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BAND	70cm 440-450 MHz	70cm 430-440 MHz	70cm 420-430 MHz	2M	2M	6M	6M	10M	10M	10M, SSB 40M, 80M	10-160M
MODE	FM & Packet	Satellite SSB & CW	ATV & Digital + PSK 31	FM & Packet + PSK31	SSB	FM & Packet + PSK31	SSB	FM & Packet	SSB	CW	CW, SSB, & Data
SATELLITE	N/A	3000 + Miles	N/A	World Wide Digital	**3000 + Miles	N/A	N/A	N/A	N/A	N/A	**3000 + Miles
DX	N/A	2000 Miles	N/A	Yes, Computer	1000+ Miles**	N/A	N/A	100 Miles	N/A	N/A	N/A
REPEATER	100 Miles	N/A	80 Miles	80 Miles	10 Miles	200 Miles	200 Miles	15 Miles	125 Miles	10 Miles	40 Miles
SIMPLEX	75 Miles	100 Miles	50 Miles	50 Miles	10 Miles	200 Miles	200 Miles	15 Miles	125 Miles	10 Miles	40 Miles
MINIMUM LICENSE	No Code Tech	No Code Tech	No Code Tech	No Code Tech	No Code Tech	No Code Tech	No Code Tech	No Code Tech	No Code Tech	No Code Tech	Novice & Technician +

Receive 30kHz-199.99MHz • 400-470MHz

*1 = Mode A 2M/10M Semi Duplex
 *2 = Mode K 15M/10M, Semi Duplex
 ** = E-Layer Summertime Range (Sporadic E-Skip)
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LEGACY

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Go Mobile, get there with **COMET!**

NEW MH-209SMA • Dual-band 146/446MHz HT Antenna w/SMA Conn
Gain & Wave: 0 1/4 wave • Length: 3' Flexible rubber • Conn: Male SMA • Max Pwr: 5W

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

NEW MH-510 • Tri-band 52/146/446MHz HT Antenna w/SMA Conn
Gain: 0/0/3.2dBi • Length: 20.75' • Conn: Male SMA • Max Pwr: 10W

SB-15 • Tri-band 52/146/446MHz w/fold-over
Gain & Wave: 52MHz 0dBi 1/4 wave • 146MHz 4.5 dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Length: 58" • Conn: PL-259 • Max Pwr: 120W

SBB-7 SBB-7NMO • Dual-band 146/446MHz w/fold-over
Gain & Wave: 146MHz 4.5dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Length: 58" • Conn: SBB-7 PL-259/SBB-7NMO NMO • Max Pwr: 70W

NEW BLACK COLOR

SBB-5 SBB-5NMO • Dual-band 146/446MHz w/fold-over
Gain & Wave: 146MHz 2.5dBi 1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39" • Conn: SBB-5 PL-259/SBB-5NMO NMO • Max Pwr: 120W

NEW BLACK COLOR

THEFT Z750 • Dual-band 146/446MHz w/fold-over • Includes COMET exclusive theft-resistant lock!
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39" • Conn: Gold-plated PL-259 • Max Pwr: 200W

THEFT Z780 • Dual-band 146/446MHz w/fold-over • Includes COMET exclusive theft-resistant lock!
146MHz 6/8 wave 4.5dBi • 446MHz 5/8 wave x 3 7.2dBi • Length: 62" • Conn: Gold-plated PL-259 • Max Pwr: 150W

B-20 B-20NMO • Dual-band 146/446MHz w/fold-over
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 446MHz 5.0dBi 5/8 wave x 2 • Length: 30" • Conn: B-20 PL-259/B-20NMO NMO • Max Pwr: 50W

B-10 B-10NMO • Dual-band 146/446MHz cellular look-a-like •
Gain & Wave: 146MHz 0dBi 1/4 wave • 446MHz 2.15dBi 1/2 wave • Length: 12" • Conn: B-10 PL-259/B-10NMO NMO • Max Pwr: 50W

• The CA-UHV is a 6M/2M/70cm triband antenna. Add 2-3 of the stock or optional coils for 5-6 band operation.
• HF-70cm all in one economical easy to mount antenna.
• Fold-over hinge built in.
• Select the correct duplexer or triplexer for your specific radio (s).
• CF-706A, CF-530, CFX-514N (Ask your dealer)

NEW CA-UHV • HF/6M/2M/70cm Mobile Antenna 40/*20/*17/15/10/6/2M/70cm **40M Thru 70cm!**
Gain & Wave: HF-6M 1/4 wave • 2M 3.4dBi 5/8 wave • 70cm 2.15dBi 1/2 wave • VSWR: HF 1.6:1 or less • 6M-70cm 1.5:1 or less • Length: 6'2" • Max Pwr: HF 120W SSB • 6M 200W SSB/100W FM • 2M/70cm 100W FM • *L-14 Optional 20M coil • *L-18 Optional 17M coil

***NEW MSG-1805C** • Dual-band 146/446MHz w/spring whip and fold-over
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39" • Conn: PL-259 • Max Pwr: 120W

***NEW MSG-1105C** • Dual-band 146/446MHz w/spring whip and fold-over
Gain & Wave: 146MHz 3.5dBi 1/2 wave • 446MHz 6.0dBi 5/8 wave x 2 • Length: 43" • Conn: PL-259 • Max Pwr: 150W

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CIRCLE 131 ON READER SERVICE CARD

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ON THE COVER: Santa obviously got what he wanted for Christmas! Here he is checking out ICOM's new IC-T81A Quad Bander for 6 meters, 2 meters, 440 MHz, and 1.2 GHz. We at CQ hope that you, too, receive the gift of your dreams, but most of all we wish you health, happiness, and a new year filled with all the wonderful possibilities that amateur radio has to offer. (Photo by Larry Mulvehill, WB2ZPI)

An APRS[®] transceiver built for tomorrow's communication needs with advanced features available today.

NEW!



TM-D700A DATA COMMUNICATOR 144/440MHz FM Dual Bander

Conspicuous with its extra-large amber & black display, Kenwood's new TM-D700A is fully equipped to make the most of the exciting opportunities offered by the Kenwood Skycommand System, SSTV, GPS and APRS[®]—the Automatic Packet/Position Reporting System that is rapidly gaining popularity worldwide. This mobile transceiver with built-in TNC offers a wide range of data communications options, including simple packet operation using the AX.25 protocol. You can also send and receive SSTV images using Kenwood's VC-H1. Ham radio is truly entering a new era.

APRS[®] (Automatic Packet/Position Reporting System)

- ▶ **Position/directional data**
With an NMEA-0183 compatible GPS receiver you can transmit position data for automatic calculation of distance, current speed and heading. Last 4 digits can be masked for position ambiguity. Manual input of latitude/longitude is also possible.
- ▶ **Versatile messaging**
Transmission of position data can be accompanied by a choice of programmable status text (8 settings), position comments (up to 28 characters), icons and bulletins. For added messaging flexibility, individual alpha messages (up to 64 characters) can also be sent.
- ▶ **Station list**
Store received APRS[®] data in up to 40 station reports.
- ▶ **Grid square locator**
Position data is displayed on the grid square locator for visible reference.
- ▶ **BCON TX interval**
(0.5/1/2/3/5/10/20/30 min.)
- ▶ **Packet path selection for Digipeat**
- ▶ **Weather station & PHG data reception**
- ▶ **Digipeat station and DIGI function capability**
- ▶ **Auto Message Reply**
- ▶ **Audible APRS[®] message receive (call sign) notification (requires VS-3)**
- ▶ **Satellite Packet (PACSAT) ready**
- ▶ **Waypoint position data output**



FEATURES

- ▶ Full Dual-band operation: VHF x VHF/VHF x UHF/UHF x UHF
- ▶ Wide-band receive: 118-524, 800-1300 MHz (excluding cellular blocked + frequencies)
- ▶ Detached panel (extension cable and panel holder supplied) with extra-large (188 x 54 dots) backlit LCD and multifunction key display (reversible)
- ▶ Improved key operation announcement with optional VS-3 voice synthesizer
- ▶ Built-in 1200/9600bps TNC compliant with AX.25 protocol and KISS mode
- ▶ Simplified packet monitoring
- ▶ SSTV functions with Fast FM for transmission of images in just 14 secs (approx.) and dual receive for voice and image transmissions (two frequencies simultaneously)
- ▶ 200 memory channels with 8-character memory name input
- ▶ Up to 10 programmable memory scan banks
- ▶ Easy-to-use menu system similar to the TH-D7A
- ▶ Built-in DCS (Digital Code Squelch) and CTCSS encode and decode
- ▶ CTCSS tone frequency scan
- ▶ DCS frequency ID scan
- ▶ 9600bps PC-based packet communications for chat, BBS

- ▶ Kenwood Skycommand System (KSS) II for remote control of fixed HF transceiver (TS-570S/D(G) or TS-870S)
- ▶ DX packet cluster monitoring
- ▶ Cross-band repeater
- ▶ Wireless remote controller
- ▶ 1750Hz tone burst
- ▶ D-sub 9 pin terminal (for PCs)
- ▶ GPS input terminal (NMEA-0183)
- ▶ Visual band scope
- ▶ Mute function
- ▶ Memory control program available via Internet access
- ▶ New backlit microphone with alphanumeric message input.



D-sub 9-pin terminal
GPS input
Data Terminal
Panel Display
Mic

NOTICE:

The TM-D700A has not been approved by the FCC. This device is not, and may not be, offered for sale or lease, or sold or leased until the approval of the FCC has been obtained. Pending approval in December, 1999.

Example A: with GPS receiver & laptop



Example B: with VC-H1



ISO 9001
JQA-1205

Communications Equipment Division
Kenwood Corporation
ISO9001 certification

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Reality is an interesting thing. Every so often, it forces you to stop in your tracks, shift gears, reorder your priorities, and do all sorts of other things that result in clichés and hackneyed phrases. But the fact is . . . the *reality* is . . . that life often requires you to change the way you're doing things, even if it means revising or abandoning carefully-made plans. Reality also has the habit of making you face up to things you'd been hoping to avoid, and quite often—in hindsight—that interruption by reality results in a far better outcome than you might have had if everything had gone according to your original plan.

Take, for example, AMSAT's Phase 3D satellite. In case you're not familiar with it, P3D, as it's also called, is the most sophisticated, most capable, most flexible (and, oh yes, most expensive) amateur radio satellite ever built. At the same time, it's supposed to be the easiest to use. It's also supposed to be in orbit right now. The original plans called for the satellite to be launched back in 1997, aboard the second test flight of the European Space Agency's Ariane 5 booster rocket. Reality, however, got in the way. The *first* Ariane 5 to be launched blew up on its way to orbit. An investigation revealed certain flaws that previously had been undetected, and AMSAT (in this case, actually, several AMSAT organizations from around the world all working together) was told that certain changes would have to be made in P3D's "spaceframe" and mounting system in order to survive the rigors of launch.

Cue reality, stage left. ESA needed to get its second test launch off the ground as soon as possible to keep the high-paying commercial customers from taking their satellites to other launch agencies, and the volunteers at AMSAT couldn't get the changes completed quickly enough to meet the new launch schedule for Ariane 502. P3D was "bumped." (You know the drill if you fly with any regularity here on Earth: If you're not at the gate 10 minutes before departure time, you lose your seat. Same deal with satellites.)

Bummer, huh? Well, yes and no. First of all, Ariane 502 had problems of its own, and while it thankfully remained intact for its full flight, it deposited its payloads in a lower-than-planned orbit. Had P3D been aboard, a tremendous amount of valuable maneuvering fuel would have been used up just getting the satellite to its intended orbit. In addition, the past two years have

been spent fine-tuning the satellite, putting it through some very rigorous pre-flight tests (which showed the need for some minor adjustments, now completed) and updating some of its electronics with more up-to-date, lighter-weight components. So here's the good side of the delay: Had P3D been launched on schedule, it would have started out in the wrong orbit, used up lots of fuel intended to keep it in its proper orbit (to avoid repeating the premature re-entry of OSCAR-13), and might have had some internal problems that were revealed by the pre-launch tests. In addition, the *third* Ariane launch was flawless, so it seems that the rocket's problems have been ironed out. Thanks to reality's interruption, AMSAT now has a better "bird," fully-tested and ready to fly, with a much greater chance than it had originally of being launched successfully.

So when *will* P3D fly? That question is still up in the air, so to speak, but at least things are back on the right track. In early October, AMSAT-Germany President Dr. Karl Meinzer, DJ4ZC, who is also Phase 3D Project Leader, announced that an agreement had been reached to launch P3D as a secondary payload aboard the "first suitable" Ariane 5 flight. In addition, at an international satellite conference in Geneva, Arianespace, which books flights for ESA, promised that the launch will take place sometime in 2000.

While there is still no firm launch date, the satellite again has a "standby ticket" to fly. And since standby passengers have to be at the gate when their flight is ready to leave, P3D was being crated up in mid-October for shipment to the ESA's South American launch facility in Kourou, French Guiana. This way it will be "at the gate" and ready to go whenever a launch opportunity opens up.

Now back to reality closer to home. Last month in this space, I wrote that I didn't anticipate any "earth-shattering or immediate" changes in *CQ*. I was wrong (cue reality again). After lengthy discussions of the various options available to us, we have decided to merge *CQ VHF* magazine into *CQ* as of the January 2000 issue. The major reason for this is the changing face of our hobby, with VHF becoming more and more "mainstream" in amateur radio. This is apparent not only in our operating habits, but in our equipment as well. Take a look at the ads in this issue and you'll see that it's getting hard to find a mid-range HF transceiver that doesn't in-

clude at least one VHF band, and there's a growing number that include two or more.

As for operating habits, while you might not want to admit it publicly, chances are you've got a 2-meter FM rig around your shack somewhere (or more likely, a 2-meter/70-centimeter dual-bander). You might even use it once in a while. And if you're at all serious as a DXer, then you probably have a 2 meter packet station dedicated to monitoring the local DX Cluster. A recent survey of *CQ VHF* readers showed—and this may surprise you—that a healthy majority of them hold at least some HF privileges. Of that group, more than two-thirds regularly operate HF as well as VHF, and nearly half said HF is an important part of their overall ham operating. Now add in FCC license restructuring (whenever the folks in Washington get off their collective derrieres and make a decision), which will almost certainly bring many current Tech and Tech Plus licenses onto the HF bands, and the logic for having a separate VHF magazine has gone away.

We'll soon have lots of new HF operators who need to "learn the ropes" on proper operating procedures, pick up tips on working through pile-ups on DX stations (and the Zen of QSLing), and be shown the fun and excitement of contesting, even as a "little pistol." On the other hand, the licensing statistics show we're losing an alarming number of General and Advanced class hams. No, they're not all dying off. Some are, but the rest are simply leaving. Why? My guess is they're bored. Maybe we can hold on to some of those borderline hams by introducing them to the many exciting challenges available above 30 MHz—the unpredictability of sporadic-E (and this winter, F₂) on 6 meters; working aurora, meteor scatter, moonbounce (the *ultimate* DX), and more—the topics we've covered each month for the past four years in *CQ VHF*.

By bringing together *CQ* and *CQ VHF*, we will help promote a process that has already begun—bringing back together two parts of amateur radio, HF and VHF, that were dangerously drifting apart. Dangerous, because with all of the external pressures on our frequencies and on our operating rights, we cannot afford the infighting that we've seen in recent years. As Benjamin Franklin said at the signing of the Declaration of Independence, "We

(Continued on page 6)

THE DIRECTOR HF Multiband Beam Antenna

SMALL FOOTPRINT

BIG SIGNAL

Cushcraft's newest multiband HF antenna provides 5 band directivity in a package small enough to mount to a tripod. The **MA5B** is a design that does not sacrifice ruggedness, performance and power handling for size and ease of installation.

▪ **Easy To Tune**

No complicated gamma matches to adjust.

▪ **Easy To Turn**

With a boom length of 7 feet and a longest element length of 17 feet, a lightweight TV rotor will do the trick.

▪ **Low VSWR**

Flat response across all 5 bands. VSWR minimum 1.2:1.

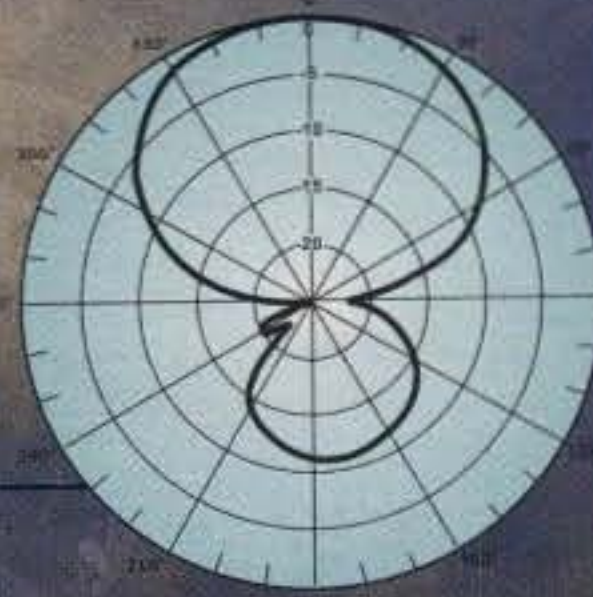
▪ **Rugged Construction**

Cushcraft's tried and true stainless steel mounting hardware and heavy wall aluminum tubing make for a rugged, long lasting antenna.

▪ **Single Feed Point**

Only one coaxial feed line is necessary for all 5 bands.

High Front To Back Ratio On 10/15/20m



MA5B SPECIFICATIONS

FREQUENCY	10	12	15	17	20	Meters
ELEMENTS	2	1	2	1	2	per band
GAIN	5.3	1.0	4.8	1.0	3.6	dBi
FRONT TO BACK RATIO	10	0	12	0	22	dB
SIDELobe ATTENUATION	25	25	25	25	25	dB
VSWR 2:1 BANDWIDTH	665	>110	255	>100	90	kHz
LONGEST ELEMENT	17.1ft (5.2m)					
TURNING RADIUS	8.8ft (2.7m)					
BOOM LENGTH	7.3ft (2.2m)					
BOOM DIAMETER	1.5in (3.8cm)					
MAX. WIND SURFACE AREA	3.22 ft ² (3m ²)					
MAX. POWER HANDLING	1.2kw					
WEIGHT	26.5 lbs (12kg)					

For more information on this outstanding HF Multiband Beam Antenna, visit our web site at <http://www.cushcraft.com> or contact any one of our dealers worldwide.



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Zero Bias (from page 4)

must indeed all hang together, or, most assuredly, we shall all hang separately."

So here's what happens next: Starting next month, *CQ* will be expanded by 32 pages to accommodate the additional VHF coverage carried over from *CQ VHF*. This will include several of *CQ VHF*'s columns and other features. But by adding pages, we hope to be able to incorporate this new material without sacrificing any of the already excellent feature articles, columns, etc., that you've come to rely on seeing each month in the pages of *CQ*.

If you are currently a subscriber to *CQ* only, then nothing will change, except that your magazine will be fatter each month and you'll have a wider variety of articles from which to choose. If you currently subscribe to both *CQ* and *CQ VHF*, your *CQ* subscription will be extended by the number of issues remaining on your *CQ VHF* subscription.

One closing thought: *CQ VHF* essentially has been a four-year-long QSO, with its readers as active participants, both as authors and as correspondents in our monthly surveys and in our "Letters," "Reader Feedback," "Q&A," and "Op-Ed"

columns. We want to bring that feeling of "magazine as conversation" to *CQ* as well, and encourage your input. It's our reality check. And if you think you've got a potential article about any aspect of amateur radio, we want to hear from you. If you've got something worthwhile to say, we'd like the opportunity to share it with your fellow readers. You can reach us by mail at 25 Newbridge Rd., Hicksville, NY 11801, or by e-mail to <cq@cq-amateurradio.com>. We look forward to hearing from you.

Finally, all of us here at *CQ* would like to extend to each of you our best wishes for a happy and healthy holiday season, new year, new century, and new millennium. And don't let the Y2K bug bite!

73, Rich, W2VU

BE PREPARED FOR Y2K HF TO GO!

The World's Smallest Full-Featured HF-SSB Radio

\$50 FACTORY REBATE
(expires Jan. 15, 2000)



The SG-2020 is the perfect choice for base, backpacks or business trips.

- Weighing in at just 4.5 pounds, the SG-2020 features fully adjustable output power from 0 to 20 watts PEP.
- Low current requirements in receive mode allow practical battery pack operation.
- A bullet-proof front end provides third order intercept at better than +18dB, virtually eliminating adjacent channel interference.
- Designed with the portable user in mind, it comes complete with built-in, fully adjustable mode 'B' iambic keyer, VOGAD baseband speech processing and RF clipping.
- All this plus legendary SGC quality and reliability at an incredibly low price.

SGC-2020

For complete details on the SG-2020, see your SGC dealer, or check out our website.

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CIRCLE 69 ON READER SERVICE CARD



Jim Dionne, K1MEM, SK

It is our sad duty to report yet another loss in the *CQ* family. Longtime Worked All Zones (WAZ) Award Manager Jim Dionne, K1MEM, passed away on October 12th at age 51. Jim had fought a life-long battle with kidney disease, and he ultimately lost that battle. He was WAZ manager for some 15 years, keeping *CQ*'s premier award program running smoothly and with the greatest integrity. Even in the days just before his death, Jim was working on WAZ award applications and checking QSL cards.

I never had the opportunity to work directly with Jim, but I did meet him several times at Dayton and was always impressed with his friendly nature and upbeat outlook even in the midst of battling a debilitating disease. I am sorry that I'll never have the opportunity to get to know Jim better.

All of us here at *CQ* join Jim's family in mourning his loss. For those wishing to do so, donations in Jim's name may be made to the Kidney Transplant/ Dialysis Association, Inc., P.O. Box 1362 GMF, Boston, MA 02205-1362.

We will announce a successor to Jim as WAZ manager as soon as we make an appointment. If you currently have cards and/or an application pending, please be assured that everything will be well taken care of during this transition period.

—W2VU

THE VECTRONICS HFT-1500 . . . THE FINEST HIGH POWER ANTENNA TUNER MADE!

High current Roller Inductor
SSB*Analyzer Bargraph™
Cross-Needle Meter
6 position Antenna Switch
Built-in 4:1 Balun
Gear driven Turns Counter

VC-300DLP

\$459⁹⁵

The VECTRONICS HFT-1500 is not just an antenna tuner . . . it's a beautifully crafted work of art, using the finest components available and the highest quality construction.

Every HFT-1500 aluminum cabinet is carefully crafted with a durable baked-on paint that won't scratch or chip.

The attractive two-color Lexan front panel is scratch-proof. Take a quarter. Scratch the HFT-1500 front panel as much as you want. You won't have a mark!

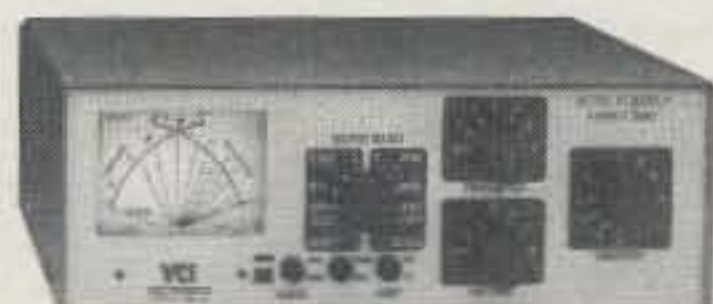
Arc-Free Operation

Two heavy duty 4.5 kV transmitting variable capacitors and a massive high current roller inductor gives you arc-free operation up to 2 kW PEP SSB.

Precision Resetability

A sturdy hand cranked roller inductor lets you

300 Watt Antenna Tuner



VC-300DLP
\$159⁹⁵

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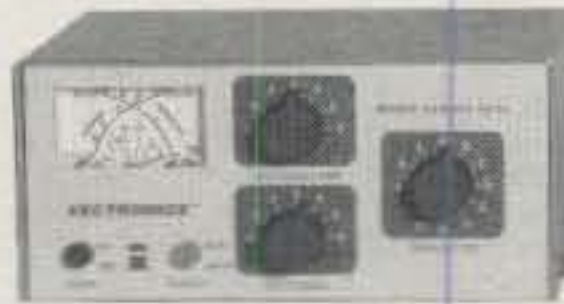
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Announcements

• **Y2K QSO Party:** The Old Old Timers Club (OOTC) will sponsor the Y2K QSO Party for 24 hours beginning 0001 UTC January 1, 2000. Contacts between members and nonmembers on any frequency/mode. Suggested frequencies: CW 1800-20, 3550-60, 7050-60, 14050-60, 21050-60, 28050-60; SSB 1950-60, 3850-60, 7250-60, 14250-60, 21350-60, 28350-60. (No WARC bands; no repeaters allowed.) Call "CQ OOTC." OOTC members identify as "MBR" after call. Exchange RST+ first wireless (i.e., 599 36). Log must show call of station worked and last two numbers of his/her first wireless. Certificate will be sent to any amateur contacting ten OOTC members. Send copy of log showing call and year of first wireless of at least ten OOTC members and \$2.00 to: OOTC Inc., 3191 Darvany Dr., Dallas, TX 75220-1611 (e-mail: <ootc@ticnet.com>; phone 214-352-4743; website: <http://www.ticnet.com/ootc/>).

• **Special Events scheduled for Dec.:**

W2T, from Y2K celebration, Austin, TX; 3M ARC; 1100Z Dec. 31 to 2400Z Jan. 2; SSB 7.230, 14.340, 21.410, 28.350 MHz. For certificate send QSL to: 3M ARC - W3MRC, A147-5S-03, 6801 Riverplace Blvd., Austin, TX 78726-9000. <www.qsl.net/w3mrc>

WX3MAS, from Season's Greetings celebration, Nazareth and Bethlehem, PA; Christmas City and Delaware-Lehigh ARCs; 1300Z Dec. 18 to 0100Z Dec. 20; on 3.970, 7.270, 14.265, 21.365, 28.465 MHz. For certificate send QSL and 9 x 12 SASE to: CCARC/DLARC WX3MAS, Greystone Bldg. - Grace-dale Complex, RR 8, Nazareth, PA 18064.

KC5OUR, Christmas from Bethlehem, Bel-

en, NM; Valencia County ARA; 1400Z Dec. 18 to 2300Z Dec. 26; on 7.270, 14.270, 21.370, 28.370 MHz. QSL to VCARA, P.O. Box 1076, Peralta, NM 87042.

N5A, from 100th anniversary of the Army/Navy game, Annapolis, MD; 1200-1800Z Dec. 3; on 14.250 and 7.240, plus 28.450 and 21.350 MHz \pm QRM. For certificate send QSL and SASE to: Mike Waranis, 422 Halsey Rd., Annapolis, MD 21401.

WA7USA, from Battleship *USS Arizona*, Mesa, AZ; East Valley Amateur Radio Group; 1500-2400Z Dec. 7; on 14.240, 21.340, 28.340 MHz. For certificate send QSL and 9 x 12 SASE to EVARG, 3264 E. Carol Ave., Mesa, AZ 85204-3245.

W9MKS, from 57th anniversary of launch of the first Landing Ship, Tank, from Seneca, IL prairie ship yard; Starved Rock RC; 1400Z Dec. 11 to 0400Z Dec. 13; on 3557, 7257, 14257, 21357 kHz. For certificate send large SASE to SRRC, P.O. Box 198, Leonore, IL 61332.

W9WWI, from Christmas celebration, Bethlehem, IN; Clark County ARC; 1500Z Dec. 10 to 2200Z Dec. 11; General 75, 40, 20 meter bands. For certificate send QSL to CCARC, 1805 E. Eighth St., Jeffersonville, IN 47130.

• **These hamfests are slated for Dec.:**

Dec. 5, **Hancock ARC Hamfest '99**, Greenfield Central High School Pavilion, Greenfield, IN. Contact Tom Donaldson, N9LFU, 317-326-3168.

Dec. 17-18, **Columbia County Hamfest & Computer Show**, American Legion Hall, Lake City, FL. Contact Colen Boutwell, WA5RKR, 904-755-7969, 800-752-7969; e-mail: <wa5rkr@isgroup.net>.

Our Readers Say

Amateur Radio Operators Goodwill Ambassadors Indeed

Editor, CQ:

Sometimes a group of hams come together outside amateur radio activities and really makes you proud to be one. Last year a four-year-old Guatemalan girl, Claudia, came to Kentucky. She came into the foster care of John, W4JHT, and Ruth Trent of Allen County. Children of the Americas brought her to the United States for a number of major surgeries to give a hip joint that Claudia was born without. The hope was to give her near normal mobility.

Initial surgeries were performed at Kosair Hospital in Lexington, Kentucky, and the little girl suffered her fifth birthday in a green body cast. It was green because she was cast in a frog-like position and pediatric staff at the hospital made her into a big frog.

After a short time, Claudia's English was good enough to be heard in the background as "Papa John" operated his ham station. It wasn't long before all the area hams knew little Claudia. We anguished when "frog" Claudia tipped over while watching cartoons, flopping onto the floor (unhurt).

Hams love to ask questions, and over the next twelve months they began to ask how they, as a group, might assist Claudia when

she returned home to her parents, younger brother, and sister. Joe Taylor, N4NAS, was asked to look into Claudia's family needs.

Through the Children of the Americas, it was soon learned that Claudia needed to continue to learn English to better communicate with her doctors as she returned for several additional surgeries, and it was learned that Claudia couldn't afford to go to school. It came to light that a disabled child does not have a good chance at life in Guatemala, and educating Claudia became the focus.

Putting Claudia into school was found to cost \$550 U.S. A school within reasonably easy walking distance was located and that school taught English! Funds were collected from area hams and, as word spread, from as far away as Alaska. Within 15 days of the start of the Claudia Fund the \$550 goal was reached. Claudia could start school thanks to hams who cared enough to contribute.

When you hear that amateur radio operators are goodwill ambassadors to the world, please remember that fellowship among southern Kentucky hams combined with the wonderful work of Kosair Hospital and the Children of the Americas gave little Claudia a chance at a better life.

Joe Taylor, N4NAS

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The better you understand batteries, the more operating time you will be able to squeeze out of your portable gear—especially as winter temperatures arrive. Here is a short course on the different types of batteries and what to expect from them when the mercury drops.

A Cold Look At Batteries

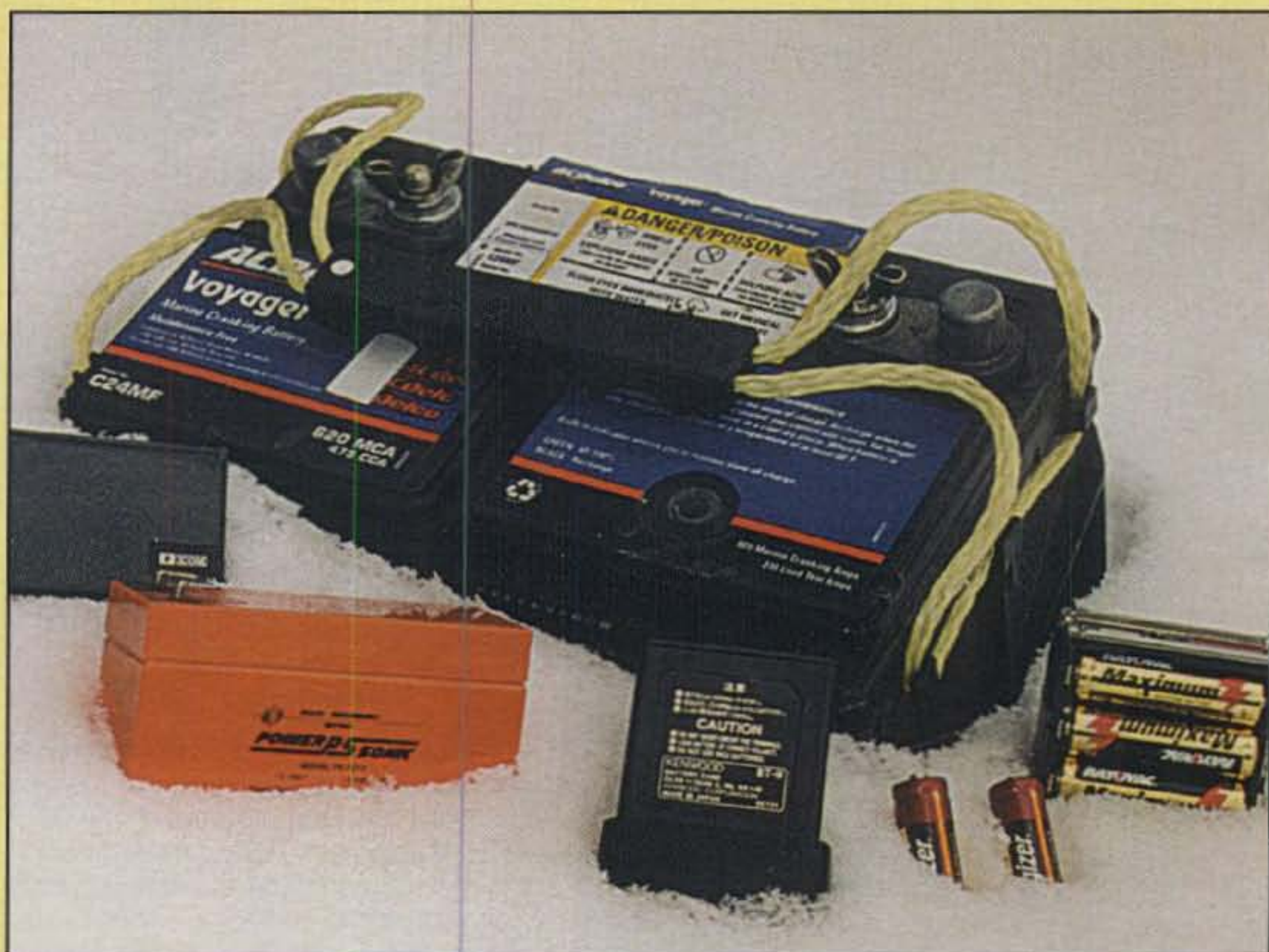
BY JIM ANDERA*, KØNK

One of the nice things about operating outdoors in the winter is that you don't have to deal with mosquitoes, ticks, or chiggers. However, there is one troublesome bug that polar-bear hams do have to deal with—reduced battery performance. Whether you're planning a winter expedition into the frozen wilds, or just occasionally leave your HT in the car on a cold winter night, it pays to understand the degrading effect of cold temperature on batteries. Even if you never leave the ham shack on a cold day, do you know which types of batteries provide the most energy at room temperature?

It's no secret that some types of batteries perform better in amateur radio applications than others. Nor is it any secret that when a battery is placed under heavy loads or is operated at sub-freezing temperatures, its performance will suffer. If you operate under these two conditions simultaneously, you may end up very disappointed in the performance of your portable gear, unless you have planned ahead and selected the right type of battery.

The Importance of Load Current

Even warm-weather HT users quickly learn that the way to squeeze more operating time out of a battery pack is to minimize the transmitted power and keep the length of the transmissions short. Why? There are actually two reasons for the shorter operating time when transmitting. The most obvious reason is that the battery's energy simply is being consumed at a faster rate when you transmit. A second, less obvious reason is that the capacity of the battery actually decreases with heavier load currents. Fig. 1 illustrates this decreased-capacity effect with heavy loads for a lead-acid battery. You can see that even at room temperature and under a heavy load, the battery's capacity is only about 60% of what would be available with



Battery performance and cold weather often do not mix well. However, with the proper selection of battery type, you can still enjoy many hours of operating even when the temperature falls well below freezing.

a light load. Other battery chemistries exhibit a similar trend with regard to the capacity reduction with heavy loads, although some batteries do better than others.

NiCads, primary and secondary lithiums, as well as nickel-metal-hydrides all hold up significantly better than lead-acid batteries under heavy loads. At room temperature and under loads of about 1 Capacity, they tend to retain above 80% of their low-current capacity. NiCads are particularly forgiving of heavy loads, yielding good capacity with loads of 5 Capacity or greater. On the other hand, alkalines, particularly rechargeable alkalines, do poorly under the heavier loads, losing well over

half their rated capacity. Carbon-zinc and zinc-chloride cells do even more poorly.

The Effects of Temperature

Reduced battery performance is a part of life in winter operating, largely due to the fact that chemical reactions slow down at cold temperatures. Almost every battery parameter degrades as the temperature drops. As batteries get cold, their overall usable capacity decreases, their internal resistance goes up, and the open-cell voltages go down. Thus, that battery pack you've relied on in the summer to operate your radio for several days may yield dis-

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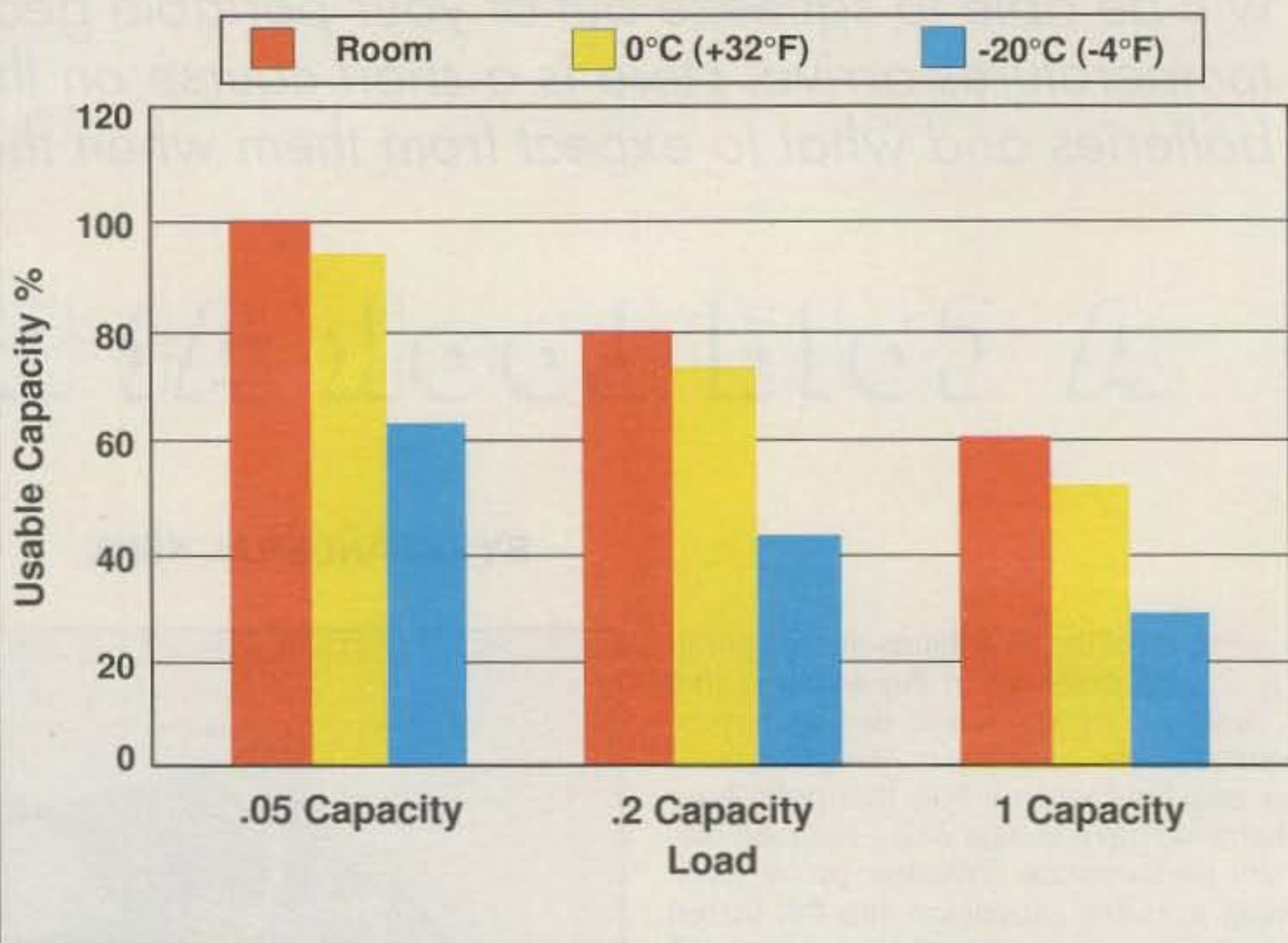


Fig. 1— The capacity of a lead acid battery decreases with both cold temperatures and heavy loads. Keep in mind that the capacity of a gel-cell battery is usually specified at room temperature 20-hour discharge rate, which is a .05 Capacity load. Under heavier loads performance suffers. Even at room temperature, with a load of 1 Capacity the battery's available energy is only about 60% of that which is printed on the side of the battery. At temperatures well below freezing the performance is even more disappointing. A load of 1 Capacity is equivalent to the amperage portion of the Amp-hour rating. For example, a 2 amp load on a 2 Ah battery is a 1 Capacity load. Likewise, a 400 mA load on that same battery constitutes a .2 Capacity load ($.2 \times 2A = .4A$, or 400 mA).

appointing results during winter activities. However, some battery chemistries are more prone to serious performance degradation than others under cold conditions.

It is important to understand that at cold temperatures the battery's capacity decreases—even with light loads. At the same time, the effects of heavy-load currents become more pronounced, reducing the capacity still further every time you key down. To the winter operator, this means that the rules of minimizing both the transmit time and the transmit power become even more important. The degradation in battery capacity at cold temperatures will tend to be minimized when it is lightly loaded, such as when powering just a receiver. With such a light load, even at -20°C (-4°F) the battery may operate at 80% or 90% of its room-temperature capacity. But with the heavy current draw of a transmitter at -20°C , that same battery may deliver less than 30% of the capacity than what would be available when transmitting on a warm day.

Another way of looking at this is to say that the greater the capacity of the battery for a given load current, the less degradation you will realize when your teeth are

chattering. This means that with a particular transmit power and duty cycle, your 300 mAh battery pack will suffer far more degradation in cold temperatures than your 1200 mAh pack (assuming they are both made of the same chemistry).

The reduction in battery capacity is aggravated by two other parameters that change for the worse at cold temperatures. As the temperature drops, the battery's internal series resistance increases, which means the voltage will sag more when you transmit. At the same time, the open-cell voltage also drops. This open-cell voltage drop will even be realized with light loads, such as in receive. These two factors, added to the previously mentioned capacity degradation, mean that you can run out of battery voltage well before you fill up the page in your logbook—unless you planned ahead and packed a battery that can withstand the abuse that winter weather offers.

Shelf Life

There is a bit of good news to report when it comes to batteries and cold-weather operating. Believe it or not, there is actu-

Typical Energy Capacity of AA-size Cells at Room and Cold Temperatures

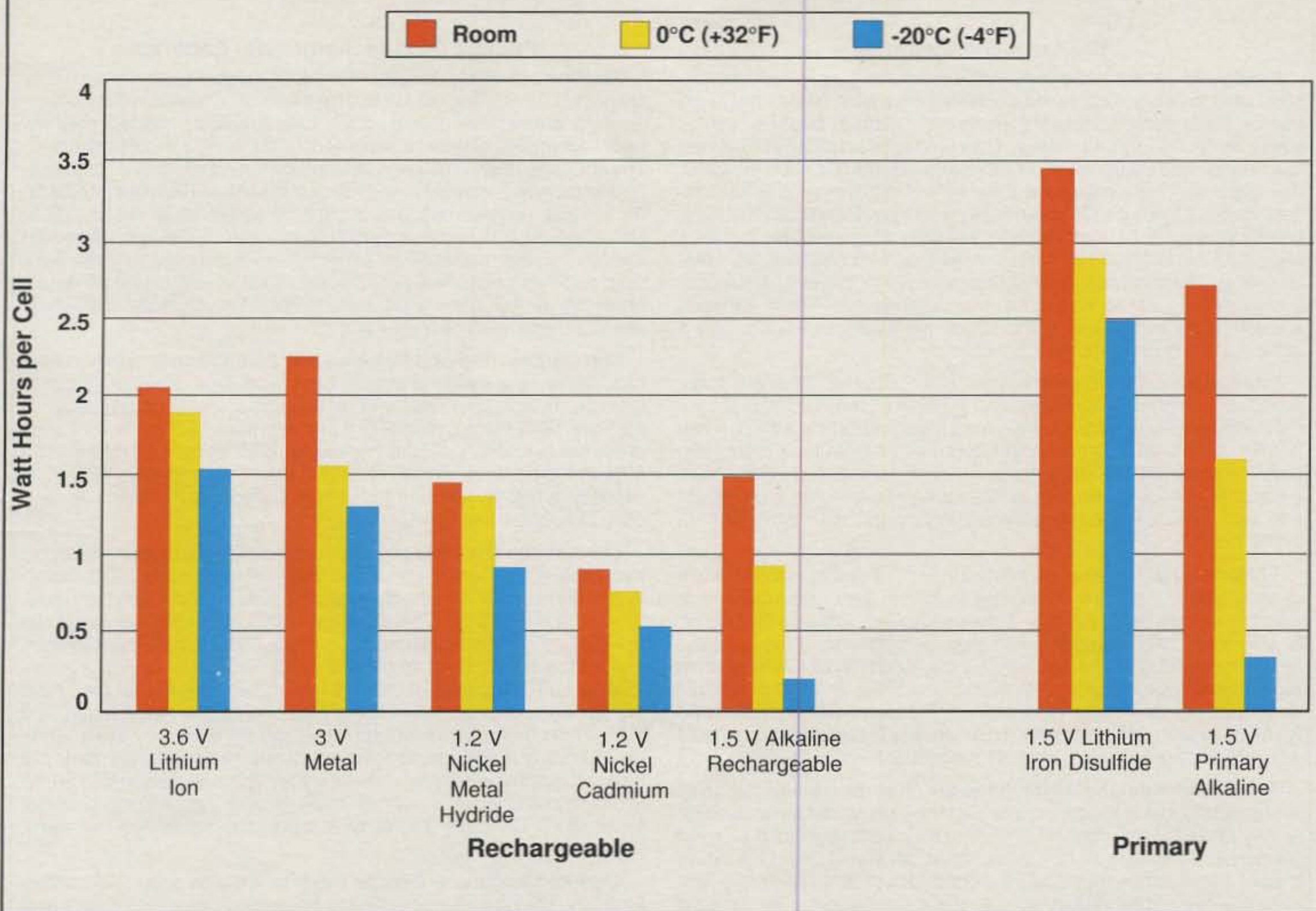


Fig. 2— Different battery chemistries store different amounts of energy. Also, the amount of energy that can be recovered from a battery diminishes as the temperature drops. This chart estimates the typical performance of various chemistries that are available in AA-size cells. A transmit duty cycle of 5% to 10% is assumed in a typical HT application. Although apparently not available in AA packages, 3 V lithium-manganese-dioxide cells will exhibit temperature characteristics similar to lithium iron disulfide. (The capacity is expressed in watt-hours in this chart to accommodate different cell voltages. If you would like to convert the watt-hour rating to the more commonly used mAh units, simply divide the watt-hour rating by the cell voltage, then multiply by 1000.)

ally one battery parameter that improves at cold temperatures—shelf life. Shelf life is a measure of how quickly or slowly a battery will discharge itself when no load is applied. All batteries will discharge themselves when stored in an unused state. However, some types of batteries can lose nearly half their charge in just a couple of months, while others will last five to ten years when stored at room temperature. This self-discharge parameter can be expressed two different ways, either as a percent of energy lost each month due to self-discharge, or as the number of years they will retain about 85% of their capacity when stored at room temperature. (The former is generally used for batteries with shorter shelf-life characteristics, and the latter for those with longer shelf life.) Typically, rechargeable batteries have shorter shelf life than primary bat-

teries. A battery's shelf life can improve by as much as a factor of ten when it is stored at -20°C simply because its self-discharge rate slows down.

Therefore, if you are planning a three-month polar expedition, battery self-discharge is one problem you may not have to worry about! Another way to take advantage of this characteristic on an everyday basis is to identify the batteries you have that exhibit poor shelf life and store them in the refrigerator when they are not in use (see Table I in the "Battery Encyclopedia for Polar Bears" box).

Different Chemistries—Different Characteristics

Battery performance will vary somewhat from one manufacturer to the next and will also vary with different grades of batter-

ies and from one manufacturing lot to the next. However, it is the battery chemistry that tends to have the strongest influence on how the battery will perform. At cold temperatures the performance differences of the various chemistries can become even more dramatic. We can make some general predictions as to what to expect from various battery chemistries, and what to expect when the mercury drops below the freezing mark. Fig. 1, fig. 2, and the information in the "Battery Encyclopedia" later in this article will give you an idea of what to expect from different types of batteries whether you operate from the comfort of your living room or go outside and play in the snow.

As fig. 1 illustrates, not all battery chemistries contain the same amount of energy, nor are they affected the same by cold temperatures. *Primary lithium cells (non-*

Battery Encyclopedia for Polar Bears

Rechargeable Batteries

Lead-Acid batteries are a mainstay in amateur radio communications whenever significant capacity is required. Both sealed-lead-acid (gel cell) and vented-lead-acid (deep-cycle marine) batteries exhibit similar temperature performance. They tend to retain about 95% of their room temperature capacity at 0°C. Once the temperature falls to -20°C, their capacity drops markedly to about 70% of room temperature capacity under light loads and to about 50% under heavy loads. At -40°C the battery may be able to produce almost 50% of its room temperature capacity if the load is light. While vented-lead-acid batteries have better energy-density characteristics than gel cells, both types exhibit poor energy density compared to most other chemistries. These batteries are commonly available in 6 and 12 volt packages, which is simply a series combination of multiple 2 V cells.

Lithium Ion cells are good cold-weather batteries. They are specified down to -20°C, where they tend to retain as much as 80% of their room temperature energy when lightly loaded and as little as 40% when heavily loaded. At 0°C only slight degradation from their room temperature performance will be noted. These 3.6 V cells have good energy density, meaning that they contain a lot of energy for their weight and size, and are becoming increasingly popular in miniature HT applications.*

Lithium Metal batteries generate 3V per cell and are rated for use down to -30°C. They are advertised as having the highest room temperature energy density of any rechargeable cell, although that density advantage may disappear with cold temperatures. When used in temperatures of 0°C, the capacity will degrade to about 70% of room temperature capacity, and at -20°C to about 55%. At -30°C they retain about 40% of room temperature capacity. There have been some safety concerns surrounding the reactive chemistry of this battery; concerns which manufacturers have worked to address.*

Nickel Cadmium (NiCad) batteries are often rated for discharge as low as -20°C and offer respectable performance at cold temperatures. Lightly loaded at 0°C, these 1.2 V cells retain about 95% of their room temperature capacity. At this same temperature and under the heavy load of a transmitter, the capacity drops to about 90%. When the temperature hits -20°C, about 60% of the room temperature capacity remains under transmit-type loads. The situation improves under receiver-type current draws where NiCads may retain up to 80% capacity at -20°C. NiCads can provide up to 40% capacity under light loads at -40°C, but will likely not be able to source enough energy to power a transmitter very well at this temperature. This chemistry exhibits low internal-series resistance and mediocre shelf life.

Nickel Metal Hydride (NiMH) batteries are usually considered useable to -20°C, where they will maintain 90% of their room temperature capacity with a light load and only about 40% capacity with a heavy load. At 0°C the capacity remains above 90% under heavy loads and about 95% lightly loaded. These 1.2 V cells perform well enough at cold temperatures that at least one manufacturer rates these batteries for a low operating temperature of -30°C, although at such a low temperature the battery will provide only limited current. One drawback of this type of battery is poor shelf life.

Rechargeable Alkalines have fairly high internal resistance even at room temperature, which means their voltage will sag significantly if you are trying to transmit more than a fraction of a watt of power (the maximum recommend current is about 400 to 500 mA). At cold temperatures this problem gets noticeably worse, making them a poor choice for serious winter hamming. In cold weather these batteries are best suited for low-current-type applications. Under lightly loaded conditions they maintain about 75% capacity at 0°C and less than 20% at -20°C. With moderate loads, this drops to around 40% at 0°C and less than 10% capacity at -20°C. One attractive feature of these 1.5 V cells is that they exhibit very good shelf life for a rechargeable battery. A drawback of this technology is that they offer only a limited number of charge-discharge cycles.

* Due to special charging and safety concerns, rechargeable lithium batteries are usually only available as part of manufacturer-supplied battery packs.

Primary (Non-rechargeable) Batteries

Alkaline batteries offer a lot of capacity at room temperature if they are not too heavily loaded, but tend to afford only mediocre cold-weather performance. When these 1.5 V cells are lightly loaded, they will retain about 75% of their capacity at 0°C, but as little as 20% at -20°C. The series resistance of these cells increases significantly at cold temperatures, which causes a serious sag in voltage under heavy loads. As a result, an alkaline's useful capacity under heavy loads falls to about 30% at 0°C and less than 10% at -20°C. (The new, improved alkalines on the market seem to provide an advantage over the standard alkalines under heavy-load applications at -20°C.) Alkalines are rather heavy, but have good room temperature capacity, are readily available, and are moderately priced.

Carbon Zinc (General Purpose) and Zinc Chloride (Heavy Duty) batteries are generally not used in transmitter-type applications due to their low current capabilities and low capacity (which is usually between 15% and 40% of the capacity of a primary alkaline). Carbon-zinc cells are usually rated for operation as low as -6°C, where they retain about 40% of their energy. A zinc-chloride battery will maintain 70% of its capacity at 0°C and drop to about 40% capacity at its rated low-operating temperature of -17°C.

Lithium Iron Disulfide cells have impressive cold temperature performance. Under light loads, at 0°C they maintain nearly 100% capacity and fall to only 90% capacity at -20°C. With heavier loads the capacity is more like 75% at 0°C and 55% at -20°C. When the mercury drops to -40°C, these batteries can even retain 60% of their room temperature capacity with light loads and about 30% capacity with a heavy load. A real advantage of primary lithium batteries is that they have high energy densities—containing a lot of energy for their weight and size. While these batteries are rather pricey, there are designed to handle heavy loads and perform well in cold temperatures. Marketed as photographic electronic batteries, they are manufactured in an AA size and produce 1.5 V per cell, making them a drop-in replacement for alkalines. Only one manufacturer makes this chemistry—Eveready. It's their Energizer L91.

Lithium Manganese Dioxide batteries are also good cold weather batteries. They are often specified for operation down to -40°C, although at this temperature the capacity may be only 30% of the room temperature capacity. If lightly loaded at 0°C, these 3 V cells will retain just over 90% of their capacity and have about 85% capacity at -20°C. Under heavy loads an additional 10% to 20% of the capacity will be lost, and there will be some noticeable sag in cell voltage. Often sold as photographic batteries, this chemistry exhibits an exceptional shelf life. Unfortunately, this type of cell does not seem to be available in an AA size.

Centigrade to Fahrenheit Conversion Table

Degrees C	-40	-30	-20	-10	0	+10	+20	+30
Degrees F	-40	-22	-4	14	32	50	68	86

Battery	Typical Shelf Life	°C	°F
Nickel Metal Hydride	2 weeks (30%/mo.)	50	122
Nickel Cadmium	3 weeks (20%/mo.)	45	113
Lithium Ion	6 weeks (10%/mo.)	40	104
Lead Acid	3 months (5%/mo.)	35	95
Lithium Metal	1 year	30	86
Carbon Zinc	3 years	25	77
Zinc Chloride	4 years	20	68
Rechargeable Alkaline	5 years	15	59
Primary Alkaline	5 years	10	50
Lithium Iron Disulfide	10 years	5	41
Lithium Manganese Dioxide	>10 years	0	32
		-5	23
		-10	14
		-15	5
		-20	-4
		-25	-13
		-30	-22
		-35	-31
		-40	-40

Table 1— Typical shelf life to 85% capacity at room temperature, and self-discharge rate.



