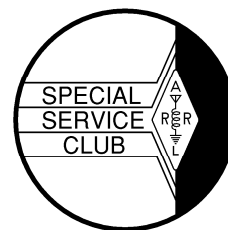




SIGNAL



de NINC

December 2008 Volume 17 Number 12

This Month's Meeting

Next club meeting is Thursday December 18th. The meeting program is Homebrew. Polish up those projects to show off.

No road cleanups till April.

Meeting site info and maps on the back page and the NVARC Website.

Wear your badge to the meeting so new members can tell your name and you can introduce yourself to them. It may be worth your while.

Short Subject Meetings

The January meeting program is Members' Short Subjects. Let an officer or Board member know if you have a presentation to give.

These are five to ten minute presentations and are not expected to be "polished" or go into great depth. They are more to let everyone know what you doing.

Success depends on member participation. We also need three or four short subjects for the January meeting.

Last Months Meeting

Last month's meeting program was a presentation on Logbook of the World (LOTW) by Darryl WA1GON. Darryl covered the evolution of the electronic option to exchanging QSL cards and how it works. He also covered the set up and how you take the contacts in your logging software and submitting them to Logbook of the World.

Skip K1NKR did a short presentation on a Board initiated program to recognize members who con-

tribute in an extraordinary way to amateur radio. The areas are defined by Part 97 precepts. Details are posted on the Web site; www.n1nc.org/Recognition/.

Bob W1XP who is the NVARC Outgoing QSL Manager did a short presentation on this member benefit. He covered the requirements of the Outgoing QSL Bureau and how to prepare cards that are to be sent out.

Present at the meeting were:

Joel W1JMM, Erik W1ZBT, Bruce K1BG, Dick W1LTN, Peter N1PQ, Gary K1YTS, Jim N8VIM, Leo K1LK, Darryl WA1GON, Dennis K1LGQ, Phil KB1JKL, Tom K1NNJ, Jim W1TRC, Rod WA1TAC, Larry KB1ESR, Skip K1NKR, John KK1X, Bob W1XP, Stan KD1LE.

Book Review Update

Thunderstruck
By Erik Larson

Reviewed By Bob Reif W1XP
Dec. 2007

In the December 2007 Signal I reviewed the book "Thunderstruck" by Erik Larson. This book told the two stories of how radio was developed by Guglielmo Marconi, and of the brutal murder of the wife of an American doctor, Dr. Hawley Harvey Crippen in London. Dr. Crippen was convicted of the murder of his wife Cora, and hung for the crime. He maintained his innocence till his execution.

These events took place in the early 20th century. And if you haven't read the book I still recommend it. But there are breaking developments in the murder case. About a month ago I saw a program on TV that purported to relate the results of modern scientific crime investigation techniques to this famous case. The series of programs is "Secrets of the

Dead". You may have seen one or more of the series. This program revealed the results of applying modern DNA testing to a tissue sample supposedly found buried in the cellar of the house Dr Crippen and his wife lived in. It was claimed by the prosecution at the trial, that Dr Crippen had poisoned his wife and cut up her body and disposed of it in pieces and the only piece found was the one dug up by Scotland Yard detectives. This sole piece of physical evidence sent Dr. Crippen to the hangman. Well the DNA tests which were an attempt to match the sample to now living distant relatives of the murdered woman, not only failed, they revealed that the tissue was not female but male! This of course doesn't mean Crippen did, or did not murder his wife. But it does mean that the evidence that sent him to the hangman was not what it was supposed to be. Was Dr. Crippen framed, murder or not? It seems this hundred year old crime is still not closed.

I still recommend the book, as an interesting read on Marconi and the development of radio. And the murder case may be even more interesting in view of the latest developments. 73 Bob W1XP

Tower Takedown

November 22nd a group of NVARC members recovered a tower from a new homeowner who wanted it removed.

Headed up by Larry KB1ESR the crew of Ralph KD1SM, Jim N8VIM (the climber on this activity), Joseph N1QDZ, and Stan KD1LE disassembled the tower and removed it from the site.



