Johnson County Radio Amateurs Club, Inc.
P.O. Box 93
Shawnee Mission, KS 66201

FEEDBACK

February/March 2022

January Meeting

5G Cell Phones and Radar Altimeters

Bill Gery, KA2FNK, introduced a video featuring pilot-turned-aviation analyst Juan Browne (right) discussing the consequences of potential interference 5G cell phone signals will have upon radar altimeters in large aircraft.

Radar altimeters send a radio signal toward the earth, measure the time it takes for the signal to return, calculate the distance the signal traveled, divide by two and determine the plane's altitude.

Amateur radio operator Lloyd Espenschied, perhaps best known to hams as being one of the inventors of coaxial cable, patented the radio altimeter in the 1920's. The device has been used in aerial navigation in 1938.

Many in the aviation industry are concerned that 5G cell phone signals in nearby frequencies will interfere with or otherwise confuse aircraft altimeters. The principal concern seems to be that the automatic landing systems in large aircraft rely upon prompt accurate altimeter readings when landing in low-visibility situations. On-board computers can make adjustments when one of several redundant

systems differs from the others, When, as industry simulations predict will occur, two or more instruments report the same bad data, the on-board computers may misjudge the plane's height above a runway, with potentially unhappy consequences.

FCC research concluded that 5G signals were not likely to cause interference near airports.

Some JCRAC hams looked at the data and concluded that the problem lay in the inability of aircraft altimeters to discriminate between useful signals and noise.

See ALTIMETERS on 2

MARCH MEETINGS

***February 11** – Portable Mesh used at the Hawk 100 -- Bill Gery, KA2FNK*

***February 25** – EZNEC – John Raydo, KØIZ*

March 11 – TBA

March 25 - TBA

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. The Pizza Shoppe is just past the Sonic on your left.

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

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PRESIDENT'S CORNER

February

With the number of COVID-19 cases still being high we are going to continue to have our meeting via Zoom. I for one can not wait until we can meet in person and have pizza. It is important that we all remain as safe as we can during this period.

Public service events are being posted on Larry's list. This includes three events sponsored bu the Johnson County Parks. Please look at the calendar and volunteer for at least one. These events prepare us for disasters. Select a couple events to support and contact the event ham coordinator. Better yet, think about being a coordinator for an event. Being an event coordinator is another way be prepare for disaster.

Work has begun on Field Day 2022. When is Field Day as Jay would ask…. June 25 and 26. We set up on the Friday before (June 24). Please make plan to help with set up Friday and tear down Sunday.

The rework of the club's Constitution and By Laws is almost complete. The Board will be doing another review after which we will be posting it for members to provide comments. That will start the process for the members to vote.

March

Trying to take advantage of nice weather on Friday March 3rd, several club members gathered at Black and Veatch. The plan to get the new mount and cement blocks on the roof went off without a hitch. The new pad was laid on the roof and the mount was then bolted together. Now it's time to install the new mast, the last step before moving the antenna. At this point the phase "the best laid plans of mice and men" comes to mind. The new mast did not have the proper holes drilled in it to permit the braces to be connected. That ended the task and the crew retreated off the roof. We have reach out to get the correct mast. Once we have the corrected mast we will look for another nice weather day to returned to the roof.

Planning for Field Day 2022 is underway. Jay (WJ0X) has heard back for the Park Department and the permit is on its way. Mark June 25 and 25 on you calendar for
Field Day 2022. We will be having several planning meetings with at least on at the Hutton Farm.

– Bill Gery – KA2FNK

Johnson County Radio Amateurs Club - January 14, 2022

Meeting Date: Friday January 14, 2022. The meeting Started at 7:00 PM.

Attendance: Due to COVID-19 restrictions, this Meeting took place online using Zoom Video Conferencing. 33 were present.

There were No Minutes from the last meeting as it was the Club's Christmas Party.

The Treasurer's report was read and accepted unanimously.

Old Business:

- We welcomed all 1st time visitors to the meeting.
- Repeater Update – Bill Brinker, WA0CBW reported All Repeaters are working well. The Repeater Antenna on the roof of the Black and Veatch was blown over during the windstorm back in December. The wooden skid that the Antenna is mounted to has failed. The Antenna was temporarily stood back up and a Non-Penetrating Roof Mount has been ordered for $500 and will be installed when it arrives.
- The re-write of the Club's Constitution and By-Laws are almost complete. Once finished we will start the process of having them Approved by the Membership.

