wireless Industry Association (WIA) has announced a new web board to support the amateur radio community; it's at <http://hamradiomarket.com> (fig. 2). According to WIA founder Bob Hutchinson, N5CNN, the Ham Radio Market is a fast-moving board where radio amateurs can seek, find, buy, and sell anything in amateur radio. The board is for the use of hams, ham radio dealers, ham "wannabes," collectors, distributors, brokers, and others to see, find, buy, and sell amateur radio products, equipment, and other "ham radio stuff." Both browsers and users can go directly to Ham Radio Market at <http://hamradiomarket.com>; click "Post Ad or Message" to quickly create an ad or message on the board.

For more info on the Ham Radio

Photo D– PowerDesk 4 Pro from Ontrack has all the features and functionality in PowerDesk 4, plus integrated FTP (file transfer protocol), a customizable toolbar for fast access to your favorite files and applications, extensive file viewing capabilities for over 200 types of files, a tool that helps you convert graphic files from one format to another, and more. (Photo courtesy Ontrack)

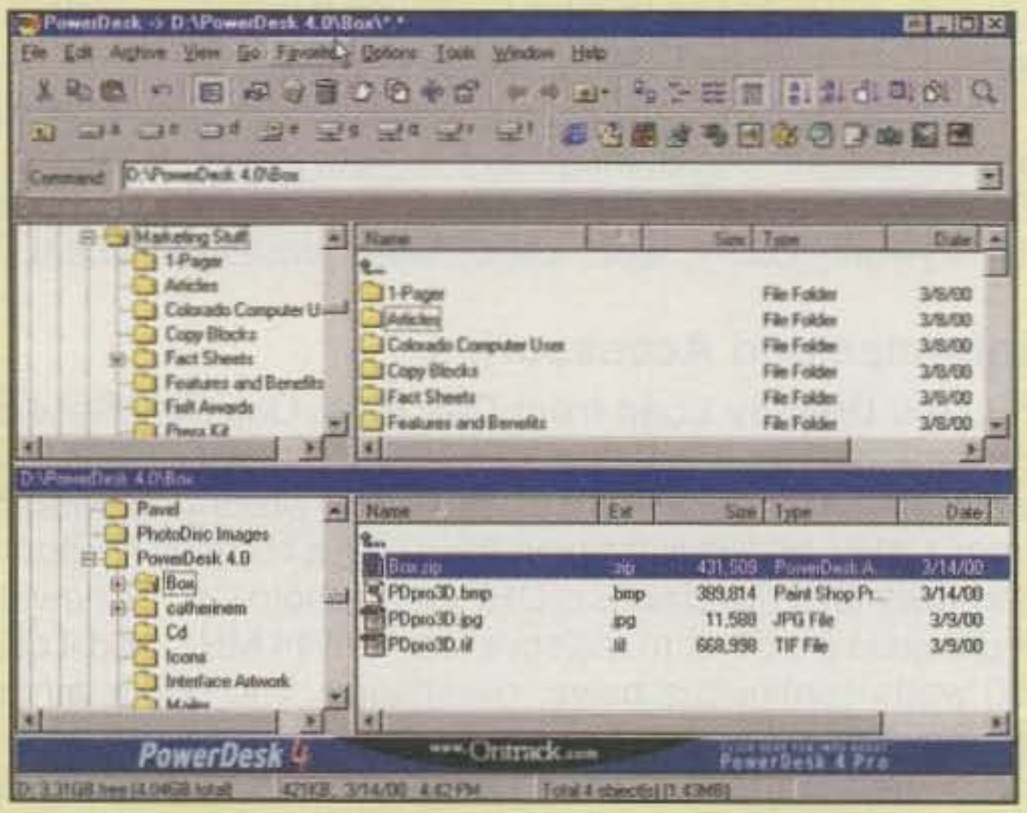


Fig. 1– PowerDesk 4 Pro helps you make Windows work the way you do. It includes the PowerDesk File Manager, claimed to be "the world's best file manager." A free version, PowerDesk 4, is downloadable from the Ontrack website (see text). (Digital graphic courtesy Ontrack)

Marked Web, contact Wireless Industry Association, 9746 Tappenbeck Drive, Houston, TX 77055 (1-800-624-6918; e-mail: <bob@wirelessindustry.com>; web: <http://wirelessindustry.com/PR/HamRadioMarket1.htm>).

timeanddate.com Website. A novel, feature-packed Norwegian website (fig. 3) offers a guide to time zones, calendars, and more. The site's main features include a World Clock Main Page, which offers capable, customizable World Clocks; and a Calendar Main Page, which offers various customizable calendars and an advanced meeting planner. The site also proffers a Counters Main Page, where you can perform several types of countdowns, including a customizable countdown to any date. There also is a Main Configuration Page, where you can select your own time zone, country, language, number and date formats, and more.

Check out the timeanddate.com website at <http://www.timeanddate.com>; or contact the site's operator, Steffen Thorsen, at e-mail: <information@timeanddate.com>.

From the Bookshelf

Cebik's *Cubical Quads, Vol. 2.* In June we profiled the excellent book from noted author and antenna expert L. B. Cebik, W4RNL, *Cubical Quad Notes, Vol. 1: A Review of Existing Designs,* available from the antenneX website. We also mentioned that the follow-on Vol. 2, "Rethinking the Quad Beam," would appear later this year.

W4RNL's *Cubical Quad Notes, Vol. 2: Rethinking the Quad Beam,* now is available (fig. 4). Volume 1 in this pair reviewed existing quad designs and uncovered a number of factors that have not been fully appreciated. In this second volume, these factors lead to a rethinking of quad design and to some redesign of monoband quad arrays. The second, 14-chapter, 240-page volume results in computerized monoband quad design programs for one- to four-element arrays, as well as in a consideration of larger designs, narrow-band design, VHF designs, and factors influencing the elevation patterns of quads.

The new book is available in a choice of soft-cover or eBook versions; the eBook is in the popular PDF format and requires the free Adobe Acrobat Reader software. Prices range from $22.95 to $29.95, depending on format and delivery method.

The antenneX website is sponsored by antenneX Online Magazine, P.O. Box 72022, Corpus Christi, TX 78472

Fig. 2– The Ham Radio Market is a fast-moving board where radio amateurs can seek, find, buy, and sell anything in amateur radio. You can access Ham Radio Market at <http://ham radiomarket.com>. (Digital graphic from the Ham Radio Market website)

Fig. 3– This feature-packed Norwegian website offers World Clock, Calendar, and Counters Main Pages. There also is a Main Configuration Page, where you can select your own time zone, country, language, number and date formats, and more. (Digital graphic from the <timeanddate.com> website)

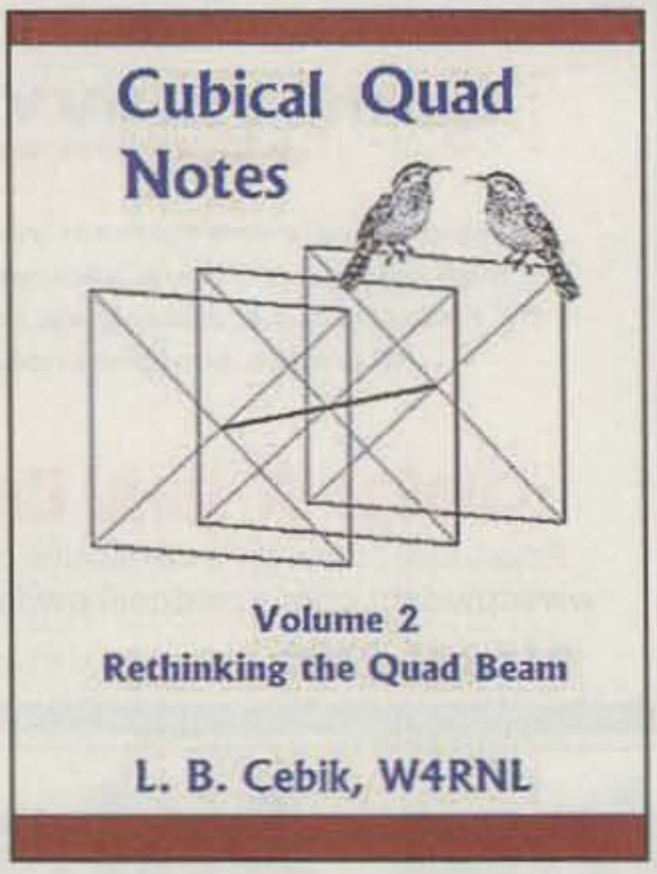


Fig. 4– L.B. Cebik, W4RNL's Cubical Quad Notes, Vol. 2: Rethinking the Quad Beam, *now is available. Volume 1 reviewed existing quad designs and uncovered a number of factors that have not been fully appreciated. In Volume 2, these factors lead to a rethinking of quad design and to some redesign of monoband quad arrays. Together, the two-part series clarifies some aspects of quad array performance and codifies some basic elements of quad design. (Photo courtesy the AntenneX website)*

(phone 1-888-855-9098; e-mail: <info @antennex.com>; web: <http://www.antennex.com>). Be sure to check out the antenneX website, which is chock full of useful and authoritative antenna information.

Search Engines for the World Wide Web, Third Edition. Billions of pages of information are everywhere on the internet, but often none are to be found when you need them! Indeed, finding a specific online resource can be difficult, but various search tools are available. Internet search engines are many, and include AltaVista, Google, HotBot, Lycos, Northern Light, and more than 3500 others, all competitively seeking your attention.

The proliferation of search sites has created new problems and questions, such as how do I find out what the really good ones are? Does it make a difference as to which one I choose? What are the strengths, weaknesses, and quirks of each search engine?

Alfred and Emily Glossbrenner address these questions and other problems and issues in their new book, *Search Engines for the World Wide Web, Third Edition*. A part of the Peachpit Press "Visual QuikStart" series, their book takes an easy, visual approach to teaching you how to search the web, working like a reference book, with concise, straightforward commentary that explains what you need to know. There's also a companion website supporting the book at <http://www.peachpit.com/vqs/search>. The 20-chapter, 345-page book is $17.99. It's available in bookstores, or you can purchase it directly from Peachpit Press.

For more info on the new book, contact Peachpit Press, 1249 Eighth Street, Berkeley, CA 94710 (1-800-283-9444; e-mail: <info@peachpit.com>; web: <http://www.peachpit.com>). Also be sure to check out the Peachpit Press Visual QuickStart Online Library at <http://www.quickstartonline.com>, discussed in the July column.

Radio Resources

Typetronics Tube Mall Supermarket. In our solid-state world, have you tried to buy tubes for your favorite "vacuum tube era" receiver, transmitter, or transceiver? Tubes can be scarce, and when available, often price themselves out of the market.

As we pointed out in a 1997 column, a firm that's easing the tube availability problem is Typetronics, a Ft. Lauderdale mail-order firm I often see at hamfests in the southeast. Fred G. Schmidt, N4TT, offers mostly receiving types, but his flyer also lists many popular transmitting, industrial, and special-purpose types of tubes.

Also offered are tube socket connectors, extenders, and socket savers; plate caps; tube shields; pilot lights; doorknob and other capacitors; Teletype® repair parts; time-delay relays; ballast tubes; Geiger counter tubes; test equipment; and tube complements for Collins amateur radio gear. Specialty lists are available for test equipment and for Collins tubes.

For a flyer or specialty list, send an SASE to Typetronics, P.O. Box 8873, Ft. Lauderdale, FL 33310-8873 (954-583-1340).

We Get Letters

Once again we're just about out of space in this month's column. Before wrapping things up this time around, however, we would like to acknowledge some of the good folks who have corresponded with us in recent months. A tip of the W8FX hat goes to Jay Craswell, WØVNE; Richard Mollentine, WAØKKC; Press Jones, N8UG; Bob Hutchinson, N5CNN; Dave Ingram, K4TWJ; Irv Sautman, KD6GSN; Bill Fell, KK5PB; Dale Smith; KA5WHO; Randy McDonald, K4MAD; Bill Lauterbach, WA8MEA; and Mike Black, N6EGN.

Wrap-Up

That's all for this time, gang. Next time more "What's New." See you then.

Overheard: It's true that people do what you encourage them to do, not what you nag them to do. 73, Karl, W8FX

Beginner's Corner

BY PETER O'DELL, WB2D

For the Newcomer to Ham Radio

Nothing Better To Do? Reinvent The Wheel

A couple of days ago I was the guest speaker at the Boca Raton Amateur Radio Club meeting. I "made" $140 just by showing up. No, the club did not pay me. Let me explain how it was worth $140 to do a talk for free.

It all started about six weeks ago when my Canon Multipass (printer/fax/scanner combo) was not printing clearly. I bought one of those cleaning kits at a computer show and was attempting to clean the cartridge. Suddenly, the printer "thought" that it had the wrong cartridge and ceased to work. The unit was only a couple of years old, and I had paid about $350 for it new.

First, I contacted Canon via its website. Nothing that they suggested made any improvement. I then called around to some repair shops and was told that I needed to replace the cartridge holder and ribbon, and maybe the logic board. The consensus was that I had blown a diode buried somewhere deep in the innards. The cost would be $70 for the ribbon and maybe $100 for the labor. A logic board would run another $80, if needed. Could I do it myself? Maybe. The best advice from the service shops was to toss it out and buy a new one. Upon checking, I found I could buy a new one at Sam's for $140; prices fall as technology marches forward. That's what I did.

Here, however, is the part that Wendy hates about me: I could not bear to throw out the broken one. Heck, it was only a couple of years old and I had paid $350 for it.

For the last six weeks it has sat on the floor of my home office. Remember the old TV show *Magnum, PI*? Magnum always talked about the "little voice" that seemed to know more than he did. Well, I don't hear voices (as long as I take the meds, anyway), but I do get hunches from time to time—gut feelings, if you will—and I had one. I just knew that someone at that club meeting would know how to fix this printer.

Sure enough, during my talk I asked the group if anyone had experience with these things. There was a ham who had fixed a bunch of Canon printers with similar symptoms. He said that chances were all that was needed was a cleaning of the electrical contacts on the cartridge holder. Duh! Whether I should have thought of that on my own or not, his advice turned out to be golden. After 30 seconds of scrubbing with a Q-tip and alcohol, the printer worked like new. I now have a multi-function unit to use in my home office. It would have cost $140 for another one.

The point is this: Collectively, hams have an enormous warehouse of useful information. Some of it is pretty esoteric, but an awful lot of it is wisdom that comes from experience. Going to club meetings is certainly one way to tap into that knowledge pool, but there are other ways, too. A lot of the garden-variety experience has been distilled into books. Since the holidays are at hand, I want to give you what I think of as the essential ham library. No shack should be without these books, in my opinion. It is like having a thousand of the smartest hams ever at your beck and call.

All of the titles mentioned are published by the ARRL and are available from them or their dealers. The holidays are upon us, so maybe you can drop some hints—or just buy them, if need be. I present them here in what I think is their order of importance. The first one to buy is also the least expensive:

The ARRL's FCC Rule Book

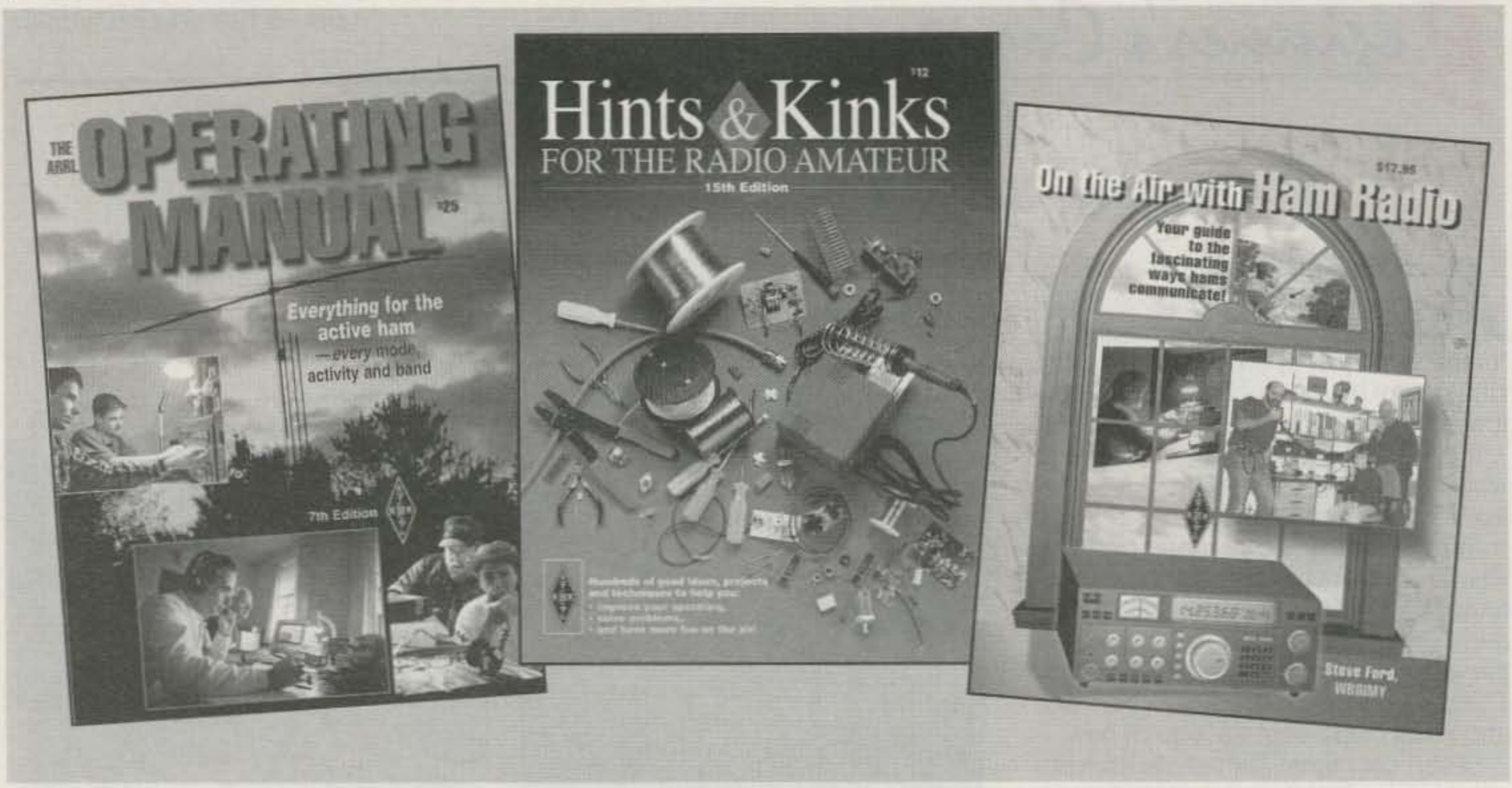
edited by John Hennessee, N1KB

There is no excuse for any ham not to have a copy of this book. It is only $12, but it could save you time, money (lots of it), and grief. Not only do you get the rules (Part 97 plus other governmental material), but you get a plain-language explanation of what it all means.

For instance, I just opened the book and flipped through it. The section on repeaters caught my eye, because I know there are endless discussions in groups about what is legal and what is not legal on the repeater. In about ten pages Hennessee lays out very clearly what you can and cannot do legally. If all the "jail house lawyer" hams read through these pages (a really slow reader could do it in a half hour or less), those endless, agonizing debates about what is legal on the repeater would disappear. That would be a shame, wouldn't it?

If you don't find this one in your stocking, do us all a big favor and buy a copy for yourself.

**123 NW 13th Street, Suite 313, Boca Raton, FL 33432*
e-mail: <wb2d@cq-amateur-radio.com>



The ARRL Handbook For Radio Amateurs

This book has the subtitle "The Standard in Applied Electronics and Communications," and this is one case in which a grandiose-sounding subtitle is actually an understatement. You will find 1200 or so pages divided into 30 "chapters" with everything from how to make a dipole for 75 meters to designing Chebyshev Filters. You could turn each chapter into a stand-alone book by adding a little fluff here and there. That is the one thing you will not find in this tome, as it is tightly written and finely edited.

For instance, there is a whole chapter on Digital Signal Processing (DSP). Suppose you want construction projects? How about a 30/40 watt SSB/CW 20 meter transceiver? Or a Binaural I-Q Receiver? Don't know what that it is? No problem; it is explained in detail in the *Handbook*. If your interest runs toward space communications, there is another chapter that details how to get started and assemble a station that will deliver for you. Maybe you want to know about repeaters. It's all in the *Handbook*.

This book is more than just a collection of construction articles. The first three chapters provide an overview of the whole hobby. Chapters 4 through 8 cover the fundamentals of electronics theory and practice. You could teach a college course from these chapters alone. There is a chapter on "Component Data." In addition to the basics, such as resistor color codes and three-terminal voltage regulator specifications, you will find a chart comparing the relative advantages and disadvantages of polystyrene versus polyethylene and other common thermoplastics—and it goes on.

My copy of the *Handbook* is the 2001 edition. By the time you read this, the ARRL will have released the 2002 version. Promotional copy suggests that there are some incremental changes to the new version. This new one lists at $35 for the softcover version; hardcover and CD-ROM versions are available at somewhat higher costs. A reasonably current copy of the *Handbook* is an absolute necessity for every ham shack.

The ARRL Operating Manual

edited by Chuck Hutchison, K8CH

Ever meet one of those "hams" who tells you that he has been licensed for 15 years but never got on the air? I have. A bunch of them. Talk to them a little bit, and you quickly learn that fear plays a big role in their reluctance. Fear of what? Who knows! Fear of the unknown. Fear of failure. Fear of doing "it" wrong. Fear of being laughed at by other hams. Well, this book pretty much cures those fears—or, at least, removes whatever rational component the fear had.

Weighing in at approximately 400 pages divided into 17 chapters, *The Operating Manual* is roughly one-third the size of the *Handbook,* but it does for operating and making contacts what the *Handbook* does for technology and construction. Most of the chapters have a "guest author," who is an expert in that particular activity. By the way, Chuck, K8CH, who recently retired from ARRL HQ, has been a ham most of his life. In addition to being an excellent writer and editor, Chuck has been active on most modes at one time or another. I can only think of a handful of hams who would be equally well versed to oversee a project such as this one. My point is this: If you read it in this book, you can be assured that this is how it really is in the real world.

The first two chapters are devoted to an overview of the ham radio and a simple interpretation of the rules and regulations as they apply to normal, everyday operation. The third chapter is devoted to FM and repeater operation—easy to understand guidelines for the newcomer to ham radio. Chapter 4 deals with VHF and UHF operation beyond repeaters, excluding digital techniques, space communications, and video techniques (all of these are covered in chapters of their own). The next two chapters are devoted to digital techniques on HF and VHF/UHF. Traffic handling and public service also have chapters of their own, too. Typical HF activities are covered in chapters on DXing, contesting, and chasing awards, and there are special chapters on pointing antennas, online resources, and monitoring (SWLing).

If your idea of ham radio is to get on the radio and do the same thing everyday, you probably won't buy this book. That's a shame, because you probably could easily double or triple your ham-

ming pleasure by reading a chapter or two and branching out a little. If you still have your sense of adventure intact, you will want to buy this book and pretty much read it from cover to cover. You will find that this $25 softcover road map provides a shortcut to your next voyage.

Hints & Kinks

edited by Larry Wolfgang, WR1B

My printer adventure (on the first page of this column) is the kind of story that is behind most of the items in this manual. Most, if not all, of the material in this book appeared in *QST* at one time or another. Some of it ran as short articles, while most of it appeared in the "Hints & Kinks" and "New Ham Companion: The Doctor Is In" columns. By comparison, this is a smaller book (a little less than 300 pages divided into 10 chapters), but it could be the best $12 you've spent in a long time.

Chapter titles include Equipment Tips and Mods, Batteries and Generators, Mobile Stations, Portable Stations, Construction/Maintenance, Test Gear, Antenna Systems, Operating, Around the Shack, and Interference. These divisions are somewhat arbitrary, I suspect. What is truly in this manual is the practical experience of thousands of hams doing what hams have always done—figure out some way to get the job done, whether you have the "right" part or not.

In a sense this is a text book on the ham attitude, but it is also a testament to ingenuity. I'd recommend new hams read this book cover to cover, whether or not you have the equipment discussed. Need to add PSK31 capability to a newer Kenwood radio? No problem; the details are there. Or maybe you are repairing a 30-year-old Heathkit SB-200 amp and can't find the 1 ohm resistor you need? The solution is there . . . and on it goes.

Hints & Kinks is not limited to just devices that produce radio signals directly. There is a short article on how to pick the right generator for emergency power needs, and there is another article on building your own computer from off-the-shelf parts. Still another article deals with upgrading memory in your computer. How about using a palm computer as a packet station? It's all there.

On The Air With Ham Radio

by Steve Ford, WB8IMY

This $18 book is a bit different from those we looked at earlier. You might subtitle this one "A Taste of Ham Radio." Do you have a child, spouse, parent, or friend who is a little more than bewildered by your fascination with ham radio? Maybe you think one of these people would become interested in hamming with just the right amount of prodding. This book may be your answer. With a minimum of technical jargon it tells what hams do.

This book is reminiscent of *Ham Radio Horizons: The Book* jointly published by *CQ* and the ARRL about ten years ago. Personally, I think this new version falls a bit short of the level of journalistic genius set forth in the earlier volume *(Guess who wrote it?—ed.)*, but, alas, that book is no longer in print. With that one caveat, we can recommend this book wholeheartedly for all those would-be hams on the sidelines.

You've put a big dent in the plastic buying the new rig, right? Drop some hints for one or more of these low-cost books. Santa knows you've been good and deserve it, but if no one responds to the hints, do yourself a favor and pick up these books. It is the best start your library could have. Happy Holidays.

73, Pete, WB2D

Call for Photos and Stories

We'd like to hear from you about your experiences as a newcomer. If you have questions, we'll try to incorporate them into future columns. If you have photos (color prints or slides okay) of your station or antennas, please send them along and we'll publish the best ones. If you have a solution to a common problem that new hams experience, we'd like to hear about it so we can pass it along. You can contact me at <wb2d@cq-amateur-radio.com> or Peter O'Dell, WB2D, Beginner's Corner, 123 NW 13th St., Suite 313, Boca Raton, FL 33432.

BY DAVE INGRAM, K4TWJ

The Art of Low-Power Hamming

Personal Portable—The Hot New Rage

The Survival Radio Aspect

In light of the September 11, 2001 terrorist attacks on our great nation, I am sure everyone will agree that emergency preparedness is more important now than ever before. Particularly attractive is "use anywhere" HF equipment and accessories as discussed in both this month's column and coming up in our February "QRP" column. Check out our featured items, and then ask yourself if you are prepared with both stand-alone gear and operating expertise to provide emergency communications for your community—not if, but when needed. Do you know your equipment's capabilities and limitations, what frequencies or nets to check, and which international shortwave bands to monitor during a crisis? Right now is the time to get cracking on those plans.

As you have probably heard or noticed, a captivating new trend—indeed, a sheer rage—in both QRP and "personal portable" operation is presently exploding in popularity. Inspired by the new style of "grab and go" transceivers such as the Yaesu FT-817, Elecraft K1, and SGC 2020 and supported by a rapidly growing mini-industry of mating accessories, this trend is the biggest "shot in the arm" for amateur radio in many years. In several ways it may remind you of those first days of TR-22s and handheld talkies on 2 meters, except this time it is HF, the range in worldwide communications, and it is growing faster than anyone can keep track of developments.

Imagine talking with fellow amateurs coast to coast plus working DX (on both CW *and* SSB no less!) with a shoulder-strapped rig while walking on a beach or having lunch at an outdoor restaurant to get the full impact of that statement. It is awesome! Yes, and every licensed HFer can join the fun. All it takes is some good amateur radio enthusiasm and QRP savvy—and you have both. Wake up! Have fun!

With respect to accessories, anything and everything oriented toward hand-held HFing is hot, hot, hot—pull-up antennas, small power supplies, battery packs, tiny headsets, mics and keys, carrying cases, and more. The portable antenna scene in particular is blowing wide open with neat offerings from NCG/Maldol, Waters and Stanton/MFJ, Super Antennas/W6MMA, and probably a couple more that will join in by the time this column is printed. Most of the mini antennas target Yaesu's FT-817, but they can also be used with most other transceivers operating at QRP power levels. Just use a counterpoise with them and remember "pocketable" HF antennas of any type are not big on performance, but they are very handy for traveling, monitoring, and medium-range communications.

Now let's take a look at some of these delights, and watch for our February 2002 "QRP" column to continue the story with more soon-to-be-revealed treats plus some time-proven favorites.

4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

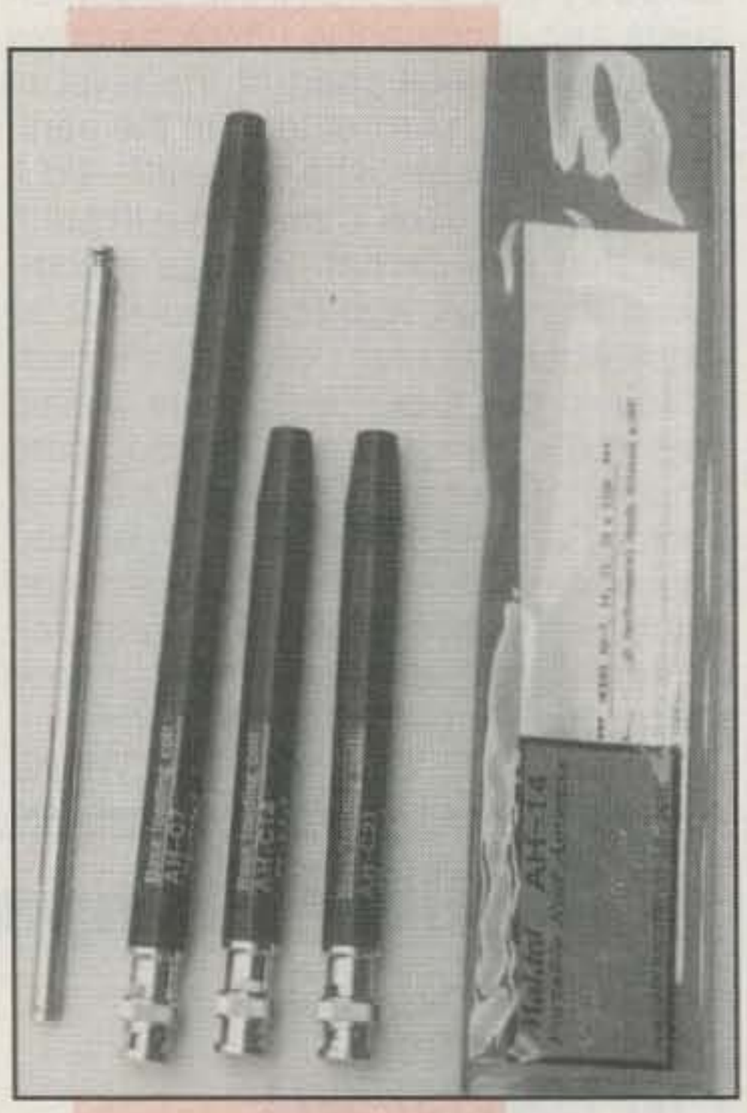


Photo 1– Maldol's new monoband mini HF antennas utilize a pull-up whip and interchangeable base loading sections to cover 40, 20, 15, and 10 meters. They extend to approximately 50 inches for operating, retract and separate into 7 inch sections for carrying, and are very lightweight. Base sections and extendable whip may be purchased separately to fit your needs.

