

**JOHNSON COUNTY RADIO
AMATEURS CLUB, INC.**
P.O. Box 93
Shawnee Mission, KS 66201

FEEDBACK

JANUARY 2022



JANUARY MEETINGS

January 13 – Emergency
Communication Service – Herb
Fiddick, NZØF and Program Planning
for 2022

January 27 – TBA, depending upon
what we decide on January 13.

The Johnson County Radio Amateurs Club normally meets on the 2nd and 4th Fridays of each month at 7:00 PM at the Overland Park Christian Church (north entrance), 7600 West 75th Street (75th and Conser), west of the Fire Station.

Much of the membership travels to the Pizza Shoppe at 8915 Santa Fe Drive for pizza buffet and an informal continuation/criticism/clarification of the topics raised at the meeting ... or anything else.

LEAVE THE CHURCH, TURN RIGHT (WEST) ON 75TH. TURN LEFT (SOUTH) ON ANTIOCH. TURN RIGHT (WEST) ON SANTA FE. PIZZA SHOPPE IS JUST PAST THE SONIC ON YOUR LEFT.

We're (Almost) Back!

The JCRAC annual holiday party on December 10 marked the first occasion the club met indoors since Bill Brinker, WØCBW, conducted a question and answer session on Fusion radio tips and technology on March 13, 2020.

Several municipalities issued stay-at-home orders ahead of the Club's March 27, 2020 meeting, but the Overland

Park Christian Church anticipated them all, informing the club that the church "would not be available to outside groups until at least mid-May". There was no indication as to which year that "May" referred.

In deference to the Omicron spike, the first meeting of January (at least) will be by way of a Zoom video conference

IN THIS ISSUE

- 1-- We're (Almost) Back!
- 2 – December Meeting / President's Corner
- 3 – Hambone and the ABC's – a Hambone Story - Jaimie Charlton, ADØAB
- 4 – Raydo Recommends: EZNEC – John Raydo, KØIZ

>> THE FEEDBACK <<

*A publication of the
Johnson County Radio Amateur Club, Inc.*

Bill Gery, KA2FNK, President

Jaimie Charlton, ADØAB, Vice President

Ted Knapp, NØTEK, Secretary

Cal Lewandowski, KCØCL, Treasurer / FEEDBACK distribution

* * *

Chip Buckner, ACØYF, Editor

Charlie Van Way, NØCVW, Photography

Deb Buckner, KDØRYE, Contributing Editor

All email addresses are available at w0erh.org

Photos by NØCVW

December JCRAC Meeting

Meeting Date: Friday, December 10, 2021.

The Meeting began with self-introductions at 7:00 PM.

Members brought meals and socialized with other Hams.

Tom Wheeler, NØGSG prepared Ham Carols for Hambone's gang.

President's Corner

It was great to see those that were able to attend our in person Christmas Party. Our thanks to Tom (NØGSG) and his band of assistants for the entertainment.

Field Day 2021 was a success while being threaded between rain and thunderstorms. We had a great turnout which resulted in all having a good time. The Club's field day score was of the highest for our class.

The Ensor auction was a success as well. Cal has received the last of the receipts and mail out the consignment checks. So we will have a full report shortly.



The latter part of the summer and well into fall really had a large number of Public Service events. Some of these were postponed from the spring. Thanks to everyone

that volunteered for at least one of these events. The coordinators of these events could use some help. If you would like to help ask one of the coordinators, they would be happy to show you the ropes.

Please note that our first for the year will be January 13th and will be a Zoom meeting. We have not made a decision about in person meetings at this time. The number of Covid cases may go up for a time after the holidays. We do not want to place anyone at risk.

I hope everyone had a merry Christmas and a safe New Year.

– Bill Gery – WA2FNK

Hambone Learns His ABCs

A Hambone story by Jaimie Charlton, ADØAB

"I don't really understand it Unck, sometimes it seems to work and other times it doesn't. I don't understand what's happening."

The euphoric high of Christmas and New Year's has nearly passed and the cheerful lights are being replaced by old, dull gray, snow as the grim reality of at least two months of cold winds settles in.