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SS-12	10	12	1 1/2 x 6 x 9	3.4
SS-18	15	18	1 1/2 x 6 x 9	3.6
SS-25	20	25	2 1/4 x 7 x 9 1/2	4.2
SS-30	25	30	3 1/4 x 7 x 9 1/2	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	2 1/4 x 7 x 9 1/2	4.2
SS-30M*	25	30	3 1/4 x 7 x 9 1/2	5.0



MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3 1/2 x 19 x 9 1/2	6.5
SRM-30	25	30	3 1/2 x 19 x 9 1/2	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3 1/2 x 19 x 9 1/2	6.5
SRM-30M	25	30	3 1/2 x 19 x 9 1/2	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	3 1/2 x 19 x 9 1/2	10.5
SRM-30-2	25	30	3 1/2 x 19 x 9 1/2	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3 1/2 x 19 x 9 1/2	10.5
SRM-30M-2	25	30	3 1/2 x 19 x 9 1/2	11.0



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MODEL SS-10EFJ-98

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- EF JOHNSON 9800 SERIES
- GE MARC SERIES
- 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
- MOTOROLA RADIUS & GM 300
- MOTOROLA RADIUS & GM 300
- UNIDEN SMH1525, SMU4525
- VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

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- SS-18GX
- SS-12EFJ
- SS-18EFJ
- SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
- 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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FT-100
This ultra-compact HF/VHF/UHF 100W Transceiver provides SSB, CW, AM, FM and AFSK coverage of the HF, 6M, 2M and 70 CM bands. Features include 300 memory channels, built-in Electronic Memory Keyer, DSP, IF Shift, IF Noise Blanker, and CTCSS/DCS.



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

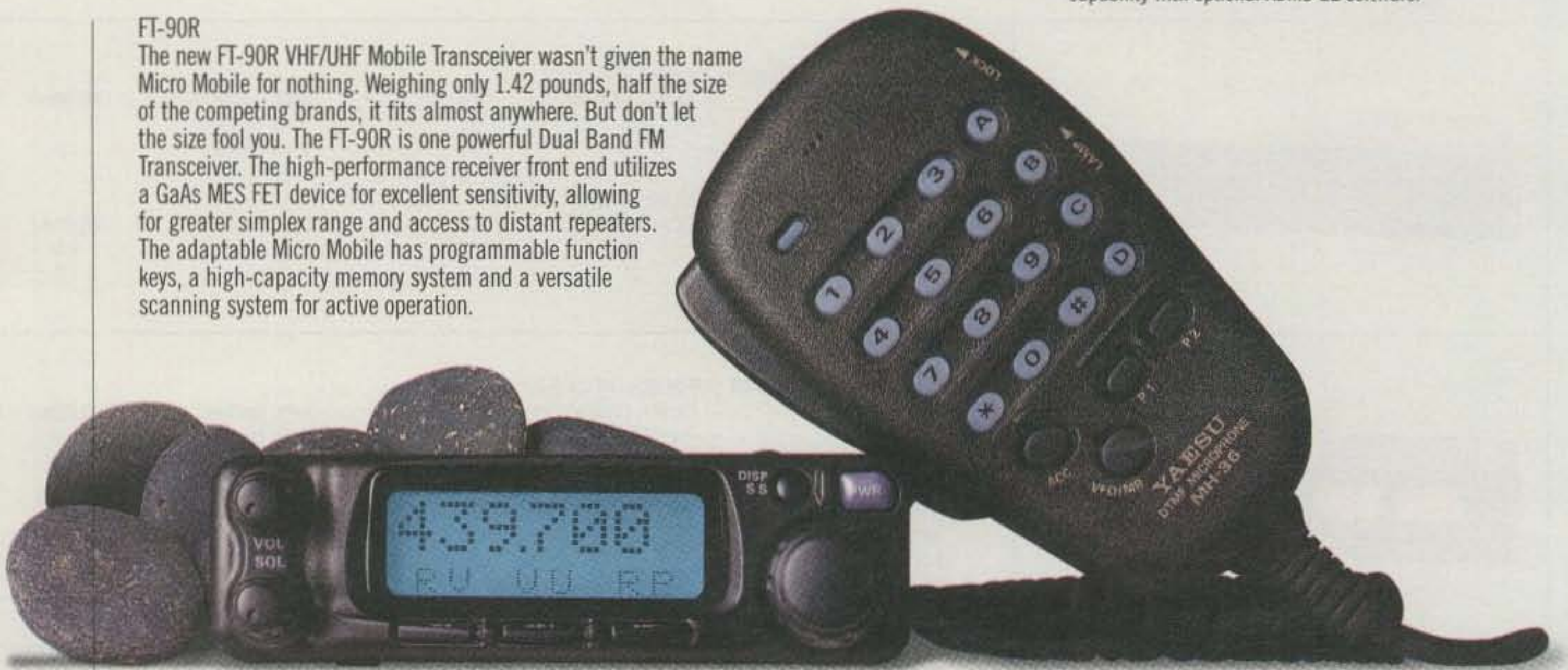


FT-290RII
Ideal for base, vacation, or expedition use, this 25 Watt 144 MHz Multimode Transceiver is outstanding for emergency, travel, or weak-signal DX work. Optional battery pack allows over-the-shoulder portable use for search-and-rescue operation.



FT-2600M
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FT-50RD
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* Cellular Blocked



FT-11R
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FT-411E
The affordable FT-411E is compact and durable. This 5 Watt VHF FM Handheld features a die-cast case, 40 memory channels, 10 DTMF memories, built-in VOX, CTCSS, and multiple scan modes.



FT-23/33R
These ultra-compact, 5 Watt VHF FM Handhelds feature rugged die-cast aluminum cases, 10 memory channels, optional CTCSS, and multiple scan modes. The FT-23R (2M) and the FT-33R (222 MHz) are easy to operate, and give outstanding performance.



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These single-band handhelds are manufactured to MIL STD 810 specifications, featuring either 30 or 99 memories, CTCSS/DCS operation, Dual Watch, and are available in 2.5 Watt or 5 Watt versions, with four keypad options.



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rechargeable) have impressive performance characteristics at cold temperatures as well as at room temperature. They also exhibit another very favorable characteristic: They store a lot of energy *per ounce* at any temperature—a real plus for backpackers. Rechargeable lithiums exhibit good room-temperature energy densities and are also good performers when it comes to reusable batteries in below-freezing temperatures. Cold-weather operators can be thankful that rechargeable lithium-ion batteries are becoming increasingly common in HT applications.

Primary alkaline (non-rechargeable) batteries are popular for summer operation when operators are in need of more capacity than a NiCad pack can offer. However, at cold temperatures their performance can be disappointing, especially under heavy loads. While alkalines lack the energy density of primary lithiums, they sport a more modest price tag and will still provide fair performance down to at least freezing. NiCads and *nickel-metal-hydride* batteries offer surprisingly good cold-weather performance. Lead-acid batteries hold up quite well at temperatures down to freezing, but will offer significantly reduced performance at temperatures well below freezing. Rechargeable alkalines are attractive because they have good shelf life and are reasonably

Battery Tips

Important charging note: While rechargeable batteries may be safely discharged at temperatures well below freezing, many battery manufacturers recommend that charging should be done only at temperatures above freezing. Check the specific charging specifications for your battery before you attempt charging at sub-freezing temperatures. Most battery chemistries will charge with the greatest efficiency at temperatures between 60°F and 80°F (15°C and 27°C).

Don't let a discharged lead-acid battery freeze: The electrolyte in a lead-acid battery (either sealed or vented) loses its "anti-freeze" quality when it is discharged. Be careful not to let a discharged battery go below freezing, or it may burst. Also, unless it is a deep cycle battery, discharging it more than about 5% below its rated voltage in really cold weather can permanently reduce its capacity.

Converting marine battery capacity to amp-hours: The capacity of marine batteries is often rated in terms of minutes of *Reserve Capacity* rather than the more common Amp-hours hams are accustomed to. A rule-of-thumb in converting this value to Amp-hours is to multiply the Reserve Capacity by 0.66. For example, a battery with a 90 minute Reserve Capacity will provide about 59 Amp-hours of capacity in typical amateur use ($0.66 \times 90 = 59.4$).

Energy recovery: Just because the battery loses capacity when it gets cold doesn't mean that the energy is lost forever. You can recover most of the lost energy by warming up the battery. Put the battery in the sun, slip it inside your jacket, or keep it in your sleeping bag so it's ready to go for your early morning schedule. Be aware that placing a warm battery inside a cold HT, however, can induce condensation problems inside the radio.

Select the most forgiving radio: One trick to allow yourself to operate longer when the battery voltage sags is to select a radio that operates over a fairly wide voltage range. For example, if your HT can operate from 6 V to 13 V, and you clip on a 12 V battery pack, you can still be functional when the battery sags down to 6 V, which is a 50% drop in

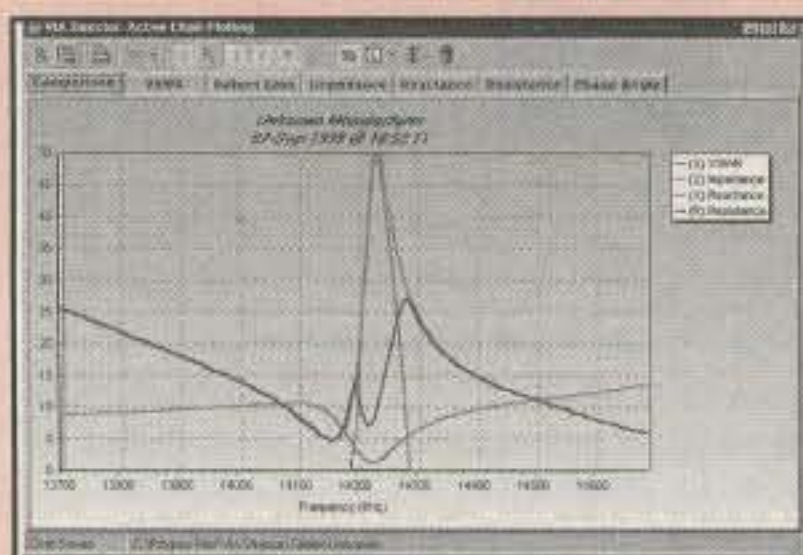
voltage. If, though, you clip a 7.2 V pack to a radio which operates only from 6 V to 8 V, the radio will quit operating with only a 17% sag in voltage.

What about hot temperature performance? With most chemistries there will be about a 5% to 10% increase in capacity as the temperature climbs up to about 40°C, although carbon-zinc cells may increase by as much as 40%, while lithium-iron-disulfide cells show no appreciable increase. As the temperature rises much above 40°C, the capacity usually will either remain flat or start to decrease.

Backcountry batteries: There is perhaps no better time to enjoy the spectacular beauty of the wilderness than when Mother Nature transforms it into a winter wonderland. Each winter NØIET and I, along with our packdogs, answer the call of the wild and embark on a backpacking/snowshoeing trip into the Colorado Rockies (see "Hamming from an Igloo," *QST*, March 1999, page 28). What type of batteries do we take with us into the backcountry? A mix of chemistries has served us well. Our HTs are normally powered with freshly charged NiCads. If the NiCads give out, we have a spare battery pack loaded with either primary alkalines or 1.5 V primary lithiums, with the latter being preferred in the coldest temperatures. The QRP HF station is powered off a 2.2 Ah gel-cell. The degraded capacity of this battery can become a serious limitation with regard to HF operating time when the temperature drops below 0°F. (I'd like to carry a much larger gel cell, but Tobie, my packdog who carries it, doesn't think that's such a good idea!)

Public Service: Battery capacity is an important part of our ability to provide public service communications, especially in emergencies. Except for those hams who live in the sunny south, we have no guarantee that the next severe storm or other disaster will occur in above-freezing temperatures. Understanding our capabilities and the limitations of our batteries can only make us better prepared to provide emergency communications when we have to battle with the freezing elements in our public-service role.

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priced. However, they exhibit significant performance degradation when the temperature drops to freezing or below. Regardless of the chemistry, the key to getting the most out of your batteries, especially in cold weather, is to load them as lightly as possible or use the highest capacity battery you are willing to carry.

Transceivers are not the only items that tax the capabilities of batteries. Flashlights, cameras, lap-top computers, and GPS receivers also place significant loads on their batteries and yield disappointing performance when the battery voltage sags. With these items you generally have little control over how much current they consume, other than perhaps the ability to turn off any backlighting for the displays or minimizing the use of the camera's flash or lighting. The best thing

you can do to compensate for the ill effects of cold weather with these devices is limit your usage time or keep the batteries warm.

Go Ahead—Play in the Snow

If you dislike the heat, humidity, mosquitoes, and chiggers that accompany summer operating, give cold-weather operating a try. A fresh layer of snow can really bring out the beauty of Mother Nature. Enjoy it. Do your homework and select a battery that can give you the desired performance. Then, when a fresh layer of snow transforms the outdoors into a winter wonderland, grab your radio, battery, and antenna, and your snowshoes, skis, or ice-fishing pole, and head for the great outdoors. ■

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

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AL-1500
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Suggested Retail
TrueLegalLimit™
Ameritron's
most powerful
amplifier uses

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AL-1200
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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, 18 1/2 D x 17 W x 10 H in.

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\$2295
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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, 18 1/2 D x 17 W x 10 H inches.

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Results of the 1999 CQ WW DX 160 Meter Contests

BY DAVID L. THOMPSON*, K4JRB

Activity was down somewhat on both modes this year, and this was reflected in the number of stations on the master log. Sunspots are up, so many are active on the higher frequency bands and will return when sunspots drop and 160 conditions peak again.

The UA2 (Kaliningrad) Contest Club traveled to 3V8BB for the 1999 SSB contest and turned in the high score. This is a first for an SSB entry, and the UA2 gang took home the world high SSB multi-operator plaque.

The master CW log showed 4487 different stations, down 3% from 1998. The master SSB log contained 4490 calls, or some 112 calls less than in 1998. No entry came close to 1 million points or breaking the existing QSO total of well over 1700 contacts. However, for both modes the band was full of stations, and many DX contacts between continents were made on both modes. There were 133 countries on CW and 131 on SSB, so the possibility of someone working DXCC during the contests is within reach. This is the ideal chance for the low power and QRP types to add to the DXCC count and finish up WAS. In fact, more stations can be worked on 160 meters during the two contest weekends than on any other weekend during the year. Try your luck in 2000 and be surprised!

On CW, VA3DX operated 8P9DX once again. Glenn's patience paid off with the top CW single operator score. KE3Q operated at W3LPL's QTH as W3AO and came in with the top USA score. VE3EJ again came away with the top Canadian score. The Croatian DX Club, using the call 9A1A, finally made it to the top as world high CW multi-operator champions. The gang at W2GD edged out SECC entry W8JI for the top USA multi-operator spot. There were several CW close races for state or country winners, with JH4UYB just nosing out JH5FXP for the Japan plaque. DJ7AA beat DK1NO by a handful of QSOs for the top German multi-operator spot.

Top CW QSO count (1304) was recorded at the W1BB multi-op effort at K1ZM's Cape Cod QTH. Another of the UA2 contest clubs turned in the top CW DXCC



CW world single operator winner Glenn, 8P9DX, shown here at the keyboard of his modern station.

count (72) using RW2F. Multi-operator winner 9A1A tied RW2F with 72 countries. There were several new names on 1999 plaques, and this is always a welcome sight. WK3I was the world high QRP entry, and ZF2MO was the top low power entry. KH6DX operated mobile on the state lines of North and South Dakota. Several logs were corrected to show only one contact, although you could count two multipliers. He made over 500 QSOs in one night.

On SSB, 3V8BB was the runaway high score. VE3BY recorded the high single operator score and was tops in Canada. Since he could only win one plaque, VE5RA won the Canada plaque. Bob, W4MYA, beat out Dana, W3TS, for the top USA score, and ON4AFZ again was the top European score (and DX, too) from OT9T at ON4UN. GJ2D was the highest scoring multi-operator outside of the 3V8BB effort. Kudos to XE1RCS for the excellent multi-operator score and to N8TR with the top USA multi-operator effort.

Only two stations made over 1000 QSOs this year: UU7J (1073) and N8TR (1005). 3V8BB worked 59 DXCC counters plus 25 states and provinces to aid in their world high effort. Close races on SSB

included Russia single operator and Ohio, where multi-ops N8TR and K8MK battled not only for Ohio leadership, but for the entire USA as well. S59D was the world high QRP winner, and SV8CS was the world high low power entry as well as sixth place world high DX. WA1LNP was the USA low power winner on both modes.

The Frankford Radio Club nudged out the Potomac Valley Radio Club to repeat as the club winner. Fifteen clubs topped 1 million points even in this low year for 160. The UA2 Contest Club again led all the clubs in score per entry. Several clubs came up one entry short of the three necessary to be listed. Maybe next year!

The checkers had fewer complaints about logging this year mainly due to the number of e-mail and electronic logs. DX stations do need to double-check the state or province logged as several lost hundreds of valuable points by entering the wrong location. Please make sure you send the correct logs (ASCII or text format)—especially the dupe log, which is a list of all stations worked in alpha sort order. This part of the log is used as the basis for the master logs and for cross-checking purposes.

*4166 Mill Stone Court, Norcross, GA 30092

PLAQUE WINNERS AND DONORS

SINGLE OPERATOR CW

WORLD BY K5AAD (W5MBB Memorial): Winner Glenn Wyant, 8P9DX (VA3DX).
USA BY K4TEA: Winner National Press Radio Club, W3AO (KE3Q operator at W3LPL).
CANADA BY K2UFT: Winner John Sluymer, VE3EJ.
ZONE 3 BY N5IA: Winner Ken Keeler, N6RO.
ZONE 4 BY K4WA: Winner Jerry Rosalius, WB9Z.
ZONE 5 BY XXX: Winner Steve Sussman, W3BGN.
AFRICA BY K4MZW: No Entry.
ASIA BY K4SX: Winner Ivo Pezer, C4A (5B4ADA).
EUROPE BY K9UWA: Winner Jerzy Smoczy, SP3GEM.
OCEANIA BY K4IS: Winner Jack Wheeler, KH6CC.
SOUTH AMERICA BY W4NU (W4UUH Memorial): No Qualifier.
JAPAN BY W4ZV (JA1XAF Memorial): Winner Masaki Okano, JH4UYB.
NORTH AMERICA BY CQ (N4IN Memorial): Winner Alexander A. Aimette, V47KP (W2OX).

SSB

WORLD BY K5AAD (W5MBB Memorial): Winner Carleton Styan, VE3BY.
USA BY K4JRB: Winner Robert Morris, W4MYA.
CANADA BY W0ETC: Winner Doug Renwick, VE5RA.
ZONE 3 BY N4TMW: Winner Radio Club N7GP (N5IA operator).
ZONE 4 BY W4UCK: Winner Don Kerouac, K9NR.
ZONE 5 BY K4ODL: Winner Dana Michael, W3TS.
AFRICA BY WB4ZNH: Winner Antonio Perez Pino, EA8AN.
ASIA BY AH2BE: Winner Spyros Stavrinids, H22H (5B4MF).
EUROPE BY N4NX: Winner John Devoldere, OT9T (ON4AFZ operator at ON4UN).
OCEANIA BY N4XMX: Winner Jack Wheeler, KH6CC.
SOUTH AMERICA BY K4EA: No Qualifier.
NORTH AMERICA BY CQ (N4IN Memorial): Winner Alexander A. Aimette, V47KP (W2OX).

MULTI-OPERATOR CW

WORLD BY N4RJ: Winner Croatian DX Club 9A1A.
USA BY K9UWA: Winner John M. Crovelli, W2GD.
Zone 3 BY 4X4NJ: Winner Horned Toad Acres Wireless Association, N7KQ.

SSB

WORLD BY SOUTHEASTERN DX CLUB: Winner Igor Avdeev & UA2 Contest Club, at 3V8BB.
USA BY WB9Z: Winner Peter Michaelis, N8TR.
Zone 3 by 4X4NJ: Winner Horned Toad Acres Wireless Association, N7KQ.



QRP entry W7DRA with his ARC-5 WW II gear. He made 81 QSOs with this setup.



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SINGLE OPERATOR

USA CW		USA SSB	
W3AO	342,805	W4MYA	192,015
W3BGN	301,990	W3TS	186,354
N2NT	291,300	K9NR	127,443
WB9Z	277,032	KZ5MM	126,588
W4MYA	258,261	KD9SV	125,852
K8CC	251,433	K8CC	124,416
K4VX	243,695	W0ETC	113,664
KV0Q	242,080	AJ3K	112,536
W3GH	237,990	AA1BU	107,163
KE9I	224,460	N3OUC	103,280

VE CW		VE SSB	
VE3EJ	540,480	VE3BY	359,556
VE5RA	184,000	VE5RA	130,113
VE3PN	183,312	VE3PN	93,456
VE3CSK	158,480	VE6JY	83,752
VE3DO	149,250	VE4OV	59,400

QRP CW		QRP SSB	
WK3I	87,080	S59D	34,003
LY2FE	69,880	YZ7ED	27,120
N0TT	62,481	W3GCG	21,666
OM0TT	44,536	LY2FE	18,513
UY5VA	39,195	VY2MGY/VE3	18,009

DX CW		DX SSB	
8P9DX	770,526	OT9T	325,688
SP3GEM	697,413	I4JMY	274,008
C4A	647,144	S51F	210,373
SP7GIQ	522,816	LY5A	203,557
OZ7YY	488,448	V47KP	194,893
F6BEE	483,066	SV8CS	185,984
4X4NJ	482,977	YZ6A	172,236
M2D	456,855	S57M	128,180
V47KP	455,712	IV3OWC	122,280
DL1AUZ	445,075	OZ3SK	114,855

Low Power CW		Low Power SSB	
ZF2MO	237,196	SV8CS	185,984
UN7CE	207,350	WA1LNP	98,325
EU1AZ	188,682	K9XD	88,288
LY1DD	179,910	DL7VRO	81,141
WA1LNP	169,176	UA4UDF	77,448

MULTI-OPERATOR

CW		SSB	
9A1A	591,052	3V8BB	842,460
DJ7AA	573,510	GJ2D	261,750
W2GD	572,112	UU7J	255,702
W8JI	567,865	XE1RCS	241,488
DK1NO	557,333	RW2F	237,832
RW2F	553,504	LX9UN	228,671
W1BB	546,576	N8TR	218,956
OM7M	539,451	VE3DC	199,584
IK4MTF	537,380	K8MK	196,964
OK5W	510,800	4L0G	180,960

The 2000 CQ WW 160 Contests will be the last full weekend in January for CW and the last full weekend in February for SSB. The dates are CW 2200Z January 28 to 1600Z January 30, and SSB 2200Z February 25 to 1600Z February 27. Logs may be submitted in handwritten or electronic form (on a 3.5-inch diskette or via e-mail). The logs requested include the summary sheet, log, and dupe list (ASCII only). Please put the summary sheet at the front of the log.

The 2000 deadlines for sending in the logs are February 28st for CW and March 31st for SSB. The exception is both logs may be submitted together by March 31st.

GUEST OPERATORS

CW

Call	Operator	LY3ID	LY2BIL	W3AO	KE3Q
3Z4N	SP4NI	LY7A	LYR 346	W5OT	WA5TWL
8P9DX	VA3DX	LZ0A	LZ2UU	W6RKC	AB1U
8Q7AC	DJ4KW	LZ1DFP	OK1DF	W7RM	K17Y
9M6NA	JE1JKL	LZ5Z	LZ1UQ	W9IOP	W3TMZ
C4A	5B4ADA	M2D	G4BYG	W9VT	K9PMV
DL0DX	DK2OY	M4T	G0VQR	WC4CW	KS4DU
HG1S	HA1TJ	M5X	G3KKQ	XX9TRR	OH2PM
HG5M	HA5MY	N7GP	WA6CDR	YU1AVV	YU1SB
K0CAT	K9WIE	SN7N	SP7NMW	YU1AST	YZ1EA
K2UG	WA2JQK	UT7I	UT2IO	YZ6A	Veka
K3VOA	K3NJ	V47KP	W2OX	ZF2CM	K0BJ
K4VX	N9JF	VE3TDG	VA3YL	ZF2MO	KM9D
K8CC	W8MJ	VP2EJ	W5SJ		
LX9DIG	DL2JRM	W1QS/4	AA4NN		

SSB

Call	Operator	K8CC	W8MJ	OT9T	ON4AFZ
4N800H	YU1UA	LY5A	LY3MN	W1BB	K1VV
4U1WB	AJ3M	LY7A	LYR 346	W3USS	K3ZJ
C4A	9A3A	LZ1DFP	OK1DF	YU1AST	YZ1EA
H22H	5B4MF	M4T	G0VQR	YZ6A	Veka
IK2ZVU	I2OKW	N7GP	N5IA		

Send all logs to the 160 Contest Director David L. Thompson, K4JRB, 4166 Mill Stone Court, Norcross, Georgia 30092 USA. The e-mail address is <CQ160@contesting.com>. 73, Dave, K4JRB

CW Soapbox W/VE

Could not hear the weaker stations due to AM radio station getting into the receiver . . . AA1SU. Thanks again to the U.S. Coast Guard at Sandy Hook for operating permission . . . W2GD. The question was how to log KH6DX/M0 . . . W8JI. Seems everybody was resting up for the super bowl . . . WY3T. Got called back to work about an hour into the contest. Lost two hours of prime time . . . KD9SV. Kudos to K8AEM for keeping the food coming . . . K8XXX. Had to cut the contest short to head for Christmas Island . . . WB9Z. Highlight was working four JA's. The first time for us on 160 . . . VE5RI. No Europe, Africa, or South America this year . . . W6UE (W4EF op.). New beverages work great and were cheap. No so the land to put them on . . . K5RX. We had trouble putting up all the beverages, but they were worth it . . . K0XG.

Nice to hear Europe early both nights . . . AA4S. Line noise finally eased up to allow me to hear S9 static on Sunday morning . . . N4BP. Happy to break 400 Q's this year . . . VE7CPN/W4. Good conditions on Friday. Even better on Saturday . . . WA1LNP. We need to fix the receiver on SSB, too . . . N7KQ. It was fun doing a quick 6 hour "chipshot" effort . . . K3UA. This is my favorite contest . . . KV0Q. Made more contacts this year but had 15 fewer multipliers . . . W0AH. Used an inverted-L with 200 feet of chicken wire as radials . . . K4OAG.

CW Soapbox DX

We had a problem with a 20 KW BC station less than 2 km away. Heard him all the way to 10 meters without the filters . . . PIACOM. Missed a few Asia mults. Maybe better luck next year . . . DJ7AA. Better conditions for us this year . . . OM7M. Best DX was W8JI. No W1, 2, 3 heard this year . . . JH4UYB. The rules have a built-in bias for Europe and North America. (You mean the hours?—ed.) . . . 4X4NJ. Where was Africa? Poor conditions to North America . . . SV1NA. Had a fight with a local European multi-operator station operating on 1833 kHz (Please stay off 1833 in the DX window!—ed.) . . . OZ7YY. Also participated

in the RSGB 7 MHz Contest on Saturday. I am a glut-ton for punishment . . . G3HZL. Worked four in Bosnia, but only one other GW . . . GW3JXN.

Stayed for 45 minutes . . . S57AW. Hard to work stations with the big guns splattering all over . . . F5RAB. I use a "long wire" all of 41 meters long . . . OM4DN. Local S9+ noise made working very hard. Will try to locate before next time . . . PA0IJM. Nick, UA2FJ, helped me organize the operation from his company's 50 meter tower . . . UA2FZ. Sorry I don't have a PC . . . RW4PL. 8P9DX was number 96 on 160 for me . . . LZ3AB. Thrilled to work KH2/K4SXT. My highest QSO total in 15 years of operating the contest . . . M2D (op. G4BYG). With low power and legal band only 20 kHz (1830 to 1850) it's hard to contest on 160 . . . ON6TJ. Conditions right except for U.S. contacts; obviously a change of location is the only solution . . . S53R.

SSB Soapbox W/VE

Operated from W9LT's again this year . . . K8OQL. First time I tried to submit a computer disk for a log. Used an older version of CT . . . N3BUD. The scary part is remembering you worked stations without having to check the computer . . . WY3T. Thanks to all the patient stations who helped us muddle through noise levels rivaling summer levels of +20 dB . . . KS4YT. Thanks to YCCC "coach" K1MV . . . N1RLI. Operated at N2ZX . . . K2YR. N2ORM's first 160 contest . . . KN2T and the gang at N2ORM. Without the EWE's I would not have been able to hear most stations . . . K3IXD. Had the flu bug so only operated 9 hours . . . AA1BU. No voice keyers please . . . K4UZ. First time to have European's call me . . . NC4NC. Worked 2 new countries . . . N2XTX. Where were Montana and North Dakota? . . . AA4MM.

Have not figured out how to produce the diskette files yet . . . K2UOP. Could not believe Georgia was my last mult . . . W4DMB. It's been over 15 years since I had a 160 antenna . . . K2FR. My first ever contacts on 160 . . . WA3RBK. Surprised to hear EA8AN and DK6WL calling me through the crashes . . . K5RX. Endless CQs with no answers and requests to "say again." Such is the plight of low power on 160 SSB . . . W5CWQ. Static Saturday night was too much for me . . . N4UH. My first try at QRP . . . N5KB. Amp died the day before the contest . . . W4HJ. Did not plan on getting on, but put up a low 160 dipole and worked 300 stations Saturday night . . . KB3AUG. High point was working W1BB and P43P . . . W9LYN. Highlight was working GJ2D . . . N7GP (N5IA op.). This contest

is still the best . . . W0ETC. Worked 20 Europeans in 20 minutes . . . N8TR. We need to fix the receiver . . . N7KQ.

Used my tri-bander with coax shorted into a tuner . . . KS7T. Good conditions into the Midwest . . . W7JXU. My run frequency was grabbed by high-power stations several times . . . N8II. Worked KH7R with 2 watts . . . NQ7Q/QRP. Worked EA8ZS on SSB when I never could get through on CW . . . K6SE. Worked Hawaii and New York within 20 minutes . . . N6SNO/M. Will Have to get better antennas . . . VE4RP. Small loop let me dig stations out of the mud . . . VO1NO/VE1. One day I will work Mississippi in the contest . . . VE3PN. Worked KH6 for my final WAS state . . . VE4OV.

SSB Soapbox DX

My log is sent to you as I wanted to confirm someone from Rhodes island was really active . . . SV5AZP. S5 noise bothered us the entire contest . . . 3V8BB. Often the competition was trying to win the splatter award not the contest . . . OM7M. We found 2 hour shifts

worked best . . . PA4WM. We operated from the race-course on the Island of Jersey . . . GJ2D. Where have all the countries gone? . . . G3NAS. No propagation . . . KH6CC. Hard to work with non-resonant antenna. VE1ZZ and 3V8BB booming in but no QSO . . . G0TMN. Nice contest, but poor propagation . . . ES5RIM. Too much work on the weekend means less QSOs . . . DL7MAE. It's not easy with a mobile whip . . . G4NXG/M. I got on for one contact and stayed for 45 minutes . . . S57AW. Hard to work stations with the big guns splattering all over . . . F5RAB. I use a "long wire" all of 41 meters long . . . OM4DN. Local S9+ noise made working very hard. Will try to locate before next time . . . PA0IJM. Only a few weak European signals . . . VK3IO. Double beverages on Europe. Got 59+ SWL from Japan . . . XE1RCS. Heard many Stateside, Canada, and Caribbean stations but few answers . . . DL8PC.

Station Operators CW Multi-Op

4L0G: 4L2M, 4L1DA, 4L34, 4L6Z. 4N800H: YU1UA, YU1RA. 9A1A: 9A5W, 9A3GW, 9A6A, 9A7R, 9A3NR, 9A9A. 9A7A: 9A3TR, 9A4RX,

9A4BT, 9A6DM, 9A8A. AA3B & PACKET. BT1WW: OH2BH, BA1AB, BA1OK. DF0RU: DL7AU, DL7UBA. DJ5CL & DL6RAI. DJ6TK & PACKET. DJ7AA & DK7YY, DL3DXX, DL8WPX. DK0IW: DF9MV, DL6KO, DL9CHR, DJ9WH, DL1HPJ. DK1II & DJ7MG, DL5EBE. DK1NO & DL1IAO, DL2CC. DL0HVL: DL1RNE, DL2RYL. DL2MDZ & PACKET. DL5RBK & DL5RBW, DJ5MN, DK5MV. EA40A & EA4BIN, EA4AQ, EA4XA, EA4BHK, EA4DAT, EA4BCR. EA5BY & EA5EU, EA5FD, EA5GRV, EA5KW, EA5SM.

G3VGG/P: G4AHK, G3RLF, G4AAL, G3TOD, G3MRC. HA8KAZ: HA8PW, HA8LLK, HA8PG, HA8MT. HB9AA: HB9ARF, HB9DCM. HB9DBC & HB9AFI, HB9CGL, HB9IJC. HB9LF: HB9CEY, HB9DNK, HB9EAZ, HB9EBB, HB9ECV, HB9CRV. HG5A: HA5IW, HA5OM, HA5WB, HA6GK, HA5CCC, HA5BWJ, HA5CXC. HG6N: HA6ND, HA6NY, HA6PX. HG6V: HA6FQ, HA6WX, HA6IAB. IK4MTF & IK2QEI, IK4UPB. JA0ZRY: 7K1DBH, 7L1FOH, JP3KRV, JQ1PPX, JR0BOD, JS3JSB. JK1GKG & PACKET. K0KX: K0MX, KT0R, K0OB. K0LIR: AA0A, WA0IYY, KI9A, KG0KP, WB0IUN. K0XG & K9WA, NN9K, KE0FT. K1KI & PACKET.

K2FL & PACKET. K20WE & PACKET. K3ATO & PACKET. K3CP & PACKET. K3DI & PACKET. K3JGJ & PACKET. K3MD & N3PUR. K3NZ & PACKET. K300 & PACKET. K3WW & PACKET. K4HA & W2XL. K4UEE & PACKET. K8MK & N8VW, WR8C. K8XXX: N8CC, NU8Z, K8AQM, K8BCO, K8BK, W8MC, K8AEM, K8JJC. K9BG & PACKET. K9NR & K9CS, AK9F. KB7N & N7VMV. KC1F & PACKET. KD9SV & KA9A, K9LA, KC9LA. KE3VN & PACKET. KH7R & KH6ND, AH6OZ, KH7U, AH7R, KV4T & K54YT. K0SX & KJ0G. LA1K: Operators. LA8W: LA4DCA,



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UA2 CONTEST CLUB.....	2,959,988	YU CONTEST CLUB.....	321,813
SLOVENIAN CONTEST CLUB.....	2,263,701	N. CALIF. CONTEST CLUB.....	315,089
BAVARIAN CONTEST CLUB.....	2,116,639	GAVARIAN DX GROUP.....	291,714
YANKEE CLIPPER CONTEST CLUB.....	2,112,602	RUSSIAN CONTEST CLUB.....	282,601
SOC. OF MIDWEST CONTESTERS.....	1,986,596	DAUBERVILLE DX ASSN.....	279,232
CROATIAN CONTEST CLUB.....	1,595,133	MILE HIGH DX ASSN.....	262,525
RHEIN RHUR DX ASSN.....	1,871,043	MINNESOTA WIRELESS ASSN.....	261,961
CONTEST CLUB FINLAND.....	1,829,499	LYNX (SPAIN).....	252,762
NORTH COAST CONTESTERS.....	1,699,063	FLORIDA CONTEST GROUP.....	225,368
SOUTH EAST CONTEST CLUB.....	1,450,450	OKLAMOMA DX ASSN.....	193,055
MAD RIVER RADIO CLUB.....	1,295,261	SO. CALIF CONTEST CLUB.....	171,139
MARCONI CONTEST CLUB (ITALY).....	1,128,768	ROCHESTER DX ASSOCIATION.....	164,482
KTU RADIO CLUB (LY).....	1,100,345	CAROLINA DX ASSOCIATION.....	163,886
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HAMILTON ARC (CANADA).....	480,488	HUDSON VALLEY CONTESTERS.....	73,844
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Station Operators SSB Multi-Op

3V8BB: UA2FB, UA2FF, UA2FZ, RA2FW. 4L0G: 4L1DA, 4L2M. AA4V & PACKET. CS1A: CT1DXQ, CT1FAC, CT2FJN, CT2FVL. DH1HB & PACKET. DK0IW: DL5MFL, DH0MCA, DJ6CZ, DL1GEO, DL1HPJ. DL2DBH & DJ9DZ. EA1EEY & EA1CS, EA1DZW, EA1CUB, EA1BVP, EA1BXW. G6YB/P: G3XSV, G3TKF, G0WKW, G7ORR. GJ2D: G3SJJ, G3SVL, G3UEG, G7TAJ, GJ4CBQ, GJ0NYG. HB9CXZ & HB9OCR, HB9BLQ, HB9FAQ. HB9FBO & HB9BYT, HB9BYU, HB9DOM, HB9OCR, HB9FAW, HB9FBL, HE9EEX, HE9ZHA. HG1S: HA1DAC, HA1DAE. I5JVA & I5VXG. IT9EQO & IT9NJE, IT9CHU. K0XG & NN9K, K9WA, K2DRH, K80KRO. K2FL & PACKET. K2OWE & WK2G. K2YR & N2ZX. K3DI & PACKET. K3IXD & PACKET. K3KO & PACKET. K3MM & PACKET. K3NZ & PACKET. K3OO & KB3CLQ. K3VDA: K3NJ, K1HTV.

K3WW & PACKET. K4UZ & KB4IJJ. K7UHF: WB7VVD, KC7AED, KB7VCO, N7VUB, KC7PCV, AB7QC. K8MK & N8VW, KU8E, W8ZD, WR8C. KB3AUG & PACKET. KB3TS & PACKET. KE0FT & KF9TL. KF4ZR & KE4OAR. KH7R & KH6ND, ND3A. KL7JJB & AL7L. KS4YT & KV4T. KT10 & K1MV, W1SDR, N1AO. LX9UN: LX1KC, LX1UN, LX1RQ, LX1HD, LX1AQ. LZ9A: LZ2CJ, LZ2DF, LZ2JE. N0KOV & WB0LBF, N0RWB, N0UJQ, WB0SRP, WB0YIX, WB0ZLV. N2ORM & W2MF, WJ2D, KN2T. N2VW & PACKET. N2WM & KB2LHH, N2ATE. N6SNO/M & K6OM. N7KQ & W7CPA, W7GNP, K7OX, WB7QGN, KJ7TX. N8TR & WB8K, N8Z, KF8UN, W8BIN, N8DMM.

NS7K & NS7K, NS7B, KB7RUQ, KC0PA, N6GDS. OK1KCF: OPERATORS. OM7M: OM5RW, OM2XW, OM3TZQ, OM3TPF, OM5ZW. PA4WM & PA3GCV. RW2F: RA2FA, RN2FA, UA2FM. RZ9AWW: RA9ASA, RA9ASC, RA9AUN. UU7J: UU4JMG, UU8JK, UU0JM. VE2UMS: VE2FAB, VA2FRU. VE3DC: VA3YO, VE3AHQ, VE3BK/VE3OZY, VE3DNN, VE3FBO, VE3OCD, VE3OCY, VE3OZP, VE3SS, VE3STT, VE3VMO. VE4ZK & VE4KR, VE4WG, VE4UD, VE4SY. VE6AO: VE6EX, VE6KC, VE6RTL, VE6JKZ, VE6NJK, VE6WSI. WBJH: KB0RCS, N0MR, N0PEY, WB0VHF. W1GD & PACKET. W1TO & PACKET. W2GG & PACKET. W4CN: W4MWH, K4IU, W4OKY, W4DES, K4WW, N4UL. W6YRA: WA6AYI, WA7WYE, KU6T. W7II & KJ7TH, KW7N, N7LB. WA1RR: KB1LN, KA1VMG. WB0O & WN9O, W9IU. WD5R & N5ECT. WM9M & WD8LLR. WY3T & KA3PVA. XE1RCS: XE1JG, XE1KK, XE1ME, XE1VIC, XE1YAW, XE1YJY.

(Continued on page 88)

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Antennas and Towers

This month W8FX continues his archaeological expedition through some of the classic names in amateur radio equipment history, plus gives buying and restoration tips and sources of more information on the gear of yesteryear.

Classic Jurassics—Part II

BY KARL T. THURBER, JR.*, W8FX

NOSTALGIA

Last month we covered classic receivers and some of the history of the companies that produced them. We also began on the journey through classic transmitters and their manufacturers. Now we continue our coverage of transmitters and also provide radio rehabilitation considerations, plus resources for vintage radio and electronics equipment, websites for more info, and sources of manuals and service documentation.

Classic Transmitters

E. F. Johnson Co. The E. F. Johnson Company of Waseca, Minnesota, was founded by Edgar F. Johnson and his wife Ethel in 1923; they initially sold and later manufactured radio components. Their claim to fame was the superb Viking series of transmitters and linear amplifiers produced beginning in 1949.

Reportedly, between 1949 and 1966 the Johnson factory produced, in kit or wired form, more than 53,000 rigs, mostly transmitters. First off the production line were the Viking I and II. Later on came the Viking Ranger, Valiant, Adventurer, Navigator, Pacemaker, Courier, Thunderbolt, and about a dozen other highly regarded transmitters, in addition to many ham-shack accessories.

If you flip open almost any *CQ* or *QST* magazine from the 1950s and early '60s, you'll likely find a big Johnson equipment ad. However, by the early 1960s the solid-state, SSB era was dawning in the amateur market, and Johnson didn't get aboard fast enough. Company management abandoned amateurs and concentrated on the burgeoning CB and land-mobile communications markets.

E. F. Johnson no longer is an amateur radio supplier, but the respected Viking name was taken over in the 1970s by the William M. Nye Company, and several Johnson items (but not the kits) were continued by Nye. Many Johnson rigs still are in service today, as are Johnson's best known accessories, the Viking Match Box and Kilowatt Match Box antenna tuners.

*289 Poplar Drive, Millbrook, AL 36054-1674



World Radio Laboratories (WRL) was known for big, heavy gear, which included the massive Globe Champion and Globe King series. The relatively lightweight, 90 watt Model 90 Globe Chief, circa 1956–1957, is shown here. (Photo by Jim Hanlon, W8KGI, via Electric Radio magazine)

Sideband Engineers (SBE). Sideband Engineers (SBE) was founded by Faust Gonsett, W6VR, in 1962 after he sold Gonset (see Part I). SBE was known for its line of very small, mostly solid-state transceivers, the SB33 and the SB34. These rigs contributed greatly to amateur radio SSB development in the 1960s.

The company later introduced the LA line of amateur linear amplifiers, SB1-LA, SB2-LA, and SB3-LA. In 1963 the company came under Webster Manufacturing, and by 1967 it had become affiliated with Raytheon. SBE produced its last amateur gear in 1969.

Swan. Swan Electronics, previously Swan Engineering, began as a one-man operation under Herb Johnson, then W7GRA. He built the first Swan SW-120 SSB transceivers, bargain-priced at under \$300, in a garage in Benson, Arizona in 1960. At that time the only other SSB transceiver on the market was the "gold standard" Collins KWM-2, which sold for considerably more (about \$1150).

Swan production continued into the 1970s, with thousands of affordable rigs being produced in Oceanside, California. Ultimately, Swan was acquired by Cubic Communications. Cubic continued in the amateur market for a time, but in recent years they focused on the military, government, and commercial markets.

World Radio Laboratories (WRL). Originally called Wholesale Radio Laboratories, WRL was founded by well-known amateur and later store owner Leo Meyerson, W9GFQ/W0GFQ. WRL made its first transmitter, the WRL-70, in 1938, changing the company name to World Radio Laboratories in 1946. The company changed form and name several times, and made equipment under the names Globe Electronics and Galaxy Electronics. Ultimately (in 1970) the business name was sold to Hy-Gain Electronics.

WRL, in its various incarnations, was best known for its big, heavy gear, which over the years included the massively rugged Globe Champion and Globe King

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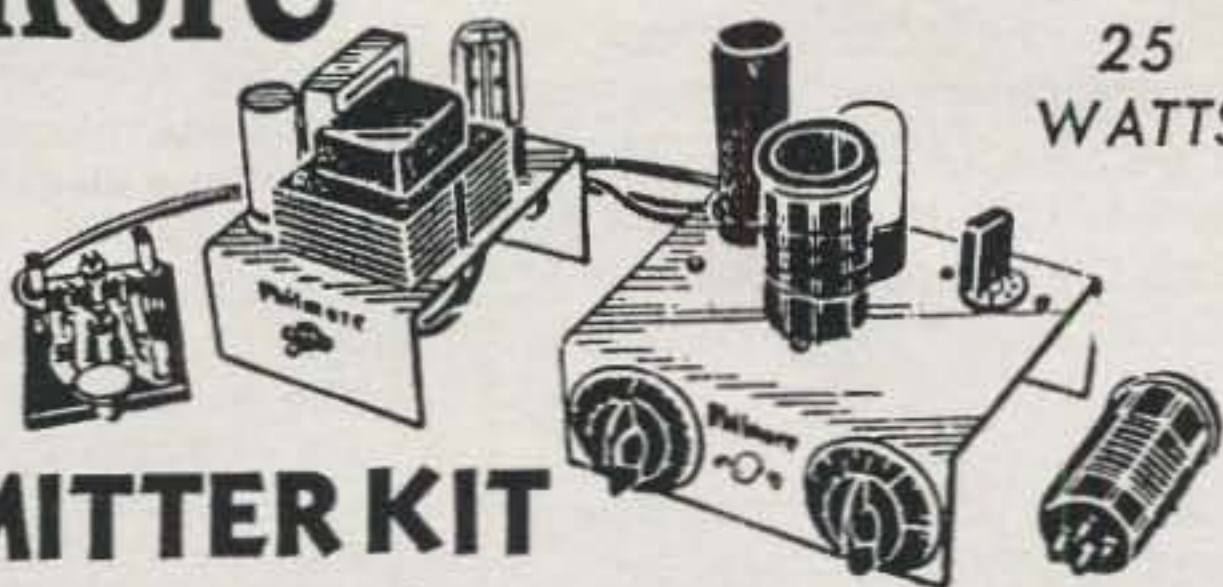


Fig. 1— The 25 watt Philmore NT-200 transmitter kit shown here was a popular "low-end" Novice starter rig in the early 1950s and was this author's first amateur rig. Almost everything you would need was furnished, including the key! Best of all, the kit cost \$29.95.

series. Other popular equipment included the Globe Chief, Globe Scout, Globe Trotter, and Meteor series of transmitters.

These are just a few of the companies that made always interesting, sometimes

classy, receiving and transmitting equipment, much of which survives to this day. A few other prominent classic-era names include Apollo, Barker & Williamson, Dentron, ELDICO, Millen, P & H Elec-

tronics, Philmore, Pierson. Space being limited, we'll have to defer their treatment to another time.

Radio Rehabilitation Considerations

Is there a "Classic Jurassic" in your future? Most radios today are solid-state, so buying tube gear can be asking for grief in today's decidedly solid-state world. However, some vacuum-tube equipment still can do a creditable job for you.

Why then would you buy a used, older receiver, transmitter, or transceiver? The answer is twofold: potential savings and classic appeal. As a rule, you might expect to save 25–60 percent by buying an older, used receiver rather than a new one. However, you need to be wary of a tube-era set. Performance depends on the present condition of the tubes and all other components, as well as the mechanical devices—tuning gears, dial cords, band-switches, and other hard-to-replace parts.

Where to Buy Used Gear. Sources of used radios include radio-equipment dealer trade-ins, radio flea-markets and hamfests, and private sales. Regardless of where you buy a classic radio, satisfaction depends largely on the integrity of the seller.

You may fare better buying your used equipment from a dealer, local or mail-



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order, who sells clean, used traded-in gear. The dealer often offers a limited warranty and in some cases a return privilege, so you shouldn't be stuck.

Your local radio fleamarket or hamfest may be the place to find your radio. The watchword here though is caveat emptor! Fleamarkets can yield real savings, but there's little protection from bad deals and junk. Be wary, cagey, and canny.

In a private sale—auction, estate sale, or yard sale—you'll normally pay less. You're on your own, however. You must rely on the seller's word on condition and performance, there's no warranty, and you can't use a credit card.

Used Gear Reference and Pricing Information. Radio gear specs and pricing information are readily available. Very useful is Osterman's *Shortwave Receivers Past and Present*. Moore's *Communications Receivers* also is authoritative, and his companion transmitter book, *Transmitters, Exciters, & Power Amplifiers*, is helpful. Various "trading sheets" and other periodicals are of use in gauging specs and prices.

Service Documentation Problem. It's difficult to repair and maintain electronic equipment without instruction or service manuals and schematics. Unfortunately, many manufacturers of vintage gear are no longer in business and the manuals are out of print. A number of third-party man-

ual-supply resources can furnish you originals or copies, however.

The two sidebars in this article give selected resources for vintage radio and electronics equipment and information on obtaining manuals for such gear. The section below lists names and contact numbers of firms that we have mentioned.

Resources

Here are contact points for publishers of equipment manuals and other resources that are either mentioned in or related to this article.

73 Amateur Radio Today, 70N Route 202, Peterborough, NH 03458-1107; 1-800-677-8838.

AM International, Box 1500, Merrimack, NH 03054-1500; e-mail: <dgagnon@concentric.net>.

AM Radio Network, Box 73, West Friendship, MD 21794.

American Radio Relay League (QST), 225 Main St., Newington, CT 06111-1494; 860-594-0200; e-mail: <pub-sales@arrl.org>. web: <http://www.arrl.org>.

Antique Electronic Supply, P.O. Box 27468, Tempe, AZ 85285-7468; 602-820-5411; e-mail: <info@tubesandmore.com>. web: <http://www.tubesandmore.com>.

Antique Wireless Association, Attn: Joyce Peckham, Secretary, Box E,

Manuals and Tube Data

Selected Sources of Manuals

Here are some selected sources of manuals and other service documentation. They are listed in alphabetical order:

Antique Electronic Supply. This company supplies pre-1960 service manuals for many electronic products and receivers. They offer reprints of older service manuals, tube manuals, a tube substitution guidebook, and a catalog of radio parts and books.

Hi-Manuals. Manuals for most ham gear made from 1935-1980 are available. A catalog, which is required to order manuals, is \$3 but is free on the Internet at <http://www.hi-manuals.com>.

The Manual Man. P. A. "Pete" Markavage, "The Manual Man," offers vintage manuals for amateur, radio, and audio equipment. His catalog shows many operating, service, and assembly manuals, as well as other documentation.

Universal Radio, Inc. The firm publishes a free, 100+ page, comprehensive radio communications catalog that features about a dozen books which offer guidance on classic radio repair and restoration, radio collectibles, servicing, and related topics.

W7FG Vintage Manuals. W7FG offers a very extensive selection of manuals; over 4000 manuals are in stock for most vintage to present-day radio gear. The catalog is viewable on and downloadable from the W7FG website at <http://www.w7fg.com>.

Vacuum-Tube Data

RCA Tube Manuals. Although now they are hard to find, manuals were published for receiving, special-purpose, transmitting, and industrial tubes. Sylvania also published a comparable series. Some of the resources we list can supply either or both of these tube manuals. (Tubes themselves are becoming scarce and expensive, offered by just a few dealers.)

VTDATA. You'll also find several sources of vacuum-tube reference software. One is EPS/Solutions, which offers the VTDATA software tube manual. The program lets you look up the specs for any vacuum tube in the manual (over 1200), find all tubes that match your specs, locate substitutes, and even maintain your tube inventory. The DOS program is \$29 plus \$3 s&h from EPS/Solutions.

Breesport, NY 14816; 607-739-5443; web: <http://www.ggw.org/freenet/a/awa>. Publishes "The Old Timer's Bulletin."

CQ Communications, Inc., 25 Newbridge Road, Hicksville, NY 11801; 1-516-681-2922; website: <www.cq-amateur-radio.com>.

The Collins Journal, David A. Knepper, W3ST, P.O. Box 34, Sidman, PA 15955; 814-487-7855 or 814-472-7826; e-mail: <slkst29@vms.cis.pitt.edu>; web: <http://www.pixi.com/~jenkins/collins>.

EPS/Solutions, VTDATA Software, P.O. Box 862, Broomall, PA 19008-0862; e-mail: <EPSweb@aol.com>; web: <http://members.aol.com/EPSweb/vtdata>.

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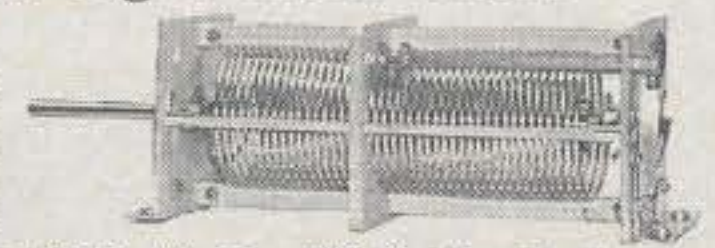
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You get everything you've ever wanted in a high power, full featured antenna tuner -- widest matching range, lighted Cross-

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\$359⁹⁵

Needle SWR/Wattmeter, massive transmitting variable capacitors, ceramic antenna switch, built-in dummy load, TrueCurrent™ Balun, scratch-proof Lexan front panel -- all in a sleek compact cabinet (10 3/4"Wx4 1/2"Hx15D in).

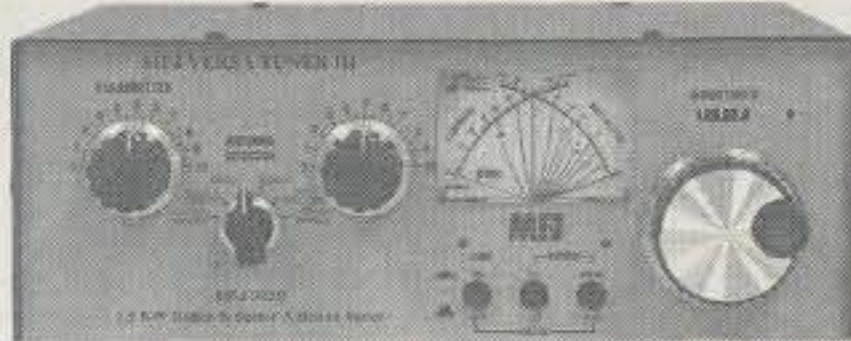
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MFJ-986 Two knob Differential-T™



Two knob tuning (differential capacitor and AirCore™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. 10 3/4"Wx4 1/2"Hx15 in.

MFJ-962D compact Tuner for Amps



A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! AirCore™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10 3/4"x4 1/2"x10 7/8 in.