N8VIM at the fold over point of the tower.

Two weekends later we recovered another tower that needed to be taken down in Harvard. Bruce K1BG saw the post offering the tower and made first response.



Tower crew ready for second tower take down; KD1SM, N1QDZ, K1BG, KK1X, KB1ESR (behind the camera).



Ralph KD1SM removing the antenna from the tower.

Need a Ride?

Do you need a ride to the club meetings? Do you know someone who does? If you do please contact Bob W1XP 978-448-6559 and leave a message. We'll see that you get to the meeting.

PSLIST

Every event needs communications volunteers

No events listed

Planning for the 2009 Longsjo Classic has already begun.

Board Meeting

Discussion about an awards program and the posting to be added to the Website.

Ralph gave the Treasurers report.

Discussion on the meeting format and possible layouts that would improve projector screen visibility.

December Homebrew
January meeting needs several short presentations.

February meeting program open

Discussion about DTV conversion and the FCC request to the ARRL for assistance with Digital TV Conversion.

Road Cleanup needs better turn outs. Do we want to sign up in the spring? We need someone new to run the cleanup for 2009 if we are going to continue.

Adopt A Highway

The November road clean up was held on the 22nd.

Thanks to the following people for helping out at the cleanup. (L-R) Bruce K1BG, Bob W1XP, Larry KB1ESR, Stan KD1LE, Rod WA1TAC and John KK1X. Behind the camera is Ralph KD1SM.



We need a minimum of six people by MassHighways rules and we need eight to cover our 2 miles in an hour. The rules say we need to work in pairs. With four pairs each group walks one quarter mile out and back. With that plan we are easily done in an hour. Think about it this way. If everyone in the club did one cleanup a year we would have our eight people

for the eight cleanups just doing one cleanup each. No more cleanups until April.

Stan

Treasurers Report

Income for November was \$45 in membership dues, \$30.49 in bank interest, and \$10 in PowerPole distributions. The road cleanup yielded \$5.08 in found donations. Expenses were \$16.80 for newsletter postage leaving a net income of \$73.77 for the month.

We received a donation of \$250 from the Squannacook River Runners to thank us for our assistance with the Groton Road Race this past April. This has been added to our Community Fund.

Current balances:

General fund	\$3,993.34
Community fund	\$2,699.41

As of 10 December we have 57 members who are current with their dues and 8 renewals outstanding. Please check the member roster that is circulated at the monthly meeting if you do not remember your renewal date. Your membership date also appears on your newsletter mailing label. You can always ask Ralph if you are in doubt.

Remember; the Club gets a commission on any new ARRL memberships or membership renewals that you submit through Ralph. Checks should be made payable to NVARC so that our commission can be deducted before we forward your membership to Newington.

Ralph KD1SM

Field Day Site

As I had mentioned at the last meeting the Field Day site is undergoing a transformation to an open field. Here are some more pictures of what is happening.



Above Joseph N1QDZ stands next to a shear that can cut off the trees at the ground.



From the knoll looking west this is the "road" we usually set up on. All the trees to the north (right) have been cleared. The trees to the south (left) have been de-branched and are awaiting removal.

ARRL Letter

ARRL CELEBRATES INTERNATIONAL EDUCATION WEEK

With all the educational opportunities the Amateur Radio on the International Space Station program (ARISS) provides <http://www.rac.ca/ariss/oindex.htm>, it's no wonder

that the organization has captured the attention of the US Department of Education (ED). According to ARRL ARISS Program Manager Rosalie White, K1STO, the ED has been tracking ARISS's activities for a long time: "The Department of Education invited ARISS to help celebrate the ninth annual International Education Week (IEW) by coordinating three contacts with the International Space Station (ISS) during IEW, November 17-21 <<http://www.iew.state.gov/>>. How could we say no?" International Education Week is a joint initiative of the US Department of Education and US Department of State.