New Business:

- Al Rawitch, K0IMP was responsible for keeping the SK Plaque up to date. With his Passing we are now looking for some to take over this important responsibility. Gary Schlotzhauer, N2FSH has volunteered to fill this roll. Thank you, Gary!
- Field Day 2022 – June 25 and 26.

Reports:

- 6 m – NR.
- 10 m SSB Roundtable – 3 participated on January 13 and 5 participated on January 6.
- 40m SSB Roundtable – 5 participated on January 12 and 3 participated on January 5.
- Fusion Digital 440 net – 10 Check-ins on January 12 and 10 Check-ins on January 5.
- 2m Wheat Shocker net – 15 Check-ins on January 13 and 13 Check-ins on January 6.
- HF Activity – John Raydo, K0IZ contacted a station in Spain (EA3) on 20m with a strong echo. Turns out the echo was cause for the signal traveling the long path around the earth.

Announcements:

- John Raydo, K0IZ reported that starting January 1st the Creator of the EZNEC Antenna modeling program Retired and is now offering the Program for FREE. This is his top-of-the-line Program which sold for over $500.
- Olathe Marathon is April 23rd – See Herb Fiddick, NZ0F.
- Airshow at New Century Airport is also April 23rd – See Herb Fiddick, NZ0F.
- Bike MS is September 24 – 25. See Herb Fiddick, NZ0F.
- See Larry's List for upcoming Events.

Business meeting adjourned at 7:48 PM.

Program:

The Program was a presentation on by Herb Fiddick, NZ0F on "Emergency Communication Service, ECS" and we discussed potential Programs for 2022.

Johnson County Radio Amateurs Club - January 28, 2022

Meeting Date: Friday January 28, 2022. The meeting Started at 7:00 PM.

Attendance: Due to COVID-19 restrictions, this Meeting took place online using Zoom Video Conferencing. 40 were present.

The Minutes from the January 14, 2022, meeting was read and accepted unanimously.

The Treasurer's report was read and accepted unanimously.

Old Business:

- We welcomed all 1st time visitors to the meeting.
- Repeater Update – Bill Brinker, WA0CBW reported All Repeaters are working well. The new mount for the Repeater Antenna on the roof of the Black and Veatch has arrived. We are looking for a good weather day to install it.
- The Board will be meeting soon to finalize re-write of the Club's Constitution and By-Laws. Once complete, we will start the process of having them Approved by the Membership.
- Field Day 2022 – We have reached out to Shawnee Mission Park to secure the Old Hutton Farm for this year's Field Day (same spot as last year). We are currently working through the language on the Permit as there are some new clauses regarding Signage and Demonstrations.

New Business:

- Due to the recent surge in Covid 19 cases we have decided to continue the Club Meetings via Zoom until further notice.

Reports:

- 6 m – NR.
- 10 m SSB Roundtable – 3 participated on January 27 and 3 participated on January 20.
- 40m SSB Roundtable – 3 participated on January 26 and 3 participated on January 19.
- Fusion Digital 440 net – 9 Check-ins on January 26 and 8 Check-ins on January 19.
- 2m Wheat Shocker net – 15 Check-ins on January 27 and 11 Check-ins on January 20.
- HF Activity – FT8 on 30m – lots of contacts.

Announcements:

- Santa Fe Trail Amateur Radio Club Special Event Station January 29th.
- Winter Field Day January 29th – 30th.
- Shawnee Mission Triathlon and Duathlon is July 10th – See Bill Gery, KA2FNK.
- Kill Creek Park Triathlon and Duathlon is August 13th – See Bill Gery, KA2FNK.
- JCPRD Kids Triathlon at Kill Creek Park is August 20th – See Bill Gery, KA2FNK.
- Olathe Marathon is April 23rd – See Herb Fiddick, NZ0F.
- Walk MS is April 30th – See Herb Fiddick, NZ0F.
- Airshow at New Century Airport is also April 23rd – See Herb Fiddick, NZ0F.
- Bike MS is September 24 – 25. See Herb Fiddick, NZ0F.

Business meeting adjourned at 7:48 PM.

Program:

The Program was a video titled "5G C-Band Interference with Radar Altimeters in Aviation" by Juan Browne.

Johnson County Radio Amateurs Club – February 11, 2022

Meeting Date: Friday February 11, 2022. The meeting Started at 7:00 PM.

