MARCH 2015

N4LNR

News & Views

P. O. Box 3276
Lenoir, NC 28645
http://N4LNR.ORG

Serving Amateur Radio
In Caldwell County

Save the Date!

Next LARC Meeting
March 12, 2015
Thursday, 7:00 PM
Gamewell Fire Dept
2806 Morganton Blvd SW,
Lenoir

LARC Weekly Net
Thursdays 9:00 PM
146.625 MHz Minus PL 94.8
Alt 147.330 MHz Plus PL 141.3

Caldwell ARES Net
Sundays 9:00 PM
147.330 MHz Plus PL 141.3

Go Kits
At March 12 Meeting!

We are slowly coming out of winter, a time filled with lots of opportunities to "grab our gear" and head out to support communications for weather emergencies. This winter almost needed our help—would we have been ready? Spring will offer renewed opportunities as rains and tornados whip our region—will we be ready?

Get your GO KIT in shape now as LARC offers a program at the March 12 meeting on building and using your "Go Kit." The meeting will be followed by a brief Caldwell ARES meeting to discuss how we communicate prior and during an emergency.

Updates on Club projects will also be discussed.
See You There!

President's Message

I have only been the Club President for a few months and while I am getting the hang of it a little at a time, it has been nice to be able to ask some of the former Presidents for advice on the direction the Club is heading. This got me to thinking about mentors. Mentors can come in many different forms in a person's life. Sometimes it comes from a special teacher who helped you along the way in school and other times it can come from a family member or a close friend. We all need mentors in our lives. People to help us as we reach forks in the road. Many people have influenced who I am but none more than my grandfather.

Growing up, I was in a special situation. Both of my parents worked and my grandmother worked at my elementary school. My sister and I would ride home with her and shortly after my grandfather would arrive home from work. We would both stay at their house until one of our parents picked us up. This allowed me to become very close to my grandfather. My grandfather was a tinkerer and someone who liked to come up with his own solutions. He always allowed me to tag along and "try to help him solve a problem" Most of the time I just got in his way. Never did he give up on a challenge and that instilled in me an attitude that I still have today. Even though he has passed, those attitudes help me as I come to decisions in my life.

How does this impact amateur radio you may be thinking? Most of us including myself all had someone help us into the hobby. For me it was a friend who persuaded me to study and take my Technician exam. They helped guide us into the place we are today. Without them, we would not have the level of interest or knowledge of the hobby and we would not enjoy it nearly as much. Some of those "Elmers" that helped you advance in the hobby may still be alive and some may have passed but the impact from the guidance that they gave will continue to help you along the way. With their help you have advanced faster than you could on your own.

My challenge is simple. Take some time to think back this month on the person or people who helped you get started into ham radio. If they are still around, give them a call and thank them for introducing you to a wonderful hobby. If not, then remember them and the impact they had on you. And most importantly, find someone who you can mentor and give back the same guidance and knowledge that they gave you. Become a mentor for someone new to the hobby and start the circle once again. You never know whom you may help become the next generation of amateur radio operators.

Tanner Greer KK4SZI

How Many Radials Is Enough?

I have seen a lot of articles about how many radials you should install for a vertical antenna and heard a lot of information and some misinformation about that subject. For those new to the hobby, a "Vertical" can be thought of as one-half of a dipole turned on its end just like the ones used for automobiles and the "radials" or "counterpoise" make up the other side of the dipole, except it acts as a ground or reflector of the main radiator for the RF energy to have something to 'push' against.

Some of the information I've found is based on ancient research conducted for commercial broadcasters, who have the space to install over 100 radials per antenna. Many of the articles I've seen draw on purely theoretical studies using antenna-modeling software, which also draws on the decades-old research just mentioned. Quite a lot of what we read is essentially anecdotal ("It works really well: I work loads of DX!"). Unfortunately few hams have been able to actually demonstrate what works in a typical amateur setting, or to answer very common yet basic questions such as:

- How many radials do I need?
- How long should they be?
- Should I lay them on the surface, bury them or elevate them?
- Do I need to lay them out symmetrically?

