



# SIGNAL



de NINC

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## This Month's Meeting

This month's meeting is the annual Homebrew Night. So bring along those homebrew projects, finished or not, so we can see what you've been up to. For those super-sized projects a few pictures would do. We can have a computer and projector if you bring pictures in electronic form on a flash drive or CD.

ARRL members can give your outgoing QSL cards to Bob W1XP and the club will pick up the cost of getting them to the League.

## Last Month's Meeting

Last month's meeting program was Operating The FM Satellites by Joel W1JMM. Joel told of his goal to chase DXCC via satellites using only the standard ham equipment of mobile rigs and handhelds.



Courtesy KDISM

Joel has worked 64 countries and 49 of the 50 states via the RS-12 satellite which has since failed.

The challenge he took on besides the equipment limitation was to work beyond the normal "footprint"

of the satellites to get countries or states further away than would be normally expected.

Joel distributed an explanation of the Doppler Effect.



Courtesy KDISM

Stan presented Debbie KA1LEQ with field day pin.

Attending the November meeting were; Stan KD1LE, Ralph KD1SM, Bob W1XP, John KB1HDO, Peter N1ZRG, Dale Sinclair, Larry KB1ESR, Hank KB1JLA, Earl WR1Y, Wolf KA1VOU, Dave N1MNX, Dennis K1LGQ, Phil KB1JKL, Gary K1YTS, Nancy KB1KEF, Les N1SV, Joel W1JMM, Leo K1LK, Stephen WA4LDL, Richard KB1MBR, Don N1NWE, Ken K1JKR, Bruce K1BG, and Peter KB1LZH.

Guests: KA1LEQ Debbie Vardaro, guest of KB1ESR, and W1TRC Jim Hanson, guest of KB1LZH

## ARISS Contact at Hawthorne Brook School

November 29<sup>th</sup> was the culmination of two months of preparation for an ARISS contact between the International Space Station and Hawthorne Brook Middle School in Townsend.

Two month's earlier we had been contacted to provide radio communications for the event by Steven Best VE9SRB who was involved in the original application and Marilyn Richardson (the teacher). The club that had signed up on the original application in April of 2002 was not able to support the event. After some brief discussions and a club meeting we decided to support the event. The kids after all have been waiting three and one half years for this to happen.

From that point on it was a scramble to assemble the required two satellite stations for the contact. Not having been involved in the original application we had a lot to learn.

We made site visits to the school to check out the classroom, the possible antenna locations like the roof, adjacent athletic field, and a basketball court near the classroom. Knowing something of the terrain there were concerns. But anticipated ISS passes were expected to have Acquisition of Signal (AOS) in the southwest and Loss of Signal (LOS) in the southeast. These were the optimum places due to a high ridge that runs east-west on the north side of the school. We also had a lot to learn about the NASA requirements for the equipment used. A review of the original application and several other sources revealed exactly what NASA expected. This included for the primary station; a radio, power amplifier, large cross polarized antenna, rotator system, emergency power, and some audio amplifier, and lots of cables.

After looking at what radios might be acceptable it was decided to use a satellite type radio. Bob W1XP had a Yaesu FT-847 which would fit the bill. To make operation and programming easier it was decided to use two of the same radios. After sending out an all-club email we located three more of the same rig. When we started assembling the second station Hank Lane KB1JLA supplied the second rig.

The available antennas needed to be repaired, some elements replaced, matching cables built, and the antennas tuned and checked out. That was completed by mid October.

Software was obtained to track the satellites and International Space Station. Some practice was re-

quired to understand the program, learn to update the KEPS, and synchronize time.

A rotator system was available but untested. Cabling had to be made to test the system. For the event rotator and RF cables needed to be extended to 250 feet. For accurate aiming, computer control of the azimuth and elevation of the primary antenna was needed. A computer interface and software was obtained. The software for the rotator interface takes data from the satellite tracking program to point the antennas in the correct direction. Calibration of the system to synchronize the position and feedback from the controller was required.