Ham radio operators are of mixed feelings. Many don't look forward to the bleak midwinter, but on the other hand, they do look forward to all the radiosport contests and lower RF noise on the HF bands that Winter brings. It's because of all that we find

Hambone in his Uncle Elmer's ham shack looking at the insides of a recently obtained transceiver and amplifier.

"Nothing seems loose or burnt in here and all the fuses are good. I hope I didn't wreck anything. That amp's sort of new to me," said Hambone as he leisurely poked around with a screwdriver at the internals of the amp.

"Take it easy Hammy and put down that screwdriver before you do wreck something. Tell your ole uncle what seems to be the problem," soothed a very mellow Elmer as he took another swig from his jumbo cup of left-over eggnog.

"I got this amplifier from a guy at a virtual hamfest over a year ago. He said he built it and it was a high-efficiency design and put out a solid

500 watts with only 120 VAC input. It looked pretty good and it was cheap so, I bought it.

"I just now got around to trying it out. I hooked it up to my transceiver and antenna and power supply and tapped out 'CQ'. A guy came right back to me and said it sounded great. We tried a couple of different bands ending up on ten-meters. He said all the bands sounded good and suggested we try ten-meter FM. I didn't know there was such a thing, but he assured me there was and I could try it just by pushing the 'FM' button on my transceiver. I did. He sounded great and said that I did, too."



"So Hammy, what's the problem?"

Hambone continued, "Really, Unck, that FM from him was nearly broadcast quality – clear and very low

noise. He said I was clear but a little noisy. It turned out he was running 1500 watts. This rig only puts out 500 watts."

"So far, Hammy, I don't see a problem. Your signal is bound to be weaker."

"Yeah, I got that, Unck. Do you have any more eggnog?"

"Yes, but you're too young to drink it. Go on," said Elmer refilling his cup.

"Gee, Unck!

Anyway, later, I tried making some more contacts on HF and everyone said I sounded terrible. Some were not very polite and told me to get

off the band. They called me a LID and said I was causing QRM."

"That wasn't very nice of them," mocked Elmer. "Some hams really have no manners. The nerve of them saying you sound bad when you really do. Don't they know the ham bands are a fairyland where you tell everybody they are 5 by 9 and clear as a bell no matter how weak and distorted they sound?"

"You're being sarcastic, aren't you, Unck?"

"Maybe. Were those contacts still on FM?"

"No, they were all single sideband. I switched off the amp and ran the transceiver barefoot and got good reports although my signal was fairly weak. I turned the amp back on and went back to CW and got good reports again. I retried FM with and without the amp and got good reports both ways. I don't know why I got such lousy reports on SSB."

"Well Hammy," said Elmer, adopting his professorial tone of voice, "Let's figure out what the problem is by analyzing your data."

"What data, Unck? I don't have any data."

"Oh, Hammy, but you do. You have definitive test reports on FM, CW and SSB transmissions with and without the amp. That's data.