To go along with the theme of this year's IEW -- International Education: Fostering Global Responsibility and Leadership -- White explained that the Department of Education requested ARISS's participation through NASA. "Late last spring, JoAnne Livingston from the Department of Education asked NASA if the ARISS Team could support an ARISS radio contact in conjunction with IEW. The trick for the ARISS Team was to have a successful QSO that tied together three school communities from spots all over the globe into one 10 minute radio contact."

The ED took the initiative of selecting three schools to participate in the contact. Eventually, Enloe Magnet High School in Raleigh, North Carolina, Poolesville High School in Poolesville, Maryland and Academia Cotopaxi, an all-grade school in Quito, Ecuador, were chosen as the three participating schools. "Because of orbital mechanics," White said, "the radio contact was slated for Friday, November 14 at 15:02 UTC as the 'curtain opener' for IEW."

To get these schools ready for their QSO, White looked over the ARRL Affiliated Club roster, searching for clubs to help out the selected schools. "I invited the Raleigh Amateur Radio Society to help support the Enloe Magnet High School. The Goddard Amateur Radio Club, which has many ARISS volunteers, agreed to assist the Poolesville High School." With the help of ARRL Membership and Volunteer Programs Manager Dave Patton, NN1N, White searched for active Ecuadorian hams to assist with the contact with the school there.

"The ARISS QSO is always the headliner for all ARISS activities," White said. "The QSO, via WH6PN, the ARISS telebridge station in Hawaii, allowed students to interview astronaut Mike Fincke, KE5AIT, the current ISS commander. As community leaders and school administrators watched, the radio contact occurred without a hitch, with students walking on air as the day ended. In addition to attracting the eyes and ears of educational organizations, three TV stations were on hand at the Poolesville school to

tell their ARISS/IEW story." A video, produced by Gary Pearce KN4AQ, of Amateur Radio/Video News, is also available <<http://www.youtube.com/watch?v=6d3D66DbBEo>>.

White said that due to the IEW, the three school communities got an education treat: "On November 18, students from all three schools tied in to a video-conference activity held at the US Department of Education auditorium. Students asked questions round-robin style to a panel of experts from around the world. The panel was made up of astronaut Don Thomas, KC5FVF; ARISS Chairman Frank Bauer, KA3HDO, and other ARISS worldwide volunteers and science leaders. Top-level staff from the Departments of Education and State, as well as representatives from educational associations such as the Sally Ride Science Club and the head of NASA Education watched the proceedings."

Each panel member gave a short presentation and participated in a question and answer session with all students. Aside from an overview of ARISS, panelists spoke about unusual ARISS events that have happened in their countries, space exploration and what ham radio activities are popular in their countries. According to White, they also interjected a little of the cultural flavor from their parts of the globe.

Students from the three schools and their lead teachers will not forget their IEW 2008 experiences. Mark Curran, head of Poolesville High School's Science, Math and Computer Program, said his computer students are developing skills for programming a rover to investigate an imaginary planet (Planet Falconia, named for the school mascot). The Research and Engineering Class designed and constructed the rover to successfully navigate hazards, sense differences in surface temperature and recognize boundaries. The Earth Systems Science Class studied planetary geology and remote sensing applications for Planet Falconia. "Through ARISS," Curran said, "students gained insight into daily challenges faced by current astronauts and the importance of the communication efforts including ham radio. Students realized the need to be able to communicate well in both written and spoken languages, addressing the English and foreign language aspects of the curriculum."

Enloe Magnet High School teacher Samuel Wheeler developed special lessons for 11th and 12th grade students in his AP Physics, Honors Physics and Physical Science classes. Enloe is currently ranked 73rd in Newsweek's list of the top 100 United States high schools. Enloe students have exchanged communications with high schools in China, Germany and Turkey through videoconferencing.

Kathy Beahn at the Academia Cotopaxi in Quito, Ecuador, led the effort for pre-kindergarten through 12th grades. Recommended by the US Embassy in Quito for the ARISS QSO, the school teaches an American curriculum.

According to White, space-related and ARISS studies were integrated into the Conceptual Physics Course for 11th and 12th grade students, and students in grades 2, 7 and 8 also took part in the ARISS radio contact.