Attendance: Due to COVID-19 restrictions, this Meeting took place online using Zoom Video Conferencing. 35 were present.

The Minutes from the January 28, 2022, meeting was read and accepted unanimously.

The Treasurer's report was read and accepted unanimously.

Old Business:

- We welcomed all 1st time visitors to the meeting.
- Repeater Update – Bill Brinker, WA0CBW reported All Repeaters are working well. We are still waiting on good weather to install the new antenna mount on the roof of the Black and Veatch.
- The Board will be meeting soon to finalize re-write of the Club's Constitution and By-Laws. Once complete, we will start the process of having them Approved by the Membership.
- Field Day 2022 – We have reached out to Shawnee Mission Park to secure the Old Hutton Farm for this year's Field Day (same spot as last year).

New Business:

- None.

Reports:

- 6 m – NR.
- 10 m SSB Roundtable – 4 participated on February 10 and 3 participated on February 3.
- 40m SSB Roundtable – 4 participated on February 9 and 4 participated on February 2.
- Fusion Digital 440 net – 10 Check-ins on February 9 and 8 Check-ins on February 2.
- 2m Wheat Shocker net – 10 Check-ins on February 10 and 13 Check-ins on February 3.
- HF Activity – Pota Activation 2 for 1 by NZ0F, Germany and Sweden on 20m CW.

Announcements:

- Shawnee Mission Triathlon and Duathlon is July 10th – See Bill Gery, KA2FNK.
- Kill Creek Park Triathlon and Duathlon is August 13th – See Bill Gery, KA2FNK.
- JCPRD Kids Triathlon at Kill Creek Park is August 20th – See Bill Gery, KA2FNK.
- Hawk 100 is September 10 and 11 – See Bill Gery, KA2FNK.
- Olathe Marathon is April 23rd – See Steve Rainey, WD0DPB.
- Walk MS is April 30th – See Herb Fiddick, NZ0F.
- Airshow at New Century Airport is also April 23rd – See Herb Fiddick, NZ0F.
- Bike MS is September 24 – 25. See Herb Fiddick, NZ0F.

Business meeting adjourned at 7:31 PM.

Program:

The Program was a video titled "Portable Mesh Network used at the Hawk 100" by Bill Gery, KA2FNK.

Submitted by Ted Knapp, N0TEK Secretary.

Johnson County Radio Amateurs Club – February 25, 2022

Meeting Date: Friday February 25, 2022. The meeting Started at 7:00 PM.

Attendance: Due to COVID-19 restrictions, this Meeting took place online using Zoom Video Conferencing. 35 were present.

The Minutes from the February 11, 2022, meeting was read and accepted unanimously.

The Treasurer's report was read and accepted unanimously.

Old Business:

- We welcomed all 1st time visitors to the meeting.
- Repeater Update – Bill Brinker, WA0CBW reported All Repeaters are working well. We have targeted next week to install the new antenna mount on the roof of the Black and Veatch building.
- The Board has finalized re-write of the Club's Constitution and By-Laws. Look for a presentation on the next steps shortly.
- Field Day 2022 – We have secured a Permit for the Old Hutton Farm at Shawnee Mission Park. We are looking for any suggestions for this year's Field Day. Contact Jay Greenough, WJ0X with questions or suggestions.

New Business:

- None.

Reports:

- 6 m – NR.
- 10 m SSB Roundtable – 4 participated on February 24 and 5 participated on February 17.
- 40m SSB Roundtable – 4 participated on February 23 and 6 (including New Mexico) participated on February 16.
- Fusion Digital 440 net – 10 Check-ins on February 23 and 9 Check-ins on February 16.
- 2m Wheat Shocker net – 15 Check-ins on February 24 and 15 Check-ins on February 17.
- HF Activity – Greenland, Ukraine, Marshal Islands, and Estonia.
- POTA Activation 4 Total.

Announcements:

- Shawnee Mission Triathlon and Duathlon is July 10th – See Bill Gery, KA2FNK.
- Kill Creek Park Triathlon and Duathlon is August 13th – See Bill Gery, KA2FNK.
- JCPRD Kids Triathlon at Kill Creek Park is August 20th – See Bill Gery, KA2FNK.
- Hawk 100 is September 10 and 11 – See Bill Gery, KA2FNK.
- Olathe Marathon is April 23rd – See Steve Rainey, WD0DPB.
- Walk MS is April 30th – See Herb Fiddick, NZ0F.
- Airshow at New Century Airport is also April 23rd – See Herb Fiddick, NZ0F.
- Bike MS is September 24 – 25. See Herb Fiddick, NZ0F.