The primary station was completed more than three weeks before the contact. We still only knew the week and not the day of the contact. But we started testing equipment by making packet QSO's through the ISS packet system on nearly a daily basis as passes were available. Ultimately more than fifteen packet QSO's were made through the ISS.

Over the course of the two month's the prospective date had narrowed from a list of weeks in a November and December to the last week in November. With a week to go we received news the contact would be November 29<sup>th</sup> at about 1:24 PM. The good news was we now had the date and time. The bad news was the pass was now going to come up in the northwest where we knew there was a significant hill and set in the southeast. Ralph KD1SM set to work again computing the horizon elevation angles where we expected AOS and LOS. To our dismay we found that with the new LOS bearing a new hill in the southeast would now be a problem. With this information we estimated the total length of the contact. This is less than the flat land horizon to horizon calculation the program gives. After a few adjustments to the calculations we estimated that the 9 minute 44 second pass would be more like 9 minutes. This information was passed on to Marilyn so she could plan the students question and answer time.

The week before the contact Bob and Stan practiced with the students. Using the actual radio and microphone setup they transmitted to a local handheld and recorder. After all the students asked their questions which now included the word "over" the tape was played back so they could see how they sounded and if they needed to speak louder. That process was repeated several times.

Another problem was audio distribution and a desire to record the event. Bob had built two audio pre-amps so speakers could be driven by the fixed audio output of the rigs. This made the speaker audio level independent of the rig volume control that might

need be adjusted by the operator if he were wearing headphones. The original requirement was only to have audio in the classroom which would only have the 20 students asking questions and some visitors. A simple PA system using computer speakers satisfied this requirement. Providing audio from both the uplink and downlink in a way that doesn't cause feedback is more of a challenge. Not to mention the basic problem of RF getting into the system. Larry KB1ESR put together a mixing and distribution system that he thought would satisfy the requirements.

The week before the scheduled event both stations, all the antennas and all the peripheral equipment were assembled. On the weekend we scheduled a training session to go over last minute details and have everyone assigned a role. Gary K1YTS, Joel W1JMM, Bob W1XP, Stan KD1LE, and Larry KB1ESR made the meeting. As a plus there was an actual pass of the ISS so we could track in auto and manual, compare received signals on both stations, and try to make a few packet QSO's. As the ISS approached antennas were positioned. When the ISS came over the horizon at AOS we expected to hear packet bursts. Much to our surprise and pleasure we heard voices. We quickly switched from the packet uplink frequency to the voice frequency which was already programmed into the radios. Bill McArthur, the astronaut we would talk to in the school contact, was making contacts as he came up the east coast. One of those contacts was to the Naval Academy. During that QSO he wished them good luck at the upcoming Army Navy football game but said he would be rooting for Army. As he worked stations Stan KD1LE called and after a few tries was acknowledged. On closing Stan mentioned we would be the calling station for next Tuesdays school contact which he acknowledged. A number of additional stations made QSO's and as the ISS neared the horizon Joel W1JMM made several calls which were answered. We weren't sure he repeated the callsign correctly but we hope so.



Without notice on the day of the event the audio requirements expanded to providing audio to two adjacent classrooms. The challenge was to provide uplink and downlink audio to the adjacent rooms without creating feedback in the middle room where the students were asking their questions. The middle room would only have downlink audio so the students could hear the astronaut's replies. With the help of audio equipment supplied by the music teacher Larry supplied signal to the new systems.



Courtesy KB1ESR

Above is station one with packet computer on left, rotator control and interface under the speaker, radio with packet TNC on top, and power amplifier on the right. Stan KD1LE and Bob W1XP operated station one.



Courtesy KB1ESR

On the left side of station one was the tracking computer with software to track the space station and pass tracking information to the interface software and controller interface.



Courtesy KB1ESR

Above is station two with tracking computer, radio, and power amplifier. Joel W1JMM and Les N1SV operated this station.