"We began the year learning about waves in general, including basics about the electromagnetic spectrum," Beahn said. "This helped students understand ham radio technology. We studied planetary motion and astrophysics topics including special relativity and black holes." Alfredo Caviedes, HC1HC, helped out with the QSO and Rick Dorsch, NE8Z -- a Michigan ham who has been to Quito many times and is friends with Caviedes -- provided translating assistance.

White said that the Department of Education was so impressed with ARISS and with what students learned before, during and after the contacts that ARISS has been invited to participate in next year's International Education Week. IEW 2009 is scheduled for November 16-20.

GET READY FOR THE ARRL TRIPLE PLAY WAS AWARD

As of January 1, 2009, the ARRL will offer another award: The Triple Play Worked All States Award <<http://www.arrl.org/awards/#tripleplay>>.

This new, exciting award is available to all amateurs who confirm contacts with each of the 50 states using three modes for each state: CW, phone and RTTY/digital. All 150 contacts must be made on or after the starting date and must be confirmed via Logbook of the World (LoTW) <<http://www.arrl.org/lotw/>>. All bands -- with the exception of 60 meters -- may be used in pursuit of the Triple Play Award.

In their July 2008 meeting, the ARRL Board of Directors decided to implement this new award. Based on a suggestion by former ARRL Dakota Division Vice Director Hans Brakob, K0HB, the League's Programs and Services Committee referred the award's parameters to the Board where it received enthusiastic approval.

According to ARRL Chief Executive Officer David Sumner, K1ZZ, the Triple Play Award is a one-time award -- once you have made the required 150 con-

firmed contacts via LoTW, you're done. "Even so," Sumner writes in "It Seems to Us" in the January issue of QST, "there are many possible variations on the theme. You can try to be the first (or at least the first on your block) or you can set your own pace. Think it's too easy? Limit yourself to QRP while operating your favorite mode (or all three). Maybe you prefer to be the quarry; it will quickly emerge which states are the most difficult to find, offering opportunities to earn the gratitude of your mates by activating the ones you can get to with your portable or mobile rig."

The Triple Play Award is not a contest, but Sumner points out that the ARRL RTTY Roundup <http://www.arrl.org/contests/rules/2009/rtty.html> takes place the first weekend in 2009, with the North American QSO Party (CW and Phone) <<http://www.ncjweb.com/naqprules.php>> following soon after. "Contesters are among the most loyal devotees of LoTW," Sumner writes, "so participating in these three events should take care of all of the easy states, as well as some of the more difficult ones." He warns that it can be addictive once you begin making your contacts for the Triple Play Award!

The rules for the Triple Play Award state that two-way communication must be established on the amateur bands with each state on each mode (the District of Columbia may be counted for Maryland). There is no minimum signal report required. Contacts must be made from the same location, or from locations no two of which are more than 50 miles apart. Club station applicants must include their club name and call sign of the club station or trustee on their application. The Triple Play Award will be issued on sequentially numbered certificates, starting with #1, as determined by the time stamp of the electronic application as submitted via LoTW. There are no endorsements for this award.

Contacts made through repeater devices or any other power relay method may not be used for WAS confirmation (a separate WAS award is available for satellite contacts). All stations contacted must be land stations; contacts with ships, anchored or otherwise, and aircraft, cannot be counted. The only exception to this rule is permanently docked exhibition ships (such as the Queen Mary) and other historic ships will be considered land based.

Triple Play Award applicants who reside in the US must be ARRL members to be eligible to receive the award. DX stations do not need to be ARRL members.

ARISS TO CELEBRATE 25 YEARS OF AMATEUR RADIO IN SPACE WITH SPECIAL EVENTS

Twenty-five years ago this week, Owen Garriott, W5LFL, made history by being the first Amateur Radio operator to talk to hams from space. His historic flight on STS-9 on board the space shuttle Columbia was launched on November 28 and landed on December 8, 1983. Garriott's ham radio adventure on that mission ushered in a host of what Amateur Radio on the International Space Station (ARISS) Chairman Frank Bauer, KA3HDO, called "outstanding outreach activities that continue today with the ARISS program."