So, it was nice to find a proper scientific study of radials for vertical antennas by a respected amateur, Rudy Severns, N6LF. It's obvious from Rudy's excellent articles in QEX magazine that he knows what he is talking about. His articles are carefully researched both in his professional and amateur literature. He then designs and painstakingly conducts controlled experiments to test his theories against practice.

Here are some of Rudy's key conclusions from a series of 7 articles:

- Try to use at least 16 radials on or below the ground, or at least four radials if elevated.
- If you don't have the space for radials, lay down a larger number of shorter ones.
- The shorter your antenna, or the poorer your soil, the more you'll need to have a good grounding system.
- A surface or above-surface radial grounding system will affect the resonant frequency and you may have to adjust the height of your vertical element for that.

Aside from the earth system, work hard at making the antenna itself more efficient. In other words, use high-Q loading coils, use top loading to minimize the size and inefficiency of the loading coils, minimize conductor loss and so on.

Note that '16' is not a magic number for on-ground radials. His experimental data indicates Marginal improvements with more radials but rapidly diminishing returns probably make the effort pointless. He suggests we are probably better off optimizing other parts of the system than the radials. Unless you are absolutely desperate to squeeze the last tenth of a dB out of your antenna, there is no practical value in going beyond about 32 radials. Note that if you use too few on-earth radials (e.g. just 4), their lengths become critical --they become resonating. This leads to the counterintuitive finding that reducing their lengths to hit resonance may actually improve their efficiency!

Rudy conducted experiments simulating installations where there was no room for radials right around the base of a vertical. These experiments indicated that symmetry is fairly important. Efficiency is slightly reduced if one quarter of the circle is empty, and losses mount to as much as 3 dB if you can only lay radials in a semicircle. However, it does help to substitute the missing radials with *more* shorter ones in the directions that you can lay radials.

His experiments also showed that numerous other factors affect the effectiveness of the radials, including for example the soil conductivity, which varies with geology, moisture levels and band. Unless you can measure and control these factors, theoretical calculations from antenna modeling such as reported in so many articles may not hold true in real installations. That's why we need careful experimental studies like Rudy's.

Please consider that if you live in an antenna-restricted residence or have very little yard space - an antenna compromise is better than no antenna at all.

Article by ***Stan, K4SBZ*** K4SBZ.Stan@Gmail.com

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Topics of Interest

Have an idea you would like to share with your fellow hams? Interested in one of the new exotic digital modes and would like to get others interested in it too? Found a blog somewhere that you think others would find interesting?

All those receiving this Newsletter are encouraged to submit items of interest for publication. Send to hrmaddox@nettally.com . The Newsletter editor reserves the right to determine which items will be included in *News & Views* and to edit for content and grammar. The deadline for publication is the 28th of the Month. The Newsletter will be distributed at least one week prior to the next LARC meeting.

Pictures, too. If you've taken pictures at an event and would like to submit them for possible inclusion in the newsletter, forward them to the newsletter editor. Please send action shots, if possible. Faces are often preferable over the backs of heads.

Trailer Work Advances

February was cold but the "hammers" were busy inside James N4NIN's heated garage! The front lower cabinet and the wall cabinets were framed and primed. The cabinet doors were sanded and primed. Future workdays will include sanding, painting of cabinets, building the back cabinet, hanging cabinet doors, putting Formica on work table, flooring, baseboards and heater.

Be a part of the progress join the "hammers" on the scheduled workdays! Help is always appreciated.

FRS/GMRS Training
Caldwell County CERT Teams

By Tom Land KA4HKK

On February 7, LARC members Tom KA4HKK, Josh N4JDE and Irv W4IWK conducted a training class for members of Caldwell County CERT Teams. The training was held at the Caldwell County Emergency Operations Center.