Courtesy W1JMM

Above (L-R) Larry KB1ESR, Gary K1YTS, and Les N1SV setting up equipment in the classroom. The audio equipment and microphones for both stations are near Larry. Station two is behind Gary and Les. The screen on the right is set up to display SatScape, a tracking program, so everyone in the room could see where the space station was.



Courtesy W1JMM

Above are the primary antennas for the contact. The antennas were set up the day before the contact. The classroom is on the second floor left of the greenhouse.



Courtesy KD1LE

The backup antennas arrived ready for deployment. The yagi and vertical on another tripod base were shipped mostly assembled on the trailer. The base for the yagi was on wheels. The main antennas shipped assembled and connected on the tower trailer.



Above is the backup cross polarized antenna with an azimuth only rotator. The antenna was set at a fixed elevation. The antenna system was mounted on a wheeled base. Cables were attached to the antennas and coiled on the cart ready for quick deployment. This setup required an operator to monitor the location of the space station and manually make azimuth adjustments.

The Monday afternoon before the contact the two stations and the main antenna system were set up. Participating were Joel W1JMM, Stan KD1LE, Bob W1XP, Larry KB1ESR, and Gary K1YTS.

Tuesday morning we arrived around 10:00 AM and continued set up and testing. The crew was composed of Larry KB1ESR, Bob W1XP, Dick KB1MBR, Stan KD1LE, Gary K1YTS, Les N1SV, and Joel W1JMM.

Cables were re-run to the primary antenna and rotator as we did not leave them across the driveway overnight. The secondary antennas were set up and cables run. An hour and one-half before our pass everything was set up. Since there was a pass around noon Bob started sending CQ on the packet frequency the space station uses. During the pass a message came back from the ISS "are you the station for the school QSO today?" Bob replied "roger we're just checking out the system". The reply came back from the ISS "good luck."

After that exchange everything was set and we only had to wait. There was time to pose for pictures as Marilyn and her crew of 20 students below.



Marilyn Richardson N1CSH (L) whose activity this was and her 20 student questioners.



About ten minutes prior to the expected AOS Marilyn gives and introduction to the students and visitors. Behind the students are various members of the press and the School Principle.



After calling "NA1SS this is N1CSH" for the third time Bill McArthur replied "hear you loud and clear". With a brief comment Marilyn turned the microphone over to the students. Bob keyed the microphone for each after Bill completed his answer for the previous question.

Nineteen students were able to ask their questions though only 18 answers were heard. As the space station went lower on the horizon the signal started getting noisy. The last student asked their question but we heard no reply. At this point Marilyn thanked Bill and led a group "Thank You" from the students after which she signed off.

After the contact was over Larry replayed the audio for the students. The video made by the school was played in the library.

The school provided a pizza lunch after the event. After everyone had calmed down we started packing up. It took a while to pack all the equipment and take down the antennas but considering it took two days to set up the two hours to take down was not bad.

### Adopt A Highway

The last cleanup was November 19, 2005. We held the cleanup directly after our Saturday breakfast. There was a good turnout and if there is general agreement we may continue this in the Spring. At the cleanup were Erik W1ZBT, John KB1HDO, Leo K1LK, Bruce K1BG, Larry KB1ESR, Peter N1ZRG, Peter KB1LZH, and Stan KD1LE. With the great turnout we scoured our two miles and picked up 17 bags of trash and some miscellaneous items, hub-caps, vinyl siding, and a penny.

We meet at the Nashua River common at 9:00 AM. Our clean up day is Saturday after breakfast.

The next road cleanup is Sunday April 23<sup>rd</sup> 2006.

### Board Meeting Notes

The Board Meeting was to take place November 10<sup>th</sup> so the notes were not available for the newsletter due to the holiday on Friday and the printing schedule.

Buy a case of Now Your Talking.

Tee shirts for ARISS crew.

Expenses for ARISS contact.  
Snow fence for around the trailer  
Material to make anti-climb for tower

Speakers and Programs for the spring.

