

# HAM RAG

Rockford Amateur Radio Association, Inc.

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in the Rockford area at <http://rara.tripod.com>

January 2004

## W9GD Makes DXCC Honor Roll for the second time!



Photo by Bob Davidson, WA9NTT

On December 31 we (Shari Harlan, N9SH and Bob Davidson, WA9NTT,) made a trip down to Oregon to visit with W9GD, Gene Duncan. Gene had ordered an ARRL Handbook, and he received the handbook on CD. When he told me about it, I told him that I would trade a new handbook that I had for the CD. While there Gene mentioned that he had made the DXCC Honor Roll for the second time. This is quite an

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## The January meeting is the 2004 RARA Awards Dinner

January 9th, 2004

6:00 pm - Happy Hour

7:00 pm - Dinner

Forest Room

Thunderbay Bar and Grill

7652 Potawatomi Tr.

Rockford, IL

## New Rates For Club Dues

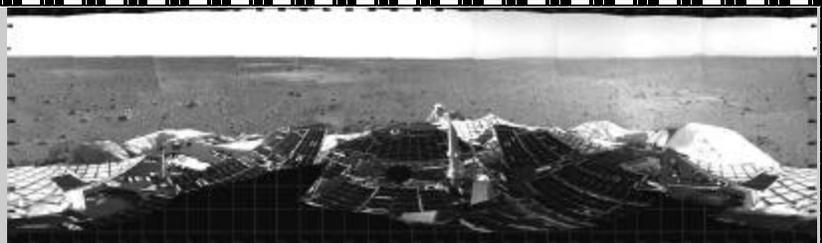
The new dues schedule is as follows:

Single	\$30.00
Family	\$35.00
Senior	\$15.00
Senior Family	\$20.00
Student	\$15.00
Ham Rag Only	\$10.00

With the increased costs of maintaining the repeaters, insurance, newsletter and other incurred costs the BOD reluctantly voted to increase dues for the first time in 5 years. These rates started on January 1, 2004.

## Welcome to the Mars Gustev Crater via the Spirit Rover.

This 360 degree picture was taken  
with the navigation camera within  
hours of landing



## President's Letter January 2004

Happy New Year! I hope everyone had a good time over the holidays. As I am writing this, snow is being predicted, so maybe it will seem like winter has arrived.

First, I would like to thank Scott Allhouse, KB9YRW, for the time he gave us as President of RARA. It was much appreciated by all of the rest of us and you did a great job.

Thank you to the rest of the board of directors as well. It is nice when a group of people work together so well. I am hoping that this year will go just as smoothly!

I hope that I will see most of you at the January meeting/dinner on January 9th. Remind everyone that you talk to that there is not a regular meeting and that they are welcome to come to the dinner at Thunder Bay even if they are not a member. This is the meeting we get to see and talk with those that can not come on a regular basis. I am sure that we can squeeze in a few extra people even though the deadline for getting our money and reservation in has passed. Call Mary Auerswald, KC9AKC, at 962-6793 and let her know you are coming and get your money to her so she can solidify your reservation. As I am sure you know, that the club gets charged by the restaurant even if you do not show, which is why we need the money in advance. Fun is guaranteed!

I will be looking over the questionnaires



closer to see what topics we would like to cover at this years meetings. I promise it will not be a year of amateur television meetings..... I would like to see more meetings covering technical topics, operating low bands, special modes, as well as some of the regular topics such as emergency communications, weather and field day. Let me know what you would like to have for meeting topics. Playing tuba could be arranged!

I wish you all the best for the new year.

Gene Harlan -  
WB9MMM



*(Continued from page 1)*

accomplishment doing it once, but doing it a second time is just astonishing.

Gene is also the Co-Chairman of the Dxing interest group with Gary Hilker, K9LJN. So if you would like to learn his secrets of his success. You can usually find him on the clubs 146.610 repeater where he will gladly talk to you about Dxing or any other HF activity. In the picture below it shows one doesn't need a room full of radios to do what Gene has done.