see HAMBONE on page 4

<p>from HAMBONE on page 3</p> <p>Your data shows that FM and CW signals work fine with and without the amp, except they are much stronger with the amp. Single sideband signals are fine with the transceiver running barefoot but are distorted with the amp. It sounds like an amp problem to me.”</p> <p>“I know that! But if the amp is the problem, why doesn’t it distort the FM voice? It only distorts sideband voice.”</p> <p>“Think about it, what is the difference between those types of signals?”</p> <p>At that point, Dude, Hambone’s younger and precocious brother who had been listening outside the door popped in and offered, “That’s simple Hammy, one is voice and the other is not!”</p> <p>“Okay, wise guy, why does FM work and SSB not? They’re both voice. So there!”</p> <p>Following a rare moment in which Dude was speechless, Elmer stepped in to quell the brewing storm. “Guys, calm down. Technical problems aren’t solved by hollering. Let’s look again at the data. What’s different about the FM, CW and SSB signals that the amp works fine with some and not with the others?”</p> <p>“I don’t know,” murmured Hambone.</p> <p>“Me neither,” added Dude.</p> <p>“Okay, I’ll tell ya. Both FM and CW are constant amplitude signals. That is, their strength doesn’t change. But single sideband is different.”</p> <p>“What do ya mean, Unck? CW goes on and off.”</p>	<p>“It does, but when it’s on, the signal strength is constant. The same with FM. When you talk over FM the signal strength is constant, just the frequency wiggles a little.</p> <p>“Okay, so why is that important to my amp?”</p> <p>“It’s important because to amplify a constant amplitude signal, the amp really just turns on and off. When you send it a CW signal, the amp just recreates a new stronger signal at the same frequency.</p> <p>Likewise with an FM signal. When you send your amp an FM signal, it just recreates a constant amplitude</p>	<p>carrier of whatever frequency the transceiver is sending it, but stronger.”“But what about the frequency modulation?” asked Dude.</p> <p>“The frequency modulation or ‘wobble’ is so small compared to the carrier frequency that the amp doesn’t even know it’s there. The amp’s output wiggles right along with the input signal.</p> <p>But the important point is that in either of these modes the amp does not have to reproduce amplitude changes in any sort of accurate way. That’s different for single sideband.</p> <p>see HAMBONE on page 5</p>
<h2 style="text-align: center;">Raydo Recommends: EZNEC</h2>		
<p>Roy Lewallen, W7EL, the designer of EZNEC, has retired and has made his famous program available to everyone without cost as of January 1st. This is the same program (PRO/2 Ver 6.0) that I and many others have purchased over the years for up to \$525. I used this simulation software to design my Colorado antennas and our club’s Field Day phone antenna. From the simple to the complex, Roy’s program allows detailed analysis of resonance, SWR, gain, elevation and azimuth plots, and more.</p> <p>“Easy Neck” is how the name is pronounced. It is a front-end to a</p>	<p>complicated simulation program call NEC-2, hence the name. Download from ez nec.com. On-line manual is available. A number of sample files are included plus files that come with the ARRL Antenna Manual and many more at various internet sites. I find it much easier to modify an existing file of similar antenna type than to start from scratch. I plan to do a club program on getting started with EZNEC. In the meantime, download and install and play around with some of the samples.</p> <p style="text-align: right;">— John Raydo, KØIZ</p>	

from **HAMBONE** on page 4

“Single sideband is really just a stripped-down form of AM or amplitude modulation. In other words, the information, your voice, is partly carried by changes in the signal’s strength or it’s amplitude and partly carried by changes in frequency. That means your amp must not only reproduce a signal of the same frequency as the original, it must accurately—that is, linearly—create a larger version of the signal’s changes in amplitude. If it doesn’t do that, you get distortion.” “So, you’re saying my amp isn’t linear, is that right?”

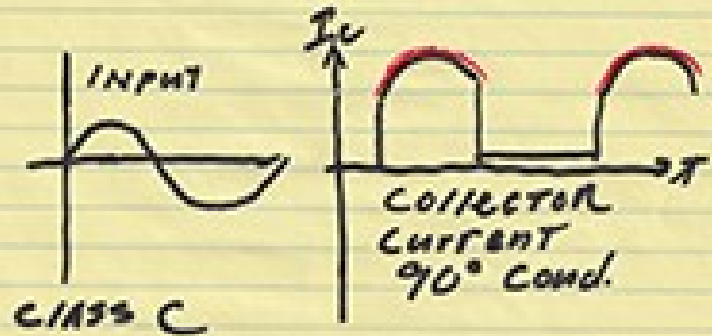
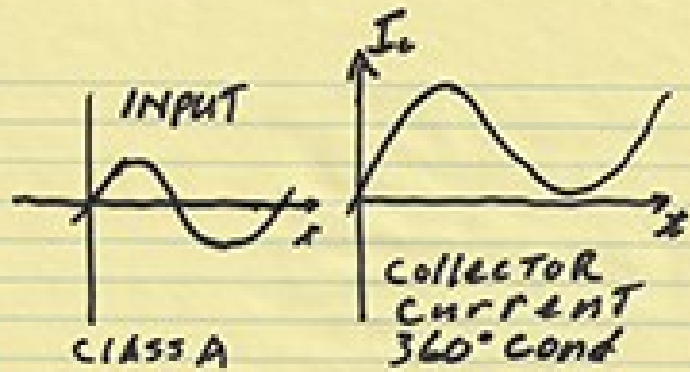
“That’s right. Since up to now, you only operated CW, you never noticed that your amp is not a ‘linear amp’,” replied Elmer stressing the word linear.

