August 2019 Volume 08-2019

Nacogdoches Amateur Radio Club

2019 CLUB OFFICERS

Pres: Jack York – KG5POU

Vice Pres: Bill Rascher – KT5TE

Sec/Treas: Army Curtis - AE5P

Visit our web site at

http://w5nac.com/

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 and having fun.

JULY MINUTES

The July meeting of the Nacogdoches Amateur Radio Club (NARC) was held as scheduled on July 3rd. **President Jack KG5POU** opened the meeting at 7:00 p.m. in the Lunch Room of Christ Episcopal School. Fifteen members and eight guests were present. Each person present introduced them self. Minutes of the previous meeting were approved as published. The Treasurer's report was read.

Andy KE5EXX made comments on Field Day. He will present the program this evening with more detailed information.

Army AE5P gave a report on the upcoming ARRL VHF contest. Several club members are planning to participate as rovers.

Army AE5P passed around a nominating petition on behalf of our current West Gulf Division Director **John Robert Stratton, K5AUS**. John is running for reelection and club members were urged by Army to support him.

Reminder that the annual 13 Colonies Special Event is occurring this week.

The monthly book raffle was won by **Bob K5ME**. The book for July was

Volume 3 of ARRL's "Hands On Radio Experiments".

Meeting closed at 7:25 p.m. Tonight being our annual Ice Cream Social, all present enjoyed their fill of ice cream and other goodies.

Program:

Andy KE5EXX presented a program on the club's Field Day event. A total of 37 people participated. We had a total of 208 phone contacts, 74 CW, 107 digital, and 28 Winlink messages passed for a total of 1140 points. This coupled with 1250 bonus points gave us a final score of 2,390 points.

Congratulations to Andy and all participants for a great Field Day.

FROM THE PRESIDENT

Regulations and Licenses - PART 4

Since radio equipment has the potential to interfere with other radio transmissions, operators must learn some information about radio, how it works, and the regulations governing amateur radio. There used to be six license classes in the US, but that has more recently been reduced to three: Technician, General, and Extra. Each subsequent class requires more knowledge and grants further privileges with regards to permitted transmission bands.

Ham operators abide by various rules of conduct such as refraining from strong language and keeping personal disputes off the air. They are required to identify themselves by their call sign periodically when they transmit; there is a public database of call signs that can be searched for basic information about any licensee. The combination of a strong code of ethics and personally identifiable transmissions helps to keep amateur transmissions civil.

Call Signs

Each licensee is assigned a call sign. Call signs are made up of three parts and look something like this: ZS1NAT. The structure of the call sign was prescribed by an international committee and allows for localized assignment of unique IDs. The prefix of the call sign, usually composed of two or three letters and numbers, define the operator's country of origin, and often a specific region within the country. The suffix of the call sign, usually 1-3 letters, is uniquely assigned to the licensee.

Going back to our example, ZS1NAT, we can tell that the license was issued in South Africa ("ZS"). The "1" indicates the Western Cape. Finally, "NAT" is the

unique suffix identifying the license holder.

Reprinted from an article by W2AEW found at https://www.tek.com/blog/ham-radio-facts

73 de Jack York

KG5POU

gtjakco@yahoo.com

FROM THE VP CHAIR

Life is very busy on the farm right now, so no article this month. One has been promised for next month, so check back.

73, Bill KT5TE

bill@watershipfarm.com

NOTES FROM OUR EC

(24 July 2019) The "cold front" is upon us, if you call 89 degrees a cold front. The forecast lows are in the mid 60's to low 70's. Should make for much more tolerable.

Yep, Summer 2019 has moved in with a vengeance, still 2 months left in the season. The air conditioners are working overtime. Typical heat indexes over 100 and the nights aren't really cooling things off. Temperatures like these can lead to heat cramps, heat exhaustion and heat stroke. I won't go into symptoms. You can find all of that on the web.

How prepared are you for going out in the heat even into the back yard? Lots of water, electrolyte drinks, sorry sugary drinks or diet drinks like diet sodas are not part of this equation. Do you have plenty of the above if you have to go to a deployed site?

The 2019 Hurricane season has been quiet in July. Hurricane Barry was short lived. Fortunately it stayed well east of the Sabine River. There was another tropical along the Florida Atlantic coast that fizzled pretty quickly. Finally there was one more again, just south of New Orleans that is not forecast to do much of anything. Maybe August will be as quiet
Don't forget our Monday and Thursday nets.