Wrap up of the ARISS contact.

Treasurers Report

### Advertisements

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

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### 2006 Flea Markets and Conventions

- February  
18 Algonquin, Marlboro  
Marlborough Middle School
- March  
26 Spring Flea Market, Framingham
- April  
8 IRS Hamfest and Flea Market  
9 Londonderry, NH

### Treasurers Report

Income for November was \$45 in membership dues, \$4 from ARRL membership renewals, \$10 from PowerPole connector sales, \$8 from mug sales, and \$1.47 from bank savings interest. Expenses were \$14.80 for newsletter postage leaving a net income of \$53.67 for the month.

The Squannacook River Runners have presented us with a donation of \$250 from the 2005 Groton Road Race to add to our Community Fund. In their letter to the Club they write

"Our community road race is organized and hosted by a dedicated crew of volunteers, and it is with great pleasure again this year that we share the fruits of our efforts with worthy organizations such as NVARC."



Current balances:

General fund \$4449.64  
Community fund \$2329.95

As of 7 November we have 60 current members and four renewals outstanding. Please check your newsletter mailing label for your expiration date. If you pick up the newsletter from the Web site only I will send you a reminder by email if your renewal is overdue.

It's easy to renew your ARRL membership through the Club. We pay the postage and the ARRL gives the Club a commission for every renewal that we handle. Hand me your check for the full ARRL renewal amount made out to NVARC and I'll do the rest.

-Ralph KD1SM

### NVARC Club Net

The club net has been meeting on the 442.900 repeater. Recent participants include Dave N1MNX, Bob W1XP, Bob AB1CV, Joel W1JMM, John KB1HDO, Larry KB1ESR, Skip K1NKR, Gary K1YTS, Ralph KD1SM, Stan KD1LE and Don AB1DS, and Dick KB1MBR.

The net is a good place to bring information for the club and questions or discussions. The net meets at 8:00 PM Monday evenings on the 442.900 N1MNX repeater.

### ARRL Letter

#### ARRL, FCC CONTINUE BPL INTERFERENCE RESOLUTION DATABASE DEBATE

The acting chief of the FCC Office of Engineering and Technology (OET) is standing foursquare behind the recently opened Broadband over Power Line (BPL) Interference Resolution Web site <<http://www.bpldatabase.org/>>. The deadline for BPL operators to populate the database, provided by the

United Power Line Council (UPLC) and the United Telecom Council (UTC), was November 19. In October, the ARRL took strong exception to limitations UTC, the site's administrator, has imposed on the number of allowable licensee searches and to the use of ZIP codes as the only search key. Acting OET Chief Bruce Franca defended the BPL database November 22.

"Your concern, limiting access to the database, does not constitute a violation of the rules," said Franca, citing verse and chapter of Part 15 to back up his assertion. Franca said §15.615(d) "clearly states" that the database is intended to identify possible sources of harmful interference thought to emanate from a BPL system. "Permitting individuals who are using a licensed service that operates on the same frequencies as are used by a BPL system to query for pertinent information in the geographic area of that interference fully fulfills this function," he concluded.

A note on the BPL database site cautions that users are "allowed to search a limited number of times each month." It further advises users not to conduct random database searches, lest their access to the database be further restricted. In his initial complaint, ARRL CEO David Sumner, K1ZZ, characterized the notice as an attempt to "ration access" to the site.

Franca also defended the use of ZIP codes as the only means to query the database, saying they are easily understood and identifiable and will provide the information the rules require on BPL systems deployed within a ZIP code. Sumner had argued earlier that requiring users to enter a ZIP code before gaining access to the database was "clearly contrary" to the requirement that the database be available to the public.

