January 2009 Volume 1-2009

Nacogdoches Amateur Radio Club

Pres: Lon Glaze – AE5BN

VP: Tom Atchison – W5TV

Sec/Treas: Army Curtis - AE5P

MISSION STATEMENT

The Mission of the Nacogdoches Amateur Radio Club is to support and promote Amateur Radio by public service, offering training to unlicensed interested parties and licensed amateurs, mutual support of other amateurs, engaging events that promote amateur radio to the general public and other amateur radio operators, and continuing fellowship by regularly scheduled organized meetings and events.

JANUARY MINUTES

The January meeting of the Nacogdoches Amateur Radio Club (NARC) was held as scheduled on January 7th. Thirty members and three guests were present. **President Lon, AE5BN**, opened the meeting at 7:00 p.m. in the Parish Hall of Christ Episcopal Church. Each person present introduced himself. Minutes of the previous meeting were approved as published. An abbreviated Treasurer's report was read.

Marshall, K5QE, reported working Hawaii, his 50th state on 2 meters. Congratulations!

The January ARRL VHF contest was discussed. Quite a few members went out as rovers this time, many for the first time, and although conditions were horrible, all reported having had a fun time.

The Shuttle Columbia Special Event Station operation is scheduled for Saturday, February 7 at McMichael Middle School. The day will begin with breakfast at IHOP at 7:00 followed by antenna raising at 8:00. K5QE will bring a 756, computers will be by KC5MIB and N5AIU. All are urged to participate.

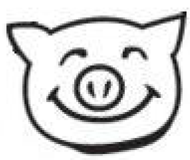
Meeting was closed at 7:35 p.m.

Show and Tell:
K5ME presented a graph of solar flux that indicates we may be on the upswing again (finally).

KC5MIB showed off a new Heil Heritage Microphone.

AE5P showed off a new Samsung Netbook computer.

Program this evening was a Question and Answer session.



HAMMING IT UP

CQ, CQ, CQ, this is Alpha Echo Five Bravo November/ Rover, Echo Mike Two One. Woo, did we have a time during the January VHF Contest. This was the first time I had ever been out that I had to work part of the contest by myself. John N5AIU was not able to go with me on Saturday. I was not able to find a temporary replacement for him. We had thankfully made some changes to the Red Rover that allowed us to use both radios from the front seat. This was also the first time I had ever used the computer to log while in the truck. I had also borrowed a GPS unit from Andy KE5EXX that allowed the computer to keep up with our location. I will say that I had my hands full Saturday. I was pretty busy. I was logging and making contacts at the same time. If John is ever unable to go again I will have to make sure that, I at the very least find me someone to chauffeur me around. Logging and talking is pretty hard. Driving is impossible on top of that. Thankfully, Army AE5P had come up with a pecking order of who would call and in what order. This allowed me to know who was going to be calling me and whom I was going to call. That allowed me to make changes to the log as I was being called or calling. I am sure glad he came up with it. We were down in the Beaumont area quite awhile but at least we were making contacts. We were in that area about the same amount of time in the contest before and only had a few contacts. One of the biggest things that drove the score so high was being able to work the family rovers; Army AE5P/ Pat NH6VJ with eight bands and Dustin KE5CLR/ Amanda KE5CLQ with six bands. Also running with our group was W5GSW Stuart who teamed up with K5JLW Jerry who had 3 bands plus 222FM. KE5JER B.B. who teamed up with K5WSS Will who also had 3 bands plus 222FM. We also had Bob KE5VIM with his wife KE5VIO Joanne who had 3 bands. All of the first time Rovers did a tremendous job and deserve a pat on the back. Thanks guys and girls.

