

# North Fulton Amateur Radio League NFARL eNEWS February 2016



www.nfarl.org

## "NFARL - A CLUB ON THE MOVE"

NFARL is a club on the move!

In case you missed the January meeting, NFARL kicked off the year by continuing our participation in another successful Techfest. Our team of club volunteers were busy from 9 am until 2 pm mentoring youth and more than a few adults in learning the art of kit construction and soldering skills to successfully build a LED blinking light project. Our January club meeting had over 80 members in attendance and a great presentation facilitated by Tim Romashko, K4RA on Emergency Preparedness. While we haven't experienced the blizzards of our friends to the North, it was a great reminder to plan and prepare for the South's spring severe weather!

Amateur Radio has something for everyone! Many of our DX enthusiasts were successful in contacting the DXpedition VP8 to South Sandwich and South Georgia islands. The South Sandwich Islands are a cold and inhospitable place. At 59 degrees south, Southern Thule Island

is one of the most remote places on Earth. While many of us may not have the opportunity to participate in a DXpedition, we can participate in the ARRL National Parks on the Air (NPOTA) contest. As presented at the January meeting, Terry Joyner W4YBC and Jim Payne N4SEC are captaining the clubs participation and efforts to rank nationally!

Closer to home, NFARL is participating in an ARISS (Amateur Radio on the International Space Station) contact March 8<sup>th</sup> at Fernbank Science Center. As many of you will remember, NFARL facilitated a successful ISS contact with Mill's Springs several years ago. Preparations are also underway to continue NFARL's leadership role in the Georgia QSO Party and a friendly club competition. Our club is also committed to continuing our leadership role in the 13 Colonies event to celebrate our nations independence.



Mark Schumann KK4FOF NFARL President

I am also pleased to announce NFARL's commitment to encouraging and mentoring future amateur radio operators, enthusiasts and club members via our HamCram events. The club conducted several HamCrams last year and we had a 100% pass rate for our December session (a club record)! We are planning three HamCrams for 2016! A Technician class in April, a General class in the Summer and a Technician class in the Fall. Wouldn't it be great to have an Extra class this year? Defend our ARRL Field Day 3A and attendance title? Set a goal of being the 2017 Hamvention Club of the Year?

I challenge our members to ask how you can contribute to NFARL's club efforts! Older members, how can you mentor new members? New members, how can you become our future leaders? How can every member contribute to improve and grow NFARL?

I look forward to your ideas and seeing everyone at the club meeting on February 16!

# **NFARL Upcoming Events and Dates**

- Every Sunday NFARES net 8:30 PM 147.06 MHz (+) PL 100
- Every Monday Tech Talk 8:30 PM 145.47 MHz (-) PL 100 Check NFARL Nets website for "how to."
- Every Wednesday Hungry Hams Lunch Bunch 11:15 AM Slope's BBQ, 34 East Crossville Road, Roswell.
- Every Wednesday Youth Net 7:00 PM 145.47 MHz (-) PL 100 Check NFARL Nets website for "how to."
- Every Thursday YL Net 8:00 PM 145.47 MHz (-) PL 100 Check NFARL Nets website for "how to."
- Every Saturday Royal Order of the Olde Geezers (ROOG) Lodge No. 1
  9:00 AM Reveille Café, 2960 Shallowford Road, Marietta (at Sandy Plains and Shallowford). Everyone is welcome: You don't have to be "old" or a "geezer" to join this breakfast get-together.
- Second Tuesday NFARES Meeting 7:00 PM
   Fellowship Bible Church, 480 W. Crossville Road, Roswell.
- Third Tuesday NFARL Club Meeting February 16th, 7:30 PM.

Pre-meeting activities begin at 7:00PM.