Congratulations Gene on the great work!



Photo by Bob Davidson, WA9NTT

## **RADIO LAW: LOMPOC SAYS NO TO BPL**

The City of Lompoc, California, has said NO to Broadband over Powerlines, and its a big win for ham radio. Amateur Radio Newslines Bruce Tennant, K6PZW, has been monitoring the situation and has the details:

Paul Andreasen, K1JAN, said it this way -- quote: "Well, we won ONE at least!"

What Andreasen is referring to was a plan by Lompoc city leaders to deploy Broadband over Powerlines in that city and the work of the ham community to head it off.

Andreasen is the ARRL Technical Coordinator for the Santa Barbara Section and a ARRL Technical Advisor for the League's Southwestern Division. And he was one of the organizers of the movement to stop the deployment of BPL in the Lompoc area.

In an e-mail, Andreasen says that his group sprang into action when they learned of plans to permit powerline broadband. He presented city leaders with several studies and some facts on interference effects to and from other licensed RF users.

Andreasen: "I know the mayor so I stopped in one day and asked him. He said yes they were and I introduced him to some of the facts of radiation not only causing problems with public communications, the CHP, Amateur Radio, etc., but about it also causing problems with the BPL system (itself).

Meantime, Eric Lemmon, WB6FLY, made the California Highway Patrol aware of their efforts. The statewide CHP radio system operates on low-band FM which falls right smack in the middle of the spectrum used by BPL.

And then they wait until December 17th for the newspapers to report the results of their City Council vote on the matter. The good news: No Broadband Over Power lines in Lompoc. Instead, the City Council approved a rival, non radiating system that uses fiber optic technology.

But that's not all. The company that did the study for the planners was told by the City Administrator not to entertain any radiating methodologies at all. All because ham radio operators spoke up and provided proof that BPL could

be hazardous to the regions RF environment.

For the Amateur Radio Newslines, I'm Bruce Tennant, K6PZW, reporting.

Another quote from Paul Andreasen, K1JAN, kind of sums it up. "We not only win one, but a bureaucracy kept it's word!" (K1JAN, W6YN)

## **FOUNDATION FOR AMATEUR RADIO SOLICITS SCHOLARSHIP APPLICATIONS**

The Foundation for Amateur Radio Inc (FAR), a non-profit organization headquartered in Washington, DC, plans to administer 59 scholarships for the 2004-2005 academic year to assist radio amateurs. Comprised of more than 75 area Amateur Radio clubs, FAR fully funds seven of these scholarships with income from grants and its annual hamfest. The foundation administers the remaining 52 without cost to the donors.

FAR invites Amateur Radio licensees planning to pursue a full-time course of study beyond high school and now enrolled in or accepted for enrollment at an accredited university, college or technical school to compete for these scholarships. Awards range from \$500 to \$2500. Preference in some cases goes to residents of specific geographical areas or to those pursuing certain programs of study.

FAR encourages Amateur Radio clubs especially those in Delaware, Florida, Maryland, Ohio, Pennsylvania, Texas, Virginia and Wisconsin to announce these scholarship opportunities at meetings, in newsletters, during training classes, on nets and on Web pages.

Additional information and an application form is available by sending a letter or QSL card post-marked prior to April 30, 2004, to FAR Scholarships, PO Box 831, Riverdale, MD 20738.

The Foundation for Amateur Radio is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1954. It is devoted exclusively to promoting the interests of Amateur Radio and those scientific, literary and educational pursuits that advance the purposes of the Amateur Radio Service.

**Rockford Amateur Radio Association  
Monthly meeting of the membership**

December 12, 2003

St. Anthony Hospital

RARA President Scott Allshouse, KB9YRW called the meeting to order at 7:12 pm.