MFJ-969 300W Roller Inductor Tuner



Superb AirCore™ Roller Inductor tuning. Covers 6 Meters thru 160 Meters! 300 Watts PEP SSB. Active true peak reading lighted Cross-Needle SWR Wattmeter, QRM-Free PreTune™, antenna switch, dummy load, 4:1 balun, Lexan front panel. 3 1/2"Hx10 1/2"Wx9 1/2"D inches.

MFJ-949E deluxe 300 Watt Tuner

More hams use MFJ-949s than any other antenna tuner in the world!

Handles 300 Watts. Full 1.8 to 30 MHz coverage, 48 position Precision48™ inductor, 1000 Volt tuning capacitors, full size peak/average lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, dummy load, QRM-Free PreTune™, scratch proof Lexan front panel. 3 1/2"Hx10 3/8"Wx7D inches. MFJ-948, \$129.95. Economy version of MFJ-949E, less dummy load, Lexan front panel.

MFJ-941E super value Tuner

The most for your money!

Handles 300 Watts PEP, covers 1.8-30 MHz, lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek 10 1/2"Wx2 1/2"Hx7D in.

MFJ-945E HF+6 Meter mobile Tuner

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. Lighted Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz and 6 Meters. 300 Watts PEP. MFJ-20, \$4.95, mobile mount.

MFJ-971 portable/QRP Tuner

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x6 1/2x2 1/2 inches.

MFJ-901B smallest Versa Tuner

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.



MFJ-949E
\$149⁹⁵



MFJ-941E
\$119⁹⁵



MFJ-945E
\$109⁹⁵



MFJ-971
\$99⁹⁵



MFJ-901B
\$79⁹⁵

MFJ-16010 random wire Tuner

Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 6 Meter Tuners

MFJ-906 has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. MFJ-903, \$49.95, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 VHF/UHF Tuners

MFJ-921 covers 2 Meters/220 MHz. MFJ-924 covers 440 MHz. SWR/Wattmeter. 8x2 1/2x3 inches. Simple 2-knob tuning for mobile or base.

MFJ-922 144/440 MHz Tuner

Ultra tiny 4x2 1/2x1 1/4 inch tuner covers VHF 136-175 MHz and UHF 420-460 MHz. SWR/Wattmeter reads 60/150 Watts.

MFJ-931 artificial RF Ground

Creates artificial RF ground. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire. Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. MFJ-934, \$169.95, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

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Electric Radio Magazine, Barry Wiseman, N6CSW/Ø, 14643 County Road G, Cortez, CO 81321-9575; 970-564-9185; e-mail: <er@frontier.net>.

Ham Trader Yellow Sheets, P.O. Box 2057, Glen Ellyn, IL 60138.

HI-Manuals, P.O. Box 802, Council Bluffs, IA 51502; e-mail: <himan@radiks.net>; web: <<http://www.hi-manuals.com>>.

Hi-Res Communications, Inc., 8232 Woodview Drive, Clarkston, MI 48348-4058; 248-391-6660; e-mail: <hires@rust.net>; <<http://www.rust.net/~hires>>.

The Manual Man, P. A. "Pete" Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872-1818; 732-238-8964; e-mail: <manualman@juno.com>.

Terry Perdue, K8TP, 18617 - 65th Court NE, Seattle, WA 98155; e-mail: <terryp@halcyon.com>.

Popular Communications, "The Radio Connection" column, 25 Newbridge Rd., Hicksville, NY 11801; 1-516-681-2922; <www.popular-communications.com>.

Popular Electronics, 500 Bi-County Blvd., Farmingdale, NY 11735; 516-293-3000; <<http://www.gernsback.com>>.

RSM Communications, P.O. Box 27, LaBelle, FL 33975-0027; 941-675-2923.

Universal Radio, Inc., 6830 Americana Pkwy., Reynoldsburg, OH 43068-4113; 1-800-431-3939; e-mail: <dx@universal-radio.com>; <<http://www.universal-radio.com>>.

Selected Resources for Vintage Radio and Electronics Equipment

Radio nostalgia is "in," so there's a burgeoning market in books, videos, magazines, and newsletters serving the market for older radio equipment. Let's look at some of what's offered. (For addresses and other contact information for these companies, see the resources list at the end of the article.)

Books and Videos

The Collins Video Library. A number of Collins operating, rebuilding, aligning, and troubleshooting tutorials are available from Hi-Res Communications, Inc. Recently, the firm also issued a repair video for the classic Hammarlund SP-600-JX receiver.

Communications Receivers, Fourth Edition. This book by Ray Moore, ex-K1DBR, is an authoritative guide to American communications receivers from the tube era, 1932 to 1981. The 136-page book covers all major manufacturers and some 750 receivers. The book is \$19.95 plus \$3 s/h from RSM Communications.

Heath Nostalgia. By Terry Perdue, K8TP, this is a 124-page, nostalgic history and scrapbook that covers a half-century of Heathkits. The recently reprinted book is available for \$15 postpaid from Terry Perdue, K8TP.

Shortwave Receivers Past and Present. This third edition, by Fred Osterman, N8EQU, at 473 pages covers receivers from 1942 through 1997; 770 receivers from 98 manufacturers are featured. It's \$24.95 plus \$2 s/h (bookrate) or \$3 (UPS) from Universal Radio, Inc.

Transmitters, Exciters, & Power Amplifiers. Ray Moore also offers this companion transmitter book, which covers some 561 amateur HF-band, U.S.-made transmitters from 118 companies, over the period 1930-1980. The book is \$21.95 plus \$3 s/h from RSM Communications.

Magazines, Newsletters, and Organizations

AM International. This is a revival of a group that was formed in 1967, functioning as a sort of advocacy group for amplitude modulation (AM) aficionados. Updates are published regularly in *Electric Radio* magazine. It costs but \$2 to join AMI.

AM Radio Network. This is an informal association of members active in the AM amateur radio community. It handles SWL inquiries and acts as a liaison to commercial media.

Electric Radio. Published by Barry R. Wiseman, N6CSW/Ø, *Electric Radio* is for tube-type ham-gear lovers. Each issue explores vintage gear and the people who produced it. Domestic subs are \$28 by second-class mail and \$38 via first class.

Ham Trader Yellow Sheets. This publication helps amateurs and SWLs buy, sell, and trade their radio gear, and the ads are guideposts to market prices. It is published twice monthly, and a one-year subscription is \$16.50.

"The Old Timer's Bulletin." Published by the Antique Wireless Association, Inc., annual membership is \$15 and includes a subscription to the bulletin, which is dedicated to the collector, historian, and old time wireless operator.

Note: The classified ads in amateur radio publications such as *CQ*, *QST*, and *73 Amateur Radio Today* are good sources of information about classic gear. Also, the Antique Radio column by Marc Ellis in *Popular Electronics* is a good restoration resource.

Interesting Websites

Check out the following sampling of websites of "classic jurassic" interest. Many of them offer valuable links to other related sites you may find useful and interesting:

Amateur Radio Museum Links (Netherlands): <<http://www.dse.nl/~ws19/muslinks.html>>

The Collins Journal: <<http://www.pixi.com/~jenkins/collins>>

Hammond Museum of Radio Home Page (Canadian): <<http://www.kwarc.on.ca/hammond>>

Heathkit Virtual Museum-Ham Radio: <<http://www.cyberventure.com/heathkit/hkham.html>>

QCWA On-Line Amateur Radio Museum: <<http://www.teleport.com/~qcwa/qcmuseum.htm>>

Radio Historical Society of West Sweden: <<http://www.telemuseum.se/Grimeton/Grimeen.html>>

Rec.radio.amateur.boatanchors FAQ (extremely comprehensive Frequently Asked Questions from the Boat-anchors newsgroup): <<http://www.cs.unc.edu/~nick/rwab.faq.htm>>

VE4YH Virtual Swan Radio Museum: <<http://www.pcs.mb.ca/~standard>>

WA3KEY Virtual Collins Radio Museum: <<http://www.wa3key.com/collins.html>>

World Radio Laboratories: <<http://www.bigcountry.com/w5ami/wrl/index.html>>

W7FG Vintage Manuals, 402731 West 2155 Drive, Bartlesville, OK 74006; 1-800-807-6146; e-mail: <w7fg@w7fg.com>. web: <<http://www.w7fg.com>>.

Summary

This article profiled "Classic Jurassic" amateur radio and shortwave radio equipment and manufacturers of the past. "Boat-anchor" radio gear from Collins, Drake, Hallicrafters, Hammarlund, Heath, E. F.

Johnson, National Radio, World Radio Laboratories, and others was fondly depicted. Included was an orientation to today's radio nostalgia, radio rehabilitation considerations, and further resources.

We've rather loosely and cavalierly dubbed these venerable radios "boat-anchors," but maybe we shouldn't do that. Rather, we should treat them with the respect they deserve and call them what they are—classic radios from another era. ■

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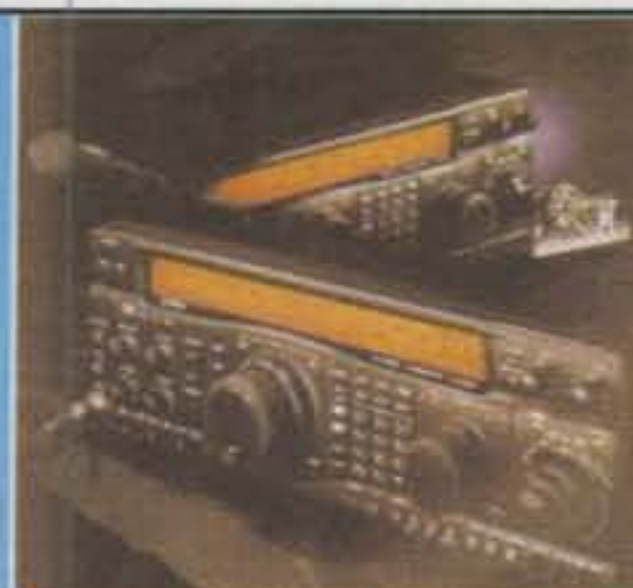
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P40W (W2GD)	18,313,216
P40N (KW8N)	14,407,904
VF3EJ	14,009,736
EA8ZS (EA3NY)	13,410,684
KQ2M	11,064,214
8P2K (8P6SH)	10,280,172
IH9/OL5Y (OK1FUA)	9,991,780
KF3P (K3MM)	9,632,829
VO1MP	9,509,929
OK1RF	8,889,804
N5KO/6	8,885,032
OH5LF (OH1WZ)	8,287,733
OE1EMS	8,117,010
OT9T	7,427,392
NB1B	7,377,672
WZ4F (K4AB)	7,338,584
*VP5E (K6HNZ)	7,032,136
JH4UYB	6,926,395
ZW7BZ (PT7BZ)	6,910,514
K3ZO	6,744,404
VU3VLH (OK1MM)	6,568,800
KV0Q (N0NR)	6,411,600
HK6KKK	6,287,720
XX9TRR (OH2PM)	6,227,792

28 MHz

ZX5J (PP5JR)	14,915,256
ZD88A (K6NA)	13,368,000
LT1F (LU1FKR)	9,534,960
CW8C (CX8CP)	7,976,158
WP2Z	7,701,338
L10F (LU2FFD)	7,651,746
L2F (LU9FDG)	7,520,844
CE3F (CE3FIP)	7,341,544
5X1Z	7,143,160
KH6ND	6,596,721

21 MHz

ZD8Z (N6TJ)	12,284,302
EA8AH	11,777,454
P43A	9,151,472
9A3GW	6,633,480
UA0ZBK/0	6,593,751
SP5GRM	6,581,760
AH7DX (KH6TO)	6,521,628
J13OPA	6,436,240
XO7X (VE7AHA)	6,368,568
WE9V	6,180,453

14 MHz

DJ7AA	5,884,890
PP5JD	4,574,199
KK9A	3,908,968
RW4WR	3,845,205
IQ3A (IV3TAN)	3,573,525
OK5W (OK2ZW)	3,484,734
SM2DMU	3,349,472
9A6A	3,336,000
KH7U	3,200,700
RS0F	3,086,663

7 MHz

LZ5W	5,157,288
9A9A	4,719,624
WH7Z (K9QQ)	4,704,256
S53M (S55OO)	3,899,616
ED8WPX (EA8PP)	3,737,484
9A5Y	2,927,808
OL6X (OK1DIG)	2,442,441
HA9BVK	2,310,906
SK0UX (SM0TOX)	1,722,424
RV6LNA	1,483,044

3.7 MHz

OK2RZ	1,747,656
LX6T (LX1KC)	1,140,700
KE1Y	1,069,288
DL1ZIH	871,155
AH6OZ	698,534
LY2HM	653,484
LY1FW	573,992
*4X1IM	528,002
*J4Z (SV2CWY)	514,026
9A4W	468,384

1.8 MHz

VA1A (K3BU)	570,640
EA8/OH1MA	432,066
OM0WR	296,474
OZ3SK	242,028
AA1BU	117,500

KN2T	113,088
LY2OU	109,682
IR1A (IK1GPG)	100,359
NE5D (K5RX)	89,420
*OK2SNX	83,386

TRIBANDER/SINGLE-ELE

LA8W (LA4DCA)	5,813,252
LY2BTA	5,099,923
*KH0/JF2QNM	4,577,808
LU0H (LU3HU)	4,565,387
RA3AUU	4,532,716
EA3NY (EA3FUM)	4,382,270
N6ED	4,034,085
UA2FB	3,853,436
NX9T	3,641,792
*PY2YU	3,592,138

ASSISTED

TM2V (F6GLH)	7,126,116
NV4X (K4MA)	6,747,345
OH9W (OH6EI)	4,965,174
IN3ZNR	3,731,424
N3MKZ	3,640,926
N5JR	3,081,320
NA2NA	2,928,488
VE1RX	2,862,510
DF6QV	2,716,560
K3WW	2,487,436

LOW POWER ALL BAND

VP5E (K6HNZ)	7,032,136
UP5P (UN5PR)	5,046,480
KH0/JF2QNM	4,577,808
PW1S (PY1KS)	4,482,940
VA3DX	4,083,624
PY2YU	3,592,138
PY2MNL	3,579,528
4M5E (YV5NWG)	3,020,097
LU9HO	2,853,630
S53EA	2,740,685
P43E	2,662,212
EA7GTF	2,603,065
WA1LNP	2,568,445
AC0W	2,525,708
W2TZ	2,479,764
Z31JA	2,428,800
JF1SQC	2,385,000
3B8/DL6UAA	2,298,608
JR7WAB	2,258,781
WD5K	2,256,272

28 MHz

LU5FC	4,252,046
LR6D (LW5DX)	2,863,215
VP2VF	2,724,785
TI7/N4MO	2,617,482
LU4DX	1,920,900
KP3A	1,632,119
LU4OJS	1,546,685
PY2NW	1,502,609
PY3RK	1,289,340
PY2BSY	1,260,020

21 MHz

C17A (VE7SV)	4,488,463
UA4LCQ	2,793,967
SU9ZZ	2,444,238
LU3FZW	2,250,274
P43DJ	2,196,320
PP5UA	1,848,460
JR3RIY	1,836,315
JL3VUL/3	1,694,951
OH4MDY	1,654,137
BY1DX (OH2BH)	1,199,996

14 MHz

RS0F	3,086,663
AK4L (K4PC)	1,165,248
UA3BL	1,067,238
PY5HSD	986,986
AK0A	901,192
VE6TP	692,664
YL3FW	403,002
UA3IKO	365,735
AE6Y	351,941
UA9BS	314,675

7 MHz

S54A	430,902
UT1T (UR7TZ)	396,088
CT1BWW	94,962
YO3GOD	79,960
DJ2YE	51,030

3.7 MHz

4X1IM	528,002
J4Z (SV2CWY)	514,026
TA3J	396,865
S51Z	368,440
IV3KTY	272,742

1.8 MHz

OK2SNX	83,386
VY2MGY/3	71,820
EA1DVY	17,696

UNITED STATES SINGLE OPERATOR ALL BAND

KQ2M	11,064,214
KF3P (K3MM)	9,632,829
N5KO/6	8,885,032
NB1B	7,377,672
WZ4F (K4AB)	7,338,584
K3ZO	6,744,404
KV0Q (N0NR)	6,411,600
K7RI	6,009,732
N3OC	4,259,491
KR1G	4,252,490
WC1M	4,045,932
N6ED	4,034,085
K8OQL	3,941,955
AB5SE	3,774,060
NX9T	3,641,792
A17B (W7GG)	3,484,320
K3JT	3,371,775
W1CU	3,326,904
KE9NA	3,228,012
W0TM	2,973,642

28 MHz

KZ5MM	2,591,631
NX5M (N5XJ)	2,198,734
W5WMU	1,899,648
K5NZ	1,763,632
K4JYO	1,743,616
N8II	1,130,983
W6AFA	782,574
KK0SS	695,145
*W2BZR/3/T	683,350
*W3NO	605,244

21 MHz

WE9V	6,180,453
K6LL/7	4,564,845
KK0T (N2IC)	4,487,808
N4PN	3,404,040
KG0ZI	2,911,256
N3HBX	2,638,652
K7BV	2,495,464
A13Q	1,739,100
K4WX	1,573,696
W7FP	1,356,295

14 MHz

KK9A	3,908,968
NA5B (W5AO)	2,504,277
*AK4L (K4PC)	1,165,248
K1KJT	1,029,591
*AK0A	901,192
K7ZZ	752,238
*AE6Y	351,941
*NP4IW/NX6	216,920
*KU6W (K6RO)	176,754
*KG7RZ	161,772

7 MHz

NC4NC	336,951
AE5B	176,600
KE8GG	78,262
N9LCR	45,472

3.7 MHz

KE1Y	1,069,288
NP2N/AG0	37,680

1.8 MHz

AA1BU	117,500
NE5D	89,420
K0CS	10,050

TRIBANDER/SINGLE ELE

N6ED	4,034,085
NX9T	3,641,792
W1CU	3,326,904
KE9NA	3,228,012
NA1Q (W1NT)	2,792,912
*W2TZ	2,479,764

KA1UQ	2,378,978
KY3ORK (KC3TL)	2,348,549
*WD5K	2,256,272
N2ED	2,103,672

ASSISTED

NV4X (K4MA)	6,747,345
N3MKZ	3,640,926
N5JR	3,081,320
NA2NA	2,928,488
K3WW	2,487,436
*WW3S	2,318,201
K4UVH	2,191,532
KD6WW	2,118,685
W7OM	1,597,120
KT0R	1,488,370

LOW POWER ALL BAND

WA1LNP	2,568,445
AC0W	2,525,708
W2TZ	2,479,764
WD5K	2,256,272
K1VUT	1,997,224
WS1A	1,946,056
WN6K	1,317,942
WA4IMC	1,141,709
WA1S	1,097,085
NT5D	1,004,032

28 MHz

W2BZR/3/T	683,350
W3NO	605,244
WJ7S	500,160
K6KAY/T	448,576
NU6S	414,264
AJ4Y	317,538
N4KP	227,970
KA9UQT	214,784
WD4AHZ	210,576
N9NUN/T	191,394

21 MHz

NI9C	666,169
AE1B	555,000
W6BSY	506,520
KW2O (K2SG)	457,166
WA7BNM	421,443
W0MHK/1	392,265
W5RNF	251,559
KG0UA	170,170
N9GUN	154,068
KD6DAE	109,798

14 MHz

AK4L (K4PC)	1,165,248
AK0A	901,192
AE6Y	351,941
NP4IW/NX6	216,920
KU6W (K6RO)	176,754

QRP/p WORLD

KR2Q	A	1,805,237
VE3KZ	A	1,783,804
HA2SX	A	1,382,382
LY3BA	A	1,131,559
N0KE	A	1,095,669
N6MU	A	1,083,316
DL2NBU	A	1,061,000
JA6GCE	A	938,214
LY2FE	A	765,845
KB3TS	A	757,200
KT3RR	28	538,242
LW3DWX	28	314,223
JA5GPJ	28	272,384
HA5BSW	28	246,431
I3VFJ	28	138,528
NA4CW	21	474,129
W6YJ	21	114,800
S59D	21	71,118
W5FO	14	369,380
OK1GW	14	96,900
WB7OCV	14	24,990
WJ8C/P	7	13,066
SP4GFG	3.7	21,996
UT/UA0QGQ	1.8	9,472
YL2GUV	1.8	6,600

UNITED STATES

KR2Q	A	1,805,237
N0KE	A	1,095,669
N6MU	A	1,083,316

KB3TS	A	757,200
N1TM	A	331,296
W8QZA/6	A	228,585
NW7DX	A	144,600
KI0II	A	57,222
KS4RX	A	48,506
WN6HYX	A	37,842
KT3RR	28	538,242
WA6FGV	28	98,556
WB0IWG	28	62,550
WA0VBW	28	51,831
WB1FWQ	28	46,720
NA4CW	21	474,129
W6YJ	21	114,800
W7/JR1NKN	21	25,728
W5FO	14	369,380
WB7OCV	14	24,990
WJ8C/P	7	13,066

WORLD MULTI-SINGLE

ZX0F	28,360,192
VP5N	22,993,257
T33RD	18,639,376
ZW5B	18,030,330
UA7A	15,347,348
TM	

MFJ 24/12 Hour Clocks



Shown actual size

Dual 24/12 hour LCD Clock

MFJ-108B

\$19⁹⁵

plus s&h

MFJ-108B dual clock has separate 24 hour and 12 hour displays. Lets you read both UTC and local time simultaneously. Features huge high-contrast 5/8 inch LCD

numerals that makes it easy to read across the room. Mounted in solid brushed aluminum frame with sloped face for easy viewing. Synchronizable to WWV for split-second timing. Quartz controlled for excellent accuracy. Long life battery included. 4 1/2 W x 1 D x 2 H in. MFJ's famous *No Matter What™* one year limited warranty. \$6 s&h.

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MFJ-125, \$29.95. 12 inch DXer's Quartz wall clock gives 24 hour time plus more. Has three smaller independently settable dials for 12 hour time, day of week and date. No more day/date confusion when logging DX! Highly visible, easy-to-read dials! Has Seconds hand.



MFJ-115, \$24.95. Set this 24 hour clock to UTC/GMT and you can determine the time in any time zone of the world at any time of the day. Premier world cities encircle its colorful world map face to indicate time zone. 12 inch face is easy to see across room. Has Seconds hand.



MFJ-105C, \$19.95. World's most popular ham radio wall clock! True 24 hour Quartz movement. Huge 12 inch black face with large white numerals give excellent visibility across room. Attractive gold colored hour, minute and seconds hands.



MFJ-126, \$24.95. 12 hour Quartz movement gives 12 hour time on inner dial (for XYL) and 1200 to 2400 hour time on its outer dial (for you). Attractive clean, white face is highly visible. Real glass cover! Handsome hunter green trim. Has seconds hand.

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MFJ-119B, \$49.95. LCD Display 24/12 Hour Clock. Has giant see-across-the-shack 2 1/4 inch time digits. Digital calendar or clock modes. Displays inside temperature (F/C), relative humidity, month, date and day of week. Handsome hunter green and tan color. Wall mount. 8 1/2 x 9 inches.



MFJ-118, \$24.95. 24/12 hour clock has jumbo 1 1/4 inch LCD digits. Displays 24 or 12 hour time, year, month, date, and day of week. 100 year full calendar. Hang on wall or desk mount. 5 1/2 W x 2 1/2 H x 1 1/2 D in.



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MFJ-152, \$24.95. Read Indoor and Outdoor temperatures and 24/12 Hour time at-a-glance on huge 3/4 inch LCD digits! Choose F or C. Stores minimum and maximum temperature readings. Has backlight for in-the-dark viewing, outdoor temperature sensor with ten foot cable.

Bright LED Clocks



MFJ-114B, \$59.95. Bright, GIANT 1.75 inch red LEDs are the biggest and brightest we've ever seen! 24 or 12 hour time with seconds digits. Easily seen 50 feet away -- even in the dark! 110 VAC. Great on your desk or mounted on the wall! 12 1/2 W x 4 1/2 in.



MFJ-116, \$14.95. Big bright 5/8 inch LED digits. 24 or 12 hour, 9 min. ID timer, battery back up. Black. 110VAC.

MFJ-116DC, \$19.95. 12 VDC, plugs in cigarette lighter. Great for motorhomes and truckers! 12 hour only.

Monster Display Atomic Clock with PinPointAccuracy™



MFJ-120, \$69.95. 24/12 hour Atomic Clock automatically receives WWVB for millisecond accuracy. Monster 2 inch LCD characters. Reads relative humidity and temperature (F or C). Has alarm. Attractive

metallic copper color. Use on desk or mount on wall. Giant 8 x 10 1/2 W x 3 1/4 D inch showpiece.



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\$29⁹⁵ Tiny powerful MFJ CyberEar™

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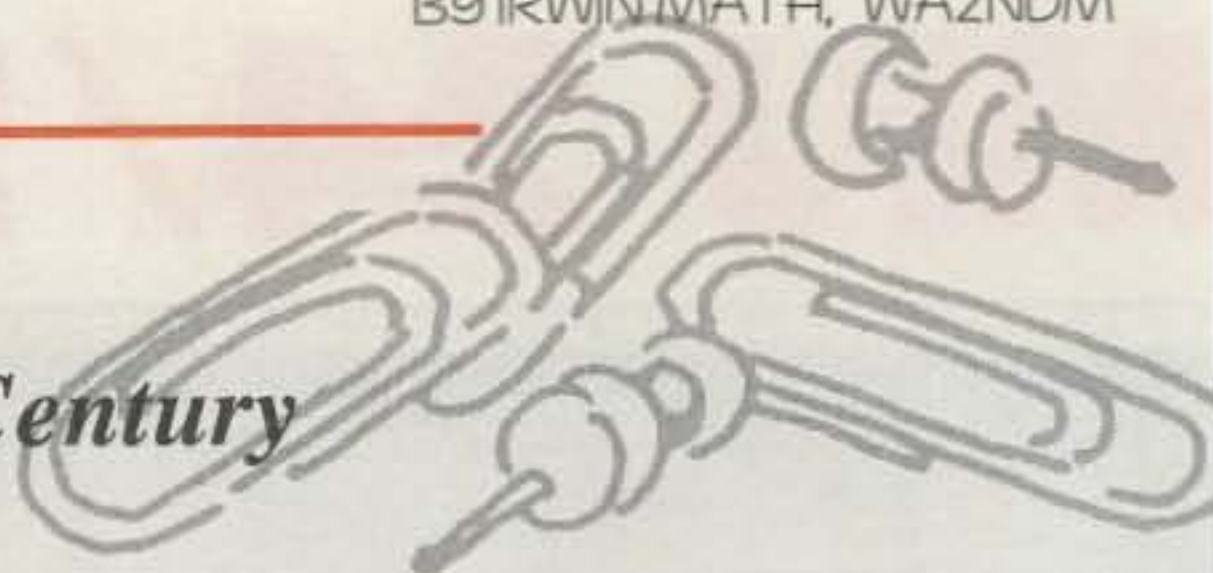
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Technology in the 21st Century



The 21st century is almost upon us (even though there are those who say that technically we must wait another year), and this is the time when most people consider and predict the future. Not to be outdone, I would like to present my point of view on the technology to come, since the readership of this column is technically inclined (Hopefully, my assumption is correct.). To understand what I base my views on, we must first consider where we have come from.

The growth of technology during the 20th century certainly has been outstanding. In 1900 Marconi was first thinking about radio transmissions. The Wright brothers had not yet flown, and horse-drawn vehicles, not automobiles, were clogging our roads. If you were fortunate enough to have a wind-up Victrola, you could listen to recorded music on shellac-coated disks and cylinders, but even the simple vacuum tube had not yet been developed. The great Thomas Edison dismissed the one-way flow of electrons from a filament to a metal plate in a vacuum (He dubbed it the "Edison Effect.") as interesting but not of much use in helping to prevent blackening of the glass in his new electric lamp. Even basic electrical service to many homes was rare.

During the next hundred years, though, we would see the development of vacuum-tube and then solid-state electronics, television, the aircraft and space industry, orbiting satellites, nuclear physics, the laser, the entire field of opto-electronics, the microprocessor, and the computer revolution both in hardware as well as software. The 1900 predictions of where we would be in the year 2000 would fall far short of the mark. Even the 1939 World's Fair predictions of where our society would be technologically in the 1960s and '70s were not particularly accurate. Furthermore, only 25 years ago the mass computer revolution was just a dream, and four-function calculators were as close as we came to state of the art. The slide rule was still the sign of the "true engineer," just as the typewriter was the author's best friend.

c/o CQ magazine

The general public did not even have a clue of what was to come. As a result of developments we don't even know of yet (but which surely will come), any specific prediction by anyone of where we will be in 2100 in my opinion will also fall far from its mark. If you doubt this statement, read a book offered by the New York Metropolitan Museum of Art entitled *Yesterday's Tomorrows*. This book will give you a very good idea of how predictions of the future (made in the early 20th century) may capture some of the "flavor" of what eventually will be, but not the essence.

Yesterday and Tomorrow

In the 20th century there were some fundamental developments that shaped the current state of our technology. The first was, of course, the vacuum tube. Once electrons could be controlled, everything up to and including color television was possible. Even basic computers were manufactured at the time, albeit with a myriad of tubes, but they did calculate nonetheless.

In 1948 at Bell Labs in New Jersey the transistor was developed, and the age of solid-state physics was born. This was another fundamental discovery of the magnitude of the vacuum tube, and the future state of electronics would never be the same. Filament power was eliminated and the size of the amplifying element was reduced by magnitudes. The eventual outgrowth was the integrated circuit.

While the frequency response for vacuum tubes eventually did extend into the GHz range, noise figures and costs were high. The transistor made GHz operation at almost theoretical noise figures an everyday occurrence (with devices that cost a dollar or so), which brings me to my first prediction.

I believe that solid-state physics will be replaced (or at least supplemented at some point during the 21st century) with something else. Once frequencies of tens of GHz need to be handled routinely to accommodate our growing need to rapidly transfer vast amounts of data, basic physics will come into play, and the physical size of the conventional electronic switch, amplifier, or gate (as we know it)

will limit the maximum speed at which it can operate.

I believe that we will learn how to switch, amplify, and process light inexpensively, the way we now do with conventional high frequencies. Or perhaps something else even more remote that will do the job suddenly will be discovered. Remember, before 1895 (Marconi's first transmission) the entire field of wireless was only a mathematical equation on James Maxwell's desk, and by 1903 the Atlantic had been spanned! Who knows what other equations or theories exist even today on someone's desk?

I believe that the shrinking of electronic circuitry will continue (with chips containing millions of transistors) to the point where we will be designing with complete functional blocks—and I don't just mean extended op-amp type circuits. I mean chips where external components will be minimal or even nonexistent, or at the very least limited only to those required for direct human interface (speakers, microphones, switches, power sources, displays, and so on). Along these lines, I also believe that the use of basic components such as resistors, capacitors, diodes, etc., will dwindle as the 21st century progresses and that a new way of implementing electronic designs will come about.

I believe that the physical size of power sources such as batteries (both chemical and solar), fuel cells, and the like will continue to shrink to match these "super chips" so that portable devices such as cellular-type communications links will truly become Dick Tracy wrist radios (or communicators) with full-motion video to boot! I also think that a revolutionary new power source will be developed. After all, the common battery—be it carbon-zinc, lead acid, or nickel cadmium—is not much different in principle from what was used in the early 1900s. In terms of watts per pound (the figure of merit for a power source), I do not believe that we have come far enough, but the need is certainly there. Possibly a safe nuclear device will come about, or maybe even something else of equal magnitude.

As ICs and software become more and more complex, I believe that artificial intelligence will become more and more prev-

alent and refined. I am almost certain that we will begin to communicate verbally with machines—not just with keyboards, switches, or touch screens—and they in turn will “talk” to us in the same way. Already telephone information services using speech recognition and synthesis are in common use, but they are not totally reliable yet. In the next 10 to 20 years I think they will become almost perfect, and we will interface with our computers (whatever they evolve into) as easily as we interface with others. It will also be harder and harder to distinguish a machine from a fellow human being for routine interactions.

As the century progresses, the frequencies used most certainly will climb higher and higher. GHz will replace MHz as a common term, just as picoseconds will replace microseconds. Already one major semiconductor manufacturer (a division of Siemens) has announced that it will begin delivering its B7HF process series of gates using 75 GHz SiGe devices by the second half of next year. That's 1 00Gb/s+ logic, by the way! Others will follow in short time and push the speed still higher. Just the way amateurs given the “useless” frequencies “200 meters and down” discovered the whole world of shortwave radio propagation, I believe that the frequencies of 200 micrometers and down (beyond visible light) will have many surprises in store for us as well and that we will begin to explore these in the 21st century.

Unfortunately, I do not have a prediction for amateur radio. I think, though, that we had better get our act together and “swell the ranks” by whatever means makes sense, or we surely will lose many, if not all, of our privileges. Spectrum space is worth far too much, especially the VHF and UHF bands (unless an entirely new propagation medium emerges).

There are numerous areas that could be covered when trying to predict the technological future, but I have limited myself to only a few to give you a fleeting glimpse of what may come (in my opinion). I believe, however, that while we cannot really guess specifically what will come, we can view the coming century as one in which technological developments will occur at a much faster rate than in the past. In 1900 we did not have much of a real technical base from which to work. In 2000 we have an infinitely better starting point.

Season's Greetings to all of my readers, and to paraphrase my usual end-of-the-year comment, “May the coming century bring you all that your heart desires.” Also a final fond farewell to my friend and colleague Alan Dorhoffer, K2EEK.

73, Irwin, WA2NDM

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SKY NEEDLE**

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- Mobile tower trailers to 100 ft plus.
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- Total money saving tower packages includes Tri-Ex Tower (or tubular mast) rotator and a Force 12 Antenna.
- Complete tower installation in 42 states.
- Spare parts for Tri-Ex Towers are now available. eg. replacement cables, pulleys, etc.
- First Call Communications Tri-Ex Newsletter (Informa iss. 2).
- Pre Tower installation guide and Tri-Ex installation guide.

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Small Wonder Labs DSW

Five Digital CW Monoband Kits

BY BRUCE PRIOR*, N7RR

The digitally-tuned DSW transceiver kits sold by Small Wonder Labs set a new standard for monoband QRP CW kits. I built the 40 meter version, but similar DSW kits are available for four other amateur bands. Selling at a QRP price, the rigs use firmware to control both frequency and keying.

Operate by Sound and Touch

Dave Benson, NN1G, has designed five simple monoband rigs which you can operate strictly by sound and touch. Since they have no meters or visual frequency readouts, the DSW kits are equally useful for blind radio amateurs and for outdoor enthusiasts operating at night in a dark tent. Even with the beautiful, optional anodized enclosure built by Doug Hauff, KE6RIE, the DSW is small enough to fit inside a sandwich bag. The unit covers all of one amateur band and more. The only frequency limitations are governed by the band-pass filters, not the digital circuitry.

Easy to Build

The DSW kits come well-packaged with a user-friendly manual. I built my rig in just a few hours with only two glitches. First, I installed internal jacks 1, 2, and 3 facing west instead of east. I should have remembered that the kit comes from New England, after all! Second, my soldering overheated the subminiature momentary switch used to control keyer functions, making it inoperative. A quick bicycle ride to RadioShack yielded a replacement.

Alignment is incredibly simple. All you need is an ohmmeter, headphones, and a small-slot screwdriver. You measure the resistance of the DDS filter output resistor to ground, adjust the sidetone frequency with a trimmer capacitor against an internally-generated tone, and finally adjust the IF transformer for maximum receive audio. That's it! I finished my alignment in about five minutes and was ready to operate.

If you've never built a kit before, this is a good place to start.

*853 Alder Street, Blaine, WA 98230-8030 e-mail: <n7rr@arrl.net>



The optional enclosure. The shaft-encoder tuning control is on the right.

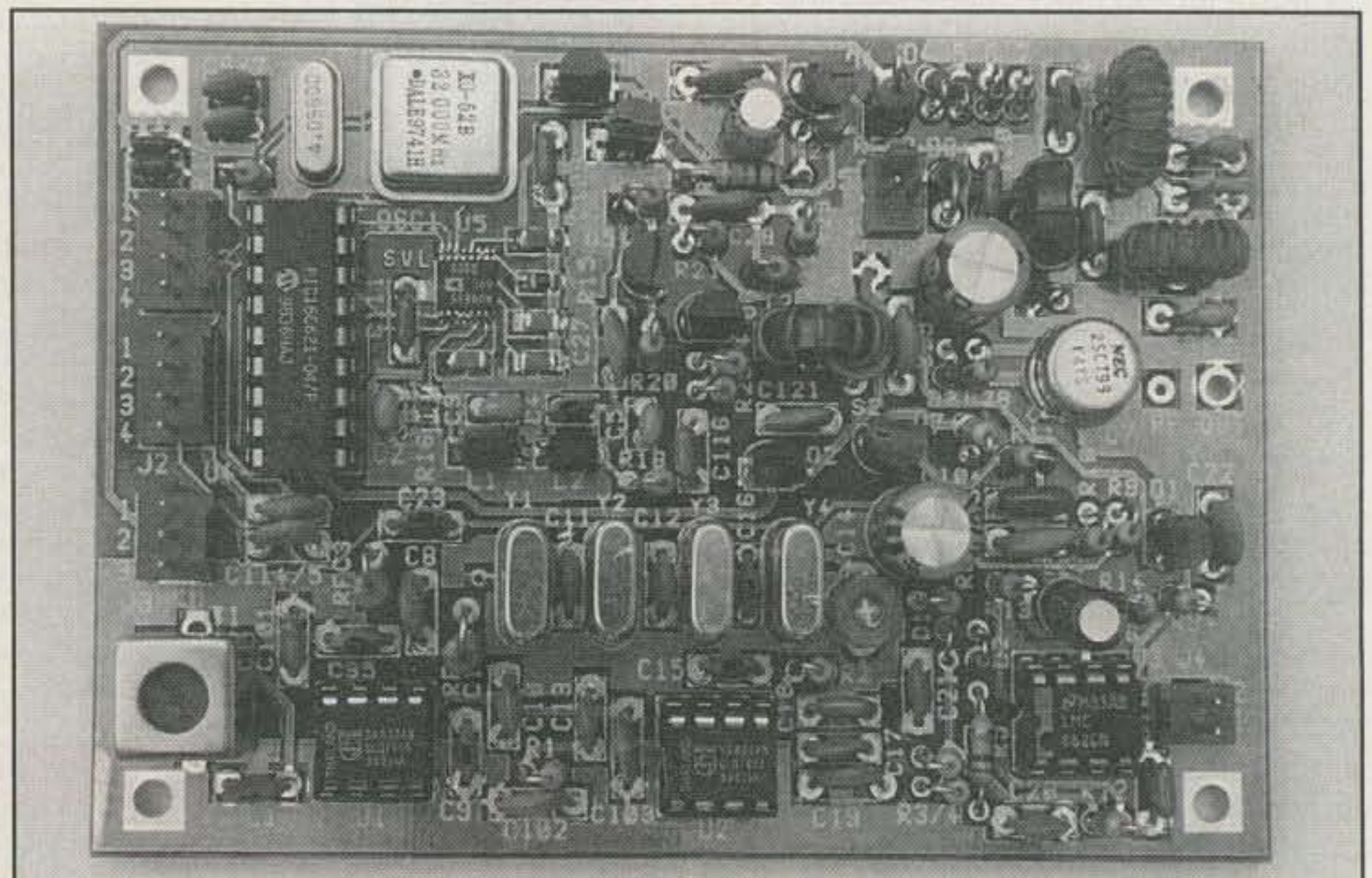
Built-in Quality

The rig puts out a solid 2 watts of RF. In my first QSO with K7ZPE in the Idaho panhandle, Art Stone described the keying as "A1." He complained about QRM on me. I wasn't bothered by it at all.

My impression is that the receiver filter is fairly broad, but it does have a marked peak around 800 Hz, the frequency of the sidetone and CW offset. Small Wonder

Labs specifies a -6 dB, 500 Hz bandwidth for the three-crystal 4000 kHz IF filter. I can hear other stations off frequency, but at much reduced volume. The DSW manual says, "The unwanted sideband image is down about 50 dB at the audio chain's 800 Hz peak response frequency." Indeed, I could just barely hear an extremely strong local station on the wrong sideband.

The receiver drives headphones with plenty of volume. Even though the DSW



Circuit board. A few surface-mount parts are pre-installed by Small Wonder Labs.

manual does not recommend the use of an external speaker, a small 8 ohm speaker worked fine for me when I advanced the gain control.

The DSW CW break-in function is as smooth as anything Ten-Tec has produced. In fact, I was completely unaware of it, which is the highest praise I can think of for a QSK circuit.

Minimal Controls

The rig has only four controls: an analog audio gain control, a keyer control push-button, a receiver incremental tuning toggle switch, and a rotary shaft-encoder frequency control. Well, let's add a fifth: Your external keyer paddle is also used in conjunction with the push-button to choose various keyer settings.

These minimal controls mean that you have to be satisfied with standard settings. You can't adjust the sidetone volume or frequency while operating, for instance, but I found both satisfactory. Transmitter power cannot be adjusted by the operator. The audio filtering is also fixed. My DSW-40 works fine for receiving CW or RTTY, but since the rig covers the entire 40 meter band, I would like to be able to switch out some of the filtering so that LSB and AM foreign broadcast stations would be intelligible. That would make it easy to check into some of the daytime 40 meter LSB nets when CW

activity is sporadic. It might even be critical in an emergency. I was just barely able to understand enough of the audio of a very strong LSB net-control station to check into a daytime net, but it was a struggle. Who will be first to develop a modification that will allow for both narrow and broad filtering on DSW rigs?

Digital Tuning

The shaft-encoder used to tune the rig digitally took a few minutes for me to get used to, but it works very well. The encoder rotates in 30 discrete tactile steps per revolution in two ranges: 200 Hz and 50 Hz per step. That translates into 6 kHz and 1.5 kHz per revolution. Moving across the band with coarse tuning selected, the CW signals change tone quickly, rather like a bugle. This coarse setting allows the operator to cover a lot of spectrum quickly without missing CW stations. The 50 Hz steps sound almost as smooth as an analog VFO, and I switch to this fine-tuning option once I get to the part of the band where I want to operate.

Every time you turn it on, the DSW-40 defaults to 7040 kHz, the North American 40 meter QRP CW gathering place. The DSW-80 starts at 3560 kHz when powered up with the RIT switch turned off. If it is powered up with the RIT switch turned on, the DSW-80 starts at 3700 kHz in the US Novice/Technician-Plus sub-band. A firm-

DSW Digital Tuning Details

You change from coarse to fine tuning, and vice versa, by depressing and holding the spring-loaded shaft-encoder until you hear two audio tones. BEE-BOOP means you've switched to fine tuning. BOO-BEEP signals a return to coarse tuning.

When you depress the shaft-encoder very briefly, the DSW uses Morse code to tell you its operating frequency to the next lowest whole kHz digit. If you are tuned to 7114.6 kHz, for instance, the DSW-40 will send 114 to you in Morse code.

To get to 7030 kHz, the European 40 meter QRP CW calling frequency, start with the notched tuning knob at 12 o'clock and power up the rig. You will automatically be tuned to 7040 kHz and the rig will be in coarse tuning mode, or 200 Hz per click step. Now rotate the shaft-encoder tuning knob counter-clockwise 1 1/2 turns, plus five more click steps. This totals 50 click steps. That's 50 x -200 Hz, or -10 kHz. To confirm that you are spot on 7030 kHz, first depress the shaft-encoder briefly. You should hear 30 in Morse. Then advance one more click counter-clockwise and briefly push in the shaft-encoder once more. Now you should hear 29 in Morse. You are actually on 7029.8 kHz. Turn the control back one click clockwise and you are ready to transmit on 7030.0 kHz.

After a little practice, remembering that in the coarse setting each clockwise rotation increases the frequency by 6 kHz and each counter-clockwise rotation decreases it by the same amount, you'll breeze up and down the band with confidence.

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DSW Keyer Functions

Just one push of the front-panel **KEYER** button on the DSW starts the keyer control ball rolling. You hear, in succession, the letters S, R, T, and SK.

S stands for SPEED. To increase speed above 15 wpm, just after hearing S, tap the dit paddle a number of times or hold it and listen to the dits speed up. Each dit represents a 3% speed increase. Similarly, to decrease speed below 15 wpm, just after hearing S, tap the dah paddle a number of times or hold it and listen to the dahs slow down. Each dah represents a 6% speed decrease.

R stands for REVERSE. After hearing R, tap either the dit or the dah paddle, and the dit and dah paddles will be reversed.

T stands for TONE. After the T is heard, tap either paddle, and a steady full-power transmitter carrier will be sent. Stop the carrier transmission by tapping either paddle again.

SK stands for STRAIGHT KEY. After hearing SK, tap either paddle to transform the keyer jack circuit into a straight key circuit. Use this function as well to key the DSW with an external keyer or computer. You may actually plug in the straight key or external keyer or computer ahead of time and use it to change the DSW into straight-key mode.

ware update for the DSW-40 will allow a similar start-up on 7110 kHz and should be a standard feature in all DSW-40 kits ordered by the time this review is published.

Receiver Incremental Tuning

Receiver incremental tuning (RIT) in the DSW works only in 50 Hz steps and has no end stop limits. That means this simple rig can operate with wide splits, although there is no reverse switch to briefly monitor your transmit frequency when the RIT is engaged. The RIT is volatile: When you turn off the RIT switch or unplug the power, it reverts to zero offset. I would like



The author is shown here operating the tiny DSW-40 rig near Mt. Shuksan, Washington. (Photo by KD7CEL)

to see transmitter incremental tuning (XIT) added to these kits. XIT would make the DSW a more powerful machine for maneuvering in pile-ups. This is a serious radio which deserves to be tested by fire.

Built-in Iambic Keyer

The **KEYER** control menu allows you to:

- regulate the CW speed between 5 and 50 wpm,
- reverse the dit and dah paddles,
- send a steady full-power carrier, or
- convert the paddle input to *straight-key* mode.

There are no keyer memories. On power up, the internal keyer starts at 15 wpm. It mimics Curtis mode B, my favorite.

Under-the-Cover Details

The digital functions of the DSW are controlled by a CMOS PIC 16C622. This firmware chip does the Direct Digital Syn-

thesis (DDS) chores. These include shaft-encoder frequency interface to the DDS management system, RIT management, and Morse audio readout. The Morse readout doesn't count the frequency directly. It keeps track of the actions of the shaft-encoder. Morse frequency readout is sent at the same speed the operator has set for transmitting. That makes the Morse frequency readout a convenient gauge of transmitting speed.

The 16C622 runs at 32 MHz, so a 21 MHz low-pass filter is used to keep the alias signal from the DDS away from the rest of the circuitry. Audio selectivity is achieved by a combination of a three-crystal IF filter and a band-pass filter centered on 800 Hz at the final AF amplifier stage. The offset of all DSW rigs is set for receiving on the lower sideband. The transmitter amplifies the filtered DDS signal by two linear amplifier stages, followed by an NPN transistor final amplifier in a TO-5 metal-can package without a heat-sink, which is biased for efficient class C operation.

Power Supply

In a pinch, the DSW will operate at a lower power level with a fresh lithium 9+ VDC smoke detector battery. In the shack, I use a 13.5 VDC power supply or my emergency stand-by deep-cycle marine battery. For short backpack trips I use ten rechargeable AA alkaline cells in series, which amounts to about 16 VDC at full charge, giving me lots of operating time. For longer backpack trips I plan to use eight lithium AA cells in series. Their lighter weight plus excellent longevity compensate for their higher price when backpack weight becomes critical.

Summary

I built this small radio as a backpacking rig, and I've used it on five trips in the North Cascades of Washington state. It operates so well that I've also put in a lot of hours with it at the home station. It's definitely a keeper.

I also think Small Wonder Labs DSW kits would be excellent candidates for club projects. Sighted hams may want to build them for their visually-impaired friends.

Each DSW board-only kit including the shaft-encoder is priced at \$95. The high-quality custom-enclosure kit including external jacks and all other external controls is \$35. Shipping and handling costs \$3 to the US and Canada, \$10 to Europe, and \$20 to Asia/Pacific. The DSW kits are available for the 160, 80, 40, 30, and 20 meter bands.

Contact Small Wonder Labs at 80 East Robbins Avenue, Newington, CT 06111 (860-667-3536). You also can get more information about DSW rigs on the web at: <<http://www.smallwonderlabs.com>>.

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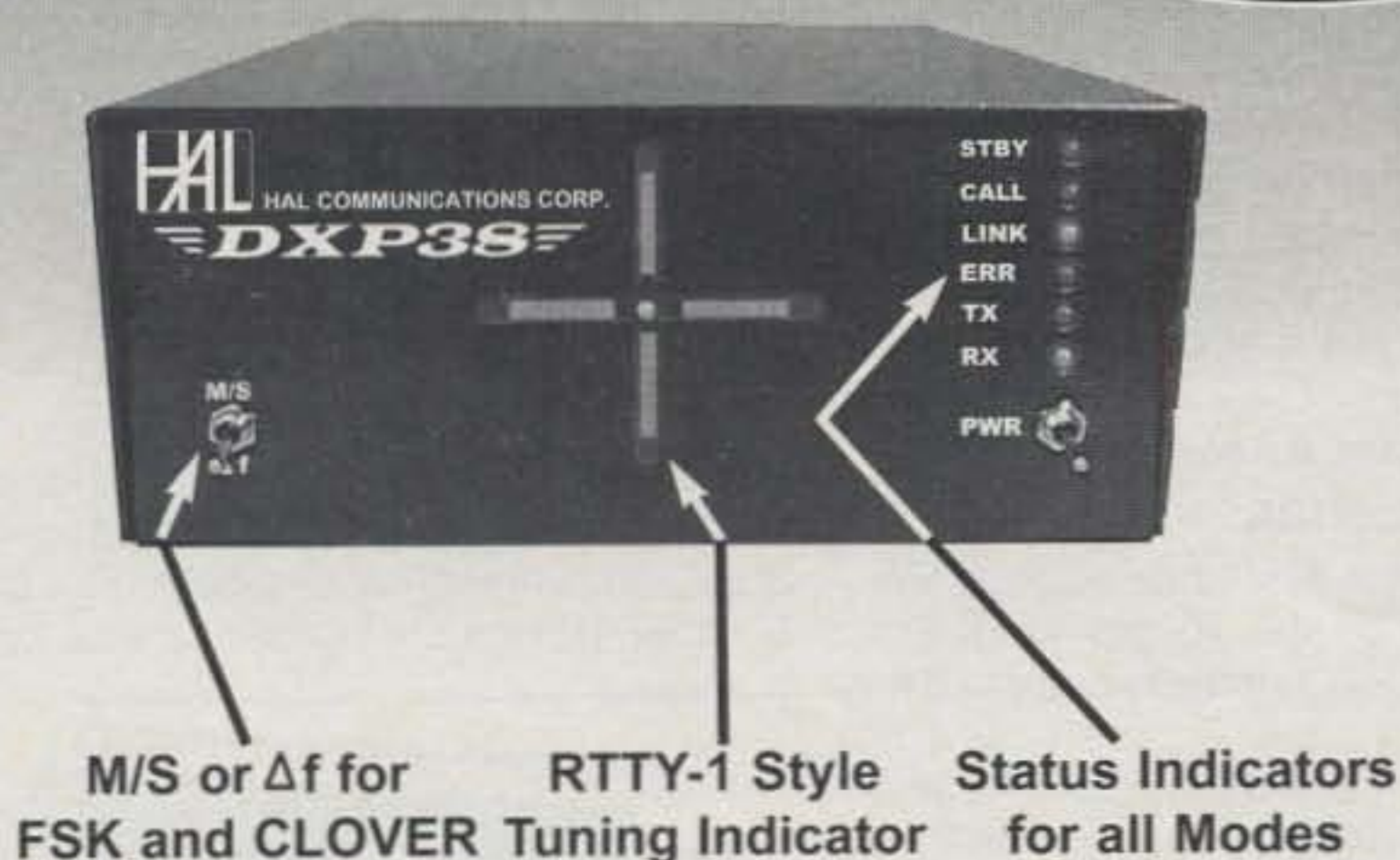
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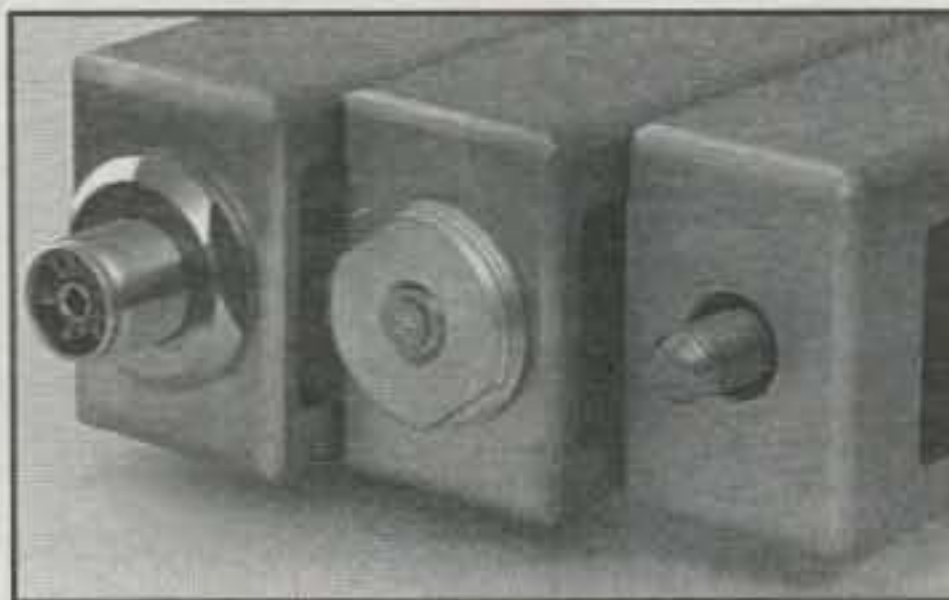


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CQ Showcase

Geotool Stake Pocket Antenna Mounts

GeoTool has announced three additions to its line of Pickup Truck Antenna Mounts. Included are the VHF-1 with an SO-239 adapter, VHF-2 with NMO connector, and SM-1 stud mount with 3/8"-24 grounded mounting bolt (other sizes available on request). GeoTool's antenna mounts are designed to anchor securely into the stake pocket and provide a strong mount for most antennas currently in use. The HF version has been used successfully with antennas as large as the Texas Bug Catcher and the 80 meter Hustler.



The VHF-1's SO-239 adapter fits many multiband VHF and UHF antennas on the market and also works with the new ATAS-100 HF "screwdriver" antenna from Yaesu. The VHF-2's NMO connector fits a wide range of new and older VHF and UHF antennas. The SM-1 mount is suited for use as a base for some screwdriver antennas, plus it can be used for mounting loop antennas for VHF and UHF SSB, since it is grounded to the chassis. GeoTool Pickup Truck Antenna Mounts can be seen at <http://www.geotool.com/antmount.htm>. For more information, contact GeoTool, 1280 Bison Ave. B-9 #414, Newport Beach, CA 92660 (telephone/fax 949-759-3166; e-mail: info@geotool.com), or circle number 101 on the reader service card.