Maldol's Mini Marvel

First in the spotlight are the new Maldol monoband mini antennas shown in photos 1 and 2. These little wonders are made up of two screw-together sections—an AH-R telescoping rod or whip and mating AH-C7, C14, C21, and C28 base loading coil sections for 40, 20, 15, and 10 meters, respectively. The rod and base coil sections can be purchased separately for monoband applications to fit your needs. The base sections average 6 inches in length and the rod retracts to 7 inches, making the combo perfect for carrying in a pocket. When mated together and extended for operation, overall height is 47 to 52 inches (you can vary total length or height to fine-tune SWR in a preferred CW or SSB band segment).

Photo 2– We mate a Maldol AH-14 base coil section with an AH-R whip, snap it onto an FT-817's front BNC socket, tune in 20 meters, and we are ready for HF action from anywhere. The carrying pouch for rig and antennas is the FT-817 Power Port available from Cutting Edge Enterprises.

Big Savings on Radio Scanners

Uniden® SCANNERS

Bearcat® 780XLT Trunk Tracker III with free deluxe scanner headset

Manufacturers suggested list price $529.95

Less -$205 Instant Rebate / Special $324.95

500 Channels • 10 banks • CTCSS/DCS • S Meter

Size: 7$^{5/8"}$ Wide x 6$^{15/16"}$ Deep x 2$^{13/16"}$ High

Frequency Coverage: 25.0000-512.0000 MHz., 806.000-823.9875MHz., 849.0125-868.9875 MHz., 894.0125-1300.000 MHz.

When you buy your Bearcat 780XLTGV Trunktracker package deal from Communications Electronics, you get more. The GV means "Great Value." With your BC780XLT scanner purchase, you also get a **free deluxe scanner headphone** designed for home or race track use. Headset features independent volume controls and 3.5 mm gold right angle plug. The Bearcat 780XLT has 500 channels and the widest frequency coverage of any Bearcat scanner ever. Packed with features such as Trunktracker III to cover EDACS, Motorola and EF Johnson systems, control channel only mode to allow you to automatically trunk many systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display and backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control with RS232 port, Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, operate your scanner from your computer running Windows. Order Scancat Gold for Windows, part number **SGFW** for $99.95 and magnetic mount antenna part number **ANTMMBNC** for $29.95. Not compatible with AGEIS, ASTRO or ESAS systems. For fastest delivery, order on-line at www.usascan.com.

Bearcat® 895XLT Trunk Tracker

Manufacturer suggested list price $499.95

Less -$320 Instant Rebate / Special $179.95

300 Channels • 10 banks • Built-in CTCSS • S Meter

Size: 10$^{1/2"}$ Wide x 7$^{1/2"}$ Deep x 3$^{3/8"}$ High

Frequency Coverage: 29.000-54.000 MHz., 108.000-174 MHz., 216.000-512.000 MHz., 806.000-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

The Bearcat 895XLT is superb for intercepting trunked analog communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning pleasure, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. **CAT895** Computer serial cable $29.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.

Bearcat® 245XLT Trunk Tracker II

Mfg. suggested list price $429.95/**CEI price $189.95**

300 Channels • 10 banks • Trunk Scan and Scan Lists
Trunk Lockout • Trunk Delay • Cloning Capability
10 Priority Channels • Programmed Service Search
Size: 2$^{1/2"}$ Wide x 1$^{3/4"}$ Deep x 6" High

Frequency Coverage:
29.000-54,000 MHz., 108-174 MHz., 406-512 MHz., 806-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

Our Bearcat TrunkTracker BC245XLT is the world's first scanner designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Our scanner offers many new benefits such as Multi-Track - Track more than one trunking system at a time and scan conventional and trunked systems at the same time. 300 Channels - Program one frequency into each channel. 12 Bands, 10 Banks - Includes 12 bands, with aircraft and 800 MHz. 10 banks with 30 channels each are useful for storing similar frequencies to maintain faster scanning cycles or for storing all the frequencies of a trunked system. Smart Scanner - Automatically program your BC245XLT with all the frequencies and trunking talk groups for your local area by accessing the Bearcat national database with your PC. If you do not have a PC simply use an external modem. Turbo Search - Increases the search speed to 300 steps per second when monitoring frequency bands with 5 KHz. steps. 10 Priority Channels - You can assign one priority channel in each bank. Assigning a priority channel allows you to keep track of activity on your most important channels while monitoring other channels for transmissions. Preprogrammed Service (SVC) Search - Allows you to toggle through preprogrammed police, fire/emergency, railroad, aircraft, marine, and weather frequencies. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in your scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - An LCD light remains on for 15 seconds when the back light key is pressed. Autolight - Automatically turns the backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BC245XLT automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BC245XLT also works as a conventional scanner. Now it's easy to continuously monitor many radio conversations even though the message is switching frequencies. The BC245XLT comes with AC adapter, one rechargeable long life ni-cad battery pack, belt clip, flexible rubber antenna, earphone, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, ESAS or LTR systems. Hear more action on your radio scanner today. Order on-line at www.usascan.com for quick delivery. For maximum scanning satisfaction, control your Bearcat 245XLT from your computer running Windows. Order Scancat Gold for Windows, part number **SGFW** for $99.95 or the surveillance enhanced version with audio recording part number **SGFWSE** for $159.95.

More Radio Products

Save even more on radio scanners when purchased directly from CEI. Your CEI price after instant rebate is listed below:

Bearcat 895XLT 300 ch. Trunktracker I base/mobile scanner	$179.95
Bearcat 780XLT 500 ch. Trunktracker III base/mobile	$324.95
Bearcat 278CLT 100 ch. AM/FM/SAME WX alert scanner	$159.95
Bearcat 245XLT 300 ch. Trunktracker II handheld scanner	$189.95
Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner	$89.95
Bearcat Sportcat 200 alpha handheld sports scanner	$169.95
Bearcat Sportcat 180B handheld sports scanner	$149.95
Bearcat 80XLT 50 channel handheld scanner	$99.95
Bearcat 60XLT 30 channel handheld scanner	$74.95
Bearcat BCT7 information mobile scanner	$139.95
AOR AR8200 Mark II Wide Band handheld scanner	$539.95
AOR AR16BQ Wide Band scanner with quick charger	$209.95
ICOM PCR1000 computer communications receiver	$379.95
ICOM R10 handheld wideband communications receiver	$279.95
ICOM R3 handheld wideband receiver with video display	$379.95
Uniden WX100 Weather Alert with S.A.M.E. feature	$49.95

AOR

AOR® AR8200 Mark IIB Radio Scanner

AOR8200 Mark IIB-A wideband handheld scanner/**SPECIAL $539.95**

1,000 Channels • 20 banks • 50 Select Scan Channels
PASS channels: 50 per search bank + 50 for VFO search
Frequency step programmable in multiples of 50 Hz.
Size: 2$^{1/2"}$ Wide x 1$^{3/8"}$ Deep x 6$^{1/8"}$ High

Frequency Coverage:
500 KHz to 823.995 MHz, 849.0125-868.995 MHz, 894.0125-2,040.000 MHz
(Full coverage receivers available for export and FCC approved users.)

The AOR AR8200 Mark IIB is the ideal handheld radio scanner for communications professionals. It features all mode receive: WFM, NFM, SFM (Super Narrow FM), WAM, AM, NAM (wide, standard, narrow AM), USB, LSB & CW. Super narrow FM plus Wide and Narrow AM in addition to the standard modes. The AR8200 also has a versatile multifunctional band scope with save trace facility, twin frequency readout with bar signal meter, battery save feature with battery low legend, separate controls for volume and squelch, arrow four way side rocker with separate main tuning dial, user selectable keypad beep/illumination and LCD contrast, write protect and keypad lock, programmable scan and search including LINK, FREE, DELAY, AUDIO, LEVEL, MODE, computer socket fitted for control, clone and record, Flash-ROM no battery required memory, true carrier reinsertion in SSB modes, RF preselection of mid VHF bands, Detachable MW bar aerial. Tuning steps are programmable in multiples of 50 Hz in all modes, 8.33 KHz airband step correctly supported, Step-adjust, frequency offset, AFC, Noise limited & attenuator, Wide and Narrow AM in addition to the standard modes. For maximum scanning pleasure, you can add one of the following optional slot cards to this scanner: **CT8200** CTCSS squelch & search decoder $89.95; **EM8200** External 4,000 channel backup memory, 160 search banks. $69.95; **RU8200** about 20 seconds chip based recording and playback $69.95; **TE8200** 256 step tone eliminator $59.95. In addition, two leads are available for use with the option socket. **CC8200A** personal computer control lead $109.95; **CR8200** tape recording lead $59.95. Includes 4 1,000 mAh AA ni-cad batteries, charger, cigarette lighter adapter, whip aerial, MW bar antenna, belt hook, strap and one year limited AOR warranty. For fastest delivery, enter your order on-line at http://www.usascan.com.

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Photo 3– All bands right in your hand! This new MFJ-1899T "Walkabout" antenna covers 80 through 2 meters in a single "break apart and carry anywhere" package. Fully extended, it measures 63 inches in height. Retracted and separated, the helical base section is 12 inches long and the pull-up whip is 7 inches long.

Generally speaking, I find performance of the Maldol mini antenna close to par with a base-loaded 4 foot antennas. That is, assuming a 1/4 -wave counterpoise to simulate ground or a vehicle's metal body used in conjunction with the antenna (I use a section of shield removed from a piece of old coax cable.). I also find the lower band 40 and 20 meter antennas are much more SWR-sensitive and difficult to resonate than higher band antennas (obviously because of longer wavelengths). Place one on one side of a room, and its SWR might be low; place it on the other side of the room and its SWR skyrockets.

Unseen metal frames and wires drive mini antennas crazy. My AH-14 wanted to resonate on 15 rather than 14 MHz, so I added a short (7 inch) extension wire to the AH-R rod's tip. The idea worked, so I then used an MFJ-259B antenna analyzer with other experimental-length extension wires and other base loading coils to "hop up" performance and add WARC band coverage (the old "more whip and less coil" trick). Next I plan to devise small add-on capacity hats to replace the extension wires.

If you like dinking with antennas and want super portability (and limit your power to 10 watts), you will like the new Maldol mini antennas. They are available from amateur radio dealers nationwide. Details are on the Comet/NCG website: <www.cometantennas.com>.

MFJ-1899T "Walkabout"

Another fascinating new mini-antenna for on-the-spot HFing is the "Walkabout" made by Waters and Stanton of the UK and imported to the US by MFJ Enterprises (photos 3 and 4). This multiband treat is akin to a miniature Outbacker, with band taps along its lower helical winding section, a jumper lead for selecting bands, and a top-mounted pull-up whip. The base, or bottom, is fitted with a BNC connector to mate with the FT-817's front socket. Adding a BNC-to-PL-259 plus a right-angle PL-259 adapter (called an 83-1AP) and connecting it to the (stronger) SO-239 socket of the FT-817 relieves unnecessary strain. That same idea also works for adapting the MFJ "Walkabout" to other transceivers. Just remember to hold their output below the antenna's limit of 25 watts.

Overall length, or height, of the MFJ "Walkabout" with its whip fully extended and ready for operation is approximately 63 inches. Retracted, the whip is 7 inches long and the mating helical base section is 12 inches long. Moving the jumper lead between band taps selects "traditional" 80 through 10 meter operation. Adjusting the (pull-up) whip's length in conjunction with tape selection brings in WARC band coverage plus 6 and 2 meters. Fine tuning the whip's overall length also tweaks SWR for desired CW or SSB band segments.

A counterpoise or ground-simulating wire should also be used with this antenna. However, its included instruction sheet suggests it need not be 1/4 wave long. In fact, the info sheet suggests using the formula 180/F(in MHz) = Length (in feet) of the counterpoise. Cool! Monoband versions of this antenna incidentally, are also available for budget-conscious amateurs.

Performance-wise, I find the "Walkabout" right on par with my 4 foot Outbacker mobile antenna, and I have worked the world right from my Camaro with that little antenna. When initially checking out the "Walkabout" (and propping it against a wall, which caused wild variations in SWR), I heard a station in Curacao calling CQ. My transceiver was set at 5 watts output, so I quickly punched on its automatic tuner, called, and received a 579 from the PJ2 station. By jove, this "Walkabout" really works! It's a gas contacting DX with such a mini antenna! You simply must experience the thrill first-hand to fully appreciate it! MFJ "Walkabouts" are available from dealers nationwide and more details are available on the web at <www.mfjenterprises.com>.

W6MMA "Super Antennas"

Taking pull-up HF antennas to the next level (or next two levels!) are the new mini-screwdriver portable and mobile

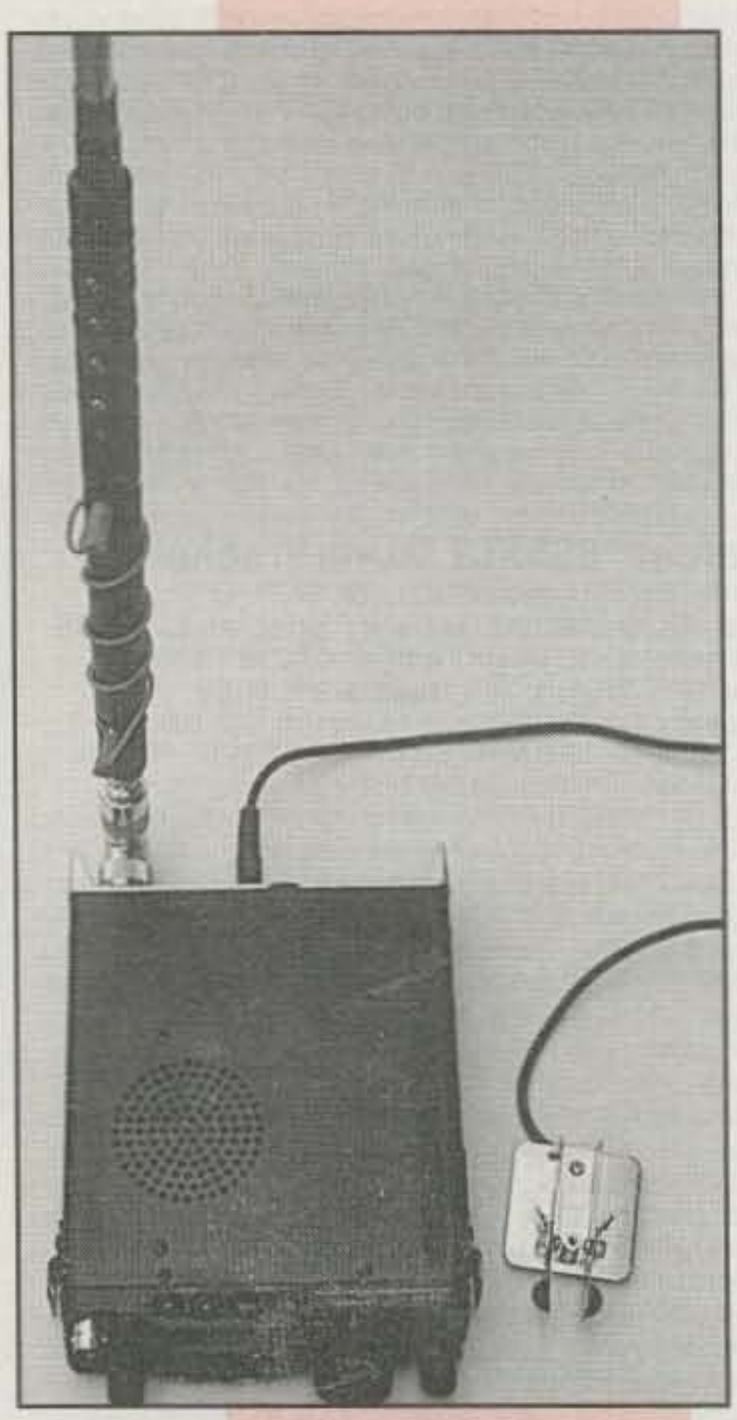


Photo 4– The MFJ-1899T "Walkabout" and Yaesu FT-817 set up for portable, on-the-spot operation. The "Walkabout" is a mite hefty, so I added a BNC-to-PL-259 right-angle adapter so it could plug into the FT-817's stronger SO-239 socket on the rear panel and stand upright. The miniature keyer paddle beside the transceiver is a new MFJ-561 item.

Photo 5– This go-anywhere/portable version of the W6MMA "Super Antenna" consists of a 12 inch base mast, MP-1 manually adjustable coil section, and top whip that extends to 43 inches for operating or retracts to 7.5 inches for carrying. Here the antenna sits on its optional tripod mount. The antenna covers 40 through 2 meters plus 70 cm and also 80/75 meters with an optional coil. It breaks down into 12 inch long sections for traveling.

antennas produced by Vern Wright, W6MMA, and shown in photos 5, 6, and 7 and fig. 1. Simply explained, these items are "break down and configure to fit your needs" versions of the popular "screwdriver" mobile antenna. They cover all HF bands and frequencies between 40 and 6 meters (plus 2 meters, 70 cm, and even 80 meters with an optional coil); stand 4, 5.5, 6, or 7 feet tall; handle 150 watts; and work out like the best center-loaded antenna you can find.

There are two basic versions of this antenna: the MP-1, which employs manual band switching (you physically move the slider on its coil), and the MP-2, which utilizes a precision servo/motor to remotely adjust the coil's slider. Either version can be assembled as a retractable 4 foot antenna that mounts to an FT-817 case or as a taller antenna that mates with a regular mobile mount, a mini-tripod, or a universal clamp-anywhere mount. All included sections and optional base mast, coil, upper whip sections, and mounts use standard 3/8-24 threads and all pieces are interchangeable. The flexibility of these "Super Antennas" is unreal!

Either version of the W6MMA "Super Antenna" setup makes a terrific mobile antenna (especially the motorized MP-2 version, as you can change bands and tweak SWR without even moving from your vehicle's front seat). You can also quickly remove selected sections of the antenna (such as the coil and maybe the mast) and pack them along with optional items (such as a collapsible top whip, counterpoise wire, and tripod base stand) for portable operations. In this case, the longest antenna section to pack is only 12 inches and the reassembled-in-a-minute all-band antenna stands 5.5 feet tall (photo 5).

Tuning the W6MMA mini screwdriver antenna to a desired frequency is a cinch—especially with the motor-driven MP-2 version. You just apply 12 volts to the motor (you can even use a regular 9 volt battery when operating portable, if desired) and listen for a peak in band noise on your receiver. If you overshoot that point (as evidenced by band noise decreasing or S-meter readings drop-

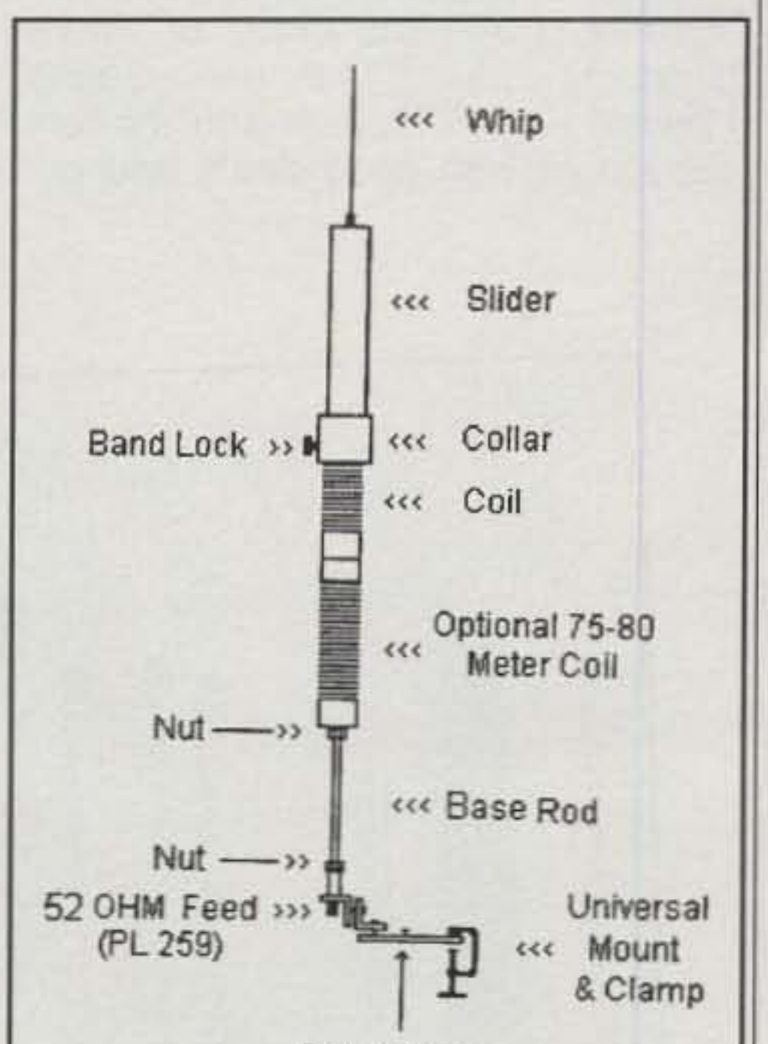


Fig. 1– General outline of the W6MMA mini screwdriver mobile/portable "Super Antenna." The lower mast is available in 7.5, 12, 18.5, and 22 inch lengths. The coil is available in manual and motor-driven versions, and the top whip may be 18.5 or 48 inches tall. Optional 80/75 meter coil installs below the main coil. All sections utilize standard 3/8-24 threads for interchangeability.

ping), just reverse voltage polarity so the slider moves in the opposite direction.

Tuning the MP-1 version follows the same general process: You just check received signal strengths after each coil movement (and step back from the antenna to avoid "body capacity" loading effects). Following that coarse tuning step, you transmit a low-power signal and tweak the slider's position for lowest SWR as read on your rig's meter. The whole process takes less than a minute and goes incredibly smoothly.

Performance on both transmit and receive is consistently superb with either version of the W6MMA antenna, probably because it employs a highly efficient center loading design. While initially checking out the MP-1 sitting on its optional tripod mount in the middle of my room, I heard 3B8FG calling CQ via the long path on 20 meters. I reached over, quickly adjusted the coil for low SWR, called 3B8FG on my FT-817 at 5 watts, and received a 449 report. Tuning up to 20 meter SSB, I answered VK4DAN calling CQ and received a 4 by 3 report. Life doesn't get much better than that, friends!

More details of both versions and their special mobiling accessories, incidentally, will be included in my next "Mobiling 2002 Special" column coming in a few months. Meanwhile, check with Vern Wright, W6MMA/Super Antennas, 1606 Pheasant Way, Placerville, CA 95667, telephone 530-662-6668 or <www.superantennas.com> for more information. Also, please understand some of the supplied and optional items may change, or I accidentally may have categorized them improperly at this time when everyone is just getting started in the game.

Giga What? RT Who?

All of our previously highlighted mini antennas are available from amateur radio dealers nationwide, but since they are ultra hot items, supplies will probably run thin during the holidays. What to do? Check with a newer and consequently less-known dealer, such as GigaParts, 4925 University Drive, Suite 140, Huntsville, AL 35816 (telephone toll free 1-866-535-4442, or <www.gigaparts.com>. Manager George Howard, KW4G, is starting out the company right with good deals and out-

Photo 6– The taller/mobile version of the W6MMA "Super Antenna" is configured with a 22 inch base mast, 14 inch MP-2 motor-driven coil assembly, and 48 inch top whip. Total height is 84 inches. The antenna may be scaled taller or shorter with optional mast and whip sections. (Details in text.)

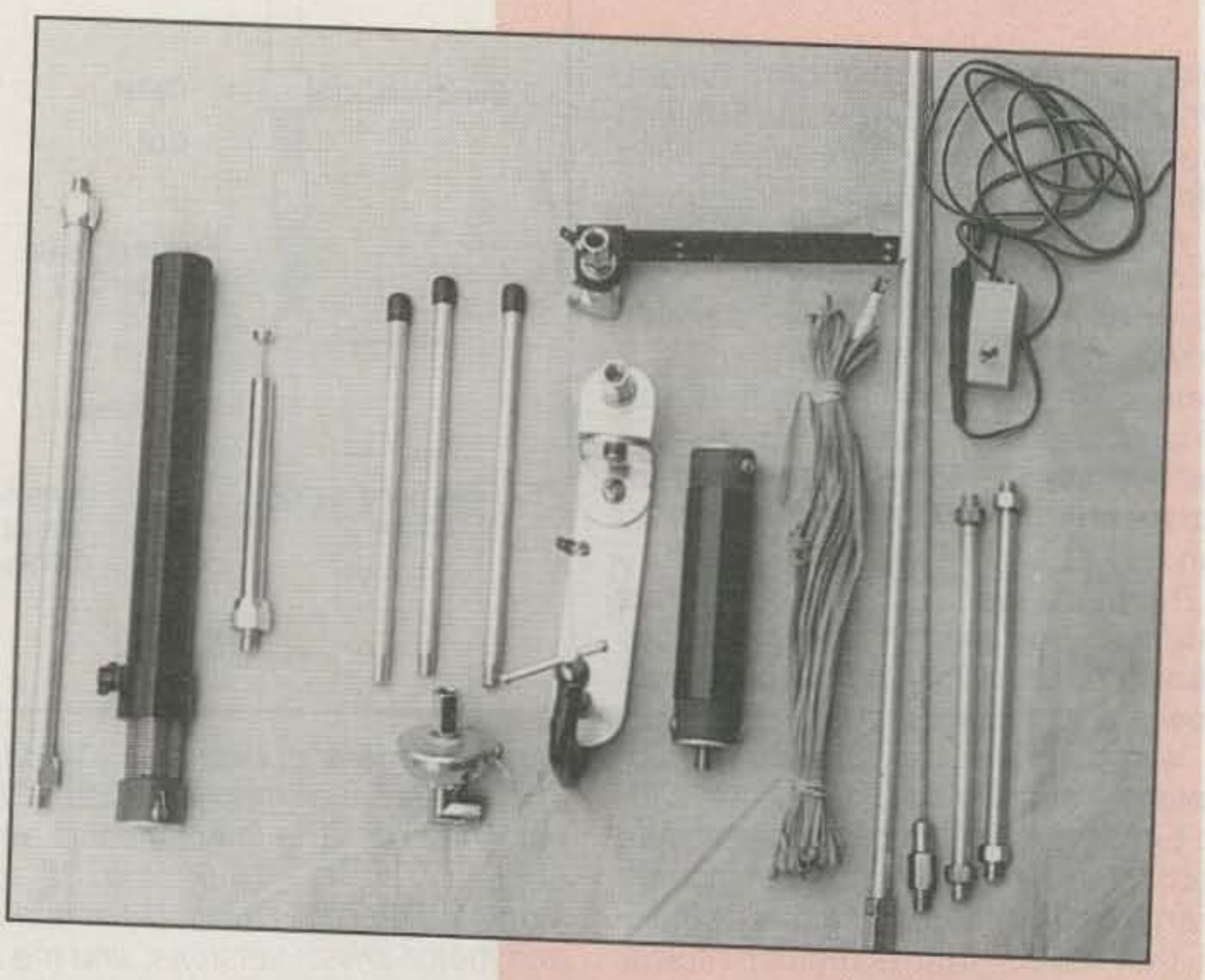


Photo 7– The W6MMA portable version MP-1 antenna separated into sections for traveling (left) and its optional masts, coil, whip, mounts, tripod, counterpoise, and motor switchbox for custom applications (right).

Photo 8– Want to enjoy "take it with you HF'n" until the cows come home? This new "One Plug Power" NiMH battery pack from W4RT Electronics is the answer. It directly replaces the FT-817's alkaline battery tray and door and powers the rig for an extra long time. It is amazing!

Photo 9– The new "One Touch Tune" module from W4RT Electronics. The unit plugs into sockets on the rear of the FT-817 and a press of its pushbutton or remote activation from an LDG Z11 tuner activate the rig to transmit a tune-up carrier.

standing customer service. (I speak from experience; he resolved my FT-817 problems like a pro!) He also handles some brand-new W4RT Electronics items you will love.

One such item is the "One Plug Power" NiMH battery pack for an FT-817 shown in photo 8. You just pop out the FT-817's supplied alkaline battery tray, and move its power connector over to the W4RT pack and slip it right into the little rig's battery compartment. The W4RT unit's NiMH cells are rated at 1650 maH, which is more than double the current capacity of nickel cadmiums or alkalines, so you can operate the FT-817 at a full 5 watts output or monitor band activities for an exceptionally long time on a single charge. It is terrific, and it is also supplied with double fuses plus a new Yaesu battery door with charging socket for additional flexibility.

Another headliner item from W4RT Electronics and GigaParts is the "One Touch Tune" module shown in photo 9. This plug-in module sidesteps multiple button fumbles in producing a key-down signal from an FT-817 when adjusting an antenna tuner. Whether operating SSB, PSK, or RTTY, you just press the module's pushbutton to transmit a carrier. Release the pushbutton, and the rig returns to your preset operating mode. Add a W4RT Z11 compatibility kit, and all switching is handled right from an LDG Automatic Antenna Tuner's "Tune" button. Nice!

Additional W4RT goodies for the FT-817 (such as twin filters and a pocket reference book) are also hitting the market. Check with GigaParts and <www.w4rt.com>, and watch for more details in our next (February) "QRP" column. We will also look at more portable and low-profile antennas and more new items at that time.

Finally, I ask how carefully are you reading this column. I am presently writing a new book on "HF To Go" and have allocated space in the book for some photos and info on amateurs pioneering this new trend. Here is your chance to receive some well-deserved recognition! Zip some photos and details of your activity to me, and watch for them to appear in a future "QRP" column, too.

73, Dave, K4TWJ

VHF Plus

BY JOE LYNCH, N6CL

All About The World Above HF

What is a Grid Locator?

Recently, Bill Boeckenhaupt, AKØA, e-mailed me the following question: "Looking at grid squares there are two letters, two numbers, and two letters. What does the last set of letters indicate and where is the info for them?" Considering that Bill probably represents many others new to the wonderful world of VHF+, I decided to again cover the subject of grid locators—or what are sometimes mistakenly are called grid squares.

One of the first questions you are faced with when you begin operating on VHF is: "What is your grid locator?" If someone hasn't clued you in ahead of time, there is a moment of confusion that might reach sheer terror as you try to figure out the answer to that question.

Whether you operate on SSB, CW, or satellite, it's tough to get on the VHF+ frequencies without understanding the grid locator system. The following is an explanation of what they are, where they came from, and why they are so popular today.