Bauer said that many hams still remember that first set of contacts and downlinks with Garriott: "Those first contacts allowed each of us to share the excitement of space exploration through Owen's first-hand eyewitness accounts. Owen's ham radio legacy enabled space travelers that have flown on the space shuttle, the space station Mir and now the International Space Station (ISS) to share their journey of exploration."

Just last month, Garriott's son Richard, W5KWQ, became the first second generation Amateur Radio operator to travel in space and speak with hams <<http://www.arrl.org/news/stories/2008/10/17/10392/>>. "What other hobby, except Amateur Radio," Bauer wondered, "could or would open the communications lines of space travelers beyond that of the space agencies or international heads of state?"

To celebrate 25 years of Amateur Radio operations from space, ARISS has planned a set of special event opportunities for December and part of January. According to Bauer, a special certificate will be available for those who communicate with the ISS, either two-way direct (with the ISS crew, the digipeater or cross-band repeater) or one-way reception of SSTV or voice downlink. "Several 'surprises' are planned over the month-long celebration," he said, and will be announced soon.

Bauer said that in addition to school contacts and APRS digi-operations, ARISS will configure the radio system for cross-band repeater operations to utilize the standard U/V operations in low power mode during the first week of December. According to Patrick Stoddard, WD9EWK, "U" refers to the 70 cm band used for the uplink to the cross-band repeater, specifically the 437.800 MHz FM frequency (+/- for Doppler), while "V" refers to the 2 meter VHF band used for the downlink, specifically the 145.800 MHz FM frequency.

Starting December 7, ARISS will then run a test of 9600 baud packet operations on 145.825 MHz."Given that PCsat should be in full sun starting December 9," Bauer explained, "we will switch to 1200 baud packet on 145.825 on December 14-19 to support double hop opportunities. At times, especially during the weekends, you might see some SSTV operations if the crew is available."

Bauer reminded hams that due to ISS flight requirements related to spacewalks and vehicle activity, the radio onboard the ISS may be off for some portion of this schedule. School contacts and general QSO opportunities by the crew will also preempt this schedule for short periods of time. "But remember that if you hear these," Bauer said, "you still qualify for a commemorative certificate!"

WEATHER SPOTTERS RECEIVE AWARD AS SEVERE WEATHER COMES CALLING

On November 15, Amateur Radio operators who serve the National Weather Service in Taunton, Massachusetts received an award from the NWS weather forecasters citing excellence in service and "tireless service" to the NWS and to the people of Southern New England. Presented at a SKYWARN coordinators meeting, the award was accepted by Rob Macedo, KD1CY, on behalf of the more than 24 hams present. Macedo is the ARES SKYWARN Coordinator for the NWS's Taunton office and is the ARRL Eastern Massachusetts Section Emergency Coordinator.

The award reads: "Presented to NWS-Taunton Amateur Radio Team WX1BOX. With sincere appreciation for your long-standing commitment to the National Weather Service and the people of southern New England and with particular recognition for your tireless support during the unusual 2008 severe weather season."

Members of the Taunton SKYWARN Amateur Radio Club, WX1BOX, assist forecasters at the Taunton office. This office serves portions of Massachusetts, Connecticut, Rhode Island and New Hampshire. NWS Taunton forecasters Bob Thompson, Glenn Field, Bill Babcock and Eleanor Vallier-Talbot presented the award to the group.

"Today was a special meeting," Macedo said. "I wasn't expecting the trophy that's sitting on top of the power supply here at the station. I was surprised. Very well done, I must say. It is a tribute to the team effort exhibited by Amateur Radio operators and SKYWARN spotters across the four-state region."

Macedo said that the award meant "even more to the Amateur Radio team since it was funded not by NOAA, but rather by the forecasters at the station. They paid for it out of their own pockets."