Location: Alpharetta Adult Activity Center at North Park

13450 Cogburn Road, Alpharetta, GA 30004

Meeting topic: Solar Power Systems — presented by Mike Cohen AD4MC

Fourth Tuesday – NFARL Executive Team Meeting

February 23rd, 7:00 PM - 12200 Crabapple Road, Alpharetta, GA 30004 Meetings are open to all NFARL members. Space available on a first arrival basis.

Second Saturday – VE Testing

NFARL provides Amateur (Ham) Radio test sessions once per month at the Alpharetta Adult Activity Center. Please check our <u>website</u> for up to date testing information.

# February Meeting / Mike Birmingham, K4LJG

We have a great lineup of speakers so far for 2016.

**February** 

Our speaker will be Mike Cohen, AD4MC. Mike will be talking about solar power systems. You won't want to miss this especially if you operate outdoors.

March

Chuck Catledge, AE4CW, is the NFARL guru on antennas! I always look forward to Chuck's presentation on antennas.

April

Scott Straw, KB4KBS and Tim Lemmon's, WK4U presentation will be on digital communications.

May

Tim, K4RA, did such a great job in January that he will return again in May to discuss D-Star.

June

Of course, the June meeting is about Field Day. Dr. John Kludt, K4SQC, the Field Day chairman, will discuss Field Day, 2016. John did a fantastic job last year and I can't wait to hear what he has to say about this year's Field Day.

That is all the speakers I have so far. I am looking for ideas of what you, the membership, would like to hear for the rest of the year. This is your time so let me know what you are interested in. You can email me at k4ljg@nfarl.org with any ideas of topics and/or speakers. so let me know what you are interested in. You can email me at k4ljg@nfarl.org with any ideas of topics and/or speakers.

# Fox Hunting / John Kludt, K4SQC

We announced at the last club meeting the opportunity in April for NFARL to bring home two trophy's in the first ever North Metro Transmitter Hunt. This will be a hunt in two phases. The first hunt will be to find a 10 to 20 watt 2m transmitter somewhere in the area. This is the driving part of the hunt. Once located the second hunt, if you will, is to find the low power 70cm transmitter that is driving the 2m transmitter. This is the walking part of the hunt. There will be two classes: "classic" and "Doppler assisted."

Now Doppler takes some extra equipment and is a bit more costly so let's talk this time around



about the "classic" division. For this division you will need a dual band HT – does anybody not have at least one of those? You will also need a directional antenna, especially on 2m and some way to *reduce* signal strength. When working with our radios we are used to looking for *maximum* signal strength. When transmitter hunting we tend to look for *nulls* instead of *peaks* as nulls tend to be sharper and give a more precise sense of direction. As far as attenuators go, the cheapest one is your body! In one of our NFARL practice hunts, Jim, W4QO, had great success by holding his HT close to his body and getting direction by turning around. When the signal was its' weakest

the transmitter was *directly behind him*. Another NFARL member augments body attenuation by carrying a backpack in which he has placed a cutting board wrapped in aluminum foil.

You can make it a lot more expensive and technically more complex. But with your HT, some aluminum foil and a little practice you can certainly participate and have fun with yet another way to play radio.

Interested? Contact Tim Lemmon, WK4U, <a href="mailto:tim\_lemmon@yahoo.com">tim\_lemmon@yahoo.com</a> for more details.

## MAREA Update / Martha W4MSA

John K4SQC presented a program on Project MAREA (Mars lander Amateur Radio robotics Exploration Activity) to science teachers at the GSTA Annual Conference held earlier this month at Stone Mountain Park. Project MAREA is an ARRL based program that uses the Board of Education robot (BoeBot) to simulate driving the rovers on Mars. Instructions to the robot are sent via radio signals, with a delay simulating the delay between sending and receiving signals for the actual rovers, though John said, the delay is seconds not the ten to twenty minutes that occurs with the actual rover. Anyone who has worked with kids recognizes that it would be difficult for students to patiently wait that long for their classroom rovers to respond!