CA-UHV Mobile Antenna By Comet Antenna

Comet Antenna has modified their CA-HV to resonate on the 70 cm band. The new model CA-UHV is initially designed for operation on 6 meters, 2 meters, and 70 cm and can be used as a tribander until HF operation is desired. It comes with HF tuning coils for 40/15/10 meter operation; 20 and 17 meter coils are available for purchase as well. The user decides which HF band(s) he/she wants to operate and adds the appropriate coil(s) to the antenna—one vertically and one horizontally. Six meters, 2 meters, and 70 cm stay consistent regardless of which coils are added. No special hardware required for mounting,

and a foldover hinge is built into the base. The CA-UHV is a 5/8 wave on 2 meters. When using the CA-UHV with the IC-706/MK11/G, or FT-100, the two connectors on the radio have to be combined into a single feedline to the CA-UHV. Two offered duplexers are the CF-530 and the CF-706A.

For more information on the CA-UHV, duplexers, and mobile mounts, contact NCG Company, 1275 North Grove St., Anaheim, CA 92806 (714-630-4541; fax 714-630-7024; orders 800-962-2611), or circle 102 on the reader service card.

WeFax '99 for Windows™ 95, 98, NT

Creative Services Software has announced that WeFax '99, a new 32-bit Windows WeFax program for the Kantronics TNCs, is available now in preview. Cost of the program is \$49.95 and it includes free updates to all 1.x releases. A demo version of the program can be downloaded from <http://www.cssincorp.com/wefax>. The program takes advantage of the WeFax mode of the Kantronics line of TNCs. It will allow the user to save the transmissions in .BMP (bitmap) format, print the transmission to any Windows printer, or e-mail it via the Internet.

WeFax '99 is available from amateur radio dealers, or contact Creative Services Software at 256-381-6100.

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All About The World Above HF

New 2 Meter Water Tropo Record

The following is from Clint Walker, W1LP, and gives details of a 2 meter QSO between KH6HME and W1LP/MM: "I first started hearing the KH6HME 2 meter beacon at about 0200 UTC on 8/20/99. The ship was in DL17 (off Baja, Mexico) heading for the Panama Canal from San Francisco. We also were having good tropo conditions up toward Los Angeles at the time. I got KH6HME's phone number from one of the W6's and gave him a call on the satellite phone. I told Paul that I would be far enough away from him for a world-record QSO at about 1800 UTC on the 20th, and I'd give him another call at that time if I was still hearing the beacon. I woke up a couple of times during the night, and the beacon was still there. It faded out at my sunrise, but then came back again mid-morning at 1730 UTC.

"I gave Paul a call and he headed for the beacon site at the volcano. After I hung up the phone, the 432 beacon came out of the noise also. I copied the 2 meter beacon until about 2000 UTC, when it faded out, before Paul's arrival. I called Paul all afternoon on 2 meters and still was able to copy the 432 beacon. I never heard a thing on 2 meters except for W6's off the side of my antenna at 1000 miles! At about 0100 UTC the 2 meter beacon emerged again from the noise. Both beacons were loud by 0200 UTC.

"I was puzzled and began to wonder if Paul had ever made it to the volcano. I gave his house a call, and he was just walking in the door. Paul said he had been calling me all afternoon on 2 meters and never heard a thing. I then told him I had been hearing the 432 beacon all afternoon and would have killed for a way to get him to shut it off and listen. I played the S-9, 2 meter beacon into the phone for Paul. He said he would get a quick bite to eat and then head back to the volcano.

"This time we had a little better luck. At 0740 UTC I heard the 2 meter beacon shut off and knew he was there. I glanced at the GPS in my cabin and it read DL51CE. I gave Paul a call and was greeted by: 'W1LP this is KH6HME. Congratulations on a new world record.' I gave Paul a 52, and he gave me a 51. We exchanged grids and said, '73, see you on 432,' and that was it. I called Paul on 432 on CW and SSB until 1000 UTC to no avail, when

VHF Plus Calendar

Nov. 27-28	Second weekend of the ARRL EME contest.
Dec. 5	Poor EME conditions.
Dec. 7	New Moon.
Dec. 10	Moon apogee and lowest declination.
Dec. 12	Poor EME conditions.
Dec. 14	Geminids meteor shower predicted peak.
Dec. 15	First quarter Moon.
Dec. 19	Moderate EME conditions.
Dec. 22	Full Moon.
Dec. 23	Ursids meteor shower predicted peak. Moon perigee and highest declination.
Dec. 26	Excellent EME conditions.
Dec. 29	Last quarter Moon.

we sailed through a front and squall line. The tropo had already disappeared, but now I knew it would not be back.

"It was a shame we never made it on 432. The beacon had been S-5 only moments before Paul arrived at volcano. I do know that the QSO we had on 2 meters was as far as that weather system would support—BK29go to DL51ce 4743 KM / 2947 miles. My station on the ship is a Yaesu FT-847, 200 watt 2 meter brick amplifier, 9-element M² on 2 meters, 21 element M² on 432; both antennas are about 80 ft above the water."

Big 2 Meter Aurora Opening

An aurora-driven opening occurred on 22 September. Following are a couple of reports from the VHF reflector.

Dave, W6OAL: "Well, gang, what a surprise. My 6 meter rig growled at me at about 2300 UTC this afternoon here in DM79 with a nasty, raspy tone. Thus, we worked about half a dozen stations to the northwest of Denver while waiting for the 2 meter amp to come alive. Jumped on 2 meters, and wow—just like 'old home week.' Everyone was on CW, and I managed to work about 18 QSOs over 10 states. I hadn't worked a daytime aurora before, so I was in wild anticipation of everything and anything. Got back as far as Indiana to the east and up into Minnesota to the north. Sure would like to hear New England, and especially that illusive Vermont."

Mike, KM0T: "Hi, all. What a night. Good, solid AU opening on 2 meters. Worked K1UHF in FN31 as the best DX; also worked best DX to the west DN70. I solidly heard K4QI in FM06, but no an-

swer to calls. Also heard WI7Z in DN06, but he never heard me."

Big F2 Opening Follows Aurora

What often happens with an aurora event during high sunspot activity is a follow-up F2 event. Such an event occurred the evening of 22 September. What follows are reports that appeared on the VHF reflector.

Continuing Mike, KM0T's report: "I went to have some dinner and came back just in time to work three VK4 stations on 6 meters SSB. One fellow indicated that the band had not opened on 6 meters to our neck of the woods for over 10 years. I guess it pays to be in the right place at the right time. It was truly an experience to be had."

Jay Hainline, KA9CFD: "After listening to the aurora signals I decided to turn the beam west-southwest, and lo and behold I was hearing video signals from ZL and VK TV. I tuned up to 50.110 and a VK4 started calling CQ! I worked the following stations (date and times are in UTC): VK4FNQ, 0047; VK4DO, 0048; VK4ABW, 0050; VK4NW, 0053; VK4JH, 0056; VK4GPS, 0102; VK4KK, 0105; and VK4PU, 0109. I also heard VK4BRG, who was my one and only QSO with VK land from 1989! On the propagation page, JA3EGE said he heard me on backscatter! Such a deal!"

Dick Lust, K9APW, EN53: "VK4PU in PG75 was worked at 0100 UTC on 50.130 MHz SSB. Many upper Midwest stations made QSOs with VK stations between 0030 and 0110 UTC after the aurora quit here. I have been on 6 meters since the early 1970s, and this is the first really solid VK to W9/Wisconsin opening I have heard! Many VKs worked by many W9s and W0s! New DX for us here! Autumnal equinox helps—maybe?"

Pete, WA5JCI, EM21: "Greetings. Worked VK4BRG QG48 at 0120. Signals were 59, very strong both ways. At 0125 worked VK4PU QG63. Signals were 559 both ways."

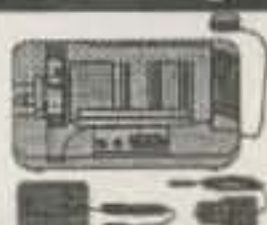
Bill, WA0KBZ: "On September 23, 1999, between 0100 and 0130 UTC, I worked VK4DO QG49 and VK4BRG QG49. Nice F2 into EM48 Missouri."

Bill, N0XX/7, CN84: "Had a surprise opening. While the Midwest guys were working VK, I worked 6 PY2's in the Sao Paulo area. After 10 years I finally worked PY5CC, among others. Signals varied from weak to 59+20 from 0100-0120.

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CIRCLE 88 ON READER SERVICE CARD

Had VK and ZL video strong here, but no signals from the Pacific."

Fred Carvalho, PY2XB, GG66pi: "It started around 2130 UTC with 3C5I, then 4X1RF, 9H's, Caribbean, and the States (W7, W8, W9, and W4), from Oregon/Washington to Florida. Very selective to the States—only a dozen stations worked. NØXX/7 peeked S9+30!"

George, KØFF: "Well, wasn't this a welcome surprise! The VK4's were rolling in, and I worked my very first one running only 40 watts. KH6 was also worked quite far inland (but not as far as Missouri). This particular opening came on the heels of a rather energetic AU session, and I'm trying to grasp the significance, if any, this has to with the health of Cycle 23. The solar flux was only at 140, but the A was at 29. This is a pretty low solar flux to be expecting this kind of opening, and more important it's about three or four weeks too early. Has anyone experienced this kind of widespread opening this early in the year before? Maybe this is the cycle we've been waiting for after all."

Ed, N5JEH, DM65RD: "Watching some of the spots last night of the U.S to VK opening, the stations I worked were different. It might be interesting to see how that opening moved around the U.S. The contacts I made were in QG65 and QG62. Stations worked were VK4NW, 0128; VK4APG, 0129; VK4JSR, 0130; VK4DMI, 0131; and VK4FI, 0135. No other calls were heard and all VKs were gone by 0140. Then it was KH6 until 0150."

Mark Brown, KBØPYO: I managed to catch VK4NW at 0105 and VK4KK at 0110. VK4KK was in and out for over a half hour from around 0050 or so. Also heard was ZL2TPY around 0100."

Paul, AJ4Y: "HC8N was worked with a big signal here in EL97 at 2140 UTC 24 September for an all-time new one on 6."

Mike, W8MM: "On the next day after the VK opening I worked PY2XB, PY5CC, and LU9EHF from 0119 to 0126 UTC from here in EM79sd. This was as soon as I started to here them. LU9EHF was in until 0144 UTC, with WA1OUB spotting him at 01:39 UTC. Spots for the VK4s were around 0108 UTC from the K9s who were reporting on the DX Cluster."

The VK View

Bill, WA6ITF: "I correspond by e-mail with Q-News editor Graham Kemp, VK4BB, and we have been discussing last week's W9-VK opening. Q-News is kind of the *Newsline* of Australia, and below is some of the info he was able to elicit from his listeners—including the list of confirmed contacts made by VK5LP with U.S. stations. It's kind of the VK view on the opening. Hope you all enjoy reading it."

Ron Graham, VK4BRG: "On 23 September VK5LP worked the following: 0110 W7XU; 0112 KØFF; 0113 WØSD; 0114

N5DDB; 0116 WAØKBZ; 0117 K9KE; 0118 KØTLM; 0120 WØFN (lost); 0122 WA5JCI; 0123 W5WP; 0125 WA5TKU; 0126 W3UUM; 0127 N5WS; 0128 AA5XE; 0129 W5OZI; 0130 W3XO/5; 0132 W5UWV; 0133 K5VH; 0134 W5AAW; 0135 KC5NOB; 0136 WA5UFH; and 0137 KC5NOA. All were two-way SSB. Most signals into this QTH were S9 or better. Main problem was sorting stations out from the pileup. Most contacts were on 50.130. When things got quiet there I would go back to 50.110, try to attract some attention, and move back to 50.130. Most stations exchanged grid squares. Most easterly station was in Illinois. Six new grids and one new state. Interesting solar conditions were predicted a week or so ago for the period from the equinox through the end of this month.

8P6CV's DXpedition Report

Stephen Thompson, 8P6CV: "The following is a report on my activity from Barbados. There were three openings. The first was on July 7th—an Es opening to W (Florida and Texas) and KP4. I was also heard in Colorado, but was not able to copy the station. The USA grids worked were EL29, 49, 95, 96, and EM12. The next was TEP on the 8th of September to LU and another TEP on 24/25 September to LU and PY. In total, I worked five countries and 14 grids."

Bob Cerasuolo, W6IJZ, SK

The following is from *Pat Coker, N6RMJ:* "I am sorry to tell all of you that as of Tuesday, September 21, 1999, we have lost another one. Bob Cerasuolo, W6IJZ (ex-WA6IJZ), editor and founder of the "West Coast VHFer Newsletter," passed away. Bob had been very active on the VHF bands for many, many years. The last time I saw him was at the Fort Tuthill ham-convention in July. After leaving there, Bob had a massive heart attack and recovered very nicely. But then last Friday Bob had a massive stroke that put him in a coma, from which he never came out. On Tuesday he passed away."

Dave, W6OAL: "Very sorry to hear of Bob Serasuolo's passing. I knew Bob for many years when he lived and had his surplus business in Oxnard and Ventura. I know that he carried on the newsletter when Wayne Overbeck, N6NB, gave it up or sold it to Bob sometime in the mid-70s. He was a spark plug in the Oxnard Radio Club. An, yes, he will be missed."

Ron, K6MPG: "I too was saddened by the news of Bob Serasuolo's passing. It was always great to contest with Bob (September '86 WA6IJZ multi-op from Mt. Pinos comes to mind) and listen to his fascinating and ribald stories on Friday night. I will certainly miss him and his unmistakable voice (It's been said that Bob didn't need a radio to work DX.) on 6 meters."

Although we never met, I knew Bob via correspondence and telephone chats almost from the beginning of my tenure here. Bob always was a gentleman and a person with whom this then-novice columnist could get and discuss ideas. I will really miss his editorship of the "West Coast VHFer," but more than that I will really miss his friendship.

New Sunspot Peak Announced

Updated predictions from NASA scientists place the solar maximum in mid-2000.

The following is from NASA's home page of October 14, 1999 and is presented courtesy NASA's Marshall Space Flight Center, Space Sciences Laboratory <<http://science.nasa.gov>>.

"Beginning in late September, a continuing series of minor to moderate geomagnetic storms have triggered aurorae along the northern tier of U.S. states and may have affected some public power systems operating at high northern latitudes. These events were caused by high-speed material streaming out from areas on the sun known as coronal holes.

"The recent increase in geomagnetic activity offers a taste of things to come as the Sun approaches the maximum of its 11-year sunspot cycle. As sunspot numbers mount, coronal mass ejections and solar wind disturbances will trigger more and more geomagnetic storms. In extreme cases, these storms can induce electric currents in the earth and oceans that interfere with electric power transmission equipment.

"The extra ultraviolet (UV) and X-ray radiation created by magnetic fields around sunspots also cause the Earth's atmosphere to heat up and expand. This creates added drag in the area where low-earth orbit satellites and the Space Shuttle orbit. Solar flares and energetic particle events further complicate matters by interrupting satellite and shortwave radio communications. It's not all bad news, though. The increased levels of solar activity will likely trigger dazzling auroral displays at mid-latitudes. Sky watchers in the continental U.S. will be treated to sights normally reserved for residents of higher latitudes. Another piece of good news is that increased atmospheric drag at solar maximum acts as a scavenger and helps clean out space debris from low-Earth orbit.

"When will the solar maximum actually take place? Recent work by David Hathaway, a solar physicist at the Marshall Space Flight Center, and his collaborators indicates that the solar activity will peak around the middle of the year 2000. 'Our predictions have consistently targeted 2000 as the beginning of solar maximum,' says Hathaway, 'but the latest numbers suggest that the peak sunspot count in 2000 will be a bit lower than expected. [According to NASA's chart, the

smoothed sunspot number is expected to peak around 135-140.—ed.] The projected peak is comparable to, but lower than, the peaks of the last two maxima (in 1989 and 1978). That would put all three of the recent sunspot maxima in the same class—above average compared to all the sunspot cycles since the mid 1700s.'

"A common misconception about the solar maximum is that it is a brief event that happens on a particular day, as reported in one recent news story that warned of a solar catastrophe on January 1, 2000. Not so,' says Hathaway.

"The sunspot maximum is usually a broad peak. There is a two- or three-year period when activity is quite high. I wouldn't say that we're really in the solar maximum yet. I expect solar activity to be highest in 2000 and 2001, and then in 2002 it may decline back to where we are now in October 1999.

"The effects we've been experiencing for the past few weeks [in August and September] are relatively minor geomagnetic disturbances caused by the solar wind flowing out of coronal holes. A coronal hole is something you see in X-ray pic-

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tures of the sun where the corona appears dark. In contrast, bright spots in the X-ray image tend to overlie sunspot groups where hot gas is bottled up in magnetic fields that rise up out of one sunspot and bend back to reconnect at another spot nearby.

"The magnetic fields around coronal holes are different," Hathaway continued. "Instead of looping back to reconnect on the Sun's surface, these magnetic fields are essentially open. They go way out into the solar system and no one knows exactly where they reconnect. These open-field lines allow high-speed solar wind particles to escape."

"In fact, the solar wind streams off of the Sun in all directions, not just from coronal holes. But the wind speed is high (800 km/s) over coronal holes and much lower (300 to 400 km/s) elsewhere. The higher-pressure streams from coronal holes buffet the Earth's magnetic field and can produce geomagnetic activity."

"For more information about space weather and current solar activity, including official alerts, warnings, and forecasts, see NOAA's Space Environment Center web site at <<http://www.sec.noaa.gov>>."

Current Contests

The second half of the ARRL EME Con-

test is November 27-28. Complete rules are in September *QST*.

Current Meteor Showers

Two showers occur this month. The first, the *Geminids*, is predicted to peak around 1050 UTC, 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 0110 UTC, 23 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.

Big Dishes Available

The following is from the Moon-Net reflector, Randall Brooks: "If anyone is interested in taking up radio astronomy, here's an opportunity. The 32 dishes of the Algonquin Radio Observatory's solar interferometer are being disposed of. All facilities at ARO except the 46 meter telescope were closed down in 1982 and in 1996 the property reverted to the Ontario Ministry of Natural Resources. The 46 meter is still in operation.

The MNR is about to dismantle the remnants of the buildings and equipment. Hence, this is a last chance opportunity to acquire some of the equipment. I'm passing on the following note from the contact person, Ralph Connor, if you might be interested. Four dishes have gone to a group in the Ottawa Centre and one has been acquired for the collection of the National Museum of Science and Technology (including key components of the very first VLBI). I have digital images of the interferometer for anyone who may be seriously interested. Send requests for the images to me, Randall Brooks, at <RBrooks@nmstc.ca>."

"Re: Disposal of Long Baseline Interferometer Antennas and Equipment: The Long Baseline Interferometer (LBI) was located at Lake Traverse, Algonquin Park, Ontario, Canada. It was constructed in 1961 and operated until 1982.

"The facility can be reached via Peta-wawa and the entrance to the Sand Lake gate of Algonquin Park. It is approximately 86 km from departing Hwy 17. About 71 km of the road is graveled but kept in excellent condition for personnel who man and staff the 46 meter main dish. The LBI site was vacated in 1965.

"The LBI facility consists of a 900 foot long building and some 32 identical 3 meter parabolic reflectors made of spun aluminum by Bristol Aerospace of Winnipeg. The LBI was used to conduct research into solar flare activity and was laid in a precise east-west line and scanned the surface of the Sun's emissions as it rose. There is some azimuth

control as well as +/- 22.5 degrees of elevation control in the mounting structure.

"The dish reflector is detachable by removing 50 bolts which fasten through a circular aluminum casting attached to the cast-iron mounting frame. Weight of the aluminum dish is estimated at 165 lbs. Weight of the supporting structure, including drive motors and gear reducers and elevating gear segment, is about 750 lbs. The heavy base section can be removed by undoing the four large mounting bolts.

"The feedhorn arrangement uses a 'J' feed of aluminum which is secured to the center of the dish with eight removable bolts. The rigid copper waveguide used to feed the array is known commercially as WR-284 and has dimensions of 3" x 1.5". Solid brass flanges connect with 1/2-20 stainless bolts.

"Operation of the array was conducted at 2.8 GHz and the photos show the 110 volt drive motors and gear reducers as well as the requisite waveguide hardware to connect to the rotary joint. These are all removable from the rear of the mount. While some surface rust and paint weathering is evident, the antennas appear to be usable, as the design is very robust.

"The antennas/mounts are being offered on an 'as is-no warranty' basis and the buyer will be required to remove them. As a matter of interest, five complete antenna systems were removed in about five hours on September 18 using a fork lift and flatbed for transport.

"This facility is slated for demolition early in 2000 due to the presence of asbestos in the building and lack of funding, as well as outdated technology. It is currently owned by the Provincial Ministry of Natural Resources, and I am acting as their sole agent for disposal. Money received from recovered assets will be used to return the site to its natural state.

"Applications for these antennas would probably require new LNAs to be installed, but the feedline requirements would be lessened due to the lower frequency of converted signals. It is hoped to attract groups or single experimenters and those using such equipment for training, education, and/or advertising.

"Pricing has been established as follows: Quantity 1-2, \$250 each, 3-9 \$200 each, 10 or more, negotiable. I will be pleased to answer any queries pertaining to this offer for sale."—Ralph Cameron, 30 St. Remy Drive, Nepean, ON K2J 1A3 Canada (telephone 613-825-1634; e-mail: <ralphc@igs.net>).

Southeastern VHF Society Announces 2000 Conference

The Southeastern VHF Society will host its Fourth Annual Conference on April 14-15, 2000 at the Atlanta Marriott Northwest, I-75 and Windy Hill Rd., Marietta, GA (Same location as the first three conferences). This notice constitutes the first call

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for presentations to be made at the 2000 conference and papers to be published in the conference proceedings (submissions due by February 18, 2000). Contact program chairman Bob Lear, K4SZ, at P.O. Box 1269, Dahlonega, GA 30533 (706-864-6229, e-mail <k4sz@arrl.net>). In addition to the technical program, there will be preamp noise figure testing, antenna gain measurements, a fleamarket, banquet, and door prizes. Further details will be announced here and on our web site, <<http://www.svhfs.org/svhfs/>>.

And Finally . . .

We are on the eve of the end of an era. At the end of this month we will be looking at the last year of our old millennium. When I was a kid I thought that this time was a long way off. Now that it is here, I am amazed that it got here so fast.

This month is a time to do some introspective thinking. What have we done with this past year that's worthwhile? Some of us in the hobby have participated in pioneer work. Others have accomplished personal goals. Still others have been involved in altruistic activities such as using our hobby to help others in disasters. Whatever we have done or accomplished, we should never sit on our laurels.

People come up to me after I have delivered a sermon and say, "Nice sermon, Preacher." It strokes my ego just a bit, but I also realize that my reputation as a preacher is only as good as my last sermon. The same goes for us in the hobby. People recognize that we have done something worth noting. However, fame is fleeting and our noteworthiness is only short-lived. We must continue to focus on what we can do that is worthwhile and a contribution to our hobby.

For me, as it should be for all of us, I am challenged to continue to improve, to do something new, to accomplish something else. I cannot sit idly by, because that is not what I was created for. Indeed, we all have a responsibility to live our lives to the fullest, to do the best we can with what is set before us to accomplish.

This month we traditionally think about altruistic activities. If you haven't already done so, work on ideas that you can accomplish during the season. Perhaps one of the ideas is to play Santa Claus over the radio—or even in person. Believe me, it's lots of fun to be Santa. I can testify to that because I have "suited up" on more than one occasion.

Maybe your altruistic thoughts will lead you to do something that has nothing to do with amateur radio. Whatever you find yourself doing, do it with all of your heart, because when you do, you will find your heart strangely warmed.

May you and yours enjoy the best of the holiday season.

Until next month—next year . . .

73, Joe, N6CL

Some Things Never Change.



Fortunately, the Kachina 505DSP isn't one of them.

Chances are, the HF rig you bought several years ago is exactly the rig you have today. If you didn't like it when you bought it, you probably don't like it now. The 505DSP, on the other hand, has continually evolved as hams like you have let us know what features you'd like to see added.

Control-software upgrades are available free of charge from our Internet web site, enabling you to add most new features or enhancements to your radio as soon as they are announced. Over the last few months we've added CW Tx buffers, CW keyboard transmission, keyboard frequency entry, frequency display reverse video, log book CD-ROM support, telephone line and wireless remote-control capability, coarse-tuning slide bar... and on and on. We've also made it easier for 3rd-party logging/contesting programs to interface with our software. LOGic and Log-EQF are among the programs now compatible with the 505DSP.

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Others have begun to imitate the 505DSP's "no knobs" approach. Still, nobody but Kachina gives you the performance of a \$4,000 radio at nearly half the price. Compare the 505DSP's specs below with some of the most respected conventional HF radios available and you'll see what we mean.

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RX Frequency Range	30 kHz-30 MHz ✓	100 kHz-30 MHz	100 kHz-30 MHz	100 kHz-30 MHz
RX Sensitivity (SSB-2.4 kHz, 10 dB S/N, preamp)	.18µV	< .20µV (1.705-30 MHz)	25µV	.16µV (1.8-30 MHz, filter not specified) ✓
RX IF Rejection	> 80dB ✓	>70 dB (1.8-30 MHz)	>80 dB ✓ (1.8-30 MHz)	>70 dB
RX Audio Output (4Ω)	4 Watts ✓	1.5 Watts (8Ω)	2 Watts	2.6 Watts (8Ω)
TX Carrier Suppression	> 55 dB ✓	> 50 dB	> 40 dB	> 40 dB
TX Unwanted Sideband Suppression (1KHz mod.)	> 55 dB ✓	> 50 dB	> 50 dB	> 55 dB ✓
TX Spurious and Harmonic Radiation	< 60dB ✓	< 40dB (Spurious only)	< 50 dB	< 60 dB (Spurious only) ✓
Int. ATU VSWR Capability	3:1 ✓	3:1 ✓	3:1 ✓	2:1
Price w/ATU (Source: AES Summer '99 Catalog)	\$2,199.95 ✓	\$3,999.95	\$4,199.95	\$6,599.95

Note: All figures based on respective manufacturer's published specifications. The 505DSP is Proudly Made in U.S.A.

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Thanks to a tip from KF9YL, we found out that in a county-wide referendum last November, south Florida voters approved changing the name of Dade County to Miami-Dade. According to a press release from Mayor Alex Penelas, this became effective immediately. The name change was supported by business and civic leaders, including the Greater Miami Chamber of Commerce, the Greater Miami Convention and Visitors Bureau, and the Beacon Council, Miami-Dade County's economic development agency. This name change will be supported in the next reprint of the *CQ USA-CA* counties record book. Note this is just a change in name, not the formation of a new county.

Jack DeLorme, K7DZE USA-CA All Counties #982

The following story comes from Jack DeLorme, K7DZE, USA-CA All Counties #982, August 30, 1999.

When I enlisted in the Army and had my Basic training at Ft. Lewis, I didn't have a clue as to what they wanted me to do somewhere down the road. I was given the opportunity to take some tests, though. Little did I know where that would lead.

After completing Basic, I was sent to Vent Hill Farms Station, located in the hills of Virginia, some 50 miles or so south of Washington, D.C. Would you believe code five days a week for five months? I did manage to graduate at 28 words per minute. I then was sent to Ft. Monmouth, New Jersey, where they decided that I needed to pack an ANG/RC 9 radio, climb up and down the hills, and send lots of code. I started my training in early April 1946 and finished November 30 the same year.

I chased code for about three years and ended up being assigned to the 60th Signal Service company at Ft. Lewis, Washington. The company had a ham station (W7LAL), and I was assigned the job of keeping it open as often as I could. I did not have the theory mastered, so it was study, study, and more study.

The Korean War took me away from the amateur radio field until about 1954. At that time I was stationed in Germany, and several people assigned to my company were ham operators. Along came my call, K7DZE (May 1964). My first contact was with a Heathkit AT-3 late at night running 5 watts max. I used a long wire for about two years, and when I was required to move into military housing, I decided to go for broke. I ran a homebrew pair of v70D's on CW for the next year. I finally put in a modulator and I was in business. I've never looked back.

I used the call DL4TZ from Bad Aibling, Germany for five years and even was involved in a CQ WW Contest during that period. I won something, but I don't remember what it was—

65 Glebe Road, Spofford, NH 03462-4411
e-mail: <k1bv@top.monad.net>

USA-CA Special Honor Roll

Jack W. DeLorme, K7DZE
USA-CA All Counties #982
August 30, 1999

Tony Mazzocco, WA9DLB
USA-CA All Counties #983
September 23, 1999

something to do with single band, single operator and all on 15 meters (I think). From there the Army sent me to Ft. Devens, Massachusetts, where I built and ran 6 meter mobile all over the New England area. Still moving around, I was sent to Japan and ran KA9JD from Hokkaido Island, northern Japan. I returned to the States, but had not yet run into county hunting. I may not have been up and running at that time. I was sent to Korea in 1964-65 and used the callsign HL9JD. I returned to the States and spent some time again at Ft. Devens. After a short stint I returned to Japan and was KA7JD from southern Japan (Hakata station). I returned to the States, and having accumulated 23 1/2 years of service I decided to give it up.

I had to do something, so I went to work for the U.S. Immigration Service. The beginning years were very busy, and amateur radio was not a top priority. I was working mostly on 10 and 15 meters. It was in the late '70s or early '80s when I ran across the county hunters. I also found that my son-in-law Harley, WB7PMZ, was also active from North Dakota, and he worked overtime trying to get me active. I think my first contact as a county hunter was in early 1981. I got as serious as the job would allow in 1983. Although it took a very long time to get #982, it was worth it to talk and meet many of the hams who were directly involved. I traveled across the U.S. three times during 1990-95 and met about 20 hams while on the road. One trip I will never forget was in 1991, when Bill, WA3ZMY, W3XE, and a number of other hams and I all got together and had a great lunch at the Chesapeake Bay restaurant. It was so good that we did it a second time a year and a half later.

I spent many hours as alternate net control with Paul, WA3TUC, and others. Amateur radio is one of the most enjoyable hobbies, especially if you are involved with county hunting.

I am not going to quit at this point, either. I have started again, the second time around. I have worked 2137 on CW just for fun and I have 164 to go for "bingo," so it will be fun to continue. We plan to go mobile again this fall, traveling as far as Texas, and I will run counties all the way. I might get lucky and work all of southern Texas. I have 938 mobile, and I would like to have 2000 or more when I quit.

I am now running a TS-440 driving an SB-1000 (Heathkit) and using a TH6DXX at 45 feet. I run a TS-440 and a large Texas Bugcatcher from the front of the truck. Listen up! K7DZE will be on the road again very soon.

73, Jack, K7DZE

USA-CA Honor Roll

500		2000	
K7DZE.....	3090	K7DZE.....	1170
CE6NES.....	3091	WA9DLB.....	1171
ON8AW.....	3092	KL1V.....	1172
WA9DLB.....	3093		
KL1V.....	3094	2500	
		K7DZE.....	1095
		WA9DLB.....	1096
		KL1V.....	1097
		3000	
		K7DZE.....	999
		WA9DLB.....	1000
1000			
K7DZE.....	1525		
WA9DLB.....	1526		
KL1V.....	1527		
1500			
K7DZE.....	1270		
WA9DLB.....	1271		
KL1V.....	1272		

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is \$4.00. For nonsubscribers it is \$10.00. 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 March 1, 1997. 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.

DX Awards

The Russian Central Radio Club award series, which we began last month, will be continued in a future column. This month we will cover a few awards that recognize the year 2000.

Canadian QRP Award for the Year 2000. Make one contact with each of the 13 Provinces and Territories of Canada during calendar year 2000 using QRP. QRP is defined as using no more than 5 watts CW or 10 watts PEP SSB. This group also sponsors the "regular" Canadian QRP award, and if you have not applied for this one, both certificates will be issued at no additional cost. The certificates are printed in color on gold embossed paper. The contacts do *not* have to be confirmed; if the contact was made, then it counts for the award. A special plaque will be issued to the first amateur radio operator to complete the requirements of the Canadian QRP award for the year 2000 and who submits an application. Send in log data plus fee of \$US5 or 3 IRCs to: Canadian QRP Award, c/o Jeff Hetherington, VA3JFF, 3399 Cardinal Drive, Niagara Falls, Ontario, Canada L2H 3A6 <<http://www.systems95.com/users/jeffh/rules.htm>>.

Canadian provinces/territories are as follows:

Nova Scotia VE1, CY0, CY9

Quebec VE2, VA2

Ontario VE3, VA3

Manitoba VE4

Saskatchewan VE5

Alberta VE6

British Columbia VE7, VA7

Northwest Territory VE8

New Brunswick VE9, VE1

Yukon Territory VY1

Prince Edward Island VY2, VE1

Newfoundland VO1, VO2

Nunavut VY0

Germany Millennium Award DL 2000.

The Weinheim branch of DARC DOK A-20 is offering this award for confirmed QSOs from 1 September 1999 on to celebrate the new millennium. SWL okay. The award is 210 x 297 mm, four-color on heavily coated boxboard paper. Several stations will be on the air to celebrate this occasion, including DL2000, which will be active leading up to the specified period and will count for the award. Special stations set up in other countries for this occasion, for example ZL2000, will count. (See the item on ZL2000 later in this column.) Make contact with six different millennium special event stations (above 30 MHz only three needed). All bands and modes may be used. Send GCR list of received QSLs and \$US10 or 10 Euro fee to: Diploma Manager DARC-OV Weinheim, Horst Poelitz, DF7ZH, P.O. Box 1213, D-68537 Heddesheim, Germany.

Israel's Shalom-2000 Award. Issued and sponsored by the municipality of Nazareth-Illit City and the Israel Amateur Radio Club, this multicolor award measures 21 x 30 cm and each one is personally signed by the Mayor of Nazareth-Illit City. Amateurs and SWLs around the world need to collect 2000 points in QSOs or SWL with Israeli stations. All eligible stations may be worked only once; no duplicate contacts on other bands or modes allowed.

A. QSOs with club station 4Z4SZ count 300 points.

B. Each QSO with amateurs from the cities of Nazareth-Illit, Jerusalem, Haifa, Tiberias, and Lod count 100 points.

C. QSOs with stations 4X1AT, 4X1IM, 4X1UK, 4X4CD, 4Z4RJ, 4Z4KX, 4Z5AF, 4Z5BO, 4Z5FW, 4Z5JM, and 4X6DK count 150 points.

D. QSOs with any other Israel stations count for 50 points.

Contacts may be made on or after 1 April 1999. Send GCR list and fee of \$US7 or equivalent to: Shalom-2000 Manager, P.O. Box 13082, Nazareth-Illit, Israel.

New Zealand ZL2000 Award. This is the last of a special series of colorful awards spanning a five-year period, all leading up to the year 2000. The rules are the same as for any of the preceding cer-

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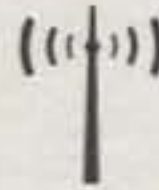
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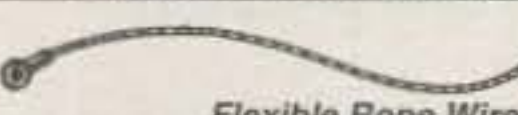
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See CQ Amateur Radio Magazine February 1994, Pg 68, Antennas And Accessories J. Martin "Ground It" Bus

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MILLENNIUM AWARD DL 2000

Zur Jahrhundert- und Jahrtausendwende wurde dieses vom Deutschen Amateur-Radio-Club e.V. anerkannte Diplom entsprechend den Diplombedingungen durch den Ortsverband Weimheim, DOK A20, verliehen an:



Heinz Joachim Schilling
DL3-1XX

DARC

Datum: 19.09.1998 Diplom-Nr.: 3 Diplomempfänger: J. Schilling

The Millennium Award DL 2000.

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CIRCLE 50 ON READER SERVICE CARD

tificates, namely to make one contact with ZL2000 at any time during January 2000. This year the award pictures a symbolic sunrise over the towering New Zealand mountains on New Year's Day 2000. The cost of the award is \$US10 (\$Aus/NZ5 for the South Pacific Basin countries). Apply to Ric Coleman, ZL2RIC, ZL2000 Custodian, P.O. Box 1017, Gisborne 3815, New Zealand. You may contact Ric via e-mail at <ricol@xtra.co.nz>.

Ric thanks the many amateur radio operators around the world who have given them a great time in each January for the past four years. Some good friendships have been made as well as some rare contacts. He also thanks CQ magazine, who has supported this effort.

A special presentation-quality desktop clock in a case handmade of a rare New Zealand wood will go to just one DX station who has worked ZL2000 for four out of the five possible years, including the upcoming January 2000. All stations who meet this requirement will be placed in a drawing carried out by their constabulary (police station to us), and the winner, no matter where he or she lives in the world, will receive the clock free of charge.

Sweden's SSA 75 Award. Sveriges Sandareamatorer (SSA), the Swedish member society of the IARU, is sponsoring the SSA 75 Award, which celebrates the 75th anniversary of the society. Contact Swedish stations during the calendar year 2000 and earn a total of 75 points

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CIRCLE 62 ON READER SERVICE CARD



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Nazareth Illit Municipality
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NAZARETH ILLIT AWARD

SHALOM 2000

This certifies that _____
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two-way communication with 4Z4SZ - in Nazareth Illit
and with other Amateur Radio stations in Israel.

M. Atlas Mayor
Award Manager
4Z4CD (DL, UC2RD, UICD)

Award Number: _____ Date: _____

The Shalom-2000 Award is issued and sponsored by the municipality of Nazareth-Illit City and the Israel ARC.

GISBORNE AMATEUR RADIO CLUB Inc

ZL2000

GISBORNE 2000 AWARD FOR 2000

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NEW ZEALAND

Photograph by Dunstan & Kings

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NEW ZEALAND THE FIRST CITY OF THE SUN NEW ZEALAND

New Zealand's ZL2000 Award.

from the following schedule:

Swedish stations = 1 point.

Swedish club stations (SJ, SK, SL, and other special calls) = 2 points.

District anniversary stations using the prefix "SI" = 5 points.

HQ anniversary station SI75A = 10 points.

Contacts on VHF count double; if using a repeater, it is normal value. Each station may be worked one time per band. Endorsements for single band, mode, and QRP. Send log entry application with fee of 40SEK, \$US5, UK£3, DM10, or 5 IRCs to: SSA Awards Manager, Bengt Hogkvist SM6DEC, Harenegatan 11A, SE-531 34, Lidkoping, Sweden. A special record book and software are available, but they are

not required. Contact Bengt via e-mail at <bengthogkvist@swipnet.se> for details and cost.

Internet Site of the Month

A very large selection of Italian awards may be found at: <<http://www.425dxn.org/awards/awards.html>>. At last count, rules for some 47 awards are shown here in both English and Italian.

My monthly request for award samples has been more successful than I hoped. If you've sent me information, thank you very much. And please be patient. We'll get to all of them eventually.

73, Ted, K1BV

Föreningen
Sveriges Sändareamatörer

SSA 75

SSA 75th Anniversary

This is to certify that

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has submitted satisfactory evidence of having conducted twoway communication with Swedish amateur radio stations during the SSA 75th Anniversary in year 2000

Endorsement: _____

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A Contest Club Resource Guide

December's Contest Tip

How many of you operate contests with your eyes closed? If you're like 99.999% of most testers, you use your eyes as well as your ears when operating. The need for adequate lighting is a key element of the perfect contest environment. Poor lighting means premature fatigue and lower contest scores. Crank up the watts in your shack (and not the kind put out by your amplifier!). It's another investment that will improve your contest experience and score!

Contest clubs have been a part of the contest scene for decades with some true stalwarts such as the Potomac Valley Radio Club of Maryland/Virginia and the Frankford Radio Club of metro Philadelphia/New Jersey. With the wide availability of the Internet, information about contesting from these sources now is more available than ever before.

Now that the computer superhighway is at our fingertips, we have the option of getting incredible information. Even if there isn't a contest club near your QTH, by taking a few minutes to do a little web surfing, you'll soon learn that there are over 20 dedicated web sites sponsored by contest clubs (see Table I). Not only are these sites a wealth of information about contesting all by themselves, they also offer valuable links to other sites. Touring all of these sources will keep you a busy Internet surfer indeed. (Make sure you don't miss this year's contest season!)

I had the pleasure of attending a recent YCCC (Yankee Clipper Contest Club) meeting a few weeks ago. What I witnessed was a dream for new testers. Not only was there an enthusiastic group of experienced guys wanting to help the "newbies," there were a nice number of host operators looking for operating help. What better way to learn the ropes without being burdened by having to put up that "perfect" contest station yourself.

The message is brief this month. If you haven't checked out the contest club circuit, you're really missing out on something. Make that a goal for this coming year; you'll be glad you did. Whether you're a member of a local organization,

Calendar of Events

Nov. 20-21	LZ DX Contest
Nov. 20-21	RSGB 1.8 MHz Contest
Nov. 20-22	ARRL SSB Sweepstakes
Nov. 27-28	CQ WW CW DX Contest
Dec. 3-5	ARRL 160 Meter Contest
Dec. 11-12	ARRL 10 Meter Contest
Dec. 18	OK/OM DX RTTY Contest
Dec. 18-19	Stew Perry Contest
Dec. 18-19	Croatian CW Contest
Dec. 19	RAC Canada Winter Contest
Jan. 1	ARRL Straight Key Nite
Jan. 7-9	Japan Int. CW DX, 160-40M
Jan. 8-9	ARRL RTTY Round-Up
Jan. 8-9	North American CW QSO Party
Jan. 15-16	North American SSB QSO Party
Jan. 16	HA DX Contest
Jan. 28-30	CQ WW 160 Meter CW Contest
Jan. 29-30	REF CW Contest
Jan. 29-30	UBA SSB DX Contest
Feb. 6	North American SSB Sprint
Feb. 12-13	World-wide RTTY WPX Contest
Feb. 12-13	Dutch PACC Contest
Feb. 13	North American CW Sprint
Feb. 19-20	ARRL Int. CW DX Contest
Feb. 25-27	CQ WW 160 M SSB Contest

subscriber to a contest club's newsletter (most will let you subscribe for a nominal charge to cover postage and other expenses), or just an Internet surfer, I guarantee your contest scores will improve this year. Let me know how you do!

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. And as always, please remember that the deadline for the April issue is February 1st.

73, John, K1AR

ARRL 160 Meter CW Contest

2200Z Fri. to 1600Z Sun., Dec. 3-5

This is the 29th year for this "Top Band" activity. QSOs are among US, VE, and DX stations. DX-to-DX QSOs are not permitted for contest credit.

Classes: Single operator, high- and low-power, QRP; and multi-operator, single transmitter.

Exchange: RST and ARRL section for W/VE. DX stations send RST only. ITU Region is to be sent by maritime and aeronautical mobiles.

Scoring: Contacts between stations in ARRL sections count as 2 points; with DX stations 5 points.

Multiplier: Determined by number of ARRL sections (maximum 79) and DXCC countries worked (for W/VE). DX use ARRL sections only.

Final Score: Total QSO points times the ARRL section and DX country multiplier.

Awards: Certificates to the top-scoring single operator station in each ARRL section and DXCC country. Awards also available for the top-scoring multi-op station in each ARRL Division and continent.

You may submit your contest entry on diskette or via e-mail in lieu of paper logs. Use an MS-DOS formatted disk, 3.5 inch (720 KB or 1.44 MB). Diskette labels should clearly indicate the callsign used, contest name, entry class, and date of the contest. Include one entry only on each diskette. All files must be in standard ASCII text format. The log data file name must consist of the callsign and the extension ".LOG" (for example, K5ZD.LOG). The summary sheet file name must consist of the callsign and the extension ".SUM" (for example, K5ZD.SUM). Electronic entries should be sent via the Internet to <160Meter@arrl.org>. The subject line must contain your callsign, contest, mode, and class (for example, W1AW SS CW SO B). Do not send any other contest-related mail to this address, only logs. All files must be sent as attachments. For more information, check out <<http://www.arrl.org/contests/email.html>>.

Official log forms are recommended and are available from the ARRL. A large SASE and 45 cents postage, or 2 IRCs, will get you a supply for more than 300 contacts. The usual grounds for disqualification (violation of established rules, excessive duplicate contacts, etc.) will prevail. Mailing deadline for logs is 30 days after the contest to: ARRL 160 Contest, 225 Main St., Newington, CT 06111.

TARA RTTY Sprint

1800Z Sat. to 0200Z Sun., Dec. 4-5

This is the 8th running of the TARA RTTY Sprint sponsored by the Troy Amateur Radio Association, Inc. Contacts are encouraged with as many stations as possible using RTTY only on 80-10 meters (no WARC bands). Any station may work any other station.

Classes: (a) Single operator, multi-band—one person performs all operating

Contest Club Web Sites

SKY SAT Contest Club: <<http://www.ham.sky-sat.com>>

SKY Contest Club sponsors contest activities from exotic locations.

Caribbean Contesting Consortium: <<http://asgard.kent.edu/cc>>

Loosely organized group—four prior and many future Caribbean contest operations planned. Links to VP5FXB and VP5CW sites.

Central Texas DX and Contest Club: <<http://www.kkn.net/~ctdxcc/>>

Site of the K5NA/K5DU DX/Contest Quiz Bowl!

Troy Amateur Radio Association: <<http://www.n2ty.org>>

N2TY—sponsors of the annual TARA RTTY Sprint each December.

Contest Club Finland: <<http://www.contesting.com/ccf>>

CRI Contest Club: <<http://www.99main.com/~ctri>>

The CTRI (Connecticut-Rhode Island) Contest Group

Badger Contesters: <<http://www.qsl.net/bc/>>

The Badger Contesters Online

LT1F The Private Antenna Field Bad Power:

<<http://www.rosarinos.com/badpower/ingles.html>> English version

Southern California Contest Club (SCCC): <<http://www.contesting.com/sccc/>>

Northern California Contest Club (NCCC): <<http://www.nccc.cc/>>

TCG Tennessee Contest Group:

<<http://geo1.tdec.state.tn.us/tcg.html>>

S50E: <<http://lea.hamradio.si/~s50e/>>

W4NC Forsyth Amateur Radio Club:

<<http://summitschool.com/faculty/w4nc.html>>

W4WS: <<http://summitschool.com/faculty/w4ws.html>>

The Winston-Salem Courteous Operator's Club

Texas DX Society: <<http://wb5fnd.tech.uh.edu:80/~tdxs/>>

Home page for the TDXS. Very nicely done by KK5DK.

Kentucky Contest Group: <<http://www.n4gn.com/kcg/>>

Edited by KJ4VH

Yankee Clipper Contest Club: <<http://www.yccc.org>>

W1 cornerstone contest club

Potomac Valley Radio Club: <<http://www.pvrc.org>>

Steve, K3SA, keeps the PVRC homepage up to date. Neat pictures of some PVRers, including W3LPL's station.

Frankford Radio Club: <<http://www.frc-contest.org>>

The FRC is a contest club based out of Philadelphia, Pennsylvania. See a few member profiles here.

Society of Midwest Contesters:

<<http://www.probeelectronics.com/smc/>> Great site!

Quebec Contest Group:

<<http://www.riq.qc.ca/users/mcaron/qcg.html>>

If you've ever sweated out the VE2 multiplier, check out the site of a group of young, enthusiastic contesters from Quebec City.

Rhein Ruhr DX Association: <<http://home.pages.de/~RRDXA>>

Bavarian Contest Club:

<<http://www.rrze.uni-erlangen.de/~unrz45/BCC/>>

A real neat site from the 100+ member Bavarian Contest Club.

Includes a comprehensive list of rules for all those second-tier EU DX Contests.

South Eastern Contest Club:

<<http://members.aol.com/doughdh/paqsoparty/paqs.htm>>

New club in the southeastern USA centered around north Georgia.

Table I—Contest club web sites and Internet addresses (tnx to the folk at <www.contesting.com>).

and logging functions. Use of spotting nets (operating arrangements involving assistance through DX-alerting nets, etc.) is not permitted. Single operator stations are allowed only one transmitted signal at any given time. (1) less than 150 watts output or (2) 150 watts output or more. (b)

Multi-operator, single-transmitter, only—more than one person operates, checks for duplicates, keeps the log, etc. Once the station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Multi-operator stations are

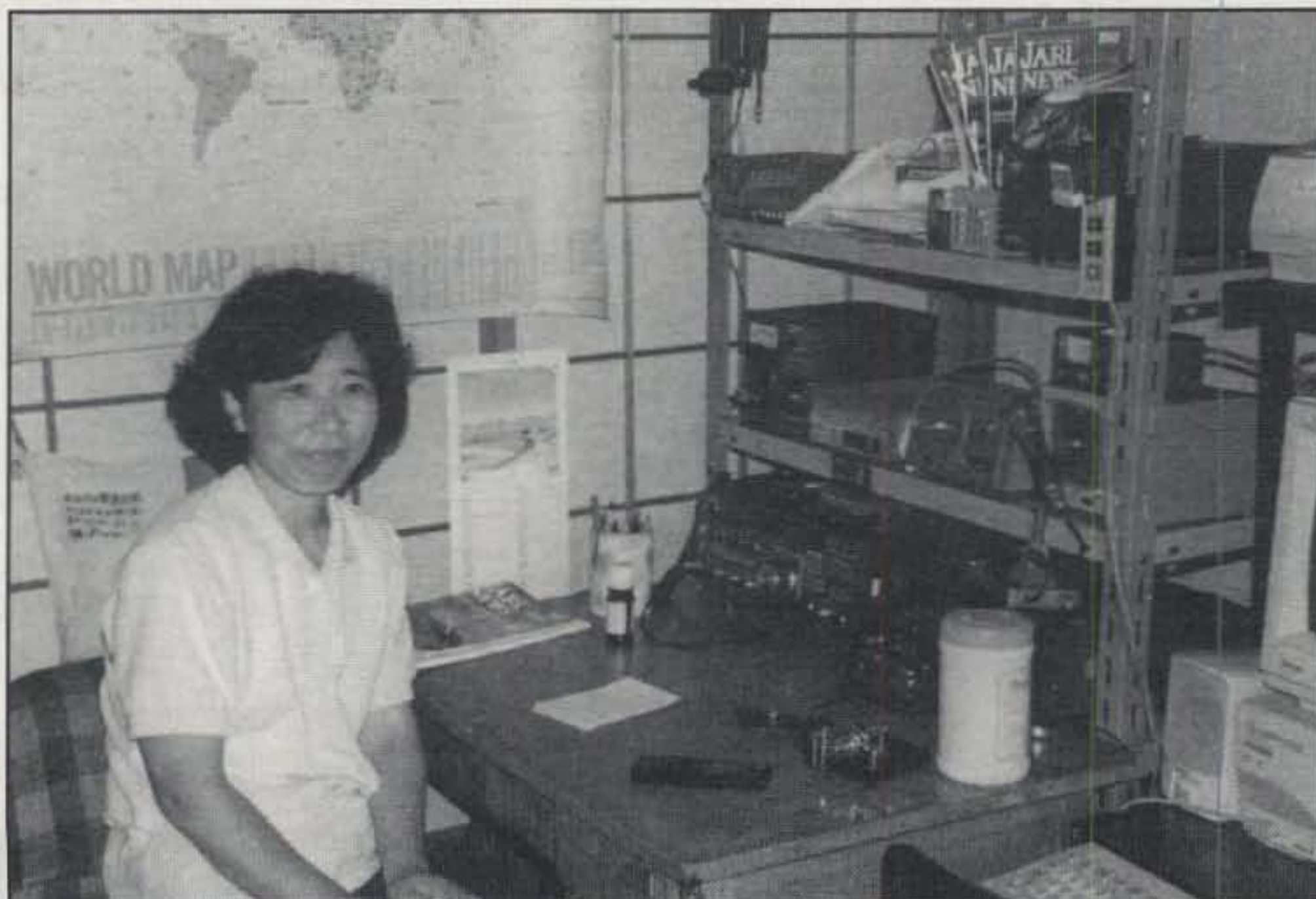
allowed only one transmitted signal at any given time.

Exchange: US stations: signal report and state; Canadian stations: signal report and province; DX: signal report and serial number starting with 001. Both stations must receive and acknowledge the complete exchange for the contact to count.

Scoring: (a) QSO Points: Count one point for each completed QSO (anyone can work anyone). A station may be worked once per band for QSO credit (but not for additional multipliers). (b) Multiplier: Count only once (not once per band), each US state (except KH6 and KL7), each VE province (plus VE8 and VY1), and each DXCC country. KH6 and KL7 count only as separate DXCC countries. The U.S. and Canada do not count as DXCC countries.

Awards: Certificates will be awarded to the top three stations in the low power and high power categories, worldwide.

Entries must be postmarked no later than 41 days after the end of the contest. Any entry making more than 200 total QSOs must submit duplicate check sheets (an alphabetical listing of stations worked). No late entries can be accepted. Use ARRL RTTY Roundup forms or a reasonable facsimile. Entries may be submitted on diskette or via e-mail to: <rtty@n2ty.org>. Paper entries should be mailed to: William J. Eddy, NY2U, 2404 22nd



Mieko, JA0QWO. Mieko photo appeared in the CQ WW DX CW Results in the October issue of CQ, but with the wrong caption.

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Jan, 4X1VF, an entrant in the 1998 CQ WW DX CW Contest.

Street, Troy, NY 12180-1901. Check out the new TARA web page for more information at: <http://generators.com/tara/rtty.html>.

EA DX Contest

1600Z Sat. to 1600Z Sun., Dec. 4-5

This popular CW-only event is sponsored by the Spanish URE and is open to amateurs worldwide.

Classes: Single operator, and multi-operator single transmitter.

Exchange: RST + serial number. EA stations send province abbreviation (A, AB, AV, AL, B, BA, BI, BU, C, CA, CC, CO, CR, CS, CU, GC, GE, GR, GU, H, HU, J, L, LE, LO, LU, M, MA, NA, O, OR, P, PM, PO, S, SA, SE, SS, SG, T, TE, TO, V, VA, VI, Z, ZA).

Scoring: Count one point per contact with an EA station. Multipliers are each EA province worked per band. Final score is total QSO points times total multipliers.

Send logs within six weeks after the contest to: URE, EA DX Contest, P.O. Box 220, Madrid, Spain.

ARRL 10 Meter Contest

0000Z Sat. to 2400Z Sun., Dec. 11-12

This is the 27th annual 10-Meter Contest organized by the ARRL. It's an extremely active competition in which stations can work each other within their own country as well as around the world. With 10 meters heating up, this year's event should really be good!

A maximum of 36 hours operating time is permitted out of the 48-hour contest

period for all stations (listening time counts as operating time). The same station may be worked on SSB and again on CW for QSO points.

Categories: Single operator, mixed mode, SSB only and CW only. Additionally, there are three power categories: QRP (5 watts output or less); low power (150 watts output or less); and high power (more than 150 watts output). Finally, there is a multi-operator, single transmitter, mixed mode only.

Exchange: W/VE stations (including KH6 and KL7) send RS(T) and state or province. DX stations (including KH2, KP4, etc.) send RS(T) and QSO number starting with 001. Maritime or aeronautical mobile stations use RS(T) and ITU region. Novice/Tech stations must identify themselves with a /N or /T designator.

Scoring: SSB QSOs 2 points; CW 4 points; Novice/Tech CW QSOs 8 points.

Multiplier: U.S. states (50 plus District of Columbia), Canadian provinces (NB, PEI, NS, VE2-8, VY1, VO1, VO2), DXCC countries, and ITU regions (1, 2, 3).

