

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

# ***FEEDBACK***

**JULY 2021**



## **JULY MEETINGS**

**July 9 -- TBA**

**July 23 -- 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.*

## **JCRAC FIELD DAY RESULTS 2021**

Call Used: WOERH // GOTA Station Call: WOAR

ARRL/RAC Section: KS // Class: 4A

Participants: 62

Power Source(s): Generator, Battery, Solar

Power Multiplier: 2X

Preliminary Total Score: 10,658

Bonus Points:

100% emergency power = 400

Media Publicity = 100

Public location = 100

Public information table = 100

W1AW Field Day message = 100

Natural power QSOs completed = 100

Site visit by invited elected official = 100

Site visit by invited served agency = 100

Educational activity = 100

Youth participation (9 x 20, max of 100) = 100

Safety officer = 100

GOTA Station = 360

Entry submitted via web = 50

Total bonus points = 1,810

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## **-> 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*

## **More Field Day Results**

	<u>CW</u>	<u>Digital</u>	<u>Phone</u>	<u>Total</u>
Total QSOs	787	530	1790	
Total Points	1574	1060	1790	4424
Claimed Score=(QSO points x power multiplier)=8848				

	CW	Digital	Phone
	QSOs/Watts	QSOs/Watts	QSOs/Watts
80m		53/30	155/100
40m	377/100	215/30	556/100
20m	389/100	222/30	777/100
15m	21/100	40/30	
		GOTA	302/100
TOTAL	787	530	1790

## **Historical QSO Comparison (courtesy of Ted, NØTEK)**

	2021	2018	2017
Phone	931	1148	875
Solar	578	692	913
CW	742	528	412
Digital	530	266	215

## **PRESIDENT'S CORNER**

Field Day 2021 was a true "Field Day" with operations at the Shawnee Mission Park. Rain delayed the setup Friday, but



did not prevent the Club's meeting and ice cream social after the meeting.

Setup Saturday was completed just in time for our planned Field Day events.

This meant however that we did not have

time to check out everything like we would have liked. There were several items that were being troubleshoot after the 1 PM start Saturday. Most were resolved by Saturday evening. The Field Day logging software network latency issue was not resolved however. We did capture network data and will use this to understand and correct for next year.

Unlike 2019 Field Day, 2021 was not rained out. High temperatures were 80 to 85 Saturday and Sunday with the overnight reading in the mid 60s. Setup Friday, however, was less pleasant. The temperatures were in the low 90s.

Please extend thanks to the club members who worked hard to helped make this a successful Field Day. Jay (WJ0X), had to track down the porta potties. Keith (KE0AEP) brought his solar equipment. Brian (KC0BS) was our GOTA coach. Our station captains were great. My special thanks go to (KC4TKL) and Keith (KA0VXX) for all their help troubleshooting the network issues. Thanks to everyone who helped with the setup and breakdown.

**- Bill Gery - KA2FNK**

## ***Johnson County Radio Amateurs Club - June 11, 2021***

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

The Minutes from the May 28, 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.
- Repeater Update – Bill Brinker, WA0CBW, reported that all 5 Repeaters are doing well.
- Field Day 2021 – we are all set to go.
- Dave Porter, K0DVP reported that the New Member Committee proposal has been submitted to the Board.
- Jeff Darby, KS0JD Reported that around 50 people attended the Marshal Ensor Wm. S. Paley Award Special Event on June 5<sup>th</sup>. He also reported that about 120 contacts were made.
- The Overland Park Christian Church will allow us to meet in person starting in July. The Church is requiring that ALL meeting participants wear a mask.

### New Business:

- The Johnson County Community College Amateur Radio Club recently installed a VHF/UHF antenna on the college campus. They currently do not have a radio. They are also working on applying for a Club Call.

### Reports:

- 6 m – Open to the East.
- 10 m SSB Roundtable – 5 participated on June 10.
- 40m SSB Roundtable – 1 participated on June 9.
- Fusion Digital 440 net – 10 Check-ins on June 9 and 15 for Check-ins on June 2.
- 2m Wheat Shocker net – 18 Check-ins on June 10 and 16 Check-ins on June 3.
- HF Activity – Japan and Lebanon on FT8. Kenya and Venezuela.