**Minutes:** The minutes from the November meeting were read by Secretary Wendy Owano, KC9BCF. Chuck Liljegren, WB9UMC moved to accept the minutes as read, second by, Larry Snyder, KOHNM motion carried.

**Treasurer's Report:** Treasurer Rich Ludwig, K9PK reported a balance of \$5,332.60 as of November 24, 2003, a **net gain of \$1,468.39**. The balance is **up \$641.74** as compared with last year. Dave Bond, W9MG moved to accept the report as presented, second by Larry Snyder, KOHNM motion carried.

**Old Business**

Herb Eckstein will be taking down the 610 repeater for a couple of hours for the testing of equipment. He will be doing this shortly, not on a net night.

**Ham of the Year:** Shari Harlan, N9SH asked that nomination forms be turned into her no later than this meeting.

Gene Harlan, WB9MMM reported that the Sixth Annual Midwest Emergency Preparedness and Response Conference will be held in May. He will be doing a presentation on "Implementing Amateur Radio in an Emergency" on May 6, 2004, from 9:15 am- 10 am. Volunteers are needed to staff the booth that RARA will have at the event.

**Repeater Control Ops:** Herb Eckstein, Shari Harlan, Tom Shouler N9VJU, and Rich Ludwig are the control operators.

**Interest Group Reports**

**ATV:** Gene Harlan reported that the repeater is not working correctly through the duplexer.

**Public Information Officer:** Steve James, KA9NPT reported that the Wheaton Ham Fest will be held on 1/25/04 in St. Charles at Pheasant Run Resort.

The monthly Board of Directors Meeting are held at Saint Anthony Medical Center 5666 E. State St. Rockford, IL on the last Tuesday of each month at 7:00 PM. *Except for December.*

**DX:** Gary Hilker, K9LJN asked that his group meet during the break of this meeting.

**HF:** Dave Bond asked that members submit to him in written form past experiences they have had using HF antennas.

**Fox Hunt:** Nicholas Lager, KB9SKW asked that interested members contact him via email or phone in order to do work during the winter in preparation for the spring fox hunts.

**Weather Spotting:** Scott Allshouse asked that reporting of severe weather conditions continue to be called in to the Romeoville and Davenport locations.

**New Business:**

Shari Harlan reported that she is working with a 5<sup>th</sup> grade class at Christian Life School to develop interest in ham radio. Contact her if you can assist her with this project.

Larry Snyder reported that ARRL and FEMA are against Broadband Power Lines (BPL).

Bob Davidson, WA9NTT moved to adjourn the meeting, second by Larry Snyder, KOHNM, motion carried.

Respectfully Submitted,

Wendy Owano, KC9BCF  
RARA Secretary



***RARA Officers for 2004***

**President:** Gene Harlan WB9MMM  
**Vice President:** Scott Allshouse KB9YRW  
**Secretary:** Wendy Owano KC9BCF  
**Treasurer:** Carl Cacciatore W9TQ  
**Director:** Dan Hunt KC9ATR  
**Director:** Gary Hilker K9LJN  
**Director:** Nicolas Lager KB9SKW  
**Director:** Larry Snyder KOHNM  
**Newsletter and Web Site:**  
**John Auerswald KA9SOG**

## Cracks in Earth's Magnetic Shield

**Immense cracks in our planet's magnetic field can remain open for hours, allowing the solar wind to gush through and power stormy space weather.**

Earth is surrounded by a magnetic force field --a bubble in space called "the magnetosphere" tens of thousands of miles wide. Although many people don't know it exists, the magnetosphere is familiar. It's a far flung part of the same planetary magnetic field that deflects compass needles here on Earth's surface. And it's important. The magnetosphere acts as a shield that protects us from solar storms.

According to new observations, however, from NASA's IMAGE spacecraft and the joint NASA/European Space Agency Cluster satellites, immense cracks sometimes develop in Earth's magnetosphere and remain open for hours. This allows the solar wind to gush through and power stormy space weather.