This training had its origin in the first CERT class taught in Caldwell County years ago – LARC being the first group to be trained as a CERT Team. At the first CERT class, attendees receive a backpack with stuffed with items such as gauze, tape, hardhat, flashlight AND a GMRS radio. Recently, members of Caldwell CERT Teams asked for additional training on use of the GMRS radios since they had used these radios in earlier search and rescue training.

Tom reviewed the FCC rules pertaining to the GMRS Radio System and explained the difference between that service and the FRS service. He explained the fact that a license was needed to operate in the GMRS service and the difference in power allowed and available with the radios. After that, Josh and Tom helped others program their radios so that everyone was on the same channel using the same PL tone (FRS radio service). They also demonstrated the difference of using the PL tone and not using it, explaining that the term privacy tone doesn't mean the transmission is private. Teams spread out around the HHS building and outside as well as one person driving into Lenoir and back to demonstrate the range of the radios. With the help of the CARES radio in the EOC Radio Room set to the FRS frequency, transmissions were could reach 2 miles.

Next Tom handed out the ICS 214 radio log, a net procedure and some messages that would be used during an emergency, requesting assistance, supplies, and information, etc. Josh and Tom stayed in the room where the class was being presented while the others went to other rooms in groups of 2 to 4 CERT team members. Tom explained how to check into a Net using the first letter in their last name and an assigned tactical callsign, i.e. CERT team 1, 2, 3, 4. Josh logged while Tom called the Net. Although this was a serious training event some humor was injected into the Net, which produced chuckles from the other rooms.

The response from the CERT members was positive. Everyone learned more about their radios, including the trainers. Tom prepared an ICS 205, which will be the starting point and reference for further radio activity using the FRS Radio Service.

Tom also brought up the idea that hams could be deployed with the CERT team to provide communications for them. It may be a good idea to have GMRS/FRS radio, along with other radio services on board the LARC Communications Trailer and Antenna Trailer.

Foothills Community Workshop
Learn - Teach - Make

License Classes Offered

Foothills Community Workshop will be offering a Technician license preparation class on three consecutive Sundays, March 1, 8, and 15 from 2:00 until 4:00 PM. VE exams will be on Saturday, March 21 at Noon. All levels will be tested and the class does not have to be taken in order to take the exams. The exam fee is $10. The class is free. Both are open to the public.

Interested parties can check the FCW webpage http://foothillscommunityworkshop.org or contact Michelle at michellesuddreth@bellsouth.net or 828-754-5002 for more information.

Carl's Quiz

By Carl Hayes NN5I

Question:

Many a ham uses an **Antenna Tuner** Between a transceiver (or an amplifier) and the feedline. Some of us know that this device doesn't really "tune" the antenna. Few hams know what it actually does.

*What does an **Antenna Tuner** actually do?*

Answer:

Briefly, an antenna tuner intercepts power reflected back down the feedline by a mismatched antenna, and reflects it back up the feedline, returning it to the antenna for another try.

Consider a 100-watt 50Ω transmitter, connected with a 50Ω feedline to a 50Ω antenna. Everything is perfectly matched. One hundred watts come out of the transmitter, go into the feedline, and are radiated by the antenna. This system will have an SWR (Standing Wave Ratio) of 1.0 to 1.0 everywhere. Let's assume the feedline is perfect and has no losses. Now replace that antenna by a folded dipole whose impedance is about 300Ω. The SWR is now about 6:1! The antenna radiates just half the power, or 50 watts, and reflects the other 50 watts back down the feedline. These 50 watts will re-enter the transmitter.