### Announcements:

- Hawk 100 September 11-12. See Bill Gery, KA2FNK for more information.
- Bike MS September 25-26.
- Lenexa Moonlight Bike Ride July 17.
- Buffalo Bill Century Ride September 18.
- See Larry's List for upcoming Events.

Business meeting adjourned at 8:08 PM.

### Program:

The Program was an open Question and Answer Panel discussion.

## ***Johnson County Radio Amateurs Club - June 25, 2021***

Meeting Date: Friday June 25, 2021. The meeting Started at 7:00 PM.

The meeting tonight was held at the Field Day site (Old Hutton Farm at Shawnee Mission Park).

There was no formal meeting.

## A Hambone Story - Jaimie Charlton, ADØAB

### *Hambone Has Something in Common*

It's Summer in Kansas. It's hot. No, not that so-called dry heat that some of the uninformed say really doesn't feel hot. This feels hot. Really hot.

The engineering school that Hambone and his buddies attend is on summer break.

Visiting professor Gavot Bransle has gone back to his hometown in western Kansas and Professor Erlenmeyer Flask and his wife, Florence, are touring Europe on a river cruise.

Things are moving pretty slowly on campus, but they are moving, sort of.

Adjunct Professor Elmer, Hambone's uncle, is teaching a light-weight class on electrical safety. But today's session has ended and Elmer is just wandering around campus. Most of the out-of-town students have returned home to work summer jobs. Some others, who live closer, can still be found draping themselves over the tattered furniture in their Fraternity House where there is an unending supply of summer coolers. Hambone and his buddies belong to this in-town group.

But Hambone is not lounging, he's in the frat's ham shack arguing with Tim, one of the smarter – maybe the smartest – frat brother.

"I don't care what you said, Hammy, this station worked and now it has problems. That new software defined radio is the best there is, but you've managed to screw it up."



"Tim, cool it! I did NOT screw up the new transceiver. I connected it up exactly like the book shows and all the voltages are correct. I just cleaned things up a bit."

"Cleaned up and screwed up. You shouldn't mess with things you don't understand. After all, who has the higher-class license you or me?" asked Tim.

"Oh, now you're pulling rank on me? Well, your license doesn't make you right."

"Ever since you 'cleaned things up', Hambone, that new radio re-boots itself randomly, I can't get a decent SWR reading on the antenna analyzer and that new dual indicator RF ammeter goes wonky and shows different currents on the two sides of the ladder line going to our big double zepp antenna."

"I don't know what your problems are, but I didn't cause them!" shouted Hambone. "It's just common sense that cleaning up and shortening our feedlines reduces loss and makes the station run better"!

Elmer's campus wandering has brought him over to the frat house ham shack. He wanted to see how the new equipment that was given to the fraternity by an anonymous donor was working. He arrived at the door just in time to hear the word 'wonky'.

"Hi guys," said Elmer as he entered the shack and closed the door

sealing in the cool air-conditioned air and the heated argument. "Is 'wonky' a technical term? I haven't heard that one before."

"Hi Unck," said Hambone.

"Hi Mr. Elmer," said Tim. "I don't think 'wonky' is a technical term, but it sure is what's going on."

"Yeah, Unck. Tim says I screwed up the new radio we just got. I didn't. At least, I don't think so."

"Okay," said Elmer trying to tamp down the heat. Technically speaking, tell me what's going on? Tim, you go first."

"Well, Mr. Elmer, that new Software Defined Radio is spectacular and the amp that came with it is even more spectacular. We are really grateful to whoever donated that rig to our fraternity. But there's some problems."

"Problems?" asked Elmer.

"Yes, they appeared right after Hambone cleaned..."

"I DID NOT cause any problems," interrupted Hambone.

"I didn't say you CAUSED them," Tim retorted. "I said they appeared right after you 'cleaned up' the shack!"

"Calm down, boys. We'll find the problem. Go on, Tim."