An Overview

Nearly 50 years ago a system of grid locators was introduced in Germany as a way of spurring activity on the VHF+ ham bands. These locators were assigned two-letter designators. Initially, the system worked well enough for the areas it covered in Europe and North Africa. However, worldwide expansion of the system necessitated replication of the same two-letter designators in other geographic areas, causing obvious confusion.

Two hams, working independently of each other to alleviate this problem, developed nearly identical designator systems. The first was created by Folke Rosvall, SM5AGM, in October 1979. The system started at the principal dateline and involved 20 degree by 10 degree large units, 2 degree by 1 degree middle units, and 6' by 3' small units (the measurement is in minutes, not feet).

The second, developed by Dr. John Morris, G4ANB, in December 1979 also involved 20 degree by 10 degree large units and 2 degree by 1 degree middle units. However, the small units were 5' by 2.5'. The proposed starting location for his system was the Greenwich longitude.

In April of the following year a group of European VHFers met in Maidenhead, England. Among the 20 or so proposals presented, Rosvall's and Morris's surfaced as the front-runners. The group determined that the best solution would be to modify Morris's system to start at the principal dateline.

P.O. Box 73, Oklahoma City, OK 73101
(phone 918-627-6625; fax 918-835-9785)
e-mail: <n6cl@cq-amateur-radio.com>

VHF Plus Calendar

Dec. 2	Poor EME conditions
Dec. 3	Highest Moon declination
Dec. 6	Moon perigee
Dec. 7	Last quarter Moon
Dec. 7-10	Winder 6-Meter Contest (See text for details)
Dec. 9	Good EME conditions
Dec. 14	New Moon and *Geminids* meteor shower peak
Dec. 16	Lowest Moon declination. Very poor EME conditions
Dec. 21	Moon apogee
Dec. 22	First quarter Moon and *Ursids* meteor shower peak
Dec. 23	Moderate EME conditions
Dec. 30	Lunar eclipse (in some parts of the world) and Full Moon. Poor EME conditions.

• EME conditions courtesy W5LUU

The U.S. Awards System

Meanwhile, the activity stimulated by use of the grid locator system in Europe prompted hams in the United States to take a look at developing a system for North America. At the 1981 Central States VHF Society conference held in Sioux Falls, South Dakota the Committee on Society Awards (headed by Lance Collister, WA1JXN, now W7GJ) proposed a series of three awards. The first was for making 100 contacts on VHF, the second was for making contacts in one hundred 1 degree by 1 degree grid locators, and the third was for scoring 1000 points by working stations at increasing distances from one's home QTH. Distances were measured on the basis of 1 degree by 1 degree grid locators. The proposal was adopted, and the awards were put in place and publicized. In the months that followed activity on VHF+ increased, and a few awards were issued.

Back in Europe, however, plans were being implemented to adopt the modified Morris plan—now called the Maidenhead Grid Locator system. Officials in the three International Amateur Radio Union (IARU) regions were contacted about adopting the plan within their respective regions. Region 3 was the first to adopt the plan in 1982. Region 2 followed in 1983. Then finally, in April 1984, Region 1 adopted the Maidenhead Grid Locator system, with an implementation date of January 1, 1985.

With interest in the CSVHF Society awards program increasing, the American Radio Relay League (ARRL) formed an Ad Hoc committee to study the adoption of a League-sponsored awards program as a possible replacement for the CSVHF Society awards. During 1982 the committee, working closely with members of the board of CSVHF Society, developed the VHF/UHF Century Club (VUCC), which incorporated the 100-grid concept. Seeing that the future lay in the Maidenhead locator system, the committee designed the program around it.

In January 1983 an article in *QST* by then Communications Manager John Lindholm, W1XX, announced the implementation of the awards program. Although the rules weren't spelled out entirely in the article (the rules for the higher microwave frequency awards were still being developed), a starting date of January 1, 1983 was set. Readers were encouraged to send for copies of the rules and application blanks. (These can be found on the League's URL at <http://www.arrl.org/awards/vucc/>. Log sheets can be printed from that URL or obtained from the League by sending an SASE with one unit of first-class postage.)

The awards provided for decreasing requirements on increasingly higher frequencies. On both 6 and 2 meters, the number of required grid locators to be worked was 100. On 125 and 70 cm, 50 grids were required. Operators on 902 and 1296 MHz needed 25 grids each. As the rules developed, requirements were spelled out for the higher bands. On 2.3 GHz the requirement was 10 grids. On the 3.4 GHz and above amateur bands, the requirement was 5 grids. The recipients would receive *half-century* awards for contacts on 125 (now 135) and 70 cm. For all bands above 70 cm, the recipients would receive *quarter-century* awards. Awards above these bands are designated SHF.

Initially, no award was offered for repeater or satellite contacts. However, on September 1, 1992 an award was created for working 100 grids via satellites. Endorsements are also available for working more grids on a particular band. However, no other endorsements (such as for mode or propagation path) have been authorized.

The awards require a fee of $10 for the initial application for each band, or for the satellite award. Subsequent endorsements require a 9" × 12" SASE with sufficient return postage for the return of all paperwork. In lieu of an SASE, $2.00 ($4.00 foreign) for postage and handling may be sent.

If you are a U.S. or Canadian applicant, you must have your QSLs field checked by an official from an ARRL Special Service Affiliated Club, or the Radio Amateurs of Canada equivalent. To obtain a list of field checkers near you, you can either click on the link embedded in the URL announcement or send a letter and an SASE to the American Radio Relay League in the U.S. or to the Radio Amateurs of Canada in Canada. Foreign applicants must have their QSL cards field checked by a designated official in their country.

Interestingly enough, while this awards program was designed to supersede the CSVHF Society program, it has done so only in *popularity*, as the CSVHF Society awards still exist today. However, according to Kent Britain, WA5VJB, one of the board members, no one has applied for any of the awards in the past ten years, and it's doubtful the mechanics would be in place to issue any if someone were to do so. For all intents and purposes, their "States Above 50 MHz Award" has replaced the old award. Rules for that award can be found on their URL at <www.csvhfs.org> and click on the current link for it.

The VUCC program was an instant success, and the race was on to see who would be first to attain the award on each band. Keeping in step with the change, the June 1985 VHF QSO Party rules switched from sections to grid locators as multipliers, creating a whole new scoring procedure.

Leaders were still based on sections and divisions. However, point accumulation was based on the grid locator, with its relatively uniform size, rather than the arbitrary size of different sections. Suddenly, a grid locator had the potential of becoming more rare than Delaware. Amateurs began making efforts to be "in demand" by operating from one of these rare grid locators—a practice that continues today.

Over the years, because of the fleeting nature of VHF+ contacts, the grid locator has come to replace both the QTH and signal-report information as the exchange for many VHF+ QSOs (the exception being meteor scatter and EME contacts, which still use a modified signal-report system). However, this has not eroded what is considered a legitimate QSO. VHF+ operators have maintained a high level of ethics. An operator agrees that he or she must hear both callsigns and the grid locator (or signal reports on meteor scatter and EME QSOs), along with an acknowledgement from the other operator that he or she also has received the same information, in order for the QSO to be considered complete.

It's well accepted that if one operator hasn't received all the information necessary, the contact is incomplete and both operators will wait for another time to repeat the attempt. The "exchange a signal report only" type of QSO so prevalent on HF operations, and particularly on some DX nets, is rarely found on VHF.

Determining Your Grid Locator

The grid locator designator has up to six places, two letters followed by two numbers, followed by two letters. The starting grid field, the 20 degree by 10 degree large unit, begins with "AA." It's located

between 180 degrees and 160 degrees W and 90 degrees and 80 degrees S. The next field "AB" is also found between 180 degrees and 160 degrees W, and is located between 80 degrees and 70 degrees S. Each successive field in that column is ten degrees farther north, and is designated by an increasing second letter; the most northerly field is designated "AR." The next field to the east repeats the alphabetical sequence with the designator "BA" and continues the same progression north. The final field, found at the opposite corner (between 160 degrees and 180 degrees E and 80 degrees and 90 degrees N) is designated "RR."

Determining your grid locator location within the grid field is simply a matter of finding your longitude and latitude. There are one hundred 2 degree by 1 degree grid locators in each grid field. (Actually, these locators are more commonly referred to as *squares*, as a throwback to the old CSVHF Society 1 degree by 1 degree system which, because of their equal degree dimensions, got mislabeled as squares. Unfortunately, the name "square" stuck.) Grid locators are numbered between "00" and "99." The lowest number is located at the southwest corner of the grid field, and the highest number is located at the northeast corner.

Find your 2-digit number by counting how many degrees you are located east and north of the southwest corner. For example, if you're located within 100 degrees and 80 degrees W and 40 degrees and 50 degrees N, you are within grid field EN. If you're located between 96 degrees and 94 degrees W and 43 degrees and 44 degrees N, count one locator for each 2 degrees east of the corner and one locator for each 1 degree north of the corner. In this example, you'd be two locators east and three locators north of the corner—within grid locator EN23, or somewhere in northern Iowa or southern Minnesota.

Things get a bit more complicated if you want to figure out your exact designator. You must know your location down to the last 2.5 minutes. If your starting point is an even degree, increase the first letter by one increment for each 5 minutes of your degree intersection, beginning at the letter "A." If your starting point is an odd degree, increase the first letter by one increment for each 5 minutes east of your degree intersection, beginning at the letter "M." For each 2.5 minutes north of your degree intersection, increase the second letter by one increment. In neither the longitude nor the latitude designations will you find a letter beyond "X." Again in the above example, if the location fell between 95 degrees 20' and 95 degrees 25' W, and between 43 degrees 15' and 43 degrees 17.5' N, your grid locator would be EN23QG, and you would be located very near, if not at, the four-corner intersections of Osceola, Dickenson, O'Brian, and Clay Counties in Iowa. The last two letters are rarely used in North America, except to indicate the locations much more accurately in order to measure distance records (and then principally on the microwave bands). It's important to note that the system of finding your fifth and sixth designator is reversed when you are south of the equator and/or east of Greenwich longitude.

Those who don't want to bother figuring out their location and looking it up in an atlas can purchase a couple of aids from the ARRL. The *ARRL Grid Square Map for North America* is available for $1, plus a business-size SASE. The *ARRL World Grid Square Atlas* is available for $5, plus $1 shipping and handling. The *Atlas* includes documentation for a BASIC program you can use to calculate your grid locator. Both items can be purchased directly from the League (both via their URL and the U.S. mail) and may also be available at your local ham store.

If you have a IBM-PC type computer, there are shareware software packages available for downloading from various URLs that will help you calculate the grid locator, or the longitude and latitude if you know the other. The League has a couple of built-in programs for determining your grid locator by city or by longitude or latitude values. It is important to note that when determining your locator by your city carefully consult the map that comes up with the information. For example, my imputing Tulsa, OK gave my correct grid locator of EM26. However, some of west Tulsa is located in EM16 and a little of south Tulsa is located in EM25. Uniquely, here we can access a grid corner fairly easily, as the corner of EM15, EM16, EM25, and EM26 is located fairly close to the intersection of U.S. Highway 75 and Oklahoma State Highway 117.

Determining Your Correct Longitude and Latitude

If you are right near a grid corner, how do you know exactly where you are located? Finding out where you are on the Earth can be a bit of a challenge. There are two ways—the easy (but a bit more expensive) way and the slightly more difficult (but considerably cheaper) way. The easy way is to find someone with a Global Positioning System, or GPS, receiver. With one of these devices you can determine your longitude and latitude with a fair degree of accuracy.

These receivers rely on signals transmitted from at least three of the 24 satellites that are in synchronous orbit approximately 11,000 miles above the Earth. The GPS receiver must receive a minimum of three of these satellites to obtain the necessary signal to produce a two-dimensional location, which will allow the circuitry in the unit to calculate your location. However, it takes a minimum of four satellites for accurate triangulation information and for altitude information. Some receivers are able to pick up signals from as many as six or more satellites.

There are several handheld models on the market from around $100 and up. They can be purchased at a variety of locations, including several sources on the internet. Several of them, such as the Trimble Navigation Scout and the Scout Master and several of the Garmin models, have the grid locator system built into their software. Acquire one of these receivers, and your problem of finding out where you are in terms of your grid locator is solved.

You can use the U.S. Geological Survey 7.5 minute series topographic maps to plot your grid locator, but this is a slightly more difficult method. These maps are called 7.5 minute series because they cover an area 7.5' by 7.5'. They are available from the U.S. Geological Survey Centers in Denver, Colorado or Reston, Virginia, from the Oklahoma Geological Survey Center, Norman, Oklahoma, or at your local map store. I purchased mine from the local map store for $3 per map. Incidentally, the local map store is probably your best bet because each map is named, and if you don't know the name of the map, you can at least look through their selection until you find the one you want.

Once you've acquired the right map, simply look for the correct location and read the scale on the side of the map to determine your longitude and latitude. For my QTH in Oklahoma City the map is called "Britton, Oklahoma." I looked up my QTH and determined that I was approximately 1200 feet west of the 97 degrees 32' 30" mark and 5200 feet north of the 35 degrees 30" mark. The 97 degrees by 35 degrees indication places me within grid locator EM15. By a bit of interpolation and drawing on the map, I could see that I was within the 5' by 2.5' location bounded by 97 degrees 30' to 97 degrees 35' by 35 degrees 30' to 35 degrees 32' 30", which places me within the sublocator of "fm." Therefore, my Oklahoma City grid locator was EM15fm.

Incidentally, once I knew my longitude and latitude, I could have plugged them into one of the software programs mentioned above and had it calculate my grid locator for me.

Why are Grid Locators So Popular?

The quest for completing contacts with stations in different grids rivals that of county hunting on HF. To economize on space and

time, anyone who wishes to go on a grid expedition will probably also want to put on as many grids as possible. Pat, W5OZI; Nick, W5FUA; and John, KB5IUA; held their 1992 grid expedition at the exact intersection of DM70, DM80, DL79, and DL89. The 1992 Chip Angle, N6CA, grid expedition took place at the exact location of the four corners of DM05, DM06, CM95, and CM96. The ARRL allows this sort of expedition, as long as the exact intersection can be determined by physical means. In both of these cases, the operators had the benefit of a survey marker.

Looking Ahead

What is the future of the grid locator system? As an incentive for activity, it still presents a challenge. There are 32,400 grid locators in the world. To date, Fred Fish, W5FF, has worked the most grids, somewhere around 800. Fred has also worked all of the grids in two fields. Even so, his total accumulation represents only 2.3 percent of the total locators available. Thus, even for the leader there is still plenty of challenge left. When the VHF+ operators, who fled the bands for 10 meters because of the "easy" DX, return again, there will be even more active stations to work from different grid locators.

Pacific Northwest VHF Society

VHF, UHF, and Microwave weak-signal enthusiasts in the Pacific Northwest have formed a new society to promote more interest and activity in weak-signal operation on the bands above 50 MHz. The new organization will focus on VHF-and-up weak-signal activity in Washington, Oregon, Idaho, and British Columbia.

Announcement of the new society came at the 2001 Pacific Northwest VHF Conference in Tacoma, Washington, on Sept. 22. Lynn Burlingame, N7CFO, will serve as president of the new society, and Jim Aguirre, W7DHC, will handle the secretary-treasurer duties. A board of directors is currently being formed. Board representation will follow the ARRL and RAC section format, with directors from each of the five sections in the Pacific Northwest; British Columbia, Idaho, Oregon, eastern Washington, and western Washington. There is a one-time membership fee of $10.00. While there are currently no annual dues, provisions for them have been made in the society's constitution and by-laws should they be needed in the future. A membership application form can be downloaded in pdf format at the site: <http: //pw1.netcom.com/~n7cfo/pnwsociety/PNWVHFS.pdf.

While the focus of the organization will be on Pacific Northwest activities and interests, anyone interested in weak-signal VHF, UHF, and microwave operation is invited to become a member. For the most part, society "business" will be conducted electronically and at the annual meeting each September.

Workshops, seminars, operating activities, and social gatherings will be held in various locations throughout the Pacific Northwest from time to time during the year. Consideration is also being given to sponsoring a regional award recognizing technical and operating achievements in the Pacific Northwest. Details will be forthcoming.

A temporary web page has been set up at <http://pw1.netcom.com/~n7cfo/pnwsociety/pnwsoc.htm> and an official e-mail reflector (<nwwsvhf@qth.net>) has been designated for sharing information. A permanent web page is under development. For additional information, contact Jim Aguirre at <w7dhc@arrl.net>.

On the Air

From **Sam Whitley, K5SW:** "On 5 October, I saw on prop logger that west coast had propagation to Pacific. I began listening/calling that way and hrd 'k4blk.' I called CQ DX and was answered on 50.110 MHz CW by VK4BLK (QG56) at 0158 UTC. I gave him 5/5. At 0217 on 50.105 I heard T32EQ (BL11) calling CQ. I worked him for country number 99. The QSOs were sporadic-*E* linked to *F2*. Now if only I cud get the QSL from TF3T for a 6 December 1981 QSO I'd have 99 confirmed when the T32EQ card gets back. One more to go for DXCC!"

From **Barry Malowanchuk, VE4MA:** W5LUA and VE4MA did complete QSO number two on 24 GHz EME in about 20 minutes on 9 October 2001. Al's signal was very readable, easy to find, but as time progressed over 2 1/2 hours, signals became more like 10 GHz with a very pronounced aurora-like buzz.

"Murphy's Law made an appearance at both QTHs. For the 07:00 test period my PLL TX LO was unlocked with a crystal that did not start. I readjusted for best crystal activity, which moved my TX converter about 550 kHz away! After recalibrating all was OK for the 09:00 test period.

"Al had trouble with one erratic readout, which because of No visual moon meant he could not track during one sequence.

"Information on further testing will be forthcoming."

Current Contest

The following is from the Six Club: "The first winter (6 meter) contest begins at 2300 UTC December 7 and goes to 0300 UTC December 10. *Contest rules:* Each QSO is worth one point in his/her own country and two points for every contact made outside of their country. Hawaii and Alaska each are considered a separate country. *Scoring:* Multiply total QSO points by the total number of grids worked. All entries must be received by January 15, 2002, either by e-mail or snail mail. Webpage address: <http://6mt.com/contest.htm>. The mailing address is: Six Club, P.O. Box 307, Hatfield, Arkansas 71945. *Awards:* awards will be given out to the first, second, and third place winners in each country.

Current Meteor Showers

Two showers occur this month. The first, the *Geminids,* is predicted to peak around 0350 UTC on 14 December. It has a broad peak and is a good north-south shower, producing an average of 100–110 meteors per hour at its peak.

The second, the *Ursids,* is predicted to peak around 1330 UTC, 22 December. It is an east-west shower, producing an average of greater than 12 meteors per hour, with the possibility of upwards of 90 at its peak.

And Finally . . .

My home country, the United States of America, and indeed the world, has been through so very much this year. While I am writing this in mid-October, I am looking forward to the time of year that many around the world think of as a time for peace and reconciliation. During this holiday season and leading into the new year I urge all of us to take time to reflect on how important we are to each other. We have a wonderful hobby that bridges geographic boundaries. This has been proven to me time and time again, but perhaps never more poignantly than when I was in other countries and have been accorded such respect as a ham and an American.

If you want to get a sense of who we are as a worldwide community, if you have access to the November 2001 *QST* read the "Correspondence" column on pages 24–25. There you will find letter after letter from hams around the world, each one sharing feelings about our loss this past September. Also in that issue of *QST* my friend Dave Sumner, K1ZZ, the Executive Vice President of the ARRL, wrote one of his best editorials ever. In an unusual move, the League has posted his editorial on one of their open-access pages so that, as they say, "both ARRL members and nonmembers might appreciate it and find it informative," and, I might add, also find it very inspirational. You can find it at <http://www.arrl.org/news/features/ 2001/10/08/2/>. I urge you to take a moment to read it and reflect on what Dave has to say to all of us amateurs worldwide.

Until next month . . . 73, Joe, N6CL

Awards

BY TED MELINOSKY, K1BV

News Of Certificate And Award Collecting

AMSAT Awards Series

Jim Blackman, KØEVE, is the recipient of USA-CA All Counties #1029, August 29, 2001. As Jim says in his story below, county hunting is largely a U.S. endeavor, but it is not without the thrill of DX, too. Here is his story.

Jim Blackman, KØEVE, USA-CA All Counties #1029, Aug. 29, 2001.

A year ago last Christmas, Patti (my XYL and now mobile logger) wandered into the shack while I was running a European pile-up on 20 meters CW. After I finished, she nonchalantly (and probably regretfully) asked how come I never talked to anyone in the U.S. I gave her the usual stories about the "Thrill of DX" and the "Magic Carpet," but I could see she wasn't impressed.

After my XYL left, I thought a lot about what she had said and went to my files, where I found an old blue USA-CA Record Book. It was empty. I rummaged through my QSLs and found about 200 counties, mostly from my Novice days. My uncle, W9BBU (SK), had introduced me to this wonderful hobby back in 1956, and my father, KØJFK (SK), supported my activities, including a new Viking II and an NC300 when I got my General in 1957. My initial interests were CW and DXing. Who could forget Cycle 19 as an introduction to amateur radio and DX?

I accidentally landed on the CW net (14.0565) and soon learned the way through good tutelage from Jerry, WØGXQ. On the SSB net (14.336), Jim, K2JG, quickly taught me how to be a county hunter and eventually how to run mobile. Ken, KC4UG, reminded me that if you go mobile, you are not a *real* county hunter unless you have 40 meters. I would like to add . . . and also carry a key!

Jeff, W9MSE, encouraged me to go mobile, especially to help put out counties on the CW net. Ken, KC4UG, critiqued my homegrown MRCs, and Fred, K5CWR, provided a model of human kindness and organization. His students must love him. Our home each night would not be the same without the booming voice of Ralph, WB4FFV, from the "large car."

Although county hunting is primarily an American enterprise, it is not without the "Thrill of DX." As a mobile I have enjoyed providing counties in the morning for Jim, VK4BS; Alan, VK4AAR; June, VK4SJ; Cliff, VK3CB; Graham, VK5AQZ; and others. Yaz, JH8GWW, is usually there, and in the afternoon our European county hunters appear: Eddie, G4KHG; Werner, DL9YC; John, SM3BCZ; Dag, SM4SET; John, EA3GHZ; John, G3LAS; Henri, OH3JF; Tonda, OK1APV; and others. Eddie, his XYL Barbara, Patti, and I had a delightful afternoon together in Central Idaho this summer.

I especially enjoy our VE neighbors. County hunting would not be the same without Lloyd, VE4AGT; Stan, VE1BES; Andy, VE2EM; Gilles, VE2MAM; Tom, VE3KZE; Scott, VE1OP; and others.

Patti patiently sits beside me and logs sometimes 10 to 12 hours a day when I am mobile. Her logs retain a true sense of the trip and accurate data to help with QSLs. They also provide us time together to enjoy the evenings, rather than sitting at a desk transcribing mounds of tapes.

All and all, it has been a fantastic trip. The pinnacle was being able to provide Dave, KE3VV, his last county for the second time around, and then, a few minutes later, to be able to get my last county from Jim, KB4XK, on my very next contact. Thanks, Jim, and Pete, K4QFK, for that effort.

My advice to new county hunters and perhaps to a few of the old timers would be as follows. Do it all. Operate both CW and SSB nets. Go mobile as often as you can. If you have a second QTH, put up a vertical and work counties. Geography does make a difference.—*73, Jim, KØEVE*

Awards Available

The Euro Award. France's REF Branch 19 is sponsoring the Euro Award, a short-term award good during all of 2002 and commemorating the Euro, the new European currency which will be put into circulation on January 1, 2002. Make one QSO (or receive one SWL card) with a station from each of the 12 countries of the Euro zone: CT – Portugal, DL – Germany, EA – Spain, EI – Republic of Ireland, F – France, I – Italy, LX – Luxembourg, OE – Austria, OH – Finland, ON – Belgium, PA – Netherlands, and SV – Greece.

One QSO with special station TM2E may be used as a joker (substitute for any one missing contact). QSOs have to be made between January 1, 2002 and December 31, 2002. All modes and bands okay. No use of repeaters. The award must be requested before December 31, 2003. No QSLs need to be submitted, only a certified log extract.

The fee is 20 Euros (naturally) or 25 IRCs for European stations, and 25 Euros or 30 IRCs for all others. The award is a handsome wood plaque. Apply to: Mauricette DeJean, F8BPN, 10 Impasse M.R. Guillot, F-19240 Varetz, France.

Important Note: Effective August 1, 2001, the administration of the REF (French National Radio Organization) has moved from using a long list of volunteer staff to a central administrative office for its awards program. Send all applications for REF awards to: REF Union, Demande de Diplome, BP-7429, 32 Rue de Suede, F-37074 Tours Cedex 2, France.

Marconi Club "Marconista." In December 2001 we technically can celebrate the 100th anniversary of DXing, as this is the centennial month of Marconi's first transatlantic radio transmission. A very nice award commemorating Marconi's contributions to long- distance

USA-CA Special Honor Roll

Jim Blackman, KØEVE
USA-CA All Counties #1029
August 29, 2001

Dave Curran, WD4RCO
USA-CA All Counties #1030
September 15, 2001

Tom Pennebaker, N4RS
USA-CA All Counties #1031
September 24, 2001

USA-CA Honor Roll

500		2000	
N2KX	3170	KØEVE	1219
WD4RCO	3171	WD4RCO	1220
HK3CW	3172	N4RS	1221
N4RS	3173		

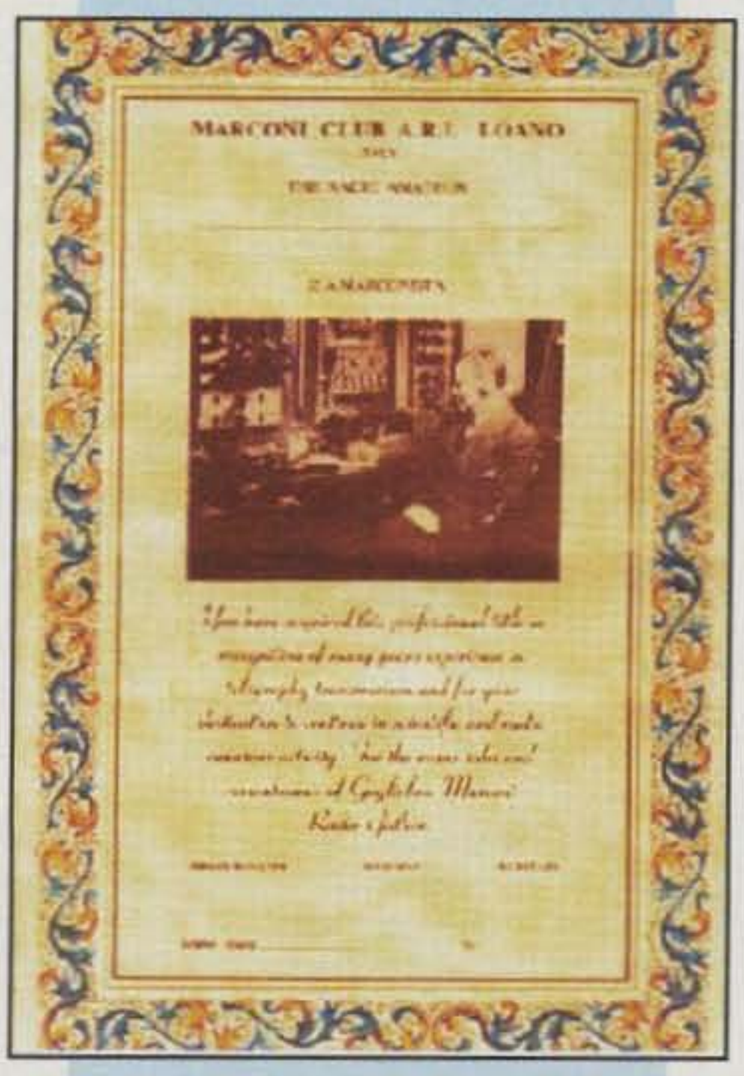
1000		2500	
KØEVE	1581	KØEVE	1141
N2KX	1582	WD4RCO	1142
WD4RCO	1583	N4RS	1143
N4RS	1584		

1500		3000	
KØEVE	1319	KØEVE	1049
WD4RCO	1320	WD4RCO	1050
N4RS	1321	N4RS	1051

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 65 Glebe Road, Spofford, NH 03462-4411 USA. DX stations must include extra postage for airmail reply.

65 Glebe Road, Spofford, NH 03462-4411
e-mail: <k1bv@cq-amateur-radio.com>

The Euro Award, offered by France's REF Branch 19, is a short-term award for 2002 that commemorates the Euro, the new European currency.



The Marconi Club "Marconista" award is issued in honor of Marconi's contributions to long-distance radio communications. It is sponsored by the Loano branch of ARI, Italy's national radio organization.

radio communications is offered by the Loano branch of ARI, Italy's national radio organization.

To honor amateurs who use the CW mode with expertise, A.R.I. Loano will give a "Marconista" mark of honor as Guglielmo Marconi intended. The president of this honorary CW club is Marquise Maria Cristina, Marconi's wife (silent key as of 1994). The title will be given to those who qualify under any of the following criteria:

a. any member of the HSC, VHSC, SHSC, EHSC, or FOC club upon written request.

b. any member of INORC, MF, MARAC, RNARS, or TOPS who supplies a letter from the president of the group declaring that the applicant works the CW mode.

c. any amateur who sends in three QSLs from Loano's ARI Department SV.

d. any amateur proposed by three current members of the Marconi Club who certify the applicant's proficiency in CW mode transmissions.

Member list is available from K1BV for an SASE. The use of keyboards and decoders is not permitted. Fee is 15000 lire or US$10 or the equivalent. Apply to: Marconi Club, c/o ARI Loano, P.O. Box 16, I-17025 Loano (SV), Italy.

AMSAT Series Awards. Another interesting anniversary occurs this month. Can you believe it? It's been 40 years since communications by amateur satellite became possible. AMSAT has been associated with this special branch of communications from the very beginning and offers a neat series of awards as described below. There's something for every level of satellite communicator. The simplest is for just one contact; the most challenging is a DXCC via satellite.

General Requirements: A photocopy of the front and back of cards used to apply for the awards must be sent. Fee is US$3.50 for AMSAT members, US$5 for non-members, plus two units of postage. Apply to: AMSAT-NA Awards Manager, Mike Scarcella WA5TWT, 310 Lombardy, Sugar Land, TX 77478 (e-mail: <wa5twt @amsat.org>).

OSCAR Satellite Communications Achievement Award. Make one satellite contact with 20 different US or Canadian call areas or DXCC countries.

