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

FEEDBACK

MAY 2021

Hambone and the Lost Current

A Hambone Story by Jaimie Charlton, ADØAB

It's a cool spring day in Kansas as we find Hambone lost in thought and slouching his way back to his frat house. Suddenly, he is shaken back to reality.

"It's a beautiful spring day, school's almost over and summer's waiting, why so glum, Hammy?" asked Hambone's excessively cheerful uncle Elmer.

"Oh, hi Unck, what are you doing here in campus?" said Hambone, answering a question with a question.

"I am just here to say good-bye to my friend Professor Gavot Bransle. I believe he goes back home at the end of the week."

"Well, all I can say is he can't leave too soon. I want Professor Flask back. That Gavey is just too weird."

"That's Professor Bransle, to you," retorted Elmer. "Show some respect! Professor Bransle is a brilliant man and you were lucky to have him as your teacher."

"Sorry, Unck. It's just that he is weird, that's all."

"What do you mean 'weird'?"

"It's like this. The class I'm in is a radio frequency lab, right? That means we play with, er, study antennas and amps and stuff like that, right? Then why did he make our big exam today all about plain old 60 Hertz AC? That makes no sense. That's weird," replied Hambone getting a bit more aggressive.

"So, how did you do on that exam?"

"I flunked! Okay?"

"At last, the truth is out!" shouted Elmer. "You think Professor Bransle is weird because you flunked an exam. Now I get it, he's weird because you're dumb."

"It sounds different when you say it," mumbled Hambone. "But, yes."

"I've got to go," said Elmer. "But come over to my shack this afternoon and tell me why the exam was so difficult. As I used to say to my students when I was teaching, you learn best from the exams you fail."

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"So, tell me about the exam," said Elmer. With his ubiquitous coffee cup in hand and yellow pad on his bench, Elmer is all set to review Hambone's failings.

see HAMBONE on page 5

MAY MEETINGS

May 14 *-- Zoom meeting – Field Day 2021.*

May 28 *– Zoom meeting - 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. Pizza Shoppe is just past the Sonic on your left.

IN THIS ISSUE

-> FEEDBACK <-

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

Bill Gery, KA2FNK, President

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Ted Knapp, NØTEK, Secretary

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All email addresses are available at w0erh.org

PRESIDENT'S CORNER

We lost another member in April. Rich (KCØVDH) passed away after an accident at his home. The was limited space at his house, but Rich's family appreciated the drive by to honor Rich. Thank to everyone that could take part in the drive by either in person or on the repeater.

We are beginning to see groups planning public service events. COVID caused us to miss these events last year. Public service events are a great way to learn more about your equipment, so please try to volunteer for at least a couple. I still need operators for the Hawk 100 on September 11 and 12th.

Field day planning is in full swing. Details at our first May meeting. There is a need for help with setup Friday afternoon and break down Sunday. Also, some people to campout Friday night.

While we have not set at date for the Ensor auction in October, please start gathering donations. The auction could be either October 23 or the 30th.

– Bill Gery – KA2FNK

Johnson County Radio Amateurs Club - April 9, 2021

Meeting Date: Friday April 9, 2021. The meeting Started at 7:00 PM.

Attendance: Due to COVID-19 restrictions, this Meeting took place online using Zoom Video Conferencing. 39 were present.

The Minutes from the March 26, 2021 meeting were read and accepted unanimously.

The Treasurer's report was read and accepted unanimously

Old Business:

- Both Gary Adams, WA0BTM and Rich Zaban, KC0VDH became Silent Keys recently.
- We welcomed all 1st time visitors to the meeting.
- Repeater Update – Bill Brinker, WA0CBW, reported that all 5 Repeaters are working well. A new Wires-X has been posted by Harold "Van" Van Daveer, K0HCV on the kansascityroom.com website under the Wires-X Tab.
- Field Day 2021 – Planning will start soon around Stations with the Station Captains including a Site visit.
- Herb Fiddick, NZ0F reports the SATERN Communication Van upfitting has been completed by VanDoit. The next step is to install the radio and computer equipment.
- The Overland Park Christian Church, where we hold our in-person meetings, has not decided yet as to when we can return to having our meetings there. The Church is planning to discuss the matter at their May Board meeting.