Using a Martian landscape designed by Wes, W3WL, complete with 'boulders' that blocked the straight line path between the rover and the food stash, represented by a small orange, teachers had to measure distances and angles to determine the instructions for the robot to use to navigate the gritty surface of the planet. Teachers were actively engaged in the process involving measuring and the measurement of angles which took several tries to get right. Some attempts took the robot into a boulder. Others sent the robot off the map entirely. In some cases, the robot was simply dancing shifting left, then right, and then back again. But in another instance, the robot made it to the cached food supply! The mission was saved! The teachers for all the misadventures seemed enthralled with what John was challenging them to do.

The command set to MAREA conforms to APRS standards. Although we did not utilize the function this outing, MAREA could be commanded from anywhere in the area using the 144.390 MHz APRS repeater. The ultimate experiment would be to use the 145.825 MHz packet repeater on the ISS. And that would really be a cool demonstration of the contribution of Amateur Radio to the STEM curriculum!

John also told the teachers about the ARRL's Teachers Institutes. These Institutes sponsored and conducted by the ARRL give teachers the tools to be



comfortable teaching wireless technology in general and Amateur Radio in particular in the classroom. MAREA is a deliverable of the second session of this institute. These Institutes are part of the ARRL Education and Technology Program to which NFARL is a contributor using some of the proceeds from HamJam.

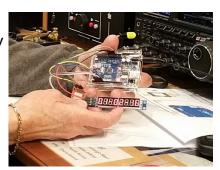
Involvement in the Georgia Science Teachers Association annual meeting, the Atlanta Makers Faire and the Atlanta Science Festival are just some recent examples of NFARL and other area radio clubs reaching beyond the more usual world of hamfests and radio club meetings to bring Amateur Radio to a wider audience. Many we meet in those venues are surprised that we are still here. Yes, still here, growing and stronger than ever.

# Arduino Project Errata / Neil Foster, N4FN

I realized after last month's Arduino article was published that there was an error, sorry about that. The wall wart (power supply) that was used was a 9 Volt DC unit, **not** a 5 Volt DC unit as described.

Also, there were times when the ARDUINO would lose sync with the satellites primarily during the night causing the display to blank. Warren KD4Z suggested moving the GPS antenna outside the shadow box and I did move it to the back. Evidently the density of the wood frame was attenuating the receive signal.

Once the GPS unit was moved the project has worked flawlessly. I might add the shadow box sits about 6 inches above an Alpha 99 amplifier and this has not caused a problem. A really fun project thanks to Warren.



# NFARES Update / Mike Birmingham, K4LJG

Our weekly ARES net is attracting more attention as we continue to practice and learn more about digital communications. Join us on Sunday nights at 8:30 PM on the 147.06 repeater, PL tone 100 Hz. You don't have to join ARES to participate.

The second Tuesday of the month is the ARES meeting at seven o'clock at the Fellowship Bible Church. Thanks to Tim, K4RA for this great location. It is easy to get to and parking is never an issue. Everyone is welcome! Check out our website at <a href="www.nfares.org">www.nfares.org</a> for details.

We have 23 active North Fulton ARES members and among them are seven AECs. If you have any questions about ARES let me know or contact any of our AECs.

Mike Cohen, AD4MC, Stuart Williams, AK4EX, Tim Romashko, K4RA, Wayne Chapman, KG5WU, Mike Clark, KK4YDQ, Jim Payne, N4SEC, and Tom Koch, W4UOC. Talk to any of us if you are interested in getting more involved in NFARES.

# Membership Renewals Requested! / Pavel Anni, AC4PA

### **Renew Your NFARL Membership Today!**

One day at a club meeting at the Alpharetta Activity Center I was approached by Neil, N4FN.

"Are you a member?" - he asked.

"Member of what?" Who knows, Neil might have an idea to invite me to some other club.

"Member of NFARL, of course!" - said Neil.