"The first thing we noticed is that the rig would re-boot occasionally when transmitting. It doesn't do it very often, but it's annoying when it does. The radio flashes an alarm and then restarts by itself."

**see HAMBONE on page 5**

**from HAMBONE on page 4**

“It doesn’t always restart completely. Sometimes the operator has to restart it,” added Hambone.

Tim continued, “I thought there might be an antenna problem so I took our antenna analyzer outside to measure the SWR.”

“What did you find?” asked Elmer.

“I’m not sure,” said Tim. “I would get a reading, but then it would change when I set the antenna analyzer down. I don’t know what was happening. I measured the SWR again inside the shack and got the same thing. Not the same SWR exactly, but it changed depending on whether or not I was holding the analyzer or touching the antenna connector.”

“But that’s not all,” added Hambone. “I hooked the ladder line going to our big ole’ double zepp to the tuner to see if it was any different. You know, that tuner with the double ammeter for showing the current in each leg of the ladder line separately?

Well, I was surprised to see that on some bands the currents in the two wires were the same, but on other bands they were way different. I don’t see how that can happen. Isn’t there some electrical law that says current always flows in a loop so the currents flowing on both sides of the ladder line must be the same?”

“Yes, there is,” replied Elmer.

“Were there any other strange happenings?”

“Only one I know of,” said Hammy. “The guys upstairs said the washing machine would sometimes stop for no reason when we were, as they say, ‘playing radio’.

“So, Hammy, what did you do to clean up the shack?” asked his Uncle Elmer.

“Not much, Unck. Most of it was outside. First, I got rid of the extra coax that was connecting up one of our antennas. There was pretty good-sized coil of it hanging on a hook outside. I straightened it out and cut off the excess. Now it’s a shorter straight run into the shack.”

“You said you messed with the ladder line going to our double zepp antenna...” added Tim.

“I didn’t mess with it. I moved it. That ladder line dropped straight down from the middle of the antenna and was always in the way when I cut the grass. So, I just angled it over to the shack wall and mounted it on insulators. It’s out of the way and looks good, too.”

“Well boys, it sounds to me like you’ve got the dreaded common mode current problem,” said Elmer.”

“What’s common mode current and what’s its problem?” chorused the Tim and Hambone almost together.

Adopting his professorial style, Elmer continued, “Simply put, common mode current is RF current that flows over the outside of your coax and ladder line and all over your equipment as it finds its way to ground. It seems to get into everything, including non-radio appliances like your washing machine, because it gets into the house wiring. It can cause different effects from a tingle if your lips touch the metal housing of a microphone while transmitting to tripping the GFI, er, ground fault interrupter on you washing machine to re-booting your PC. Or, in your case, re-booting your new software defined radio.”

“Whew,” sighed Hambone. “That gets me off the hook. Cleaning up the yard couldn’t cause all that!”

“Oh, sorry to burst your bubble, Hammy, but you probably did,” added his uncle.

“I’ll explain, but first, let’s talk about where common mode current comes from,” said Elmer reaching for a yellow pad and marking pens. His favorite tools. “It comes from imbalances in your antennas. Especially those coax-driven dipoles you guys love.”

“Our antennas are exactly balanced,” Tim retorted. “I measured them myself and the two legs are exactly the same length.”

“Unfortunately, they are not carrying the same current so, they are not balanced electrically. The unbalance is due to the skin effect.”

“Oh yeah,” said Hammy. “I think Professor Early... that is Professor Flask said something about current flows over, not through a conductor,” said Hambone catching himself before using the students’ slang name for their professor, Erlenmeyer Flask.”

“That’s basically correct and I’m glad to see you were listening,” continued Elmer. Inside a coaxial cable the center conductor carries current in one direction on its surface while the inside surface of the shield carries current in the opposite direction. Since the two currents are equal and opposite, their electromagnetic fields cancel each other out and there is no radiation outside the cable. The problem occurs where the coax connects to the two legs of the dipole antenna.”