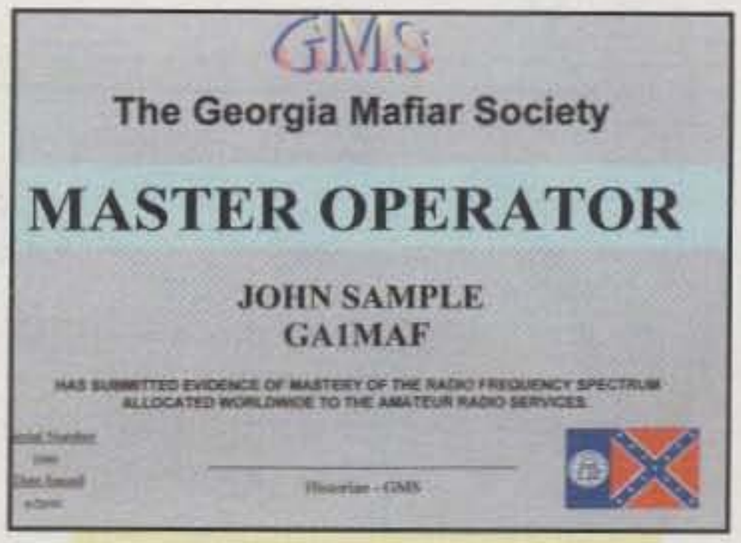
OSCAR Sexagesimal Award. Make one satellite contact with 60 different US or Canadian call areas or DXCC countries. The 20 contacts required for the OSCAR Satellite Communications Achievement Award may be included.

OSCAR Century Award. Make one satellite contact with 100 different US or Canadian call areas or DXCC countries. The 60 contacts required for the OSCAR Sexagesimal Award may be included.

South Africa AMSAT Communications Achievement Award. Make 25 satellite contacts on any Phase II satellite (low earth orbit—i.e., FO-20, AO-21, AO-27, RS-10, RS-12, RS-15).

W4AMI Satellite Operator Achievement Award. Make 1000 two-way contacts with any stations on any satellite. Must be OSCAR-6 or later satellite only. Endorsements are issued for 2000, 3000, and 4000 contacts, and a special certificate is issued for 5000 or more contacts. For this award send copy of logbook only to Mark Rosenberg, AD4KS, 331 S. Yates, Memphis, TN 38120.

Satellite Communicators Club. Make one satellite contact. Send the report of your contact, plus US$1 for AMSAT members or US$2 for non-members and two units of postage to: AMSAT SCC Manager, P.O. Box 27, Washington, DC 20044.



The GMS Master Operator Award is a challenging award offered by the Georgia Mafiar Society.

GMS Master Operator Award. The Georgia Mafiar Society is an organization with a worldwide membership of experienced DX operators. New members are selected by ballot from nominations submitted by and voted on by all active members. This group has created a most challenging award. Basically, you need to provide proof of having earned the following awards:

1. The ARRL's VUCC plus DXCC
2. *CQ* magazine's WAZ Award
3. Plus at least one of the following:

a. Australian WAVKCA Award

b. Hong Kong ARTS CATCH-22 Award (First Class)

c. Council of Europe Radio Club Award

d. DARC WAE Award (First Class or Top level)

e. Canadian Maple Leaf Award

f. Israeli Holyland Award

g. the South African AAA Award

Send either a photocopy of the awards you are using to qualify or a certified list with complete details including the title of the awards, serial numbers, and date of issue. Submit to: Teresa Lowe, KG4CRD, 490 Sandpiper Street, Richmond Hill, GA. 31324. Check out their website at: <http://www.gamafiar.com> for more details. (No fee stated.)

URL of the Month

The Chinese Radio Sports Association sponsors a very challenging DX award. Their web page is a mixture of Chinese and English, but the award rules are pretty easy to understand: provide proof of having contacted one Chinese amateur in each of their ten call districts (Ø–9) using any band. The application fee is very reasonable, and it will be a real accomplishment. Let's see . . . I only have seven more districts to go! Go to: <http://www.crsa.cn/CRSAJZ.htm>.

Continue to send your group's or club's award samples for the best publicity money *cannot* buy. 73, Ted, K1BV

BY CARL SMITH, N4AA

News Of Communication Around The World

IREF and the IOTA Program

We are well into the winter DX and contest season now, and I trust you all are doing well with your efforts to add to your worked/confirmed lists. This month I want to bring you some information on the Radio Society of Great Britain's IOTA Program. A relatively new organization, the Island Radio Expedition Foundation, Inc. (IREF), is providing much needed funding for island DXpeditions around the world. Here's a report on their activity during 2001:

As the expedition season winds down for 2001, IREF has had another good year. To date we have sponsored the following operations that cover 15 islands, including 6 new ones. Additionally, IREF has committed funds to CE9C from SA031 that will occur in January 2002. Hopefully, you are noticing the IREF logo on these cards as you receive them.

TAØ/IT9YRE	AS154
BV9L	AS155
3W7D	AS157
BA4DW/2	AS158
TAØ/IT9YRE	AS159
BI4F	AS160
3B6RF	AF001
KL7AK	NA053
FOØDEH	OC062*
V73E	OC087
FOØDEH	OC094
YC3MM	OC215*
FOØDEH	OC238*
YB8HZ	OC247
4TØI	SA052
CE9C	SA031*

**Operations have not occurred yet.*

Hopefully you will see from the above list the IREF remains focused on our objective of providing support for new and rare IOTA qualifying islands. We get numerous applications from islands that are semi-rare, but do not fit in the group above and so we do not make grants.

In addition to the island operations above IREF also provided help to the series of DU islands that were activated—4IØP, etc.—with QSL cards, as well as QSL card support for the RIØB and other arctic islands that were activated a few months ago.

I will be making my annual trek to the RSGB IOTA Convention in Windsor in October and will attempt to drum up some European support. As always, all of my trips are paid by me; no IREF funds are used.

Contributions have been steady this year. The above sponsorship represents about $5,500 that IREF has granted in support of IOTA expeditions. As always, the kitty could use a little regeneration in preparation for next year. Remember, contributions are tax deductible and you can mail them to: IREF, 118 Oak Ridge Drive, New Braunfels, Texas 78132.

Remember, we also sell the *IOTA Directory* ($19) and *DXpeditioning Behind the Scenes* ($31). IREF receives a portion of each sale.

73 and thanks for your support,
Mike Crownover, AD5A
President
Island Radio Expedition Foundation, Inc.
<www.sat.net/~iref>

Gaynell, KK4WWW, operating J79WWW in Dominica. Her OM is David, KK4WW, a director of FAIRS (Foundation for Amateur International Radio Service). (All photos this month courtesy John, KDØJL)

Eli, 9M8RC, likes to operate 10, 15, and 20 meters SSB into North America to improve his English language skills.

QSLs for IOTA Operations

The IOTA Committee has established some pretty strict QSL card rules for them to be accepted for credit. Actually, these rules are not all that difficult to comply with. Luke, PT7WA, sent along the following, and I'm glad to provide this information for everyone involved in the IOTA program.

RSGB requires QSLs with the name of the island printed. Handwritten information is not OK for IOTA. Just to tell you one case, I had to request a QSL for four different stations to get a "good one" to confirm a certain European island. See below, a summary of instructions emitted by G3KMA (IOTA Manager). I would like the subject to be shown in CQ.—73 de Luke, PT7WA

If you are getting new cards printed for contacts made after 1 January, ensure that the island name (of course, one appearing in the *Directory* listing) is printed on them. If however you are intending to use your current stock of cards and they don't mention the island name, you have the following options. You can have the cards overprinted with the island name, you can get a rubber stamp of the island name and stamp each card individually, or you can print the island name on the computerised QSL label. Whichever route you choose, the island name must be reasonably prominent and the card must be totally unambiguous as to the location and the time of contact—this may require a few extra words of clarification on the card. Do not try and deal with the problem by relying on adding the island name in manuscript. Furthermore, please do not try to move the problem on to us by asking us, for whatever reason, to tell our checkpoints to accept your cards exceptionally!

For more information on the IOTA Program, you can contact Roger Balister, G3KMA via e-mail at <g3kma@dial/pipex.com> or check the IOTA website at <www.eo19.dial.pipex.com/index.shtml>.

Documentation For DXCC credit

A number of DXpeditions have had their QSLs "rejected" by the ARRL DXCC

P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

Marian, ON4AYL, has been licensed since 1982 and enjoys talking to other hams and contesting. Operating OT8R, she took first place single op, all band in Belgium in the 1998 CQ WPX SSB Contest. With a few other YLs Marian helped set up the Belgian Young Ladies Club in 1984. She became chairperson of the Bruges Radioclub in 1993. She is also a guide at the Canadian War Museum and operates from there as ON4CWM, plus she serves as QSL Manager for ON4UVW and ON4CWM. She is a very busy lady indeed! Look for ON4AYL on 14135 and 21234 kHz.

Max, OE5CMN, is a Master Watchmaker. He works 40–10 meters and especially enjoys RTTY on 10 when that band is open.

The WPX Program

CW

3079.....LU4AT

Mixed

1886.....GMØVPG

CW: 1650 JA1XCZ. 1700 VE6BF. 3200 W4VQ.

MIXED: 650 GMØVPG. 2800 VE6BF. 4950 W2FXA.

160 meters: K9GWH

Africa: JA1XCZ

Award of Excellence Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP KØJN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YB0TK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, KØDEQ, KUØA, DJ1YH, OE6CLD, VR2UW, 9A9R, UAØFZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM.

160 Meter Endorsement: K6JG, N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF N4NX, SMØDJZ, DK3AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WBØDD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA5CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, UAØFZ, CT4NH, W1CU, EA7TV, LY3BA, RW9SG, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. ***NOTE:*** *WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

used as a guide to identify those documents necessary for accreditation.

a. Photocopy of license or operating authorization.

b. Photocopy of passport entry and exit stamps.

c. For islands, a landing permit and a signed statement of the transporting ship's, boat's, or aircraft's captain, showing all pertinent data, such as date, place of landing, etc.

d. For locations where special permission is known to be required to gain access, evidence of this permission must be presented.

e. It is expected that all DXpeditions will observe any environmental rules promulgated by the administration under whose authority the operation takes place. In the event that no such rules are actually promulgated, the DXpedition should leave the DXpedition site as they found it.

Not all locations will require this documentation, of course. If there is any question, DXpedition leaders should contact the DXCC Desk prior to depar-

Desk for "No Documentation." The DXCC Rules, Section III. Accreditation Criteria, gives all of the information on what is required for an operation to be "accepted" for credit. In particular, paragraphs 2 and 3 give the specific details on this subject. Just for the record, let me quote paragraph 3:

"For those cases where supporting documentation is required, the following can be

ture to ensure what will, or will not, be required for their operation to be accepted for credit.

The Second "QRP-pedition"

The UR-QRP Club has schedule its second QRP-pedition to plateau Ai-Petri, Crimea, from December 9–17, 2001. The following is via Peter Grytsay, US1REO, president of the club:

One-hundred years ago Marconi tried to make a wireless link through the Atlantic Ocean. Finally, on December 12th, the First

The WAZ Program

10 Meter SSB

526 ..... JF2LEX

15 Meter SSB

558 ..... K9RR

20 Meter SSB

1080 ..... I6TIH
1081 ..... W5WOK
1082 ..... XE1JRV
1083 ..... K9RR

15 Meter CW

291 ..... JA4ENN

20 Meter CW

517 ..... JHØAUY

30 Meter CW

44 ..... OH2DW

40 Meter CW

219 ..... IK8BIZ
220 ..... UT3UA

80 Meter CW

57 ..... DK7SU

6 Meters

14 ..... AE4RO (27 zones)
15 ..... DL3DXX (27 zones)
16 ..... W5OZI (25 zones)
17 ... WA6PEV (25 zones)
18 ..... 9A8A (29 zones)

160 Meters

166 ..... PY3CEJ (40 zones)
79 ..... DJ7RD (37 zones)

All Band WAZ

SSB

4691 ..... N5DD
4692 ..... N9ZOE
4693 ..... GØCAM
4694 ..... WA6HDH
4695 ..... DJØIR
4696 ..... W4QH
4697 ..... VA2TG
4698 ..... K9WK
4699 ..... W8PT

Mixed

8077 ..... W4BN
8078 ..... WD9DZV
8079 ..... RU1AO

All CW

272 ..... JHØAUY
273 ..... JM7TKK
274 ..... W2ZK

RTTY

129 ..... W9MU

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached via e-mail: <k5rt@cq-amateur-radio.com>.

CQ Awards Checkpoints

CQ enlists the help from many qualified DXers around the world in processing applications for the WAZ, CQ DX, and WPX awards. These individuals provide the service for no compensation other than the satisfaction of "toiling in the DX vineyards." We attempt to recruit checkpoints in nearly every major city around the USA and in as many foreign countries as possible. If you notice that your area does not have a *CQ* Awards Checkpoint, drop K5RT a note at <K5RT@cq-amateur-radio.com> via his callbook address.

By taking advantage of the *CQ* Awards Checkpoints, you can reduce postal expenses and minimize the risk of losing your QSL cards in the mail. We (the various *CQ* Award Managers) encourage your taking advantage of this service, as it reduces our cycle time in processing your applications.

Please be sure that you take the time to read the rules for the award you are applying for carefully and complete the application form in a legible fashion. Double check your QSL cards to make sure they haven't been altered in any way and reflect all the required information.

The *CQ* Awards Checkpoints do not collect application fees. Application fees are sent directly to the appropriate Award Manager with your approved application. Be sure you include the correct application fees (again, read the rules). In most cases, *CQ* subscribers are offered application fees at a reduced rate. Please be sure to include the mailing label (or a copy) with your application.

Checkpoints in the U.S. and Canada

W1AM	Durham, NH	N4NO	Huntsville, AL	K7CU	Bountiful, UT
K1NU	Andover, MA	KD5ZD	Arlington, TX	K7JS	Ogden, UT
W2RQ	Newton, NJ	N5HB/N5BV	San Antonio, TX	WS7W	Casper, WY
K2FL	Palmyra, NJ	W5LLU	Houston, TX	W7XN	Portland, OR
AA2X	Long Beach, NY	WA5MLT	Houston, TX	N7YL	Las Vegas, NV
KE2UK	N. Bellmore, NY	WN5MBS	El Paso, TX	W8AH	Charleston, WV
W3GG	Derwood, MD	N5FG	Gulfport, MS	N8BJQ	Beavercreek, OH
WB3DNA	Harrisburg, PA	NW5K	Napoleonville, LA	WB8LFO	Lorain, OH
K3UA	Coraopolis, PA	WN5N	Clovis, NM	K8LJG	Flint, MI
K8IU	Royersford, PA	K5TVC	Farmington, NM	K8BTH	Livonia, MI
K4SE	Jonesboro, TN	K5PP	Mounds, OK	W8EG	Livonia, MI
AA4DO	Mt. Juliet, TN	K5UR	Little Rock, AR	AA8R	Swartz Creek, MI
K4XO	Germantown, TN	K5TVC	Springdale, AR	AA9DX	Wood Dale, IL
W4DF	Lynchburg, VA	W6KFV	Nipomo, CA	AI9L	Braceville, IL
W4FRU	Suffolk, VA	K6CF	Anaheim, CA	K9UWA	Leo, IN
N4MM	Boyce, VA	N6AW	Cerritos, CA	W5YH	Jeffersonville, IN
WA4PGM	Farmville, VA	W6DPD	Fresno, CA	W9NT	Bemidji, MN
W4ZYT	Virginia Beach, VA	K6NA	San Diego, CA	WØIJR/KAØCDN	Aurora, CO
KG6AR	Callaway, VA	W6RJ	Danville, CA	K9ZV	Salina, KS
K4UU	Bowling Green, KY	K6BZ	Igo, CA	KBØU	Overland Park, KS
W3AZD	Miami, FL	K6ZZ	California City, CA	NGØW	Cedar Rapids, IA
N6AR	Windermere, FL	K3EST	Davis, CA	KØCA	Hannibal, MO
N4UF	Jacksonville, FL	N6HC	Santa Ana, CA	VE3XN	Toronto, ON
W2LZX	Delray Beach, FL	N7MQ	Eugene, OR	VE6HAM	Edmonton, AB
W4WJ	Miami, FL	KC7V	Cave Creek, AZ	VE7SMP	Kitimat, BC
WA4YLD	Hollywood, FL	W7YS	Flagstaff, AZ	VO2AA	Labrador
WA4FFW	Burlington, NC	W7CNL	Boise, ID	KL7PJ	Anchorage, AK
KU4BP	Winston-Salem, NC	K7ABV	Great Falls, MT	KP4L	Puerto Rico
K6EID	Marietta, GA	WS7I	Spokane, WA	KP4P	Puerto Rico
WA4CLU	Mableton, GA	W7OM	Seattle, WA	KH6DD	Honolulu, HI

Checkpoints Overseas

3A2LF	Monaco	LU6DDF	Pergamino, Arg.	XE2FL	Mexico
4S7DA	Sri Lanka	LU4AH	B.A. Argentina	YCØEBS	Jakarta, Indonesia
9H4H	Malta	OA40	Peru	YC3HCM	Surabaya, Ind.
A92BW	Bahrain	OA4QV	Peru	YC7DF	Sanggau, Ind.
BA4RF	Nanjing PR China	OE1FQS	Austria	YL2MU	Latvia
CE3GN	Santiago, Chile	OH2PQ	Finland	YU1AB	Yugoslavia
CE6EW	Temuco, Chile	OH3RM	Finland	YV5IVB	Venezuela
CT4NH	Portugal	OK1MP	Czech Republic	Z21JE	Zimbabwe
CX2CS	Uruguay	ON5KL	Belgium	Z35M	R. of Macedonia
CX4HS	Uruguay	OZ1DXX	Denmark	ZL3GX	New Zealand
DJ80T	Velbert, Germany	PB7CW	Netherlands	ZS5DX	Bloemfontein, RSA
DJ8SW	Bringhausen, Germany	PY2YP	Brazil	ZS6EZ	Pretoria, RSA
DU1JZ	Philippines	UA3AB	Moscow	4X6UD	Israel
DU1SAN	Philippines	UXØUN	Kiev (zone 16)	9A9R	Croatia
EA3GEG	(Spanish *CQ*)	UA9CBO	Sverdlovsk (zone 17)		
F6HMJ	Villeneuve-Loubet	RA9YD	Barnaul (zone 18)		
GM3YTS	Scotland	UWØMF	Vladivostok (zone 19)		
G4BWP	England	S58MU	Slovenia		
HA5WA	Poyyos, Hungary	SM6DEC	Sweden		
HA8UB	Tiszakecske, Hungary	SP5NOW	Poland		
HB9ATA	Switzerland	SV2YC	Greece		
HC1RF	Ecuador	TF3ACW	Iceland		
HK3DDD	Colombia	TI4SU	Costa Rica		
HL1AS	Korea	VK1BH/VK4LC	Australia		
HL5AP	Korea	VK3AKK	Victoria, Australia		
I2MQP	Italy	VK5IE	South Australia		
JARL	Japan	VK6JS	West Australia		
LA7JO	Norway	VU2DVP	India		
LU3BU	B.A. Argentina	XE1AE	Mexico		

(listing as of October 2001)

5 Band WAZ

As of October 15, 2001, 574 stations have attained the 200 zone level and 1227 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
UY5AB LY2ZO G3IFB IK6SNR DK7SU

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
ABØP, 199 (23)
KL7Y, 199 (34)
NN7X, 199 (34)
IK1AOD, 199 (1)
DF3CB, 199 (1)
F6CPO, 199 (1)
KC7V, 199 (34)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
K4UTE, 199 (18)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
K2UU, 199 (26)
W1FZ, 199 (26)
UT4UZ, 199 (6)
SM7BIP, 199 (31)
K4ZW, 199 (23)
W9RPM, 199 (19)
PY5EG, 199 (23)
SP5DVP, 199 (31 on 40)
EA5BCX, 198 (27,39)
G3KDB, 198 (1,12)
KG9N, 198 (18,22)
KØSR, 198 (22,23)
UA4PO, 198 (1,2)
JA1DM, 198 (2,40)
9A5I, 198 (1,16)
LA7FD, 198 (3,4)
K5PC, 198 (18,23)
VE3XO, 198 (23,23 on 40)
K4CN, 198 (23,26)
KF2O, 198 (24,26)
W6BCQ, 198 (37,34on40)
G3KMQ, 198 (1, 27)
W5BOS, 198 (18,23)
N2QT, 198 (23,24)
OK1DWC, 198 (6,31)
K7FL, 198 (23,37)
W4UM, 198 (18,23)
UU2JQ, 198 (30on40&20)

The following have qualified for the basic 5 Band WAZ Award:
UU2JQ (198 zones)
SM5ENX (165 zones)
RU1AO (177 zones)
RZ1AZ (171 zones)
K4HB (185 zones)

Endorsements:
W2JZK (200 zones)
AE1Q (181 zones)
HC8N (200 zones)
N6HR/7 (197 zones)
UA4SKW (187 zones)
W1JZ (197 zones)
EW3CW (180 zones)
UA9YE (200 zones)
RW9SG (196 zones)
PY5EG (200 zones)
YZ7AA (195 zones)
RU9TU (185 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached via e-mail: <k5rt@cq-amateur-radio.com>.

Wireless Link between England and Canada was done! In fact, this first transatlantic wireless link opened the door for the world radio amateur movement.

The UR-QRP Club expedition is dedicated to all who pioneered the art radio in the beginning. Also we want to commemorate the centenary of the first transatlantic wireless link.

Those who wish to join our QRP-pedition are welcome. We shall also accept with gratitude any technical or financial support.

Information and photos about the first UR-QRP Club expedition can be found on the

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

5054 ....9A2AA	3734 ....VE3XN	3121 ....KF2O	3019....IT9QDS	2597....HA5NK	2291 ....K5UR	1926 ....I2EAY	1496 ....KØKG	1199 ....KU6J
4412 ....W2FXA	3624 ....9A2NA	3118 ....W9HA	2945....I2EOW	2469 ..YU7GMN	2170 ....W4UW	1916 ....DJ1YH	1436 ....N1KC	1165 ....KX1A
4095 ....F2YT	3606 ....N4MM	3091 ..WA8YTM	2873....IK2ILH	2464 ....K2XF	2093....W7OM	1871 ...OZ1ACB	1429....W2EZ	1147....W2CF
4086 ....K6JG	3573....N9AF	3090 ....S53EO	2853 ....KØDEQ	2455 ....N6JM	2028 ..WB3DNA	1755 ....VE6BF	1418....WT3W	1082..OK1DWC
4034 ....W1CU	3523...SM3EVR	3084....I2MQP	2849....4N7ZZ	2424 ....W9IL	2019....HA9PP	1745 ....AA1KS	1408 ....NG9L	1040...PY1NEW
3960 ....EA2IA	3513 ....I2PJA	3060 ..WB2YQH	2835 ....W2WC	2380 ....9A4W	2012....JN3SAC	1716....Z35M	1343 ....VE6FR	1006....K6UXO
3846....N4NO	3465....N5JR	3029...YU7BCD	2800....JH8BOE	2372....S58MU	1989....CT1EEB	1670 ....W7CB	1295 ....VE9FX	937 ....N3KR
3809....N6JV	3458....YU1AB	3027 ....YU7SF	2773....W2ME	2314....W6OUL	1983....W9OP	1651 ...I1-21171	1263...VE6BMX	687 ....VE3NQK
3772 ....UA3FT	3144...PAØSNG	3026 ....K9BG	2743....HAØIT	2305....W8UMR	1939 ...PY2DBU	1613....YU1ZD	1236 ...EA2BNU	

SSB

4306....IØZV	2980 ....N4NO	2515 ...LU8ESU	2033 ....HAØIT	1707 ....I8LEL	1585....K8MDU	1318 ....N2SS	1130 ....I2EAY	783....VE6BMX
4128....VE1YX	2968 ...EA8AKN	2515....EA5AT	1989 ...CT1EEB	1698 ....EA7TV	1568 .CT1BWW	1311 ....KC6X	1111....EA3KB	781....N3DRO
3927 ....ZL3NS	2902 ....I2MQP	2488 ....I8KCI	1981 ...CT1EEN	1690 ....K3IXD	1562....W2ME	1287 ....KI7AO	1092....N1KC	717....F5RRS
3784 ....K6JG	2900 ....N5JR	2412..WA8YTM	1972....W4UW	1667 ....KS4S	1545...SV3AQR	1273 ....NG9L	1070....JN3SAC	716 ....KX1A
3547....F6DZU	2888 ....I4CSP	2404....KF7RU	1950....K5UR	1655 ....K5IID	1532....DF7HX	1239....LU4DA	1064....NH6T	680....OK1DWC
3503....I2PJA	2877 ....9A2NA	2381...YU7BCD	1945....LU5DV	1643....W6OUL	1524 ....IKØEIM	1222 ...LU3HBO	1051 ...EA3EQT	652....F5LIW
3172 ....CT4NH	2758...PAØSNG	2333....W2WC	1860 ....N6FX	1631 ....HA5NK	1493 ....IK2AEQ	1192....K4CN	1005....DL8AAV	634....F5UTE
3168....N4MM	2706....I2EOW	2332....CX6BZ	1860 ....K2XF	1626 ....W70M	1427 ....N3XX	1165 ...EA5DCL	990....HA9PP	609....VE7SMP
3097....OZ5EV	2672...CT1ANU	2325....EA1JG	1748....YU7SF	1617 ....I3ZSX	1421 ....W2FKF	1154 ....WT3W	982....AG4W	605 ....KE4SCY
3056 ....EA2IA	2621 ....4X6DK	2202 ....IN3QCI	1717 ....W9IL	1599 ....DK5WQ	1410....T30JH	1141....IKØJMS	972....AI6Z	
2995 ....F2VX	2619 ....KF2O	2038 ...OE2EGL	1712....NQ3A	1591 ....IT9SVJ	1385 ....I3UBL	1138 ....VE9FX	812....KU6J	

CW

4129 ..WA2HZR	2699 ....LZ1XL	2238 ....W2WC	2000 ....OZ5UR	1762 ....W6OUL	1546 ....W7OM	1340 ....EA2CIN	1101 ....YU1TR	887 ....WA2VQV
3781 ....N6JV	2589 ....N5JR	2238 ...JA9CWJ	1996 ....G4SSH	1744 ....IK3GER	1485....9A3SM	1339....LU3DSI	1060 ....W4UW	832 ....WT3W
3399 ....N4NO	2566 ....9A2NA	2232 ....KF2O	1946 ....I7PXV	1706...JN3SAC	1480 ....IK5TSS	1310....I2EOW	1034 ....WO3Z	814....KU6J
3365 ...VE7CNE	2548 ....N4MM	2198....EA7AZA	1946 ....W2YA	1658 ....VE6BF	1466....IK2ECP	1248 ....AC5K	987 ....K6UXO	750 ....KX1A
3353 ....K6JG	2534 ....W2NE	2184 ....KA7T	1923 ....K2XF	1620 ....I2EAY	1452....EA6AA	1154 ...LU7EAR	935....VE6BMX	732....N1KC
3043 ....K9QVB	2437...YU7BCK	2105....G3VQO	1855....K5UR	1590 ..EA7AAW	1390 ....I2MQP	1150....DF6SW	926....PY4WS	612....F5RRS
3021 ....YU7LS	2396..WA8YTM	2016 ....N6FX	1779 ....IT9VDQ	1572 ....W9IL	1361 ....4X6DK	1121 ...EA2BNU	898....JK1AJX	604 ....EA5DCL
3005 ....EA2IA								

Jimmy Lou, BX5AA (ex-BV5GQ), has been licensed since 1994. He is active on 80–10 meters from 1400–1800Z and 2200-0100Z. Jimmy says not more than 20 hams use the BX prefix, and unfortunately many confuse this prefix with China. Prefixes in Taiwan include BM, BN, BO, BP, BQ, BU, BV, BW, and BX. Jimmy also says that IRCs are not redeemable in Taiwan, but one green stamp is okay. He is not active in the Taiwan Bureau, so please QSL direct and not via the BV bureau.

CQ DX Awards Program

SSB

2352....WA1ECF	2355 ....XE1JRV
2353....RA9FDR	2356....LU4DXU
2354 ....KB5FET	

CW

1023....WD9DZV

SSB Endorsements

320....K5TVC/333	320 ....W2FKF/328
320....VE4ROY/333	275....N5WYR/286
320 ....LU4DXU/332	250....XE1JRV/257
300....K9HQM/330	

CW Endorsements

320....VE7CNE/330 320....K7JS/326

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 333 active countries. Please make all checks payable to the award manager.

web at: <http:\\www.qsl.net\us1rch\urqrp\rk3zk\aie.htm>.