Final Score: Total QSO points times the sum of U.S. states, Canadian provinces, DX countries, and ITU regions, per mode.

Awards: Certificates will be awarded to the top-scoring single operator station in each category (including /N and /T) for each ARRL section and DXCC country. Additionally, the top-scoring multi-operator station in each ARRL division and each continent will also receive a certificate.

Indicate a new multiplier only the first time it is worked. Dupe sheets are required for logs with 500 or more QSOs. *Note:* The frequencies from 28.3 through

28.35 MHz are designated as a non-contest window (stations may not call CQ contest in this window). The usual disqualification criteria will be enforced. A large SASE will get you log and instruction forms. The standard ARRL policy for electronic logs applies to this contest (contact the ARRL Contest Branch if you have any questions or log onto <www.arrl.org>). Logs may be uploaded as ASCII entry files, following the ARRL Suggested Standard File Format, to the ARRL BBS (860-594-0306) or via the Internet to: <10Meter@arrl.org>

Mailing deadline for entries is 30 days after the contest to: ARRL 10 Meter Contest, 225 Main St., Newington, CT 06111.

Croatian CW Contest

1400Z Sat. to 1400Z Sun., Dec. 18-19

This is another fairly new one for December, sponsored by Hrvatski Radio Amaterski Savez of Croatia. December is typically a slow contest month, so this should add some excitement to the end of the year for many.

Classes: Single operator, all bands—high power, low power (<100 watts); single operator, single band—high power, low power (<100 watts); single operator, all bands—QRPp (<5 watts); multi-operator, all bands, one TX; SWL. The minimum time of operation on one band is 10 minutes, though a quick band change in order to work a new multiplier is allowed.

Exchange: RST and serial number.

Scoring: 10 points for contacts with 9A stations on 1.8/3.5/7 MHz, 6 points on 14/21/28 MHz; 6 points for contacts with other continent on 1.8/3.5/7 MHz, 3 points on 14/21/28 MHz; 2 points for contacts with own continent, including entrant's own country on 1.8/3.5/7 MHz, 1 point on 14/21/28 MHz. Multipliers are DXCC and WAE countries per band. Final score is total QSO points times the sum of multipliers worked on each band.

Awards: Certificates will be sent to the highest scoring station per category/DXCC country. Plaques will be awarded to the first, second, and third highest scoring station in each category depending on sponsors.

Logs must be mailed within 30 days to: Hrvatski Radioamaterski Savez, Croatian CW Contest, Dalmatinska 12, 10000 Zagreb, Croatia. You can also send your log via e-mail to: <hrs@hztk.tel.hr>. Your log must be in a plain ASCII file and summary sheet also in plain ASCII file.

Stew Perry Topband Distance Challenge

1500Z Sat. to 1500Z Sun., Dec. 18-19

This is the fourth edition of this new one and another fine example of "grass roots"

contesting. The idea, spawned by N6TR and W4AN (among others), was conceived to take advantage of winter activity on 160 meters, honor one of the band's heroes, W1BB, and most important, to have fun!

Operation is limited to 160 meter CW only. A maximum of 14 hours of operating time is permitted. Only one break may be taken between your first and last QSO and it must be at least 30 minutes in duration.

Classes: Single- or multi-operator. Only one signal shall be transmitted at a time. Remote or packet spotting is not permitted.

Exchange: Four-digit grid square, only. A RST report may be given, but it is not required for a complete QSO.

Scoring: There are no multipliers. QSO points are based on the distance between the two stations. Credit a minimum of one point per QSO and an additional point for every 500 km between you and the other station worked. Note that all of the major contest logging programs will support this calculation automatically (i.e., NA, TR, CT). If your logging software does not support this scoring method, they will compute your score for you if you submit your log electronically. You can also use public-domain program spscore.exe, which can be found via anonymous ftp to jzap.com in the pub/n6tr directory. Final score equals the total number of QSO points. Stations using less than 100 watts may multiply their score by 2. QRP stations (less than 5 watts) multiply their score by 4.

Your log can be sent via the Internet to <tbd@contesting.com> or via diskette in MS-DOS/Windows format by January 28, 2000. Entries submitted by mail should be sent to: Boring Amateur Radio Club, P.O. Box 1357, Boring, OR 97009 USA. Diskette-based logs must be in ASCII format. A summary sheet may be sent, but is not necessary.

RAC Canada Winter Contest

0000Z to 2359Z, Sun., Dec. 19

This is a popular year-end affair, sponsored by the Radio Amateurs of Canada. Amateurs all over the world are invited to participate.

Classes: Single operator (all bands, low power, single-band) and multi-operator. Multi-operator stations may operate on multiple bands simultaneously.

Exchange: Canadians send RS(T) and province/territory. All others send RS(T) and serial number.

Frequencies: QSOs may take place on 160-2 meters (no WARC activity). Suggested operating frequencies are: CW 25 kHz up from the lower band edge; SSB 1850, 3775, 7075, 7225, 14175, 21250,

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1998 CQ WW DX Contest Errata
CW

The operator of **NH7A** was KH6TO.
 The operator of **K1NO** was K5FUV.
 The operator of **W1HR** was W1JCC.
 One of ops at **WO1N** was NT2X not N2TX.
RA3AUU operated assisted AB and his score was left out.
 The operators of **RK3YYM** were RW3YW, UA3YFA, RA3YZ.
W3UM was left out of the results: Low Power 1,036,222 864 98 320
HG1S (MS) was left off the Top Scores box.
K5IID/8 was low power.
MU0BKA/SV9 log file was misplaced and he was not listed. He was
 AB 352,768 1035 63 193 and the #1 score from Crete.
UT1PO's log arrived too late: L7 19,144 131 11 41
 Team Contesting: **PY2XE** was only a member of TuPY Team 2 not
 Labre-SP.
UT1WW: L7 7,344 107 12 36
N4XR was /1 and not the W4 assisted leader. The winner of the 4th
 call area assisted was **N4VZ**
 The winner of the combined MM SSB/CW trophy was **EA9EA**.
 The U.S.A. call area 9 MM record holder is **K9NS** (11,526,040) and not
W0AIH/9 as indicated.
SN2B was listed in the European Top Scores box as 14 MHz. He was
 7 MHz and #3 in Europe.

SSB

CT2GVG was listed as a check log. He was low power 28 MHz.
K5IID/8 was low power not high power and #1 8th call area.
VY2MGY/3 was a certificate winner.
 The Zone 2 All-Time single op all band record holder is **VE2ZP**
 from 1989.
 The new Zone 2 All-Time MS record holder is **VO2WL**.
WW3S's low power all band score was not listed. It was
 1,137,048 952 117 321.
JH7PKU was adjusted by the CQWWCC to have 5,132,792 pts.
W2A (MM) operators: N2TX, W2XX, KD2TT, AA2MF, K2LS, KD2RD,
 and KE2NL (now KE2TR).
 The winner of the Canadian All Band Trophy was Dale Green (**VE7SV**)
 operating **XL7A** not VE1JX.
OK1AUT/5N0 was high power not low power. Therefore, the World
 high 21 MHz score was **5X1Z**.
N5YV: 2,087,372 1956 132 376 Top 5th area MM and certificate
 winner.
VA2DO set a new Zone 2 record on 1.8 MHz.
WB6NFO was left out of the results: LA 180,476 330 68 130
DF0HQ MS score was #6 in Europe and was not included in the
 Top Scores table.

28500 kHz. Check for CW activity on the half-hour.

Scoring: QSOs with Canadian stations are worth 10 points. Contacts with stations outside of Canada are worth 2 points. QSOs with official RAC stations (i.e., VE3RAC) are worth 20 points. You may work stations once per band and mode. Multipliers are Canadian provinces/territories and may be counted once per band/ mode. Final score is total QSOs points times your multiplier count from all bands.

Awards: A number of plaques will be awarded to winners of each category, including the top foreign entry, who will win the Jorge Bozzo, LU8DQ, memorial plaque sponsored by Alan Goodacre, VE3HX/VE2AEJ.

All entries must be postmarked by January 31st and should be sent to: RAC, 720 Belfast Rd., #217, Ottawa, ON K1G 0Z5 Canada. Final results will be published in *The Canadian Amateur*, which will be sent to all certificate winners. Feel

free to pose any questions you may have to TCA's contest columnist, Dave Goodwin at <ve2zp@va3tcp.ampr.org>.

ARRL Straight Key Night

0000Z to 2359Z, Jan. 1
 (7 PM Tues. to 7 PM Fri., EST)

This is a friendly meeting on the air using a straight key only. Suggested frequencies on 80, 40, and 20 meters are 60 to 80 kHz up from lower band edges, 10 kHz from lower edge of Novice bands.

Use SKN instead of RST in the exchange to "clue-in" other stations. Include a list of stations worked plus your vote for the best fist heard during that period (not necessarily one you've worked).

This is not a contest, so any additional chatter is encouraged.

Send your report and vote for "best fist" and "most interesting QSO" to ARRL SKN, 225 Main Street, Newington, CT 06111 by January 10th.

News Of Communication Around The World

Endings and Beginnings

This month marks the end of the 1900s, followed immediately by the beginning of the 2000s. While many are saying this marks the change of the millennium, I'm one of the purists who feel that the "official" start of the Third Millennium is still a year away. However, the change in the date is a significant one. It gives us an excuse to look at both endings and new beginnings in the field of DX.

The 1900s are ending on a high note in DX, with good band conditions and lots of DXpeditions to both rare and not-so-rare places. The DXCC 2000 program has given DXers a handful of new "entities" to chase, while smoothing out many of the rough spots of the DX Century Club program. DXCC looks well suited to entering the 21st century, whenever that begins.

On a low note is a sad ending. Don, W5FKX, announced in August: "After several weeks of review and soul-searching, the Board of Directors of the New Orleans International DX Convention voted to dissolve the convention. Faced with a financial deficit and a flat attendance for the last several years, a majority of the board was no longer willing or able to justify the extensive amount of work and effort that was required to maintain a quality program. It was with great sadness that this final step was taken. The board extends its sincere thanks to all of our friends and supporters, as well as to all those who have attended over the last eight years."

The New Orleans International DX Convention (NOIDXC) was a valiant attempt to hold a first-class DX gathering—a well-run, carefully organized convention at a four-star hotel in a city known for taking care of visitors. The NOIDXC crew did an excellent job at everything except attracting DXers to attend. The facilities were first-rate. The programs were varied and interesting, and the hospitality was up to southern standards. My wife and I enjoyed our visits to New Orleans on several occasions. (For some reason, my wife declines my invitations to Visalia and Dayton.)

I, for one, am sorry to see the NOIDXC fade away. In the year 2000 DXers should plan to support their regional DX gatherings—the Northwest DX convention in late summer, the W9DXCC Dinner in early September, and the New England DXCC dinner later in the year—so they too don't fade away.

P.O. Box 50, Fulton, CA 95439
e-mail: <chod@compuserve.com>



Some of the gang at this year's New Orleans International DX Convention.

On another very sad note, Jim Dionne, K1MEM, passed away on October 12th. Jim had been custodian of the CQ WAZ program for many years, bringing a high level of integrity and knowledge to the program. He had been battling severe illness for some years, but previously was always seen in high spirits at Dayton and elsewhere. He will be missed.

In the opposite direction, both in terms of time and happiness, is the ARRL DXCC Millennium Award. The purpose of the award is to work 100 or more of the entities on the current DXCC list during the UTC year of 2000—that is, from 0000Z on January 1, 2000 to 2359Z on December 31, 2000. Applicants should use the official application form available from the ARRL to apply for the award. The application can be downloaded from the ARRL web site or obtained by mail for a self-addressed, stamped envelope (SASE) or an SAE and one International Reply Coupon (IRC). No QSL cards are necessary; only log information about the 100 entities. The award is available to non-members of the ARRL as well as members, but it carries a fee of US\$10 to cover printing, postage, and handling. The usual DXCC rules apply to contacts for the award, but such contacts do not add to a DXer's official DXCC record. For permanent DXCC credit for millennium contacts, DXers should use the usual DXCC application process, including the inspection of QSL cards.

The Millennium Award is a great way to begin the 2000s. It is an example of pure DX. The program provides the opportuni-

ty to have meaningful contacts with DX stations—not fight huge pile-ups for a quickie signal report and one of 50,000 contacts, but actually talk to the DX operator. The hassle of exchanging cards also disappears, and the effort previously expended chasing down addresses and the correct number of IRCs necessary for return mail can be rechanneled into making more DX contacts.

The Millennium Award certificates will not be numbered, but they will be dated. As with any DX effort, there will be an element of competition to see who can work 100 entities the fastest. When the ARRL sponsored the similar DXCC Golden Jubilee award in 1987, several dozen DXers fought for the honor of working the fastest DXCC. Jay O'Brien, W6GO, completed the task in about 48 hours, if memory serves, besting everyone else who was willing to submit log data.

Look for some hard-fought competition for the first few hours of the year 2000, and then things should settle down and allow actual rag-chews with DX stations.

Burundi Revisited

Back in May we discussed the problem with licensing in Burundi 9U. When the Burundi licensing authorities objected to some previously issued amateur licenses, the DXCC desk removed DXCC credit for those contacts from individual DXCC records. The action generated considerable discussion, with the majority of DXers applauding the decision of the DXCC desk to delete the disputed contacts. The only

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Silvano, KB6GL, one of the major supporters of the NOIDX.

exception to the list of purged callsigns was an operation under the auspices of the United Nations—4U9U.

The good news is that another operator is in Burundi and appears to have a valid

5 Band WAZ

As of September 30, 1999, 496 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

RA9YD

The top contenders for 5 Band WAZ (zones needed, 80 meters):

- | | |
|------------------------|---------------------------|
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| W4LI, 199 (26) | K4UTE, 199 (18) |
| K7UR, 199 (34) | K5RT, 199 (23) |
| W0PGI, 199 (26) | UT5UGR, 199 (10) |
| W2YY, 199 (26) | K4PI, 199 (23) |
| VE7AHA, 199 (34) | HB9DDZ, 199 (31) |
| IK8BQE, 199 (31) | N3UN, 199 (18) |
| JA2IVK, 199 (34 on 40) | UA3AGW, 198 (1, 12) |
| K1ST, 199 (26) | EA5BCK, 198 (27, 39) |
| AB0P, 199 (23) | G3KDB, 198 (1, 12) |
| KL7Y, 199 (34) | KG9N, 198 (18, 22) |
| NN7X, 199 (34) | DK0EE, 198 (19, 31) |
| OE6MKG, 199 (31) | K0SR, 198 (22, 23) |
| H8IB, 199 (2 on 15) | K3NW, 198 (23, 26) |
| IK1AOD, 199 (1) | UA4PO, 198 (1, 2) |
| DF3CB, 199 (1) | JA1DM, 198 (2, 40) |
| F6CPO, 199 (1) | 9A5I, 198 (1, 16) |
| W6SR, 199 (37) | K4ZW, 198 (18, 23) |
| W3UR, 199 (23) | OH2VZ, 198 (1, 31) |
| KC7V, 199 (34) | RA0FA, 198 (2 on 10, 15) |
| GM3YOR, 199 (31) | LA7FD, 198 (3, 4) |
| VO1FB, 199 (19) | K5PC, 198 (18, 23) |
| KZ4V, 199 (26) | NT5C, 198 (18, 23 on 40) |
| N4CH, 199 (18 on 10) | VE3XO, 198 (23, 23 on 40) |
| OE1ZL, 199 (1) | K4CN, 198 (23, 26) |
| W6DN, 199 (17) | KF2O, 198 (24, 26) |

The following have qualified for the basic 5 Band WAZ Award:

RA9YD, 200 Zones

1097 stations have attained the 150 Zone level as of September 30, 1999.

****PLEASE NOTE:** Due to supplier increases, effective September 1, 1998 cost of the 5 Band WAZ Plaque is now \$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, CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801. The processing fee for all CQ awards is \$4.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$10.00 for nonsubscribers. Please make all checks payable to the CQ WAZ Award. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage.

license. Ragge (Gus) Jagero, SM5DIC (ex-5X1C, 9Q5TE, and 9X/SM5DIC), is now operating as 9U5D on all bands, including 6 meters. However, he must spend the night at his office to work the low bands because of a curfew in the city. His contract runs to December 10, but he may be back in Burundi after Christmas. Gus prefers SSB, but he is also active on CW. He hopes to move his station to his living quarters and get on the digital modes during his stay. QSL direct only to Leif Hammarstrom, SM0BFJ, Birger Jarlsgatan 38, SE-114 29 Stockholm, Sweden.

DX Clubs

The National Capitol DX Association has elected the following officers for the 1999–2000 term: President Rick Murphy, K1MU; Vice President Mark Behrens, W4GP; Treasurer Henry Herman, W3UJ; and Secretary Leo Boberschmidt W3LEO.

All correspondence for the Yasme Award, including applications, should go

The WAZ Program

Single Band WAZ

12 Meter SSB

13.....DJ9ZB 14.....VE3XN

17 Meter SSB

16.....G4BWP

20 Meter CW

503.....IK3XJP

All CW

144.....WA2RZJ

160 Meter WAZ

126.....DK5PR, 40 zones 142.....UA0MF, 40 zones
141.....N7RT, 31 zones

All Band WAZ

SSB

4513.....KM5OE 4515.....EA8AG
4514.....WB4PVT 4516.....EA3GEP

CW/Phone

7886.....WA2RZJ 7891.....JA9MAT/QRP (CW)
7887.....7M4HXG 7892.....JA9AVU
7888.....UA3AP 7893.....AA5XE
7889.....VE2PBA 7894.....LZ1MS
7890.....DF8LD (CW)

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, CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801. The processing fee for all CQ awards is \$4.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$10.00 for nonsubscribers. Please make all checks payable to the CQ WAZ Award. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage.

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The WPX Program

SSB

2717.....IK1RLI 2718.....WA2STH

CW

3020.....DF7QK 3021.....JA3HYV

CW: 800 AA1KS, OK1DWC, 850 OK1DWC, 900 OK1DWC, 950 F5YJ, 1150 KC6X, 1200 KC6X, 1600 K9UQN, 1650 K9UQN, 1700 K9UQN, 1750 K9UQN.

SSB: 350 IK1RLI, 400 IK1RLI, JA1QJE, 450 IK1RLI, 500 IK1RLI, 550 IK1RLI, OK1DWC, 600 IK1RLI, OK1DWC, 650 IK1RLI, OK1DWC, 700 IK1RLI, 750 IK1RLI, 800 IK1RLI, 850 IK1RLI, 950 IK1RLI, 1000 IK1RLI, 1050 IK1RLI, 1100 IK1RLI, 1300 KC6X, 1350 KC6X.

MIXED: 700 JA2-3803, 750 JA2-3803, 800 JA2-3803, 850 JA2-3803, AK7O, 900 AK7O, 1000 OK1DWC, 1050 OK1DWC, 1100 OK1DWC, 1650 KC6X, 1700 KC6X, 1750 KC6X, 2000 K9UQN, 2050 K9UQN, 2100 K9UQN, 4300 F2YT, 4600 W2FXA.

15 meters: DL3NEO, WA7OBH, K9GWH

20 meters: DL3NEO, K9GWH

40 meters: DL3NEO

80 meters: JA2J-3803, DL3NEO

160 meters: DL3NEO

Asia: K9GWH

Africa: K9GWH, DL3NEO

No. America: K9GWH, DL3NEO

So. America: K9GWH

Europe: JH5OXF, K9GWH

Oceania: K9GWH

Award of Excellence Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ,

DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SM0AJU, N5TV, W6OUL, WB8ZRL, WA8YM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, DK4SY, UR2QD, AB0P, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, H8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KB0G, NB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YB0TK, K9QFR, 9A2NA, W4UW, NX0I, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DE0-DAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, I0RIZ, I2MQP, F6HJM, HB9DDZ, W0ULU, K9XR, JA0SU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, K0DEO, KU0A, DJ1YH, OE6CLD, VR2UW, 9A9R, UA0FZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RA0FU, CT4NH.

Award of Excellence with 160 meter Endorsement: K6JG, N4MM, W4CR2, N5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SM0DJZ, DK3AD, W3ARK, LA7JO, SM0AJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, H8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KB0G, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YB0TK, K9QFR, W4UW, NX0I, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WB0DD, I0RIZ, I2MQP, F6HJM, HB9DDZ, K9XR, JA0SU, I5ZJK, I2EOW, KS4S, KA5CLV, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, K0DE1, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RA0FU, UA0FZ, CT4NH, W1CU.

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.



Wives were a common sight at the NOIDXC, in contrast to many of the other DX gatherings.

to the following new address: Randy Wright, 18432 Milmar Boulevard, Castro Valley, CA 94546 USA.

Upcoming DX Operations

4U1ITU should be active in most major contests. In the CW portion of the CQ WW, DL6RDR, DL6BCC, and others will operate in the multi-single category. Look for VE3IAY and JH4RHF as another multi-



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COAX (50OHM "LOW LOSS" GROUP)

	100FT/UP	500FT	1000FT
"FLEXIBLE" 9913 STRD BC CNTR FOIL + 95% BRAID 2.7dB @ 400MHz NC/DB/UV JKT...	58/FT	56/FT	54/FT
LMR 400 SOLID CCA CNTR FOIL + BRAID 2.7dB @ 450MHz WP/UV JKT	59/FT	57/FT	55/FT
LMR 400 "ULTRA-FLEX" STRD BC CNTR FOIL + BRAID 3.1dB @ 450 MHz TPE JKT	87/FT	86/FT	85/FT
LMR 600 (OD.590") SOLID CCA CNTR FOIL + BRAID 1.72dB @ 450 MHz WP/UV JKT	1.25/FT	1.22/FT	1.20/FT
LDF4-50A 1/2" "ANDREW" HELIAX® 1.51dB @ 450MHz	25FT/UP	2.10/FT	

COAX (50 OHM "HF" GROUP)

	100FT/UP	500FT	1000FT
RG213/U STRD BC MIL-SPEC NC/DB/UV JACKET 1.2 dB/2500WATTS @ 30MHz	.36/FT	.34/FT	.32/FT
RG8/U STRD BC FOAM 95% BRAID UV RESISTANT JKT 0.9dB/1350WATTS @ 30MHz	.34/FT	.32/FT	.30/FT
RG8 MINI(X)95% BRAID UV RESISTANT JACKET 2.0dB/875 WATTS @ 30MHz	.15/FT	.13/FT	.12/FT
RG58/U 95% BRAID UV RESISTANT JACKET 2.5dB/400 WATTS @ 30MHz	.15/FT	.13/FT	.11/FT
RG58A/U STRD CENTER 95% TC BRD UV RESISTANT JKT 2.6dB/350 WATTS @ 30MHz	.17/FT	.15/FT	.13/FT
RG214/U STRD SC 2.95% BRD NC/DB/UV JKT 1.2dB/1800WATTS @ 30MHz	25FT/UP	1.75/FT	

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- Part #: DSC99 (w/UHF male (PL259) \$299.95

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"FLEXIBLE" 450 OHM 16GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT+)	.20/FT	.18/FT	.16/FT
"FLEXIBLE" 450 OHM 14GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT+)	.25/FT	.24/FT	.23/FT
300 OHM 20GA STRD (POWER: FULL LEGAL LIMIT)	.15/FT	.13/FT	.12/FT

ROTOR & CONTROL CABLES

	100FT/UP	500FT	1000FT
5971 8/COND (2/18 6/22) BLK UV RES JKT. Recommended up to 125ft	.20/FT	.18/FT	.16/FT
1618 8/COND (2/16 6/18) BLK UV RES JKT. Recommended up to 200ft	.35/FT	.34/FT	.32/FT
1418 8/COND (2/14 6/18) BLK UV RES JKT. Recommended up to 300ft	.47/FT	.45/FT	.43/FT
1806 18GA STRD 6/COND PVC JACKET Recommended for Yaesu Rotors	.23/FT	.21/FT	.19/FT

Quick disconnects: PS308 KIT (JONES 8/C M/F) \$7.95/pr., PS309-KIT (JONES to AMP ROUND M/F): \$10.95/pr.

Or we can install either pair for \$22.95, \$25.95.

ANTENNA WIRE (UNINSULATED BARE COPPER)

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14GA 168 STRD "SUPERFLEX" (great for Quads & Portable set-ups etc.)	.14/FT	.12/FT	.10/FT
14GA 7 STRD "HARD DRAWN" (perfect for permanent Dipoles etc.)	.10/FT	.08/FT	.06/FT
14GA SOLID "COPPERWELD" (for long spans etc.)	.10/FT	.08/FT	.06/FT
14GA SOLID "SOFT DRAWN" (for ground radials etc.)	.10/FT	.08/FT	.06/FT
ROPE: 3/16" DOUBLE BRAID "POLYESTER" 770# TEST WEATHERPROOF	.12/FT	.09/FT	.08/FT
ROPE: 5/16" DOUBLE BRAID "POLYESTER" 1790# TEST WEATHERPROOF	.17/FT	.14/FT	.13/FT

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RG213/U strd BC Mil-Spec NC/BD/UV JKT. 1.2dB 2500 watts @ 30MHz.	150' \$69.95	100' \$49.95	75' \$39.95	50' \$29.95	25' \$19.95	15' \$17.95	10' \$15.95	6' \$11.95	3' \$9.95
RG8/U strd BC foam 95% braid UV resistant JKT. 0.9dB 1350 watts @ 30MHz.	150ft \$64.95	100ft \$44.95	75ft \$34.95	50ft \$24.95	25ft \$14.95	10ft \$13.95	6ft \$11.95	3ft \$9.95	
RG8 MINI(X) strd BC foam 95% braid UV resistant JKT. 2.0dB/875watts @ 30 MHz	150' \$34.95	100' \$24.95	75' \$19.95	50' \$15.95	25' \$10.95	6' \$4.95	3' \$3.95	(3ft & 6ft are China made)	
LMR 400 SOLID CCA CNTR FOIL + BRAID 2.7dB @ 450MHz WP/UV JKT=100'	\$72.95								

With USA made Silver/Teflon®/Gold Pin male "N" connectors.

FLEXIBLE 9913 strd BC cntr foil+95% braid 2.7dB 400MHz NC/DB/UV JKT.	150' \$110.95	100' \$80.95	75' \$67.95	50' \$54.50	35' \$45.95	25' \$39.95	15' \$32.95	10' \$25.95	6' \$16.95	3' \$15.95
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With USA made Silver/Teflon®/Gold Pin PL259 to male "N"

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All terminations are soldered, Hi-Pot® tested @ 5kv for one minute, & completed with UV resistant heat shrink tubing. CUSTOM CONNECTOR WORK TOO. Call for price and delivery.

CONNECTORS Both connectors fit 9913 types and LMR400 MADE IN USA

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10GA (rated:30 amps)	25FT \$10.50	50FT \$19.00	100FT \$36.00
12GA (rated:20 amps)	25FT \$8.00	50FT \$14.00	100FT \$26.00
14GA (rated:15 amps)	25FT \$6.00	50FT \$10.00	100FT \$18.00

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QSL INFORMATION

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 4S7YSG to JA2BDR
 5W0FN to HB9HFN
 5W0LZ to HB9DLZ
 5N8ZKD to OK1KN
 8P9NX to W0SA
 9H4GRS to 9H5JO
 9M0C to G3SWH
 9M2XA to JF4WPO
 9V1BG to JL1MWI
 A22EW to KB2MS
 A35FN to HB9HFN
 A35LZ to HB9DLZ
 A61AS to YO3FRI
 BX0QSL to JA1JKG
 CE0AA to CE3WDH
 CE0ZAM to CE3ESS
 C46A to 9A2AJ
 C6AJZ to W19WI
 C91A to I4LCK
 CN2IB to OM1APD
 CY9AOE to VE1AOE
 DX1DX to DU1SAN
 E4/OK5DX to OK1TN
 FOBSCH to LX1SP
 H2T to 5B4XF
 H27X to 5B4XF
 H44RY to OH1RY
 H75A to N5FTR
 HI500UD to HI3LFE
 HI9UD to HI3LFE
 HK3OSA to DF4UW
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 HU1X to YT1AD
 J41AG to SV1CIB
 J41W to SV1CIB
 J43AFA to SV1CIB
 J47LHA to SV7CO
 J48AFA to SV1CIB
 J48ISL to SV2AEL
 J73JT to W3HC
 K7IL/KH0 to JF3PLF
 KH0/KF8TW to JH3TXR
 QJ8VR to OH1VR
 OL5Q to OK1FFU
 OT8L to ON7YP
 OT8T to ON4UN
 P29BI to VK4EJ
 P40K to I2EOW
 PP4P to PP1CZ
 PW1Z to PP1CZ
 PY0A to PT2GTI
 PY0B to PP1CZ
 R6Y to RZ6AXO
 RA6Y to RZ6AXO
 RK9AWC to UA9AB
 RK9AYY to UA9AB
 RP6Y to RZ6AXO
 RP6YPC to RZ6AXO
 RP9ATZ to UA9AB
 RP9MOF to UA9NN
 RY6Y to RZ6AXO
 RZ9A to UA9AB
 RZ9AZA to UA9AB
 S19AM to SM3CVM
 SV1AFA/8 to SV1CIB
 T48RCT to SK0UX
 TT8DF to F5SWB
 TU2DP to K4MQL
 UA9AH to UA9AB
 UA9AJ to UA9AB
 UA9BA to UA9AB
 UE9AWA to UA9AB
 UT1T to UR7TZ
 V31CK to XE1CI
 V31JY to KV5E
 V31KR to K5KR
 V31MP to W5ZPA
 V31YK to W5JYK
 VP2EREM to WB2REM
 VQ9JC to WB9IHH
 YB7ZKS to YF7PT
 ZK1MGS to JH8DEN
 ZF2MM to K1TO
 ZK1EHH to K8VIR
 ZK2FT to DL7FT
 ZL7DK to DK7YY
 ZL8RS to ZL1RS
 ZW2Z to PY2ZI
 ZZ1AA to PP1CZ
 ZZ7Z to PR7AR

3D2WC/R to OK DX Foundation, Bradlec 73, 293 06 Mlada Boleslav, Czech Rep.
 3W6EA to Peter Emmerton, P.O. Box 121, Central Post Office, Ho Chi Minh City, Socialist Rep. of Vietnam
 5B4AFM to Stavros Tsiakkouris, P.O. Box 5089, Nicosia, Cyprus
 5B4XF to Paris Andreou, 19 Napoleontos St., Stovolos, CY-2021 Nicosia, Cyprus
 9H1RS to Stephen Camilleri, "Little Mermaid," Qaliel Street, Marsascalea ZBR 10, Malta
 9H3AAW to B. Winter, Bojeweg 46 A, D-21033 Hamburg, Germany
 9M2LL to MD Basri Bin Wagimen, 495-A, Jalan Taman Indah, 73000 Tampin, N. Sembilan, Malaysia
 9N1HR to S. H. Chong, P.O. Box 12, West Incheon 404-600, Korea
 9V8WW to James Basil Rodrigo, Bldg. 13 Ghim Moh Road #19-37, Singapore 270013, Rep. of Singapore
 9Z4DZ to Stephenson Ballah, #12 Erin Road, Siparia, Trinidad
 AH8K to OK DX Foundation, Bradlec 73, 293 06 Mlada Boleslav, Czech Rep.
 BA7JK to Chow, P.O. Box 1711, Guangzhou 510600, China
 BD4DW to David Y. J. Zhou, P.O. Box 040-088, Shanghai, China
 BD6JN to L. Z. Sun, P.O. Box 6, Xinyang, Henan 464000, China
 BD7JK to Chow, P.O. Box 1711, Guangzhou 510600, China
 BD7QI to Lin Kun, P.O. Box 10, Nanning, Guang Xi 530001, China
 BG0BA to Li Qing Ming, 45-2-2-401 Xihong Road, Wulumuqi 830000, China
 BV2RS to Wendy Chang, P.O. Box 105-29, Taipei, Taiwan
 BV6HK to Tom Tseng, P.O. Box 15, Tainan, Taiwan
 BY4RRR to 22nd Middle School Club Station, P.O. Box 538, Nanjing, China
 BY7KM to Amateur Radio Station of Guangzhou Blind School, Xing Hua Street, Xing Hua Road, Tianhe District, Guangzhou 510507, China
 C56/DL5MM to Wolfgang Hunger, G. Palitzsch Str. 17, D-01239 Dresden, Germany
 CE3ESS to Mickey, P.O. Box 195-20, Santiago 20, Chile
 CL2FN to Orestes Echenique Valdes, P.O. Box 26, Santiago de las Vegas, Habana 17200, Cuba
 CT3GU to L. Miguel Silva Pereira, Piquinho 101, P-9360 Ponta do Sol, Madeira, Portugal
 CX1UU to Wilson Mariano Ferreira Cano, P.O. Box 7, 33000 Treinta y Tres, Uruguay
 CX2UP to Jorge Newton Duhalde, P.O. Box 7, 33000 Treinta y Tres, Uruguay
 DS1FNQ to Kim Eun Soo, Department of Metallurgy and Materials Science, Room K420, Hong-Ik University, 72-1, Sangsu-dong, Mapo-gu, Seoul 121-791, Korea
 DS1GNT to Kim Young Joo, 86-17, 5/4 Sangsu-dong, Mapo-gu, Seoul 121-160, Korea
 DS1GNU to Kim Young Sin, 86-17, 5/4 Sangsu-dong, Mapo-gu, Seoul 121-160, Korea
 DS1KVP to Tae-Gyu Sohn, 1-301, Woosung APT, 1133, Sadang 3-Dong, Dongjak-Gu, Seoul 156-093, Korea
 DS2BZN to Park Joon Cheol, A-305 Mido APT, 563 Jookyo-dong, Dukyung-gu, Koyang-si, Kyungki-Do 412-010, Korea
 DS2JBO to Kim Sun Ye, A-305 Mido APT, 563 Jookyo-dong, Dukyung-gu, Koyang-si, 9H5JO Kyungki-Do 412-010, Korea
 DS2LFY to Hai Kyong Yang, P.O. Box 10, West Incheon 404, Korea
 DS2MPH to Jae-Pyeong Shin, 102-1402, Ace APT 34, Tanhyun-Dong, Ilsan-Gu, Koyang-Si, Kyunggi-Do 411-320, Korea

DS4NHG to Hye Jung Park, Ga-202, Daemyung APT, Sosohak-dong, Wansan-gu, Chonju 560-130, Korea
 DS5DXR to Kim Seog-Hyun, P.O. Box 510, Pusan 600-605, Korea
 DS5FWC to Oh Chang-Hun, Hyundai Tower 1409, 285 Banku 1-dong, Jungku, Ulsan 681-261, Korea
 DS5JCJ to Park Myung-Ok, Hyundai Tower 1409, 285 Banku 1-dong, Jungku, Ulsan 681-261, Korea
 DS5JCK to Oh Hyun-Soo, Hyundai Tower 1409, 285 Banku 1-dong, Jungku, Ulsan 681-261, Korea
 DS5RLI to Yi Do-Sang, 201-602 Green-Mansion APT, 247 Bon-Dong, Taegu 704-350, Korea
 DS5XEH to Il Kwon Choi, 302 Dong 502 Ho, 3 Jukong APT, Hyeonggok 1-Dong, Kumi 730-041, Korea
 DS5ZKL to Ok Ki Lee, 302 Dong 502 Ho, 3 Jukong APT, Hyeonggok 1-Dong, Kumi 730-041, Korea
 DU1IHU to Donat P. Pamiloza, Jr., 86 Jasmin St., Caloocan City, MM 1400, Philippines
 DU1KT to Roger Flores, P.O. Box 2030, Manila, Philippines
 DU1OZ to Edward B. Soriano, M.D., 42-E F. Reyes Street, Caridad, Cavite City 4100, Philippines
 DL5VJ/DU1 to Claus J. Karthe, P.O. Box 3771 MCPO, 1299 Makati, MM, Philippines
 E20REX to Kornnapa Chukwamdee, P.O. Box 1090, Kasetsart, Bangkok 10903, Thailand
 E41/OK1FHI to Radek Stofa, 471 16 Polevsko 187, Czech Rep.
 FM5UH to Jean-Claude Ruchti, Maison Brice, Morne Poirier, F-97220 La Trinite, France
 FO0/OK1TN to OK DX Foundation, Bradlec 73, 293 06 Mlada Boleslav, Czech Rep.
 FO0/OK5DX to OK DX Foundation, Bradlec 73, 293 06 Mlada Boleslav, Czech Rep.
 FR5FD to Labeaume Patrick, 40 Rue Louis Desjardines, F-97411 Bois de Nefles, St. Paul, France
 H44NC to Norried F. Chaisson, Jr., P.O. Box 168, Munda, Western Province, Solomon Isl.
 HC8/DL6FBK to Paul Michel, Im Kennel 5, D-56414 Hundsangen, Germany
 HI3LFE to Lorenzo Fernandez E., P.O. Box 1464, Santiago, Dominican Rep.
 HJ2PMP to Wilfredo Santana A., A. P. 0290, Riohacha (Guajira), Colombia
 HJ9QYJ to Enrique A. Quintero Villegas, P.O. Box 23, Leticia, Amazonas, Colombia
 HL0CHQ to Radio Club, P.O. Box 133, Chonju 560, Korea
 HL1AZH to Eun Ju Lee, Biology Dept., Seoul National University, Seoul 151-742, Korea
 HL1VAU to K. L. Han, 649-3, Jayangdong, Kwangjin, Seoul 143-192, Korea
 HL2KAK to Sung-Rok Cho, 308-502, Sung Po-Dong, Ansan 425-040, Korea
 HL2TCY to Jae Myung Choi, APT 524-1106, Jugong 5 APT Complex, Maetan 1-Dong, Paldal-Gu, Suwon 442-371, Korea
 HL3EEI to Mun Gu Hwang, P.O. Box 63, Cheong Ju 360-600, Korea
 HL3EPH to Suh Pil Won, P.O. Box 67, Suwon 440-600, Korea
 HL3EPI to Kim Young Ju, P.O. Box 67, Suwon 440-600, Korea
 HL4CYG to Soo Hwan An, 105-1403 Kumho APT, Il-Kog Dong Buk-ku, Kwangju 500-160, Korea
 HL4CYH to He Sook Kim, 105-1403 Kumho APT, Il-Kog Dong Buk-ku, Kwangju 500-160, Korea
 HL4CYX to Jung Ho An, 105-1403 Kumho APT, Il-Kog Dong Buk-ku,

Kwangju 500-160, Korea
 HL4GKR to Ki Bong Park, Ga-202, Daemyung APT, Sosohak-dong, Wansan-gu, Chonju 560-130, Korea
 HL4GMJ to Young Ok Ha, Ga-202, Daemyung APT, Sosohak-dong, Wansan-gu, Chonju 560-130, Korea
 HL5BXY to Sang Mi Choi, 789-24 duck Chun 3 Dong, Buk-Gu, Pusan 616-103, Korea
 HL5PRU to Yong Ki Han, Miju-APT 3-508, 332-6 Puam 1-Dong, Pusanjin, Pusan 614-091, Korea
 HL5UOK to Lee Young Su, P.O. Box 20, Dong Taegu, Korea
 HL5URV to Moon Do Gon, 15-1 391-4, Yongho 3-Dong, Nam-Gu, Pusan 608-093, Korea
 HS1CKK to Winit Kongprasert, 49/203 Jangwattana Road, Prakret, Nonthaburi 11120, Thailand
 HS1NRU to Noppachart Limpaphayom, 567 Nakornchaisri Road, Dusit, Bangkok 10300, Thailand
 HS5AYO to Niwes Suwanboos, P.O. Box 73, Lampang 52000, Thailand
 HS9CA to Somchai Limphanudom, 275 Thamanoonvithi, Haadyai, Songkhla 90110, Thailand
 HS9IFG to Pong Wongsawat, P. O. Box 45, Bangkok 10902, Thailand
 JI1FLB/JD1 to Seiichi Tanaka, 2-12-20 Nishimizumoto, Katshika-ku, Tokyo 125-0031, Japan
 JQ1SUO/JD1 to Eiji Shinoda, 3-3-17, Tomisato, Kashiwa, Chiba 277, Japan
 JT2KAA to Dornod Radio Club, P.O. Box 94, Choibalsan, Dornod Aimak, Mongolia
 JW5RIA to Erling Winje, Bautaveien 8, N-6507 Kristiansund, Norway
 JW8WF to Jon Dahl, P.O. Box 18, N-1312 Slependen, Norway
 LX1EK to Germaine Knabe, 25, rue Basse, L-4415 Soleuvre, Luxembourg
 LX1JH to Jean-Marie Juchemes, 2, Haaptstross, L-6869 Wecker, Luxembourg
 LX1KC to Kieffer Christian, 121, rue Klensch, L-3250 Bettembourg, Luxembourg
 LX1SP to Scharz Louis, 3, rue du Nord, L-4469 Soleuvre, Luxembourg
 LX1TI to Trezzi Carlo, P.O. Box 117, L-4901 Bascharage, Luxembourg
 LX2AK to Alfred Knabe, 25, rue Basse, L-4415 Soleuvre, Luxembourg
 LX20AK to Adrad Kaldall, P.O. Box 26, L-3601 Kayl, Luxembourg
 NH0F to Gene F. Fajilan, PPP 521, Box 10000, Saipan, MP 96950
 SV1/UY0MF to George V. Sobolevsky, P.O. Box 135, Lugansk 348042, Ukraine
 TF3AO to Arsaell Oskarsson, Gnodarvogi 20, IS-104 Reykjavik, Iceland
 TG9AGG to Roberto Garcia, P.O. Box 21 F, Guatemala, Guatemala
 VU2TMP to V. M. Thampi, Veliyathumalil, P.O. Pulpally, Kerala 673 579, India
 YB0MOS to Musa Suraatmadja, Taman Meruya Ilir, Blok D1B/5, Jakarta 11620, Indonesia
 YB3ZBZ to Club Station Lokal ORARI Malang, P.O. Box 234, Malang 65101, Indonesia
 YB9ZBI to ORARI Daerah Bali, P.O. Box 3114, Denpasar, Bali 80001, Indonesia
 YC0SHD to Suhendra, P.O. Box 2226 JKP, Jakarta 10022, Indonesia
 YC1LY to Dedy Sudradjat, P.O. Box 1042, Bandung 40010, Indonesia
 YS1EJ to Juan Manuel Molina, 3 Calle Poniente #3685, Colonia Escalon, San Salvador, El Salvador
 ZP5ERG to Gregorio Espinosa Rojas, P.O.B. 1939, Asuncion 1209, Paraguay
The table of QSL information is courtesy John Shelton, K1XN, editor of The Go List, P.O. Box 3071, Paris, TN 38242 (901-641-0109; <golist@wk.net>).

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. Lifetime Honor Roll fee is \$4.00 (U.S.) for each mode, with no fee for additions.

MIXED

5017.....9A2AA	3652.....N6JV	3085..WA8YTM	2727.....IK2ILH	2276..WA1JMP	2224..W8UMR	1591.....W7CB	1395.....VE6BF	1264.....VE6BF
4305.....W2FXA	3566.....VE3XN	3059..PA0SNG	2689.....HA0IT	2273...YU7JDE	2159.....W4UW	1580...I1-21171	1339.....N1KC	1195.....W2CF
3984.....W1CU	3507.....9A2NA	2968.....I2MOP	2670.....K0DEQ	2270.....KS4S	2018.....N3XX	1544.....Z32KV	1319.....WT3W	1162...JR3TOE
3946.....F2YT	3482.....N4MM	2934..WB2YQH	2669.....S53EO	2259.....W9IL	1871.....DJ1YH	1522.....AA1KS	1293...VE6BMX	1014...EA2BNU
3891.....EA2IA	3444.....YU1AB	2926.....KF2O	2355.....K2XF	2242.....K5UR	1855...PY2DBU	1499.....YU1ZD	1280...W2EZ	1010...F5RRS
3827.....K6JF	3424...SM3EVR	2832.....HA5NK	2346.....S58MU	2238.....9A4RU	1759.....I2EAY	1451.....AI6Z	1271.....VE6FR	792.....K6UXO
3797.....UA3FT	3369.....N5JR	2787.....W9HA	2281.....N6JM	2239...W6OUL	1707.....KC6X	1397.....NH6T	1268..KW5USA	611.....JH2IEE
3708.....N4NO	3099.....YU7SF	2745.....I2EOW						

SSB

4180.....I0ZV	2888.....I4CSP	2487.....UA3FT	2211.....CX6BZ	1770.....YU7SF	1544...DK5WQ	1380...SV3AQR	1028...DL8AAV	790.....N3DRO
3779.....ZL3NS	2844.....N4NO	2446.....KF2O	2162...K5RPO	1685.....KS4S	1535.....I3ZSX	1318.....KC6X	1011...I2EAY	786...JN3SAC
3557.....K6JG	2804.....N5JR	2401...PY4OY	2074...IN3OCI	1650...HA5NK	1525...W2ME	1271...W2FKF	1010...EA7CD	736...VE6BMX
3465...F5DZU	2780...I2MOP	2397..WA8YTM	1975.....W4UW	1613...K3IXD	1452...LU5DK	1160...K4CN	1002...N1KC	729...F5RRS
3384.....I2PJA	2712...9A2NA	2396...I8KCI	1975...HA0IT	1570...W6OUL	1443...N3XX	1090...LU3HBO	972...AI6Z	660...F5LIW
3127...CT4NH	2657...PA0SNG	2380...I2EOW	1921...K5UR	1567...CT1BWW	1438...DF7HX	1073...N6HT	946...LU4DA	643...BD4DW
3948...B4NN	2509...CT1AHU	2329...KF7RU	1814...N6FX	1560...K8MDU	1421...T30JH	1061...KI7AO	896...JR3TOE	608...KE4SCY
2978...EA2IA	2491...LU8ESU	2213...EA1JG	1785...K2XF	1546...IK0EIM	1396...W9IL	1061...WT3W	836...AG4W	

CW

3984..WA2HZR	2926.....YU7LS	2415.....LZ1XL	2079.....KF2O	1711...W6OUL	1546...9A2HF	1335...VE6BF	1167...AI6Z	984...EA2BNU
3638.....N6JV	2786.....YU7SF	2384..WA8YTM	2043...S58MU	1694...N3XX	1537...JN3SAC	1271...LU3DSI	1094...LU7EAR	967...NH6T
3272...N4NO	2613...VE7DP	2362...YU7BCD	1982...N6FX	1652...KS4S	1514...EA5YU	1270...W9IL	1083...I2EOW	888...VE6BMX
3251...UA3FT	2511...N5JR	2179...HA5NK	1823...K2XF	1651...IK3GER	1513...IK5TSS	1262...I2MOP	1078...9A3UF	815...WT3W
3239...VE7CNE	2479...G4UOL	2165...EA7AZA	1806...LU2YA	1626...DJ1YH	1509...9A3SM	1217...AC6K	1055...W4UW	813...K6UXO
3084...K6JG	2451...N4MM	2127...HA0IT	1804...K5UR	1599...EA6BD	1506...I2EAY	1178...KC6X	995...K2LUQ	659...N1KC
2940...EA2IA	2432...9A2NA	2089...KA7T	1799...I7PXV	1590...JA1GTF	1482...EA7AAW			



The short-lived tradition of dressing up for the Saturday night banquet at the NOIDX helped give an air of class to the event.

single in the ARRL 10-Meter contest this month. QSL via the Austrian (OE) bureau or direct to the 4U1ITU address.

Another CQ WW DX CW operation is **TM5CW** by Dominique, F5SJB. He'll use the special call until December 5.

Alan, K4AVQ, will operate from the P49V QTH December 18 to January 1 as **P40AV**. Alan will be active on all bands, 160-10 meters. QSL via home call (ex-W0RIC).

Dr. Rick, NE8Z, returns to Ecuador again this winter, where he will be active under his usual **HC1MD** call as well as **HC1MD/HC7** from the Amazon jungle November 30 to December 14. Rick likes

CW on the new bands. He'll also have 6 meter gear with him. QSL via K8LJG direct or via the W8 bureau.

A group of Italian DXers plans a trip to **Chad** in late November or early December. The amateurs will repair the missionary radio of TT8MS and help other missions set up local communications. They will also put up antennas for the amateur bands. They expect to have a directional antenna for 10, 15, and 20 meters, with verticals for the other bands. They'll also have a 6 meter station running. Max, I8NHJ, will operate the CQ WW CW Contest as a single-op, all-band, low-power entry, with QSLs going to his home call.

CQ DX Awards Program

SSB

2286.....WR5Y	2288.....HK3LGO
2287.....K3JGJ	2289.....K7ZM

CW

994.....K3JGJ	995.....YT1SJ
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SSB Endorsements

320.....K1UO/330	320.....K3JGJ/324
320.....K9MM/330	320.....I0SGF/323
320.....K7JS/330	320.....W2FKF/321
320.....WA4IUM/329	310.....W9IL/317
320.....YV1KZ/329	300.....WR5Y/306
320.....K1HDO/328	275.....KK4TR/286
320.....WD0BNC/328	275.....K7ZM/282
320.....YV1JV/328	28 MHz.....WR5Y

CW Endorsements

320.....K9MM/330	310.....YU1AB/317
320.....WA4IUM/330	310.....W4UW/312
320.....K3JGJ/325	310.....OZ5UR/311
320.....K1HDO/325	275.....W9IL/275
310.....K7JS/317	

RTTY Endorsements

320.....K2ENT/326

The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. 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 330 active countries. Please make all checks payable to the award manager.

Other operators are Elvira, IV3FSG, Giovanni, IK8TOA, and Luciano, IK8HBA. Anyone who can provide assistance or funds is requested to contact Max at <i8nhj@pagus.it>.

73, Chod, VP2ML

A Look At The World Around Us

Holiday Delights for Happy Hamming

Season's Greetings, friends! Here's hoping this festive time of year finds you in good health, in a cheerful mood, and holding a big sack of previously overlooked or unrealized funds to spend freely on amateur radio gear. Alternately, maybe you will receive one of the new zero-interest, double-deferred principal credit cards as a special Christmas gift. Those are the ones set up so you charge a big bunch of treats and goodies, and your grandchildren pay the card back with cheaper money. Now that's my kind of plastic! I understand the number of those "play now, pay later" cards is rather limited, however (your odds may be better with the lottery). We will thus assume you are not one of the chosen few and tailor this year's views of goodies to a range everyone can afford.

This year's highlighted items are guaranteed to make your on-the-air operations during the new millennium more enjoyable than ever before. What else can I say except settle back, enjoy the "window shopping" tour, and remember to order items of interest early to avoid shipping delays or "sold out" dilemmas. Remember, too, I am only your tour guide here. Orders for featured items go directly to their listed sales addresses or outlets. The fun views await, so let's get started!

"Heartbeat of Hamming" Accessories

First in the limelight is a new semi-automatic key guaranteed to capture the hearts of CW devotees of all ages: the new Vibroplex Blue Racer 2000, or "Millennium Bug," debuting in photo 1. This trim little beauty is a modern rendition of the famous Vibroplex Model 4, or Blue Racer, used by professional telegraphers and radio amateurs alike during eras past. It is an exceptionally small and agile bug, measuring only 6.5 inches long by 2.5 inches wide and exhibiting an approximate speed range of 20 to 50+ wpm. Although out of production for several decades now, the Blue Racer is still Vibroplex's most requested "NLA model—and a genuine collectible capable of producing beautifully distinctive CW. This new "2000 version" differs from its forerunner in its use of a larger ("Original" rather than "Blue Racer" size) mainframe/yoke and damper assembly. The Standard version 'Racer

4941 Scenic View Drive, Birmingham, AL 35210

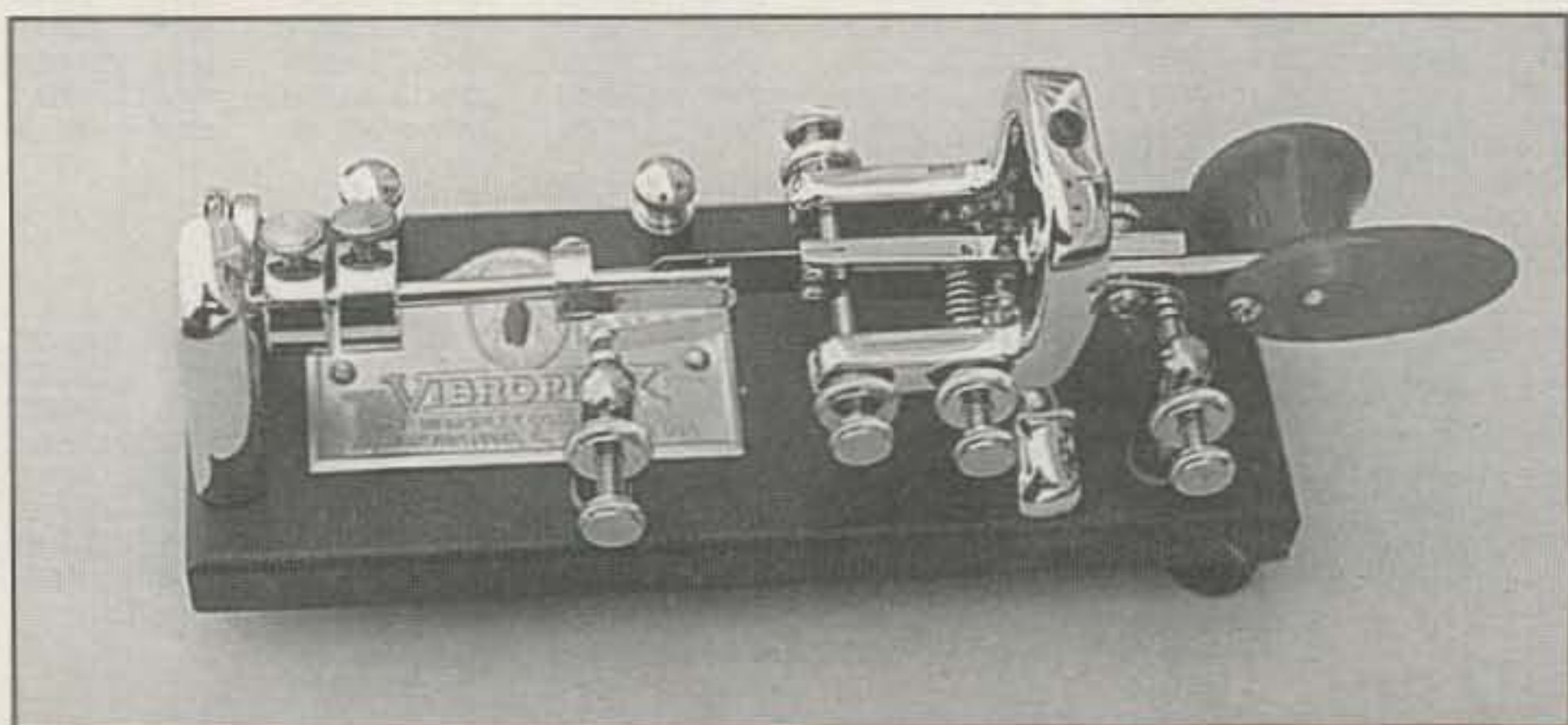


Photo 1— Glitz, glamour, and flash galore best describe this new Blue Racer 2000 "Millennium Bug" from Vibroplex. The standard version of this pint-size gem sports a rich-blue-color base like its rare cousin of yesteryear. Yes, and this new bug works as great as it looks. A mating solid-oak carrying case is also available for this telegraphic treat.