According to Macedo, the 2008 summer severe weather season in Southern New England featured 974 local storm reports. Of those, 917 -- or 94 percent -- came from the Amateur Radio SKYWARN Spotter Network. There were a total of 50 SKYWARN activations recorded over the summer of 2008. "This has been the most active year in the 13 years I've been involved in the SKYWARN program. We hope next year will be calmer in terms of severe weather," Macedo said.

Later that evening, the NWS posted a tornado watch for much of Southern New England, lasting until 2 AM Sunday. Strong winds ahead of a cold front resulted in pockets of tree and power line damage across Connecticut, Rhode Island and Massachusetts. Some minor structural damage was also reported, as wind gusts of 50-70 MPH were reported; a wind gust of 67 MPH was recorded at the Blue Hill Observatory in Milton, Massachusetts.

"While the line of severe thunderstorms that were capable of damaging winds and the possibility of tornadoes fell apart as it moved toward the region, strong straightline winds out ahead of the storm were the story of the event. This resulted in pockets of wind damage across the region, including several reports of trees falling on cars and homes. A couple of weakened roofs on old structures were blown off due to the strong winds in Boston, Massachusetts and Providence, Rhode Island," Macedo said. "Somehow, given such an active year in 2008 for severe weather, it is no surprise that we had a wind damage event on the evening of our coordinators' meeting. We hope this is the end of the active stretch."

NEW BASIC ANTENNA BOOK AVAILABLE FROM ARRL

For something that is often so simple to make, an antenna is remarkably difficult for many people to understand. The antenna is one of your shack's most important elements and can make your radio system a success. Now available from ARRL, "Basic Antennas: Understanding Practical Antennas and Design" <http://www.arrl.org/catalog/?item=9994> is a comprehensive introduction to antennas -- basic concepts, practical designs and details of easy-to-build antennas. You'll learn how to make antennas that really work. This book will provide a foundation in antenna theory and design necessary for anyone undertaking more advanced topics and projects such

as those presented in "The ARRL Antenna Book" <<http://www.arrl.org/catalog/?item=9876>>.

Written by ARRL Technical Editor Joel Hallas, W1ZR, this new book includes an introduction to antennas, as well as sections on dipole antennas, antenna impedance, transmission lines, practical two element arrays, wideband and multiband antennas, monopole antennas, reflector antennas, Yagis for HF and VHF loop antennas, antennas for microwave applications, vehicle antennas, antenna measurements and an introduction to antenna modeling

"Most people involved in the radio arts come from a background in the circuitry required to define radio equipment," Hallas said, "and many have difficulty making the transition to the electromagnetic side of radio. 'Basic Antennas' is intended to assist those with a basic knowledge of radio technology in making that important leap from the circuit domain to the antenna domain." Hallas said the technology presented in the book is developed using the "minimum of mathematical concepts to allow introduction of basic principles in an easy to read manner." Upon completion of this book, readers should have enough understanding of the basic principles of antenna systems to be able to make decisions about selecting antennas for their applications or using more advanced antenna materials properly.

Joel Hallas, W1ZR, earned his BS and MS degrees in electrical engineering. He has been a radar and telecommunications systems engineer, engineering manager, telecommunications executive and college teacher. Now QST Technical Editor, he is also the author of "Basic Radio -- Understanding the Key Building Blocks" <<http://www.arrl.org/catalog/?item=9558>>.

GLOBAL EMERGENCY NETWORK MARKS RECORD

The Global ALE High Frequency Network (HFN) <<http://hflink.net/>> -- an international Amateur Radio Service organization of ham operators dedicated to emergency/relief radio communications -- has become the first network to operate continuously for more than 500 days on all international Amateur Radio shortwave bands simultaneously.

