FEEDBACK

OCTOBER 2019

September Show-and-Tell

JCRAC members and visitors showed off a variety of radio projects at the September Show-and-Tell at the September 13 JCRAC meeting.

Bill Brinker, WAØCBW, (below) started with a series of Knight radio kits.

Pat O'Brien, KEØUWO, became what is probably the first first-time visitor to present his work at a show-and-tell. Pat read about Bill Gery's work with Raspberry Pi's and amateur radio and decided that he needed to meet the people at the JCRAC.

Ted Knapp, NØTEK, showed his method of organizing HTs and charging paraphernalia.

Finally, John Capra, KDØEVM, who received the club's certification of appreciation for unselfish support of public service events in the methropolitan KC area, had his own go-kit to show to the club.

Lon Martin, K§WJ (above) showed the club his new go-kit.

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.

IN THIS ISSUE

OCTOBER 25 MEETING LOCATION

The October 25 meeting will be at the Ensor Farm, 18995 W 183rd Street (just west of 183rd and Ridgeview Road) in Olathe. Bring a chair and some marshmallows.

The annual "Ensor Auction" of amateur radio equipment to benefit both the JCRAC and the park, begins at 11:00 Saturday morning.

Please welcome Pat O'Brien, KEØUWO, who attended his first JCRAC meeting in September.

PRESIDENT'S CORNER

October is here and it is time for the Ensor auction (October 26). This year the Ensor activities will start October 25. That Friday evening will start with Club meeting, followed by a camp fire and camp out. Saturday morning bring your items to donate or for consignment. Setup for the auction will start about 8 am Saturday. The auction startis at 11 am. Food will be available for purchase Saturday before and during the auction.

Search your shack for those items that you thought you needed, but have not left the shelf. You know the items and we have a solution.

October is also the mouth the we provide volunteers for Ensor . Please sign up for one or more of the weekend slots. Each time you volunteer your name is submitted for a fifty dollar gift certificate at Associate Radio.

Please note that the second club meeting (October 25) will be at the Ensor farm. .

– Bill Gery – WA2FNK

Meeting minutes were not available at the time of publication.

HSMM at the Hawk Hundred?

At the September 27 meeting, president Bill Gery told the JCRAC about a problem he had encountered earlier that month at The Hawk Hundred. The "Hundred" is a 100/50/26.2 mile run in a series of loops through Clinton State Park, on the west edge of Lawrence, KS.

Like many such events, the organizers reach out to the ham radio community for communications support. Unlike much of Kansas, the terrain surrounding the like is filled with both trees and abrupt changes in elevation.

The radio problem, Gery observed, was getting a signal from the base station over, around or through a hill to an aid station in a low area. In many cases, the solution is nearby repeater at a high location, but that solution is not available at Clinton Lake. After doing a bit of reading, Gery concluded that the solution might be to build an ad hoc relay system on site using High Speed Multi-Media radio.

Amateur radio (FCC Part 97) and the ISM bands (FCC Part 15) share parts frequencies near 2.4 GHz and 5.8 GHz. Part 15 allows many low-power uses, the most familiar, perhaps, being WiFi. A number of hams have discovered that they can reprogram certain models of consumer WiFi equipment (in some cases shifting down to ham-only frequencies just below the ISM band) to be inexpensive self-configuring network nodes operating at microwave frequencies.

A user on one network node may send data to or make inquiries of devices attached to any other node on the network. Being digital, the transmision make contain voice over IP, chat messages, files, a video stream or pretty much anything else. Throughput will be similar to data moving through a home wifi network.

Hams, operating under Part 97, have some technological advantages that are not available to wifi users. Hams are not limited to ISM's power and antenna limitaitons.

At about this point in the program, several other hams who had helped with the Hawk Hundred interrupted with observations and questions.