“Gee, why would anybody make an amp that’s not linear?” asked Dude.

“Efficiency,” responded Elmer. “If you don’t need linearity, as with CW and FM, you can get more output power for a given input.”

Elmer grabbed his ubiquitous yellow pad and markers and continued.

“There are three basic classes of analog amplifiers, A, B and C. Class A is the most linear and least efficient. It’s what you find in hi-fi stereo amplifiers and anywhere accurate reproduction is important. The problem with class A amps is that to obtain their linearity, their transistors must be conducting all the time or for 360 degrees of the input cycle. That ‘biased on’ state means they are dissipating power even when producing no output. That results in about 34% efficiency.



Class B amps are also linear and are more efficient because their transistors are biased to conduct over only half, or 180 degrees, of the input signal’s waveform. They don’t conduct over the other half of the wave.”

“How can that be linear?” asked Hambone.

“It is because class B amps generally employ two transistors, one to amplify the positive half of

the input waveform and another one to amplify the negative half. You see, when the ‘A’ transistor is conducting, the ‘B’ transistor is not. That way, the two transistors together amplify the entire waveform, yet each transistor only operates half of the time.”

“Wow Unck, that’s cool!”

But what class of amp is my amp?” asked Hambone.

see **HAMBONE** on page 6

from **HAMBONE** on page 5

"I'm not sure, but since it distorts SSB signals and has only one transistor, it would appear to be a Class C amp."

"Class C", laughed Dude. "Your amp gets the same grade as you do in school!"

"Shut up, Dude! Class C is good, right, Unck?"

"That depends, Hammy. It's the most efficient of the three analog classes, but the least linear. Its transistor conducts only over about 90 degrees of the input cycle which results in about 74% efficiency. As you can see, it works fine for CW and FM, but it's not good for single sideband."

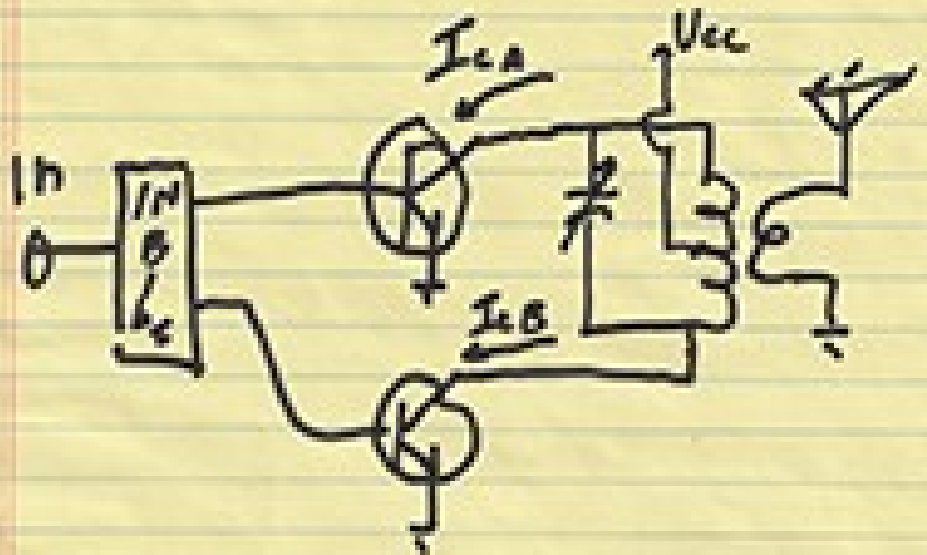
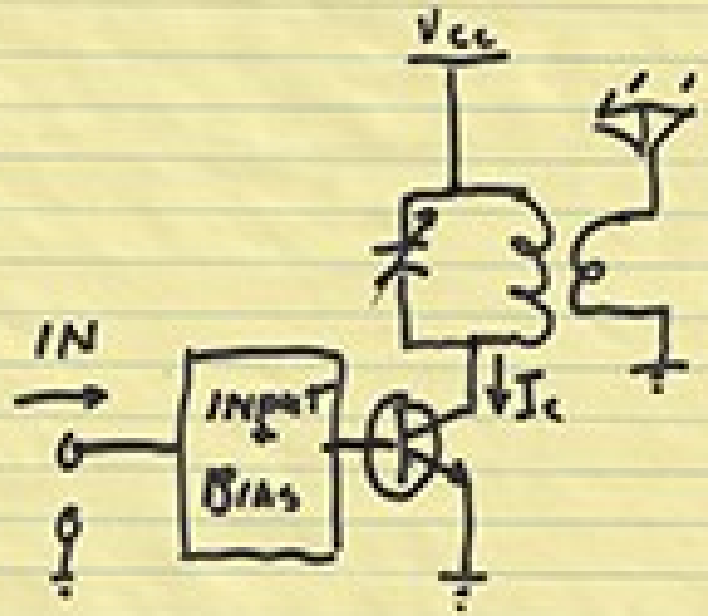
"If you say so. But I'm not sure what this conducting stuff is all about."