There were some miscues, but I would have to say that it was a 100% improvement over how we worked together last contest. I do the think that the band conditions were horrible. At times we had trouble reaching Marshall K5QE when it would normally have been a shoe in. Not sure what was going on. I only managed three contacts outside of Marshall or the other Rovers. I had two contacts with K5GZR in EM20 from EM21 and EM22 and one contact with AA5SE in EL29 from EM21. All three of those were on 2m. I was hoping for some longer range on 2m but it just wasn't going to happen. I ended the weekend with 540 contacts and a total of 129,184 points. Quite well considering the awful conditions. Thanks to all that went out and to all that worked so hard to make it all happen.

Make sure you have your calendar clear for the Columbia SES coming up Saturday, Feb. 7 from 9 a.m. to 3 p.m. at McMichael Middle School, 4330 SE Stallings Dr, Nacogdoches, TX.

See you all at the meeting.

73, this is AE5BN/R EM21… I mean AE5BN Lon.

73 de AE5BN Lon

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VP's CORNER

Here we are getting ready for the NARC meeting on Wednesday, February 4. The program will include a presentation by Mark, W5TXR, concerning 'Effective Sensitivity'. We will also put the final touches on planning our Special Event Station operation on Saturday, February 7. Remember this event will be on the campus of McMichael Middle School on SE Stallings Drive. For those who are able, we will meet at IHOP for breakfast at 7:00 a.m. on February 7. After that we will proceed to the McMichael campus to put up some antennas and begin our operation. It is a lot of fun to visit with others and do some 'ragchewing' on the radios.

Finally, if you have any 'Show and Tell' matters, please bring them to the meeting on February 4. It is always exciting to hear what people have that is new and/or different.

See you at the meeting.
73, Tom W5TV

VE TESTING

Our next VE testing is scheduled for Wednesday, February 18th at 7:00 p.m. in the Parish Hall of Christ Episcopal Church. Applicants should bring a picture ID, the original and a copy of their current Amateur license, the original of any CSCE's and $15 to cover the cost of the exam(s). Correct change is always very much appreciated. Please note the slight increase in the cost of the exams.

73 de AE5P

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CLUB NETS

Remember to join us each week for the 2-meter nets sponsored by NARC. Each MONDAY is the NARC ARES/RACES net, at 8:00 p.m. on the club's 146.84 repeater (PL 141.3). Second, on THURSDAY evenings at 8:00 p.m. is the Deep East Texas Skywarn Net on the 147.32 repeater (PL 141.3). Please join us for one or both.

NEXT MEETING

The next meeting will be on Wednesday February 4th at 7:00 p.m. in the Parish Hall of Christ Episcopal Church. The church is at the corner of Starr and Mound Streets in Nacogdoches. If you have items for show and tell, please bring them. Hope to see y'all there.

Basic Antennas
Part Four
By Thomas Atchison

When we put RF power into an antenna there are two parts to the resistance (or impedance). One is the radiation resistance and the other we will call ohmic resistance. The power used up in radiation resistance is the power that is radiated from the antenna into space. This is the useful part of the resistance. The ohmic resistance is related mostly to the wire used to construct the antenna and any insulation associated with that wire. Power dissipated in ohmic resistance is turned into heat so it isn't useful.

We want the radiation resistance to be much larger than the ohmic resistance so the ratio of radiation resistance to ohmic resistance becomes important. We would like this ratio to be as large as possible. As we measure total resistance at different points along an antenna we may measure different values, however, the ratio of radiation resistance to ohmic resistance does not change. This may lead you to believe that the actual value of resistance in not important. This is true for the antenna, but we have to put the RF power into the antenna in some way. This is where the actual impedance of the antenna is important. The impedance of the antenna is important when we think of the transfer of RF power from the transmitter to the antenna. We normally want to locate our antenna outside and as high as possible. This means we need some conductor to transfer the RF power to the antenna. The conductor we use to transfer power from the transmitter to the antenna is called the transmission line.