Ham History

This issue of *CQ* magazine is dedicated to ham radio history. In my October column there is a photo of the Southern Appalachian Radio Museum in Asheville, North Carolina. I am pleased to be a part of this group and was happy to hear from several readers who saw the photo. A few have already visited our

QSL Information

3A0FC pirate
3B8/PA3BAG via PA0VHA
3DAODF via DL7DF
3DAOFR via DL7DF
3DA0RF via DL6DQW
3W2KF via F5BPL
3W3ZZ via JA1EUI
4K0LO via 4Z5LO
4L1AE via LY2MM
4X6HP via EA7FTR
4Z1DX via 4Z4DX
5A32 via 5A1A
5H1F via KQ1F
5H1F/3 via KQ1F
5H1X via KQ1F
5H1X/3 via KQ1F
5R8GZ via G3SWH
5R8HC via F6BUM
5Z4FT via EA7FTR
5Z4TT via SP5TT
7Q7DX via EA4CEN
8P9HT via K4BAI
8P9JL via K0COP
8P9JM via K2ZD
8P9Z via K4BAI
9A/N0MX via DJ2MX
9A640KC via 9A7K
9A6JYL via 9A7K
9A8K via 9A7K
9A97WPC via 9A7K
9A0LH via 9A7K
9G1XA via K1ER
9H3AAG via PA1XA
9H3AAK via PE1VRQ
9H3IE via PA0BEA
9H3LRK via PA0LRK
9H3ON via PA3BIZ
9H3QC via PA3CLF
9H3QF via PA3FEO
9H3S via PA3HGP
9H3TE via PE1NZA
9H3X via PE1NGF
9H3YT via PA3GUU
9H0VRZ via PA7DX
9K2USA via 9K2RA
9M6BG via VR2BG
9M6JQT via JA1JQJ
9M6VET via JA8VE
9N7BY via JH0DHL
9N7QJ via JH0DHL
A51A via JH1AJT
A51B via W0GJ
A52CB via N4BQW
A52DA via KW4DA
A52ED via K0EN
A52PC via N0ADQ
A52SL via W0SHL
A52ST via W0HT
AH1A via K1ER
AT0D via VU3DJQ
AT0HF via VU2APR
BD9BL/7 via EA7FTR
BV4VL via EA7FTR
C91RF via DL6DQW
C91RF/8 via DL6DQW
C98/DJ7ZG via DL7AFS
C98DC via SL7AFS
CE2VQF via EA7FTR
CE3HKF via EA7FTR
CN2KA via F6HKA
CN2LE via F6ELE
CN2R via W7EJ
CT7B via OH2BH
CU3/CT3BH via OH2BH
CU3EE via EA7FTR
CW5AM via EA5RD
CX5BE via EA5RD
CX8BU via EA7FTR
D44TC via IV3TAN
DU1LAV via EA7FTR
DU8UTC via EA7FTR
E30NA via DL5NAM
E44A via K3IRV
ET3VSC via K3IRV
FO0DEH via ON4QM
FR5ZU/T via JA8FCG
GB2FB via G4DFI
GB0WB via M5GUS
GH4BJC via G0DBX
H40RD via EA4DX
HO1A via DL6MYL
HR3J via JA6WFM
J48DX via 4Z4DX
J49XB via DJ9ZB
JY4NE via K3IRV
JY9LC via W4JS
KC4USV via K1IED
KP2A via W3HNK
L25FF via LU5FF
L45FF via LU5FF
LQ0F via LU5FF
LU3AEA via EA7FTR
LU3VAL via EA5RD
LV2V via EA5RD
LW9DAH via AC7DX
LX0RL via LX1KQ
M0DOV via 4Z4DX
N2IU/KH4 via JA1EOD
N2OO/KH9 via N4XP
NP2/K7BV via KU9C
OD5/JY4NE via K3IRV
OD5TE via K3IRV
OD5UT via K3IRV
OG3M via OH1VR
OG3M/0 via OH1VR
OH2BA via OH1VR
OH3MMM via OH1VR
OH0HEY via OH3TY
OJ0U via OH1VR
OK8DG via 4Z4DX
OX3CO via EA7FTR
OZ7D via OZ1ACB
P40MM via K3MM
PJ9U via OH1VR
S21RA via EA7FTR
SM1T via SM1TDE
T88AY via JA7AYE
T88MO via 7K1SGX
TF4/LX9EG via LX1NO
TF4RX via K1WY
TG/DB2TR via DL1SBF
TG9AJR via WA1ECA
TG9RZ via EA7FTR
TI5X via N0KE
TM8CDX via F5IPW
TR0A via UA3DJY
UN7MO via EA7FTR
VK4AWX via KC6AWX
VK7KHZ via EA7FTR
VK9CQ via PA3GIO
VK9KND via SP9EVP
VK9KNE via SP9PT
VP2VE via WA2NHA
VP5G via K3TEJ
VP5YG via K2FF
VR97BG via VR2BG
VR98BG via VR2BG
VS6BG via VR2BG
VS6UP via VR2BG
VS96BG via VR2BG
VS97BG via VR2BG
VY2ZMM via K1ZM
WH2M/KH4 via JA1EOD
WH2M/WH4 via JA1EOD
WP2Z via K0DEQ
XQ3IDY via XQ1ZW
XT2AJ via F5JRY
XU7ABW via F6BFH
XX9TDM via VR2BG
YB1ARW via W4JS
YB2ARW via W4JS
YB4JIM via EA7FTR
YB0ACL via W4JS
YB0HXH via W4JS
YB0LBK via W4JS
YC1ANA via EA7FTR
YC1CVA via EA7FTR
YC1LPL via EA7FTR
YC1VBH via EA7FTR
YC4FIJ via YC9BU
YC4TRY via W4JS
YC4TUU via W4JS
YC7URA via YC9BU
YC8RRK via YC9BU
YC8SHQ via YC9BU
YC9ID via YC9BU
YC0FYJ via W4JS
YC0IR via W4JS
YC0LBK via W4JS
YC0LCF via W4JS
YE1ZTC via YB1BOD
YM3CC via LX1CC
YU8/9X0A via UA3DX
ZB2AZ via G3MNN
ZC4DW via G0DEZ
ZC6A via K3IRV
ZG2FX via G3RFX
ZK1QMA via OM2SA
ZK1TUG via OM2SA
ZP8AE via EA7FTR
ZP8BHA via EA7FTR
ZW5B via VE3HO

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," P.O. Box 3071, Paris, TN 38242; phone 901-641-0109; e-mail: <golist@wk.net>.)

museum. Of course, we welcome anyone else who might like to come and see what we are doing.

We have an ever expanding website, <www.SARadiomuseum.org>, and invite you to take a look at some of the nice pieces of gear that we have collected. One donation of some 24 antique radios provided us with nice Atwater Kent pieces dating back to the mid-1920s. Other donations of ham radio equipment have included several Hammarlund receivers, Heathkit pieces (AT-1), B&W 5100, WRL Galaxy 300, Drake C-Line, etc. More items are being offered to us all the time, and we welcome any and all inquiries. We are a 501c(3) corporation and encourage tax-deductible donations.

Our club station, W4AFM, with a Kenwood TS-440 and Yaesu FT-736R, will be active on the air and we look forward to working many of you. As we expand our capabilities, we expect to be on all HF bands as well as some of the satellites.

I hope everyone has a great holiday season, and let's all work for better understanding among people around the world. We are in a unique position to further goodwill through our communications skills. Happy Holidays . . .

73, Carl, N4AA

Contesting

BY JOHN DORR, K1AR

News/Views Of On-The-Air Competition

Are You Getting Sleepy?

December's Contest Tip of the Month

Making sure your coax is in good condition is an easy thing to verify and can have a huge impact on the effectiveness of your contest station. A bad coax line can look just fine cosmetically speaking but still have tons of loss. A check of all your cables (including switching lines, rotators, etc.) is a few hours of great investment in preparation for your next contest effort.

Calendar of Events

Nov. 17-18	LZ DX Contest
Nov. 17-18	RSGB 1.8 MHz Contest
Nov. 17-19	ARRL SSB Sweepstakes
Nov. 24-25	**CQ WW CW DX Contest**
Dec. 1-2	TARA RTTY Sprint
Dec. 7-9	ARRL 160M Contest
Dec. 15	OK DX RTTY Contest
Dec. 15-16	Croatian CW Contest
Dec. 15-16	ARRL 10M Contest
Dec. 29	RAC Canada Winter Contest
Dec. 29-30	Stew Perry Topband Distance Challenge
Dec. 31	Straight Key Night
Jan. 5-6	ARRL RTTY Roundup
Jan. 11-13	Japan Int'l DX Contest
Jan. 12-13	North American CW QSO Party
Jan. 19-20	North American SSB QSO Party
Jan. 25-27	**CQ WW 160 Meter CW Contest**

Well, here I sit in front of my trusty laptop again, and as the subject of this month's column suggests, I'm tired. What better topic to discuss in the context of contest operating than lack of sleep?

For those of you who are scientifically inclined (and, other than a bit of experience and common sense, I hardly claim to be an expert on this particular subject), sleep is defined as the healthy state of reduced inertia and temporary loss of consciousness from which one can easily be roused. Despite all of the dedicated research on the subject over the years, there remains no single consensus that describes the function of sleep or its root physiological cause. In reality, the features of sleep are better understood than sleep's functional use for the body.

There are two primary sleep categories: rapid eye movement (REM) and non-rapid eye movement (NREM). These sleep types alternate during each sleep period, usually in 90-minute intervals beginning with drowsiness and then passing into the NREM and REM phases, respectively. Flaccid muscle groups and loss of reflexes characterize REM sleep. It is also the period of sleep in which brain activity best approximates the awake state and when the vast majority of dream activity occurs. Our NREM intervals, however, consist of periods of deep and intense sleep where brain activity is at a minimum. Lack of recall is often experienced in this state, particularly when someone is abruptly awakened during this period.

2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

Adults generally require seven or more hours of sleep per night. There are rare instances of some people for whom only three or four hours of sleep suffice. The proper amount tends to be defined by an individual's specific biological needs. In general, the need for sleep is determined by many factors. The time of day is a key contributor, as we become trained to sleep at certain times of the day. Of course, lack of sleep favors the need for sleep, as do other elements such as comfort, boredom, and satisfaction. Stress, unusual environments, and excitement all contribute to a reduced need for sleep.

Sleep Deprivation

An issue for all contest operators is our ability to manage the lack of sleep. Scientists have been studying the effects of sleep deprivation since the late 19th century. In 1935 a subject was deprived of sleep for over 230 hours, resulting in hallucinations and extreme paranoia. Perhaps you can relate to this phenomenon as an occasional "sleep starved" contester. Modern advances in sleep research have shown, however, that it is nearly impossible to totally deprive subjects of sleep for extended periods of time. In reality, the human body will engage in "micro-sleeping" episodes that can last as little as a few seconds.

Sleep deprivation studies have shown a specific characteristic that is of great importance to contesters. In addition to the expected fatigue are properties of increased appetite, difficulty focusing one's eyes, and poor performance/attention span. This lack of attention can often be a critical factor against maintaining the intensity level required for a full 48 hours of contest operating. Another sleep deprivation characteristic I've often heard discussed is the occasional time lapse (perhaps 30–60 seconds) that seems to occur on Sunday afternoon while you are "working" someone. Have you ever experienced that one? I've always found it amazing to log two or three stations and have absolutely no recollection of the QSOs. A similar example is when you are so tired that you begin to send illogical text to another contest station, such as the rig you're running or the name of your dog. It's actually quite funny when you think about it.

For those of us who feel like pounding our chests after accomplishing 45-plus hours of operating time in a weekend, take note of the current record for sleeplessness as documented in the *Guiness Book of World Records*—Mrs. Maureen Weston of Peterborough, England. Mrs. Weston is reported to have accomplished 449 continuous sleepless hours (18 days, 17 hours) during a rocking chair marathon in 1977. As far as I can tell, Mrs. Weston is not a ham, but I sure would want her on my multi-operator team if she were, wouldn't you?

Some Sleep Tips—Before the Contest

What follows will transition from scientific reporting to practical experience as a contester.

I have always viewed a 48-hour contest as a marathon. Just like marathon runners, the serious contester must prepare both mentally and physically. Perhaps the most important area of preparation is before the contest even begins. I usually begin physically preparing for a contest one to two weeks before it starts. This means I consciously attempt to sleep for longer periods. The normal sleep habit for me is six to seven hours a night, which becomes extended to seven to eight hours a night. Second, one to two nights immediately before the contest are set aside as special nights for sleep peri-

ods approaching ten to eleven hours (i.e., 9:30 PM to 7:30 AM). Although many of us do not necessarily have total flexibility with our jobs, it is a significant advantage to avoid long work hours and stressful situations during the week leading up to a major contest.

The Friday preceding a contest weekend is the most pivotal day in contest preparation. Most contesters recommend that you take this day as a vacation day. There are a variety of other techniques I've used or heard over the years for "contest eve," which include a multi-hour nap during the afternoon. Others prefer an early Friday morning wake-up time as a means of short-term physical training for the Friday evening run. Despite our best intentions, a stressful day on Friday culminating with your arriving home and sitting in the operating chair at 2330Z is a sure cure for insomnia on Sunday morning.

Some Sleeping Tips—During the Contest

During the contest, operating times often are as specific to a person's physiological makeup as much as they are the result of planning around a recommended strategy. In my case, I easily benefit from short naps (45 to 60 minutes) and have little trouble waking up and heading for the operating chair in a matter of two or three minutes. Also, for reasons that mystify me, there are many operators who set their alarm clocks for a specific time and possess the amazing ability to wake up a few minutes before the alarm sounds!

The relationship between eating and sleeping is another consideration for the contest operator. Recall the feeling you experience after a large, filling meal. How many of us then head directly for the family-room couch as we eagerly anticipate an unconscious session in front of the television? Needless to say, this is hardly the physical state we should be experiencing before or during a contest. Small, high-energy meals are the order of the day for contesters lacking sleep.

While there are no hard and fast rules for maximizing your physical potential in contesting, common sense seems to prevail. Although I personally cracked through the 46-year-old physical barrier this summer, I am still a proponent of 48-hour DX contests. No matter which side of the fence you sit on with respect to that issue, the 48-hour DX contest lives on for the moment. Its existence requires deliberate and concentrated preparation to be a serious competitor whether you are trying to win it all or satisfy personal goals.

Some Conclusions

You've heard me say this about contesting many times, but the subject of sleep also falls into one of my favorite categories—common sense. If you think about what makes you tired, avoid it before and during a contest. It's not simply when you sleep, it's also what you eat and drink, where you sleep, and how you balance operating time with rest periods. Unfortunately, the real solution to sleep deprivation is motivation and interest. I can stay up for very long periods indeed if I'm busy working lots of stations during a contest. The same cannot be said when the rate is slow and boring. Therefore, if you're not pairing up your station's ability with your sleep needs, you've just lowered your potential in contesting.

Final Comments

It's always hard to believe, but the holiday season is already upon us. My family (Barbara, Timothy, Katelyn, and Kendra) and I wish you a safe and joyous time with friends and family. This has been a tough year for many of us. Use this time of year to remember what's important in life, being sure to always keep it in perspective.

73, John, K1AR

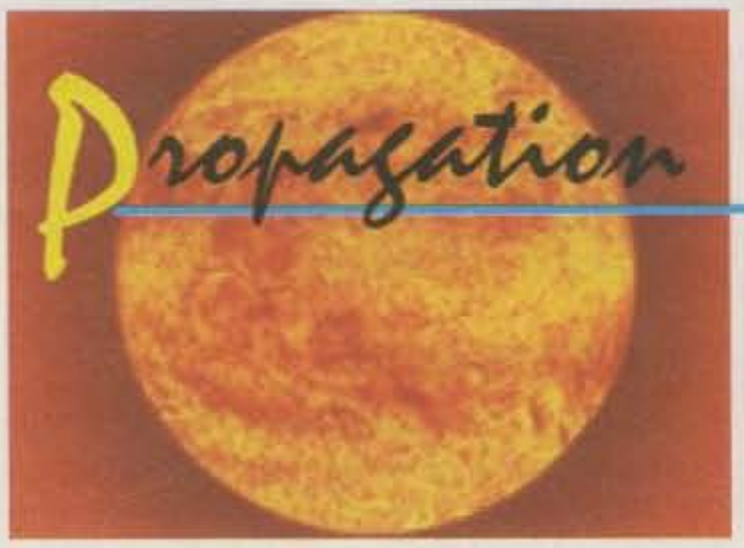
For More Information

There are literally hundreds of useful sites on the internet that cover the subject of sleep and techniques for dealing with sleep deprivation. Check out the following:

http://www.sleepfoundation.org/
http://www.sleephomepages.org/htdocs/hotlinks.html
http://www.sleepquest.com/
http://www.sleepnet.com/depriv.htm
http://www.sleepnet.com/definition.html

Attention Contesters:

Due to security concerns, CQ Communications Inc. is asking all participants in CQ-sponsored amateur radio contests to submit their logs electronically. In light of recent events, logs received through the mail at the CQ offices will be held unopened until all potential health risks have been evaluated. We cannot guarantee that logs submitted by postal mail will be opened. All logs for the CQ World Wide DX Contest, the CQ WPX Contest, the CQ World Wide 160-Meter Contest, the CQ World Wide VHF Contest and the CQ/RTTY Journal RTTY contests should be submitted via e-mail per instructions in the rules for each contest. Thank you.



BY GEORGE JACOBS, W3ASK

The Science Of Predicting Radio Conditions

CQ WW DX CW Contest

Batten Down the Hatches—Storm Warning!

This deadline forecast for the November 24–25 weekend of the CQ World-Wide DX CW Contest is being written on October 10. This issue of *CQ* should reach most readers in time for the contest.

A severe geomagnetic storm, with widespread auroral activity, disturbed HF communications for a four-day period between October 1 and 4. The storm peaked on October 3 when the geomagnetic Planetary *K*-index soared to 118. The dates October 1 and 2 fall one solar 27-day recurrence cycle before the CQ WW DX SSB Contest weekend of October 28–29, and two cycles prior to the CW contest weekend. The solar recurrence tendency would indicate a high probability for a radio storm to occur during the SSB contest weekend. By the time tthis month's issue of *CQ* reaches readers, we should know whether this expected storm occurred during the SSB weekend. The conditions observed during the SSB weekend will likely recur 27 days later during the CW weekend.

At deadline time the recurrence tendency for geomagnetic conditions continues to indicate the possibility of radio storminess during the CW weekend. Unsettled geomagnetic and ionospheric conditions are expected, with generally Low Normal HF propagation to low and middle latitudes, possibly with brief periods of High Normal.

8701 Georgia Ave., Suite 711, Silver Spring, MD 20910
e-mail: <george@gjainc.com>

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for December 2001

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 10-11, 14, 26-27	A	A	B	C
High Normal: 6-7, 9, 17, 21, 25, 28-29	A	B	C	C-D
Low Normal: 1-2.4-5, 8, 12, 18-20, 24, 31	B	C-B	C-D	D-E
Below Normal: 3, 13, 15, 22 30	C	C-D	D-E	E
Disturbed: 16, 23	C-D	D	E	E

Where expected signal quality is:

A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. **Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.**

2. **With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be fair-to-good (C-B) on Dec. 1–2; fair-to-poor (C-D) on the 3rd; fair-to-good (C-B) on the 4th and 5th; good (B) on the 6th and 7th, etc.**

Low to Below Normal conditions are expected to most other areas of the world, with periods of Disturbed conditions for paths passing through higher latitudes and the auroral zones. Storminess may increase on the 26th, causing Below Normal to Disturbed conditions to most areas of the world, except the lower latitudes.

Check this editor's website at <http://www.gjainc.com> for links to more than a dozen sources of up-to-date and often real-time solar, geomagnetic, and ionospheric data during the contest weekend.

Sunspot Cycle 23 Progress

Sunspot Cycle 23 reached its peak activity during April 2000 with a count of 121. Since then it has been slowly declining. The year 2001 began with a smoothed sunspot count of 109, and it is expected to drop to the mid-90s by year's end. Despite the decline, 2001 was a year of relatively high sunspot count, and another good year for HF propagation.

The 10.7 cm solar flux level declined correspondingly from a smoothed value of 166 in January to an expected level of 161 at the end of the year.

The Royal Observatory of Belgium reports a mean sunspot number of 107 for August 2001, with daily values ranging from a high of 130 on the 5th and a low of 62 on the 1st.

The mean level for August results in a 12-month smoothed sunspot number of 104 centered on February 2001. This is a drop of 5 in the count from the level of the previ-

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
1996	10	10	10	9	8*	9	8	8	8	9**	10	10
1997	11	11	14	17	18	20	23	25	29	32	35	39
1998	44	49	53	57	59	62	65	68	70	71	73	78
1999	83	85	84	86	91	93	94	98	102	108	111	111
2000	113	117	120	121	119	119	120	119	116	115	113	112
2001	109	104	*102*	*102*	*105*	*103*	*102*	*101*	*100*	*98*	*97*	*95*
2002	*94*	*93*	*92*	*90*	*89*	*88*	*85*	*84*	*83*	*83*	*82*	*81*

Predicted values appear in italics.
**May 1996 marks Cycle 23's mathematical beginning.*
***October 1996 marks the beginning of Cycle 23 according to a consensus of scientists, which NGDC is now using.*

Table I– The smoothed sunspot numbers observed for Cycle 23 from its beginning through February 2001, as well as predictions through 2002.

books calendars videos

The Mobile DXer

by Dave Mangels, AC6WO

An in-depth look at Mobile DXing- includes its language; versatility; selecting and installing mobile HF radios; mobile HF antennas and tuners; tuning HF antennas; utilizing tools, tactics, and techniques; and more!

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Fifteen month calendars
January 2002 through March 2003
(Specify Amateur Radio or Classic Radio)

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Amateur Radio Calendar brings you 15 spectacular images of some of the biggest, most photogenic shacks, antennas, scenics and personalities.

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by Bill Orr, W6SAI

Inexpensive, practical antenna projects that work! Guides you through the building of wire, loop, Yagi and vertical antennas.

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Building and Using Baluns and Ununs

by Jerry Sevick, W2FMI

This volume is the source for the latest information and designs on transmission line transformer theory. Discover new applications for dipoles, yagis, log periodics, beverages, antenna tuners, and countless other examples.

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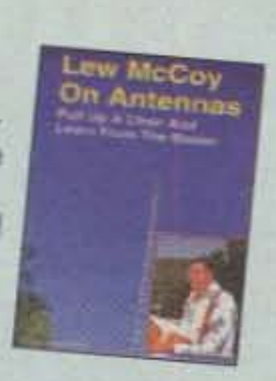
McCoy on Antennas



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by Dave Ingram, K4TWJ

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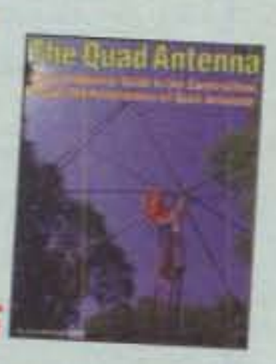

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CQ Communications Inc., 25 Newbridge Rd., Hicksville, NY 11801/516-681-2922; Fax 516-681-2926

ous month. A smoothed sunspot number on the order of 96 is forecast for December 2001 as Cycle 23 is expected to begin its slow decline.

A corresponding 10.7 cm mean solar flux level of 171 was reported for August 2001 by the Dominion Radio Astrophysical Observatory at Penticton, B.C. This results in a smoothed solar flux value of 166 centered on February 2001. A smoothed 10.7 cm flux level of approximately 161 is forecast for December.

Cycle 23 is expected to continue to decline during the new year. The year 2002 is expected to begin with a smoothed sunspot count in the mid-90s, dropping to the mid-or-low 80s by the end of the year.

Table I is a listing of smoothed sunspot numbers observed for Cycle 23 from its beginning through February 2001, as well as predictions through 2002, based on data provided by the National Geophysical Data Center, Boulder, Colorado and the Royal Observatory of Belgium.

A typical sunspot cycle declines much slower that it rises. Using a peak date of April 2000, Cycle 23 rose to its estimated peak in 3.75 years. It probably will take approximately seven years from this date, or by mid-2007, for it to reach its minimum level.

December Band Openings

During December the density of ionization in the northern hemisphere is expected to increase more rapidly after sunrise than during other seasons. Atmospheric noise and static levels should be at seasonally low values during the month, and signal levels are expected to be exceptionally strong during many band openings.

Solar activity has now declined to a point where daytime DX openings on 10, 12, and 15 meters will be noticeably fewer than they were during the winter seasons of high solar activity.

Ten and 12 meter DX openings should be possible during much of the daylight period. Fairly good 17 and 15 meter DX openings are expected to most areas of the world sometime during the daylight hours, and the bands occasionally may remain open towards the west during the early evening. Twenty meters should open for DX in almost all directions for an hour or two after sunrise, and remain open to one area of the world or another through the daylight hours and into the early evening. When conditions are Above Normal, 20 meters is likely to remain open towards the south and west during the hours of darkness to about midnight.

With static levels at seasonally low values in the northern hemisphere, and the hours of darkness at a maximum, a considerable improvement is expected in DX conditions on the 30, 40, 80, and 160 meter bands during December. Thirty and 40 meters should open for DX during the late afternoon hours, with the first signals coming from Europe and other areas in a northeasterly direction from the USA. During the hours of darkness DX should be possible to many areas of the world. The bands should peak shortly before

W3ASK's Most Memorable *CQ* Moments

Since this is a special *CQ* nostalgic issue, Rich, W2VU, asked me to reflect on which topics I covered in this column over the past half century excited me the most. This was not as difficult a choice to make as it may seem.

Once-in-a-Lifetime Conditions

In the March 1956 issue I wrote the *CQ* Exclusive Sunspot Report entitled "Once in a Lifetime Conditions."

Sunspot Cycle 19 began in 1954 and climbed at an unprecedented rate. By the beginning of 1956 it had soared to a count near 100, and my analysis indicated that it was heading toward breaking the previous record count of 159 established in 1778!

In the report I called for the peak probably to occur in 1958, and predicted that it would break a sunspot record. Based on the unusually good HF conditions observed during the peak of Cycle 18, which reached a level of 152 in mid-1947, I forecast exceptionally good, unprecedented HF propagation conditions for the peak years of Cycle 19.

Cycle 19 actually peaked, much as predicted during March 1958 with a record-breaking count of 201.

Because of the intense ionosphere during the period 1957–1959, HF radio conditions, especially on the 20, 15, 10, and 6 meter bands, were exceptionally good. Year-round DX propagation was observed on 6 meters. Ten meters remained open for DX year round from sunrise to sunset, and often into the early evening, as did 15 meters. Twenty meters was a 24-hour worldwide DX band.

Then, too, direct reception of European, South African, and Latin American television broadcasts in the 45–65 MHz bands, while often amusing, caused considerable interference to U.S. TV stations. These well may have been "once in a lifetime conditions."

To me, verification of my analysis in the 1956 report was professionally rewarding and exceptionally exciting.

Project OSCAR

In the early days of space communications I was also Space Communications Editor for *CQ* from about 1959 through the 1960s.

Don Stoner, W6TNS, who was a member of the *CQ* editorial staff, is given credit for the idea of an amateur radio satellite presented in his April 1959 "Semiconductors" column. The idea took hold and was brought to reality by a group of West Coast radio amateurs who were professionally in the field of missiles and satellites. I covered the progress of Project OSCAR's development in my monthly column, and also acted as the Washington, DC contact person for the project with concerned Government Agencies.

The ten pound OSCAR-1 satellite was successfully launched on December 12, 1961. Its 100 mw transmitter sent out "HI" in Morse Code for the world to hear. Amateur radio had entered the space age. The rest is history. I featured the launch in my January 1962 column.

The development of Project Oscar, its successful launch, and my being a part of it was another exceptionally thrilling experience for me. December 12 marks the 40th anniversary of the OSCAR-1 launch, which coincides with the 100th anniversary of Marconi's successful bridging of the Atlantic by radio. *(Check elsewhere in this issue for additional articles on both subjects.—ed.)*

The Solar Cycle during 2002

By Tomas Hood, NW7US

Cycle 23 started between May and July 1996 with a minimum of activity observed during October 1996. This cycle reached its peak in April 2000 and is now slowly declining, but we still can expect a few more spikes this year, providing many excellent worldwide openings on the higher frequencies.

Several models predict that the planetary index (*Ap*) will increase during 2002. The *Ap* index, which tracks the daily summaries of the three-hourly *K* indices derived at a network of geomagnetic observatories, has been archived since 1932. Based on current models and observed geomagnetic disturbances, Cycle 23 will resemble Cycle 22 in terms of overall geomagnetic activity. Stronger storms and disturbances than those seen in 2001 will degrade HF communications during 2002. An in-depth summary on this is located at <http://www.sec.noaa.gov/ info/Cycle23.html>. The current trend of the *Ap*, as well as the 10.7 cm radio flux and solar sunspot numbers, is shown at <http://www.sec.noaa.gov/SolarCycle/>.

Solar Cycle 23 compares most with Cycles 17 and 20. Those developed much the same way, and if the current cycle follows the trends of cycles 17 and 20, expect a slow decrease over several years before reaching the minimum and end of the cycle. Each cycle averages about 11 years from minimum to minimum. After subtracting the four years from the May 1996 beginning of Cycle 23 to the peak during May 2000, seven years of the cycle are left. This slow decline promises continuous moderate to excellent conditions for amateur radio signal propagation. Check out the graphical comparison at <http://www.dxlc.com/solar/cyclcomp2.html>.

I look forward to the New Year and the great radio communication possibilities that this cycle holds. I am excited about starting my journey with you as I step fulltime into George's shoes. *—NW7US*

sunrise to Oceania and other areas in a generally southerly and westerly direction.

Fairly good DX conditions are also expected on 80 meters. Openings with relatively strong signal levels should be possible to many areas of the world during the hours of darkness, with conditions expected to peak as the sun rises at the easternmost terminal of a DX path. Even the 160 meter band is expected to have its share of DX during December. Some openings are likely to take place when the transmission path is entirely in darkness, or when part of the path is in darkness and the other in either twilight or dawn.