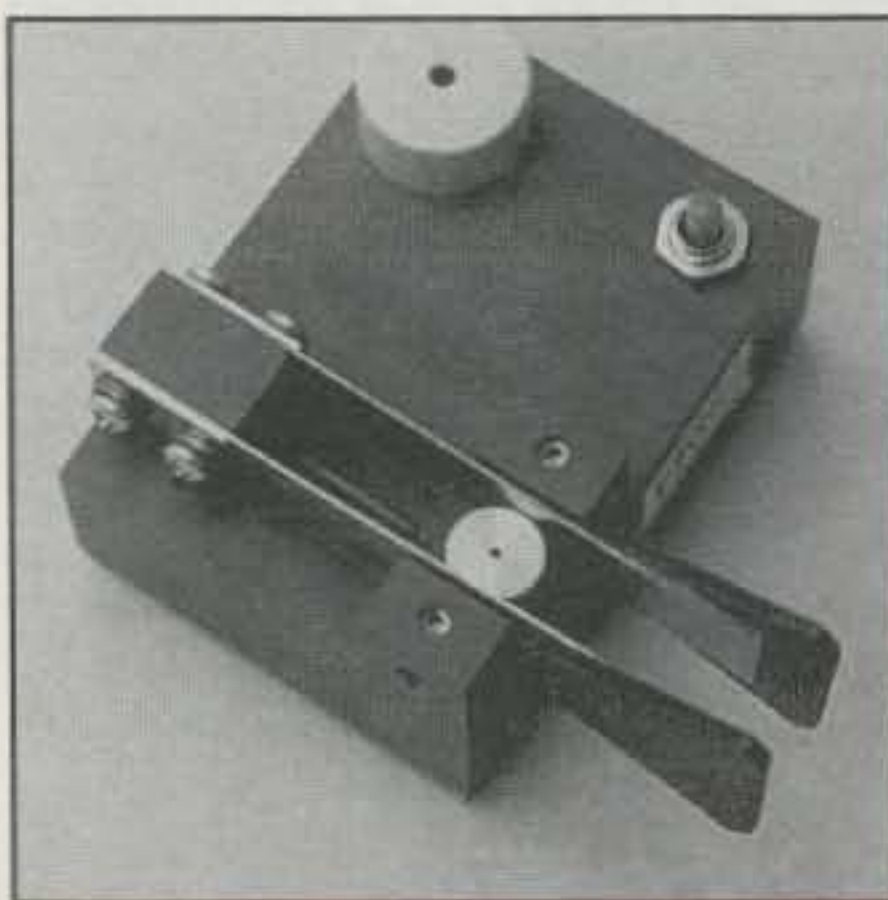


Photo 2— The new Paddlette KP-3 is a combination iambic paddle and base-mounted Tick keyer with integral lithium battery. It has a magnetic base and mating adhesive-backed magnetic plates that give it lift-and-go mounting flexibility. All keyer functions are accessed and controlled by the keyer's pushbutton and fingerpieces.

2000 also sports a rich-blue-color base like its predecessor. Combined with its chrome-plated upper mechanism, this little bug is a real eye-catcher. I understand production of the Millennium Bug is limited and there may be a waiting list, so check with The Vibroplex Company, 11 Midtown Park East, Mobile, AL 36606 (telephone order line 1-800-840-8873) for the latest details.

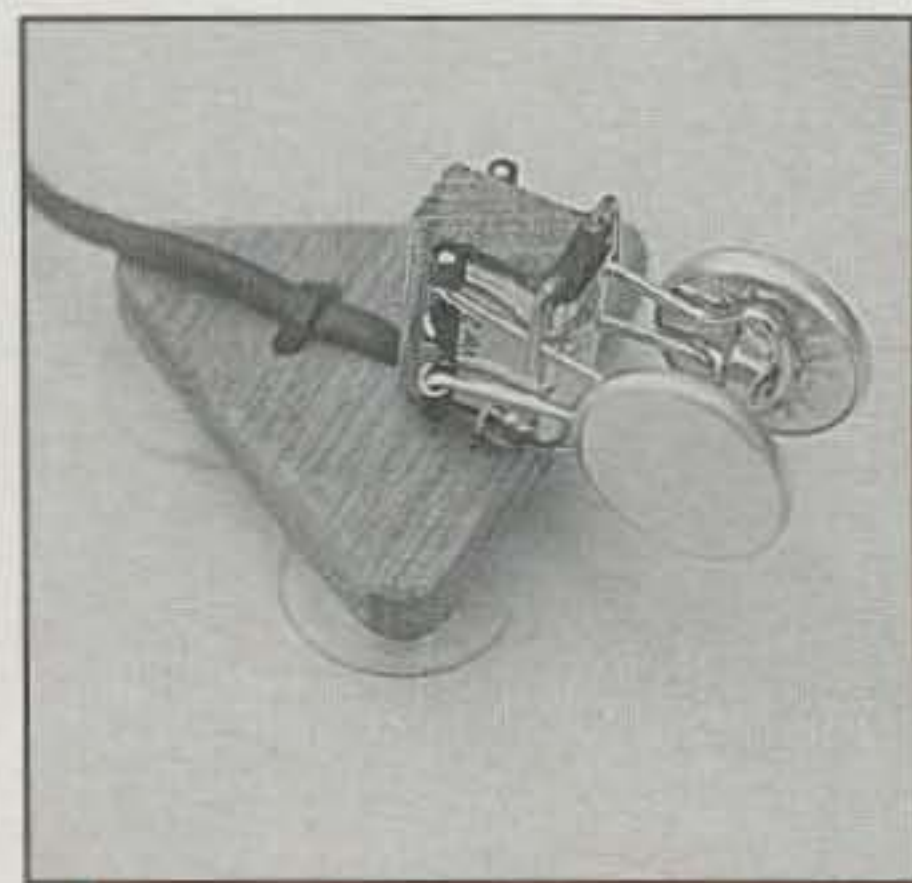


Photo 3— The new "Bulldog" iambic paddle from K9LU is small, unique, and ideal for rigs with built-in keyers. It is a little gem and a genuine conversation piece!

Say you have been looking for a tiny key for traveling, QRP'n, and/or backpacking? Well, check out Paddlette's recently announced KP-3 shown in photo 2. This combination iambic paddle and base-mounted Tick keyer unit is exceptionally small (1.5 by 2 inches), yet it has everything you need for big-time CW operations. The paddle has fine pitch screws for setting gaps, and its adjustment wrench even stores in the base. The Tick keyer has two 50-character memories, beacon mode, tune-up function, sidetone with top-mounted piezo sounder, and more. All keyer functions are accessed and set by



Photo 4— Heil Sound's new goldline microphone helps any transceiver stand above the crowd with full-bodied, studio-quality audio that sounds marvelous. Flip its "HC" switch, and a second element in the mic changes response to more "talk power" for DXing and contesting.

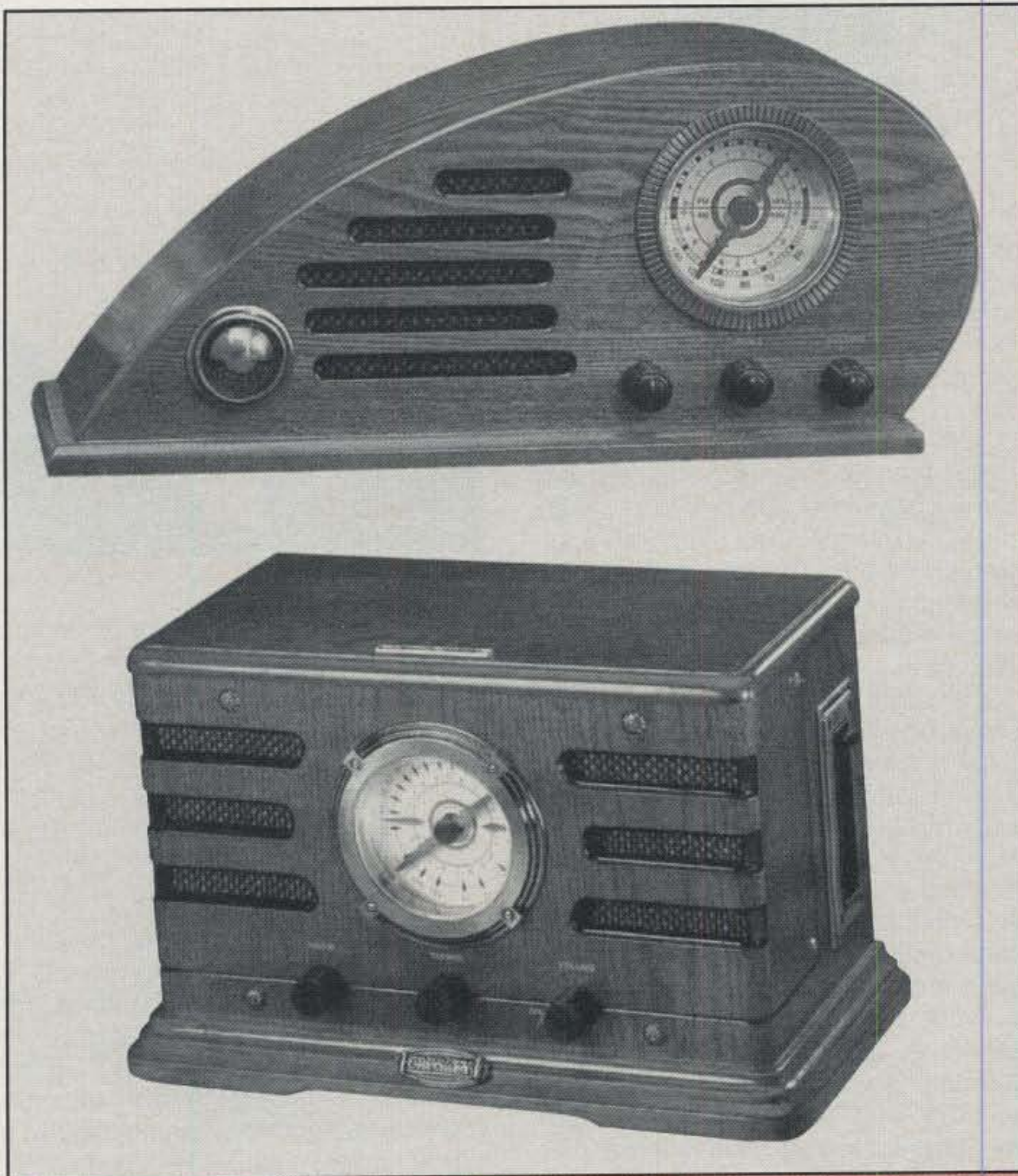


Photo 5— Classic radios and replicas of classic radios are hot items of the time, and these little Crosleys are in a class of their own. The top item is a rare "Ruby" model. The other radio is the "Metro" version. Both sport polished-wood cabinets with aircraft-style tuning dials and receive the AM and FM broadcast bands. These heart-throbs are available from Universal Radio, Inc., Reynoldsburg, Ohio.

a single top-mounted pushbutton and the paddle's fingerpieces. The KP-3 comes with a magnetic base and two adhesive magnetic hold-down pads you can stick on a desk or portable rig's case. A mag-

netic knee mount for mobiling is also available as an option. This little gem is available directly from Bob Hammond, K17VY, of Paddlette Company, P.O. Box 6036, Edmonds, WA 98026 (425-743-1429).

EXPAND YOUR KNOWLEDGE



Ham Radio Operator's Guide

by Carl J. Berquist

This book includes how to secure an amateur radio license, study aids, FCC regulations, standard convention, types of equipment, methods of transmission, antennas, local organizations, networks, and simple construction projects such as field strength meters, antennas, power distribution centers, and other "add-ons".

Category: Communications

Trim Size: 7-3/8" x 9-1/4"

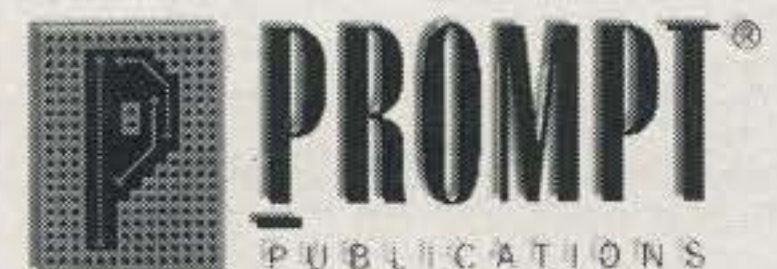
Pages: 264

Sams#: 61195

Price: ~~\$20.95~~



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Refer To Offer 61195A



CIRCLE 73 ON READER SERVICE CARD

December 1999 • CQ • 63



Photo 6— These new all-leather carrying cases from Cutting Edge Enterprises are designed to softly coddle and protect micro-size FM talkies. The case on the left opens from the bottom and carries the talkie upside down. The case on the right has elastic sides and holds the rig upright. The case in the middle is similar to a shirt protector for a thin HT and its antenna.

Prefer a stand-alone miniature paddle to mate with your rig's built-in electronic keyer? Take a close look at the novel "Bull Dog" iambic paddle made by K9LU and shown in photo 3. It is built around a modified bulldog paper clip, has three bottom-mounted suction cups for holding solid almost anywhere, and handles great. (I use mine daily in the den and car.) This little heartthrob is available from Louis Petkus, K9LU, 1020 Cedar Avenue, Suite 2M, St. Charles, IL 60174 (toll-free 1-877-227-9139).

If voice operations are your mode of choice, a very special treat is also in store for you this holiday season: The new Heil Goldline microphone shown in photo 4. This new dual-function mic is a genuine studio-quality instrument capable of giving your SSB or FM transceiver (or classic AM rig) near-broadcast-quality audio and allowing you to sound better on the air than you do in person. It can be set for rich, full-bodied transmissions when signals are strong and band conditions are good, plus it has a switch-selectable second element with a more tailored audio response for DXing and contesting. That second element can be a wide-range Heil HC-5 or a sharper response and pile-up busting HC-4, according to what you select when ordering a new Goldline mic.

Visualize the possibilities here, gang. You can project an image of the best-sounding operator on the band one min-

ute, and then you can flip a switch and become a heavy-duty DXer with a blowout signal. The mic also has a smooth-operating reed-type PTT switch, optional pre-assembled and color-coded cable for direct plug-in operation with modern Kenwood, Yaesu, and ICOM transceivers, and a versatile desk-type boom mount.

I have been using a new Goldline mic with my home and mobile rigs (ICOM 761 and Kenwood TS-50), and the unsolicited compliments on my audio quality have been amazing. This mic romps! More details on the microphone and amateur radio's continuing love affair with beautiful-sounding audio are slated for an upcoming column, but don't wait until then to set your new image. Goldline mics and accessories are available right now from Heil Sound Ltd., 5800 North Illinois, Fairview Heights, IL 62208 (618-257-3000). They make admirable holiday gifts!

Crosley Replica Radios

Like to add a unique touch of old-time glamour and warmth to your shack or den this holiday season and during the new millennium? Check out the neat little Crosley replica radios available from Universal Radio and shown in photo 5. These reproductions of classic collectibles feature modern solid-state circuitry and AM and FM broadcast-band reception, and they are ideal for casual entertainment or for monitoring local news and weather. Their

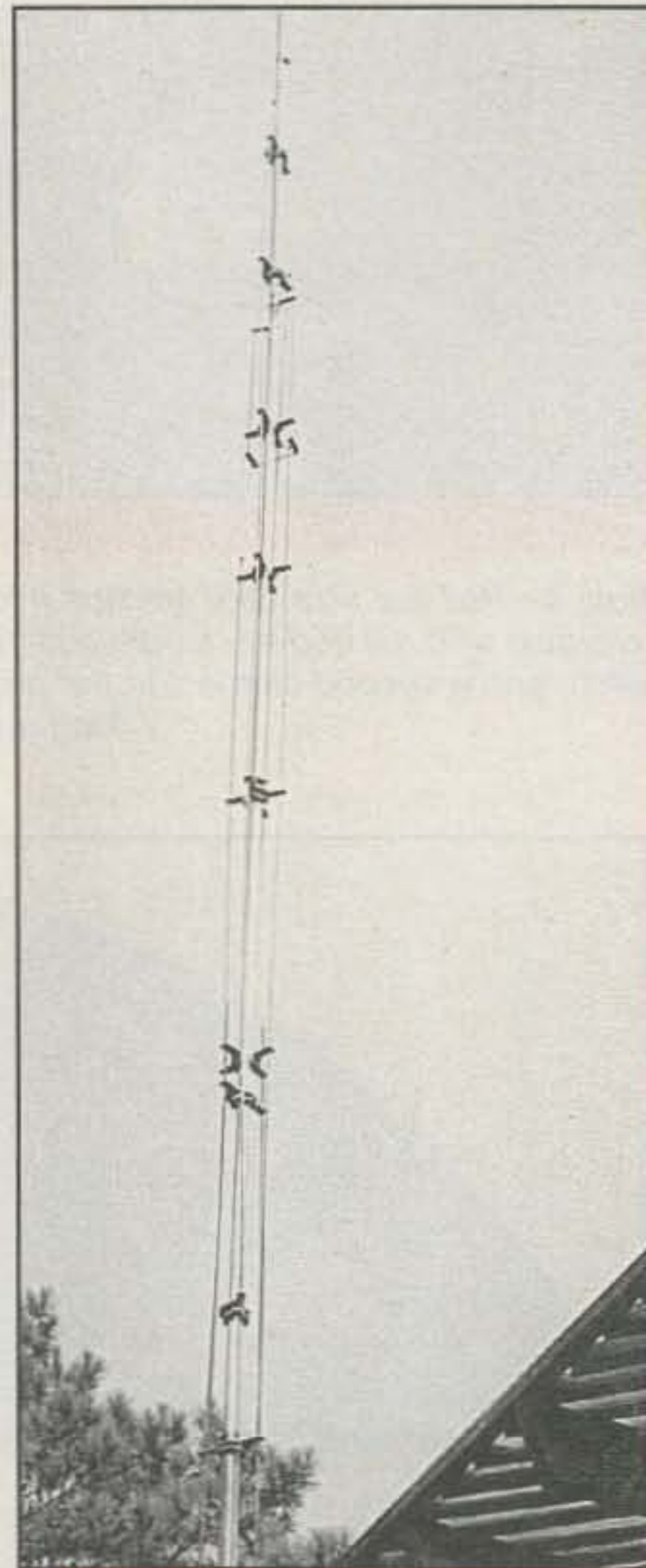


Photo 7— Say your antenna-raising crew went south for the millennium? No problem. Hy-Gain's new AV-640 multiband vertical will get you on the air with a great signal in no time flat. It is easy to assemble and install, exhibits mild gain, and does not require an external ground system. (Photo courtesy Hy-Gain)

glossy wood and veneer cabinets plus aircraft-style tuning dials give them a right out of the 1930s look that captures attention from across a room. They are magnificent. The tabletop beauties are available from Universal Radio, Inc., 6830 Americana Parkway, Reynoldsburg, OH 43068 (orders 1-800-431-3939).

Classy Carrying Cases

Remember the padded "Worldpack" travel case for an IC-706 or similar-size rig featured in the September column? Cutting Edge Enterprises carried the idea a couple of steps further and developed the impressive micro-talkie carrying cases shown in photo 6. These soft-leather cases are especially designed to coddle and protect FM talkies such as Alinco's DJ-C5T and DJ-S11T, ICOM's IC-Q7, and

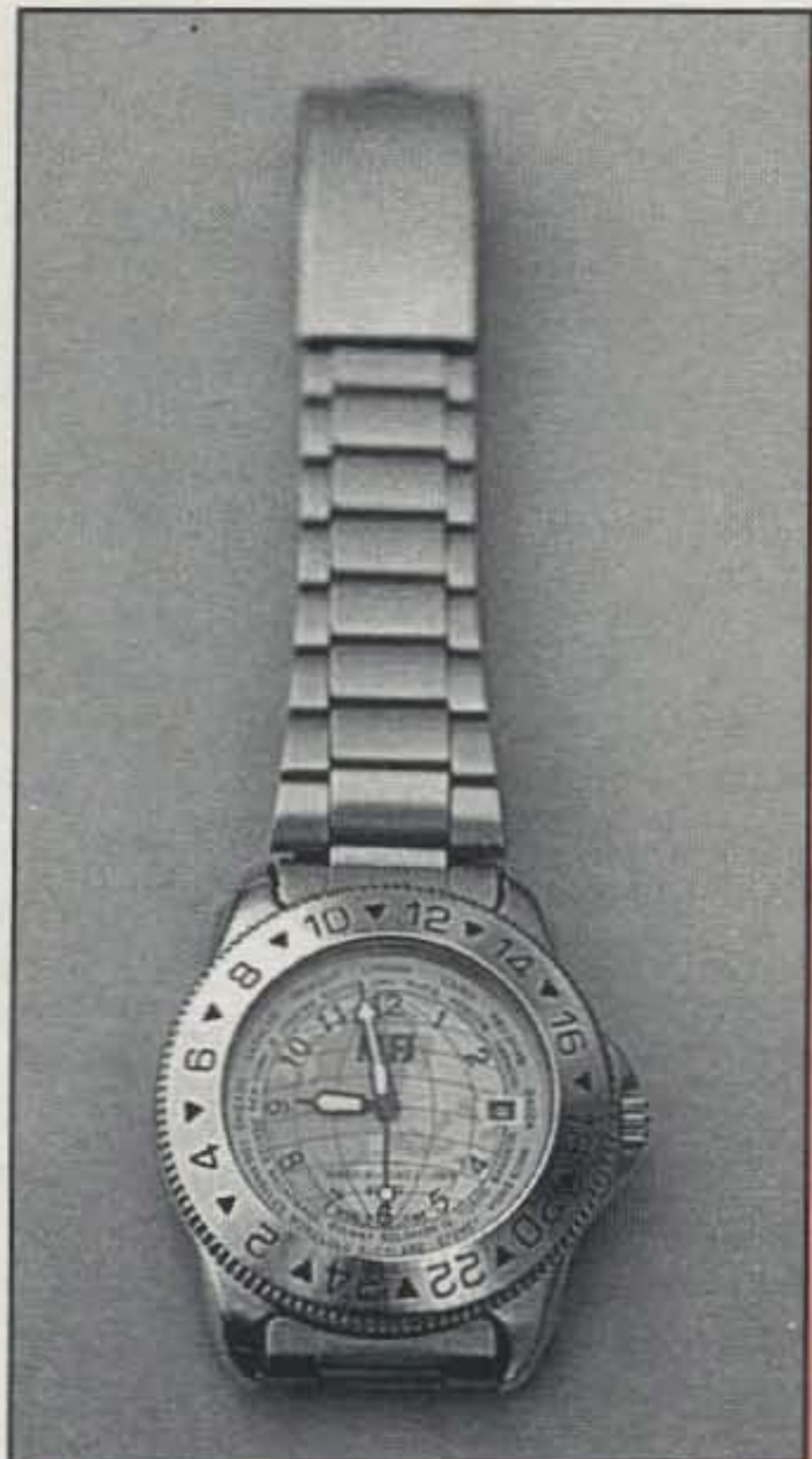


Photo 8— Here is a special treat you will find useful both at home and in the field— MFJ's new DXer's watch. It is dandy for quickly checking time both locally and around the world, plus visualizing daytime/nighttime signal paths and even estimating gray-line propagation times.

Yaesu's VX-1R. Slightly larger versions are also available for talkies such as the IC-81T, VX-50R, and TH-G71A.

The case on the left in photo 6 is called a "Radio Holster" It is fitted with a rear belt clip and holds a talkie in the "antenna down" position. Turn it upside down (as shown), and it also protects a rig's top controls and sockets from rain. The middle case is a "PocketPro." It holds a mini-talkie plus a pen and antenna, and it has a rear clip for securing it to a shirt pocket. The case on the right is a "Radio Glove." Its top flap has a Velcro closure, its leather feels and smells like quality, and it is nice! All three cases plus the previously mentioned "Worldpack" are available from Cutting Edge Enterprises, 1803 Mission Street, Suite PMB 546, Santa Cruz, CA 95060 (1-800-206-0115).

Big-Time Vertical

Our next featured item is dedicated to folks with limited time, space, and "strong-arm assistance" for assembling and raising a large HF antenna system, especially during inclement weather conditions. You want a globe-spanning signal, but a tall tower and multi-element beam are out of the question, right? No problem. The

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Jim's New Book - "Frequently Asked Questions about Antenna Systems and Baluns." This 124 page book answers questions and dispels myths. The material is presented in a style that's easy to read and Jim, W4THU, is not beyond poking fun at jealously held concepts that don't quite hold up under close scrutiny. However, at the heart of this book are questions that a lot of hams ask over and over again. Available now - \$10.95 + \$3 postage.

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"easy living" solution to that age-old dilemma is Hy-Gain's new ground-independent AV-640 vertical shown in photo 7. The AV-640 stands 25 feet tall; covers the 6, 10, 12, 15, 17, 20, 30, and 40 meter bands; handles up to 1500 watts; and works like a champ. You can assemble this antenna indoors, walk it into position on a patio or deck, and be on the air with a big-time signal in less than a day.

I assembled one of these Hy-Gain verticals, pretuned it according to manual-specified stub lengths, secured it to my deck's rail with rope in two places, and have been working DX like crazy with it. That includes HLs, JAs, 9M6, VQ9, and much more—on all the bands. The vertical "works out" so well, in fact, that I find myself using it more than my 3-element beam. Why? The vertical does not require rotating (a "work 'em the instant you hear 'em" advantage), and it pulls in weak stations on the WARC bands as if they are right in the neighborhood.

The bands are doing great, sunspots are high, and the DX is calling, friends. Why wait? Gear up for fun and answer them! You even have two choices of antennas: Hy-Gain's AV-640, which covers 40 through 6 meters, or their AV-620, which is also 25 feet tall and covers 20 through 6 meters. Both versions of Hy-Gain verticals are available from dealers nationwide, or you can order them directly from Hy-Gain, 300 Industrial Park Road, Starkville, MS 39759 (1-800-647-1800).

New DXer's Watch

You have seen watches for joggers, scuba divers, and road runners. Now check out the unique new DXer's watch shown in photo 8. This stainless-steel beauty has the names of 24 well-known cities—such as London, Tokyo, Sydney, and Hong Kong—imprinted around its display's inner edge. The watch's outer bezel is marked in 24-hour time, so you can turn/set it to the present/displayed time in one zone (like CST), then read local time in the other 23 areas/time zones by comparing the display's inner edge and the outer bezel. Alternately, you can rotate/set the outer bezel to a time when amateurs in a distant land typically flip on their rigs (8 PM in Bangkok, for instance), then trace hours around the bezel and note your related local time. By studying areas in day and night hours below the bezel, you can also estimate which bands are open each hour and even estimate best times of gray-line propagation. The watch is a killer, an item you will thoroughly enjoy, and it is available right now from MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762 (1-800-647-1800) and MFJ dealers nationwide.

Great Reads

As we begin wrapping up another year's

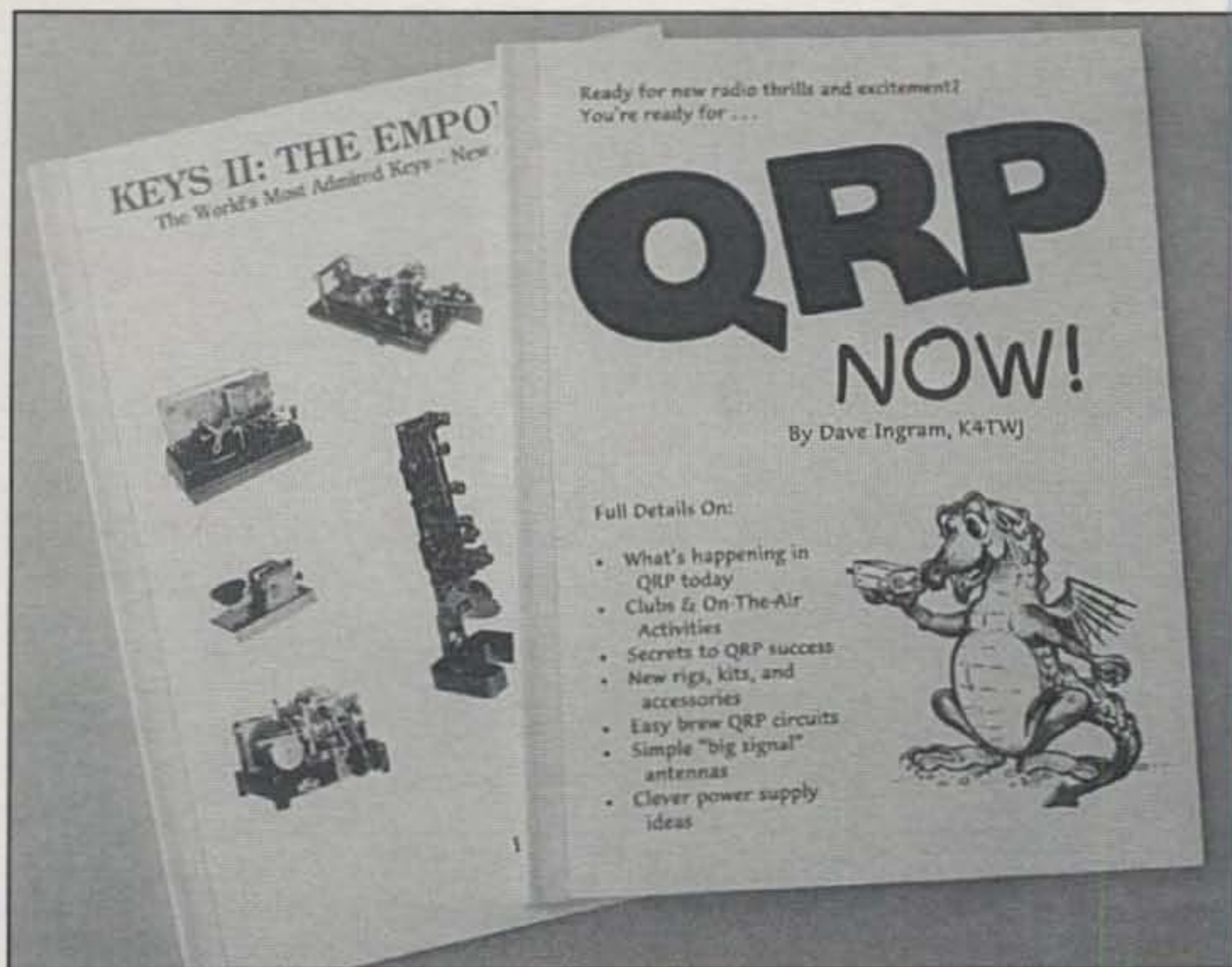


Photo 9— The holidays are an ideal time to read about and plan new amateur radio pursuits, and these latest two books from K4TWJ give you an inside track on two of today's hottest interests—keys and QRP.

worth of columns in *CQ*, I once again encourage all of you to continue expanding your amateur radio horizons and to pursue at least one new interest for the new millennium. The "what" and "how" behind that wish of self-improvement depends on personal interests, so let your natural instincts be your guide. As a good "getting started" inspiration in that direction, check out some of my books, such as *Keys*, *Keys*, *Keys* and *33 Simple Weekend Projects* (both available from CQ Communications, Inc., 25 Newbridge Road, Hicksville, NY 11801 [516-681-2922]). Two more hot books are my self-published *Keys II* and *QRP Now!* available directly from my house to yours (photo 9). *Keys II* is a CW enthusiast's and key collector's dream. It has photos and info on the world's most exotic keys, bugs, paddles, and miniatures (new and old), plus details on all Vibroplexes since "day one," pricing and dating guides, and much more. *QRP Now!* describes what is happening in QRP right now: today's hot new rigs, kits, and accessories, plus the clubs, contests, and on-the-air activities you can join. It also highlights secrets of QRP success, low-profile yet high-performance antennas, and much more useful information. Either book is \$16 plus postage (\$2 book rate, \$3.20 Priority Mail). Order them directly from me, K4TWJ, 4941 Scenic View Dr., Birmingham, AL 35210.

That wraps up our mini-tour of tantalizing treats for this time, gang. However,

remember it is a mere sampling of readily available goodies. The tour continues in the advertisements here in *CQ*, and there are items to fit every interest.

Once again this year, I am planning an on-the-air Christmas party with "Wild Woody WARC Keys" and others items to give folks QSOs, and everyone is invited. The time is between 2000 and 2230 GMT December 18 and 19, and the place is 14.200 to 14.220 MHz. See you there!
73, Dave, K4TWJ

Remembering Alan Dorhoffer, K2EEK

Al was always friendly, attentive, and interested in everyone he met—a genuine "Good Guy of Amateur Radio." His enthusiasm for chasing DX on 10 meters, collecting keys, and finding those unique treats in hamfest fleamarkets reflected his dedication to the hobby. As Editor of *CQ*, he gave the magazine direction, balance, and purpose beyond comparison. The vacancy left by Al's passing is immense. He will be eternally missed.

Al was one of our closest radio friends. We will always remember him when working another "good one" on 10 meters (this one's for you, Al) and when reading each new month's issue of *CQ*. May God's love always be with you, Al.
Dave, K4TWJ, and Sandy, WB4OEE

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Season's Greetings '99

Once again, I can't help but note just how 1999 has flown by. But now I should instead note how the century has flown by! It's truly hard to believe that this is the very last column for both this year and for this century. Talk about something (and everything) being the very last of an era!

In any case, the best of 1999 Season's Greetings to all our readers. That having been said, in this final holiday month of both 1999 and the century, we'll continue with our customary formula of antenna, software, and book notes. Stay with us, and if the Y2K bug doesn't get either or both of us, we'll see you next month in the brand new century.

Antenna Notes

First Call Communications "Informa" Newsletter. First Call Communications, Inc., is the domestic dealer for Force 12/ Tri-Ex Tower products. First Call also offers Prodistel Big Boy commercial rotators, prop pitch rotators, help with tower permits, formal stress documents, installation packages, lists of suggested tower installers, online installation and tower maintenance guides, add-ons, replacement parts, and more.

Recently, First Call began issuing a new, quarterly newsletter, "The Informa." It's a summary of information for potential US Tower buyers, both novices and experienced persons. Various newsletter sections cover diverse topics such as tower maintenance, concrete and rebar considerations, specifications and local approvals, masts, rotators, lightning protection, purchase and installation factors, and the like. You can sign up online for the free newsletter.

Contact First Call Communications, Inc., 28 Grove St., Spring Valley, NY 10977 (1-800-426-8693; e-mail: <firstcall@cyburban.com>; on the web: <<http://www.firstcall.com.net>>).

TX RX Systems Update. TX RX Systems, Inc., of Angola, New York, has as its motto "dynamic solutions for wireless communications." The firm offers a variety of specialized RF and antenna accessories of interest to VHF, UHF, and microwave users. These accessories include transmitter and receiver multicoupler systems, duplexers, resonant cavity filters, signal boosters, tower-mounted preamplifiers, and other RF system products. We last visited TX RX Systems in November 1996.

Several new products are offered. Among them are the 423 Series Tower-Mounted Preamplifiers, which offer good balance between low noise, high gain, and intermodulation (IM) immunity. Other new items include paging filters and multicouplers.

Although TX RX Systems products primarily are designed for commercial service, many of their characteristics are advantageous for amateur use in the 2 meter, 220-225 MHz, 420-450 MHz, and 1.2-1.3 GHz regions. Of special interest to amateurs is their line of "professional duplexers for amateur radio." These devices make use of the firm's patented Vari-Notch(R) circuit, which boasts excellent bandpass characteristics. Recently, patented Vari-Notch performance has been made available for 6 meter applications, with the introduction of the 6 Meter Vari-Notch Duplexer, covering 50-54 MHz.

You can download a "short form catalog" from the TX RX Systems website, or you can have a catalog sent to you by mail. Also available for download or viewing is a short presentation on omnidirectional-gain antenna design, "Antennas 101," by Ron Jakubowski, the firm's system engineering manager.

For more information on the company's products, contact TX RX Systems, Inc., div. Bird Technologies Group, 8625 Industrial Parkway, Angola, NY 14006-9696 (716-549-4700; e-mail: <sales@txrx.com>; web: <<http://www.txrx.com>>).

Soft Stuff

AEA SWR Director Software. Many amateurs "grew up" with Advanced Electronic Applications (AEA) products, the firm being founded in 1977. Today most readers are aware that the "old" AEA technically is out of business, but that its name lives on. Tempo Research, founded in 1984, is continuing the AEA trade name under the separate AEA Division. It produces AEA's products in the antenna, antenna analyzer,

Time Domain Reflectometer (TDR), and data product lines. Some new products include a complex impedance analyzer, coax tracer system, tone generator/generator and hunter probe, and TDR unit, generally for commercial applications.

We've profiled several AEA/Tempo products, including the SWR-121 Graphical Antenna Analyst, AEA's answer to MFJ's SWR Analyzers™. The SWR-121 combines a frequency synthesizer with an accurate, low-power SWR bridge. A keypad lets you select the center frequency, frequency range, and step size.

The LCD readout displays the antenna's SWR curve over an entire range. In fact, the SWR-121's key selling point is its graphic screen display of your HF antenna's performance over its useful operating spectrum, showing SWR versus frequency. The display shows SWR and return loss at the antenna's center frequency. An RS-232 interface allows for remote control, remote display, and saving of plots. The SWR-121 HF covers 1–32 MHz, while the SWR-121 V/U covers 120–175, 200–225, and 400–475 MHz.

Recently, AEA/Tempo announced their latest applications software for the SWR-121 series. Called the SWR Director, the software allows the SWR-121 HF and SWR-121 V/U user to completely control the instrument from an external PC. You can use the SWR Director with the Windows® 95 or Windows 98 operating system, intuitively controlling it with either a mouse or a keyboard.

The SWR Director lets you overlay up to five different SWR curves simultaneously in one screen presentation with a different color for each curve. A zoom feature allows close examination of any portion of a curve in great detail. With a mouse, it's possible to pan across the frequency spectrum conveniently. A very useful auto-scaling function is included.

For investigation of curves with low SWR values, you can choose to display a return loss curve, with its high resolution. You can store curves on your PC's hard drive, or you can print them out for future reference in preventive maintenance. You also can easily insert curves into a document for making a professional-looking report or article.

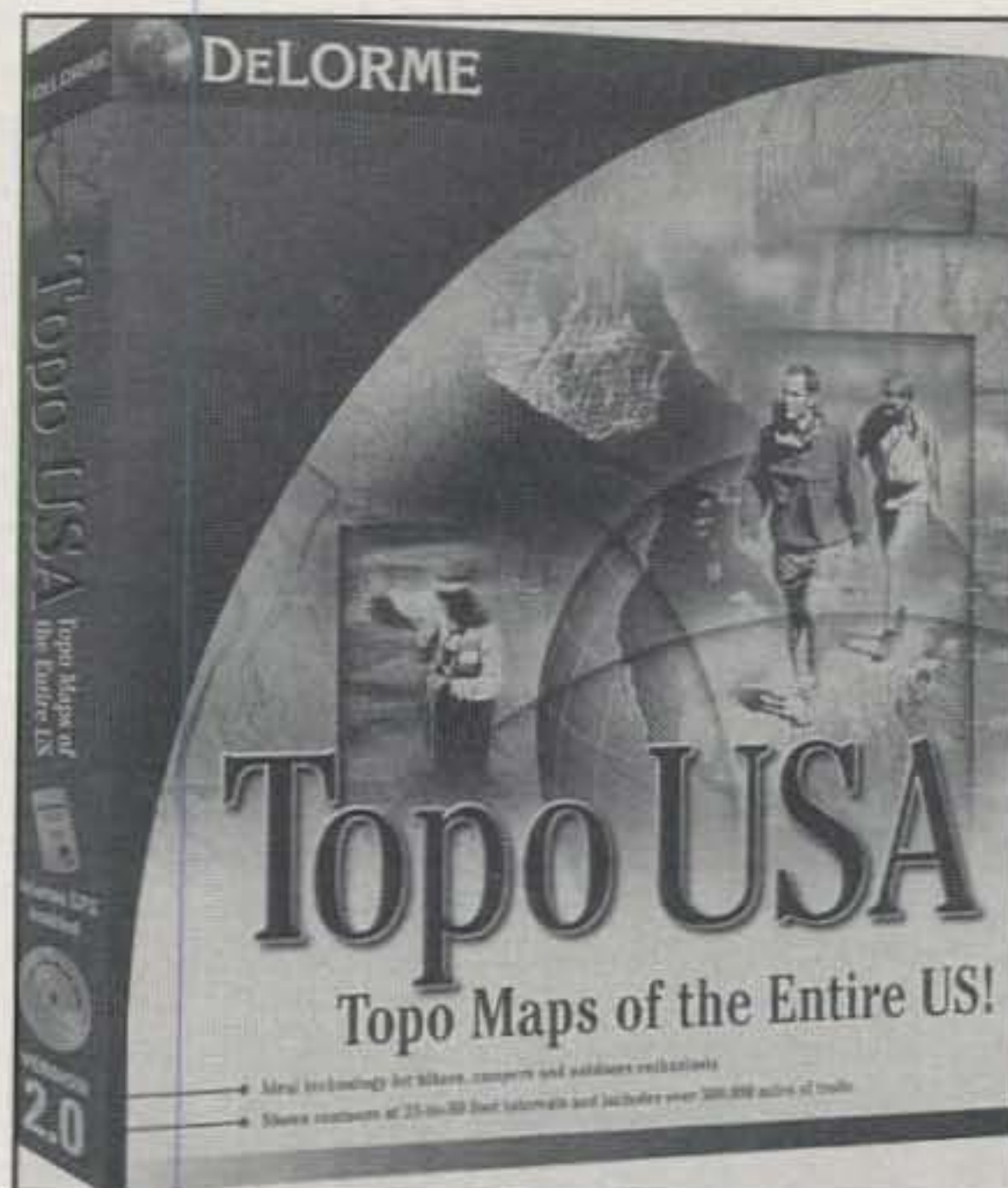
SWR Director is \$59.95 directly from AEA. For information on the SWR Director and other products, contact the AEA Division of Tempo Research Corporation, 1390 Aspen Way, Vista, CA 92083 (1-800-258-7805; e-mail: <aea@aea-wireless.com>; web: <<http://www.aea-wireless.com>>. (See fig. 1.) The AEA/Tempo website also describes AEA's classic line of VHF/UHF antennas.

Note: AEA also has available an interesting antenna report, "Facts About VHF Vertical Antenna Design." The free report covers aspects such as the problems of base-station antenna design; decoupling considerations; achieving omnidirectional gain; design of twin- $5/8$ wave antennas, including the firm's trademarked IsoPole verticals; and how to make a simple RF detector.

Delorme Topo USA 2.0. Among the many CD-ROM and DVD products we have reviewed are the excellent mapping and navigation software packages from DeLorme. These include Street Atlas USA®, the first consumer mapping software; AAA Map'n'Go®; EARTHA Global Explorer®; Phone Search USA®; and several others. DeLorme also publishes the popular "Atlas & Gazetteer®" series of state recreational atlases for all 50 states.

As we pointed out in last February's column, mountaintoppers and hiking hams should be interested in DeLorme's Topo USA™, Version 1.0, representing the firm's full-scale delving into customizable topographic maps on CD-ROM and DVD.

If you liked Topo USA 1.0, you'll likely love Topo USA 2.0. DeLorme claims that the new product redefines the way people think about topographic maps. This claim is based on a new elevation database; a fresh interface (one that will be used in other DeLorme mapping products); a realistic, three-dimensional (3-D) engine; some 300,000 miles of trails; and major parks and recre-



Delorme's newly updated Topo USA 2.0 software reportedly redefines the way people think about topographic maps. This claim is based on a new elevation database; a fresh interface (one that will be used in other DeLorme mapping products); a realistic, three-dimensional (3-D) engine; some 300,000 miles of trails; and major parks and recreation areas nationwide. Overall, it appeals to what DeLorme calls "a brand new audience of outdoor enthusiasts." (Photo courtesy DeLorme)

ation areas nationwide. Overall, it appeals to what DeLorme calls "a brand new audience of outdoor enthusiasts."

Topo USA 2.0 lets you locate any place in the United States quickly and easily; search by placename, geographic feature, street, or latitude/longitude; view street-level detail or 3-D perspective for the entire country; profile your hikes and backcountry travels for distance, elevation, and grade; add symbols, text, and MapNotes™ to customize your maps; and print detailed topographic maps and cross-sectional route profiles. If you're so equipped, you can use the Global Positioning System (GPS) through a connection with a GPS receiver. You also can upload maps and route directions to Palm Computing or Windows CE handheld computers, as well as e-mail views to other Topo USA program users.

The new product maps the entire country at 20 foot contour intervals on two-dimensional maps, based on the USGS DEM (digital elevation model) database. Topo USA 2.0 is available in several versions. The full national version on CD-ROM or DVD is available at an estimated street price of \$99; or, you can obtain one or more of six regional editions on CD-ROM for \$49 each.

For more info, contact DeLorme, Two DeLorme Drive, P.O. Box 298, Yarmouth, ME 04096 (phone 1-800-452-5931; e-mail: <info@delorme.com>; web: <<http://www.delorme.com>>).

From the Bookshelf

Two from the ARRL. Two new ARRL books crossed my desk recently. One of them is quite fat, and the other fairly thin.

The "fat" book is the third edition of the now-classic *ON4UN's Low-Band DXing*. To be sure, John Devoldere, ON4UN, needs no introduction to DXers on the low bands, particularly on 160, 80, and 40 meters. He has achieved spectacular success as a

contester on these bands, and his outstanding achievements are not the result of blind luck. John shares the professional approach he takes to hamming with readers in his latest edition.

John's latest opus is appropriately subtitled "Antennas, Equipment, and Techniques for DXcitement on 160, 80, and 40 meters." In fact, the massive, 586-pager is a sort of cross among *The ARRL Handbook*, *The ARRL Operating Manual*, and *The ARRL Antenna Book*, but specially tailored for the low bands.

The new book's 16 chapters plus a thorough index include two new chapters, one on low-band DXing from a small lot, and another on John's personal odyssey from low-band DXer to contester. The book includes operating guidelines for DX chasers and DXpeditioners; many new antenna designs; and nearly 650 figures, photos, and tables. The book is \$28 plus \$5 s/h.

The "thin" book we referred to is *ARRL's Low Power Communication*, by Richard Arland, K7SZ. The 204-page, 12-chapter book tells you just about everything you need to know to get going and get into the exciting world of QRP, or low-power operation—certainly one of amateur radio's most exciting and rewarding challenges.

Subtitled "The Art and Science of QRP," Rich's book provides the lowdown on many aspects of QRP operation, including QRP history and mindset, getting started, advanced QRP techniques, QRP antennas, HF propagation, "vintage" QRP, and more. Four appendices cover QRP calling frequencies, QRP net schedules, suppliers and manufacturers, and QRP club websites. The book is \$14.95 plus \$4 s/h.

For more information, contact the American Radio Relay League (ARRL), 225 Main Street, Newington, CT 06111-1494 (1-888-277-5289; e-mail: <pubsales @arrl.org>; web: <http://

www.arrl.org>). (The ARRL publications catalog is online at <http://www.arrl.org/catalog>.)

The Extreme Searcher's Guide to Web Search Engines. There's a world of information out there on the web, but most of us will admit that actually *finding* all that information is far from easy. Finding a specific resource on the Internet in general, and on the web in particular, can be very difficult. Fortunately, search tools are available; we should learn to use them.

A new book by Randolph (Ran) Hock shows you how to make the most of the leading search tools. His 212-page book, *The Extreme Searcher's Guide to Web Search Engines*, offers straightforward advice to help you get immediate results. The author not only shows you what's "under the hood" of the major search engines, he explains their relative strengths and weaknesses, reveals their many (and often overlooked) special features, and offers tips and techniques to get immediate, manageable results.

As a bonus, the author maintains the Extreme Searcher's Web Page. This is a website where you can get the latest word on volatile search engine features, trends, and technologies. You'll find it at <http://www.onstrat.com/engines>.

The CyberAge book, an imprint of Information Today, Inc., is \$24.95. Contact your local bookstore or Information Today, Inc., 143 Old Marlton Pike, Medford, NJ 08055-8750 (1-800-300-9868; e-mail: <custserv@infotoday.com>; web: <http://www.infotoday.com>).

Three from Macmillan Publishing USA. Recently, three new and interesting Macmillan computer books came across our desk. All three are good ones, so I'd like to share them with you.

First up is *Peter Norton's Inside the PC*, an 816-page, Sams® imprint, now in its eighth edition. The book, suitable for intermediate computer users, is by PC guru Peter Norton. It's a comprehensive, user-friendly guide, written in Peter's highly acclaimed "Norton style" to painlessly bring you up to date on highly complex technological PC developments. The 27-chapter book is well-indexed and includes a glossary. The Norton book is priced at \$29.99.

The remaining two books are oriented toward users of the new Microsoft® Office 2000 suite. The first is *Microsoft Office 8 in 1*, a Que®-imprint book by Joe Habraken. It's a sort of all-in-one resource that will help you with eight major Office components, with some useful Windows® information tossed in. The book stresses the web-based capabilities and attributes of the new Office 2000 package. The 1278-page book is \$29.99.

The second Office book is *Special Edition Using Microsoft Office 2000*, by noted Office experts Ed Bott and Woody Leonhard. The massive, 56-chapter, 1473-page Que opus is appropriately billed as "the ultimate Office 2000 reference." The authoritative treatment includes hundreds of undocumented Office secrets. The book also includes WOPR 2000, "Woody's Office Power Pack 2000," a powerful Office enhancement provided on a companion CD-ROM. The disc also includes several other bonuses, notably some third-party software, a complete copy of the book in searchable electronic format, and extensive additional chapters on Office 2000 programs from other texts. The book-disc combo is \$39.99.

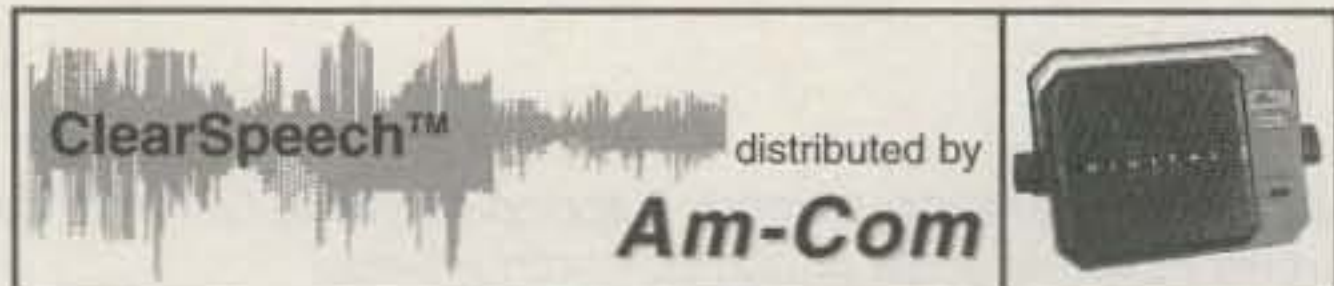
The two new books we described are available in local bookstores, or contact Macmillan Publishing USA, 201 West 103rd Street, Indianapolis, IN 46290-1097 (1-800-858-7674 for a free computer books catalog; e-mail: <info@mcp.com>; web: <http://www.mcp.com>).

Wrap-Up

That's all for this time, gang. Next time, more Digital Dipole topics of current interest. See you then.

Overheard: It's always desirable to be a good planner. Don't be too rigid, however, since many great things sometimes *do* happen entirely by accident.

73, Karl, W8FX



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CIRCLE 36 ON READER SERVICE CARD

Connecting You And Packet Radio In The Real World

A Touch of Packet Magic!

In this installment of the "Packet User's Notebook" we are going to explore more of the many options available to the packet user. This column might be looked upon as a "cause and effect."

Over the last few months we've seen more than our share of disasters in the form of hurricanes, "Floyd floods," and earthquakes. In every situation there has been loss of life and some heavy damage to homes and property. I, for one, know all too well what it means to have had my home damaged and lose equipment due to natural disaster. There are others who lost more than I, be it a loved one or their home and personal belongings. Maybe I should have done more to help those who were suffering greater losses.

More than 200 system node operators (SNOs) in the southeastern US and I work hard to keep the Southeastern Emergency Digital Association Networks (SEDAN) functioning with end-to-end continuity. With all the devastation, I have been pondering other ideas as to how I can help by making access to the emergency networks more complete, or more reliable.

With all the preparations that we've already made, there is still another window to the network that has not been fully filled. This notion concerns making the packet radio networks more accessible—from a portable packet station. It's not that it's too expensive. How can we even begin to put a price on human life?

Portable Packet

The portable packet station is truly an asset to the SNO or user who likes to enjoy his or her hobby while on vacation or just for weekend tag-along fun (see fig. 1). The portable packet station allows the packeteer to participate in local functions where the packet station can relay information through the local digipeaters to some distant point. The best and most resourceful application of a portable packet station will become fully apparent during an emergency or some unexpected crisis.

Already these stations have proven their worth during the hurricane season throughout the southern and coastal states. Portable packet stations were also used in the aftermath of the earthquakes in central and southern California.