A common chore was calling in bib numbers of runners passing particular check-points. When using voice, only one person may call net control at a time. When the message is received, someone has to enter the data into a database. Using HSMM, one operator noted, people at different check points could be keying data simultaneously and sending the data over the network without having to wait for someone else to finish. A data server attached to one of the nodes could be "listenting" and putting the data directly into a database without requiring transcription.

The assembly pointed out to Gery that he had eleven months to get this figured out for next year.

HSMM is, Gery said, frequently used in mountainous areas. A typical configuration might be a group of 2.4 GHz nodes on either side of a mountain, using a pair of 5.8 GHz units as the back bone to take data over the mountain.

The July 2013 QST features a number of stories about HSMM. One story told of a run in which a webcam at the finish line put a video stream on the mesh network that was made available to various watching posts across the course.

More information is available at the Amateur Raadio Emergency Data Network site or at any number of website devoted to High Speed Multi-Media mesh networking.

> JCRAC FEEDBACK <
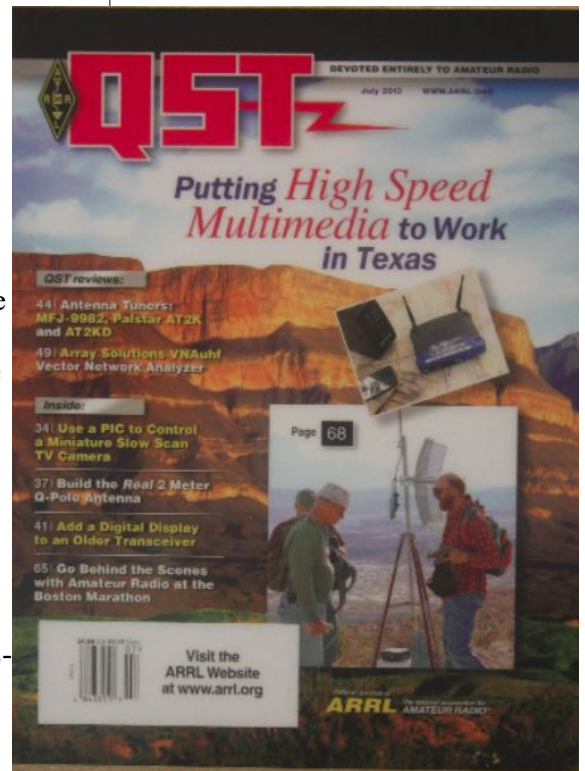
A Hambone Adventure - Jaimie Charlton, ADØAB
Hambone and the AAAA

"What the heck is this?" hollered Hambone as he slammed an official looking letter down on the bench in his fraternity's ham shack and tossed the crumpled envelope on the floor. "I've never heard of the AAAA. Who do these guys think they are saying my audio sucks?"

"Sometimes, like now, you do sound a bit blasty," suggested Dude, Hambone's younger brother.

"Blasty? No! The word is 'punchy' and that's what it takes to break through pileups. I bet this guy, Mr. Barky or somethin' is one of those gnarly QRP nerds moaning about how they can't compete with real stations."

"Hammy, calm down. It says here that this is just a notice from the Amateurs Against Awful Audio alerting you to the fact that your signal is distorted and splattering all over the band. It goes on to say that this guy, Bessel J. Barkhausen, is willing to come here and help you fix your problem. For free."

Some other fraternity brothers wandered into the ham shack to see what the noise was about and to see what a real snail mail letter looked like.

"It couldn't hurt to invite the guy over. Maybe he's got some good ideas," suggested one of the boys.

"I doubt that," said Hambone. "With a name like Bessel Barky or somethin' he's probably some old guy whining how everything was better in the old days when they made their rigs out of oatmeal boxes and fence wire and worked the world on ten watts. Who eats oatmeal, anyway?"

"I guess Hammy's afraid to have someone fix his sucky signal," said another boy. "You know, 'sucky signal Hammy' has sort of a ring to it."

Bowing to a rising tide of peer pressure, Hambone agreed to invite Barkhausen by return mail. "Does anybody have a stamp? It says place stamp here on this envelope."

"What's a stamp?"