For optimum DX openings on 30, 40, 80, and 160 meters remember that signals peak

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates best time to check for 6 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *standard* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

December 15, 2001-February 15, 2002
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10/6 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	07-08 (1) 08-09 (2) 09-13 (4) 13-14 (2) 14-15 (1) 09-11 (1)**	06-07 (1) 07-08 (2) 08-14 (4) 14-15 (2) 15-16 (1)	03-06 (2) 06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-13 (3) 13-16 (4) 16-18 (3) 18-21 (2) 21-13 (1) 23-01 (2) 01-03 (3)	14-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 17-19 (1)* 19-20 (2)* 20-02 (3)* 02-03 (2)* 03-04 (1)*
Northern Europe & European CIS	07-08 (1) 08-09 (3) 09-10 (4) 10-11 (2) 11-12 (1) 08-10 (1)**	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-23 (2) 23-02 (1)	17-19 (1) 19-01 (2) 01-03 (1) 19-02 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-09 (3) 09-11 (4) 11-12 (3) 12-13 (2) 13-14 (1) 09-11 (1)**	07-08 (1) 08-09 (2) 09-11 (4) 11-14 (3) 14-15 (2) 15-16 (1)	07-10 (1) 10-13 (2) 13-16 (3) 16-18 (4) 18-22 (3) 22-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
Western Africa	07-08 (1) 08-09 (2) 09-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 08-10 (1)**	05-06 (1) 06-08 (2) 08-14 (3) 14-19 (4) 19-20 (3) 20-22 (2) 22-23 (1)	03-04 (3) 04-06 (2) 06-13 (1) 13-15 (2) 15-17 (3) 17-00 (4) 00-01 (3) 01-03 (2)	18-20 (1) 20-23 (2) 23-01 (3) 01-03 (2) 03-04 (1) 22-03 (1)*
Eastern & Central Africa	08-09 (1) 09-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1) 08-10 (1)**	06-08 (1) 08-12 (2) 12-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	01-04 (2) 04-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-17 (3) 17-23 (4) 23-01 (3)	18-21 (1) 21-23 (2) 23-01 (1) 21-00 (1)*
Southern Africa	07-08 (1) 08-11 (3) 11-14 (4) 14-15 (3) 15-16 (2) 16-17 (1) 08-10 (1)**	06-08 (1) 08-11 (2) 11-13 (3) 13-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	06-08 (1) 12-14 (1) 14-15 (2) 15-17 (3) 17-20 (4) 20-00 (3) 00-02 (2) 02-04 (1)	18-19 (1) 19-22 (2) 22-00 (1) 19-22 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 17-19 (1)	07-08 (10) 08-10(2) 10-11 (1) 17-19 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 17-19 (1) 22-23 (1) 23-00 (2) 00-01 (1)	06-08 (1) 18-20 (1)
Southeast Asia	09-11 (1) 11-14 (2) 14-15 (1) 18-19 (1) 19-20 (2) 20-21 (1)	09-10 (1) 10-12 (2) 12-13 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-21 (2) 21-23 (1)	05-07 (1) 17-19 (1)
Far East	17-18 (1) 18-19 (3) 19-20 (2) 20-21 (1)	09-11 (1) 16-17 (1) 17-18 (2) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-04 (2) 04-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-19 (2) 19-22 (3) 22-00 (2)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
South Pacific & New Zealand	10-13 (1) 13-15 (2) 15-16 (3) 16-19 (4) 19-20 (2) 20-21 (1) 17-19 (1)**	08-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	12-19 (1) 19-21 (2) 21-22 (3) 22-02 (4) 02-04 (3) 04-07 (2) 07-10 (3) 10-12 (2)	00-02 (1) 02-03 (2) 03-07 (3) 07-08 (2) 08-09 (1) 03-05 (1)* 05-07 (2) 07-08 (1)*
Australasia	08-10 (1) 10-11 (2) 11-12 (1) 15-16 (1) 16-17 (2) 17-18 (3) 18-19 (4) 19-20 (2) 20-21 (1) 17-19 (1)**	09-10 (1) 10-12 (2) 12-15 (1) 15-18 (2) 18-19 (3) 19-21 (4) 21-22 (2) 22-23 (1)	07-09 (3) 09-11 (2) 11-14 (1) 16-18 (2) 20-22 (1) 22-00 (2) 00-05 (3) 05-07 (2)	03-05 (1) 05-08 (2) 08-09 (1) 05-08 (1)*
Caribbean Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 09-11 (1)**	06-07 (1) 07-08 (3) 08-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-00 (4) 00-02 (3) 02-06 (2) 06-07 (3)	17-18 (1) 18-19 (2) 19-20 (3) 20-04 (4) 04-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-02 (3)* 02-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 10-12 (1)**	06-07 (1) 07-08 (3) 08-10 (4) 10-11 (3) 11-13 (2) 14-16 (3) 16-20 (4) 20-21 (3) 21-22 (1)	07-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (2) 04-07 (3)	19-21 (1) 21-04 (2) 04-05 (1) 21-04 (1)*
McMurdo Sound, Antarctica	08-10 (1) 17-19 (1)	06-09 (1) 15-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-23 (1)	17-20 (1) 20-21 (2) 21-00 (3) 00-02 (2) 02-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-09 (1)	00-06 (1)

Time Zones: CST & MST (24-Hour Time) CENTRAL USA TO:

	10/6 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	07-08 (1) 08-09 (3) 09-11(4) 11-12 (2) 12-13 (1) 08-10 (1)**	06-07 (1) 07-08 (2) 08-12 (4) 12-13 (2) 13-14 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-13 (3) 13-15 (4) 15-17 (3) 17-19 (2) 19-23 (1) 23-02 (2)	15-17 (1) 17-18 (1) 18-01 (3) 01-02 (2) 02-03 (1) 17-20 (1)* 20-01 (2)* 01-02 (1)*
Northern Europe & European CIS	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-12 (2) 12-13 (1)	04-07 (1) 07-09 (3) 09-13 (2) 13-15 (3) 15-16 (4) 16-18 (3) 18-20 (2) 20-22 (1) 22-01 (2) 01-02 (1)	17-19 (1) 19-22 (2) 22-01 (1) 19-00 (1)*
Eastern Mediter-ranean & Middle East	08-09 (1) 09-10 (2) 10-11 (3) 11-12 (2) 12-13 (1)	07-08 (1) 08-10 (3) 10-11 (4) 11-12 (2) 12-13 (1)	07-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-21 (1) 21-23 (2) 23-01 (1)	18-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Western Africa	7-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-16 (3) 15-17 (2) 17-18 (1) 09-11 (1)*	06-08 (1) 08-10 (2) 10-14 (3) 14-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-21 (4) 21-23 (3) 23-01 (2) 01-03 (1) 03-06 (2)	18-20 (1) 20-23 (2) 23-02 (1) 20-23 (1)*
Eastern & Central Africa	07-08 (1) 08-09 (2) 09-13 (3) 13-14 (4) 14-15 (3) 15-16 (2) 16-17 (1) 10-12 (1)**	06-08 (1) 08-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-14 (1) 14-16 (2) 16-17 (3) 17-20 (4) 20-22 (3) 22-00 (2) 00-02 (1)	19-00 (1) 20-22 (1)*
Southern Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-16 (1) 08-10 (1)**	07-09 (1) 09-11 (2) 11-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-19 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-22 (3) 22-01 (2) 01-03 (1)	18-19 (2) 18-19 (1) 21-22 (1) 19-21 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 18-19 (1) 19-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1)	06-08 (1) 18-20 (1)
Southeast Asia	09-10 (1) 10-13 (2) 13-14 (1) 16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1) 16-18 (1) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-10 (3) 10-12 (2) 12-14 (1) 16-18 (1) 18-20 (2) 20-21 (3) 21-22 (2) 22-23 (1)	04-07 (1) 17-19 (1)
Far East	15-16 (1) 16-17 (2) 17-19 (4) 19-20 (2) 20-21 (1) 17-19 (1)*	08-10 (1) 15-16 (1) 16-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	02-03 (2) 03-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 15-18 (1) 18-20 (2) 20-22 (3)	02-03 (1) 03-07 (2) 07-09 (1) 03-07 (1)*
South Pacific & New Zealand	09-11 (1) 11-14 (2) 14-15 (3) 15-18 (4) 18-19 (3) 19-20 (2)	07-09 (1) 09-11 (2) 11-13 (3) 13-16 (2) 16-17 (3) 17-19 (4)	10-17 (1) 17-19 (2) 19-20 (3) 20-00 (4) 00-04 (3) 04-06 (2)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)*
	20-21 (1) 16-18 (1)**	19-21 (3) 21-22 (2) 22-23 (1)	06-07 (3) 07-08 (4) 08-09 (3) 09-10 (2)	02-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1) 17-19 (1)**	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-13 (1) 13-17 (2) 17-19 (3) 19-21 (4) 21-22 (2) 22-23 (1)	04-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-15 (1) 15-17 (2) 17-20 (1) 20-23 (2) 23-04 (3)	02-04 (1) 04-07 (2) 07-09 (1) 03-06 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-11 (4) 11-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 09-11 (1)**	06-07 (1) 07-08 (3) 08-11 (4) 11-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-23 (4) 23-02 (3) 02-06 (2)	17-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-05 (2) 05-07 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-02 (2)* 02-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-08 (2) 08-10 (4) 10-13 (3) 11-13 (2) 13-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 09-11 (1)**	06-07 (1) 07-08 (3) 08-10 (4) 10- – (3) 11-13 (2) 13-15 (3) 15-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	02-06 (2) 06-07 (3) 07-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3)	19-21 (1) 21-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	08-10 (1)	06-08 (1) 08-10 (2) 10-12 (1) 15-17 (1) 17-18 (2) 18-22 (3) 22-23 (2) 23-00 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1) 06-08 (2) 08-09 (1)	23-05 (1)

Time Zone: PST (24-Hour Time) WESTERN USA TO:

	10/6 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (2) 12-13 (1)	05-06 (1) 06-09 (2) 09-12 (3) 12-14 (4) 14-15 (3) 15-17 (2) 17-19 (1) 22-01 (2)	18-20 (1) 21-00 (2) 00-01 (1) 19-23 (1)*
Central & Northern Europe & European CIS	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-14 (1) 14-16 (3) 16-18 (2) 18-21 (1) 21-00 (2)	18-20 (1) 20-23 (2) 23-00 (1) 19-22 (1)*
Eastern Mediter-ranean & Middle East	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (3) 16-17 (2) 17-20 (1) 20-23 (2)	07-09 (1) 18-22 (1)
Western Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-15 (3) 15-16 (2) 16-17 (1) 09-11 (1)**	06-07 (1) 07-08 (2) 08-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-00 (2) 00-02 (1)	18-19 (1) 18-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-08 (1) 08-10 (2) 10-13 (3) 13-14 (2) 14-15 (1) 09-11 (1)**	06-08 (1) 08-12 (2) 12-15 (3) 15-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-21 (3) 21-23 (2) 23-00 (1)	18-22 (1) 07-09 (1)
Southern Africa	07-08 (1) 08-10 (3) 10-12 (4) 12-13 (3) 13-14 (2)	07-09 (1) 09-12 (2) 12-13 (3) 13-15 (4) 15-17 (2)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3)	18-19 (1) 19-20 (2) 20-21 (1) 18-19 (1)*
	14-15 (1) 08-10 (1)**	17-18 (1)	16-18 (4) 18-20 (3) 20-00 (2) 00-02 (1)	
Central & South Asia	06-09 (1) 17-18 (1) 18-19 (3) 19-20 (1)	06-09 (1) 15-17 (1) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-17 (1) 17-18 (2) 18-19 (3) 19-21 (2) 21-23 (1)	04-09 (1) 17-19 (1)
Southeast Asia	08-09 (1) 09-11 (2) 11-12 (1) 14-15 (1) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 15-17 (1)**	07-08 (1) 08-10 (3) 10-11 (2) 11-14 (1) 14-15 (2) 15-18 (3) 18-20 (2) 20-21 (3) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 15-17 (1) 19-20 (1) 20-22 (2) 22-00 (1)	02-04 (1) 04-07 (2) 07-08 (1) 04-06 (1)*
Far East	13-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 15-18 (1)**	12-14 (1) 14-15 (3) 15-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-06 (2) 06-08 (3) 08-09 (2) 09-12 (1) 12-18 (2) 18-21 (4) 21-22 (3) 22-00 (2)	00-01 (1) 01-04 (2) 04-07 (3) 07-08 (1) 01-05 (1)* 05-06 (2)* 06-07 (1)*
South Pacific & New Zealand	09-10 (1) 10-11 (2) 11-13 (4) 13-16 (3) 16-19 (4) 19-20 (2) 20-21 (1) 15-18 (1)**	07-08 (1) 08-09 (2) 09-11 (4) 11-15 (2) 15-17 (3) 17-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	04-07 (1) 07-09 (4) 09-10 (3) 10-11 (2) 11-18 (1) 18-19 (2) 19-20 (3) 20-00 (4) 00-02 (3) 02-04 (2)	21-22 (1) 22-00 (2) 00-07 (3) 07-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	10-13 (1) 13-15 (2) 15-16 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1) 17-19 (1)**	08-09 (1) 09-11 (3) 11-12 (2) 12-14 (3) 14-15 (2) 15-17 (1) 17-19 (2) 19-21 (4) 21-22 (2) 22-23 (1)	06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-01 (4) 01-03 (3) 03-04 (2) 04-06 (1)	01-03 (1) 03-04 (2) 04-07 (3) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-10 (4) 10-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-08 (1) 08-10 (1)**	06-07 (1) 07-08 (3) 08-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-08 (4) 08-10 (3) 10-13 (2) 13-15 (3) 15-22 (4) 22-00 (3) 00-06 (2)	17-18 (1) 18-19 (2) 19-20 (3) 20-04 (4) 04-05 (2) 05-06 (1) 19-20 (1)* 20-22 (2)* 22-00 (3)* 00-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-08 (2) 08-09 (4) 09-10 (3) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 08-11 (1)**	06-07 (1) 07-08 (3) 08-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	05-06 (2) 06-07 (3) 07-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-01 (3) 01-03 (2) 03-05 (1)	19-20 (1) 20-22 (2) 22-00 (1) 00-04 (2) 04-05 (1) 20-03 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 19-20 (1) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (3) 22-01 (2) 01-02 (2)	16-18 (1) 18-20 (2) 20-03 (3) 03-04 (2) 04-05 (1) 06-07 (1) 07-08 (2) 08-10 (1)	00-05 (1)

*Indicates best times to listen for 80 meter openings. Openings on 160 meters ar also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

**Indicates best times to listen for F-2 layer openings on 6 meters.

For 12 meter openings interpolate between 10 and 15 meter openings.

For 17 meter openings interpolate between 15 and 20 meter openings.

For 30 meter openings interpolate between 40 and 20 meter openings.

just as the sun begins to *rise* at the *easternmost* terminal of a path.

Short-skip conditions during December favor the 40 and 80 meter bands for daytime openings less than 250 miles in length. Try 80 and 160 meters for this same distance at night. For openings between 250 and 750 miles, 40 meters should be optimum during the day and both 80 and 160 meters at night. Try 20 meters during the day for openings between 750 and 1300 miles; 30, 40, or 80 meters from sunset to midnight; and 80 meters from midnight through the sunrise period. Try 30 and 40 meters again for an hour or so after sunrise. For openings between 1300 miles and the maximum one-hop distance of 2300 miles, 17, 15, or 20 meters should be optimum during the day; 20, 30, and 40 meters from sundown to midnight; and 40 and 80 meters from midnight to sunrise. Ten and 12 meters should also provide some fairly good short-skip openings between 1300 and 2300 miles during the daylight period, particularly when conditions are High Normal or better.

VHF Ionospheric Openings

Quite a bit of meteor activity is expected during the month. *Geminids*, classified as a major meteor shower, should begin on December 7 and last for about ten days. Maximum intensity is expected on December 14, with a meteor rate of about two a minute. This should permit fairly good meteor-type openings on both 6 and 2 meters. A second, but somewhat less intense, shower period is expected later in the month. Called *Ursids*, it should last from December 17–26, peaking on the 22nd. A meteor rate of about 15 per hour is expected during this shower.

Trans-equatorial scatter or TE openings on 6 meters should fall off quite a bit during December. An occasional opening may still be possible, however, between the southern half of the U.S. and South America during the hours of 8 to 11 PM.

A secondary seasonal peak in sporadic-*E* propagation generally takes place during December (the major peak occurs during the summer months). This should result in a few fairly good short-skip-type openings on 6 meters between distances of approximately 800 and 1400 miles. Conditions should peak during the early evening hours, but some openings may occur at other times as well.

Some auroral-type VHF ionospheric openings are also likely to occur during December, especially during periods when ionospheric conditions on the HF bands are Below Normal or Disturbed. Check the Last-Minute Forecast at the beginning of this column for the days that are most likely to be in those categories during the month.

Frequent daily updates of aurora information—as well as geomagnetic, solar, and ionospheric data—can be found on the web at: <http://dx.qsl.net/propagation> and <http://hfradio.org/ propagation.html>. For a more complete review of VHF propagation, see N6CL's informative "VHF Plus" column here in *CQ*.

Next Month

Beginning next month Tomas Hood, NW7US, will serve as editor of this column. He currently runs a comprehensive internet propagation website at: <http://hfradio.org/propagation.html> I have often r ecommended this site as a source of very useful geomagnetic, auroral, and ionospheric data.

I will remain with *CQ* as Contributing Editor Emeritus, which will allow me time to write propagation specials from time to time and special nostalgic articles focusing on my worldwide personal experiences as a radio amateur for the past 61 years (see sidebar for topics I intend to cover in more detail in the future).

Be it Christmas, Hanukkah, or Kwanzaa, I would like to extend to everyone my warmest wishes for this holiday season, and for a happy, healthy, rewarding, and most important, a peaceful 2002 for all humanity.

CU in MMII. 73, George, W3ASK

Results (Continued from page 36)

Number groups after calls denote score, total QSOs, W/VE multiplier, countries worked. Total multiplier is the addition of the W/VE and countries. Multi-op scores follow single-op listings. An asterisk (*) denotes low power. State, province, and country certificate winners are listed in bold.

CW

SINGLE OPERATOR

NORTH AMERICA

UNITED STATES

CONNECTICUT

K1VW	**212,160**	**739**	**56**	**40**
***K1PX**	**181,355**	**828**	**55**	**27**
N4XR	69,507	402	49	30
*W1TS	6,016	85	31	1
*K1BTD	3,322	65	22	0
N1TM/QRP	**3,212**	**61**	**21**	**1**

MASSACHUSETTS

K5ZD	**143,746**	**541**	**50**	**32**
K5MA	81,082	398	47	24
***W1WAI**	**66,092**	**410**	**45**	**17**
W1AA	15,129	163	40	1
*K1HT	14,965	153	36	5
W1TW/QRP	**14,022**	**165**	**36**	**2**
*K1GU	13,825	174	32	3
*NF1A	6,304	85	31	1
*K1EP	5,064	89	24	0
WG1Z/QRP	4,300	77	25	0
AA1O/QRP	2,070	53	18	0

MAINE

K1FK	**200,428**	**505**	**51**	**38**
***K1POS**	**55,216**	**389**	**42**	**14**

NEW HAMPSHIRE

KR1G	**267,744**	**796**	**59**	**41**
***K81EAX**	**181,020**	**808**	**56**	**28**
WC1M	19,450	125	37	13
*NM1W	11,396	139	36	1

RHODE ISLAND

KS1J	**119,647**	**677**	**51**	**22**
***AA1SU**	**34,929**	**340**	**42**	**3**
*AB1BX	17,952	242	32	1

NEW JERSEY

W2YC	**106,898**	**394**	**57**	**29**
***K1NK**	**99,774**	**586**	**52**	**17**
NA2AA	99,520	452	53	27
N2MR	53,754	354	46	16
*K1JT	49,464	399	44	10
NQ3N	37,296	280	49	7
*AB2DE	27,200	226	40	10
W1GD	12,341	110	37	6
W2LE	10,434	125	34	3
*N2CG	9,176	109	36	1
*W5KI	8,262	107	32	2
W2YR	6,720	79	32	3
N2LK	3,696	71	24	0
W2JEK/QRP	**3,312**	**66**	**23**	**0**

NEW YORK

N1EU	**276,400**	**797**	**55**	**45**
K2KQ	**199,857**	**775**	**56**	**37**
***K8FC**	**152,369**	**637**	**57**	**32**
K2FU	104,725	629	52	19
WD5T	61,180	314	47	23
*K2CDJ	58,362	302	50	21
*W2WC	57,288	404	46	16
*K2UG	42,883	289	50	11
NA2M	39,235	250	44	15
*W2TX	32,079	280	46	5
*W2HLI	25,992	175	47	10
*KA2MGE	19,834	186	45	2
*K2YR	17,823	201	35	4
*K2QMF	17,235	152	36	9
*N2CU	13,431	157	35	2
W2IB	11,211	134	34	3
*W2FUI	7,945	103	34	1
*W2JGQ	7,735	103	35	0
*K2CS	4,620	68	30	0
*N2CK	2,354	49	22	0
N2DCH	65	5	5	0

DISTRICT OF COLUMBIA

***K3VOA**	**4,592**	**76**	**27**	**1**

DELAWARE

AA1K	**413,718**	**1176**	**59**	**46**
***N8NA**	**30,472**	**265**	**47**	**5**
*NY3C	6,757	106	29	0

MARYLAND

N3OC	**143,028**	**367**	**53**	**23**
***K1HTV**	**131,824**	**701**	**54**	**23**
WK3I/QRP	**74,586**	**542**	**51**	**11**
W3EKT	57,822	303	47	22
W2GG	41,340	329	39	13
N3UM	39,960	256	43	17
W3GN	35,478	275	44	10
K2PLF	33,019	267	45	8
*AD3F	32,696	223	52	9
W3HVQ	30,267	167	37	22
K3DI	24,246	185	49	5
K3MM	19,150	150	39	11
*W3CP	14,880	156	35	5
*K2YWE	10,764	135	34	2
*WX3B	7,648	106	30	2
*N3UN	7,458	101	33	0

PENNSYLVANIA

W3GH	**273,728**	**848**	**58**	**46**
W3TS	**228,420**	**652**	**54**	**36**
K3SV	125,424	602	51	27
K4JLD	59,130	256	46	27
K3ATO	57,090	471	46	9
N3RJ	50,270	395	46	9
K3MD	43,600	379	42	8
K3HX	41,392	358	50	2
***K3SWZ**	**37,950**	**291**	**44**	**11**
*W3UHP	26,880	254	44	4
*AD8J	23,220	230	40	5
*AA3LX	20,564	160	47	6
*K3NL	15,532	129	38	6
*AA3ML	11,960	135	37	3
*K3MZ	10,164	136	32	1
*KZ3W	10,152	135	34	2
AA3TL	5,940	101	27	0
W3AG/QRP	**5,880**	**89**	**30**	**0**

ALABAMA

***K4IQJ**	**44,700**	**321**	**49**	**11**
*AF4OD	24,840	255	43	2
*K4WI	18,404	198	37	6
KC3QU	9,424	115	36	2
*W4NTI	8,316	117	32	1
KC4HCH	5,678	76	32	2

FLORIDA

N4PN	**179,958**	**784**	**53**	**36**
K9RB	73,290	430	48	22
K4RX	57,102	374	45	17
***W4AA**	**44,888**	**309**	**52**	**11**
K4LQ	29,904	227	48	8
*W4ROM	22,750	205	44	6
*K9BG	22,325	212	39	8
*KN4Y	17,840	214	38	2
W4OV	17,342	165	39	7
K9HUY	13,502	139	37	7
N4EK	11,320	131	36	4
W4JN	645	20	15	0
*K4RFK	319	13	10	1

GEORGIA

W4WA	**344,820**	**1054**	**55**	**50**
N4NX	90,206	476	52	22
***NE4S**	**36,520**	**300**	**48**	**7**
*N4WD	26,010	216	43	8
W4DMB	17,329	181	37	6
N4XMX	11,438	120	38	5

KENTUCKY

***KT4ZX**	**122,570**	**761**	**43**	**16**
*K4TO	97,554	587	52	19
*KM4FO	18,900	198	44	1
WB4ZDU	17,908	180	40	4
*K4BAM	12,729	157	36	1
*KM4CH	12,654	152	36	1

NORTH CAROLINA

W4ZV	**456,060**	**1167**	**58**	**52**
N4CW	**190,115**	**837**	**56**	**29**
***N4YDU**	**86,802**	**527**	**50**	**19**
*WJ9B	85,272	562	52	14
K3KO	81,863	450	51	20
N2NFG	73,344	502	50	14
N4UH	38,936	230	44	18
W4TMR/QRP	**31,368**	**268**	**47**	**7**
*N4RS	19,624	204	39	5
*K4QPL	17,850	194	38	4
WB4MSG /QRP	13,065	148	36	3
N4TL	3,406	61	25	1

SOUTH CAROLINA

K4DLJ	**149,466**	**589**	**51**	**36**
AA4NN	105,793	686	55	12
***N2FY**	**27,270**	**226**	**48**	**6**
*WA4AOS	14,148	183	33	3

TENNESSEE

N4ZZ	**188,960**	**968**	**55**	**25**
KØEJ	**175,140**	**817**	**54**	**30**
N4IR	89,586	634	51	12
K4LTA	76,405	602	52	7
***W4NZ**	**38,976**	**308**	**48**	**8**
*KE4OAR	12,152	124	39	2
WO4O	12,054	115	36	6
N4KN	9,840	115	41	0
*NY4T	9,072	120	35	1
WA4AA	8,664	99	34	4
*K4BP	7,630	100	34	1
W4OGG	4,727	74	28	1
W4TDB/QRP	**3,808**	**65**	**27**	**1**
*W4TYU	2,850	51	24	1
*W4AUI	1,584	36	22	0

VIRGINIA

W4MYA	**390,220**	**1127**	**56**	**53**
K4OAQ	**201,600**	**930**	**54**	**30**
K4ZW	172,452	706	50	34
***K7SV**	**91,688**	**506**	**49**	**24**
N3JB	71,740	455	54	14
W4YE	55,572	324	49	17
*N4MM	53,495	301	45	20
K4VV	45,705	339	42	13
*AD4TJ	33,856	333	40	6
*K4ORD	25,008	233	43	5
*WK4Y	24,030	246	40	5
*WM3T	18,855	190	41	4
W4VC	16,564	184	39	2
W2YE	14,360	159	36	4
W4HJ	13,280	142	35	5
*K4MX	9,400	101	39	1
*W4AU	7,470	114	30	0
*WB4DNL	1,932	39	23	0

ARKANSAS

WD5R	**159,467**	**888**	**57**	**20**
K5LG	64,812	427	53	13
***KJ5WX**	**41,776**	**331**	**48**	**8**
*N5SAN	15,498	184	39	2
*KG5RM	7,104	93	37	0

LOUISIANA

W5WMU	**13,072**	**160**	**37**	**1**

MISSISSIPPI

***W5UE**	**37,584**	**355**	**42**	**6**
*AC5SU	6,068	73	34	3

NEW MEXICO

N6ZZ	**60,636**	**364**	**50**	**12**
N5UL	58,368	372	48	16
W5YA/QRP	**13,156**	**126**	**43**	**3**
K5AM	11,058	117	37	1
N5YYX/QRP	552	19	12	0

TEXAS

K5RX	**141,636**	**551**	**52**	**35**
N5RG	**139,575**	**734**	**54**	**21**
N1LN	105,558	625	55	18
N5PO	89,692	519	51	17
***N5DO**	**54,873**	**379**	**53**	**10**
W9UCW	52,018	355	49	13
*W5CWQ	43,790	330	51	7
*K5IUA	42,560	336	49	7
K5NZ	23,150	203	46	4
*NZ5A	15,648	156	45	3
*AF5Z	13,717	135	37	6
*WK5K	11,232	150	35	1

CALIFORNIA

N6RO	**171,000**	**719**	**54**	**21**
K8PO	**146,812**	**650**	**52**	**16**
K6AM	137,740	674	55	16
K6SE	81,575	406	49	17
KH6DX/6	81,130	412	53	17
WA5VGI	80,448	379	48	16
***W6JTI**	**38,688**	**316**	**48**	**4**
W7CB	33,210	265	46	8
K6XT	33,178	250	44	9
*N6NF	31,722	264	44	7
N6ZFO	31,055	266	43	6
*WA6FGV	27,360	250	44	4
K6NY	25,774	230	44	5
K6TA	22,843	169	44	9
*N6LL	22,440	225	42	2
W6HG	21,604	220	40	4
*KG6O	18,236	176	44	3
N6PE	17,493	151	43	6
K6XX	15,910	123	33	4
K6MO	15,255	133	39	6
*K6LRN	13,950	135	43	2
KG6AO	9,500	102	34	4
W6ISQ	7,596	74	34	2
K6EI/QRP	6,336	130	21	1
KB6FPW/QRP	**4,980**	**113**	**19**	**1**
N6WG/QRP	4,920	110	18	2
*W6VM	4,680	82	23	1
KU6T/QRP	4,424	73	27	1
W6TK	3,584	53	27	1
*K6III	3,325	78	18	1
*K6RO	3,243	54	19	4
*N6GL	3,078	74	18	1
*W6ISO	2,880	73	17	1
W4EF	2,725	49	24	1
*AA6EE	2,220	54	20	0
*K6WG	946	39	10	1
*KE6QR	600	36	8	0
AK6R/QRP	448	32	7	0
*K7JJ	350	25	7	0

ARIZONA

N7DD	**183,645**	**792**	**55**	**22**
KN5H	36,936	278	48	9
W7YS	30,305	242	49	6
***AC7A**	**27,248**	**230**	**47**	**5**

IDAHO

KG7H	**117,317**	**630**	**54**	**13**
***WO7Y**	**39,690**	**305**	**49**	**5**
W1HUE/QRP	**6,660**	**107**	**29**	**1**

MONTANA

KS7T	**31,518**	**260**	**47**	**4**
K7ABV	24,000	211	44	6

OREGON

KØJJ	**5,440**	**66**	**32**	**2**

UTAH

***WA7LNW**	**49,113**	**429**	**48**	**3**
KD7AEE/QRP	**13,923**	**169**	**38**	**1**
*W7GT	8,296	116	33	1

WASHINGTON

W7RM	**122,060**	**572**	**54**	**14**
K7OX	**102,476**	**527**	**53**	**15**
W7QC	97,630	538	53	12
N6HR	44,856	317	48	8
KB7N	38,225	265	48	7
***K7QBO**	**27,918**	**250**	**43**	**4**
*WA7LT	24,402	213	46	3
*WN7T	17,531	155	43	4
*W7KOU	17,300	144	47	3
*N7WA	10,804	124	34	3
W7DRA/QRP	**10,780**	**128**	**33**	**2**
*N7LOX	7,150	105	25	1
*W7TSQ	1,260	28	14	1
W7/JR1NKN	10	5	1	0

WYOMING

***WC7S**	**11,000**	**119**	**38**	**2**

MICHIGAN

N8EA	**124,085**	**523**	**51**	**32**
***K8VT**	**27,360**	**253**	**43**	**5**
W8RU	26,977	223	46	7
*K8IR	25,806	225	47	4
*N8IA	24,892	218	45	4
*K8CV	14,664	169	37	2

OHIO

K8ND	**170,022**	**757**	**54**	**32**
W8CAR	**135,090**	**661**	**54**	**25**
***N8BJQ**	**81,048**	**507**	**51**	**15**
K8MR	63,426	435	54	8
N8AA	52,388	299	47	19
*KU8E	50,264	326	49	12
*W8IDM	22,836	240	42	2
*K8AB	18,964	196	42	2
*W8IQ	17,088	167	43	5
*W8PN	13,172	163	36	1
*W8FDN	11,174	147	36	1
*W8DN	11,130	115	36	6
N8XA/QRP	**8,085**	**114**	**34**	**1**
*AF8C	6,177	96	29	0

WEST VIRGINIA

WA8WV	**53,456**	**471**	**48**	**4**
K2UOP	50,952	280	43	23
K8OQL	22,752	204	42	6
N8II	21,000	149	33	17
K8OWL/QRP	**1,674**	**39**	**18**	**0**

ILLINOIS

K9DX	**373,890**	**1160**	**58**	**45**
***K9QVB**	**56,040**	**418**	**54**	**6**
*K9MMS	52,142	365	52	10
*K9ZO	33,252	302	49	2
N2BJ	29,425	231	48	7
W9OA	17,602	174	44	2
*WO9S	16,330	143	42	4
*KX9DX	16,039	167	43	0
*W9YS	10,406	108	39	4
*KB9CRY	9,840	104	37	3
KG9N	8,740	103	35	3
*N9LYE	6,138	87	33	0
*N9DT	3,654	57	29	0
*AA9NF	3,172	55	26	0
*WA9LKZ	520	17	13	0
*KB3AFT/9	112	8	7	0

INDIANA

WB9CIF	**137,133**	**641**	**52**	**29**
W9RE	85,120	397	49	27
***K9WJU**	**83,448**	**465**	**54**	**18**
*WT9U	68,835	445	53	12
*KJ9C	33,337	277	45	8
*K9IG	22,752	200	41	7
*N4TZ	19,550	164	42	8
*K9MI	12,122	149	38	0

WISCONSIN

WA9IRV	**161,433**	**824**	**55**	**26**
WT9Q	97,619	657	58	11
WI9WI	94,738	614	54	13
***K9OT**	**82,624**	**588**	**56**	**8**
*WA1UJU	65,016	526	51	5
*NI9C	52,326	444	51	3
WA9TZE	47,040	330	52	8
*K9DAF	41,800	342	50	5
N9CK	39,928	311	50	6
WI9M	5,236	74	34	0

COLORADO

WV7U	**159,300**	**752**	**55**	**20**
***KØUK**	**53,751**	**333**	**50**	**7**
KØRI/QRP	**49,126**	**372**	**52**	**6**
*WØETT	37,563	287	52	5
KØUE	13,248	128	43	3
*N5RR	7,560	70	43	2
KØCO	700	25	14	0

IOWA

KEØFT	**25,192**	**247**	**45**	**2**
WØETC/QRP	**24,115**	**193**	**46**	**7**
***NØAC**	**14,842**	**166**	**40**	**1**
KØXD	12,780	130	44	1
*NØAAA	12,054	130	41	1
*NEØP	7,820	103	34	0
KØCKD	6,258	63	37	5

KANSAS

WØUY	**28,355**	**237**	**48**	**5**

MINNESOTA

KØTT	**153,519**	**878**	**53**	**20**
WØHW	41,300	305	49	10
***ACØW**	**40,527**	**309**	**49**	**8**
WØSEI/QRP	**24,429**	**217**	**50**	**1**

MISSOURI

K4VX	**266,580**	**1088**	**57**	**33**
KØJPL	73,775	483	52	13
***KØRWL**	**72,285**	**518**	**52**	**9**
WØTT	65,392	397	54	13
NØTT/QRP	**55,912**	**434**	**51**	**7**
*WØTY	13,846	12	42	1
*WAØIYY	7,161	104	33	0
WDØFLJ/QRP	2,808	46	27	0

SOUTH DAKOTA

WØRSP/QRP	17,578	172	46	1

CANADA

NEWFOUNDLAND

***VO1MP**	**6,006**	**39**	**16**	**10**

NEW BRUNSWICK

***VE9WH**	**6,003**	**54**	**23**	**0**

QUEBEC

***VE2AWR**	**29,000**	**148**	**37**	**3**

ONTARIO

VE3EJ	**602,217**	**1167**	**58**	**41**
VA3UZ	**422,740**	**903**	**57**	**35**
VE3PN	231,487	510	56	27
***VE3KP**	**152,574**	**532**	**53**	**6**
*VE3CSK	145,596	443	51	15
*VE3ZT	101,061	362	49	8
*VE3MQW	66,872	264	47	5
VE3KZ	44,942	200	44	2
*VA3MO	43,560	207	42	2
*VE3BNO	40,572	201	40	2
VY2MGY /QRP	**30,240**	**169**	**39**	**1**
VA3IX	14,760	105	29	1
VE3KON/QRP	8,775	68	27	0
VA3EU/QRP	5,654	55	22	0

MANITOBA

***VE4AAU**	**18,798**	**100**	**39**	**0**

SASKATCHEWAN

***VE5SF**	**29,952**	**135**	**45**	**3**
*VE5CPU	6,507	50	27	0

ALBERTA

***VE6BF**	**31,590**	**146**	**42**	**3**

BRITISH COLUMBIA

***VE7SL**	**91,512**	**300**	**54**	**8**
VE7UF	84,336	303	49	7
*VE7ZBK	9,106	60	27	2
VE7RCN	549	14	8	1

ALASKA

***KL7FAP**	**602**	**17**	**5**	**2**

BELIZE

***V31YN**	**80,192**	**279**	**42**	**14**
*V31SN	52,668	239	39	5

CAYMAN ISLANDS

***ZF2CM**	**178,555**	**538**	**48**	**17**

DOMINICAN REPUBLIC

***HI3LFE**	**52,250**	**205**	**40**	**10**

MARTINIQUE

FM5BH	**210,061**	**512**	**54**	**25**

MEXICO

XE1V	**47,136**	**198**	**40**	**8**

AFRICA

CANARY ISLANDS

EA8 /OH2BYS	**834,808**	**804**	**43**	**61**

CEUTA

EA9LZ	**191,634**	**338**	**15**	**42**

CHAGOS

VQ9PO	**8,840**	**52**	**0**	**17**
VQ9SS	3,120	24	0	13

EGYPT

***SU9ZZ**	**32,770**	**113**	**0**	**29**

MADEIRA ISL.