Business meeting adjourned at 7:38 PM.

Program:

The Program was a Demonstration on how to use the EZNEC Antenna Modeling Software by John Raydo, K0IZ.

Submitted by Ted Knapp, N0TEK Secretary.

Hambone Tunes Up

A Hambone story by Jaimie Charlton, ADØAB

Outside it's Kansas cold with light snow, but inside his fraternity's ham shack we find Hambone at the repair bench bent over a blackened electronic device. "Gees, what a mess," Hambone murmurs to himself as he investigates the inside of a small antenna tuner his uncle gave him just a week ago. Although the Hambone eyes were staring blankly at the coil and capacitors, the Hambone brain was multitasking as it struggled with two problems, how to fix this mess and how to hide it from his Uncle Elmer.

It's no wonder that Hambone nearly jumped out of his skin when he heard, "Boy, that switch is really fried!

Oh, did I startle you? Sorry," said Tim, a friend and frat brother. "It looks like something really cooked that tuner."

"Yeah, it was me. I cooked it," murmured Hambone.

"Hi guys," hollered Dude, as he burst into the frat house stamping the snow off his boots. "What's happenin'? Oh, Hammy, I see you're still trying to fix Unck's tuner. Good luck with that!"

"So," asked Tim, "What happened to it?"

"Hammy just burned it up," blurted Dude. "It really belongs to our Uncle Elmer. He loaned it to Hammy so he could learn how tuners work and how to use one. It looks like the only thing he learned is how to burn one up."

"What did you do?""I'm not sure," replied Hambone. "I was trying to tune up my antenna when I heard some arcing noise and the SWR shot way up and stayed there. Maybe this little tuner can't tune my big antenna. It's a hundred-foot long-wire with lots of ground radials.

On the other hand, I'm beginning to think maybe this thing was already bad when Unck gave it to me as sort of a test. He knew I wanted an automatic tuner. They're much better. But he said I should use a manual tuner first to see how tuners work. After that, maybe I could get an automatic one."

"Well," said Tim, "I prefer automatic tuners. But some of the old fogies, er, elder statesmen of ham radio, think everyone should start with the most basic level of equipment and struggle with it before upgrading to new technology. I guess because they learned radio 'the hard way' everyone else should too."

"I'm not sure it was so hard back then. A lot less was known so a lot less was expected," said Hambone. "I was looking through some of Unck's old magazines and catalogs and there were a lot of stores selling all kinds of parts and the magazines were full of schematics and things. It all looked pretty simple to me.

"From what I read, just making something transmit or receive a signal was an accomplishment. One hundred miles was considered great DX on any band."

"When I was a kid, my dad bought me a radio kit," added Tim. "He and I built it and I could listen to stations in my room. I loved it. Even then that was old school. But it worked and I learned a lot from it. So, maybe there is something to as they say, working your way up."

"Hey, what's happening boys?" asked a deep authoritative voice that could only belong to Professor Erlenmeyer Flask, one of the boy's engineering instructors, alumnus member of the fraternity and certainly an elder statesman of the ham community.

"Oh, hi Professor Flask. Not much," said Hambone, a little too quickly. "We're just talking about antenna tuners and why we prefer the automatic ones."

"The automatic tuners are great, but you don't learn much from them. It's better to start with the basic three-knob manual tuner to really understand what's going on. After all, ham radio is really all about learning."

"Hmm, where have I heard that before," said Tim to no one in particular.

Turning to Hambone, the professor continued, "By the way, your uncle

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from Hambone on page 7

Elmer told me he gave you a tuner just so you could see how it works. Do you have it handy? We could take a look at it."

"Oh, er, I'm not sure where it is," muttered Hambone as he shuffled around the shack pretending to look for the charbroiled tuner.

"I see it, it's over there!" exclaimed ever-helpful Dude, indicating the workbench at the far end of the room. "I'll get it."

Even before Dude retrieved the tuner, the keen eye of Professor Flask perceived that something was not quite right. "Oh, I see why it's over on the repair bench. You've burned the selector switch. How did that happen?"

"Speak up, Hammy," prodded Dude. He really enjoyed putting his older brother on the spot. "Confession's good for the soul."