73 de John Chapman KC5MIB

jlchapman2@juno.com

VE TESTING

Our next VE testing is scheduled for **Wednesday August 21 at 7:00 p.m.** in the Lunch Room of Christ Episcopal Church School.

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. 73 de AE5P

email: ae5p@arrl.net

NEW HAMS

At our VE testing session July 17, we had one applicant. We are pleased to report that John Edens KC5WNM from Cushing upgraded from Tech to Extra. Congratulations John.

TWO METER CLUB NETS

Remember to join us each week for the two 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 Emergency Weather Net** on the 147.32 repeater (PL 141.3). Please join us for one or both.

NEXT MEETING

The next meeting will be **Wednesday August 7th at 7:00 p.m.** in the Lunch Room of Christ Episcopal Church School. A program is planned with a demonstration of the new FT4 digital mode.

BOOK RAFFLE

Each month, we give away a current book on a topic of interest to Amateur Radio operators. Everyone present at the meeting will receive one ticket. Additional tickets can be purchased at $1 per ticket, or 6 tickets for $5. A ticket will be drawn at the end of the meeting for the book of the month.

The book for August will be "ARRL's Best of the Doctor is In". You must be present at the meeting to win.

UPCOMING EVENTS OF NOTE

Mark your calendars for the following events coming up in the next few months. Full information on these events and much more can be found at http://www.hornucopia.com/contestcal/contestcal.html

Note that all dates shown here are local, CST dates while all contest logging uses UTC dates and times.

NAQP CW
August 3-4, 2019
http://www.ncjweb.com/NAQP-Rules.pdf

Shreveport Hamfest
August 10, 2019
http://shreveporthamfest.k5sar.com/

NAQP SSB
August 17-18, 2019
http://www.ncjweb.com/NAQP-Rules.pdf

ARRL ROOKIE ROUNDUP RTTY
August 18, 2019
http://www.arrl.org/rookie-roundup

ARRL SEPT VHF
September 14-16, 2019
http://www.arrl.org/september-vhf

TEXAS QSO PARTY
Sept 14-15, 2019
http://www.txqp.net/

CQ WW RTTY
Sept 28-29
http://www.cqwwrtty.com/

CQ WW SSB
Oct 26-27, 2019
https://www.cqww.com/rules.htm

ARRL SWEEPSTAKES CW
Nov 2-4, 2019
http://www.arrl.org/sweepstakes

ARRL SWEEPSTAKES SSB
Nov 16-18, 2019
http://www.arrl.org/sweepstakes

AMPLIFIER SUMMARY

by

Thomas Atchison W5TV

We have been discussing small signal amplifiers. They have three main properties, input impedance, output impedance and gain. Recall that we described the gain as the output divided by the input. Thus, voltage gain is represented by G_V and is given by

$$G_V = \frac{V_{output}}{V_{input}}.$$

Similarly, current gain, G_I, is

$$G_I = \frac{I_{output}}{I_{input}}$$

and power gain, G_P, is

$$G_P = \frac{P_{output}}{P_{input}}.$$

In order to amplify all of the input signal distortion free we must use DC biasing. This means that the amplifier consumes power even if there is no input signal present. If we do not provide the correct bias there will be distortion in the output waveform.

The Common Emitter Amplifier configuration is probably the most common form of amplifier using a bipolar junction transistor. It has medium voltage gain, high current gain and high power gain. The input impedance is low/medium and the output impedance is medium/high. The input signal and the output signal are 180° out of phase. These are used as low-noise RF amplifiers, particularly as preamplifiers in receiver circuits.

The Common Base Amplifier has high voltage gain, low current gain, and low power gain. It has low input impedance and high output impedance. The input and output signals are in phase. These are often used in VHF and UHF RF amplifiers and as microphones preamplifiers.

The Common Collector Amplifier has no voltage gain, high current gain, and medium power gain. The input impedance is high and the output impedance is low. The input and

output signals are in phase. These amplifiers are used as impedance matching devices, as voltage buffers, and for circuit isolation.

In our discussion of amplifiers we did not talk about classification. The following is a brief description.

Class A Amplifiers conduct current for 100 percent of the input cycle i.e. they never cut off.

Class B Amplifiers conduct for 50 percent of the input cycle.

Class AB Amplifiers conduct between 50 and 100 percent of the input cycle.

Class C Amplifiers conduct for less than 50 percent of the input cycle.

A commonly used type of power amplifier configuration is the **Class A Amplifier**. The Class A amplifier is the simplest form of power amplifier that uses a single switching transistor in the standard common emitter circuit configuration as seen previously to produce an inverted output. The transistor is always biased "ON" so that it conducts during one complete cycle of the input signal waveform producing minimum distortion and maximum amplitude of the output signal.