Responding November 30, Sumner gamely took another stab at getting the League's point across. Part 15 is unambiguous that the information in the database must be publicly accessible approximately 30 days before a BPL system begins operation, he said. Using a ZIP code to gain entry, Sumner continued, "renders the advance notification requirement meaningless to the public" unless someone were to regularly visit the Web site and repeatedly enter a particular ZIP code. But since that practice "is specifically discouraged by the UTC's notice," Sumner pointed out, it's impossible for the public to know about a BPL startup in advance, something the BPL Report and Order seems to require.

As a result, Sumner said, the benefit of a prior notification requirement, while limited as an interference-prevention measure, is lost to BPL operators as well

as to licensed radio services that may suffer harmful interference that could have been avoided.

Sumner said the UTC-administered database "provides less than was promised" in the FCC's October 2004 Report and Order. "For advance notification to be meaningful, the public must know when additions and changes to the database occur," he contended. "That is functionally impossible if the 'publicly accessible' database is actually maintained behind an opaque curtain and is only revealed one ZIP code at a time."

One workaround, Sumner suggested, would be to require UTC to make publicly available a list of ZIP codes and the date of the most recent data entry for each. "This also would make it clear when a specific BPL system serves more than one ZIP code area, information that is required by §15.615(a)(3) but that is not available to the public at present except by individual query of each ZIP code."

Sumner said Franca failed to respond to his point regarding the error message that appears when a database user enters a ZIP code where no BPL system apparently has been deployed. At that point, users are asked to provide "written details" about the nature of the interference and the user's licensed operations as well as location--"complete address and coordinates"--operating frequencies, whether mobile or fixed and a brief description of the interference.

"Frankly, UTC has no authority to require the submission of such information from an FCC licensee prior to sharing information that the public is entitled to as a matter of right," Sumner concluded--reiterating a point made in his initial correspondence. "If the database were appropriately accessible the question would never arise."

On November 23, the League told the FCC that the Manassas, Virginia, BPL system was not in compliance with FCC Part 15 rules because its operator failed to provide full information to the public BPL database by the November 19 deadline and the system should be shut down. The letter came barely six weeks after the ARRL called on the FCC to turn off the Manassas BPL system because of unresolved interference complaints to Amateur Radio.

Since the League's letter, a search under ZIP code 20110 indicates the Manassas system has provided a contact name, address, telephone number and e-mail address. Its entry still lacks details about the equipment in use, however.

## **SPACEWALKS "THRILLING," ASTRONAUT TELLS STUDENTS DURING HAM RADIO CHAT**

International Space Station Expedition 12 Commander Bill McArthur, KC5ACR, told students gathered in Geneva, Switzerland, November 22, that taking a spacewalk is a thrilling experience. Speaking the following day with middle schoolers in upstate New York, McArthur described space exploration as the new frontier. Both contacts were arranged by the Amateur Radio on the International Space Station (ARISS) program. During the Geneva contact--part of the "Science on Stage" program for European science teachers--McArthur rhapsodized about the spacewalk experience.

"It's an absolute delight, it's thrilling to be outside, it's being truly in a totally alien environment," McArthur said, "and you realize the only thing between you and vacuum is the small little spaceship that you call your spacesuit. And it is truly the most thrilling thing I've ever done."

Responding to a question involving human physiology in space, McArthur said it's theorized that bone tissue is replaced more slowly in space because it does not get stressed in microgravity.

"On Earth, when you walk, when you run, every time your foot strikes the ground there is stress on your skeletal system, and this aids in bone development," McArthur said. He told another student that getting used to weightlessness was the biggest adjustment for ISS crew members. He noted that he and crewmate Valery Tokarev will have spent some 182 days in space by the time they return to Earth next April. In the meantime, much of the research conducted aboard the ISS will help determine how well human beings will be able to handle long-term space travel beyond Earth orbit, McArthur said.

Some 300 science teachers from 25 countries gathered at the European Nuclear Research Center (CERN) in Geneva for the conference. Eighteen students from Belgium, Denmark, Greece, Italy, Norway and Portugal took part in the space QSO.