According to HFN International ALE Coordinator Bonnie Crystal, KQ6XA, the main purpose of the Network is to provide efficient emergency and disaster relief communications to remote areas of the world. "Beginning with a core group of six North American radio operators in June 2007, HFN rapidly expanded to cover large areas of the planet with 24/7 digital communications," she said. "HFN was

designed to be an open framework for global Amateur Radio emergency services to interoperate on HF using the Automatic Link Establishment (ALE) system." <<http://www.arrl.org/tis/info/ale.html>>

Relying on ionospheric radio communications, interconnected HFN base stations scan the radio bands every 10 seconds, from 3.5 MHz-28.0 MHz. Through this Net, Crystal said, ham operators stay connected with each other at all hours of the day or night in any mode of operation, and can send Internet e-mail or cell phone mobile text messages from the field.

2008 Flea Markets

November
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Tell them you saw it in the Signal. Advertisers should contact the NVARC Treasurer for information.

Contest, DXpeditions and Special Events

The information for a DXpedition can be quite detailed and may include bands, dates, number of stations, and times of day they plan to work certain continents so I can not list it all here. But if a country or prefix is of interest you can get more information at www.425dxn.org.

Contests 2008

December

5-7 ARRL 160 Meter Contest
13-14 ARRL 10 Meter Contest
15 Lighthouse Christmas Lights

January

1 Happy New 21st Century
1 ARRL Straight Key Night
5-6 ARRL RTTY Roundup
12-13 North American QSO Party CW
19 CQ UT Contest
19-20 UK RTTY DX Contest
19-20 North American QSO Party SSB
CQ World-Wide 160 Meter DX Contest CW

February

2-3 Vermont QSO Party
2-3 10-10 International Winter QSO Party
2-3 Delaware QSO Party
Mexico International RTTY Contest
9-10 Louisiana QSO Party
9-10 RSGB 1.8 MHz Contest CW
16-17 ARRL International DX Contest CW
23-24 CQ WW 160 Meter Contest SSB

March

1-2 International DX Contest SSB
15 North American Sprint Contest RTTY
28-29 CQ WW WPX Contest SSB



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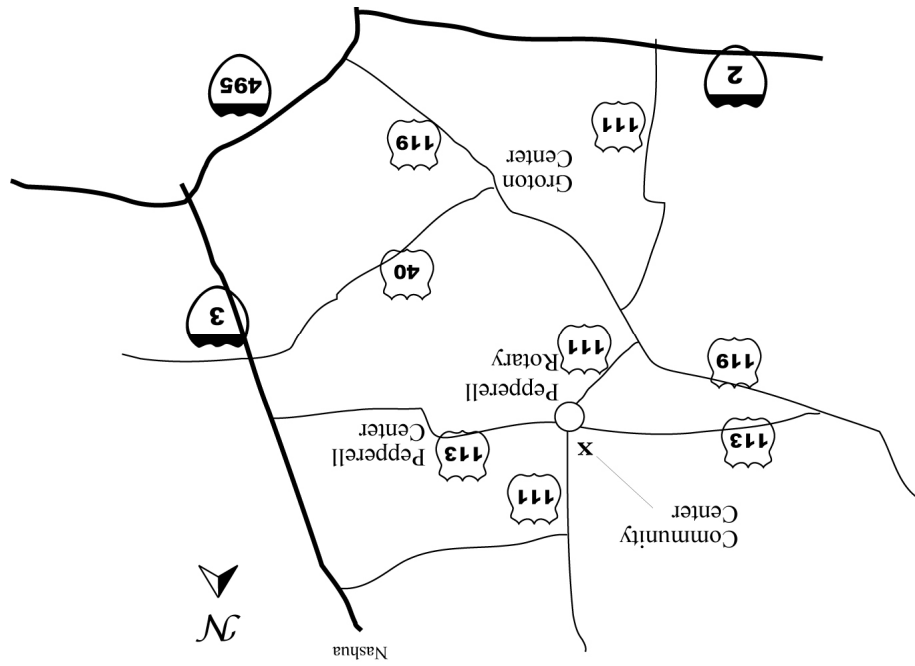
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Meetings are held on the 3rd Thursday of the month
7:30 p.m. - Pepperell Community Ctr.
Talk-in 146.490 simplex
442.900 + 100Hz Repeater
147.345 + 100 Hz Repeater
53.890 - 100Hz Repeater

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