This means then that the **Class A Amplifier** configuration is the ideal operating mode, because there can be no crossover or switch-off distortion to the output waveform even during the negative half of the cycle. Class A power amplifier output stages may use a single power transistor or pairs of transistors connected together to share the high load current.

The efficiency of this type of circuit is very low (less than 30%) and delivers small power outputs for a large drain on the DC power supply. A Class A amplifier stage passes the same load current even when no input signal is applied so large heatsinks are needed for the output transistors.

To improve the efficiency you could use a pair of transistors in class B mode and wired so they are in push-pull configuration. Such a circuit can use two transistors, each receiving the same input signal that is equal in magnitude but of opposite phase. In this case one transistor amplifies one half or 180° of the input waveform cycle while the other transistor amplifies the other half of the input waveform cycle. The resulting 'two halves' are put back together at the output. An advantage of this type of

configuration is that no current flows through the transistor when it has no input signal. The resulting efficiency can be as high as 70%.

There is much more information contained in the ARRL Handbook. If you are interested I urge you to find a copy and take a look. In the 2015 Handbook you will find such information in Chapter 3.

Reference: *The ARRL Handbook for Radio Communications*, Ninety-Second Edition, 2015.

REPEATERS – PART ONE

by

Army Curtis AE5P

Many new hams today will buy a small VHF and/or UHF handheld radio as their first radio. With prices for such radios very low ($20-$30) this is not surprising. Such radios are normally low power (5 watts) and have a very inefficient antenna. Using such a radio to communicate directly with a similar radio, the range is usually very short, on the order of just a few miles.

A repeater can dramatically increase the distance you can communicate with such a small radio. The signal from the user is received by an efficient antenna on a high tower and retransmitted simultaneously through the same antenna on a different frequency. The difference between the receive frequency and the transmit frequency at the repeater is called the **offset** and on 2M is normally 600KHz. For repeaters operating in the 145-146MHz range the offset is negative. For repeaters operating in the 147MHz range, the offset is positive. On 70cM, for repeaters operating in the 440-450MHz range the offset is 5MHz positive.

Okay, so the repeater has an antenna on a high tower connected to a receiver to hear the user with his small handheld. When the repeater hears such a signal, it will key its companion transmitter and simultaneously repeat the user's signal back up to the same antenna on the high tower. The repeater transmitter operates at a higher power than the small handheld, normally 50 to 100 watts. The result is that the ham with the small handheld can now be heard over a much wider area and find many other hams to communicate with.

Something to keep in mind here. When you are communicating through a repeater, you are talking **to the repeater** not directly to the other ham, and you are receiving **the repeater** not the other ham directly. If the other ham asks for a signal report, you can only tell them how **the repeater** hears them since you are not hearing them directly.

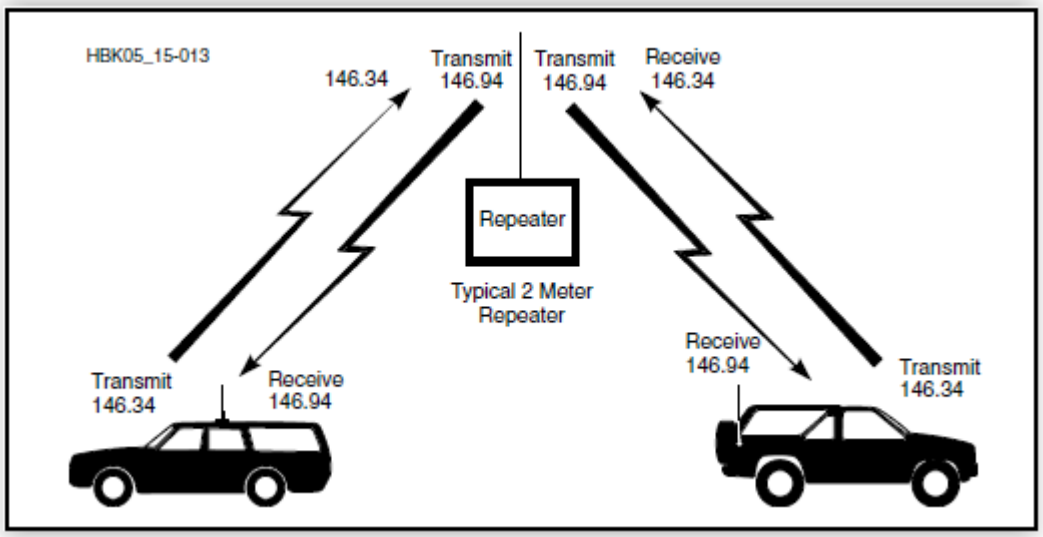
Repeaters on 2M and 70cM are normally FM. A characteristic of FM is the **quieting effect**. When a receiver hears an FM signal, the white noise it normally hears is reduced. Many FM receivers will become fully quiet when they receive a signal of 2 microvolts. With FM, once the receiver hears a signal strong enough to be fully quiet, increasing the signal strength does not improve the quality. For most receivers, an FM