"We've discovered that our magnetic shield is drafty, like a house with a window stuck open during a storm," says Harald Frey of the University of California, Berkeley, lead author of a paper on this research published Dec. 4 in *Nature*. "The house deflects most of the storm, but the couch is ruined. Similarly, our magnetic shield takes the brunt of space storms, but some energy slips through its cracks, sometimes enough to cause problems with satellites, radio communication, and power systems."

"The new knowledge that the cracks are open for long periods can be incorporated into our space weather forecasting computer models to more accurately predict how our space weather is influenced by violent events on the Sun," adds Tai Phan, also of UC Berkeley, co-author of the *Nature* paper.

The solar wind is a fast-moving stream of electrically charged particles (electrons and ions) blown constantly from the Sun. The wind can get gusty during violent solar events, like coronal mass ejections (CMEs), which can shoot a billion tons of electrified gas into space at millions of miles per hour.

Earth's magnetosphere generally does a good job of deflecting the particles and snarled magnetic fields carried by CMEs. Even so, space storms and their vivid effects, like auroras which light up the sky over the polar regions with more than a hundred million watts of power, have long indicated that the shield was not impenetrable.

In 1961, Jim Dungey of the Imperial College, United Kingdom, predicted that cracks might form in the magnetic shield when the solar wind contained a magnetic field that was oriented in the opposite direction to a portion of the Earth's field. In these regions, the two magnetic fields would interconnect through a process known as "magnetic reconnection," forming a crack in the shield through which the electrically charged particles of the solar wind could flow.

In 1979, Goetz Paschmann of the Max Planck Institute for Extraterrestrial Physics in Germany detected the cracks using the International Sun Earth Explorer (ISEE) spacecraft. However, since this spacecraft only briefly passed through the cracks during its orbit, it was unknown if the cracks were temporary features or if they were stable for long periods.

In the new observations, the Imager for Magnetopause to Aurora Global Exploration (IMAGE) satellite revealed an area almost the size of California in the arctic upper atmosphere where a 75-megawatt "proton aurora" flared for hours. A proton aurora is a form of Northern Lights caused by heavy solar ions striking Earth's upper atmosphere, causing it to emit ultraviolet light--invisible to the human eye but detectable by the Far Ultraviolet Imager on IMAGE. While this aurora was being recorded by IMAGE, the 4-satellite Cluster constellation flew far above IMAGE, directly through the crack, and detected solar wind ions streaming through it.

This stream of solar wind ions bombarded our atmosphere in precisely the same region where IMAGE saw the proton aurora. The fact that IMAGE was able to view the proton aurora for more than 9 hours implies that the crack remained continuously open. Researchers estimate that the crack was twice the size of Earth at the boundary of our magnetic shield--about 38,000 miles (60,000 km) above the planet's surface. Since the magnetic field converges as it enters the Earth in the polar regions, the crack narrowed to about the size of California down near the upper atmosphere.

Fortunately, these cracks don't expose Earth's surface to the solar wind. Our atmosphere protects us, even when our magnetic field doesn't. The effects of solar storms are felt mainly in the high upper atmosphere, the region of space around Earth where satellites orbit and bounce or deflect radio frequencies from their desired effects.

## Is the Magnetic North Where you thought it was?



At the moment it's located in northern Canada, about 600 km from the nearest town: Resolute Bay, population 300, where a popular T-shirt reads "Resolute Bay isn't the end of the world, but you can see it from here."

Scientists have long known that the magnetic pole moves. James Ross located the pole for the first time in 1831 after an exhausting arctic journey during which his ship got stuck in the ice for four years. No one returned until the next century. In 1904, Ronald Amundsen found the pole again and discovered that it had moved--at least 50 km since the days of Ross.

The pole kept going during the 20th century, north at an average speed of 10 km per year, lately accelerating to 40 km per year. At this rate it will exit North America and reach Siberia in a few decades.