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from **HAMBONE** on page 5

“That should not be a problem here,” said Tim still trying to justify his antenna builds. “Both sides of the dipoles are the same length so they have the same impedances so they will have the same currents.”

Elmer continued unabated, “Here’s a greatly magnified view of the antenna end of your coax. The coax center conductor connects to one leg of your dipole and the shield connects to the other. As you said, Tim, the currents should be the same because the two legs of the antenna are identical. But the current paths are not identical.”

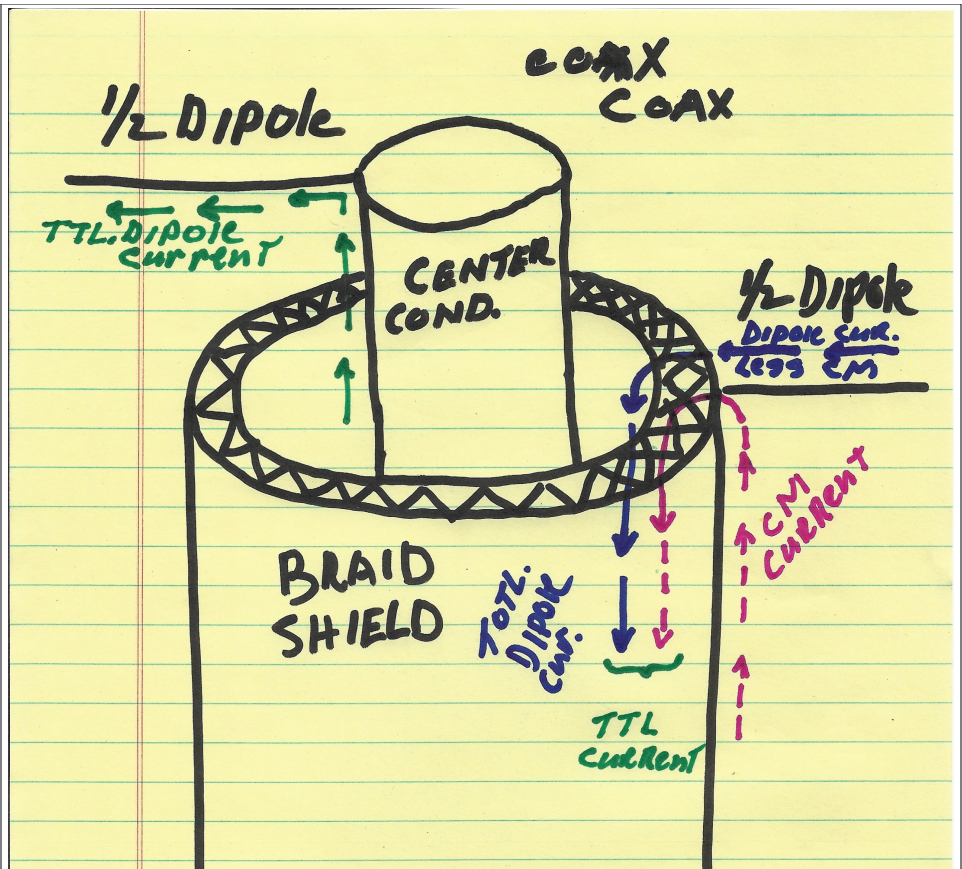
Elmer paused to let the boys think about what he just said.

“How can they not be identical?” asked Hambone. “We made them identical.”

“I said the current *paths* are not identical. Here’s why. The center conductor of the coax connects to one leg of the antenna. Let’s call that the left leg. That is pretty straight forward. The current on the center conductor arrives at its leg of the antenna and has only one place to go - to its leg of the antenna – and it goes there.” Elmer sketched green arrows to show the center conductor’s current. “The problem arises where the coax shield connects to the right leg of the antenna. Here, there are actually two current paths.”

“I don’t get it,” said Tim.

“Remember the skin effect,” said Elmer. “The current flowing on the inside of the coax shield arrives at the connection to its leg of the antenna. There it ‘sees’ two paths. One is the right leg of the antenna, but the other is the outside surface of the coaxial cable’s shield.”