New Business:

- Dave Porter, K0DVP along with Kevin van der Does, AD0IM and Dave Felter, K0DAG are forming a new committee that would prepare a welcome packet to be sent to new members. The packet would consist of a welcome letter from the club president and a listing of ham radio resources useful to new hams entering the hobby or experienced hams new to the area. The packet would be sent via email or by USPS. A follow up contact in person or by phone by a club member who would explore the interests of the new member and make referrals as needed to subject matter experts within the club. Anyone interested in helping out please contact Dave Porter, K0DVP.

Reports:

- 6 m – NR.
- 10 m SSB Roundtable – 5 participated on April 8.
- 40m SSB Roundtable – 5 participated on April 7.
- Fusion Digital 440 net – 17 Check-ins on April 7 and 15 for Check-ins on March 31.
- 2m Wheat Shocker net – 19 Check-ins on April 8 and 18 Check-ins on April 1.
- HF Activity – NR.

Announcements:

- WW1USA Remote Special Event May 15th.
- See Larry's List for upcoming Events.

Business meeting adjourned at 7:48 PM.

Program:

The Program was a Presentation on "Permanently Installing a Portable 5550-Watt Generator for Back-up Power" by Ted Knapp, N0TEK.

Submitted by Ted Knapp, N0TEK, Secretary.

Johnson County Radio Amateurs Club - April 23, 2021

Meeting Date: Friday April 23, 2021. The meeting Started at 7:00 PM.

Attendance: Due to COVID-19 restrictions, this Meeting took place online using Zoom Video Conferencing. 37 were present.

The Minutes from the April 9, 2021 meeting were read and accepted unanimously.

The Treasurer's report was read and accepted unanimously

Old Business:

- We welcomed all 1st time visitors to the meeting.
- Thanks to all who participated in the memorial drive-by procession for Rich Zaban, K0VDH. The family was very appreciative.
- Repeater Update – Bill Brinker, WA0CBW, reported that all 5 Repeaters are working well. Bill also reported that the new rules for measuring RF Exposure go into effect May 3. All Hams must now do an evaluation of the Ham Station. See Bill if you have any questions.
- Field Day 2021 – Planning will start soon around Stations with the Station Captains including a Site visit.
- Herb Fiddick, NZ0F reports the SATERN Communication Van upfitting has been completed and Computers and Radios have been installed. A show and tell of the Comm Van will take place at the SATERN meeting on May 10.
- Dave Porter, K0DVP reported that the New Member Committee is just about ready to share the proposal with the Board.

New Business:

- Parks on the Air (POTA) party May 8th from 10 am to 2 pm. See Herb Fiddick, NZ0F for more information.

Reports:

- 6 m – NR.
- 10 m SSB Roundtable – 5 participated on April 21 and 6 participated on April 14.
- 40m SSB Roundtable – 3 participated on April 22 and 4 participated on April 15.
- Fusion Digital 440 net – 14 Check-ins on April 21 and 17 for Check-ins on April 14.
- 2m Wheat Shocker net – 19 Check-ins on April 22 and 19 Check-ins on April 15.
- HF Activity – NR.

Announcements:

- WW1USA Remote Special Event May 15th and an in-person Special Event on November 15th. See Charlie Van Way, N0CVW for more information.
- Hawk 100 September 11-12. See Bill Gery, KA2FNK for more information.
- International DX Convention May 15-16. Pre-Registration is required but it is FREE. www.dxconvention.com
- See Larry's List for upcoming Events.

Business meeting adjourned at 7:41 PM.

Program:

The Program was a Presentation on "Hot DX From Baker Island" by John Miller, K6MM.

Submitted by Ted Knapp, N0TEK, Secretary.

from HAMBONE on page 1

"We met in the AC motor Control Lab instead of our usual classroom. On each of our work benches there was a 120 VAC panel relay and a capacitor, 3 MFD, I think. We also had a multimeter and 120 VAC 60Hz power supply. There were only three questions," explained Hambone.