Transmission lines are used to distribute electricity to your home. The frequency in this case is 60 Hz. Power at this frequency has a very long wavelength; therefore, the time it takes for power to reach your home is short relative to the length of one wavelength. This means that the standing-wave effects we discussed earlier can be neglected. On the other hand, if we have a signal at the transmitter of 7 MHz. and we want to send it to an antenna that is 100 feet away, the time it takes for the power to travel 100 feet is not negligible compared to the duration of one wavelength. What is happening at one end of the transmission line may be different from what is happening at the other end.

One way of dealing with the above concept is to consider an ideal infinite transmission line. This line consists of two conductors, side by side and close together, extending on to infinity. If an RF voltage is applied to the input of such a line, one terminal will be negative when the other is positive and vice versa. This causes current to flow in one direction in one wire and in the other direction in the other wire. Of course these directions periodically change at a rate that depends on the frequency of the alternating voltage. Because the currents are flowing in opposite directions, the electromagnetic fields set up by them are also opposite. This means the fields will cancel each other (almost). Since this occurs, there is no radiation from the infinite transmission line. All the energy that is input into the line will be transmitted along the line with no energy returning.

If we know how much voltage is placed across the above line, can we calculate the current in the line? To answer this question we use Ohm's law, I = E / Z, where E is the voltage, Z is the impedance, and I is the current. Because of Ohm's law, if we knew the impedance, Z, we could calculate the current I. The impedance we are talking about is called the characteristic impedance of the line and it does not depend on the resistance of the wire in the line. This characteristic impedance is a function of the inductance and capacitance per unit length of the line. This impedance is determined by the line's L/C ratio, where L is the inductance per unit length and C in the capacitance per unit length. These depend on the diameter of the conductors and the spacing between them. Two common values for the characteristic impedance of parallel conductor lines are 300 ohms and 450 ohms.

We now ask what this characteristic impedance of a transmission line has to do with our antenna? We will take up this topic in our next installment.

EFFECTIVE SENSITIVITY IS EVERYTHING!

By: Mark A. Lacy – W5TXR

Is your base, mobile or repeater performing under actual operating conditions? Unless you check the receiver sensitivity under real operating conditions, you are not getting the real picture. Antenna noise, duplexer mistuning and other on-site problems can cause the actual sensitivity to be far worse than the on-bench sensitivity figure stated in the service manual specifications. Here is how to determine just how well your repeater is performing under real-life conditions.

The "isotee" Is required in order to perform the necessary tests and measurements; Perhaps one of your ham club members owns one. Or an isotee could be barrowed from your local Motorola Two-Way radio shop. The isotee connector provides a high degree of isolation between the through-line portion and the coupled port. It can be used for coupling in either direction. That is, it can be used to couple a signal into a transmission line from a signal source or to couple a sample of the signal from the transmission line into a measuring instrument such as a spectrum analyzer, frequency counter, deviation meter or other device. A real isotee has an adjustable decoupler. Home brew isotees are usually made from a standard 'tee' connector. These are not very reliable. Usually some type of adjustable decoupling is required during the test.

To make a home brew isotee, The center pin of the male portion of the UHF tee connector is removed by unscrewing it from the connector. The pin is then cut with a hacksaw. Next, a slot is made into the end of the pin so that a screwdriver can be used to reinsert the pin into the connector. The slot can be cut with the hacksaw blade as well. Once the pin is reinserted into the connector, screw the connector onto a barrel or straight-through connector. This will leave you with a connector with three UHF female ports.

The barrel will be the isolated, or coupled, port. Make sure that no dc continuity exists between the isolated port and the other ports. If dc continuity exists, the pin is too long, and it should be removed and cut again to a length that will prohibit direct contact between the barrel connector and the modified tee connector.