CT3FN	**685,354**	**732**	**42**	**52**

ASIA

ASIATIC RUSSIA

UA9AT	**289,710**	**536**	**0**	**58**
RU9TO	**232,464**	**427**	**0**	**58**
RK9CZO	89,870	254	0	38
UA9CDV	75,996	222	0	36
***RU9CZ**	**56,448**	**169**	**0**	**36**
UA9CR/QRP	**51,952**	**165**	**0**	**34**
*UA9AX	40,590	137	0	33
*RW9QA	18,800	87	0	25
UA9AM	18,700	85	0	25
*UAØANW	9,683	48	0	23
UA9MA	9,480	55	0	20
RA9CTK/QRP	8,456	162	0	28
RW9WA	6,669	40	0	19
*UAØYAY	1,071	14	0	9

AZERBAIJAN

***4K9W**	**41,140**	**128**	**0**	**34**

BHUTAN

A52GJ	**1,900**	**20**	**1**	**9**

CYPRUS

C4A	**878,292**	**989**	**28**	**65**
P3A	502,167	711	10	63

ISRAEL

4X3A	**630,105**	**771**	**24**	**61**
*4Z5AX	1,176	17	0	8

JAPAN

JH4UYB	**61,523**	**173**	**18**	**29**
***JH2QMT**	**5,600**	**35**	**11**	**9**
*JE1SPY	2,651	35	8	3
JS3CTQ	1,540	15	1	10
JA5IP	664	12	5	3
*JK2VOC	480	45	2	2
*JE3UHV	126	13	1	2
*JE1DXC	16	8	0	1

KAZAKHSTAN

***UN2O**	**133,560**	**317**	**0**	**45**
*UN4L	10,311	58	0	21

LEBANON

OD5/OK1MU	**273,112**	**497**	**6**	**51**

OMAN

A45XR	**114,500**	**253**	**0**	**50**

SOUTH KOREA

***HL5UOG**	**414**	**42**	**0**	**2**

TURKEY

***TA3D**	**183,051**	**437**	**0**	**43**

UZBEKISTAN

UK9AA	**49,810**	**169**	**0**	**34**

EUROPE

AUSTRIA

OE8SKQ	**119,098**	**485**	**5**	**42**
OE1TKW	38,410	151	4	42

BELARUS

***EU6EU**	**182,404**	**545**	**7**	**55**
*EU1AZ	122,294	499	3	44
*EW1MN	89,616	362	2	46
*EW1WZ	80,808	366	0	42
EU1SA/QRP	**4,340**	**43**	**0**	**20**

BELGIUM

OT1T	**759,699**	**1046**	**42**	**71**
ON4BR	64,176	253	12	35
***ON6TJ**	**25,160**	**149**	**0**	**34**
ON7SS	3,298	40	0	17

BOSNIA

T97M	**228,200**	**721**	**3**	**57**

BULGARIA

***LZ2JE**	**129,360**	**433**	**6**	**50**
*LZ2RF	8,800	64	0	25

CROATIA

9A5Y	**354,456**	**800**	**18**	**63**
9A3IQ	225,991	628	12	55
9A2VR	184,590	562	8	55
***9A2KD**	**44,800**	**222**	**1**	**39**
*9A5Z	18,279	137	0	27

CZECH REPUBLIC

OK1FDY	**196,170**	**598**	**12**	**53**
OK1EP	**180,482**	**581**	**12**	**50**
***OK1DSZ**	**110,250**	**465**	**7**	**43**
OK1WF	101,764	398	7	45
*OK1FPS	95,850	398	3	47
*OK2HI	86,920	327	6	47
*OK2DW	80,600	434	0	40
*OK1AYY	76,365	359	3	42
*OK1FM	72,451	274	1	52
OK1XJ	51,320	270	1	39
*OK1HGM	38,440	203	2	38
*OK2BZM	38,190	213	1	37
*OK2EQ	34,390	188	1	37
*OK1IF	33,048	209	1	33
OK2WTM /QRP	**28,798**	**185**	**0**	**34**
OK2HZ	28,416	103	1	47
*OK1ARN	26,071	180	0	31
OK2PLK/QRP	24,030	166	0	30
OK2PCN	20,196	125	5	28
*OK2VP	17,284	119	0	29
OK2PMS/QRP	12,675	110	0	25
*OK2ZJ	11,650	100	0	25
*OK1DVK	3,822	37	0	21
*OK1DXU	2,030	18	0	14
OK1DWJ	1,560	14	3	9
OK2ZAW/QRP	216	9	0	6

DENMARK

OZ7YY	**553,482**	**969**	**29**	**68**
***OZ /DL2JRM**	**137,508**	**641**	**2**	**40**

ENGLAND

G3XTT	**179,376**	**384**	**25**	**49**
***G4VGO**	**164,700**	**380**	**23**	**52**
G3NAS	30,316	89	16	37
*M4T	21,056	138	0	32
*G3KKQ	20,808	111	3	33

ESTONIA

***ES2DJ**	**117,936**	**471**	**4**	**44**
*ES6PZ	35,428	200	0	34

FINLAND

OH1MM	**305,140**	**787**	**10**	**63**
OH1F	**250,714**	**706**	**11**	**56**
OH2U	220,480	634	9	56
OH1MA	208,030	533	15	56
OH8LAE	171,160	592	2	53
OH9W	143,520	441	8	52
***OH2NN**	**78,292**	**330**	**0**	**46**
OH3JR	64,012	233	4	48
OH5NE	53,980	280	0	38
*OH5UFO	47,196	198	0	46
OH9MM	42,218	216	0	38
OH3WD	23,814	99	2	40
*OH6RC	11,670	77	0	30
*OH3TZ	11,475	97	0	25
*OH2BPA	9,855	79	0	27

FRANCE

F6BEE	**428,730**	**743**	**37**	**56**
F5RZJ	117,184	328	20	44
***F6ACD**	**67,554**	**220**	**15**	**39**
*F6GOX	43,000	215	3	37
F2AR	33,111	169	1	38
F6HWU	29,610	123	7	35
*F5JBR	18,870	111	1	33

GERMANY

DK6WL	**343,728**	**801**	**22**	**62**
DK2OY	**237,276**	**593**	**25**	**53**
DJØMDR	229,104	643	17	55
***DJ6TK**	**174,900**	**533**	**15**	**51**
DJ5BV	157,674	471	16	50
*DL8OBD	120,568	456	6	50
DL7CX	105,992	400	6	50
DL1JF	95,590	360	8	47
DLØWW	88,256	324	4	52
DJ2MX	81,068	333	5	47
*DL3ZAI	55,083	275	3	40
DK1RV	54,432	173	11	43
*DJ9MH	51,660	274	1	41
*DL9NEI	46,375	306	0	35
*DK3KD	46,354	233	3	40
DK7ZT	43,692	209	2	42
*DL6MHW	43,680	213	5	37
*DL2RUG	43,080	225	0	40
DJ5IW	43,022	178	3	46
DJ2YA	39,463	81	14	53
*DL2KQ	38,556	138	3	48
DJ9RR	34,405	211	0	35
DF2IAX	33,813	181	0	37
DJ6QT	32,877	173	2	37
*DJ3RA	29,232	185	0	36
*DK5IM	27,860	165	0	35
DJ7MG	27,265	162	0	35
*DL2RTJ	26,477	209	0	29
*DL3NM	24,651	159	0	33
DL4FN/QRP	**23,777**	**169**	**0**	**31**
*DL6UHA	22,704	152	2	31
*DL4ME	20,367	143	0	31
DJ2IA	20,230	124	0	35
*DK3GI	19,437	125	0	33
*DK7FP	18,821	140	0	29
DK9VS	14,924	120	0	28
*DK2GZ	14,553	90	0	33
*DL3BRA	12,636	104	0	27
*DL1AQU	11,934	105	0	26
*DJ5CL	10,704	100	0	24
*DL2MY	10,675	100	0	25
*DL6ZNG	10,638	93	0	27
*DKØNS	10,511	101	0	23
DF7ZP/QRP	7,062	75	0	22
*DK3YD	5,206	68	0	19
*DL1NEO	5,104	50	0	22
*DL4KUG	3,888	33	0	24
*DH1DX	2,240	37	0	14
*DL5JS	1,008	18	0	12

GREECE

SV8CS	**36,680**	**173**	**0**	**40**

GUERNSEY ISLAND

MU2K	**174,955**	**622**	**7**	**48**

HUNGARY

HA8FM	**302,880**	**698**	**15**	**65**
***HG1S**	**281,592**	**737**	**14**	**58**
HA8IB	269,150	726	11	59
*HA8IH	203,328	602	10	54
*HA1CW	167,855	559	8	51

ITALY

I4IKW	**293,852**	**627**	**23**	**63**
IV3SKB	**120,400**	**417**	**6**	**50**
***IK6SNQ**	**77,740**	**289**	**5**	**47**
*IØZUT	58,320	290	0	40
IV3HAX	55,930	229	3	44
IKØWMT	17,484	113	0	31
*IK4AUY	17,325	102	0	13
I2WIJ/QRP	**10,604**	**100**	**0**	**22**
*IØKHP	5,960	62	0	20
IK2BCP/QRP	5,712	50	0	24
*IK2AIT	2,352	36	0	14
*IK2WYI	1,280	28	0	10

LATVIA

YL2GN	**258,112**	**756**	**4**	**60**
YL2LY	186,496	547	12	52
***YL2KA**	**87,792**	**353**	**0**	**48**
*YL1ZF	75,780	333	0	45
YL2CR	31,320	215	0	29
*YL2PP	29,880	160	0	36
*YL2PM	17,220	125	0	28

LITHUANIA

LY2CY	**269,031**	**723**	**12**	**57**
***LY9A**	**180,320**	**617**	**6**	**50**
LY2HN	168,498	473	12	54
*LY2OU	103,586	412	4	45
LY5W	99,764	383	8	41
*LY2MW	91,890	400	1	44
LY3ID	90,135	389	0	45
*LY2BM	34,815	214	0	33
LY1DS	33,408	203	0	32
LY2KM	22,444	148	0	31
LY2OM	6,764	76	0	19
*LY3IT	1,034	23	0	11

MOLDOVA

***ER6A**	**86,800**	**415**	**0**	**40**
ER1CW/QRP	**1,800**	**30**	**0**	**12**

NETHERLANDS

PAØLOU	**92,290**	**311**	**11**	**44**
***PA3AAV**	**65,124**	**209**	**16**	**38**
PA3GCV	38,425	116	11	42
*PA3FNE	29,484	160	1	35
*PA5WT	20,097	121	0	33
*PA3AFF	9,799	42	5	36
*PAØXAW	9,100	74	0	25
*PA3ELD	7,175	58	0	25
*PA3BNT	3,515	37	0	19

NORWAY

LA2O	**70,434**	**358**	**0**	**39**
***LA3BO**	**16,659**	**124**	**0**	**27**

POLAND

SP7GIQ	**452,016**	**922**	**23**	**63**
***SN2E**	**170,808**	**486**	**13**	**53**
SP8FHK/8	138,888	494	7	47
*SP5JTF	118,402	439	6	47
*SP8NR	109,600	426	3	47
SP4TKR/QRP	**60,865**	**330**	**0**	**37**
SP9W/QRP	52,962	273	0	39
*SP2FGO	49,040	241	2	38
*SP6LV	39,666	242	0	33
SP4Z	35,760	174	1	39
*SP2HPM	34,164	176	4	32
*SP6BEN	22,148	163	0	28
SP5GH	16,416	54	7	41
*SP3CUG	14,378	112	0	27
*SP4AVG	11,424	100	0	24

ROMANIA

***YO3APJ**	**97,776**	**328**	**8**	**48**
*YO4XF	55,440	251	3	39
*YO4FRF	31,882	161	0	38
*YO2BEH	17,475	139	0	25
*YO9FJW	5,700	60	0	19

RUSSIA

UA6LV	**235,389**	**545**	**11**	**66**
***RW4UU**	**211,428**	**582**	**6**	**57**
RA6AX	164,542	416	12	61
RW4PL	145,521	466	1	56
UA3AB	140,882	478	2	56
RA3DOX	138,078	500	0	54
UA4CCG	113,508	418	0	54
RU1AO	110,136	426	2	50
*RZ4FA	108,544	404	0	53
RV1CC	100,157	437	0	47
RA3NN	88,266	273	0	47
*RK6BZ	77,409	330	0	47
RW3RQ	73,755	332	0	45
*UA4FER	67,095	298	0	45
RK4FF	64,512	309	0	42
RA6LBS	62,700	280	2	42
*UA1OMS	62,348	277	0	44
*UA1TAN	61,160	277	0	44
*RW3XX	57,230	254	1	44
*RW1QD	53,466	289	0	38
*RA3UAG	52,520	269	0	40
RN3BK	50,875	284	0	37
RX3AEX	43,563	227	0	39
*RA3XA	37,481	212	0	37
*RN1AO	35,910	213	0	35
RX3VM/4	34,203	170	0	39
RD4M	32,490	167	0	38
*RW1QA	29,295	179	0	35
UA3TU/QRP	**23,170**	**135**	**0**	**35**
*UA6LFQ	23,142	113	0	38
UF3CWR/QRP	23,128	173	0	28
*UA3XGM	22,850	152	0	32
*RK3DH	19,686	118	0	34
RW1QU/QRP	19,200	142	0	30
RZ3AZ/QRP	17,874	142	0	27
UA3AGW	16,980	121	0	30
*RU3WR	7,581	81	0	21
UA3PB	6,556	62	0	22
*UA3YLM	1,635	21	0	15

SCOTLAND

***GM3CFS**	**95,400**	**329**	**12**	**41**

SLOVAKIA

OMØWR	**336,856**	**793**	**15**	**64**
OM8A	**336,345**	**716**	**20**	**65**
OM3IAG	187,064	527	12	55
OM7RU	149,472	540	7	47
***OM5KM**	**81,686**	**346**	**2**	**45**
*OM4DN	55,620	317	0	36
*OM7JG	53,480	264	0	40
*OM3TPN	49,321	269	0	37
*OM1ADM	43,327	239	0	37
*OM3BA	31,328	200	0	32
*OM1AF	28,217	203	0	29
*OM6TU	23,996	181	0	28

SLOVENIA

S5ØA	**398,430**	**759**	**29**	**61**
S58A	**395,560**	**775**	**24**	**64**
S5ØU	329,300	664	25	64
S57M	287,040	681	18	60
S5ØR	241,725	598	21	54
S53O	239,544	631	12	60
S57DX	212,520	624	10	56
S57Q	168,180	543	8	52
S59AA	155,890	457	12	53
S59L	118,531	484	0	49
S56A	95,472	370	2	49
S5ØQ	43,401	240	1	36
***S57U**	**23,610**	**164**	**0**	**30**
*S57IIO	3,765	58	0	15

SPAIN

EA3ALV	**37,026**	**130**	**9**	**42**
***EA1AEH**	**6,888**	**52**	**3**	**21**
*EA1WX	1,904	21	0	17
EA7CA	1,568	16	0	14

SWEDEN

SM3EVR	**315,388**	**781**	**18**	**56**
SM4Z	**197,714**	**380**	**23**	**63**
SM6R	57,869	223	9	40
SMØCCE	48,762	335	5	37
***SM7BJW**	**26,970**	**172**	**2**	**29**
*SM6IQD	26,117	123	9	32
*SM6WQB	15,748	100	0	31
*SM7BHM	15,471	116	0	27
*SM3ARR	2,448	28	0	18

SWITZERLAND

HB9FBS	**64,142**	**284**	**0**	**44**

UKRAINE

EO6F	**266,616**	**744**	**10**	**59**
UT7QF	**186,416**	**599**	**4**	**57**
UT5UGR	178,234	621	3	55
UY5ZZ	117,425	417	2	53
***UT1FA**	**115,182**	**422**	**3**	**51**
*UT8IM	112,860	403	2	53
UV5Q	111,072	458	0	48
UT8LL	106,722	445	0	49
*UX5NQ	101,200	488	0	44
UV5U	99,008	371	0	52
UX7IA	85,142	347	0	48
US2IR	81,744	337	0	48
*UT8IT	75,435	318	0	47
UW7I	62,145	276	1	44
US3IZ	54,600	265	0	42
*USØHZ	48,048	253	0	39
UT5ECZ	47,929	244	0	41
UY5VA/QRP	**46,960**	**240**	**0**	**40**
*UT3UA	45,090	188	2	43
*UU2JA	43,510	227	0	38
UX8IX/QRP	41,268	210	0	38
US7IB	40,565	230	0	35
*UT8LN	20,016	112	0	36
US4EX/QRP	11,986	95	0	26
US8IDV/QRP	1,845	22	0	15
UT5UGQ	1,836	20	0	17

WALES

GW3JXN	**211,992**	**498**	**25**	**48**

YUGOSLAVIA

YU1ADT	**192,211**	**605**	**9**	**52**
YU7KW	**176,960**	**524**	**9**	**55**
***YU1JW**	**115,385**	**481**	**6**	**41**
*YU1EA	109,700	429	0	50
YU7BW	104,058	431	2	45
YT1VP/QRP	**46,624**	**192**	**0**	**47**
*YU1RA	21,924	155	0	29
*YU7SF	518	16	0	7

OCEANIA

AUSTRALIA

***VK6VZ**	**6,647**	**33**	**13**	**10**
*VK2AYD	42	4	0	3

HAWAII

KH6ND	**416,975**	**648**	**53**	**12**
KH6CC	317,178	481	55	12

INDONESIA

YB5QZ	**936**	**13**	**0**	**9**
*YCØLOW	336	10	0	6

MARSHALL ISLANDS

V73CW	**27,625**	**113**	**20**	**5**

PHILIPPINES

***4F2KWT**	**15,400**	**141**	**5**	**6**

SOUTH AMERICA

ARUBA

P43P	**300,958**	**408**	**49**	**25**

BRAZIL

PY2FUS	**1,265**	**12**	**4**	**7**

FRENCH GUIANA

FY5KE	**298,351**	**411**	**50**	**23**

VENEZUELA

***YV7QP**	**16,110**	**55**	**23**	**7**

MULTI-OPERATOR NORTH AMERICA

UNITED STATES

CONNECTICUT

NZ1U	**101,680**	**473**	**50**	**30**

MASSACHUSETTS

W1FJ	**428,915**	**901**	**55**	**54**
K1TTT	282,367	911	56	41
K1VR	223,376	681	52	40
N1RR	45,549	256	43	20

NEW HAMPSHIRE

KC1XX	**396,270**	**967**	**57**	**48**
KØTV	158,670	620	52	38

RHODE ISLAND

W1OP	**64,144**	**281**	**47**	**29**

NEW JERSEY

K2TOP	**572,271**	**1158**	**59**	**60**
W2GD	436,436	1132	56	53
K2NG	405,305	1076	55	48
N2WM	90,525	449	50	25
KF2EW	33,699	327	43	4
K2SB	4,466	71	27	2

NEW YORK

W2XL	**168,606**	**739**	**57**	**30**

MARYLAND

N3AM	**32,538**	**276**	**43**	**8**

PENNSYLVANIA

K3WW	**304,571**	**908**	**57**	**46**
WY3T	**184,968**	**827**	**53**	**31**
W3OV	122,430	521	54	23
KS3F	79,464	473	44	22
W3FV	69,651	345	48	23
AA3B	40,975	305	40	15
W3AP	17,766	141	35	12
N3ZA	3,618	58	25	2

FLORIDA

NU4Y	**195,144**	**745**	**53**	**41**
WS4Y	123,424	678	55	21
N4BP	118,408	646	52	24
N8PR	63,648	271	49	29

GEORGIA

W8JI	**570,609**	**1377**	**56**	**61**

KENTUCKY

K4WW	**7,740**	**100**	**34**	**2**

Ed, K4YFR, carrying the rig (in the basket) up the North Carolina fire tower he used for the SSB contest.

NORTH CAROLINA

NY4A	**348,192**	**997**	**55**	**49**
K8AC	125,474	507	52	34
K4MA	116,592	494	51	33

SOUTH CAROLINA

AA4V	**293,280**	**940**	**56**	**48**

TENNESSEE

N4VV	**49,802**	**215**	**48**	**26**

VIRGINIA

W4NF	**82,490**	**421**	**47**	**26**

NEW MEXICO

N5IA	**184,954**	**884**	**54**	**23**
N7KA	179,450	916	55	19

OKLAHOMA

W5TM	**255,116**	**1058**	**58**	**34**

TEXAS

N5TW	**156,732**	**835**	**49**	**25**
K5ZO	108,936	706	53	15

CALIFORNIA

K6NDV	**150,891**	**728**	**55**	**18**
W6TRW	72,800	459	53	10
W6YRA	12,987	137	34	5

ARIZONA

K7ZB	**71,379**	**540**	**53**	**10**

OREGON

W7LT	**49,170**	**361**	**51**	**4**

UTAH

N7JW	**295,895**	**1057**	**55**	**28**
NS7K	51,480	410	51	4
K8EI	28,050	243	47	4

WASHINGTON

W7MCU	**14,798**	**113**	**42**	**7**
AB7RW	11,952	150	34	2

WYOMING

W7CW	**128,908**	**775**	**54**	**13**

MICHIGAN

K8XXX	**239,289**	**961**	**56**	**37**

OHIO

N8TR	**73,100**	**241**	**51**	**34**
K8KSN	16,513	151	46	3

WEST VIRGINIA

W8BAR	**219,678**	**841**	**58**	**36**

INDIANA

KD9SV	**215,033**	**700**	**51**	**40**
W9IU	98,264	585	53	18

COLORADO

KØRF	**241,200**	**1026**	**55**	**25**

IOWA

NØNI	**213,774**	**1060**	**49**	**33**

MISSOURI

AAØA	**11,817**	**144**	**39**	**0**

CANADA

QUEBEC

VE2OJ	**132,720**	**489**	**50**	**6**
VA2AM	52,277	159	44	17

ONTARIO

VE3DC	**320,679**	**787**	**53**	**26**

ALBERTA

VE6JY	**55,664**	**201**	**48**	**8**

TURKS & CAICOS

VP5F	**703,310**	**1218**	**57**	**49**

US VIRGIN ISLANDS

NP2S	**353,976**	**802**	**53**	**31**

ASIA

ASIATIC RUSSIA

RF9C	**160,800**	**359**	**0**	**48**
RK9JWV	32,400	136	0	27

SOVEREIGN BASES CYPRUS

ZC4A	**855,123**	**1012**	**21**	**55**

JAPAN

JAØZRY	**7,144**	**41**	**11**	**8**

THAILAND

HSØAC	**595**	**11**	**1**	**6**

EUROPE

AUSTRIA

OE2VEL	**106,262**	**313**	**12**	**49**

BELGIUM

OT1A	**429,345**	**849**	**26**	**61**

BULGARIA

LZ8T	**293,314**	**744**	**12**	**61**

CROATIA

9A1A	**468,778**	**886**	**30**	**64**
9A7A	267,031	702	11	60

CZECH REPUBLIC

OK5W	**437,828**	**853**	**26**	**66**
OL5Q	195,139	650	12	49
OL7R	162,922	572	8	50
OL1F	158,720	523	11	53
OL5T	95,029	362	5	48
OL7W	79,289	355	1	46

ENGLAND

G3N	**659,834**	**1065**	**43**	**55**
G3LZQ	441,024	755	33	63

ESTONIA

ES2X	**220,052**	**708**	**1**	**57**

FINLAND

OH6K	**181,879**	**601**	**5**	**54**

GERMANY

DL6RAI	**271,440**	**714**	**19**	**59**
DL5RBW	**255,840**	**640**	**20**	**60**
DL3ARM	244,644	647	18	53
DL3DXX	242,190	602	19	62
DK1II	222,592	609	18	56
DL9YX	218,448	573	19	55
DL2MDZ	204,375	547	18	57
DFØNF	131,505	491	12	43
DJ8QP	120,466	355	9	58
DKØFFO	120,232	446	8	48
DKØIW	110,646	437	5	49
DF3CB	40,100	158	6	44

HUNGARY

HG3DX	**294,561**	**795**	**12**	**57**
HG5A	255,075	631	16	59

ITALY

I5JVA	**523,320**	**848**	**34**	**71**
IV3YYK	517,572	888	31	68

KALININGRAD

RW2F	**537,382**	**1020**	**25**	**64**
UA2FZ	319,011	759	18	59
RV2FW	241,266	737	11	51
RN2FA	201,376	612	11	51

LITHUANIA

LY7A	**226,112**	**668**	**8**	**46**

LUXEMBOURG

LX1NO	**308,669**	**872**	**16**	**51**

NETHERLANDS

PI4ZLD	**179,346**	**526**	**18**	**46**
PA3BAS	135,498	359	19	47

POLAND

SP9KRT	**46,056**	**243**	**0**	**38**

RUSSIA

RU1A	**527,496**	**980**	**24**	**69**
RM6A	312,524	647	18	68
RZ6LZL	96,880	337	1	55
RK3AWK	95,358	425	0	46

SLOVAKIA

OM7M	**450,680**	**835**	**24**	**71**

SLOVENIA

S5ØX	**202,176**	**598**	**12**	**52**
S52M	196,928	596	12	52

SPAIN

EA5BY	**223,300**	**514**	**24**	**53**

SWEDEN

SL3A	**344,994**	**830**	**17**	**61**
SM7GIB	107,066	476	2	45

UKRAINE

UU7J	**415,870**	**840**	**20**	**71**
EM7Z	216,300	709	2	58
UT7L	152,656	504	1	57
UT3IZZ	64,512	311	0	42

YUGOSLAVIA

YU1EXY	**239,056**	**686**	**9**	**58**
YZ7A	183,860	609	6	52
YU2000A	18,480	134	0	28

OCEANIA

INDONESIA

YC1ZTC	**270**	**8**	**0**	**5**

NEW ZEALAND

ZL6QH	**13,884**	**61**	**17**	**9**

CW Check Logs

Thanks to the following stations for their valuable CW check logs: DL2HRE, DL5KVV, DL7UCX, DL7VAF, LA4NE, LA4LN, LA4OGA, LA5QC, LZ3AB, LZ9W, OD5PL, OK2HFC, OZ7AX, PA3CNI, RA3MB, RA9OW, SM3X, SM3CVM, SM6LJP, UA1NDX, UA6LP, UA9CLB, UR7QM, W5GFR, WA3IVV.