"Here's some basic circuits that may help."

This first circuit with only one transistor could be either class A or C. If the input and bias circuitry are such that the transistor always has some collector current, I_c like in the graph, then it's a Class A amp. But if the input and bias are such that there is collector current only over about 90 degrees of the input cycle, then it's a class C amp.

But in the second schematic, there are two transistors, A and B. The input and bias circuitry is such that the A transistor conducts for the positive 180 degrees of the input waveform and the B transistor conducts during the negative 180 degrees. This means that each transistor is only on half of the time."

Since transistors are most efficient when they are either fully



conducting – called *saturation* or fully off known as *cutoff*, the result is about 65% efficiency for a class B amp.

As an aside, it is very difficult to get a seamless handoff between the two transistors in a class B amp. That's why you often see a class AB amp. It's the same circuit, but the transistors are biased so each conducts about 270 degrees. This results in a lot of overlap and a

smooth transition, but the efficiency drops to about 55%.

"I get the different classes," said Hambone. "Why is efficiency so important and why doesn't my amp amplify single sideband signals?"

see HAMBONE on page 7

from HAMBONE on page 6

“It’s all about heat. The most fundamental factor limiting the power a semiconductor can handle is its temperature. Specifically, its junction temperature. When the junction temperature exceeds some absolute maximum limit, usually around 200 degrees centigrade, the transistor loses its electrical characteristics and stops being an amplifier, for good.

The more efficient an amplifier is, the less heat it generates. The less heat it generates, the cooler the transistors run. This translates into greater output power.”

“So, what’s special about class C?” asks Dude.

“In Class C amplifiers, the transistor conducting over only a small part of the input waveform. Sort of bursts of power. This result is higher efficiency because the transistor is mostly off. But, clearly, it’s not linear.

I noticed that the little nameplate on your amp says it’s a ‘High

Efficiency RF Power Amplifier’. It does not say ‘linear amp’. That’s why I think it’s class C.”

“Screwed again, Hammy!” chided Dude. You just never learn to read the fine print, do you?”

“Don’t feel bad, it’s a pretty good amp for CW which you mostly operate and it does put out a lot of power.”

“Is there any way I can make it amplify SSB signals?”

“Probably by changing the transistor’s bias so it operates as class AB or AAB. Of course, it’s output power will be less because it will run hotter.

You know, that might be a good class project for you this semester. I think I’ll suggest it to Professor Flask.”

“Oh no, it’s okay Unck. You don’t need to do that.”

“I guess Hammy still hasn’t learned his ABCs,” sneered Dude.

>> JCRAC FEEDBACK <<



Hambone Supplement

One of the perks of the position is that your editor gets to see some of the back and forth connected to the preparation of the text that gets into print. This month, for example:

Very nice, and a useful summary of the different types of amplifiers. But could you include the eggnog recipe? All of US are old enough, I believe ...

Charlie, NØCVW

I should have included Elmer’s recipe. For each 6 oz cup of ‘nog, start with 5 ounces of bourbon and add a shot of eggnog mix available in the dairy section of your local grocery store. If you find that is too strong, cut back the mix to half of a shot.

I’ve heard that some folks prefer rum or brandy in place of the bourbon. I suspect it’s all good.

Jaimie aka Elmer