"The exam had a simple diagram showing the relay and the capacitor connected in parallel to the 120 volt source. There was a switch in series with the capacitor so it could be switched into or out of the circuit.

The first question asked, 'Is the power supply current higher with the switch open or closed?'

The second question asked 'why'.

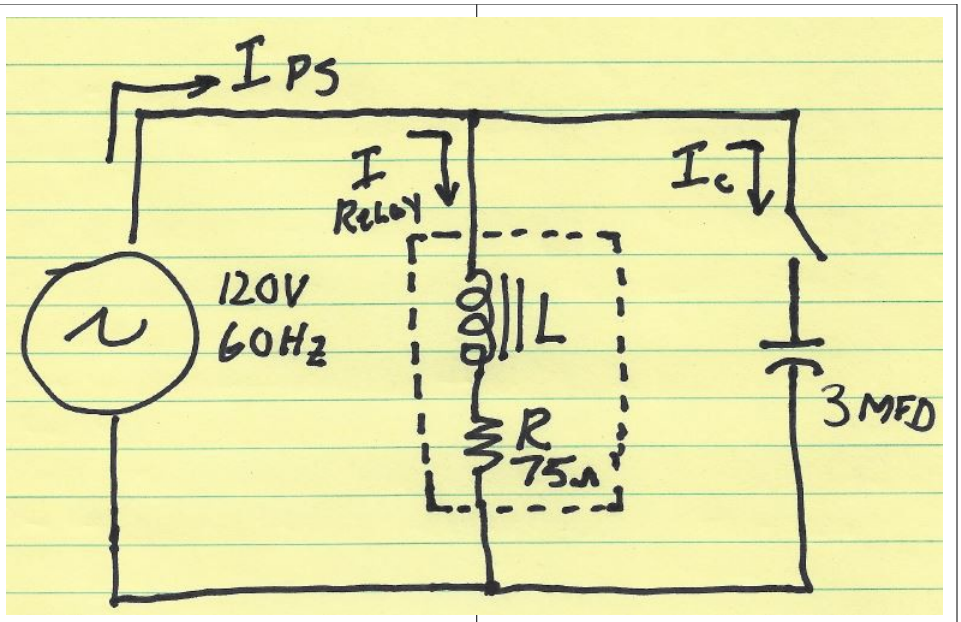
The third question asked us to calculate the inductance of the relay coil. That was easy and my answer was about 1.82 Henries. It's the first two I'm worried about."

"So, what were your answers?" asked Elmer.

"I said, the power supply current was higher with the switch closed because the elements were connected in parallel, their currents added."

"Go on."

"But then I began to suspect something because that was too easy. So, I built the circuit and measured the currents. These are my measurements and you



can see the power supply current was definitely lower with the switch closed," said Hambone as he sketched the circuit on Elmer's yellow pad.

"I panicked and measured everything again and got the same numbers. So, I changed my answer to 'lower with the switch closed'."

"That's probably the correct answer," said Elmer.

"That's crazy! How can the total current be lower when we have more parts sucking current out of the power supply?" demanded Hambone. "Did that extra current just magically disappear?"

Leaning back in his chair, Elmer drifted into his professorial mode and explained, "Radio and radio frequency is just a form of alternating current. You get used to talking about phases and SWR and impedances related to radio frequencies, but they also exist wherever AC currents are involved."

"Yes, Unck, but that still doesn't explain why the total current from the power supply doesn't equal the current through the capacitor plus the current through the relay. I thought that was the law of parallel circuits or something like that."

"I said that the currents don't 'simply' add up. They do add up if you consider their phases. It's a little like making that parmesan cheesy scrambled eggs you love.

The finished eggs taste very different from the raw eggs and cheese by themselves."

So, Unck, you're saying that I need to look at the whole circuit, not just the separate parts. Is that right?"

"Yes. Let's find the 'raw' currents through the relay and the capacitor and then put them together.

see HAMBONE on page 6

from HAMBONE on page 5

Using your numbers, let's find the impedance of the relay at 60 Hertz. You said that the inductance was 1.82 Henries and the DC resistance was 75 ohms so, we'll use those values. But, because we're using AC with capacitors and inductors, we must use impedances which means complex numbers."