Earth's magnetic field is changing in other ways, too: Compass needles in Africa, for instance, are drifting about 1 degree per decade. And globally the magnetic field has weakened 10% since the 19th century. When this was mentioned by researchers at a recent meeting

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## Earth Changes its spin, baffles scientists

BOULDER, Colorado (AP) -- In a phenomenon that has scientists puzzled, the Earth is right on schedule for a fifth straight year.

Experts agree that the rate at which the Earth travels through space has slowed ever so slightly for millennia. To make the world's official time agree with where the Earth actually is in space, scientists in 1972 started adding an extra "leap second" on the last day of the year.

For 28 years, scientists repeated the procedure. But in 1999, they discovered the Earth was no longer lagging behind.

At the National Institute for Science and Technology in Boulder, spokesman Fred McGehee said most scientists agree the Earth's orbit around the sun has been gradually slowing for millennia. But he said they don't have a good explanation for why it's suddenly on schedule.

Possible explanations include the tides, weather and changes in the Earth's core, he said.

The leap second was an unexpected consequence of the 1955 invention of the atomic clock, which use the electromagnetic radiation emanated by Cesium atoms to measure time. It is extremely reliable. Atomic-based Coordinated Universal Time was implemented in 1972, superseding the astronomically determined Greenwich Mean Time.

Leap seconds can be a big deal, affecting everything from communication, navigation and air traffic control systems to the computers that link global financial markets.

**Have anything or would like to  
submit an article to be put in the  
Ham Rag or the website?  
Contact me by e-mail at  
ka9sog@arrl.net and visit [http://  
rara.tripod.com](http://rara.tripod.com) for any late  
breaking news and information.  
Please submit any articles before  
the 1st of each month.**

## HAM RADIO IN SPACE REACHES ANOTHER MILESTONE

Ham radio in space has reached another milestone with the successful installation and checkout of the first Amateur Radio on the International Space Station (ARISS) Phase 2 equipment. The ISS now sports a new Kenwood TM-D700E dualband transceiver in the Zvezda Service Module--the crew's living quarters. ISS Expedition 8 Commander Mike Foale, KB5UAC, set up the new transceiver at NA1SS earlier this month. Only official approval is needed to begin operations. Activation of the new gear will mean a power boost for the NA1SS downlink signal, which could prove especially helpful in school group contacts. The additional equipment--which soon will include a slow-scan television (SSTV) system--also opens up new operational possibilities.

"Clearly, we've got multi-op, multi-station capability," ARISS International Chairman Frank Bauer, KA3HDO, told ARRL. The ARISS Japan Team donated the Kenwood radio and made certain hardware and firmware modifications including limiting its power output to a maximum of 25W to prepare it for flight, he said. Bauer and the ARISS US Team recently returned from Russia following successful ground testing of Phase 1 and Phase 2 equipment using a set of flight-identical ARISS antennas as well as testing of a slow-scan TV (SSTV) system.

The Phase 2 gear will use the four antennas installed on the Service Module during space walks in 2002 specifically to support Amateur Radio operations. Addition of the new antennas, which will cover from HF to microwave frequencies, opened the door to deploying the two separate ham stations aboard the orbiting outpost. Waiting in the wings is a Yaesu FT-100 HF/VHF/UHF transceiver that could go into space in January along with the

new SSTV gear.

Bauer says the second ham station with the Kenwood transceiver is near the Service Module's dinner table and the window. "This prime location will allow the crew to more conveniently use the ISS ham radio system," he said. "They'll be able to look out the window while operating from the Service Module" Complementing the Kenwood TM-D700E will be an Ericsson 70-cm handheld.

"Our intention is to operate SSTV on 70 cm with the Ericsson equipment," Bauer said, while the crew will use the Kenwood transceiver for ARISS school group contacts as well as for casual QSOs on 2 meters. The Kenwood radio also incorporates a TNC and can support the RSOISS packet system, not yet back in operation.