****

The deep-throated rumble of a no-nonsense V8 drew the boys away from their midterm studies to the front of their frat house where the raised vertical lambo doors on a pristine white Corvette C7 revealed a tall young man wearing Raybans and a charcoal tee over designer jeans. But all eyes were on the flowing blonde hair and engaging green eyes of the lady next to him.

Extending his hand, the man spoke, "Hi, I'm Bessel Barkhausen from Double-A Double-A and this is my girlfriend, Cindy. We're looking for a mister Hambone."

"I, I'm Hambone," he stuttered, his eyes fixed on the blond beauty before him.

"Mr. Hambone, I'm over here," said the man.

"Oh, sorry," said Hambone reaching for Barkhausen's hand. "I'm glad you could come visit us.

Welcome to our frat house. We are all anxious to hear what you have to say."

As they walked up the front steps Dude pulled his brother aside, "Whiny old man, eh? Here's a spoon so you can start eating your words."

After greetings and refreshments, Barkhausen began. "Thanks for inviting us to the Frat's Amateur Radio Transmitting society. I founded Amateurs Against Awful Audio, about two years ago when I noticed a lot of bad sounding single side band stations on the on air. I think there's two causes; most hams can't listen to their own signals, and modern transceivers offer good audio adjustments but the instruction manuals do a poor job explaining them. In other words, many hams are not setting up their equipment properly."

Raising his hand, Hambone asked, "What do you mean by set up? I trim my antennas for a very low SWR and carefully tune my transmitter. What else is there?"

"I'm sure, Hambone, your RF is fine. I'm talking about audio. I think you've got a problem there. It sounds to me that you have turned up the compression way too high, although there may be other problems, too."

"Oh," said Hambone. "Like what?"

"Essentially, ham transmitters have two basic sets of audio controls, frequency response and level/compression. Frequency response is determined by the audio

equalizer settings on the transmitter and is easily adjusted.

Many decades ago, when wireline telephony was new, Bell Labs did extensive studies and determined that most of the intelligence carried by the human voice falls in the 300-3000 Hertz frequency range. Consequently, the entire telecommunication network was designed to carry this range of frequencies.

Of course, this is not hi-fi. Music sounds awful. But voices sound natural enough to recognize the speaker and can punch through noisy connections.

Although we hams use single sideband radio, we still want our voice to be recognizable and punch through noise. To do that, the first thing is to set the transceiver's equalizer to roll off all frequencies below 300 Hertz and maybe bump up the middle frequencies around 2000 Hertz. This is only a starting point. Ask someone with a good ear to evaluate your signal to be sure you haven't over done it."

"Mr. Barkenhausen," said Hambone standing and waving his hand again.

"Yes, Hambone?"

"I did like you said with a friend down the street. He said I sounded just like a broadcast station real natural. Now you said that I don't sound good on the air. What gives?"

"Words like 'sounding natural' or 'broadcast quality' mean you are wasting power on frequencies below about 300 Hertz. They make your signal sound 'natural' but 'natural' doesn't break through pileups."

Flashing a smile at Hambone, Cindy interrupted, "Of course, if you want really good sounding audio, open up your frequency response as far as you can and go extended single sideband. Those eSSB guys sound really sweet."

"Oh," replied Hambone melting back into his seat.

Another hand shoots up from the back of the room.

"Yes, back row, you have a question?" asked Barkhausen.

"Is Cindy a ham?"

"She is, Extra Class."

"You can say that again," the voice added.

Trying to regain control of the room, Barkhausen continued, "Moving on, the next thing I want to talk about is compression. This is a lot trickier and is done only after you get your frequency response set properly.

Yes, young man, what's your name?" Asked Mr. Barkhausen responding to a wildly waving hand.

"Dude. My name is Dude. I read somewhere that hams shouldn't use compression because they don't need it and it causes distortion. Is that true?"