For a moment I got that feeling when you sneaked into a movie theater without a ticket and suddenly got caught by the ticket lady. Cold sweaty hands, pounding heart, you know... I must have forgot to renew my membership! What is going to happen now? Will I be deported immediately or will they give me a chance to stay tonight and listen to the presentations?

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"We tried to look up your phone number in our member database and didn't find you. Obviously, the system removed you automatically when you didn't renew your membership!" - said Neil.

"But can I stay this night here at the meeting?" - begged I. "I promise, I promise, I'll renew as soon as I'm back home!" Yes, it happens sometimes: you missed the reminder email and didn't renew your membership. Or, you have received it, but decided to deal with it later in the day and... forgot about it. Let's check it today, right now. You don't want to be expelled from the meeting do you?

- Step 1. Open your browser and go to <a href="http://nfarl.org">http://nfarl.org</a>.
- Step 2. On the left side of the page click on "Members". The links are sorted alphabetically, you'll find it between "Meetings" and "Nets". On the next page click on "List of NFARL Members".
- Step 3. Find yourself in the list of members. It is sorted alphabetically by call sign, so you can either press "Next" or you can guess which page you are at. Hint: "N" call signs start at page 9, "W" call signs start at page 11. Find the 6th column called "Membership Exp Date" and take a look at the date there.
- Step 4. If the expiration date is less than 2 months ahead, please go to NFARL Mart and renew your membership (see the instructions below). If it's further than 2 months, open your calendar (calendar app on your smartphone, on your computer, or if you are old-fashioned, your paper-based calendar) at a date *one week before* the expiration date and put a reminder there: "Renew NFARL Membership!"

Please do it **today, right now**, as you are reading this eNews article. This will really help your club.

### How to use Mart to renew your membership.

I checked my own expiration date and found out that it's 3/17/2016. Pretty close. I decided to renew my membership today. Here are my steps.

- Step 1. At http://nfarl.org click on "Mart" in the left column.
- Step 2. If you have registered at Mart already, use your username and password to login. If you forgot your password, press "Request new password". If you don't have a Mart account, click on "Create new account".
- Step 3. After you logged in, click on NFARL Membership. On the next page, click on "NFARL Full Membership" (or "Family Membership" if appropriate).
- Step 4. On the next page you'll see the description of NFARL Membership. Most important thing: you can renew any time you want, it will just add another year to your expiration date. You can also add more than one year of membership and consider it done for several years (you can do it on the next page). Press "Add to cart" button.
- Step 5. On this page you can change the number of years you are renewing your membership. I decided to add three years right away. Why not? I'm not going to leave North Fulton in any foreseeable future and I'm not going to drop out of ham radio soon. If you changed the number of years like I did, don't forget to press "Update cart" button.
- Step 6. Press "Checkout". Here you can choose to pay with PayPal or with check or money order. I chose PayPal, because it's the easiest way for me. If you already had the account at NFARL Mart, most likely it remembers your home address and phone number. If not, fill the blanks in the form.

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Step 7. Press "Review order". If everything is correct, press "Submit order" and you will be transferred to PayPal. You'll have to enter your PayPal password and confirm the payment. Press "Pay Now" on PayPal page and you are done!

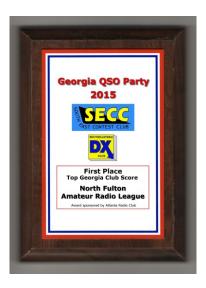
Step 8 (optional). You can go to the Membership page again and check if your membership expiration date has changed. Mine is 3/17/2019 now!

# Georgia QSO Party / John Tramontanis, N4TOL

Georgia QSO Party - Can You Handle the "Pileup" ?

The 55th running of the Georgia QSO Party (GQP) will take place on April 9-10 this year. The members of the North Fulton Amateur Radio League have always been key participants in this event and won the club competition for the state of Georgia last year. All NFARL members are encouraged to participate in this year's event.