The Phase 1 "initial station" Ericsson 2-meter handheld, which has served as the only NA1SS gear for more than three years, will remain in place in the ISS Zarya Functional Cargo Block (FGB).

Astronaut Mike Foale, KB5UAC, fired up the new Phase 2 Amateur Radio on the International Space Station (ARISS) equipment December 21 to make a number of 2-meter contacts with amateurs around the world. The Expedition 8 commander completed QSOs with amateurs in Australia, Europe and North America from 1100 to approximately 1700 UTC.

## For Sale

Laptop - Compaq Presario Portable 1625 266 Mhz, 96 M memory, 6 Gig Hard drive, internal CD & Floppy drives ,Windows 98 Extras include - two good batteries (1 good, 1 very good) three power supplies, docking station / port replicator, restore CD (will be applied prior to sale). \$400.00 in light of extras.

Bob, WA9NTT (877-6274)

(Continued from page 6)

of the American Geophysical Union, many newspapers carried the story. A typical headline: "Is Earth's magnetic field collapsing?"

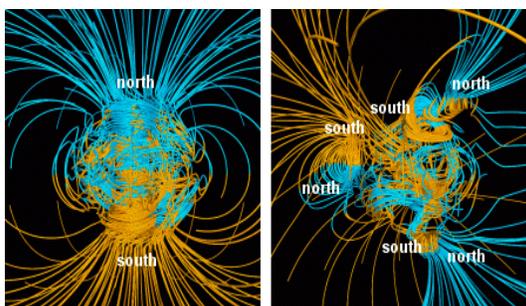
Sometimes the field completely flips. The north and the south poles swap places. Such reversals, recorded in the magnetism of ancient rocks, are unpredictable. They come at irregular intervals averaging about 300,000 years; the last one was 780,000 years ago. Are we overdue for another? No one knows.

The ongoing 10% decline doesn't mean that a reversal is imminent. The field is increasing or decreasing all the time. Scientists know this from studies of the paleomagnetic record. Earth's present-day magnetic field is, in fact, much stronger than normal. The dipole moment, a measure of the intensity of the magnetic field, is now  $8 \times 10^{22}$  amps  $\times$  m<sup>2</sup>. That's twice the million-year average of  $4 \times 10^{22}$  amps  $\times$  m<sup>2</sup>.

Using the equations of magnetohydrodynamics, a branch of physics dealing with conducting fluids and magnetic fields, Scientists have created a supercomputer model of Earth's interior. Their software heats the inner core, stirs the metallic ocean above it, then calculates the resulting magnetic field. They run their code for hundreds of thousands of simulated years and watch what happens.

What they see mimics the real Earth: The magnetic field waxes and wanes, poles drift and, occasionally, flip. Change is normal, they've learned. And no wonder. The source of the field, the outer core, is itself seething, swirling, turbulent. The changes we detect on our planet's surface are a sign of that inner chaos.

They've also learned what happens during a magnetic flip. Reversals take a few thousand years to complete, and during that time--contrary to popular belief--the magnetic field does not vanish. Magnetic lines of force near Earth's surface become twisted and tangled, and magnetic poles pop up in unaccustomed places. A south magnetic pole might emerge over Africa, for instance, or a north pole over Tahiti. Weird. But it's still a planetary magnetic field, and it still protects us from space radiation and solar storms.