NN1SS at Goddard Space Flight Center in Maryland served as the Earth station for the CERN event. MCI donated a two-way teleconferencing link between NN1SS in Maryland and the ISS. Gaston Bertels, ON4WF, was the ARISS-Europe mentor.

On November 23, youngsters at Central Park Middle School in Schenectady, New York--a NASA Explorer School--focused most of their questions on space-flight training, preparation and safety. McArthur told

the youngsters that it was hard to get into the space program.

"It was very difficult because there simply are so few astronauts--there are only slightly more than 100 astronauts in the US space program, and each time we ask for new volunteers, we get thousands of applications from very, very qualified people," McArthur explained. "So, to be quite honest, not only do you have to have a good resume, you have to be very, very lucky."

An astronaut for 15 years, McArthur said he trained four and a half years for his current mission onboard the ISS. The most challenging aspect of his job is "to be patient," he said in reply to another question. "I've spent much, much more time training and on the ground than flying in orbit."

McArthur said he believes the most important thing society can gain from missions like his is a continued belief in and commitment to space exploration. "Humans by their very nature want to go to the next frontier," he added, "and we think the next frontier is the one you see when you look straight up."

W6SRJ at Santa Rosa Junior College in California served as the Earth station for the Central Park contact, and MCI donated a teleconferencing link between W6SRJ and the school.

ARISS <<http://www.rac.ca/ariss>> is an international educational outreach with US participation by ARRL, AMSAT and NASA.

### Contest Calendar and DXpeditions

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](http://www.425dxn.org).

#### January

- 1 Straight Key Night
- 7-8 ARRL RTTY Roundup
- 8-9 North American QSO Party
- 21-23 ARRL January VHF Sweepstakes

#### February

- 5-6 Delaware QSO Party
- 18-19 ARRL International DX Contest

### DXpeditions

Call	Location	Until
9V1CW	Singapore	2008
5H3HK	Tanzania	March 2006
T68G	Afghanistan	March 2007
ZD8I	Ascension Is	March 2006

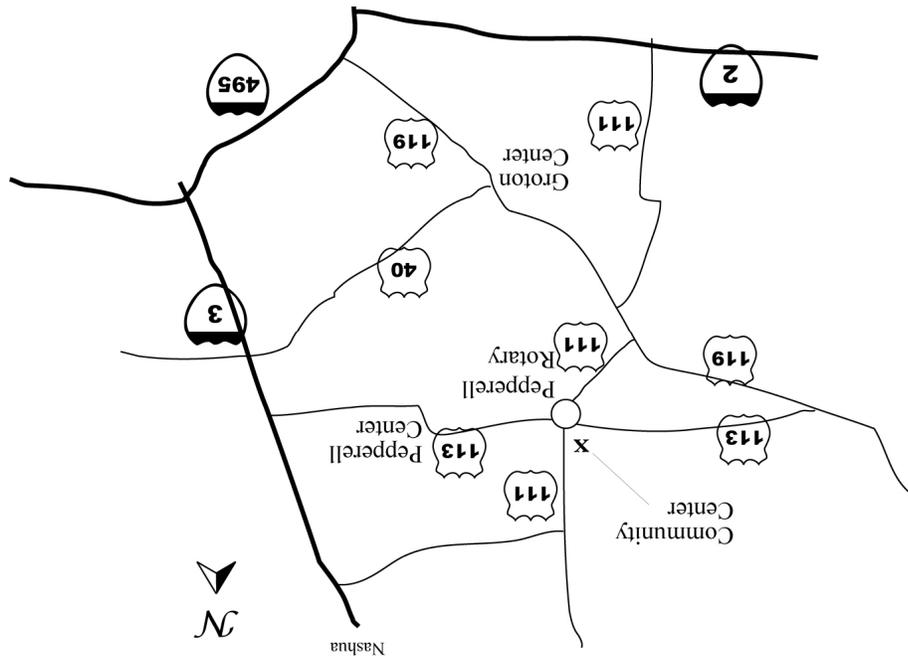


### Nashoba Valley Amateur Radio Club

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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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