signal of 2 microvolts will sound the same as a signal of 1,000 microvolts. So, when your friend asks you for a signal report through a repeater, the correct answer is that they are full quieting into the repeater, or they may be noisy into the repeater. The normal RST system does not work with FM.

Most repeaters in our area now require a specific tone to be sent by the user to allow the repeater to operate. Such tones are called PL tones, or CTCSS, or sub-audible tones.

Let's look at some specifics. NARC sponsors three repeaters; two of them on 2M and one on 70cM. One of the 2M repeaters operates on 146.840MHz, with an offset of minus 600KHz and a tone of 141.3 Hz. Breaking this down, the user will tune his radio to 146.840, use an offset of minus 600KHz and a tone of 141.3Hz. When the user transmits, his radio will switch to 146.240 (146.840-0.600=146.240) and will send a tone of 141.3Hz. The tone is lower in frequency than most radios speakers will output, and will usually not be heard by the user. The repeater receiver operates on 146.240MHz. When it hears a signal, if the signal includes a tone at 141.3Hz, the repeater transmitter will be keyed on and the user's signal will be repeated at 146.840MHz.

The second 2M repeater locally operates on 147.320MHz, with a positive offset of 600KHz and a tone of 141.3Hz. The 70cM repeater operates at 444.050MHz with a positive 5MHz offset and a tone of 141.3Hz.



Here is an overall view of a typical 2 meter repeater in operation. The frequencies shown are correct for the Lufkin 94 repeater, but the idea applies to all repeaters.

Let's introduce a few terms here related to repeaters. The user's radio operates **half-duplex**, which means it transmits and receives, but not at the same time. You talk and then you listen, but not simultaneously. The repeater itself operates **full-duplex**. It has to receive the signal from the user and transmit it simultaneously.

If the user is communicating directly with another user, they are said to be operating **simplex**. This is normally done on a single frequency, used for both receiving and transmitting. The national standard 2M simplex frequency is 146.520MHz. The local standard simplex frequency is 146.460MHz. The national standard 70cM simplex frequency is 446.000MHz.

So what can the user do to improve his range on 2M? The **last thing** he wants to do is add an amplifier to increase his transmitter output. Improving his antenna will be much more effective and usually less expensive as well. The little flexible antenna (rubber duck) antenna found on most handhelds is very inefficient. If you can replace that with a better antenna, the results will amaze you. Remember that adding an amplifier will increase the transmitter output, but does nothing for the receiver. Using a better antenna improves the transmitter output and also improves the receiver's ability to hear other signals. A separate antenna does not have to be on a 300 foot tower, but even a 20 foot pipe puts the antenna a whole lot higher than the little rubber duck mounted on the handheld.

If (when?) you switch from the rubber duck to an antenna mounted outside, remember to use the appropriate type of coax cable. While there are hundreds of different types of coax cables, the types normally used by hams include RG-58, RG-8X, RG-8, and LMR400. Frankly, LMR400 is an excellent choice of cable to use unless the distance to your outside antenna is more than 100feet. If more than 100feet, you may have to consider hardline which is much more expensive but has much lower loss.

In any event, do not try to directly connect the large coax directly to your handheld radio. Instead, use an appropriate adapter to connect the antenna connector on the handheld to a short (≈6") length of small, flexible coax, and then to a connector to fit your new larger coax. An example for a Baofeng HT can be found at Amazon (https://www.amazon.com/DHT-Electronics-Handheld-Antenna-Quasheng/dp/B00COKNKS8/ref=sr_1_3?keywords=baofeng+antenna+adapter&qid=1564431359&s=gateway&sr=8-3). This will avoid putting undue strain on the HT connector and causing it to fail.

Enough for now. We will continue this discussion next month.

In the meantime, if you have specific questions related to repeaters, please send them to AE5P for possibly inclusion in future articles.