between reversals

during a reversal

## Summary of frequency bands for communications in the Mars region.

### Link Frequency range

#### Space-to-Earth

2290 to 2300 MHz, 8400 to 8450 MHz

31.8 to 32.3 GHz

#### Earth-to-space

2110 to 2120 MHz, 7145 to 7190 MHz

34.2 to 34.7 GHz

#### Orbit-to-surface

435 to 450 MHz, 2025 to 2110 MHz

7190 to 7235 MHz, 14.5 to 15.35 GHz

#### Surface-to-orbit

390 to 405 MHz, 2200 to 2300 MHz

8400 to 8500 MHz, 16.6 to 17.1 GHz

#### Surface-to-surface

435 to 450 MHz, 390 to 405 MHz

2025 to 2120 MHz, 2200 to 2300 MHz

#### Orbit-to-orbit

435 to 450 MHz, 390 to 405 MHz

2025 to 2120 MHz, 2200 to 2300 MHz

7190 to 7235 MHz, 8450 to 8500 MHz

#### Approach navigation and atmosphere radio science

8400 to 8450 MHz

Uhf-band (390 to 450 MHz) is used for low bandwidth Mars local links. The UHF link to relay with the Mars Global Surveyor, Mars Odyssey, and the ESA Mars Express is 437.1 MHz Downlink and 401.5 MHz uplink. UHF Communications through the large UHF dish at Stanford University and the new ESA site in Germany are also possible. At 15 Watts the UHF link should be detectable with a reasonable size dish or array with a gain of about 36 dB. A simple link calculation arrives at a received signal level about -114 dBm at Mars distance.

X-band (7.2 to 8.5 GHz) is attractive because of the existing near-Earth and deep-space frequency allocations and because onboard hardware could be shared for both the deep-space and local links. The biggest concern is potential self-interference during simultaneous DTE and local-link communication passes.

Ku-band (14.5 to 17.1 GHz) is attractive because of the availability and technology maturity of components from the commercial satellite industry and because it will not cause any interference with the DTE links. Close to the commercial satellite band there is a band at 15 GHz allocated to Space Research Service (SRS) downlink and another band at 16 GHz allocated to SRS uplink.

Ka-band (32 to 34 GHz) was briefly considered. It provides a very high bandwidth and potentially a large EIRP and G/T, but it requires fine-antenna-pointing control, making this appear to be a less viable option at this time. Also, there is not the hardware maturity and availability of the other frequency bands.

## HAM RADIO IN SPACE: PCSAT NO-44 UPDATE

AMSAT North America reports that PCSat NO-44 is doing fine and will continue in good sunlight through New Years Eve. The satellite is seeing about 50 packet users per day and 30 per pass over the USA.

Anyone with a 2 meter transceiver and TNC can easily copy this bird. Just tune the radio to 145.825 and watch for 1200 baud normal AX.25 packet.

Other easy Satellites are:

ISS - International Space Station

145.200 up / 145.800 down FM

SO-41 - Saudisat-1A

145.850 up / 436.772 down FM

SO-50 - Saudisat-1C

145.850 up / 436.795 down FM (PL-67 Hz)