The isolated port of the isotee connector will be isolated by about 20dB-50dB from the through-line portion of the connector. Increase the generator signal level to produce 20dB quieting at the receiver audio output. Record the signal generator level in uV or dBm. Which ever you use whether it be uV or dBm keep it the same throughout the test. I prefer the 20dB quieting method vs. the 12dB SINAD method, however either can be used. Now, subtract the normal receiver sensitivity from the generator level required through the isotee. The result is the amount of isolation provided by the isotee connector. For example, if the normal receiver sensitivity is -119dBm, and the signal level required to produce 20db quieting through the isotee was -85dBm, then the isolation of the isotee is:

-85 - (-119) = -85 + 119 = 34dB

Be aware that the amount of isolation provided is frequency-sensitive. Thus, the isolation test should be conducted at the frequency at which you are going to be testing.

The isotee can operate in the presence of RF power and still provide enough isolation to protect sensitive devices such as signal generators from overload. Check to make sure that the instrument you are using will not be overloaded by excessive RF coming through the isolated port of the isotee. Suppose that the output of a repeater is 100W (50dBm) and that the isotee provides 35dB of isolation. This means that the RF level getting into the attenuator pad is 50 - 35 = 15dBm. Be sure that the signal generator or pad can handle this power level. If not, you must provide more isolation.

Checking repeater performance there are several things that must be known in order to determine just how well a repeater is performing and how much degradation is caused by an external problem and how much by an internal problem. The external problem would be the site noise coming in through the antenna. The internal problem would be duplexer tuning and transmitter and/or receiver performance.

First, we need to know the receiver's bench sensitivity figure for 20dB quieting. This is the basic starting point. It is easier to work with dBm than microvolts in this case. Let's suppose that the receiver has a 20dB quieting sensitivity of -119dBm. This will serve as our basic reference point. Let's call this reference level #1.

Next, we want to know how much insertion loss the receiver side of the duplexer is causing. Use the setup in Figure 2 on page 8 to determine the amount of insertion loss in the receiver leg of the duplexer. Adjust the signal generator to produce 20dB quieting again at the receiver output. Let's call this reference level #2. Subtract reference level #2 from reference level #1 to get the duplexer insertion loss. Suppose that reference level #2 is -117dBm. Subtracting this from reference level #1 (-119dBm) yields

-119 - (-117) = -2dB

This is the insertion loss of the duplexer in the receiver leg. Make certain that the transmitter is either not activated during this test or that the transmitter output is directed into a dummy load.

The next piece of information needed is the effective site sensitivity of the receiver. Next, the antenna is replaced with a 50V dummy load. The signal generator is adjusted to produce 20dB quieting at the receiver output and the signal generator level is noted as reference #3. Next, in Figure 4 on page 50, the antenna is connected, and the signal generator is readjusted to produce 20dB quieting at the receiver output. The level is noted as reference level #4, and the difference between reference levels #3 and #4 is the site noise degradation of the receiver sensitivity. (Again, the transmitter is disabled for this test.)

Finally, the transmitter is reconnected or enabled, and with the repeater operating normal, the signal generator level is again adjusted to produce 20dB quieting at the receiver output. The level is noted and recorded as reference level #5. The difference between reference levels #5 and #4 is the amount of degradation caused by the transmitter.

If the degradation is several decibels, then the duplexer might need retuning, or there might be a problem with a connection in the antenna line or antenna that is creating excessive noise that is transferred back into the receiver input.

Effective net system sensitivity The bottom line to all of this is the effective "net" system sensitivity--that is, the system sensitivity in the fully operational mode. The effective net system sensitivity takes into account many factors including site noise, transmitter noise, changing of the impedance in the antenna line due to moisture/water, receiver desense, duplexer tuning (In the case of a repeater) and antenna/connector noise. Since the transmitter and receiver must operate at the same time (duplex) then the only way to truly test the "system" sensitivity is in the full duplex mode.

Watch for intermittent changes in sensitivity when connected to the system antenna.

It is important to note here that the attenuation of the signal generator padding must be taken into account in the measurements. It is also important to note that the cable connecting the isotee and the straight tee connectors should be half-wavelength. If quarter-wavelength cable were to be used, the open circuit at the isotee might be reflected back to the regular tee as a short circuit.