"I hate complex numbers," mumbled Hambone.

L = 1.82 H

R = 75 ohms

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"I hate complex numbers," mumbled Hambone.

"Get used to them. They're extremely popular with the RF crowd so, I think they're here to stay. Let's start by listing your values and then calculate what's happening.

L = 1.82 Henries

R = 75 ohms

f = 60 Hertz

C = 3 mfd or 0.000003 Fd

The reactance of the relay's coil at 60 Hertz is:

$X_L = 2\pi fL = 2x3.14x60x1.82 =$ 702 ohms

That means the complex impedance of the relay at 60 Hertz is:

$Z_{relay} = 75+j702$ ohms

Remember, the numerical values of the reactance and impedance depend on frequency so these are only at 60 Hertz.

Using Ohm's Law and substituting the AC values – e for AC voltage and Z for impedance, the relay current is, I = E/Z:

$I_{relay} = e/Z = 120/(75+j702) =$ 0.0173-j0.169 amps or in polar notation 0.170 amps angle -84 degrees

Since you love complex numbers, I'll leave the detailed calculations for you to do at your leisure.

Now let's find the capacitor current the same way:

$X_c = 1/(2\pi fC) = 1/$ (2x3.14x60x0.000003) = 884 ohms

Since you didn't measure any resistance associated with the capacitor, its impedance is:

$Z_{cap} = 0-j884$ ohms and its current is:

$I_{cap} = e/Zc = 120/(0-j884) =$ 0+j136 amps or in polar notation 0.136 amps angle +90 degrees

So Hammy, you can see the answer is obvious."

"If you say so, Unck," yawned Hambone looking for a way to escape this mathematical nightmare.

Elmer continued, "With the switch open, you have only the relay current of 0.170 amps because no current can flow through the capacitor. Let's call that raw eggs.

With the switch closed you still have the relay current, but now you also have a capacitor current of 0.136 amps. Let's call that cheese.

But look, the phase angle of the relay current is +84 degrees and the angle of the capacitor current is -90 degrees. They are almost 180 degrees out of phase with each other. That means when we

see HAMBONE on page 7

from HAMBONE on page 6

combine these two currents to get the total power supply current – the cheesy eggs – they nearly cancel each other leaving only:

I_{relay} + I_{cap} = 0.170 amps angle 84 + 0.136 amps -90 = 0.038 amps angle 61 degrees

So, with the switch open you have a power supply current of about 170 milliamps, but with the switch closed, the power supply current drops to only about 38 milliamps."

"Gee, Unck, that's a lot of work for such a simple circuit."

"Not really, it takes longer to describe it than to do it. But it shows you that just because a problem looks simple, you shouldn't jump to conclusions about it.

By the way, that power supply current didn't 'just magically disappear'. It's been there all the time. The power supply just doesn't 'see' it because it sees the whole circuit current, not just the individual parts."

"I sort of see it, mumbled Hambone. But it still looks like the current just disappears."

"Okay," sighed Elmer. "Another way to look at it is to pretend it is a parallel LC tank circuit like in a tuner. The inductor and capacitor work together to form a high impedance, like this:

Z_{relay} = 75+j702 ohms

Z_{cap} = 0-j884 ohms

Put them together using that old familiar formula for two impedances in parallel:

$Z_{parallel\ total}$ = (Z_{relay})(Z_{cap})/ (Z_{relay}+Z_{cap}) = (75+j702)(0-j884)/ (75+j702+0-j884) = 3170 ohms angle 62 degrees. This is the impedance of the whole circuit at 60 Hz that the power supply is feeding.

We can find the power supply current by putting that impedance into Ohm's law:

I_{ps} = e/Z = 120/3170 = 38 milliamps which is what you measured."

"I get it now!" exclaimed Hambone. "That Gavey was pretty tricky disguising a tuner problem as something with a plain old relay. I won't fall for that again!"

"Oh, you probably will."