Several portable packet stations can be used to develop digipeaters or a network whereby information can be relayed to

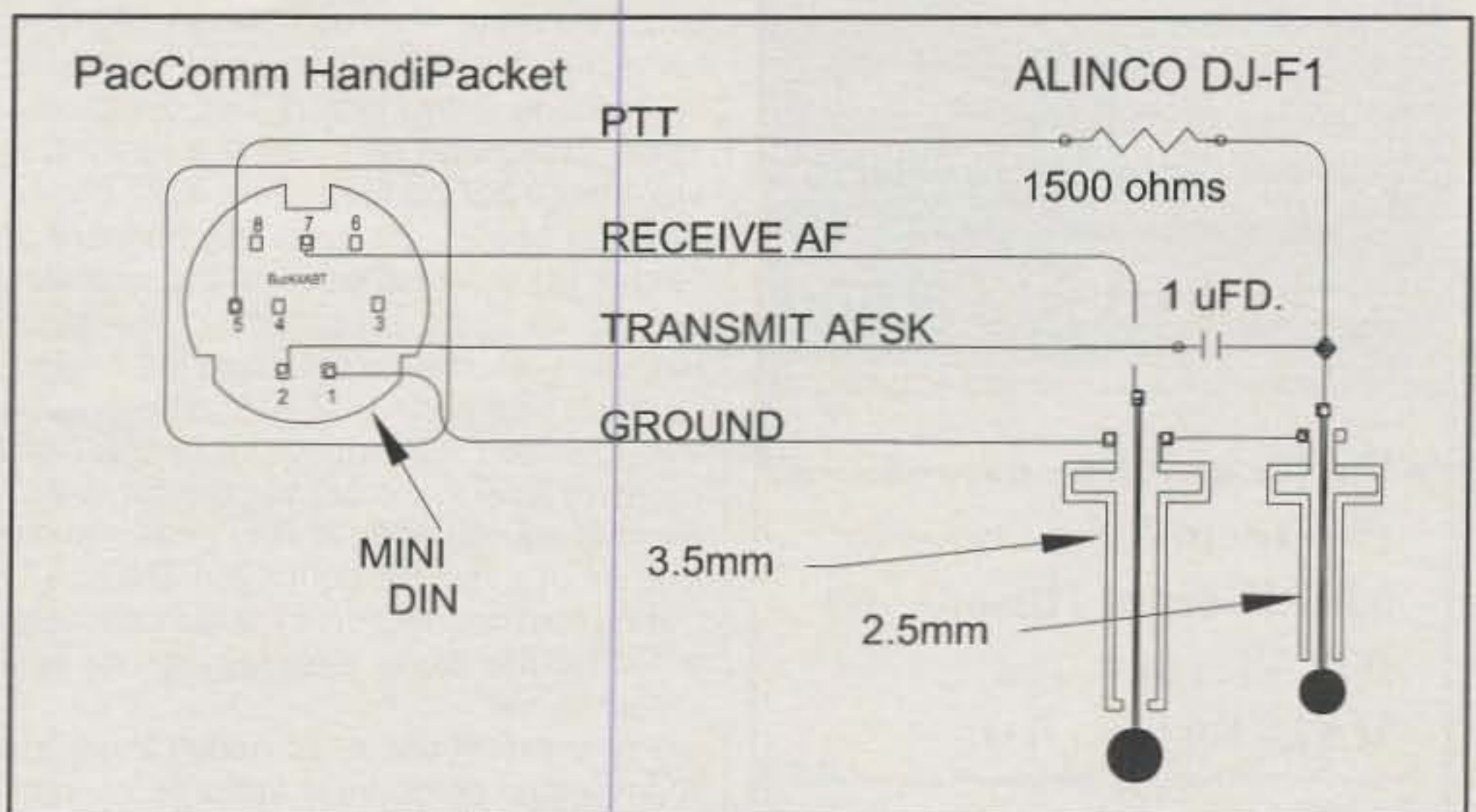


Fig. 1— Because of the compact size and internal power source, the PacComm "HandiPacket" TNC represents the ideal packet controller for use in a portable packet briefcase. The serial comport connections between a battery-powered laptop computer and the TNC are straightforward serial interfaces. Another good candidate for portable packet operations is the Kantronics KPC-3. There are several 2 to 5 watt VHF, amateur handheld, battery-operated transceivers that can be used in this application.

and from the scene of a disaster. This is made possible through the built-in "digi" capability of all TNCs. I have a rubber suction cup affixed to the base of a quarter-wave, 2 meter antenna with 18 feet of double-braid, small, 50 ohm coax attached. This allows some added antenna height while using a handheld radio with my briefcase-housed porta-packet station.

The porta-packet station makes possible many uses of packet outside the normal day-to-day use. Emergency and disaster digital communications is one such use, but a porta-packet station can also be used for hamfest packet demonstrations, scouting expeditions, and mountain-topping.

On The Other Side of the Equation

There are several types of "nodes." A node or a network node controller (NNC) is, in effect, an intelligent TNC. Depending on the originator, the NNC can be of simple design, or it can host many commands and can be a pain to operate. Some nodes talk to one another at various times and update one another as to which path is the best and shortest to use to get to grandma's house. Other nodes are simple and are used to give a local acknowledgement, while allowing them-

selves to be used in a fashion similar to a remote-controlled TNC.

The performance of these network node controllers is about the same, but the features are in wide contrast. As with the X1J4, there are features galore, including TCP/IP routing capabilities, text components, and controllable features that can be tailored to fit almost any network configuration. The X1J4 enables the SNO to choose which baud rate, or which set of portals and baud rates, he/she wishes to use.

The KNET is a node type similar to the X1J4, but with a limited number of features. The KNET is useful as a direct-connect node and in some cases can be made a part of a larger network. In either application I will address the nodes as if they all were the same, yet I want to point out some of the features of each.

You connect to the node in much the same manner as you would connect to another packet station. Here is the procedure:

```
cmd:C 007<enter>
```

The connect response will appear something like this:

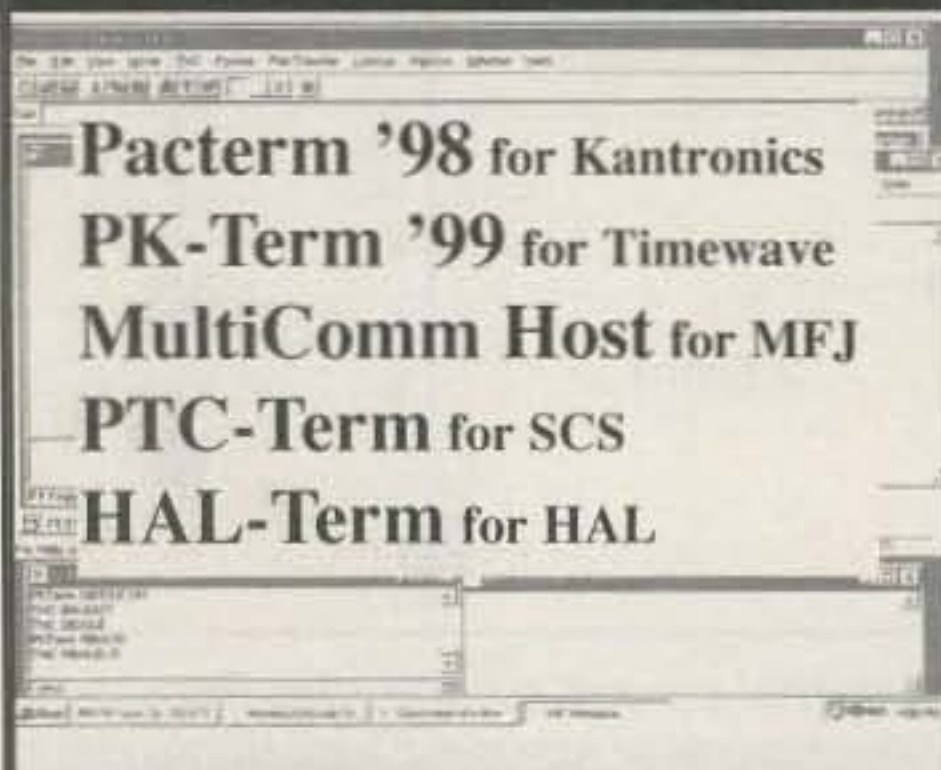
```
*** Connected to {007/K4ABT-7}  
SEDANode located atop No Business  
Mtn near Bedford, VA; Type I for INFO  
or C for MAILBOX >
```

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Your next entry or response will trigger one of the commands, or you can enter a **B** and the node will issue a disconnect.

If you press **M <enter>**, you will receive a list of about eight calls of the most recent heard stations in the receive range of node 007.

Press **N <enter>** and you will receive a list of the nodes that can be reached from node 007. Notice that some of the nodes in the node listing may not be direct connects from node 007, but are reachable via a neighbor node of node 007.

If you see a callsign in the MHeard or Nodes list to which you want to connect, you may initiate a connect in the same manner you used to establish the original connect with node 007. The difference is this time you will not return to the cmd: mode to type in the connect/callsign. As I mentioned, the node is very similar to operation of a remote-controlled TNC.

The next connect or link to the next node will offer the same features as just indicated above.

For users of the X1J4 nodes there are many other embedded features or information that the SNO may have installed and which the user can take advantage of.

While connected to a distant X1J4 TheNET node, type **CT <enter>**, and the node should respond with the Connect text installed by the SNO. Type **I <enter>** and you may receive information about the node and its location.

In the SEDAN we usually install text into the INFO area of the node that returns the "grid-square" and county where the node is located. Other data such as the transceiver type, SNO name, and antenna type and height are also a part of INFO.

In the BT, or "beacon text," is usually some information about a local club meeting, upcoming hamfest, or pertinent data about weather conditions or warnings that is beamed every hour.

All text—be it connect text (CT), info text (I), or beacon text (BT)—can be changed at a moment's notice by the SNO or a designated node manager who has the password for SNO command-level access.

Many Frequencies for Packet

As it was in the beginning with single sideband, we had a special frequency which we favored more than others. In those days, following the Korean conflict and after 1955, we would gather at 3995 kHz (on one of the sidebands and sometimes both—double-sideband). The phasing-type exciters for SSB were crystal controlled, so we were destined to go for the same frequency of operation until something better came along. Something better did, and we slowly moved away from those first "tribal" gatherings to other less congested frequencies.

To list all the available frequencies would take another column devoted to packet fre-

quencies. In Table I, I will list a few of the popular frequencies which have been set aside for packet operation. Some are not limited to packet service, but for the most part they are occupied by packet nodes.

Even now we can see there is no shortage of packet frequencies. Given a little time and another year, who knows? Packet radio is gathering momentum. I see many new stations coming onto the packet frequencies, and I see many of the old timers returning to packet fun.

A Few Unwritten Notes About Node Configuration

In my lab in Evington, Virginia I build, or modify, radios for packet use. I interface them to the TNC/node and set all the levels for the correct I/O and deviation. I then pack up the radio and TNC/node and ship it to the new SNO. When the node arrives at its new home, the SNO sets it in place and turns it on for the first time.

Every new node—be it TheNET, NetROM™, X-1J4, or any related networking switch—when placed on the air for the first time, or after some change or repair has been done to the TNC (node), should have a "hard reset" performed on it. Only once is all that is required, but it must be done at least once. This reinitializes the register pointers to zero, just in case during shipping the RAM was glitched when it was X-rayed, or some other static charges caused a glitch in the firmware or RAM.

Do a hard reset, but remember that sending only "reset" to TheNET X1J4 node while in the SNO command mode just does a "warm start." *This is not good enough.* A warm start reset leaves all the parameters, modes, BText, Ctext, INFO text, etc., intact. It may set some, but not all, of the vacant RAM register pointers to FFFF or, as some say, 0 (zero). What we are after at the initial setup is a full-blown *hard, cold start.*

Connect to the node and send it:

RESET<space>ANYTHING

I usually connect to it (either by radio or through the comport, **ESC<space>C**) and send the TNC/node **RESET<space>65536** or **RESET<space>***. Either string will perform a hard reset or cold start to your node. This will return the node to lala land or to the defaults that were initially burned into the originally EPROM.

Read the following line carefully: *Doing two or more hard resets after the node has been initialized can sometimes be a disaster.* A sluggish, or slow, 250 n/sec EPROM may fail to initialize or "sign on" after a few hard resets. The time to be cautious is if you are connected to the node via the radio link and you attempt the hard "reset 65536" remotely.

Use this reset method: Connect to your node "alias." Send **MANager** or **SYsop**

Packet Frequencies

(Below 28.200 MHz, the packet baud rate is limited to 300 baud.)

80 meters

3606 kHz
3696 kHz

40 meters

7091 kHz
7093 kHz

20 meters

14.103 MHz
14.105 MHz
14.107 MHz
14.109 MHz
14.111 MHz

15 meters

21.105 MHz

10 meters

28.103 MHz
28.105 MHz
28.295 MHz (1200 baud)

At VHF most packet operations are 1200 and 9600 baud. Some intra-city backbones operate upwards of 56 kb.

2 meters

144.390: new APRS frequency
144.910 (frequency coordination may vary by state)

144.930
144.950: DX spotting networks
144.970
144.990

145.010: National calling/throughput frequency

145.030: LAN and BBS use
145.050: LAN and BBS use
145.070: LAN and BBS use
145.090: DX spotting networks

145.510: LAN and BBS use
145.530: LAN and BBS use
145.550: LAN and BBS use
145.570: LAN and BBS use
145.590: DX spotting networks

145.610
145.630
145.650
145.670
145.690
145.710
145.730
145.750

145.770 SEDAN (emergency communications in the eastern US)

The 440 MHz band hasn't had a lot of coordination to it. However, in the southeast there is some activity on 443.800 MHz. As LANs develop, there will likely be more and more trunking activity on the UHF bands, both 223 and 440 MHz.

Table I—A few of the popular frequencies which have been set aside for packet operation. Some are not limited to packet service, but for the most part are occupied by packet nodes.

<enter>. Reply with the correct password, procedure, etc. (see page 31 of the new 1999 X1J4 SNO handbook). You are now in the SNO command mode: Send a **P** <enter>; send an **MO** <enter>.

If you are using BUXTERM.EXE, go into the BUXTERM buffer (F10) and do an **Alt B**. This will dump the Parameters and Mode configuration into the buffer. Edit the parameter and mode configuration to suit your node settings or to complement the surrounding network nodes. Save them with the correct BUXTERM commands—**P** and **MO**—at the beginning of each line.

Then do the same with the "I." Save the INFO with an "I" at the beginning of each line (multiple lines, up to 165 letters/characters). Next do the same with the Btext (multiple lines, up to 77 letters). When you save the BText, be sure each line saved has a **BT**<space> at the beginning of it.

"Do Your Thing"

Now do your thing: a hard reset; in the SNO command (password) mode, send this string to the node—**RESET 65536** <enter>. If you used the correct password and are in the SNO command mode, you will be disconnected soon. The disconnect may not appear if you are connected to the node via other nodes.

If you see the node direct, then wait 60 seconds or until the node sends the ID after 60 seconds. X1J4 TheNET nodes ID 60 seconds after a reset.

Connect to the node again. Go back into the SNO command (password) mode. Use the **Alt R** feature of BUXTERM to upload all the PARAMS, MODE, MH, INFO, Ctext, and BText to the node.

Now the fun comes. Wait 24 hours, or until 1 to 4 PM the following afternoon. Look to see which nodes are showing in the Routes lists. These are the nodes that you likely will want to lock into the Locked routes table.

Lock only those nodes which appear in the current Routes table. For 1200 baud nodes, the SNO will likely lock in the neighbor nodes at 192. For 9600 baud neighbor nodes on the radio port (0), lock them in at 224 or 240. For neighbor nodes on the comport (1), lock them in at 255.

The information I've given you here took several years to compile. Most of this information is contained in a new 1999/2000 Packet Radio Handbook. For the System Node Operator who does not have the 1999/2000 X1J4 SNO Handbook, it is available free. However, you must pay the Priority postage, handling, and disk charge: in the United States \$5.50; for Canada \$10.00. I cannot mail to countries other than the United States and Canada. Make the check or money order payable to Buck Rogers. Be sure to include your return address. Mail your request and payment to: Buck Rogers, K4ABT, 115 Luenburg Drive, Evington, VA 24550.

For the new packet radio operators who need interface information and diagrams for their TNC Christmas gifts, go to: <http://www.packetradio.com/tnc2rad.htm>. Next month, we'll continue our discussion about node configuration.

Here's wishing all of you Happy Holidays and a New Year and New Millennium filled with health and packet fun!

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CIRCLE 70 ON READER SERVICE CARD

Special Report: The State of Amateur Radio Around the World—Part II

This concludes our two-part survey on the status of amateur radio worldwide. To obtain this information, we wrote to the headquarters of over 100 national amateur radio societies around the world. We asked each to tell us how many licensed amateur radio operators the country had, and about the licensing structure and the requirements to become licensed. We also wanted to know the status of amateur radio in each country and whether or not the hobby was growing.

Many organizations did not answer our inquiry, but a good many did. The results were interesting. We found out that there is no relationship between the population of a country and the number of amateur radio operators it has. For example, China, with 1.2 billion people, only has 900 licensed operators. Egypt, with a population of 63 million, only has 42 radio amateurs. Kenya, with a population of 28 million, has 15. Amateur radio is far more popular in developed democratic nations than in the so-called third-world countries where there are more restrictions placed on people and the free exchange of communications.

Several countries, such as Fiji and Kenya, had just about no amateur radio activity due to a lack of resources and people to administer the examinations (especially Morse code) or to regulate the hobby. Even if amateur radio was available, transmitting equipment is not—and if it was, the cost is beyond the reach of the masses, many of whom are poor.

Contrary to ITU Radio Regulations, some countries, such as Costa Rica, Kuwait, Trinidad and Tobago, and Japan either have no Morse code examinations or permit HF operation without code proficiency. Lithuania exempts disabled persons and people over age 50 from Morse exams.

Most countries have two or three license classes and one or two code examination speeds (5 and 12 wpm). It appears that many of the developed nations—such as the United Kingdom, Aruba, and Spain—want to do away with the manual code proficiency testing altogether. As a general rule, amateur radio is not growing worldwide.

In our next issue, we will talk about the future of amateur radio.

Kenya: "The Licensing Authority here has been unable for the past five years to give us a figure for the number of current licensees. My best count is about 35 to 40 amateurs, but it could be more or less. Around 80 callsigns are on the books, but about half have lapsed. Of these only about 10 or 12 are at all active. Several have left the country. We know of most licensees, but possibly not all.

"There are three license classes in Kenya: Full, Intermediate (no code and reduced power), and Novice. Usually the British RAE (Radio Amateur's Examination) is required, set and administered by the City & Guilds of London Institute, which has an office in Nairobi. Other RAEs can be considered on their merit, such as the FCC RAEs. Only Kenya citizens can get a license here by taking the RAE; all non-citizens must be licensees of their own country and one for which Kenya must have a Reciprocal Agreement."

There is only one code examination speed in Kenya, and that is 12 wpm. "Our conservative Licensing Authority has made no legal changes since about 1948 and seems unlikely to do so now, although privatization may alter their thinking, but we are not holding our breath. The Radio Regulations have been under review, and we have submitted our suggestions."

Amateur radio in Kenya is not growing. "The Licensing Authority is unable to carry out Morse tests itself, so anyone wanting to take one has to go to the UK or South Africa or some other acceptable place. Most local people, both private and official, equate amateur radio with spying for 'colonialists' or some such silly fantasy, typical of the arrogance of ignorance, and this attitude is hard to change. We have been active in a few disasters, like the last serious train crash, to provide essential communications, and that has helped. We now have more recognition from officialdom and are no longer considered to be major security risks by the National Security Intelligence Service.

"Since U.S. licensees have made up the majority of local amateurs in recent years, this problem has dealt us a very serious blow. For everyone who leaves, there is no replacement. Thankfully, U.S. citizens already holding Kenya licenses have been permitted to continue." (Submitted by Ted Alleyne, 5Z4NU)

Kuwait: "Number of radio amateur operators in Kuwait is 225. We have only one general license class that allows use of all amateur bands and modes. To obtain it, the interested should pass theoretical and practical examinations. There is a written examination [but] there is no Morse code examination. However, after obtaining his/her license, if the amateur is interested, he can be trained on how to use Morse.

"The Amateur Service is expanding in Kuwait at a good pace through participating in various activities such as Kuwait National Day, POW, The World Jamboree On The Air in collaboration with Kuwait Scouts Boys Association, etc. Discussions are currently undergoing with a view to establishing an amateur club at Kuwait University.

"We think that the Amateur Service has a great future but collaboration with other humanitarian and youth bodies should be intensified." (Submitted by Mohamed Abbas Al-Holi, Manager, Kuwait Amateur Radio Society)

Lebanon: "There are 206 licensed radio amateurs in Lebanon, but only 60 are members of the national association. We have only two license classes: the Radio Telephony and the Radio Telegraphy/Telephony. The Morse code exam is at 10 wpm, transmission and reception.

"We are of the opinion to maintain the Morse code application amongst amateurs who are genuinely interested in it without imposing it on those who are not. This way we do not deprive those who have other ambitions and interests in other radio telecommunication modes from becoming Radio Telephony and Digital radio amateurs.

"Moreover, in this Internet era, any new tight restriction on newcomers would deter the young generations from joining the radio train. Also we believe that there is ample spectrum space to satisfy the requirements, experiments, and enjoyment of all hams in various radio modes. Unfortunately, amateur radio is not growing in Lebanon." (Submitted by Jamil Sayegh, OD5PN)

Lithuania: Has about 1000 licensed radio amateurs and three license classes: Class A (corresponds to CEPT Class I, all band/mode), Class B (corresponds to CEPT Class II, VHF/UHF), and a national Novice Class C. Class C permits domestic 100 watt communications on portions of four HF bands (80, 40, 15, 10 meters) and 50 watts on 2 meters, 70 cm, and 23 cm. All examinations are according to the TR-61/02 (HAREC) recommendations. Persons younger than 16 years may hold only the Class C license with parents' agreement.

Class A applicants must take a Morse code examination (receiving and transmitting) at 12 wpm. "Disabled persons and persons older than 50 years are exempt from Morse exams. Class A operators who have good technical basis, continually win contests, and observe amateur radio ethics rules, through the mediation of the Lithuanian Amateur Radio Society (LRMD), can apply for a four-letter contest callsign. This callsign is confirmed by LRMD and prolonged every year." (Submitted by Valdas Slezas, LY1BA)

Malaysia: Has about 500 amateur radio operators. "We have two license classes, 'A' (all bands) and 'B' (VHF 2 meters only). Requirement for the 'A' class is to pass a theory exam and Morse code at 12 wpm. The 'B' class requires only passing the theory exam with callsign starting with 9W2. Our written exam covers questions similar to the RSGB's [Radio Society of Great Britain], but with strong Malaysian content.

"Our society successfully convinced the telecom authority to introduce the 'B' class license which began last year. We believe the current Morse test requirements should be maintained." (Submitted by Thiam Chee Ming, 9M2CJ)

Mauritius: "There are about 41 licensed operators here, but many are not active or have no equipment," 3B8CF said. "I can safely say that only about 10 are active. There is only one

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class of license, which is equivalent to the full UK license. The Morse code requirement is 12 wpm, same as in the UK.

"Radio amateur examinations are no longer held, and now prospective amateurs must sit for the City & Guilds of London examinations. Fortunately, this certificate is recognized by the Mauritius Telecoms Authority to issue a license. The weak point in this is that candidates must learn many regulations which concern the UK only, and also the cost to sit for that exam is very high.

"As long as Morse proficiency is an international requirement, we have to abide by it; but we do not think that it is really needed to become a ham. Personally, I am 99% QRV on CW, but I feel that the use of CW should be left to individual taste and not be made a requirement to obtain a license.

"The amateur population here is not growing. The radio amateur license in its present form does not meet the needs of a modern Mauritius, and there have been no new young persons receiving a radio amateur license lately.

"MARS has proposed to the Mauritius Telecoms Authority that a Novice VHF 144-146 MHz only license be established. The assessment of the candidate would be accomplished by volunteer examiners from the local radio society. This class of amateur would be identified by the letter 'V' as the first letter in the suffix, 3B8Vxx." (Submitted by Seewoosankar Mandary (Jacky), 3B8CF, Secretary, Mauritius Amateur Radio Society)

Mexico: There are 8000 licensed amateurs in Mexico. "We have four license classes: Class I, Class II, Novice, and Restricted. In addition to written tests, 10 wpm Morse code is required for the First Class License and 7 wpm for the Second Class.

"The growth in licensees in Mexico has stalled for the past couple of years. This can be attributed to several factors, including economics (most important) as well as the competing factors such as cellular telephone service and the Internet.

"Mexico has been going through a difficult stage during the past couple of years, an authority change from the former Secretaria de Comunicaciones y Transportes (a ministry, or 'department' in the U.S.) to the current Comisión Federal de Telecomunicaciones (similar to the FCC in the U.S.), an autonomous commission whose Director is appointed by the president. This has caused the largest historic delay in amateur radio services, such as new licenses issued, renewals, address changes, mobile station changes, etc. Also, due to this fact, the amateur database is not duly updated. (They have not been able to integrate the databases from the rest of the country where the SCT is still in command.)

"Additionally, other important subjects such as a new set of rules that contemplate digital modes, and subjects such as code proficiency and license restructuring and other updates, have been delayed." (Submitted by Carlos F. Narvaez, XE1FOX, Federacion Mexicana de Radio Experimentadores [FMRE])

Namibia: There are about 100 licensed radio amateurs in Namibia (16 restricted to VHF/UHF and 84 unrestricted). "Both classes write the same examination which complies with that of the European Union. To obtain an unrestricted license you must pass the Morse test at 12 wpm, sending and receiving.

"There will always be a need for Morse code.

Being able to read Morse code puts the cherry on top of being an amateur radio operator. Having been a professional radio operator for many years, I suppose I am biased!

"Namibia being a third-world country, at this stage amateur radio does not have a high priority. Having a population who are 100% literate tops the list. The future of amateur radio looks gloomy. I feel that the Internet is the favorite communications hobby of the young people of today. The solution? That is the 64 thousand dollar question." (Submitted by Ian Sutherland, V51C)

Netherlands: There are about 15,000 amateur radio operators in The Netherlands, includ-

ing about 200 club stations and school stations. There are three license classes: Class 'A' is a full class (CEPT class 1) including HF; Class 'C' is for VHF (from 50 MHz on) and higher, all mode (CEPT class 2); Class 'N' is a Novice license for 2 meter and 70 cm operation on special band segments. The current Morse code [requirement] for the 'A' license is manual receive and send at 12 wpm.

"In The Netherlands the majority of radio amateurs still think the code is necessary for access to HF, although the majority is decreasing by the year. In the past there has been no growth of the amateur population in The Netherlands." (Submitted by Kees Murre, PA2CHM)

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Norway: There are about 5000 amateur radio operators in Norway and three license classes: Class A/General, Class B/Novice, and Class C/Technical. There is a written examination in technical, regulatory, and operational proficiency. The Morse code requirements are 60 characters per minute (12 wpm) for Class A and 40 characters per minute (8 wpm) for Class B. Class C is a no-code license. There are no plans to reduce the telegraphy requirements in Norway. NRRL says their Amateur Service is not growing. (Submitted by the Norsk Radio Relæ Liga)

Pakistan: "The number of licensed amateur radio operators in Pakistan is 224. We have one license class. An examination on electricity and electronics is required and 10 wpm Morse code. Reducing the code exam speed is currently under discussion with the Frequency Allocation Board, who is the license issuing authority here.

"We, at Pakistan Amateur Radio Society (PARS), feel that [a reduction in code speed] is important for the hobby, but we shall follow world trend. Amateur radio is growing slowly here with the efforts of the members of PARS. The availability of components and equipment is not easily within the reach of common man. International agencies should advise the governments to encourage this hobby, which is an important tool of International Peace and Friendship." (Submitted by Yunus, AP2MY)

Panama: There are about 2000 amateur radio operators in the Republic of Panama divided among three license classes: Advanced (all bands with 1000 watts maximum output power); General (all bands with 500 watts maximum output power); and Novician (40, 80, 160, and 2 meter bands with 100 watts maximum output power).

"The written exam has about 60 questions which cover radio technics, legal regulations, and amateur radio subjects. Our current Morse code examination requires the applicant to be able to transmit and receive 5 words per minute.

"Panama has not reduced the code speed exam requirements during the last 15 years. Since there are many operating this mode, examiners are 'very flexible' with the exam, however. I don't think there is a future need for a manual Morse code.

"The Amateur Service is really not growing here. Many people have abandoned or changed from the amateur bands to Internet and cellular telephone. I think these people are not real hams. They have mistaken the hobby.

"Today we should think of redefining the amateur radio function because currently we have new technology that enables other types and modes of communication among people." (Submitted by Jose Garcia Alvarez, HP8AJT)

Papua New Guinea: "Much of what happens in [Papua New Guinea] PNG is quite informal, and this certainly extends into amateur radio, which is not a common hobby for Papua New Guinean people. A working interest in technology is almost a necessary pre-requisite for any national to continue on into amateur radio. Our biggest representative group is therefore expatriate persons under contract to work here.

"In the early '70s approximately 300+ amateur licenses were issued. This has now fallen to just over 100, and I would estimate the active members may constitute 50% of that number. The Amateur Radio Society was formed almost personally by Jim Smith and a few others. Jim

moved to Norfolk Island in the late '70s, and the society has continued in one way or another.

"The number of operators in the country is about 120. We have Novice, Limited, Combined, and Full calls which have the following qualifications: Novice—simple theory exam (multiple-choice answers, 50 questions) and 5 wpm Morse sending and receiving; Limited—high-standard theory examination, no Morse code test at all; Combined—both qualifications must be passed; Full—additionally requires 10 wpm Morse tests sending and receiving. The written exam requirements are in line with Australian levels of testing.

"Morse is currently required for access to HF—5 wpm Novice and 10 wpm Full call. The PNGARS (the society) has asked that Morse code be eliminated as a qualifier for all HF access. While this is considered ideal, a reduction to 5 wpm is more realistic due to the ITU memorandums already in place and unlikely to be removed for some time.

"The society is divided, but most members, including those already holding a Morse code qualification, consider the need for Morse is wrong, as would be the need for specific knowledge of any other communications mode. There is really little evidence to indicate that passing Morse tests leads to a better operator. Many limited licensees have great knowledge of communications and are professionals with far better respect for interference and decent operating procedures. These people are restricted from HF. Many operators who have passed Morse tests publicly and who state that they could use it 'to save their lives,' have never used it since the exam and have no intention of ever using it again.

"The amateur service is not growing in PNG. We were approached by WIA to assess the situation some years ago, and as IARU representative I wrote an answer. I received no reply and little encouragement from Australian organizations. It seems that amateur radio in PNG is likely to continue based mainly on expatriate activity." (Submitted by Rick Warnett, P29KFS)

Spain: "There are 58,000 amateurs in Spain divided among three [license] classes: Class A (General, all bands allowed, 12 wpm code); Class B (Restricted, bands above 30 MHz, no code); and Class C (Novice, portions of 3.5, 7, 21, and 28 MHz, 8 wpm code).

"The examinations require basic knowledge of electricity and radioelectricity, radio amateur regulations, fitting and handling of an amateur station (only theory), and reception and sending of Morse code, except class B.

"In URE we think the Morse code must not be mandatory for obtaining an amateur license. The Amateur Service is decreasing in Spain. We [are] studying several projects, such as the encouragement of our hobby in technical schools, but [no] special action has been taken up to now." (Submitted by Angel Padin, EA1QF)

Sweden: There are about 11,000 licensed operators in Sweden. "Effective April 1, the Morse code examination speed is now 5 words per minute for a Class 1 license, giving full access to HF. It used to be 12 wpm.

"The Swedish Telecommunication Authorities decided on new regulations for amateur radio four months ago. There are now two license classes, Class 1 and Class 2. Holders of Class 1 are permitted to use all bands; holders of Class 2 can only use frequencies above 30 MHz. For Class 1 the required Morse speed

was reduced from 12 wpm (60 characters/min), to 5 wpm (25 characters/min). The Morse examination is done with a character speed of 60 characters/min, but with a longer space between each character, thus making the average speed 25 characters/min. The Class 2 certificate requires no examination in Morse code.

"The telecom authorities use the keyword 'deregulation.' Soon we are to come to an agreement on other issues which will make amateur radio easier in Sweden, but as yet it is too premature to introduce these issues."

"Our society has been given the possibility of issuing training licenses, the aim of which is to give prospective amateurs a period of time in which to train for their Class 1 and 2 license. The training licenses (with 'SH' calls) are limited to a three-year period—i.e., you must upgrade to Class 1 or 2 within three years.

"We are viewing [the] Internet as an ally to the Amateur Service by combining the speed of news and wealth of information through [the] Internet with the thrill of making contacts by radio. The amateur community must accept that we are living in a changing world. Maybe our numbers will shrink, but as long as people find it thrilling to contact other people, there will always be an amateur fraternity around." (Submitted by Eric, SMØJSM; Sigge, SM5KUX; and Gunnar, SMØSMK)

Tajikistan: There are about 45 stations in Tajikistan and four license classes: 3, 2, 1, and Extra All HF. The theory examinations are oral. Class 3 requires no Morse exam; Class 2 requires 10 wpm; Class 1, 20 wpm; and Extra, 25 wpm. "In 1994 [our country] let people get [the Class] 3 HF class without code.

"[The] number of amateurs [is] reducing—approximately 200 in 1985 and now less than 60 (1997). Low salary (\$2–4 USD a month!) and license fee \$3 USD a year. TARL could not even pay IARU fee and situation getting very dramatic.

"In Tajikistan situation is not the best unfortunately." (Submitted by Nodir M. Tursoon-Zadeh, EY8MM)

Tanzania: "Based on our membership and some guesswork, it is something between 35 to 45 radio amateurs in the country. We have a Novice class for a little bit more than one year. The examination can be done in the country. There is a full class. More or less the only way to get a full license is to obtain a license in a foreign country and apply with this license for a Tanzanian license.

"The examination requirements for the Novice Class are similar to the U.S. and British Novice license. There is no code requirement for the Novice. Theoretically there may be a Morse code requirement for the full [privilege] license. In reality all foreign licenses (including code free) are accepted for issuing a full license.

"I think one can say that there is a strong tendency among the few Tanzanian license holders against Morse code requirements and the expatriate hams are divided on the issue. Amateur radio is growing very slowly among Tanzanians. It is hard to motivate Tanzanians to get involved on a continuous base. One of the reasons is that life is very difficult for many and it is not easy for them, e.g., to pay for the fees, not to mention a radio. Also, until last year it was more or less not possible to take an examination in the country." (Submitted by Michael Seitz, 5H3MS)

Thailand: "At last count Thailand had 141,241 licensed operators, 50,914 individual



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"Initially, the speed had been set at 8 wpm, but later a 5 wpm test was introduced for Intermediate Class operators. We believe Morse code testing should remain a requirement for the time being.

"Amateur radio is relatively young in Thailand, with laws governing the activity only passed in 1987. Most of the activity is on VHF, and amateurs here have had a different introduction to

amateur radio operating than in many countries, since the private ownership of radios with BFOs or SSB detectors without a license (such as an amateur radio license) is illegal.

"Hence, the casual monitoring of HF ham transmissions has not been the reason why Thais have become interested in shortwave radio or DX, and after beginning on VHF, many do not graduate to HF. There is little or no exposure to such activity, as technically in Thailand would-be hams have to take and pass the examination before they can even listen to CW or SSB on the HF bands.

"The activity is heavily regulated here when compared with most other countries, and this

tends to stifle potential growth. There are three CB bands, and this also siphons off many potential licensed radio hams.

"Inevitably, easy accessibility of the Internet and availability of computers must divert many potential radio amateurs, although there is always the possibility that some who might otherwise not have been interested in technology will be sufficiently intrigued by Internet communications to explore amateur radio communications as well." (Submitted by Tony Walt-ham HS/G4UAV)

Trinidad & Tobago: Does not require telegraphy examinations. "There are about 425 ham operators licensed in Trinidad and Tobago. We have two license classes: 9Y4xxx requires code and 9Z4xxx is no code. The written exam for all classes of license is the City & Guilds Amateur Radio Examination.

"Morse code is optional. On passing the City & Guilds exam the individual has a choice of taking the Morse code test, 13 wpm. If successful, he is issued a 9Y4xxx call. If he chooses not to take the Morse code test, he is issued a 9Z4xxx call. Both licenses are given full privileges on all the amateur bands. There are no plans at this time to change.

"My view is that proficiency in Morse code should no longer be a requirement. It is a mode like any other and will always be around. More effort should be made to attract young people to amateur radio. Amateur radio expanded in Trinidad & Tobago when Morse code became an option. With the advent of the Internet and the vast improvement in telecommunication, it is now imperative that we revisit the purpose for the existence of the Amateur Radio Service: 'Experimentation and Investigation.'" (Submitted by Noel E. Donawa, 9Y4NED)

Turkey: "There are 2965 ham operators, of which 820 are Class A and B (HF operation, 12 wpm code). Class C is for only VHF and UHF. The written exam is on law and regulations, technical, and traffic. TRAC [Telsiz Radyo Amatörleri Cemiyeti] is going to propose to reduce the Morse code speed to 5 wpm.

"Amateur radio here is growing very slowly. Reasons: limited facilities and financial resources, high import taxes for radio equipment, lack of written materials (books, magazines) in the Turkish language." (Submitted by Bahri Kacan, TA2BK, TRAC President)

Uganda: There are about ten amateur radio operators in the country and just one license class. There are no examinations, either written or Morse. Peter Casier said Morse code was 'needed' and that their ARS was 'slowly growing.' We are trying to negotiate with the government a way to get local Ugandans licensed through a locally registered examination." (Submitted by Peter Casier, UGA)

Ukraine: There are more than 15,000 licensed amateurs in the Ukraine, where they have four different license classes: Class 1, 2, 3, and 4. Their examination requirements meet the IARU Region 1 rules and band plan. All classes except Class 4 require passing a 12 wpm CW test. "We think that CW should be historically a major type of QSO exchange which makes our members more experienced. We think that CW must be still alive in ham radio."

There is no growth in Ukrainian amateur radio due to "the big political and economic changes" taking place. "Old youth teaching system over here almost closed. We have not enough places and facilities to teach young boys and girls amateur radio! We need any type

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of used VHF and HF equipment for new club stations. Only our league and other public organizations can develop and improve our hobby for the new generation."

"Quick developing technology" is making the hobby less desirable for beginners and retired people. He criticized the DX clusters as giving amateurs all over the world the opportunity to reach the DXCC Honor Roll very fast and giving big advantages in contests.

He also believes "in developing countries modern rig prices are extremely high and many young guys can't collect homemade transceivers due to the problems with high-tech components. A more conservative ham radio . . . could be much useful for common people and we must stop technological break-down into our community." (Submitted by Igor Zeldin, UR5LCV)

United Kingdom: We have received two responses from the UK. The first is from the United Kingdom Radio Society, a group that is smaller than the Radio Society of Great Britain. The RSGB is actually the national IARU recognized amateur radio society in the United Kingdom. But when the RSGB failed to respond within our original time frame, we also wrote to the smaller UKRS.

The response we received from the UKRS was quite unlike that we received from the RSGB! Ironically, it is the RSGB and not the UKRS that is taking a stand against continued Morse examinations. Generally, the IARU-recognized amateur radio society—being made up of longer term, Morse-proficient operators—does not support the elimination of all Morse code examinations. Here is the response from the UKRS.

UKRS: "Our licensing authority, the 'Radio-communications Agency,' advises that there are approximately 61,000 amateur licenses currently issued. We don't know how many of those are actually active these days or just renew their license for the sake of keeping them current. Also, a small percentage of them will be held by the same individuals. For example, one amateur could hold two or three licenses on behalf of clubs, etc., as well as his own, and some UK licensees have two, sometimes three different grade licenses current.

"We have five license classes now: [1] Full 'A' (HF), which includes the 12 wpm Morse test; [2] Full 'B' (no HF), which is the same written test but no Morse test; [3] Novice 'A,' which has less privileges but some HF access because it has a simpler Morse test; [4] Novice 'B,' same restrictions as Novice 'A' plus no HF access because no Morse test involved; [5] new 'M5xxx' license, much derided and very controversial, recently introduced to allow Full 'B' licensees some HF access with restricted power if they pass a 5 wpm Morse test.

"Written examination requirements: [1] and [2] need to pass both of two multiple-choice exams. Only difference is Morse test at 12 wpm to upgrade from [2] to [1]. Candidates need to pass both exams. Can carry one pass forward and re-sit the failed exam if necessary.

"[3] and [4] need to take a measured course of instruction—I think it is 30 hours overall—and pass a simpler written examination. Must also produce a 'very' simple construction project.

"Papers for [1] and [2] organized by City & Guilds of London Institute—one of the main UK examination bodies. Exams on first Monday of May and December annually only. Papers for [3] and [4] organized by RSGB 'under license.'

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"Morse examination requirements: For [1] above, a 12 wpm test supervised by RSGB voluntary examiners. Approximate 1.5 minutes receive, if I recall correctly, and a short QSO-type paragraph to test receive. Limited number of corrected errors allowed on transmit, but one uncorrected error fails. Limited number of uncorrected errors on receive; 5th error on receive fails. Candidate must pass both parts.

"The Radiocommunication Agency, heavily influenced by the RSGB, recently introduced the M5xxx license with 5 wpm test speed. It is also claiming that the Morse test requirement at HF 'will' be abandoned by WARC. It is difficult to get a straight answer on UK amateur radio growth from the authorities, but analysis of historical figures suggests it is either remaining static or declining slightly." (Submitted by Greg Reilly-Cooper, G0MAM, United Kingdom Radio Society)

RSGB: "As of 31 March 1999, there were 58,926 total licensees in the UK. We have the following categories of amateur radio licenses: Novice B, Novice A, Full B, Full A/B and Full A. Both the Novice B and the Full B are multiple-choice written examinations. The Morse requirement for a Novice A and Full A/B license is a 5 wpm Morse test. For the Full A it is a 12 wpm Morse test.

"We have recently introduced a new license category, called Full A/B. This was in the main to allow Full B licensees (VHF) access to the HF bands by reducing the Morse requirement from 12 wpm to 5 wpm.

"The society continues to give full support to the code as a mode of operation. However, the society does not support mandatory Morse testing for access to the bands below 30 MHz.

"The RSGB is hopeful that the introduction of the Full A/B license and enhancements to the Novice license will provide a more attractive path into amateur radio, at the same time as increasing facilities available to existing radio amateurs." (Submitted by Peter Kirby, GTWW, General Manager, RSGB)

Zambia: "There are 45 radio amateurs in Zambia, of which approximately 15 are active. We have one 'full' license class. In the past, the license examination requirements were the same as the RSGB examination. At present, due to the absence of examiners, an applicant with appropriate educational qualifications and very good character references may be considered for a license. It is a very long and bureaucratic process.

"The Morse code requirement is 12 wpm, but again no examiners are readily available. Indications are that the Morse requirement may be reduced or dropped altogether. As a society (8 members) we are split between maintaining a requirement and dropping it altogether (20 percent for keeping it; 80 percent for dropping it).

"The Service is not growing in Zambia and we do not have any club stations. The cost of setting up and maintaining an amateur radio station (even if they have electricity) is beyond the reach of a considerable number of the indigenous population. The active amateurs are all employed full-time, which limits the amount of time that anyone has to promote our hobby.

"Zambia is a big country (bigger than the whole of the UK plus part of France) with a relatively small population (around ten million people). The majority of licensed amateurs are located in the larger towns and cities (Lusaka, Kitwe, Chingola, and Ndola) and are quite often

expatriates (licensed in their own countries prior to their arrival in Zambia) who are working here on contract or who originally came on contract and have decided to stay. While there are a considerable number of government licensed radio stations around Zambia, these are for commercial communication purposes (hospitals, flying doctor, game/safari lodges, etc.) from remote areas and do not have links with the Amateur Service. It is possible that we have some aspiring amateurs within these commercial stations, but their remoteness precludes any follow-up contact." (Submitted by Fred Bunce, 9J2FB)

The Future of Amateur Radio

Following are conclusions from a paper written by Radio Amateurs of Canada (RAC) for the IARU.

1. We are on the threshold, if not in the midst, of a very significant change in amateur radio. Many aspects of communications technology which have been around for many years are suddenly becoming commercially viable for mass communications, with the result that component and equipment prices are falling, and spectrum demands are skyrocketing. Whether it be digital modes, microwave frequencies, or satellite platforms, the world is changing, and amateur radio will either change with it, or be left behind as a historical anachronism.

2. We also believe that this is a time for optimism, not pessimism. Rarely have there been so many opportunities and challenges for our hobby. It is our opinion that the advantages in the new technology far outweigh the disadvantages. Rather than being seen as a threat, the Internet offers us unparalleled access to information, and a variety of mechanisms for strengthening and extending traditional radio communications.

3. In the midst of this revolution, the role of the IARU as our spokesman on the international scene is rapidly gaining in importance. We really are becoming part of the global village, with international standards and international frequency allocations playing an ever increasing role in the communications industry, and by extension in the Amateur Service.

4. It must be stressed, however, that there will continue to be important aspects of our service which are governed by domestic issues and policies. National Amateur Radio Societies also have an extremely important role to play in publicizing the public service and educational benefits of amateur radio, while protecting our interests within our national boundaries.

5. Finally, our study has shown that there is a disconcerting apathy in the amateur community these days. Few amateurs are aware of the changes revolutionizing our hobby, and even fewer are interested in confronting the threats and challenges. We must find ways of communicating our enthusiasm for what is going on, and engaging our fellow amateurs in the excitement of the new millennium. We must also direct this enthusiasm towards attracting young people to the hobby, to convince them that amateur radio is not an anachronism, but that it remains relevant in the light of new developments in wireless and Internet communications. To capture their interest, we must capture their imaginations with new and exciting applications of radio communications.

73, Fred, W5YI



The Science Of Predicting Radio Conditions

1999 in Review

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for December 1999

Propagation Index.....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 10-11, 21-22, 25	A	A	B	C
High Normal: 8-9, 12, 18, 23-24	A	B	C	C-D
Low Normal: 1-2, 5-7, 13, 16-17, 19-20, 26-27, 30-31	B	C-B	C-D	D-E
Below Normal: 3, 14, 29	C	C-D	D-E	E
Disturbed: 4, 28	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. 1st and 2nd; fair-to-poor (C-D) on the 3rd; poor (D) on the 4th; fair-to-good from the 5th to the 7th, etc. Santa Claus is expected to bring excellent (A) openings on Christmas Day!

During 1999 sunspot Cycle 23 did not live up to the expert opinions made when the cycle began. What was expected to be a very high cycle is turning out to be a rather average one. The smoothed sunspot count began the year at the 83 level and is estimated to have ended the year with a count of approximately 110. This is about 25% below the level originally predicted by the experts. This again points out how much scientists still have to learn about solar cycles! During 1999 there was a corresponding increase in the 10.7 cm solar flux level from 141 in January to an estimated 151 by the year's end.

The slow rise of Cycle 23 during 1999 resulted in a continued, albeit disappoint-

ing, improvement in HF propagation conditions. The 10 meter band did come back to life, but not with the zest that was originally expected. Openings on all other bands have lengthened and increased noticeably.

Sunspot Cycle 23 Observations and Predictions

Fig. 1 compares the rise of Cycle 23 to date with the rise of Cycles 21 and 22 for the same period of time.

The world's solar experts had predicted that Cycle 23 would be as strong as, if not stronger than, Cycles 21 and 22. It now appears almost certain that Cycle 23 will fall considerably short of that prediction.

Table I is a listing of smoothed sunspot numbers observed for Cycle 23 from its beginning through February 1998, as well as predictions made by the National Geophysical Data Center, Boulder, Colorado, for the first year of the new millennium. We will have a more in-depth analysis of Cycle 23 and the probable date of solar maximum in next month's column.

The Royal Observatory of Belgium, official keeper of the world's sunspot records, reports a mean sunspot number of 94 for August 1999. Daily values ranged from a low of 36 on August 17 to a high of 166

CQ WW DX CW Contest Bulletin

This issue of CQ should reach most readers in time for the CW weekend of the CQ World-Wide DX Contest, November 27-28. Here is an updated day-to-day propagation forecast for the weekend made at press time. Sunspot activity will likely be somewhat lower than originally expected, with daily levels of solar flux during the CW contest weekend probably no higher than the 125 mark. On the other hand, geomagnetic conditions are expected to be quieter, with A-indices generally below 12. Overall propagation conditions are likely to be somewhat better than reported last month. Expect generally High Normal conditions on the 27th, rising to Above Normal for openings passing through the equatorial region and the lower latitudes. On the 28th there is now also a very good chance for mostly High Normal conditions. There seems to be little chance for radio storminess during the contest weekend. Good luck in the 1999 CW Contest!

reported on August 1. Cycle 23 continues to have very wide variations in day-to-day levels. This is a somewhat unusual characteristic of this cycle to date. The mean level for August results in a 12-month smoothed sunspot number of 85 centered on February 1999. This is an increase of 2 points from the level of the previous

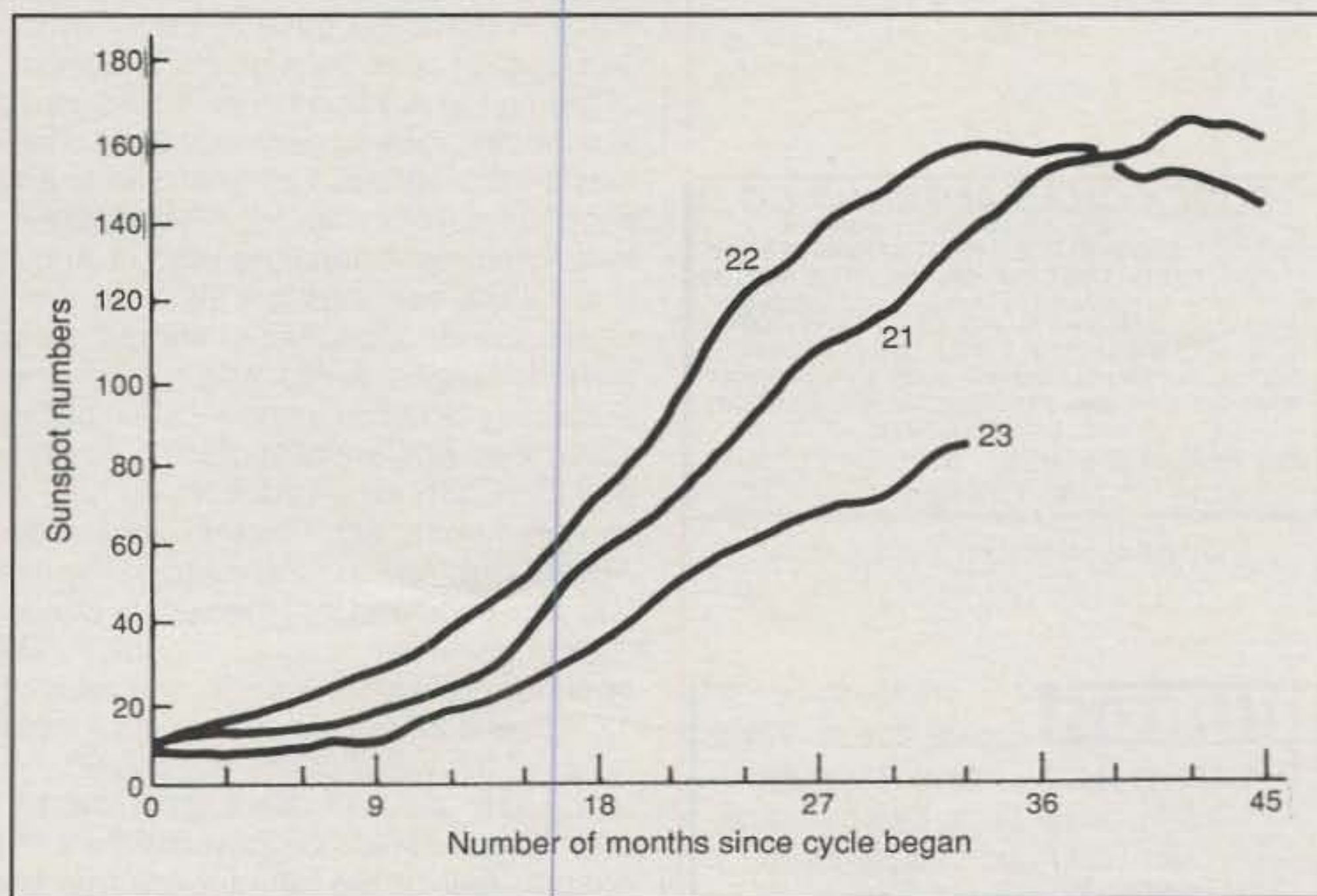


Fig. 1— Comparison of solar Cycles 21, 22, and 23. To date, Cycle 23 is considerably less intense than the previous two cycles. (Artwork via DX Listener's Club)

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Smoothed Sunspot Numbers for Cycle 23

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	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	88	92	96	99	102	105	107	110	113	115
2000	116	116	118	118	118	118	118	118	118	117	116	115

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 the National Geophysical Data Center (NGDC) is now using.

Table 1—Smoothed sunspot numbers observed for Cycle 23 through February 1999, as well as predictions made by the National Geophysical Data Center, Boulder, Colorado, through 2000. Note a predicted peak of 118 is expected between March and September 2000.

month. A smoothed sunspot number on the order of 115 is forecast for December 1999 as Cycle 23 is expected to continue its relatively slow climb upward.

A corresponding 10.7 cm mean solar flux level of 204 was reported for August 1999 by the Dominion Radio Astrophysical Observatory, Penticton, B.C. This results in a smoothed solar flux value of 144 centered on February 1999. A smoothed 10.7 cm flux level of approximately 151 is forecast for December 1999.

December Band Openings

Cycle 23 has risen to a point where 6 meter F-2 layer DX openings may be possible to many areas of the world. Beginning this month, the most likely times for such openings are shown in the DX Propagation Charts by a double asterisk (**) under the 10/6 meter column.

Continuing high levels of solar activity coupled with seasonally peak ionization levels in the northern hemisphere should result in generally good-to-excellent DX propagation conditions on all HF bands.

During the daytime hours, from sunrise to sundown, look for generally good openings on the 10 and 12 meter bands and excellent openings on 15, 17, and 20 meters. When conditions are High or Above Normal DX openings are likely on the 6 meter band. Conditions should peak towards Europe, Africa, and in a generally easterly direction an hour or two before noon, towards Central and South America and the Caribbean area from an hour or two after noon, and towards the Pacific, Australasia, and the Far East during the late afternoon and into the sunset period.

From sundown to midnight look for DX openings towards the south and west on 12, 15, and 20 meters, and to most other areas of the world on 30, 40, and 80 meters. Fairly good DX openings on the 160 meter band should be possible from the eastern half of the country towards the north, east, and south.

From midnight to sunrise the best DX bands should be 40 and 80 meters, with

openings also possible to many areas of the world on 20, 30, and 160 meters.

DX propagation conditions on the 160 meter band are usually at their seasonal peak during December. The band should open towards Europe and in an easterly direction beginning about 8 PM in all time zones, and continue until 3 AM in the EST zone, 1 AM in the CST zone, midnight in the MST zone, and 11 PM in the PST zone. These openings favor locations in the eastern half of the USA. Openings towards the south—particularly to Central America, the Caribbean area, and the northern countries of South America—



Proof that W3ASK has interests besides communications, as a chocoholic he is shown here with protective gear after a VIP tour of the Perugina candy factory, the makers of Baci chocolate, in Perugia, Italy. (Photo by Bea)

should be possible from about 10 PM to 3 AM in all time zones. Openings towards the Pacific, Australasia, and the far East will favor stations in the western half of the country, but it may be worth the time to check for these openings in other areas as well as between 4 AM and local sunrise.

Remember the old rule that applies to 160 meter DX openings, and to 30, 40, and 80 meters as well: Optimum conditions occur about the time when the sun begins to rise in the easternmost terminal of the path.

For short-skip openings during December try the 80 and 40 meter bands during the day for paths less than 250 miles, and 80 and 160 meters at night over these distances. For openings between 250 and 750 miles, 40 meters should be best during the day, and both 80 and 160 meters at night. Between 750 and 1300 miles, try 20 meters during the day; 30, 40, and 80 meters from sunset to midnight; and 80 meters later in the evening and until sunrise. Try 30 and 40 meters again for about an hour or so after sunrise. For openings between 1300 and 2300 miles, it should be a toss-up between 20, 17, and 15 meters during the day, with 12 and 10 meters running close behind. Try 20, 30, and 40 meters from sundown to midnight, and then check 30, 40, and 80 meters until sunrise. Try 30 and 40 meters again for an hour or so after sunrise.

This month's column contains DX Propagation Charts valid through mid-February. Short-Skip Propagation Charts for December appeared last month.

VHF Ionospheric Openings

The best times to check for worldwide 6 meter openings on this band were given earlier in this column. They are also indicated by ** in the DX Propagation Charts. The combination of high solar activity and seasonally high ionization in the F-2 layer may produce some good DX openings on 6 meters this month. A secondary seasonal peak in sporadic-E ionization should also result in some short-skip openings on this band between distances of approximately 800 and 1300 miles.