"Okay, okay!" said Hambone. I really wanted an automatic tuner, but Unck stuck me with this old piece of junk. He said he'd get me one as soon as I could explain how to use this thing.

"So, I hooked it up to my rig and antenna just as the diagram shows. I set my transceiver to CW to get a nice steady signal and pressed my key. The tuner's meter showed a pretty high SWR, 6 or 8 to one, I think.

"Since the tuner's job is to reduce the SWR, I turned the switch to find a better setting. To my surprise, as I clicked through the switch positions, the SWR decreased. I heard some snapping noise, but everything seemed fine. Then I turned the knobs and the SWR decreased to below 2:1 so I left the settings there.

"After making a couple of contacts, I switched to a different band and the SWR shot up again. So, I turned the switch until it went down. This time the snapping sound was much louder. The SWR decreased, but then shot way up and turning the knobs had no effect. I knew something was wrong because a hot smell came out of the tuner."

"Yup, you fried it," concluded Dude.

"I know that, dummy, but why? The manual says it is a 100-watt antenna tuner and my transceiver only puts out a hundred watts. It should not have burned. But it did, why?"

There's nothing like the word 'why' to energize a professor, even an aging one like Professor Flask. Responding to the cue, Flask said, "I can explain that.

"First, look at the specs. That tuner is rated at 100 watts PEP, Peak Envelope Power. That means it is really only good for about 50 watts, maybe less, of continuous power. Ham radio suppliers like to advertise PEP because it makes their equipment look more powerful. Unless you know differently, a good rule-of-thumb is to assume the real rating of a piece of ham gear is about one-half of its advertised value. This is especially true of antennas and accessories.

"Anyway, when you were holding your key down your transmitter was sending a full 100 watts to the tuner, way over its published PEP spec.

"Secondly, the manual says you must only tune at reduced power, about 15 watts. This is to prevent damage to the switch. Since you were tuning at 100 watts – way, way over spec, the snapping you heard was the sound of internal arcs burning up your switch contacts."

"Okay, so what's the right way to tune?" asked Hambone getting a bit defensive.

"Reading the manual wouldn't hurt," the professor shot back. "But it's simple, so I'll just tell you one possible way.

"You start with the transceiver tuned to your operating frequency and set all the knobs on the tuner to their 50% positions. Then, with the transmitter off, turn the switch until you hear maximum noise in the receiver. Once you find that position, adjust the two other controls to further maximize receiver noise.

"When you think you've got it, repeat everything. All the controls interact, so there might be a better switch position. This procedure should go fast. Don't spend more that 15-20 seconds doing it. Precision is not of any value.

"Next, set you transmitter's output to a value of around 10-15 watts and key it. The SWR should be quite low. Leave the switch and further adjust the other two knobs to minimize the SWR. If you find more than one setting giving low SWR, pick the one that results in the highest value, or most closed position, for the variable capacitor nearest the antenna. It's often marked 'Antenna'. Be sure to look inside the tuner to determine which rotation of the variable caps results in their most closed position. The calibration on the knobs can be misleading. That's all there is to it.

see HAMBONE on page 9

from Hambone on page 8

"But remember, never turn the switch while transmitting and, you will have to retune when you make a big change in frequency."

"I've often wondered," said Tim, "How the tuner tunes the antenna when it's way down here at the end of a long piece of coax."

"Actually, said Professor Flask, "It doesn't have anything to do with the antenna and as Hambone mentioned earlier, it doesn't reduce SWR either."

"Then, what good is it?" interjected Dude.

"In this case and most cases, it converts whatever complex impedance appears at the station end of your coax to a resistive 50-ohm impedance. The antenna's resonance and other characteristics are unchanged and the reflected power, er, SWR is still there."

"Again, why do we need it?" continued Dude.

"You need it because your nice solid state no-tune transmitter can only drive a 50-ohm resistive load. Deviate very far from that and either you burn out your transmitter or, its protection circuits decrease your power or take you off the air. In other words, you need to match the impedance of your antenna/coax to a value your transmitter can drive."

"If the antenna tuner doesn't tune the antenna, how does it do that?" asked Dude.

"When you take some electromagnetics classes, you'll learn the details, but the short form is this. The physical dimensions of an antenna determine its fundamental resonant frequency. For dipoles, that's the frequency at which the overall length of the antenna equals a half-wavelength, more or less.