So what? Well, let's assume that that transmitter is 80% efficient. It takes 125 watts from its power supply, puts out 100 watts of RF signal, and dissipates the other 25 watts as heat. Its designer will have provided enough cooling (heat sinks and fans) to handle those 25 wasted watts. Now, add 50 watts of reflected power that the amplifier must also get ridof, and the cooling load on the amplifier is trebled! The final stages either composed of vacuum tubes or power transistors may burn up, a common failure in transmitters. Modern transmitters include "fold-back" circuitry to mitigate reflected power and overheating of the final stages by reducing the amount of outputted power, but this often results in a diminished signal leaving the antenna system.

What to do? We could improve the antenna system, but it's easier to do on paper than in real life where even the proximity to the earth-ground and nearby objects can affect performance. It's simply easier to use an Antenna Tuner. The tuner will intercept and *re-reflect* that reflected power, sending it back up toward the antenna. Now there's 150 watts going up the feedline even though the transmitter puts out only 100 watts.

The antenna is radiating half the original power, and half the *re-reflected* power. Of the *re-reflected* 50 watts, the antenna will radiate 25 and reflect the other 25 back down the feedline. The tuner will send it back up. Now there's 175 watts going up the feedline!

After enough round trips, there will be 200 watts going up the feedline; and the mismatched antenna will be radiating 100 watts, which is what the transmitter puts out. Put a wattmeter in the line (between the tuner and the feedline) – and sure enough – it will show 200 watts going up and 100 watts coming back. This may have been surprising in the past, but now you understand it. The "extra" 100 watts has been making multiple round trips up and down the feedline.

Notice that some of the power is delayed by its extra travels. If the feedline is really long, this may actually be noticeable in the transmitted signal and is an example of "ringing." This also explains why, with a lossy feedline that loses some power as heat, the losses increase disastrously with a higher SWR. Much of the power goes up and down multiple times, with losses each way. That's why an antenna tuner, though it saves the transmitter, isn't as good as an antenna that's *properly matched to the feedline*. It also explains why a feedline that's perfectly adequate with a well-matched antenna may fail with a mismatched one.

Imagine: If the mismatch were so bad (SWR=100:1) that the antenna radiated only 4% of the power that reached it, there would be 2500 watts going up and 2400 watts coming back. Common amateur feedlines can't handle 4900 watts. Fortunately, amateur tuners can't handle an SWR of 100:1 either!

Carl Hayes, NN5I nn5i@arrl.net

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Program Follow Up: At the February meeting, Rusty Jones K4SAA gave tips on Contesting and DXing. Recently, the first DXpedition to Navassa Island in 30 years gave a grand opportunity for logbooks. A very interesting Q & A concerning working K1N can be found at http://www.mdxc.org/k1n-interview-for-mdxc-by-w0gj/#more-6209 . Item 3 is a must read for all contesters or DXers!

Time to renew your LARC membership.
See Phil KG4BCC to pay your dues.

From The February Meeting

Attendees. Tanner KK4SZI, Josh N4JDE, Susan N4OJN, James N4NIN, Ro K4HRM, Scott KC4SWL, Will WB4Y, Michelle KD4YTU, David K3DW, Gary Schwartz K30S (Guest), Benson Wills NE4W, Angie Barlow (Guest), Rusty Jones K4SAA (Program Presenter).
Program: Rusty Jones K4SAA provided a "how to" introduction to Contesting and DXing. He explained his equipment and operating setup as well as provided information about popular contests and websites.
Membership. Reminder dues should be paid by March 1. Application for membership for Gary Schwartz K30S was approved. An application for membership for Benson Wills NE4W was received after adjournment and will be voted at the March meeting.
Communications Trailer. Lighting installed, worktable constructed and front cabinet framed.
Antenna Trailer. Storage boxes received.
Repeater. Phil KG4BCC is working on scheduling completion of tower work.
Storage for Trailers. Continuing to search for a place to store both trailers undercover.
Public Service. Technician License classes on March 1, 8 and 15 at Foothills Community Workshop. Hibriten Hill Run scheduled for April 18. Cycle To Serve event is expecting to have LARC communications support.
Donation. David K3DW discussed donation for communications trailers.
Friday Breakfast. Anyone interested in informal radio talk, join the LARC group for breakfast each Friday morning at 7:00 AM at the Subway, 845 Blowing Rock Blvd, Lenoir.
Next Meeting Program. Go Kits

2014 World Radio Team Competition: James Brooks 9V1YC has produced a professional documentary on the 2014 WRTC which can be seen at https://vimeo.com/119947598?ref=tw-share.