“I still don’t get it.”

“Look here. These dark blue arrows show the current flowing in the right leg of the dipole. I am using a different color because it is less than the green current flowing in the center conductor.”

“Why doesn’t the current just go into the antenna like the current from the center conductor?”

“It’s because the shield connection actually forms a current node with one path in and two paths out. According to the rule for current division, the current will divide between the two paths inversely proportionally to their impedances.”

“I don’t get it either,” said Hambone.

“Look at it this way. The impedance of your dipole is more or less 50 ohms, right? Yes it is,” said Elmer not waiting for an

answer. “That means the impedance of one half of it is about 25 ohms.

At the end of the coax, there is an RF voltage pushing the RF current into the antenna. The current from the center conductor goes into one-half of the antenna, whose impedance is about 25 ohms, because that is the only path available to it. But the current from the inside surface of the shield has two paths it could follow, the right leg of the antenna it is connected to and the outside of the shield which eventually leads to ground.

The amount of current that flows into a path depends on that path’s impedance. The impedance of the antenna is about 25 ohms. The impedance of the shield’s outer surface is normally unknown. But

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**from HAMBONE on page 6**

it has some impedance so there is always some current flowing on the outside surface of the shield. If that impedance happens to be low, the current could be very high. That current is called common mode current.

Notice that the total antenna current is the sum of both the current flowing in the right leg of the antenna plus the common mode current flowing on the outside of the shield."

"Oh man!" exclaimed Tim, his eyes lighting up with understanding, "The shield is part of the antenna and it is right here inside the shack!"

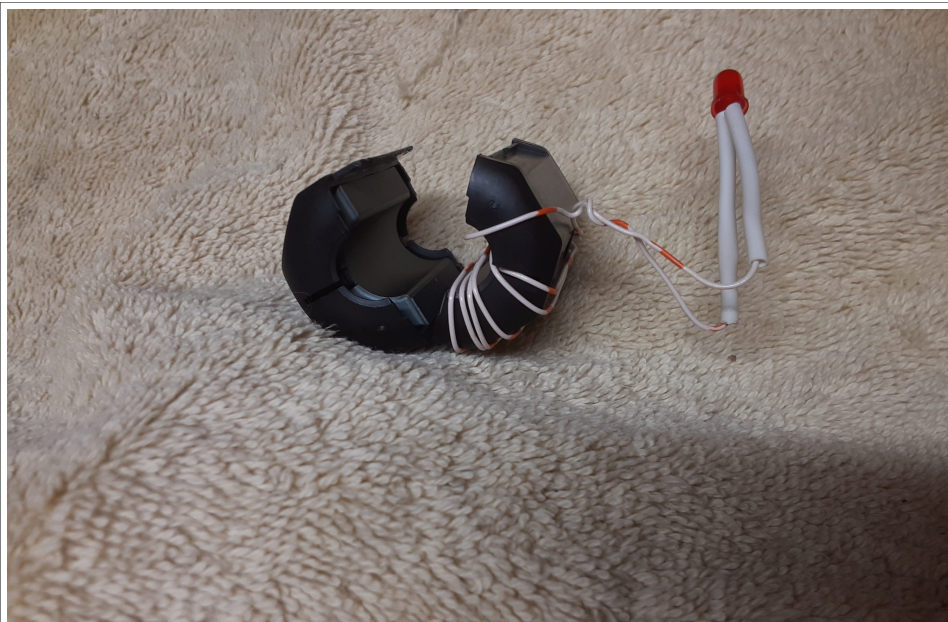
"Yes!" said Elmer. "Since the shield connects to your radio's chassis as well as everything else, it's like all your stuff is part of your antenna."

"Okay," said Hambone, "How do we stop it?"

"Stopping it is not too difficult," said Elmer. "But you have to find it first. I like to use a clamp-on RF ammeter and run it over each piece of coax at various frequencies. It should always read zero amps, but if common mode current is present, it will read some other value. Look for real high readings and you've found your common mode current source."

"That's fine for you, Unck, but we don't have hundreds of dollars to spend on a RF ammeter. Maybe you could lend us yours? Hint, hint."