Perhaps you are still dealing with the hangover of chasing the recent DXpeditions from the rare entities of Palmyra Island, K5P, South Sandwich Island, VP8STI and South Georgia Island, VP8SGI. Maybe your weary thoughts (like mine) at the time of battling those pileups were, "I wonder what it is like to be on the other side". Well, this is your chance to "be the DX." It is a real opportunity to practice "running," calling CQ and letting them come to you. You may not experience the same bedlam of calling stations as an Antarctic Island expedition, but you will have your moments to sort through a rush of calls.



The club's goal this year is to make the contest a success by having a high level of members participate in the contest, as well as representing the hams in the state of Georgia favorably to the amateur radio community throughout the U.S. and the DX world. Additionally, the club is also focused on repeating as club champion for Georgia in 2016.

However, the most important goal for the weekend is to have FUN and operate in the contest at your station, or operate with others at a shared station.

Last year, certificates were awarded to all club members for participation in the contest and special certificates awarded for key accomplishments in select categories. So be sure to play a part in this year's GQP and earn a NFARL award.

More information will be posted on the club reflector as the contest approaches. For contest details, please use the link below.

http://georgiagsoparty.org/

73 John

## Activities Update / Daryl Young, K4RGK

The January TechFest held by GARS in January each year is always a fun event for NFARL and this year was no exception. We had a grand showing of NFARL support of this event under John K4SQC's direction. Bill K4YJJ assembled a great team of kit building mentors that kept young folks (and a few adults) enthralled throughout the event. John K4SQC and Wes W3WL



challenged all comers with a MAREA programming task, direct MAREA across a Mars landscape and locate the food cache!

Many thanks to the more than 20 NFARL members that came out to represent and support NFARL during this event.

The NFARL education team is well known in the community for it's ongoing contributions. We are in need of additional volunteers and apprentice leaders to continue this tradition throughout this year and beyond. We are in the planning stages for this year's events at Mill Springs Academy, Atlanta Science Festival, and the STEM Expo to name just a

few. We want you to be involved! Introducing our hobby to the next generation of Ham radio operators is a wonderful way to enjoy the hobby

while serving your community.

Be sure to get involved in NFARL's Georgia QSO party effort this year, our 13 colonies participation and of course Field Day.

Many thanks to John N4TOL for leading the NFARL effort in the 2016 Georgia QSO party and to Nathan K4NHW for taking the helm of the Georgia and NFARL efforts in the 13 Colonies event. We are exceptionally fortunate that John K4SQC has once again offered his valuable time to lead our field day teams. Please get involved,



contact these project leaders and offer your assistance and leadership in these club activities.

NFARL continues to need volunteers for leadership and support of all activities. Keep visiting the website for up to date details of NFARL activities and email k4rgk@nfarl.org to let me know how you would like to support your club this year.

### HAM Cake! / Martha, W4MSA

Have You Ever Tasted a Ham Cake?

Meet Ruth, KM4LAO, possibly the newest Youth member of NFARL. Ruth, who earned her Tech license last June and upgraded to General this past month, got in to Amateur Radio so that she could learn and do things with CW. She mastered CW in the CWops Level 1 course taught by Vaden, NN4K, this past fall and will continue on to Level 2 soon.

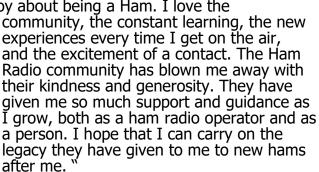
Ruth has been active in GARS activities since becoming a ham and has joyously participated in Youth-focused activities such as the Atlanta Maker Faire and the Student Shack at the Stone Mountain Hamfest this past fall. She will also help out at the Amateur Radio booths at the Atlanta Science Festival's ARISS in March as well as the Amateur Radio booth at the Atlanta Science Festival's culminating Exploration Expo. She is a regular participant in the weekly Youth Net, sometimes serving as Control Operator, the YL Net, and various GARS Nets.