Places to be…People to see…
Mark Your Calendar

March 13-14: The **Charlotte Hamfest/North Carolina Section Convention**, Mecklenburg Amateur Radio Society, Concord, NC, see http://www.charlottehamfest.org

March 28: 25th Annual **Down East Hamfest**, Down East Hamfest Association Inc., Kinston, NC, email: bhighland@nc.rr.com

April 4: 43rd Annual **RARSfest/North Carolina State Convention**, Raleigh Amateur Radio Society, Raleigh, NC, see http://www.rars.org/rarsfest

April 9: VIPER Radio Training for CERT members, 6 pm til 8 pm, Caldwell EOC. The April LARC meeting will follow VIPER training at the EOC.

April 10: If you are in the AUXCOMM database (completed ICS 100, 200, 700 and 800) you are invited to attend the **Command Rally** in Greensboro on Friday, April 10. If you want to attend, register at **www.nccommandrally.com** let Tom KA4HKK know.

April 18: 18th Annual **Catawba Valley Hamfest**, McDowell Amateur Radio Association, Morganton, NC, see http://cvhamfest.com LARC is a sponsor of this event. Tom KA4HKK is asking for volunteers to work the LARC booth.

June 13: Winston-Salem Hamfest, Forsyth Amateur Radio Club, Winston-Salem, NC, see http://www.w4nc.com

June 13: NC CERT 2015 Conference. Information now available at press time.

July 11: 30th Annual **Firecracker Hamfest**, Rowan Amateur Radio Society, Salisbury, NC, see http://www.rowanars.org

July 18: Mid-Summer SWAPFEST, Cary Amateur Radio Club, Cary, NC, see http://www.qsl.net/n4nc

July 25: WCARS Hamfest 2015, Western Carolina Amateur Radio Society, Waynesville, NC, see http://wcars.org

September 5-6: 59th Annual **Shelby Hamfest/Roanoke Division Convention**, Shelby Amateur Radio Club, Shelby, NC, see http://shelbyhamfest.org

The LARC President is asking you for ideas and interests that YOU want to talk about and/or see hands-on demonstrations at future Club meetings. Nothing is off the table, so send your thoughts directly to the top – tannergreer@bellsouth.net

LARC 2015 Officers

Tanner Greer
President
KK4SZI

Tom Land
Vice President
KA4HKK

Josh Edwards
Secretary
NAJDE

Phil Crump
Treasurer
KG4BCC

Editor for a Final

Recently on a cold snowy day, I decided to upgrade and organize my "radio shack." Now when I first started radio, my "shack" was a TV tray with a dual band UHF/VHF and an HF transceiver with power supplies, and boom mic. I later graduated to a desk with lots of room for computer and digital junk. But, now my "shack" has a room of it's own. So I wanted to make it a show place. Well, easy said, but have you every heard of "design overload." I had so many ideas that I was paralyzed to do anything. Where to put the HF, the DMR, the VHF, the UHF, the 3 computers, the mics, the HTs, all that wire, the wall charts. Never mind, the color of the upholstery of my chair and how to organize all the operating manuals, equipment files, the pieces parts, etc. And I thought figuring out how many radials to put down for the vertical antenna was a problem. Well, you guessed it; there will be a future article on the "modernization of my radio shack," that is, if I ever figure out that "ideal" setup.

Send comments concerning the LARC NEWSLETTER
to hrmaddox@nettally.com
Suggestions and your articles are appreciated.
To Unscribe from the Newsletter, send an email to this address.