## THE NEXT AMATEUR RADIO EXAM SESSION IS

**9 AM SATURDAY  
JANUARY 17, 2004**

**North Suburban  
District Library  
6340 N 2nd St.  
Loves Park, IL**

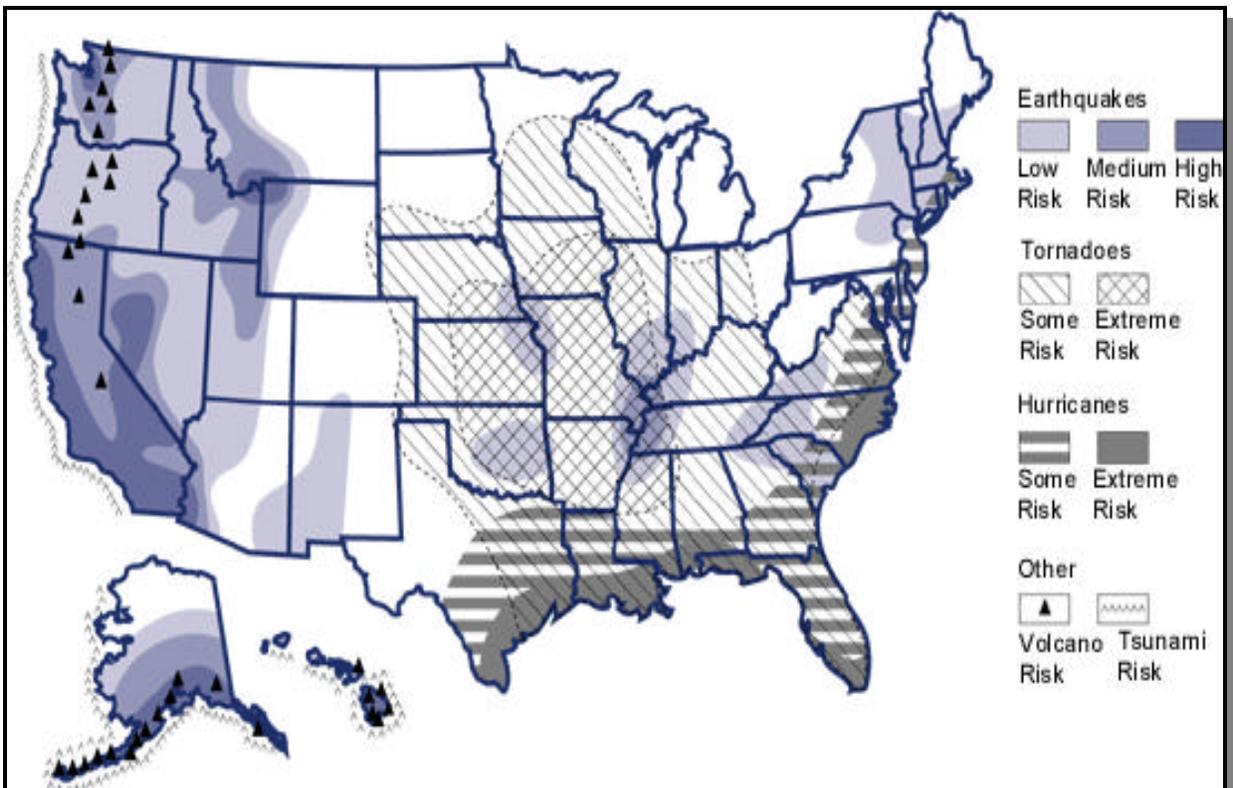
Check-in is from 9AM till 11AM. We require two signature ID's (one must be a photo ID).

If you are a licensed amateur radio operator bring your original current license and a copy.

If you are using a CSCE for an element credit bring the original and a copy.

Copiers available at site. (We need to see the originals & keep a photocopy of each document used for element credit.)

The test fee for 2004 is \$12.00.  
Walk-ins welcome.



This is a natural disasters hazards map that various agencies use to plan disasters in the US.

**Rockford Amateur  
Radio Association, Inc.**

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E-Mail: w9axd@arrl.net  
Web Site - <http://rara.tripod.com>

**Its Time to  
Renew Your  
Dues for 2004**

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**January 2004**

ROCKFORD AMATEUR RADIO  
ASSOCIATION MEMBERSHIP  
APPLICATION

Single \$30.00 Family \$35.00  
Senior \$15.00 Senior Family \$20.00  
Student \$15.00 HamRag Only \$10.00

NAME \_\_\_\_\_ CALL SIGN \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

HOME PHONE \_\_\_\_\_

WORK PHONE \_\_\_\_\_

EMAIL \_\_\_\_\_

RENEWAL \_\_\_\_\_ NEW \_\_\_\_\_ RETIRED \_\_\_\_\_

RADIO INTEREST \_\_\_\_\_

OTHER INTERESTS \_\_\_\_\_

SUGGESTIONS \_\_\_\_\_

RETURN COMPLETED FORM TO:  
ROCKFORD AMATEUR RADIO ASSOCIATION  
P.O. BOX 8465  
ROCKFORD, ILLINOIS 61126