Though members of her extended family are hams, Ruth is the first one in her home to express interest in Amateur Radio. Since earning her license, Ruth has had

every format open to her. A new member of the Straight Key Century Club, she is excited about her recent contact with a ham in Italy. She tries to get on the radio every day.

Ruth modestly says "There are so many things I enjoy about being a Ham. I love the

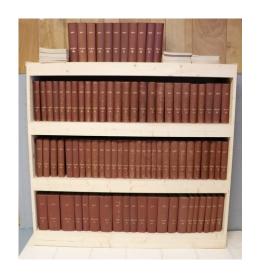




Ruth celebrated her 17<sup>th</sup> birthday this past month. When her mother asked her what kind of cake she would like, naturally, she requested a 'ham cake.' As you can see in the photo, her mother did a fine job replicating the equipment at Ruth's station.



# NFARL QST Library / Neil Foster, N4FN



Bill Hampton W4OO was helping the widow of Ted Levy W4TVN (SK) dispose of his huge ham radio collection. One of the items was a complete collection of bound volumes of QST magazine dating from 1920 to 1968. There are also a few issues of unbound QST's for 1972 through 1975.

Mrs. Levy has kindly donated this collection to NFARL. Nathan Wood, K4NHW built and donated a beautiful book case to house the collection and I have agreed to store and manage the books. These QST volumes are now part of the NFARL library and are available to be checked out by NFARL members. A record will be kept much like any library.

We are most grateful for Mrs. Levy's contribution. If you would like to check these volumes out of the NFARL library please email Neil Foster, <a href="mailto:n4fn@nfarl.org">n4fn@nfarl.org</a>.

## Morse Code Class for Kids / Pavel Anni, AC4PA

When Martha (W4MSA) asked me to help her in organizing Morse code class for kids during Stone Mountain hamfest last year, my immediate reaction was "Of course, I'll be glad to!". I like teaching, especially teaching kids. Only after I have committed to that, I asked myself: "Well, how exactly are you going to do that?" That was a good question and I had only a couple of weeks to prepare.

### The Keys

When I just started learning Morse code two years ago (well, re-learning, I did it the first time 35 years ago), I started with a straight key. I liked that feeling of a good rhythm and simplicity of straight key. Of course, I tried several of them before I found the one I liked. This is good, now I can scavenge the handful of them in my garage and pick one!



Next question is the oscillator. Of course, I have one which I built myself and which I like a lot. Nice clean sine wave tone, very pleasant to the ear. But I need five of them! Hmm, can I find enough parts and, most importantly, enough time to build them? Not sure... What are my other options?

Fry's Electronics to the rescue! A buzzer--that's what I need! It runs on 9 volts and costs just \$2.79! Add a battery, wire it to the key, and you are ready to practice!

#### The Plan

Next question: what are we going to learn? I'll have just about an hour, so we won't be able to learn the whole alphabet. Thanks to Jim W4QO we all know the magic word: ESTONIA! These are the letters you should learn first and you'll be amazed how many words you can send with just seven letters! (Did I tell you that I am half-Estonian myself?)

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Another idea I've got from CW Academy classes. They discovered that you learn Morse code much better when you focus on sending first. It sounds counterintuitive, but it works!

Armed with this knowledge, I prepared my plan. I will ask them to send ESTONIA letters and then we'll try to send short words. I will give them 2-letter words first, then 3-letter and 4-letter words made only from those 7 letters.

### The Class

And the plan worked perfectly! I had 10-12 kids in the class, all about 8 years old. I gave them worksheets with ESTONIA letters and their Morse code representation. I learned from CW gurus and I didn't use "." and "-"; I used "dits" and "dahs". So "A" would be "di-dah", not ". -".