"I would if I still had it, but I sold it at a hamfest a couple of years back and haven't really needed to replace it, yet. It was just a clip-on ferrite



*Elmer's common mode current sensor consists of seven turns of wire, an LED and a bead. The wire is wrapped through the bead and the bead is clamped around the coax being tested. If the LED glows, there is common mode current.-- Photo by Dude*

bead with a few turns of wire wrapped around it and connected to a meter. You just clipped the bead around the coax and the meter read the current."

"How did it read the current through the coax shield?" asked Hambone.

"Oh, no. It only read the common mode current flowing on the outside of the shield," Elmer replied.

It worked pretty well until the bead stopped closing tightly. Its readings became erratic so, I sold it."

"I guess we have to buy a meter," moaned Tim. "There goes the beer fund."

"You don't need to," said Elmer. "All you need is a clamp-on ferrite bead, an LED and a couple of feet of hookup wire.

Just wind a few turns of wire through the bead, not around the

bead, or you won't be able to open it. Connect the ends of the wire to the leads of the LED, polarity doesn't matter. Now, clamp the bead around your antenna or interconnection coax, transmit on the band you want to check and watch the LED. If it lights, you have CM current. You need to check all bands because it can be high on one band and non-existent on another. I have some clip-on ferrite beads if you need one."

"Wow, Unck, we can do that!" exclaimed Hambone. "But how do we stop that current when we find it?" "Just follow Ohm's Law which says 'when the impedance of a current path goes up, the current goes down'. The best way to increase the impedance is to add inductance to the outside surface of the coax shield."

That sounds hard," said Tim.

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**from HAMBONE on page 7**

“It’s not. You can buy baluns or chokes that do a good job. Or, you can wind a few turns of coax on a ferrite torroid and that will work, too. But, the easiest way is to simply make a coil of coax, say ten turns about six-inches in diameter anywhere along your feed line. That works, too,” explained Elmer.

Those coils of extra feedline coax that Hammy straightened out were probably acting like chokes and blocking your common mode current. Straightening them let the current into your shack.”

“Let’s go hunting current,” shouted Tim, “We’ve got the LED and the bead back in the ham shack!”

\* \* \*

The next day, Elmer and the boys were back in the frat ham shack.

“You were right, Mr. Elmer,” said a very smiling Tim. “We found CM current everywhere. We even found a lot of it on the coax jumpers between the transceiver and the amp. We put some chokes there and the SDR stopped rebooting. We made those coax coils in our feedlines like you said and the washing machine continued to run even when we were on forty meters. Oh, and the antenna analyzer now shows SWR readings that don’t change when I touch it. Everybody’s happy.

“But there’s still one thing,” added Hambone. “That wonky reading on our extended double zepp antenna is still there. I don’t suppose it has anything to do with common mode current. It has ladder line instead of coax so there’s no shield.”

“It has everything to do with common mode current. Even though that ladder line is feeding your antenna, it also acts like an antenna itself and is picking up some of the signal your zepp is radiating. When it was hanging straight down, it picked radiation from both halves of the zepp equally and the currents induced by that radiation canceled each other out.

“But since Hammy re-routed that ladder line, it is now closer to one side of the zepp and the current induced by that side is stronger and is no longer cancelled out. The effect is the dual indicator meter reads different currents on both sides of the ladder line which of course, is impossible.”

“Of course,” chorused the boys, unenthusiastically.

“On one side of the ladder line, the induced current adds to the current going to the antenna and that side reads higher. On the other side, the induced common mode current subtracts from the antenna current and that meter reads lower.

You see, sometimes common sense and common mode current have little in common.” Elmer turned and walked away leaving the boys with puzzled looks on their faces. But those looks turned to smiles when Hammy’s brother, Dude, showed up with two frosty summer coolers.

(That is two, not three. Dude is too young to drink.)

**>> JCRAC FEEDBACK <<**



*Field Day photo by John Raydo, KØIZ*



## Field Day Photography by Charlie Van Way, NØCVW