"Sorry, Dude. Both those statements are wrong. Almost all audio benefits from compression. Radio and TV sound, movies, even many CDs and MP3 files are compressed. The result is a fuller sound, not distortion. If your audio sounds 'blasty' or distorted after compression, it's because the compressor is set wrong.

You have all seen oscilloscope traces of voice waveforms," said Barkhausen as he sketched a

waveform on the whiteboard. "You can see, most of the energy is concentrated in this center part with some spikes going about 20-25 dB higher. When we transmit and our 100 watt transceiver shows we are peaking at 100 watts output, it is those high spikes that are hitting 100 watts, the rest of the signal is running at only a few watts."

"Can't you just turn up the microphone gain and bring up that middle part?" asked a voice from audience.

"You can," continued Barkhausen, "But since the transceiver is only capable of 100 watts output, it simply chops off the spikes. The effect is splatter and 'blasty' sounding audio. In other words, your amplifier has become nonlinear. That's kinda the sounds we heard from you, Hambone."

"Hey, Hambone's gone nonlinear!" came another voice from the back.

"Don't feel bad Mr. Hambone," said the flowing hair and flashing eyes as she sat down next to Hambone. We'll get you all fixed up."

The room fell silent and Hambone turned red.

Barkhausen went on, "A simple audio compressor is nothing more than an audio amplifier with three adjustments, *threshold*, *ratio* and *makeup gain*. There can be many others, but those are the main ones.

The threshold or knee adjustment sets the input audio level at which compression begins to take effect. For example, if your microphone audio, after preamplification has a peak level of 0dBm, you might set your threshold to -20dBm. That

means compression will begin when the input signal level reaches -20dBm. Signals below -20dBm will not be affected.

The next setting is called the compression ratio. This sets how much signals over -20dBm will be reduced. A good starting point might be two to one. That means for every two dB the input signal rises above the threshold setting, the output rises only one dB. This will allow you to make your signal about 10dB stronger without overdriving your amplifier."

"Bessel, this is really cool," said Hambone regaining his composure. "But there's one part I don't quite get. It looks to me like you're making the signal weaker. How does it get stronger?"

"Good question, Hambone. Now, watch closely, this is where the magic happens. Remember, our input audio peaks at 0dBm and if our compressor were a linear device, its output would also peak at 0dB. But it isn't linear. For the 20 dB range of input levels between -20 and 0, we are outputting only 10 dB. That makes our output level equal to -20dBm + 10 = -10dBm.

We now apply 10dB of makeup gain to the output to raise our signal back up to 0dBm.

The result is you've added 10dB to your audio level but, you are not overloading your amp. Notice that you still have some peaks, but they are lower. These numbers are just a starting point, always have someone listen to you, or listen to yourself, to be sure there's no distortion. Still, it's pretty slick, heh?"

A hand shot up and an irritating voice from the back row shouted, "Mister Bessel, what kind of car is that?"

"It's a white one. Any other questions?"

"Mr. Barkhausen, my transceiver doesn't have that fancy ratio and threshold stuff. It only has a microphone level and a compression adjustment. How do I set that?" asked a boy in the front row.

"You're right, that's all most transceivers have. But you can still get a lot of the advantages of compression. Just consider your microphone level adjustment as makeup gain and the compression adjustment as setting the threshold.

Be sure you can listen to your audio and start with no compression, speak normally and set your mic level to give full RF output on your voice peaks. If you can, look at your RF output with an oscilloscope to be sure you're not clipping off the peaks.

Next, turn up some compression. This should reduce your RF peaks. Increase the mic level until the RF peaks just hit maximum output again. Repeat this process until your audio sounds distorted or blasty. Then back off until it's clear again. There's a lot more to audio processing than we've talked about here. But do these easy steps and people will compliment you on what clear audio you have.

If there's no more questions, our job here is done."

Hambone's hand shoots up.

"Yes Hambone?"

"That's really great and I'm sure it will fix my signal, but I have a question."

"Yes?"

"Cindy, do you want to go with me to a party tonight?"

>> JCRAC FEEDBACK >>