"I still don't get it," said Tim. "I thought a tuner made an antenna resonant so it would radiate."

Flask continued, "I can see you boys didn't pay a lot of attention in last year's electromagnetics class. For simple wire antennas, the pattern and resonant frequencies are determined by the physical construction and the operating wavelength – antenna dimensions are generally expressed in wavelengths of the operating frequency. The drive-point impedance, that's where the coax connects to the antenna, depends on where the drive point is located on the driven element. If your antenna is a simple half-wavelength dipole with the drive point located in the center, it's overall length can be trimmed to present a 50-ohm resistive load to your coax.

Since your coax characteristic resistance is also 50 ohms, you don't need a tuner because the antenna matches the coax so there will be no reflected power and your SWR will be 1:1."

"That's what we want!" said Dude. "Don't we?"

"Yes," replied Flask. "But don't get too excited. That applies only at that one frequency and to some extent, odd multiples of that frequency. If you try to use that same antenna on different frequencies, its drive-point impedance will no longer be 50 ohms resistive and you'll get standing waves on your coax."

"I get it! That's when you need a tuner to re-tune the antenna to the new frequency!" exclaimed Dude.

"No," continued Flask. "As I mentioned before, the tuner has nothing to do with the antenna."

"I guess I don't get it."

"If your antenna matched your coax there would be no standing waves on the coax and the impedance at the station end would be the impedance of the coax, 50 ohms. But standing waves caused by the antenna impedance not matching the coax change that."

"How can the impedance of the coax change?" asked Hambone. "I thought 50-ohm coax was always 50 ohms."

"It is, but that's the impedance of the coax when you place a voltage across its input and measure the current that flows into the cable. According to Ohm's Law, R=E/I, the ratio of that voltage divided by that current will equal 50 ohms, or whatever impedance you coax happens to have.

But when your coax doesn't match your antenna, you have voltage and current standing waves that add to or subtract from that original voltage and current changing the ratio. The effect is the apparent impedance is no longer 50 ohms. A tuner converts that impedance back to 50 ohms."

"Couldn't you just find a place along the coax where the apparent impedance was 50 ohms and connect the transmitter there?" asked Tim.

"Maybe. There's no guarantee there's a place where the impedance is 50 ohms resistive. In any case, when you change the frequency, that position will change. Also, when

see HAMBONE on page 10

from Hambone on page 9

your antenna is not resonant, its impedance will contain a reactive component that must be removed. The tuner does that, too."

"Okay, let me get this straight," said Hambone trying to sum up what he'd just heard. "When the antenna does not match the coax – which is most of the time – standing waves appear on the coax that cause the coax impedance at the station end to appear different from the original 50 ohms.

The tuner cancels out any reactive component of that impedance and transforms the remaining resistive part to 50 ohms that the transmitter can drive. Is that correct?"

"That's exactly right," sighed Flask.

"Okay, then what happens to the standing waves, does the tuner absorb them?"

"No, the standing waves are still there. The tuner reflects most of that power back up the coax to the antenna. That power bounces back and forth between the antenna and the tuner until it gets radiated by the antenna or dissipated in the coax and tuner."

"I never knew a simple little tuner did all that," said Hambone. "I always thought that the antenna tuner tunes the antenna and that was it."

"Did somebody say tunes?" Came the unmistakable voice of Hambone's Uncle Elmer who had just wandered into the shack looking for his friend, Erlenmeyer Flask. "Early, I just saw that great honkytonk piano player has returned to the Dew Drop Inn. Let's go and listen to some old tunes."

"Good idea!"

Author's note: The boys were not invited.

>> JCRAC FEEDBACK <<

from ALTIMETERS on 1

Many authorities agree that the logical solution is to swap out old altimeters for new ones. Manufacturing, distributing, installing and testing the new devices in each variety of aircraft will, however, take time and billions of dollars that the aircraft industry, the wireless industry and the federal government have shown little appetite for paying.

Former FCC chairman Wheeler, writing for the Brookings Institution suggested that funding might come from part of the $82 billion the government received from selling 5G frequencies to wireless companies, from the wireless companies that wanted to use the frequencies, or from an aviation industry that has long known that 5G was coming.

Browne and others have suggested that an immediate solution might be two limit power and to redirect 5G antennas near airports. Others criticize the idea of limiting 5G usage near airports, where there are frequently many people needing and wanting to use the signals.

Additional background material supplied by the New York Times.