Also I put some words and even phrases on my worksheets. There were words as simple as



"tea" and "in" and phrases as complex and dramatic as "Teen sees ant in tent. Eats it." or "Siesta. Sonata. Senses. Intonation." And yes, they sent them!

Even more, at the end of the 1-hour class they were able even to copy what I sent to them.

### **Some Thoughts**

I have taught kids Morse code several times. What always amazes me is their willingness to learn. At the last Maker Faire when we had a "Send your name in Morse code" booth we had a lot of scenes

like this: a grownup usually asks a lot of questions, like "Is it in use today? Is it difficult to learn?" How long did it take for you to learn?" Kids? No questions at all! Give me the instructions and I am sending already! It's a game and I'm happy to play!

I'm pretty sure we all can learn something from that experience. Learning new things is always fun, so don't stop yourself if you have an opportunity to learn! I am not saying learning Morse code is easy, but it's definitely doable and you will be glad you did it. We may cover more about reasons to learn CW in future issues of NFARL eNews.

## Whiskey Three Whiskey Lemur / Martha Muir, W4MSA

### Where is Wes Now?

Every Wednesday evening, young hams and young people interested in Amateur Radio have the opportunity to get on the air and talk with other young hams on the Youth Net, sponsored by NFARL and the Mill Springs Academy Amateur Radio Club. In order to encourage the participants to engage with each other and speak on the air, an open ended question or two is posed and answered in a round robin, controlled net format.

Participants in the February 3<sup>rd</sup> Youth Net had a special experience after many rounds of answering the evening's main question. The question asked by that week's Net Control Operator Ruth KM4LAO went like this: A very experienced ham likes to do DX, traveling to far off places and situations to set up radio equipment and make calls. Let's call this ham "Wes." Name an unusual place where you'd like see Wes setting up his station and making contacts.

Since students in Martha's ACE class had seen bits of a video from W3WL Wes' trip to New Amsterdam earlier in the day, they lit up the chat room with LOL comments about the 'coincidence' of talking about a DX-er named Wes. The students in the Net went to town with this question and came up with all kinds of suggested locations and situations for Wes' next DXpedition ranging from bottom of the ocean to Australia to tips of mountains and more. Round after round students came up with new suggestions for Wes' next adventure.

Eventually, a new ham broke in. Actually, he is far from a new ham. The new participant, after being recognized by Net Control Ruth, declared "This IS Wes, whiskey three whiskey lemur." Once again, the chat room lit up with comments of disbelief and excitement. Each participant was given the opportunity to say hello to the real Wes. Wes stated that he had been listening to the Net and greatly enjoyed hearing all the suggestions about where he should make his next DXpedition. He also told the students about a program that he works with that takes young hams on special DXpeditions all-expenses paid. He encouraged the students to apply for this opportunity when information about the next one, to Saba Island, becomes available.

Wes' surprise appearance on the Youth Net was a hit. The young hams loved to hear him on the air with them. Perhaps he has opened the door to guest appearances by other veteran hams on the Youth Net.

The Youth Net runs from 7 to 8 PM on Wednesdays on the 145.47 NF4GA Sweat Mountain Repeater. It is listed as one of the three nationwide Youth Nets on the ARRL Education website. Echolink participation is encouraged for folks who cannot pick up that signal on a radio. As mentioned above, the NFARL Do Drop In chat room runs concurrently with this net.

If you know any young people who might enjoy participating in this Net, please encourage and help them to join in.

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# Club Repeaters

Frequency—Description	P.L. Tone	Location
145.470 (-) EchoLink Node 56086 NF4GA-R	100 Hz	Sweat Mountain
147.060 (+) Primary ARES Repeater	100 Hz	Roswell Water Tower
224.620 (-) Joint Venture with MATPARC	100 Hz	Sweat Mountain
443.150 (+)	No Tone	Roswell Water Tower
444.475 (+)	100 Hz	Sweat Mountain
927.0125 (-)	146.2 Hz	Sweat Mountain

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