There is considerably less likelihood for 6 meter trans-equatorial (TE) openings during December, but some should be possible between the southern tier states and countries deep in South America. The best time to check for trans-equatorial openings is during the evening hours between 8 and 11 PM.

Quite a bit of meteor shower activity is expected this month, and this should result in improved conditions for meteor-scatter-type openings on the VHF bands for distances up to approximately 1000 miles. The *Geminids*, a major meteor shower, should begin on December 12th and last for about three days. Maximum intensity is expected at about 5 PM EST





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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 (15 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 10 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.

on December 13th, with an estimated meteor rate of about one a minute. The *Ursids*, a considerably less intense shower, is expected to take place on December 21st and 22nd. It should peak at approximately 2 AM EST on December 22nd with a meteor rate of approximately 15 an hour.

Auroral displays often increase during December and are most likely to occur when HF conditions are Below Normal or Disturbed. Check the Last-Minute Forecast at the beginning of this column for those days during December that are expected to be in these categories. On these days there is a good possibility for short-skip auroral-type propagation to take place on the VHF bands for distances up to approximately 1000 miles.

Holiday Greetings

This is a very special holiday season, for not only is this the time for Christmas, Hanukkah, and Kwanzaa, it is also the beginning of a new millennium, a new year, and a new decade, an event which happens but once every thousand years! While many consider it the start of a new century as well, this technically doesn't happen until 2001.

On such a special occasion, I extend holiday wishes for good health, good fortune, happiness, and peace for all humanity, and a special wish for good HF propagation for readers of this column!

73, George, W3ASK

December 15, 1999-February 15, 2000 Time Zone: EST (24-Hour Time) EASTERN USA TO:

	10/6 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central	07-08 (1) 08-09 (2)	06-07 (1) 07-08 (2)	03-06 (2) 06-07 (3)	14-16 (1) 16-17 (2)
Europe & North Africa	09-13 (4) 13-14 (2) 14-15 (1) 09-11 (1)**	08-14 (4) 14-15 (2) 15-16 (1)	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)	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 & 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)* 19-02 (1)* 19-02 (1)* 19-02 (1)* 19-02 (1)* 19-02 (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)* 01-03 (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) 00-01 (3) 01-03 (2)	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)* 00-01 (3) 01-03 (2)
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) 00-02 (2) 02-04 (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)* 14-16 (2) 16-17 (3) 17-23 (4) 23-01 (3)
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) 00-02 (2) 02-04 (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)* 19-22 (1)* 19-22 (1)* 19-22 (1)* 00-01 (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) 18-20 (2) 20-22 (1) 22-01 (2) 01-02 (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) 17-19 (1) 17-19 (1) 19-21 (1) 21-23 (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)* 05-07 (1)* 05-07 (1)* 05-07 (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) 22-00 (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)* 05-08 (1)
Australasia	08-10 (1) 10-11 (2) 11-12 (1) 15-16 (1)	09-10 (1) 10-12 (2) 12-15 (1) 15-18 (2)	07-09 (3) 09-11 (2) 11-14 (1) 16-18 (2)	03-05 (1) 05-08 (2) 08-09 (1) 05-08 (1)*

	10/6 Meters	15 Meters	20 Meters	40/80 Meters
Australasia	16-17 (2) 17-18 (3) 18-19 (4) 19-20 (2) 20-21 (1) 17-19 (1)**	18-19 (3) 19-21 (4) 21-22 (2) 22-23 (1)	20-22 (1) 22-00 (2) 00-05 (3) 05-07 (2)	
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)* 19-20 (1)* 20-22 (2)* 22-02 (3)* 02-04 (2)* 04-06 (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)	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 Mediterranean & 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) 03-06 (2)	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) 00-02 (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)	07-09 (1) 09-11 (2) 11-12 (3) 12-15 (4)	06-13 (1) 13-15 (2) 15-17 (3) 17-19 (4)	18-19 (2) 18-19 (1) 21-22 (1) 19-21 (1)*

Africa	14-15 (2) 15-16 (1) 08-10 (1)**	17-18 (2) 18-19 (1)	22-01 (2) 01-03 (1)	
Central & South Asia	08-09 (1) 09-10 (2)	07-08 (1) 08-10 (2)	04-06 (1) 06-07 (2)	06-08 (1) 18-20 (1)
Asia	10-11 (1) 18-19 (1) 19-20 (2) 20-21 (1)	10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	07-09 (3) 09-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1)	
South-east 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) 20-21 (1) 16-18 (1)**	07-09 (1) 09-11 (2) 11-13 (3) 13-16 (2) 16-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	10-17 (1) 17-19 (2) 19-20 (3) 20-00 (4) 00-04 (3) 04-06 (2) 06-07 (3) 07-08 (4) 08-09 (3) 09-10 (2)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 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) 02-06 (2)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-23 (4) 23-02 (3) 20-22 (2)* 22-01 (3)* 01-02 (2)* 02-04 (1)*	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) 10-13 (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) 04-06 (1) 21-05 (1)*	19-21 (1) 21-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	08-10 (1) 08-10 (2) 10-12 (1) 15-17 (1) 17-18 (2) 18-22 (3) 22-23 (2) 23-00 (1)	06-08 (1) 08-10 (2) 10-12 (1) 15-17 (1) 17-18 (2) 06-08 (2) 08-09 (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)	06-07 (1)	05-06 (1)	18-20 (1)
	07-08 (2)	07-08 (2)	06-09 (2)	21-00 (2)
	08-10 (3)	08-09 (3)	09-12 (3)	00-01 (1)
	10-11 (2)	09-11 (4)	12-14 (4)	19-23 (1)*
	11-12 (1)	11-12 (2)	14-15 (3)	
		12-13 (1)	15-17 (2)	
			17-19 (1)	
			22-01 (2)	

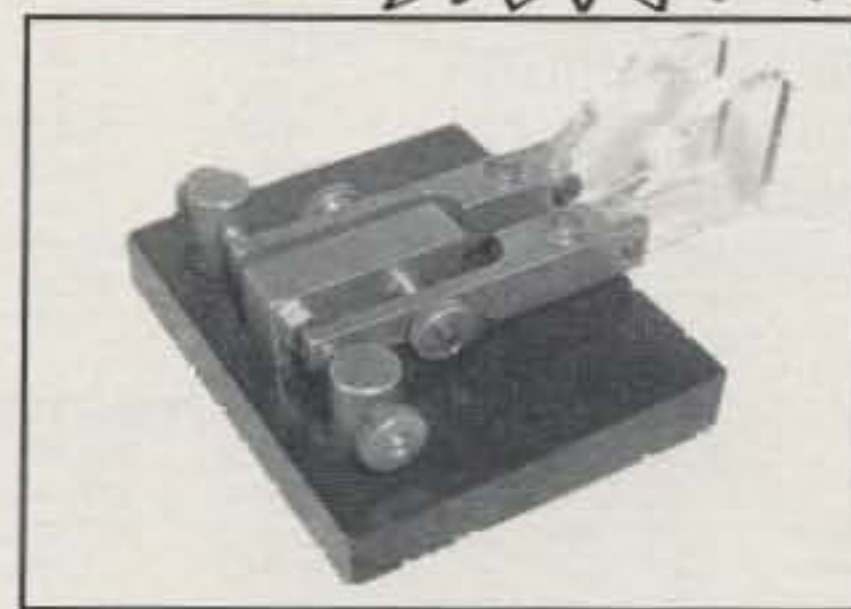
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Central & Northern Europe & European CIS	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3)	05-06 (1) 06-07 (2) 07-09 (3)	18-20 (1) 20-23 (2) 23-00 (1)	South Pacific & New Zealand	09-10 (1) 10-11 (2) 11-13 (4)	07-08 (1) 08-09 (2) 09-11 (4)	04-07 (1) 07-09 (4) 09-10 (3)	21-22 (1) 22-00 (2) 00-07 (3)		
						13-16 (3) 16-19 (4) 19-20 (2) 20-21 (1) 15-18 (1)**	11-15 (2) 15-17 (3) 17-22 (4) 22-23 (3) 23-00 (2)	10-11 (2) 11-18 (1) 18-19 (2) 19-20 (3) 20-00 (4)	07-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*		
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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)*		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) 19-20 (1)* 20-22 (2)* 22-00 (3)* 00-03 (2)* 03-05 (1)*		
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Southern Africa	07-08 (1) 08-10 (3) 10-12 (4) 12-13 (3) 13-14 (2) 14-15 (1) 08-10 (1)**	07-09 (1) 09-12 (2) 12-13 (3) 13-15 (4) 15-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-00 (2) 00-02 (1)	18-19 (1) 19-20 (2) 20-21 (1) 18-19 (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)*	
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)		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)	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)	
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)*

*Indicates best times to listen for 80 meter openings. Openings on 160 meters are 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.

160 Results (from page 24)

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

*K1PX	149,040	702	56	25
K1VW	143,418	655	52	30
N4XR	121,632	475	53	31
W1WFE	116,841	501	51	28
K2RD	79,128	426	53	19
W18IH	27,280	188	42	13
N17M/GRP	9,282	126	34	0
NM1K/GRP	5,828	82	30	1
*N1MT	5,724	97	27	0
*K1BTD	2,940	63	20	0

MASSACHUSETTS

K5ZD	101,250	327	47	34
*W01N	64,660	406	44	17
*W1TE	47,565	260	42	21
KZ1M	35,308	274	40	12
K2LP	22,246	163	38	11
*K1HT	15,480	161	36	4
*W1MK	15,244	176	33	4
AA1V	14,127	105	41	10
AA1RO	13,428	173	36	0
*K1NU	12,996	157	34	2
WR1P	9,766	107	35	3
*K5MA	8,908	119	33	1
*K1TH	7,448	118	27	1
W1CTN	5,292	87	28	0
*K1EP	3,366	69	22	0
*KX1X	470	22	10	0

MAINE

W1CEK	825	15	9	6
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NEW HAMPSHIRE

*WA1LNP	169,176	768	57	27
N4KWF	40,953	314	42	9

RHODE ISLAND

*AB1BX	15,870	242	30	0
*K2MN	7,946	125	29	0

VERMONT

K11K	126,990	475	51	34
*AA1SU	48,117	513	42	1

NEW JERSEY

N2NT	291,300	833	53	47
W2EN	107,916	677	52	16
*K3BU	105,075	563	54	21
*K1NK	89,115	548	51	14
NA2AA	80,081	416	53	20
N2ED	61,184	367	48	16
W2RD	28,899	282	41	16
N2CG	24,486	191	45	8
*W5KI	23,368	217	40	6
*WK2G	20,424	252	36	1
W1GD	16,376	145	40	6
W2HCA	10,360	128	35	2
W2GE	9,216	132	31	1
*AA2WN	8,024	106	32	2
W2JEK/GRP	1,008	30	16	0

NEW YORK

K2FU	96,019	468	52	25
*W2TZ	62,556	517	42	10
KW2J	51,562	394	51	7
*W2GR	36,623	313	52	1
*WD5T	36,424	249	45	13
*K2UF	31,320	315	43	2
*K2UG	28,461	221	43	10
*W2TX	21,996	201	41	6
*NA2M	21,600	196	42	6
*N2DBD	21,312	300	32	0
*K2QMF	18,236	160	38	9
KX2H	11,484	159	36	0
*N2UM	11,470	140	36	1
*K2CS	11,160	140	34	2
*WA2RZJ	8,695	110	37	0
*W2KTF	7,392	121	27	1
*K2YR	6,524	102	26	2
N2IX/GRP	6,496	105	29	0
W2ENY	3,519	72	23	0

DISTRICT OF COLUMBIA

*K3VOA	1,406	34	19	0
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DELAWARE

*N8NA	25,245	249	40	5
*NY3C	7,680	113	29	1

MARYLAND

W3AO	342,805	923	57	52
WK3I/GRP	87,080	528	56	14
N3NT	65,928	374	45	22
N3AM	50,076	435	49	3
W9IOP	40,235	222	48	17
W3AZ	32,542	240	41	12
W3GN	31,920	223	44	12
*W3CP	23,876	213	40	7
*W3MR	18,236	151	36	11
*N3GPU	11,934	159	34	0
*WD3A	10,642	143	34	0
*AD3F	10,584	111	39	3
WA3IVV	1,280	40	16	0

PENNSYLVANIA

W3BGN	301,990	769	54	47
W3GH	237,595	803	56	39
K3UA	201,066	545	53	40
W3TS	171,478	783	57	26
K3SV	149,814	682	52	30
W8FJ	128,216	430	56	32
K4JLD	47,815	204	52	21
W2FCR	39,830	207	50	20
*WF3M	33,660	341	38	6
N3PUR	31,326	318	44	2
*W3UHP	27,024	255	42	6
K3ND	25,300	90	32	23
*ADBJ	24,112	250	41	3
*K3SWZ	20,332	164	46	6
*W3EHZ	18,568	201	42	2
*W3IA	16,512	166	41	2
N3OUC	13,860	111	35	10
*AA3ML	12,506	169	36	1
*W3AG	11,644	127	41	0
W3KV	8,970	82	30	9
*W3DP	5,805	102	26	1
*K3PP	5,536	73	30	2
K7SZ/GRP	4,278	87	23	0
K3WWP/GRP	2,040	62	15	0
*W3ZA	1,615	40	19	0
KC3QU	240	20	6	0

FLORIDA

N4PN	179,862	687	56	37
K4RX	169,858	579	55	39
K1PT	139,590	458	52	42
N4BP	51,744	389	43	13
WC4E	21,315	150	37	12
*N2PK	19,968	180	39	9
*W4ROM	13,244	165	39	4
K4LQ	13,158	133	36	7
AD4TR	13,065	137	32	7
*KN4Y	11,340	150	34	2
W7QF	11,111	117	39	2
*K4LDR	4,250	79	24	1
*N4EK	3,192	62	23	1

GEORGIA

WA4TT	131,275	399	52	37
*NN4S	37,229	234	42	17
K2UFT	21,306	158	46	7
W4DMB	20,592	167	44	8

KENTUCKY

*AA2GS	39,950	388	46	1
*K4FXN	31,020	306	45	2
*KM4CH	19,646	245	38	0

NORTH CAROLINA

AA4S	180,320	712	55	37
K4MA	115,704	629	50	22
N4AF	71,824	402	49	18
K4PB	66,913	313	53	26
NW6S	51,590	281	47	20
*KS4S	44,356	384	45	7
W4TMR/GRP	16,779	181	42	5
N4UH	16,588	165	38	6
N4CW	9,075	130	32	1
*NX9T	8,058	111	32	2
*K4QPL	4,648	77	27	1

SOUTH CAROLINA

AA4NN	166,132	817	57	25
*VE4CPN/W4	53,650	408	47	11
W1QS/4	6,372	84	35	1
WC4CW/GRP	3,243	69	23	0

TENNESSEE

N4IR	132,696	658	51	25
*K1KY	114,523	685	54	17
K4LTA	105,915	610	52	17
K4WX	104,604	656	54	15
K0EJ	101,530	580	55	16
*NY4T	3,675	72	25	0
*W4TOB	3,666	69	26	0
W4OGG	1,650	36	22	0
*W04O	640	20	16	0

VIRGINIA

W4MYA	258,261	965	56	37
K4IQ	146,285	634	55	30
K4OAO	114,478	618	54	20
N4RV	97,856	317	53	35
K3DSX	74,195	424	55	16
*AD4TJ	73,080	519	51	12
KC4D	44,800	278	51	13
N3JB	40,800	272	47	13
*N4MM	37,324	221	50	12
NB3O	28,158	193	48	9
N4ROA/GRP	23,688	170	41	1
W4HJ	23,265	214	37	8
AE4IX	21,168	205	46	2
*K4BAM	17,055	162	39	6
N3RC	13,850	100	40	10
K4IX	13,818	164	47	0
KC4AUF/GRP	13,528	155	35	3
*KQ4RX	7,260	78	44	0
K4VV	3,864	60	28	0
*WB4DNL	2,599	52	23	0

ARKANSAS

*KJ5WX	67,405	501	55	6
K5LG/GRP	18,361	203	42	1

LOUISIANA

*W5OT	7,740	100	36	0
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NEW MEXICO

N5IA	107,100	582	55	15
N5UL	24,960	208	46	6
K5AM	18,963	166	44	5
*W5JRP	9,460	100	44	0

OKLAHOMA

K5TT	48,888	302	50	13
*K5YP	33,992	266	51	5
*K5HP	29,288	234	51	5

TEXAS

K5RX	175,010	710	55	31
W5FO	81,048	470	55	11
K5DX	36,512	276	47	9
K5XR	25,281	211	49	4
*W5CWQ	11,468	110	44	3
*WK5K	6,265	88	34	1

CALIFORNIA

N6RO	170,045	778	54	17
W6UE	108,042	577	53	13
K6SE	68,705	370	52	13
N6KI	61,006	425	50	9
*W6JTI	44,118	313	48	9
*K6CMF	39,528	296	49	5
K6DB	37,229	241	48	11
N6KB	35,298	277	46	7
K6NR	23,919	184	45	6
K6MO	22,295	161	43	6
N2KK	21,725	108	43	12
*KG6O	20,650	171	44	6
*WA6FGV	17,430	185	40	2
*W6RKC	14,715	136	42	3
N6ED	13,884	151	36	3
*W6VM	13,320	132	42	3
W6HG	10,904	93	42	5
W6YJ/GRP	10,027	113	35	2
*WA6BIL	9,555	101	39	0
K6CTA	7,683	80	37	2
K16T	7,385	84	32	3
W6ISQ	7,378	62	27	4
*K6EM	6,048	75	31	1
*N6NF	5,661	65	34	3
*W6NKR	5,068	75	26	2
K6XX	4,536	55	21	6
*KU6T	4,452	67	26	2
*N7FF	4,185	65	26	1
*K0INT	4,032	86	20	1
N16C	2,352	34	17	4
*KE6QR	2,280	47	20	0
*N6GL	2,080	58	15	1
*AA6EE	1,998	50	16	2
*K6EP	1,881	45	18	1

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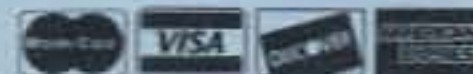
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9M6NA	201,960	401	13	38
HONG KONG				
VR2BG	16,654	130	5	17
ISRAEL				
4X4NJ	482,977	623	19	64
*4Z5JA	86,950	182	4	46

JAPAN				
JH4UYB	224,732	344	24	52
JH5FXP	219,632	313	18	56
JA7NI	194,625	296	24	51
*JE1SPY	5,092	50	8	11
*JA6ZLI	2,205	27	1	14
JA4HIX	1,736	17	5	9
JA4XRN	1,507	28	3	8
*JR1TMI	1,233	40	3	6
*JS1OYN	1,000	26	2	8
*JK2VOC	648	20	1	7
*JM2RUV/2	376	40	1	3
*7J6AAK/2	372	21	0	6
*JA1SJV	177	25	1	2
*JE1PMQ	140	13	0	4
JF2FIU	10	1	0	1

JORDAN				
JY9QJ	141,750	305	0	50

KAZAKH REPUBLIC				
*UN7CE	207,350	392	0	58
UN6P	4,879	38	0	17

MACAO				
XX9TRR	37,355	201	7	24

MALDIVES				
*8Q7AC	30	3	0	1

OMAN				
A45XR	227,740	426	3	56

TURKEY				
*TA3BN	3,458	26	0	14

EUROPE				
AUSTRIA				
OE1TKW	135,261	390	12	51
OE2VEL	135,168	360	16	48

BALAERIC ISLANDS				
EAGACC	232,505	570	22	51

BELARUS				
*EU1AZ	188,682	601	5	54
EU4AA	142,320	444	2	58
*EW8UN	66,105	522	0	39
*EU6EU	52,836	239	0	42

BELGIUM				
*ON5UM	80,984	286	8	45
*ON6TJ	10,322	60	0	26

BOSNIA				
T97M	271,170	720	13	56
*T98N	83,025	400	0	41
T95A	73,315	331	0	43
*T93Y	57,120	321	0	35

BULGARIA				
LZ5Z	290,550	706	15	60
LZ1DFP	162,370	447	9	56
LZ2JE	71,040	290	1	47
LZ3AB	35,160	168	0	40
*LZ1IA	9,592	89	0	22

CROATIA				
9A2TW	263,840	540	24	61
*9A2EU	77,376	285	4	48
*9A5MT	46,648	274	1	33

CZECH REPUBLIC				
OK1DX	356,265	719	24	63
OK1CW	330,480	638	26	59
OK2ZU	223,350	569	18	57
OK1DOT	177,060	406	24	54
OK2ZC	133,320	498	5	50
OK1FC	116,262	442	11	43
*OK2WM	96,320	474	2	41
*OK1FFC	92,832	406	3	45
*OK1XUV	78,720	345	4	44
*OK1HFP	75,500	314	5	45
*OK1DTC	71,487	314	4	43
*OK1AYY	68,355	329	1	44
*OK1URY	66,994	328	5	38
*OK2DW	62,648	325	1	40

*OK2EQ	61,963	305	3	40
*OK2HZ	61,920	269	1	44
*OK2VMB	39,515	239	0	35
*OK2HIJ	38,320	202	0	40
*OK1DOL	37,481	215	0	37
*OK2PLK	26,368	177	0	32
*OK2PBG	21,504	147	0	32
OK1DXW	14,924	115	0	28
*OK1DDV/P	5,940	66	0	20

DENMARK				
OZ7YY	488,448	867	28	68
OZ5WQ	76,391	294	5	44
*OZ8AE	48,136	212	3	41
OZ1KRF	14,060	67	4	33
*OZ1AV	2,880	36	5	15

ENGLAND				
M2D	456,855	798	31	64
G3UFY	58,558	244	3	43
*G3HZL	45,360	201	7	38
*M4T	31,050	215	0	30
G3KKQ	16,544	103	0	32
*M5X	16,544	103	1	31
*G0MTN	3,496	38	0	19

FINLAND				
OH4JFN	245,640	653	10	59
OH1MA	234,366	612	10	57
OH8LAE	209,691	525	7	62
*OH9UFO	80,700	306	4	46
OH3MMH	71,024	299	1	45
OH9DX	57,162	247	0	42
*OH3BU	51,246	258	0	39
OH3JR	24,477	111	0	41
OH3RF	21,385	128	0	35
OH6RC	17,395	98	0	35
OH2BO	11,232	46	0	36
*OH3NM	2,780	29	0	20
*OH1MM	693	19	0	9
*OH1TD	424	13	0	8

FRANCE				
F6BEE	483,066	757	35	59
F6CWA	112,480	250	22	52
F5IN	25,184	152	3	29

GERMANY				
DL1AUZ	445,075	774	30	65
DK6WL	354,900	706	29	62
DK8LV	316,030	676	22	63
DL0DX	194,530	560	19	51
DJ6QT	125,400	364	14	52
*DK3WW	99,176	353	6	50
DJ0MDR	88,860	291	10	50
*DK2CF	81,750	346	4	46
*DJ7RJ	75,980	243	1	57
*DJ3RA	71,280	310	2	46
DL7MAE	70,686	269	6	48
*DL2RUG	51,172	247	1	43
DL3ECK	46,536	240	0	42
*DJ2MX	43,000	232	1	39
*DL3BRA	41,720	225	0	40
*DF2IAX	34,790	222	0	35
*DL1IA	31,680	165	1	39
DF4AE/GRP	28,008	169	0	36
DL3ZAI	27,664	161	0	38
*DJ8UV/P	20,512	142	0	32
*DJ3XK	20,368	115	0	38
DL3DRN	18,476	129	0	31
DF3QL/GRP	17,535	102	0	35
*DK7FP	16,740	123	0	30
*DJ8RS	12,560	60	0	40
*DJ2YE	11,280	80	0	30
DK8RE	11,088	102	0	24
DL4KUG	10,830	80	0	30
*DL1CW	9,900	71	0	30
*DK7TF	6,950	64	0	25
*DL6ZNG	5,628	60	0	21
*DF6LQ	4,840	50	0	22
*DF5AY	720	12	0	12

GREECE				
SV1NA	241,728	686	9	55
*SV1DKR	33,411	177	0	37
*SV1RP/SV7	17,748	120	0	29

HUNGARY				
HG1S	304,859	648	23	60
HA8BE	247,425	580	15	60
*HA3MQ	162,560	482	6	58
*HG5M	131,806	430	7	52
HA8FM	127,338	424	6	51
*HA7UG	87,952	398	1	45
*HA5AZC	38,916	222	4	32

IRELAND				
*EI4DW	84,099	314	8	43

ITALY				
I4IKW	296,725	611	24	59
*I0ZUT	63,456	254	7	41

*IK8TFN	45,000	227	0	40
IK2XYG	15,180	90	3	30
*I0KHP	9,510	58	5	25
*IK2ANI	3,000	40	0	15

KALININGRAD				
UA2FJ	415,007	827	24	65
UA2FZ	336,951	662	22	65
UA2FB	300,437	690	15	64
UA2FP	162,869	576	5	48

LATVIA				
*YL2GN	144,976	513	0	52
YL2QQ	103,823	410	0	47
YL2NK	10,836	52	0	43

LITHUANIA				
LY2BTA	319,800	722	15	63
LY2FY	312,087	825	10	59
LY2WR	254,590	643	10	60
LY7A	206,212	623	4	58
*LY1DD	179,910	415	2	43
LY2CY	153,240	480	5	55
*LY3BA	145,962	549	3	48
LY2OU	115,750	438	3	47
LY3ID	105,600	358	6	49
LY2FE/GRP	69,880	348	0	40
*LY1DM	19,670	118	0	35
*LY2GV	5,038	50	0	22

LUXEMBOURG				
*LX9DIG	111,241	504	1	42

MOLDOVA				
ER5WU	101,490	361	0	51
*ER5DX	44,659	236	0	37
ER2GR	38,976	145	1	47
ER3DX/GRP	4,590	46	0	27

NETHERLANDS				
*PA3AAV	74,694	232	7	52
*PA5BW	52,650	231	4	41
PA3DSR	43,817	195	4	39
*PA0LOU	28,356	90	9	42

NORWAY				
LA7AK	123,808	438	2	51
*LA8WG	32,040	136	0	45
LA20	12,210	177	0	33
*LA9DK	7,511	51	0	29
*LA9PJA	4,862	38	0	26

POLAND				
SP3GEM	697,413	1058	35	68
SP7GIQ	522,816	901	29	67
3Z4N	207,814	678	5	53
*SP3SUX	106,812	380	4	50
SN7N	104,544	372	4	50
*SP5JTF	102,998	406	2	47
SP5GH	16,513	53	0	49
SP5LCC	15,892	116	0	29
SP9W	15,092	111	0	28

ROMANIA				
YO4FRF	163,404	551	3	51
*YO3APJ	149,650	359	19	54
*YO6BHN	77,088	304	1	47
*YO8FR	44,616	188	0	39
YO3AC	19,499	121	0	31
*YO4BTB	17,523	127	0	27

RUSSIA				
RA4NW	157,625	399	2	63
RW4PL	153,530	397	6	59
*RW4UU	152,439	449	1	60
RA6AX	150,627	399	7	62
UA4LCH	145,986	440	0	58
UA6AF	109,626	304	1	65
RV1CC	99,603	388	1	50
RU1AO	91,500	362	1	49
*UA1TAN	88,880	410	0	44
RW6BQ	80,886	313	0	51
UA4CJJ	80,200	316	0	50
*UA4FAO	76,704	302	0	48
*RU4WE	68,026	305	0	43
UA1TGA	65,272	316	0	41
UA4HTT	59,265	254	0	45
*UA4WAN	58,480	135	0	34
RK6BZ	56,672	235	0	46
UA6AN	55,900	208	0	52
*RA4LH	55,728	257	0	43
RW4YA	51,414	266	0	38
UA1RJ	37,370	208	0	37
RA4AG	32,912	194	0	34
*RA3UAG	30,924	171	0	36
RU3FF	27,545	158	0	35
*RA1ACJ	21,930	132	0	34
*RU3AQY	13,501	140	0	23

SARDINIA				
*IS0BMH	7,875	63	0	25

MICHIGAN			
K8XXX	362,045	1195	56 47
W8TOP	284,856	952	57 47
OHIO			
K8MK	327,858	853	59 47
N8TR	47,874	160	48 31

WEST VIRGINIA			
W8BAR	145,435	636	55 30

ILLINOIS			
K9NR	227,128	998	56 32
K0XG	205,454	951	57 29
K9BG	40,446	33	47 7

INDIANA			
KD9SV	239,400	800	56 39

COLORADO			
W0AH	170,925	776	54 21
K0SX	96,426	636	56 10

IOWA			
N0NI	170,924	1032	57 19

MINNESOTA			
K0KX	142,219	750	57 20
W0JH	48,604	372	56 2

MISSOURI			
K0LIR	78,588	614	53 6

CANADA			
ONTARIO			
VE3DC	280,904	781	55 18

SASKATCHEWAN			
VE5RI	114,352	420	50 6

ALBERTA			
VE6LB	37,400	156	44 6
VE6JY	23,460	107	45 1

BELIZE			
V31RL	18,315	99	29 8

AFRICA			
CHAGOS			
VQ9SS	49,296	128	0 39

ASIA			
ASIATIC RUSSIA			
RY9C	294,400	514	1 63
RK9MYM	60	3	0 3

CHINA			
BT1WW	38,276	225	5 23

GEORGIA			
4L0G	287,631	546	0 53

JAPAN			
JK1GKG	30,096	129	15 21
JA0ZRY	12,972	84	6 17

EUROPE			
ALAND ISLANDS			
OH0R	411,360	911	17 63

CROATIA			
9A1A	591,052	925	29 72
9A7A	357,848	750	21 61

CZECH REPUBLIC			
OK5W	510,000	860	31 69
OK1KZD	190,400	541	16 54
OL5T	143,220	533	6 49
OK2KJU	131,280	420	8 52
OL7W	79,331	343	6 43

ENGLAND			
G3VGG/P	95,462	293	18 41

FINLAND			
OH6AW	184,585	504	6 61
OH8TA	108,711	445	1 46

GERMANY			
DJ7AA	573,510	931	36 69
DK1NO	557,333	922	36 67

DJ5CL	319,467	704	26 57
DK1II	261,360	610	23 57
DL5RBK	207,870	497	20 58
DJ6TK	163,244	422	16 58
DF0RU	127,735	466	8 51
DL2MDZ	97,661	312	6 55
DK0IW	83,400	361	5 45
DLOHVL	24,900	194	0 30

HUNGARY			
HG6N	365,672	733	22 64
HG5A	362,950	760	20 65
HA8KAZ	114,504	424	3 49
HG6V	52,577	200	3 46

ITALY			
IK4MTF	537,380	905	34 63

KALININGRAD			
RW2F	553,504	930	26 72

LITHUANIA			
LY2VAD	210,145	609	6 59

NETHERLANDS			
PI4COM	466,320	878	30 57
PA3BAS	169,610	420	21 49

NORWAY			
LA8W	235,625	667	10 55
LA1K	1,397	24	0 11

POLAND			
SP9KRT	59,573	289	0 41

RUSSIA			
UA6LV	242,262	498	16 70
RX3RXX	144,845	465	3 56
RW6AWT	140,700	374	4 63
RK1OWZ	93,154	375	0 47

SLOVAKIA			
OM7M	539,451	904	33 66

SPAIN			
EA5BY	167,063	430	24 47
EA4OA	16,660	92	3 32

SWEDEN			
SL3ZV	424,352	819	21 68

SWITZERLAND			
HB9DBC	295,083	658	24 57
HB9AA	204,764	537	17 54
HB9LF	106,600	420	4 46

UKRAINE			
UR4EWF	23,160	102	0 30
UX8IXX	21,360	109	0 40

YUGOSLAVIA			
YZ7V	232,490	635	13 54
4N800H	57,017	307	0 37

OCEANIA			
HAWAII			
KH7R	473,624	654	52 21

NEW ZEALAND			
ZL6QH	2,450	27	5 9

CW CHECK LOGS
Thanks to the following stations for their valuable CW check logs:
DK5DS, DL6KWU/P, DL7VAF, EA5GRC, HA5MY, HK3DDD, K1TTT, KC8GTA, LA5QC, NX5M, OL7HC/GRP, OH5PT, RK3BY, SM3C8R, SP8FHM, YO3ND, Z31GX

**SSB
SINGLE OPERATOR
NORTH AMERICA
UNITED STATES**

CONNECTICUT			
*K1PX	75,033	504	50 13
*W1CTN	37,694	368	43 4
N1TM/GRP	7,800	118	29 1
W1ORS/GRP	803	35	11 0

MASSACHUSETTS			
AA1BU	107,163	496	55 26
W1TC	46,421	302	47 14

*W1TE	27,100	227	42 8
*W01N	20,898	210	37 6
W1BB	19,504	186	43 3
*WG1Z	18,858	201	40 2
K1NU	12,936	135	39 3
*K1JE	9,660	146	29 1
*KX1X	4,370	86	23 0

MAINE			
N1RLI	54,444	446	43 9
W1CEK	10,080	120	36 4

NEW HAMPSHIRE			
*WA1LNP	98,325	599	55 14
K1HAP	52,080	317	46 16
K1BD	19,248	169	41 7

VERMONT			
*AA1SU	2,268	54	18 0

NEW JERSEY			
N2ED	80,199	505	54 13
NA2AA	63,988	363	50 18
*K1NK	31,280	354	37 3
W2RD	29,040	200	41 14
W2YR	10,584	107	38 4
NN2Y	5,577	66	30 3
*W5KI	2,691	54	23 0
*K2SZ	2,375	43	25 0
*N2TTT	1,824	51	16 0

NEW YORK			
AJ3K	112,536	640	55 17
N2XTX	66,885	457	58 7
KA2RDO	54,207	412	51 6
*WA2JQK	41,664	324	50 6
*KG2AU	34,833	313	48 3
*NA2A	27,440	300	36 4
AA2MU	22,816	205	43 3
*N2MTG	9,396	153	29 0
*W2JUV	4,774	98	22 0
*WF2Y	3,654	81	21 0
*N2LOQ	3,575	67	25 0
*N2CK	1,649	44	17 0
*K2FR	624	23	12 0

DISTRICT OF COLUMBIA			
*W3USS	14,025	202	32 1
4U1WB	5,160	103	24 0

DELAWARE			
AA1K	34,540	213	37 18
KE3ZZ	21,756	241	40 2
*NY3C	6,554	104	29 0

MARYLAND			
*WK3I	51,576	421	49 7
*W3EKT	17,835	194	37 4
*N3GPU	11,424	159	33 1
*NV3V	8,184	123	30 1
W3MR	8,120	125	27 2
*W3CP	5,040	81	28 0
*KZ3AB	3,050	60	25 0

PENNSYLVANIA			
W3TS	186,354	828	58 29
N3OUC	103,280	474	54 26
W3GH	102,453	574	53 18
N3MKZ	79,872	523	51 13
W3BGN	79,344	305	44 32
*N3BUD	55,571	388	52 9
NN3Q	24,000	263	35 5
K3SV	21,942	214	43 3
*W3UHP	17,384	197	39 2
KA3AVB	9,936	125	35 1
K4JLD	8,769	105	34 3
AA3B	5,664	74	30 2
*WA3RBK	5,476	71	35 2
*WW3S	3,591	78	21 0
K3HIR	1,800	45	20 0

ALABAMA			
KR4QI	20,450	181	46 4
*K4JYO	10,496	112	39 2

FLORIDA			
AA4MM	71,540	380	51 22
N8PR	21,412	159	39 14
WB2WIH	13,608	142	36 6

GEORGIA			
K4JNY	66,468	520	52 6
KR4TG	36,704	255	53 9
W4DMB	4,379	71	29 0
*K4BAI	528	22	12 0

KENTUCKY			
KR4BD	10,980	107	42 3
*K4IE	8,588	97	35 3

NORTH CAROLINA			
NC4NC	84,111	522	53 16
NX9T	60,180	461	51 8
*KS4XG	38,808	349	42 7
K4MA	36,456	336	42 7
W3GCG/GRP	21,666	205	40 6
AA4S	15,498	173	37 4
*WX4DX	11,628	155	31 3
N4UH	9,500	116	35 3
*N4VHK	2,880	57	24 0
N4TL	1,953	42	21 0
*W4YDY	1,548	40	18 0

TENNESSEE			
AG4V	15,100	145	48 2

VIRGINIA			
W4MYA	192,015	902	57 28
N4RV	102,127	558	53 20
K4IQ	81,213	501	56 13
K3OSX	37,392	360	45 3
KQ4RX	13,068	132	41 3
N4MM	11,825	120	39 4
*W4YE	9,288	120	35 1
W4HJ	6,496	94	30 2
K4VV	4,814	77	27 2
NB3O	3,950	66	23 2
*N3TG	1,216	35	16 0

ARKANSAS			
W5HUQ	24,534	246	46 1
*KG5RM	1,650	36	22 0

LOUISIANA			
WA5KBU	310	14	9 1

MISSISSIPPI			
W50XA	1,440	33	19 1

NEW MEXICO			
N7DF	48,108	373	50 7
K5AM	23,079	200	45 4
W5JRP	11,000	124	39 1
W5GZ	6,992	83	36 2

TEXAS			
KZ5MM	126,588	684	56 21
K5RX	53,950	339	54 11
*W5CWO	26,070	205	48 7
*KF5YZ	7,410	86	38 1
*K5OE	6,536	80	37 1
N5KB/GRP	3,712	58	29 0

CALIFORNIA			
K6HNZ	55,512	433	50 4
N2KK	42,334	308	51 10
N6RO	36,520	268	46 9
K6SE	25,382	210	42 7
*N6CMF	22,95		

VE3PN	93,456	325	53	6
VE3EJ	29,385	134	40	5
VY2MGY/QRP	18,009	129	29	0
*VA3DZ	14,000	83	35	0
MANITOBA				
VE40V	59,400	225	50	5
*VE4RP	8,910	57	33	0
SASKATCHEWAN				
VE5RA	130,113	441	52	9
VE5SF	3,650	34	24	1
VE5CPU	583	13	11	0
ALBERTA				
VE6JY	83,752	302	50	8
*VE6CKG	21,443	109	37	4
BRITISH COLUMBIA				
VE7NS	41,400	175	44	6
VE7XO	4,746	50	21	0
CAYMAN ISLANDS				
*ZF2MO	5,656	39	23	5
MEXICO				
XE2SOZ	16,620	112	28	2
*XE2WBAH	3,216	42	14	2
ST. KITTS				
V47KP	194,893	467	52	27
AFRICA				
CANARY ISLANDS				
EABAN	36,876	91	17	25
ASIA				
ASIATIC RUSSIA				
RW9TZ	38,016	132	0	33
*RW9SC	18,750	88	0	25
*UA9MR	7,310	76	0	17
*RW9QA	826	20	0	7
CYPRUS				
H22A	76,482	193	0	42
C4A	72,928	179	1	42

KAZAKH REPUBLIC				
*UN20	47,112	199	0	26
UZBEKISTAN				
*UK9AA	7,875	47	0	21
EUROPE				
AUSTRIA				
OE1TKW	22,500	120	0	36
BELARUS				
*EU1AZ	54,079	259	0	41
BELGIUM				
OT9T	325,668	678	25	59
BULGARIA				
LZ1DFP	20,427	229	0	33
CROATIA				
*9A2EU	65,760	265	2	46
CZECH REPUBLIC				
OK1TP	52,032	217	3	45
*OK2SNX	16,096	106	0	32
OK2BZM	9,126	71	0	26
DENMARK				
OZ3SK	114,855	382	8	49
OZ5EV	17,964	97	1	35
ENGLAND				
G3NAS	95,700	246	22	44
*G4VGO	34,482	186	2	40
*M4T	2,496	33	0	16
*G4NXG/M	676	11	0	13
*G0MTN	432	12	0	9
ESTONIA				
*ES5RIM	7,248	61	0	24
FINLAND				
OH1LEU	98,600	378	1	49
OH3JR	15,334	88	0	34

DH5NE	8,762	70	0	26
OH2BO	8,294	58	0	29
*OH1MM	68	4	0	4
FRANCE				
*F5BBD	18,975	117	0	33
*F5RAB	9,423	70	0	27
F5CWU	8,554	69	0	26
F2AR	6,475	51	0	25
GERMANY				
DJ6QT	97,292	413	3	49
DL8PC	85,170	380	3	48
*DL7VRO	81,141	387	3	48
*DJ8UV/P	48,011	293	0	41
*DL7MAE	13,158	78	0	34
*DF1ZN	8,790	66	0	30
DH2RAL	3,344	39	0	19
DJ1KI	3,120	40	0	20
DL4RU	3,059	36	0	19
*DL3DRN	2,538	32	0	18
DJ6TK/QRP	1,316	23	0	14
GREECE				
*SV8CS	185,984	576	7	57
HUNGARY				
*H8BIT	57,190	260	2	41
ITALY				
I4JMY	274,008	584	26	58
IV3OWC	122,280	402	12	48
IK0YUT	96,488	342	9	47
*IC8JAH	37,674	193	2	40
*IK2ZVU	14,949	94	0	33
I4CSP	13,440	82	0	35
*IK4QIB	12,090	87	0	30
*IK2ANI	6,800	57	0	25
IK6JNH	1,740	25	0	15
*IN3HOT	1,596	30	0	14
KALININGRAD				
UA2FJ	69,137	283	2	45
UA2FP	54,489	263	0	41
*UA2FL	5,302	49	0	22
LATVIA				
YL2GUV/QRP	3,450	46	0	15

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*SP5LCC	1,500	25	0	12
RHODES				
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ROMANIA				
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YO2BEH	11,222	69	0	31
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*UA1OMS	6,300	49	0	26
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S59D/QRP	34,003	196	0	37
*S57DX	30,324	162	0	38
*S55A	16,704	107	0	32
*S57U	7,368	64	0	24
S57AW	4,584	39	0	24
*S57IIO	3,654	42	0	18
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EA5AT	20,304	112	1	35
EA5AT	20,304	112	1	35
*EA1DVY	13,472	80	3	29
*EA3GBU	4,378	40	0	22
EA5YB	3,173	35	0	19
*EA3GHQ	2,960	39	0	16
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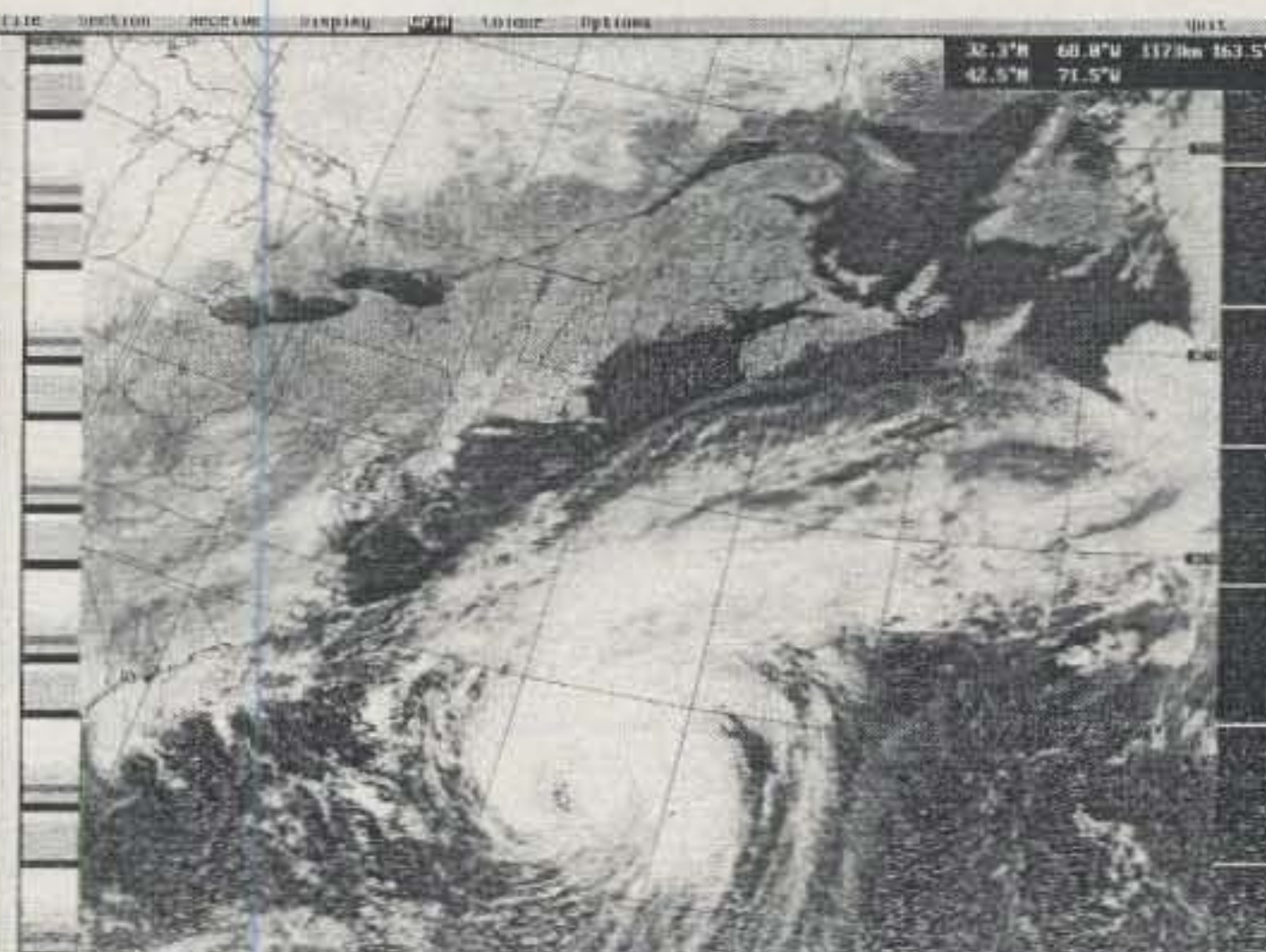
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If you would like to contact the fund-raising drive, please send an e-mail to: <ai6v@aol.com>. For more information on WRTC-2000, point your browser at <<http://wrtc2000.bit.si>>. Thank you for your support.

73, Carl Cook, AI6V/P49V

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RAINBOW AMATEUR RADIO Association, the gay/lesbian club. Active HF nets, newsletter, e-mail reflector, web page: <www.rara.org>. Privacy respected. E-mail: <rara@qsl.net>, or P.O. Box 191, Dept. A, Cheslerland, OH 44026-0191.

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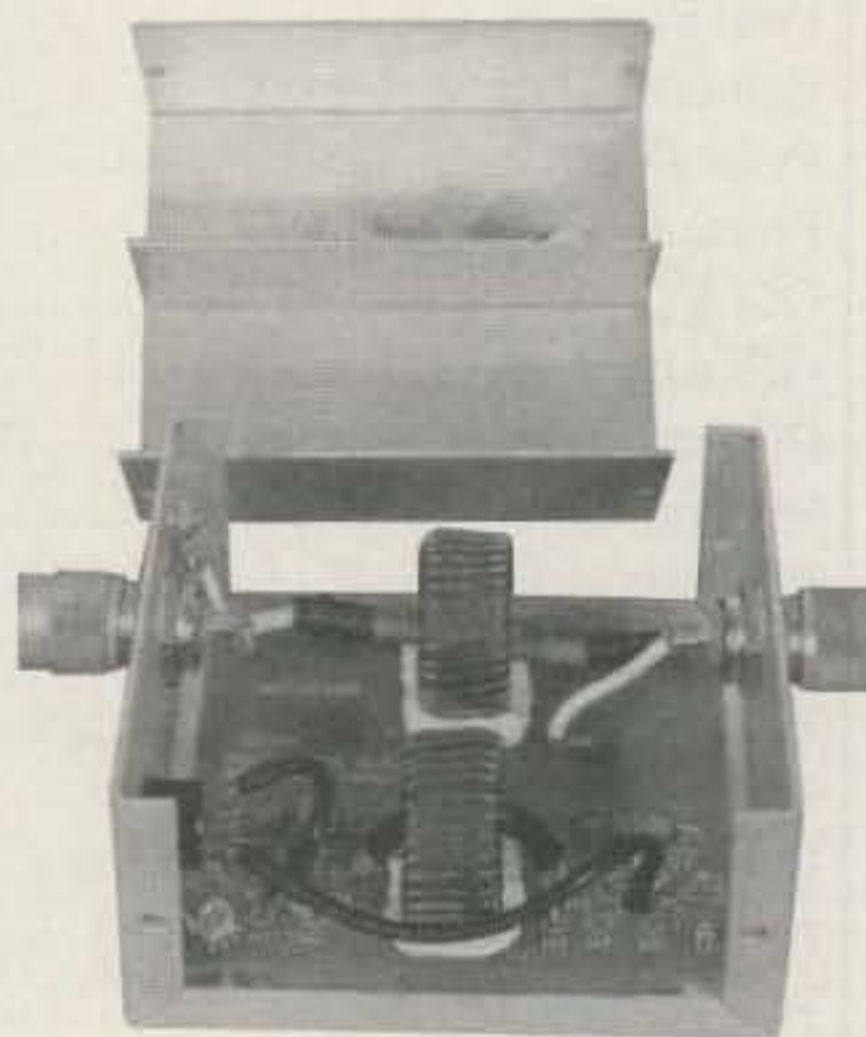
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SIMPLICITY, RIGHT OUT OF THE BOX.

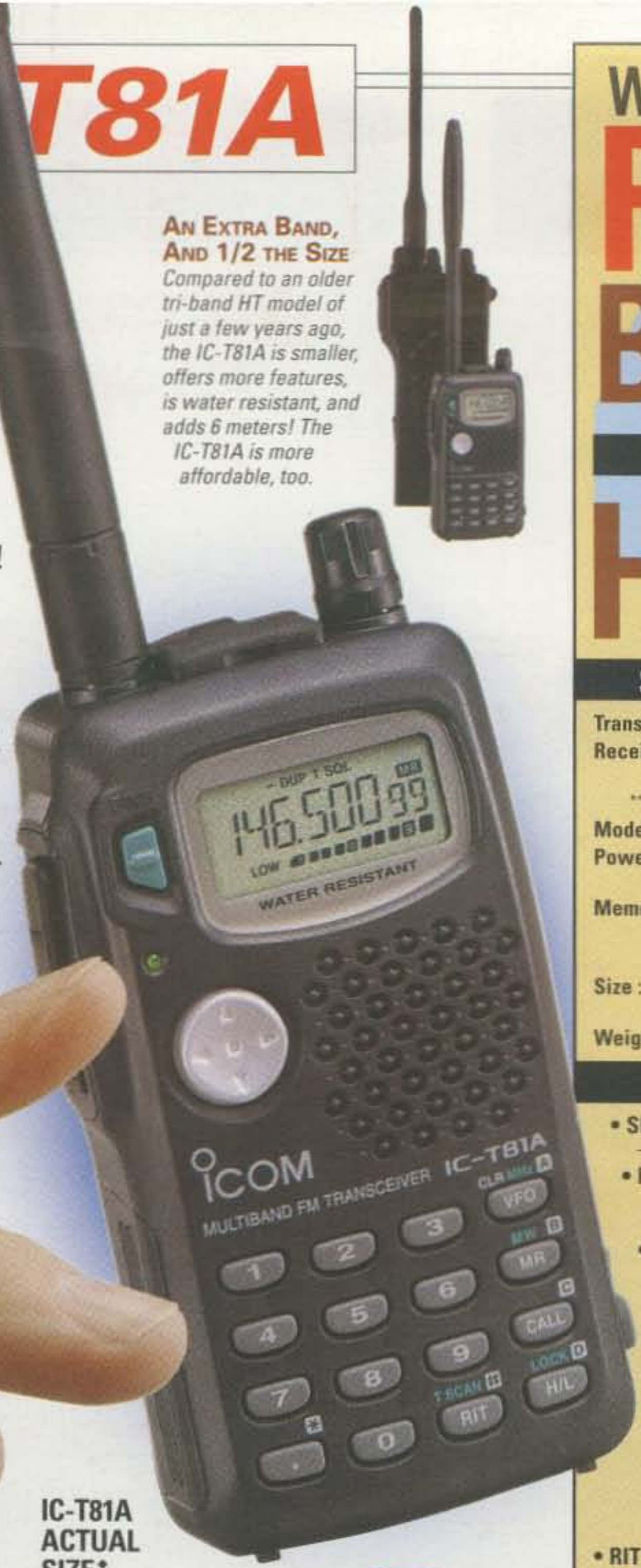
Function keys can be confusing. The 'T81A doesn't use any! It's so easy to use, many operators said they never needed to open the instruction manual.

LISTEN BEYOND THE HAM BANDS. Pick up incredibly clear, wide band** reception. Tune in a ball game (radio or TV broadcast), listen to air traffic control, or scan for police activity. Take your 'T81A everywhere!



ICOM options required for PC operation:
OPC-478
 Cloning cable,
CS-T81
 Cloning software

AN EXTRA BAND, AND 1/2 THE SIZE
 Compared to an older tri-band HT model of just a few years ago, the IC-T81A is smaller, offers more features, is water resistant, and adds 6 meters! The IC-T81A is more affordable, too.



IC-T81A ACTUAL SIZE*

WORLD'S FIRST!
FOUR BANDS
IN ONE HAND

SPECIFICATIONS

Transmit: 6M, 2M, 440 MHz, 1.2 GHz
Receive: 50-54, 74-174, 400-470, and 1240-1300 MHz**
 **Reception guaranteed on US ham bands only
Mode: WFM and AM (Rx only), FM
Power: Up to 5 Watts @ 13.5V, 1 Watt on 1.2 GHz
Memory Channels: 124 total
 Including 100 regular, 20 scan edges, and 4 call
Size: *2.3(W) x 4.2(H) x 1.1(D) in. 58(W) x 106(H) x 28.5(D) mm.
Weight: 9.9 oz /280 kg

FEATURES

- Slim, Powerful Ni-MH Battery - 4.5 Watts @ 9.8V/680 mAh (4-6 hrs)
- Rugged ICOM Construction - Die-cast aluminum chassis - JIS-4 water resistance rating
- CTCSS Encode/Decode (Tone Squelch) - 50 tones, pocket beep
- DTMF Encoder, 9 Memories
- Multi-Function "Joystick" - Easy to change bands, cruise menu options, and set modes
- Built-in Guide Function
- Auto Repeater
- Backlit Alphanumeric Display - Use a PC to name channels
- RIT and VXO for 1.2 GHz Band
- Battery Voltage Indicator
- 9 Tuning Steps (7 for 1.2 GHz band)
- "AA" Alkaline Battery Pack (optional)
- Wall Charger and Belt Clip Included

also available:

IC-T8A

Save \$70 and get a free alkaline battery case. Limited time offer. See your dealer for details. If you don't need 1.2 GHz, but still want to enjoy the best of 6M/2M/440MHz, the T8A is the rig for you!

SAVE \$70 IC-T8A

ICOM's original 3 bands in one hand mini HT is easy to use! 6M/2M/440MHz. Many of the same features, and a very attractive price. Pick one up today.



ICOM's 'T81A & 'T8A offer more bands for more fun. Contact your authorized ICOM dealer today or call for a free brochure:

425-450-6088



ICOM
 www.icomamerica.com

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