SSB

SINGLE OPERATOR

NORTH AMERICA

UNITED STATES

CONNECTICUT

***K1PX**	**76,038**	**606**	**52**	**5**
*WA1LJD	8,460	122	27	3
*W1CRS	3,654	93	16	2
*W1TS	2,667	56	20	1

MASSACHUSETTS

AA1BU	**120,400**	**580**	**55**	**25**
KK1DX	14,120	141	41	4
K5ZD	11,040	121	36	4
W1TW/QRP	**5,070**	**84**	**25**	**1**
*WO1N	4,104	102	19	0
WG1Z/QRP	2,934	77	18	0
*N1MHH	2,360	60	19	0
NF1A	798	24	14	0

MAINE

W1CEK	**15,664**	**171**	**41**	**3**
***N1LW**	**5,751**	**96**	**26**	**1**
*AB1R	1,064	35	14	0
*N1YIS	8	2	2	0

NEW HAMPSHIRE

***KB1EAX**	**96,950**	**577**	**56**	**14**
AF1T	11,186	160	31	3
*NM1W	6,474	117	26	0
WC1M	4,620	74	28	0

RHODE ISLAND

***K2MN**	**4,485**	**90**	**22**	**1**

NEW JERSEY

***K1NK**	**31,752**	**348**	**39**	**3**
NQ3N	28,860	336	35	4
N2ED	14,652	150	42	2
W1GD	14,048	199	29	3
*W2XT	10,528	154	29	3
N2VW	7,223	102	28	3
*N2NYR	4,730	100	22	0
*W5KI	1,819	52	17	0

NEW YORK

K1ZM	**239,008**	**952**	**58**	**39**
NA2M	41,689	408	44	3
***WA2JQK**	**17,360**	**190**	**35**	**5**
*N2ODU	15,523	163	41	2
*N2MTG	6,989	113	27	2
*W2JUV	4,824	93	24	0
*K2CS	3,450	53	30	0

DISTRICT OF COLUMBIA

4U1WB	**1,819**	**52**	**16**	**1**

MARYLAND

N3HBX	**84,724**	**651**	**51**	**8**
K2PLF	15,444	179	38	1
N3UM	12,691	151	32	5
***W2GG**	**8,778**	**118**	**29**	**4**
*W3EKT	7,470	110	27	3
W2BZR/3	5,590	96	24	2
*AD3F	3,427	70	23	0
*W3CP	3,014	61	21	1
K3TW/QRP	**2,331**	**54**	**21**	**0**

PENNSYLVANIA

W3TS	**110,885**	**736**	**53**	**14**
W3BGN	**100,270**	**513**	**50**	**24**
W3GH	84,096	575	56	8
K3NM	70,882	504	50	11
W3TDF	43,561	388	43	6
***NA3V**	**10,593**	**147**	**31**	**2**
*W3MF	10,065	135	29	4
*AA3LX	7,820	103	32	2
*N3RM	2,640	60	20	0
*N3WAV	2,599	52	22	1
KA3AVB	2,541	56	21	0
*AD8J	2,499	55	20	1

ALABAMA

***K4WI**	**21,870**	**228**	**39**	**6**
*AF4OD	5,632	79	31	1

FLORIDA

AA4MM	**56,192**	**392**	**50**	**14**
KE4SCY	11,550	123	37	5
N4EK	7,200	90	33	3
K1EY	7,020	75	33	6
K9HUY	6,930	92	27	6
*K4RFK	3,161	47	26	3
W4OV	1,278	31	16	2

GEORGIA

K4JRB	**49,134**	**370**	**51**	**6**
N4NX	41,211	327	49	8
WA4TII	20,678	191	43	6
W4DMB	2,354	52	21	1
*W4AMP	1,738	35	22	0

NORTH CAROLINA

K3KO	**27,416**	**248**	**44**	**5**
***K4TMC**	**10,272**	**148**	**30**	**2**
N4UH	6,992	79	34	4

SOUTH CAROLINA

AA4V	**31,467**	**267**	**42**	**9**
*N2FY	3,920	60	25	3

TENNESSEE

N4ZZ	**31,537**	**319**	**43**	**4**
K4BP	18,915	235	37	2
KØEJ	10,197	150	32	1
WD4K	8,547	125	31	2
*WO4O	3,422	50	27	2
*KG4CKX	1,638	36	20	1
AK4ST	1,020	27	16	1

VIRGINIA

W4MYA	**198,774**	**1039**	**57**	**24**
K4YT	30,174	306	44	3
***WK4Y**	**24,885**	**338**	**32**	**3**
*N4MM	18,384	172	43	5
*WA4QDM	7,099	100	28	3
*K3MZ	2,280	54	20	0

ARKANSAS

***AA5CH**	**4,480**	**64**	**31**	**1**

MISSISSIPPI

***AC5SU**	**6,624**	**86**	**34**	**2**

NEW MEXICO

K5AM	**744**	**28**	**11**	**1**
N5YYX/QRP	585	21	12	1

TEXAS

K5RX	**114,523**	**716**	**55**	**16**
W5PR	41,325	326	47	10
K5NZ	10,982	137	37	1
*KF5YZ	3,472	53	30	1
W5AJ	1,704	27	21	3

CALIFORNIA

KA6BIM	**26,660**	**270**	**41**	**2**
N6BU	19,700	175	47	3
N6RO	18,288	160	43	5
W7CB	12,285	119	42	3
W6HG	10,758	158	32	1
***N6NF**	**10,720**	**151**	**30**	**2**
*N6HC	10,570	142	33	2
N6ZFO	8,928	129	30	1
K6SE	8,160	114	30	2
*WA6FGV	4,824	90	23	1
*K6MO	3,588	63	25	1
*KJ6JO	2,530	50	21	1
*W6VM	1,740	51	14	1
*KE6QR	710	34	9	1
KU6T/QR	620	31	10	0
*AA6EE	387	20	8	1
*K6BIR	112	14	4	0

ARIZONA

N7GP	**65,608**	**509**	**52**	**7**
NF7E	32,448	291	50	2
*W7YS	3,075	54	24	1
KN5H	800	22	15	1

IDAHO

KG7H	**42,282**	**338**	**50**	**4**
KE7BT	22,494	212	42	4
***W7UQ**	**7,975**	**118**	**28**	**1**

MONTANA

***NR7DX**	**4,960**	**71**	**30**	**1**

NEVADA

N7ZT	**16,470**	**168**	**44**	**1**
*KC7DYY	486	27	9	0

OREGON

W7JXU	**8,843**	**102**	**35**	**2**
KB7RTA	8,584	133	28	1
KØJJ	5,372	67	32	2

UTAH

***W7HS**	**5,046**	**81**	**29**	**0**
*NS7K	2,478	53	20	1

WASHINGTON

***WA7LT**	**8,540**	**101**	**33**	**2**
AF7E/QRP	**2,225**	**43**	**24**	**1**

MICHIGAN

W8MJ	**53,900**	**447**	**51**	**4**
N8EA	25,428	211	47	5
***N8YEL**	**14,080**	**145**	**42**	**2**
N8LIQ	6,897	94	31	2
WB8NXG	1,848	39	22	0
KT8X	1,596	39	19	0

OHIO

ND8DX	**97,965**	**698**	**55**	**8**
K8ND	65,400	499	55	5
***N8KM**	**27,280**	**228**	**34**	**2**
*NA8W	17,520	169	47	1
*WA8LOW	15,200	177	37	3
*N8PY	11,520	150	33	2
*K8AB	9,468	118	35	1
*AF8C	3,146	67	22	0
*N8AA	3,024	50	24	3
*W8IDM	1,312	38	16	0
N8BJQ	1,045	26	18	1

WEST VIRGINIA

K2UOP	**81,716**	**592**	**51**	**11**

ILLINOIS

K9NR	**144,360**	**886**	**55**	**17**
N2BJ	66,366	580	52	2
***N9VVS**	**11,037**	**131**	**37**	**2**
*W9LYN	6,068	73	35	2
*N9LCR	3,640	62	28	0
KK9A	3,600	69	25	0
KG9N/QRP	270	12	9	0
*WA9LKZ	102	7	6	0
*K9PG	32	4	4	0

INDIANA

K8LEE	**85,806**	**630**	**52**	**11**
KJ9C	16,383	180	41	2
WB9CIF	11,051	114	40	3
KC9FC	7,437	96	36	1
***K9MI**	**5,974**	**100**	**28**	**1**
*WB9NOO	5,850	90	30	0
*WT9U	680	20	17	0

WISCONSIN

WA9TZE	**32,712**	**258**	**54**	**4**
K9KJM	26,780	232	50	2
WA9IRV	13,884	169	37	2
***WA1UJU**	**12,426**	**150**	**36**	**2**
*N9PQU	10,947	114	40	1

The neat setup at YO9FJW, a CW entry.

*NK9G	6,048	71	35	1
*N9AW	2	1	1	0
COLORADO				
***WØAH**	**56,758**	**431**	**52**	**7**
*KØUK	30,906	276	48	3
WØETT	9,589	101	42	1
*KKØQ	9,435	108	36	2
IOWA				
WØETC	**103,883**	**764**	**54**	**7**
KEØFT	3,304	50	26	2
*NO9S	24	4	3	0
KANSAS				
***KØBJ**	**14,602**	**134**	**46**	**3**
*KCØIDI	144	9	8S	LP
MINNESOTA				
KØTT	**61,824**	**503**	**54**	**2**
***N7AIN**	**36,795**	**306**	**52**	**3**
WØJH	33,372	282	52	2
*ACØW	10,710	100	43	2
*KFØQ	10,249	125	37	0
MISSOURI				
KØJPL	**21,012**	**188**	**49**	**2**
NEBRASKA				
WØHXL	**2,236**	**37**	**25**	**1**
NØLZ	1,840	37	23	0
CANADA				
QUEBEC				
VA2AM	**15,435**	**93**	**34**	**1**
*VE2OWL	1,488	26	12	0
ONTARIO				
VE3BY	**219,356**	**781**	**53**	**5**
VE3PN	121,451	409	51	10
***VE3MQW**	**16,164**	**94**	**34**	**2**
VY2MGY/QRP	**15,390**	**120**	**27**	**0**
*VA3IX	3,820	40	20	0
VE3EJ	1,080	18	12	0
SASKATCHEWAN				
VA5DX	**126,614**	**445**	**53**	**6**
***VE5SF**	**11,121**	**71**	**32**	**1**
ALBERTA				
VE6JY	**37,077**	**154**	**47**	**4**
BRITISH COLUMBIA				
***VE7SL**	**36,624**	**163**	**44**	**4**
VE7RCN	837	21	9	0
DOMINICAN REPUBLIC				
HI3HCE	**1,400**	**18**	**9**	**5**
MEXICO				
XE2TG	**14,728**	**107**	**27**	**1**
ST. KITTS				
V47KP	**38,073**	**150**	**37**	**12**

AFRICA

MADEIRA ISLANDS				
CT3DL	**125,433**	**203**	**12**	**51**
CT9L	63,087	126	10	41
ARMENIA				
***EK6CC**	**97,020**	**230**	**0**	**44**
ASIATIC RUSSIA				
RA4PPA/9	**238,272**	**533**	**0**	**48**
UA9ZZ	14,850	74	0	25
UA9OMT	9,988	91	0	22
RVØAR	8,646	50	0	22
KYRGYZSTAN				
***EX8MIO**	**8,878**	**48**	**0**	**23**
TURKEY				
***TA3J**	**175,344**	**384**	**0**	**48**
UZBEKISTAN				
UK9AA	**3,808**	**38**	**0**	**14**

EUROPE

BALAERIC ISLANDS				
EA6TC	**1,560**	**22**	**0**	**12**
BELARUS				
***EU6EU**	**240**	**6**	**0**	**6**
BULGARIA				
LZ8T	**149,340**	**503**	**1**	**56**
***LZ2JE**	**32,256**	**147**	**2**	**40**
*LZ2ML	10,098	56	0	34
*LZ2RF	6,908	56	0	22
*LZ2UZ	6,816	54	0	24
LZ2HM/QRP	**3,612**	**34**	**0**	**21**
LZ3AB	1,196	18	0	13
CROATIA				
9A2VR	**75,210**	**316**	**1**	**45**
***9A4SS**	**58,515**	**241**	**0**	**47**
CZECH REPUBLIC				
OK1TP	**52,202**	**245**	**1**	**42**
DENMARK				
OZ3SK	**123,830**	**413**	**4**	**54**
OZ5EV	24,282	118	1	37
ENGLAND				
***G4VGO**	**55,248**	**221**	**5**	**43**
G3NAS	45,637	183	5	42
*G3VAO	11,625	76	0	31
G4BJM	4,255	36	0	23
FINLAND				
OH2BYS	**61,740**	**260**	**0**	**45**
OH3JR	46,578	215	0	42
OH1MM	44,910	187	0	45
GERMANY				
DJ5BV	**106,040**	**416**	**6**	**49**
DK2OY	93,906	382	5	49
DK1RV	55,615	240	4	45
***DL9NDS**	**25,488**	**151**	**0**	**36**
*DLØSHZ	15,844	99	0	34
*DJ2YE	11,284	77	0	31
*DJ9MH	7,225	60	2	23
*DK3GI	2,945	34	0	19
*DK7JQ/M	2,159	29	0	17
DJ6TK/QRP	**1,680**	**21**	**0**	**16**
DL2MDZ	125	5	0	5
GREECE				
***SV8CS**	**28,105**	**158**	**0**	**35**
HUNGARY				
HA/WØYR	**152,020**	**534**	**1**	**54**
***HG1S**	**121,770**	**423**	**3**	**52**
*HA8IB	33,702	162	0	41
IRELAND				
***EI7GL**	**5,568**	**45**	**0**	**24**
ITALY				
***IK4QIB**	**9,542**	**74**	**0**	**26**
*I4CSP	6,916	51	0	28
*I2OKW	6,744	58	0	24
*IK3SSJ	5,037	45	0	23
IK8UND	1,144	21	0	11
KALININGRAD				
UA2FB	**198,368**	**771**	**1**	**47**
LATVIA				
YL2LY	**32,253**	**161**	**0**	**39**
***YL3GHD**	**13,392**	**85**	**0**	**31**
LY5W	177,282	708	0	49
*LY2OU	48,880	232	0	42
LITHUANIA				
LY2LY	**32,643**	**162**	**0**	**39**
***LY9A**	**27,787**	**157**	**0**	**37**
LY2TA	27,768	136	0	39
LY3BH	12,992	93	0	29
LY2OM	12,035	92	0	29
LY2BVB	9,296	72	0	28
LY1DS	6,678	63	0	21
*LY2DX	6,252	52	0	26
*LY1DM	3,880	46	0	20
MOLDOVA				
ER2GR	**17,280**	**103**	**0**	**32**
***ER6A**	**10,560**	**93**	**0**	**22**
NETHERLANDS				
***PA2SWL**	**35,684**	**155**	**3**	**41**
PAØIJM	32,340	180	0	35
*PA3AAV	11,687	72	2	29
NORWAY				
LA6WEA	**91,804**	**292**	**4**	**55**
LA6EIA	31,230	133	1	44
POLAND				
SP9QMP	**41,000**	**206**	**0**	**40**
***SP9BQJ**	**24,960**	**121**	**0**	**40**
SP4CQU/QRP	**15,008**	**92**	**0**	**32**
SP9W/QRP	12,059	78	0	31
*SP9CLO	6,279	59	0	21
*SN8M	3,096	34	0	18
ROMANIA				
***YO5KTK**	**35,244**	**193**	**0**	**36**
YO2BEH	26,532	143	0	36
YO4FRF/QRP	**1,905**	**25**	**0**	**15**
YO8WW/QRP	270	9	0	6
RUSSIA				
RW3RQ	**61,740**	**319**	**0**	**45**
***UA4UDF**	**52,785**	**238**	**0**	**45**
RK6BZ	44,791	183	0	47
RV1CC	44,198	248	0	41
*RZ4FA	23,595	116	0	39
RX3VM	21,470	105	0	38
*RA3AD	13,472	88	0	32
*UA4FER	13,110	84	0	30
*RU3DG	12,803	86	0	31
*RD4M	7,325	55	0	25
*RN3FX	3,392	47	0	16
RK3DOW/QRP	**1,500**	**25**	**0**	**12**
RA6LBS	1,196	16	0	13
UA3LHL/QRP	830	19	0	10
RN1AO/QRP	468	20	0	6
SICILY				
***IT9VCE**	**5,640**	**50**	**0**	**24**
SLOVAKIA				
OMØWR	**125,610**	**456**	**3**	**50**
***OM7AG**	**15,600**	**106**	**0**	**30**
SLOVENIA				
S5ØS	**151,515**	**464**	**11**	**52**
S57M	**137,057**	**457**	**5**	**54**
S57DX	84,720	358	0	48
***S57NMQ**	**47,340**	**212**	**2**	**43**
S5ØA	32,682	169	0	39
*S57MSU	23,660	140	0	35
S5ØQ	21,556	131	0	34
*S54A	20,748	107	0	39
S56A	18,810	99	0	38
*S57OAN	4,494	47	0	21
S56M/QRP	704	12	0	11
SPAIN				
EA5DFV	**20,826**	**108**	**0**	**39**
EA5AT	54,000	209	4	46
*EA3ATM	37,532	168	1	43
EA3CCN	16,800	94	0	35
***EA1DVY**	**13,644**	**73**	**2**	**34**
EA1DDO	8,430	54	1	29
*EA3GHQ	7,364	50	0	28
*EA5CXL	6,780	43	0	30
*EA3FAJ	6,507	46	0	27
*EA3GBU	6,372	45	0	27
*EA1AUT	1,582	22	0	14
*EA3ALV	682	13	0	11
SWEDEN				
SM6R	**19,584**	**108**	**0**	**36**
***SK4UW**	**10,260**	**68**	**0**	**30**
*SM4HEJ	1,040	16	0	13
8SØW	550	11	0	10
UKRAINE				
UR6QA	**99,700**	**426**	**0**	**50**
***UR7M**	**89,804**	**355**	**1**	**51**
*UV7D	64,272	400	0	39
EO6F	58,770	255	0	45
*UX5NQ	46,816	225	0	44
*UU4JO	29,484	148	0	39
*UR6MW	20,202	118	0	37
*US5ISV	15,488	98	0	32
*USØHZ	10,192	79	0	28
*UZ4E	6,141	60	0	23
WALES				
***GW4BLE**	**3,675**	**35**	**0**	**21**
YUGOSLAVIA				
***YU1JW**	**66,654**	**283**	**1**	**45**
*YU1AST	3,654	42	0	18

SOUTH AMERICA

FRENCH GUIANA				
FY5KE	**14,912**	**50**	**17**	**15**
VENEZUELA				
YV2IF	**31,958**	**88**	**24**	**14**

MULTI-OPERATOR

NORTH AMERICA

UNITED STATES

NEW JERSEY				
W2MF	**104,901**	**589**	**53**	**20**
AB2DE	44,715	367	49	6
N1RK	16,082	220	31	3
K2FL	6,580	110	27	1
NEW YORK				
K2YEH	**47,583**	**422**	**46**	**5**
DELAWARE				
AA1K	**20,655**	**203**	**42**	**3**
MARYLAND				
K3IXD	**30,544**	**300**	**40**	**6**
K3DI	10,268	123	34	3
PENNSYLVANIA				
WY3T	**109,276**	**718**	**57**	**11**
K3WW	40,327	359	41	8
W3FV	27,050	274	44	6
W3AP	11,058	129	34	4
ALABAMA				
KS4YT	**24,856**	**220**	**49**	**3**
GEORGIA				
W4WA	**124,916**	**841**	**55**	**13**
KENTUCKY				
K4UZ	**27,744**	**250**	**49**	**2**
NORTH CAROLINA				
K4MA	**22,528**	**230**	**38**	**6**
K4YFR	15,048	188	35	3
SOUTH CAROLINA				
N4UK	**118,932**	**797**	**55**	**13**
TENNESSEE				
K1KY	**61,692**	**539**	**50**	**3**
N4VV	23,828	240	41	5
VIRGINIA				
W4HJ	**25,830**	**280**	**38**	**4**
ARKANSAS				
WD5R	**60,088**	**501**	**50**	**6**
MISSISSIPPI				
W5ACS	**1,672**	**38**	**22**	**0**
NEW MEXICO				
N7DF	**50,576**	**266**	**47**	**5**
OKLAHOMA				
W5TM	**57,289**	**450**	**52**	**7**
CALIFORNIA				
W6TRW	**53,418**	**416**	**52**	**6**
ARIZONA				
N7KQ	**31,668**	**278**	**49**	**3**
N7PWZ	21,195	216	44	1
UTAH				
K8EI	**6,233**	**119**	**22**	**1**
WASHINGTON				
K7OX	**59,972**	**450**	**53**	**5**
OHIO				
N8TR	**156,730**	**999**	**57**	**13**
WB8TCT	10,675	142	35	0
ILLINOIS				
KØXG	**125,596**	**837**	**58**	**10**
KW9H	2,090	43	22	0
INDIANA				
W9IU	**49,860**	**380**	**55**	**5**
KANSAS				
NØKOV	**63,882**	**459**	**54**	**9**
MINNESOTA				
WØGJ	**27,030**	**220**	**49**	**4**
CANADA				
QUEBEC				
VE2UMS	**42,284**	**288**	**30**	**1**
ONTARIO				
VE3DC	**130,760**	**486**	**49**	**7**
CUBA				
T48RAC	**6,440**	**44**	**19**	**9**
MEXICO				
XE1RCS	**256,248**	**718**	**53**	**19**

EUROPE

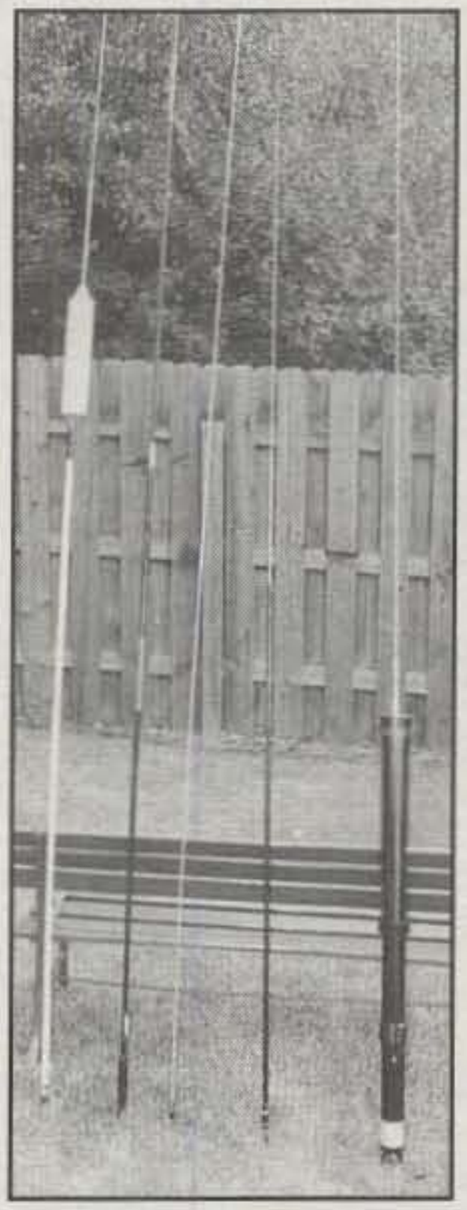
LITHUANIA				
LY7A	**139,702**	**608**	**0**	**M**
AUSTRIA				
OE5OHO	**41,964**	**216**	**0**	**39**
OE2VEL	24,660	131	1	35
BELGIUM				
ON4WW	**88,556**	**332**	**3**	**49**
CZECH REPUBLIC				
OL1F	**56,295**	**255**	**1**	**44**
ESTONIA				
ES2X	**87,122**	**337**	**0**	**49**
FRANCE				
F5CWU	**107,916**	**424**	**0**	**51**
GUERNSEY				
GU8D	**137,704**	**477**	**5**	**51**
HUNGARY				
HG3DX	**154,185**	**519**	**1**	**56**
IRELAND				
EI8GS	**23,205**	**111**	**3**	**36**
ITALY				
IV3BVK	**65,604**	**303**	**1**	**43**
KALININGRAD				
RW2F	**241,528**	**834**	**3**	**53**
RV2FW	116,208	471	0	48
UA2FZ	67,821	278	1	46
LUXEMBOURG				
LX9UN	**161,200**	**611**	**2**	**50**
SLOVENIA				
S59KW	**134,624**	**477**	**6**	**59**
SPAIN				
EA5BY	**34,380**	**148**	**1**	**44**
SWITZERLAND				
HB9CXZ	**108,050**	**428**	**3**	**47**
HB9LC	18,522	141	0	27
UKRAINE				
UU7J	**247,740**	**1049**	**5**	**55**

SSB Check Logs

Thanks to the following stations for their valuable SSB check logs: DL1DXX, DL5JMN, DL6RO, K3SWZ, SP6TRX, SP9GFI, SQ7BCG, VA3JS, W4BCV, YO8AII.

CQ Index 2001

Oops...



We accidentally omitted a manufacturer from our listings of mobile antenna sources in the October Mobile Special ("HF Mobile Whips Put to the Test," p. 22), and we swapped two photo captions on page 23. Please add the following to the information contained in the Resources box on page 26:

High Sierra Antennas, P.O. Box 2389, Nevada City, CA 95959; phone: (530) 273-3415; orders: (888) 273-3415; fax: (530) 273-7561; e-mail: <sales@hsantennas.com>; web: <http://www.cq73.com>. High Sierra makes a very popular motorized screwdriver antenna (the HS1500) for HF plus 6 meters, plus a new version of the same antenna (HS1500MVA) for fixed use in antenna-restricted locations. We apologize for this omission.

In the same article, on page 23, in case you hadn't already figured this out, the caption about the "Center-loaded Hustler antennas" belongs with the right-hand photo of a wall full of Hustler elements; and the selection of "big antenna" choices is on the left, and the antenna on the far right is a High Sierra HS1500.

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2002 CALLBOOK CD-ROM: $38.95. QRZv18: $18.95. Check/VISA/MC. **<AA6EE@amsat.org>**; 760-789-3674. ARRL items DISCOUNTED: **<www.radiodan.com/aa6ee>**.

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<http://www.seaqmaui.com>

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Advertiser's Index

now including websites

A & A Engineering	96	www.a-aengineering.com
Advanced Specialties, Inc.	50	www.advancedspecialties.net
Alinco	59	www.alinco.com
Alpha Delta Communications, Inc.	45	www.alphadeltacom.com
Alpha Power/Crosslink	7	www.alpha-amps.com
Aluma Towers	114	www.alumatower.com
AM-COM, Inc.	35	www.amcominc.com
AMSAT	68	www.amsat.org
Ameritron	5	www.ameritron.com
Antique Electronic Supply	113	www.tubesandmore.com
Antique Radio Classified	83	www.antiqueradio.com
Associated Radio	26	www.associatedradio.com
Astron Corp	51	www.astroncorp.com
Atomic Time, Inc.	58	www.atomictime.com
Batteries America/E.H.Yost	115	www.batteriesamerica.com
Bencher	87	www.bencher.com
Better RF Company, The	113	
Bilal Co./Isotron Ants	113	www.rayfield.net/isotron
Burghardt Amateur Center	55	www.burghardt-amateur.com
Champion Radio Products	114	www.championradio.com
Command Productions	65	www.LicenseTraining.com
Command Technologies	84	www.command1.com
Communication Concepts Inc	105	www.communication-concepts.com
Communications Electronics	81	www.usascan.com
Communications Specialists	93	www.com-spec.com
Comtek Systems	105	www.comteksystems.com
CQ Calendars	43	www.cq-amateur-radio.com
CQ Merchandise	101	www.cq-amateur-radio.com
Creative Services Software	85,87	www.cssincorp.com
Cubex Quad Antennas	112	www.cubex.com
Cushcraft Corporation	15	www.cushcraft.com
Cutting Edge Enterprises	84,112,113	www.powerportstore.com
Datamatrix	112	www.prolog2k.com
Davis Instruments	44	www.davisnet.com
Directive Systems	105	www.directivesystems.com
DX4WIN(Rapidan Data Systems)	95	www.dx4win.com
EQF Software	96	www.eqf-software.com
Fair Radio	83	www.fairradio.com
Fluidmotion Antenna Systems	54	www.SteppIR.com
Force 12 Antennas	61	www.force12inc.com
G4ZPY Paddle Keys	114	website.lineone.net/~g4zpy/index.htm
Glen Martin Engineering, Inc	63	www.glenmartin.com
Hal Communications Corp.	47	www.halcomm.com
Ham Radio Outlet	10	www.hamradio.com
Ham Station	49	www.hamstation.com
Hi-Q-Antennas	105	www.hiqantennas.com
Hy-Gain	1,21	www.hy-gain.com
ICOM America, Inc	Cov.IV,25,27	www.icomamerica.com
Idiom Press/Rotor Ez	83	www.idiompress.com
Juns Electronics	67	www.juns.com
K2AW's "Silicon Alley"	112	

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Advertiser's Index

now including websites

Kanga US	36,112	www.bright.net/~kanga/kanga/
Kangaroo Tabor Software	36	www.taborsoft.com
Kenwood, USA	Cov. II,3	www.kenwood.net
KK7TV Communications	112	www.kk7tv.com
KY Filter Co.	79	www.ky-filters.com/am.htm
Lakeview Company	79	www.hamstick.com
LDG Electronics	73	www.ldgelectronics.com
Lewallen, Roy, W7EL	99	http://eznec.com
Lightning Bolt Antennas	114	www.ligtningboltantennas.com
M2 Antennas	65	www.m2inc.com
MFJ Enterprises	33,37	www.mfjenterprises.com
Mountain-Ops Communication	114	www.mountain-ops.com
National RF, Inc.	83	www.NationalRF.com
Nemal Electronics	14	www.nemal.com
Palomar Engineers	36	www.palomar-engineers.com
Personal Database Applications	45	www.hosenose.com
Peter Dahl Co.	73	www.pwdahl.com
Prolog	112	www.prolog2k.com
QRO Technologies, Inc.	114	www.qrotec.com
QSLs by W4MPY	84	www.w4mpy.com
QSLs by Star Printing	97	www.qth.com/wx9x
RF Connection	70	www.therfc.com
RF Parts	23	www.rfparts.com
Radio City Inc.	39	www.radioinc.com
Radio Club of JHS 22	60	www.wb2jkj.org
Radio Depot	70	www.hammall.com
Radio Works	95	www.radioworks.com
Ranger Communications	17	www.rangerusa.com
Ross Distributing	113	www.rossdist.com
SGC, Inc.	53	www.sgcworld.com
Spectrum International	30	
Ten Tec	9	www.tentec.com
T.G.M. Communications	45	www3.sympatico.ca/tgmc/index.html
Timewave Technologies	99	www.timewave.com
Traffie Technology	70	www.hexbeam.com
Tropical Hamboree	85	www.hamboree.org
Vibroplex	97	www.vibroplex.com
VIS Amateur Supply	87	www.samcd.net
Vintage Radio Inc.	69	
W & W Manufacturing Co.	57	www.ww-manufacturing.com
W4RT Electronics	87	www.W4RT.com
W5YI Marketing	36,44,70,84	www.w5yi.org
W9INN Antennas	113	
West Mountain Radio	63	www.westmountainradio.com
Wireman, The	97	www.thewireman.com
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Yaesu Electronics	CovIII,18,19,116	www.vxstd.com

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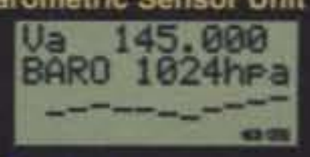

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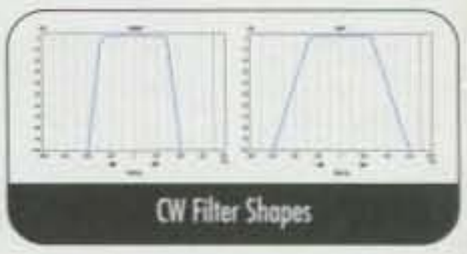
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