

## Hams Doing Private Service



Longtime JCRAC member **Harry Wilson, KBØJLN** (right) needed help moving an antenna from his roof top. **Eddy Paul, KYØF** led a crew of club members. to get the work done.

*Photos by Jay Greenough, WJØX*



## OCTOBER MEETINGS

**October 14** — "Go Kits" - bring yours  
**October 28** — Ensor Campout  
**October 29** — Ensor Auction @11 am

The Johnson County Radio Amateurs Club normally meets on the 2nd and 4th Fridays of each month at 7:30 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.*

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Les Weatherford -  
KEØCBC



Kyle Sammer - KØSNR



Jeremy Lyman - KEØKIB



Abhinav Challu -  
KEØKCA

## **-> 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*

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### **"Walking the Dog and Monitoring the Repeater"**

There are rules. Club members know that if it's the club net night, you check in to the repeater and speak when Net Control calls. Performers know that when you're working on a show, you have to have your lines memorized on the night the director has specified that you will be "off book". Dog owners know that if the pet is standing by the door, whimpering, you stop what you are doing and let him out.

In your editor's case, off-book day looms for the Gershwin musical "Nice Work If You Can Get It", which is consuming most of his non-work waking hours. His study gets interrupted, though, when the dog is by the door. The present state of affairs means that the only radio-ing your editor has done of late happens when out with the dog. Club members may have heard an occasional "ACØYF - walking the dog and monitoring the repeater".

And thus it was, when filling this final space in the October FEEDBACK, your Editor turned to his wife and asked what on Earth he should write. Mrs. Editor suggested that the space should contain a picture of Jack, the corgi and this explanation.

On the theory that husbands--whether or not they are also editors and ham radio operators--live longer happier lives when they defer to a wife's wisdom ... here's Jack.



**- Chip Buckner - ACØYF**

## **PRESIDENT'S CORNER**

October is here and that means the Ensor auction and other activities. The



events starts Friday evening October 28 with the camp out. The Auction will be Saturday starting at 11 am. It will continue until everything is

sold. Please support the auction, search through your shack for that forgotten item needing a new home. Auction items can be on consignment or donated. All profits from the auction go to the Club and Ensor.

This month is also our club's turn to provide volunteers guides at Ensor. A few hours on a Saturday and Sunday in support of the museum is also a learning experience. Lead tourguide Larry Woodworth, WØHXS, knows and shares historical information about radio, the farm and local history.

Please note that the second club meeting (October 28) will be at the Ensor farm.

**- Bill Gery - WA2FNK**

*Ed.--The Ensor Farm is on the south side of 183rd Street, west of Ridgeview Road.*

## ***Johnson County Radio Amateurs Club - August 12, 2016***

Attendance: Self introduction with name and call sign. 58 signed the check in sheet. This was followed by the Pledge of Allegiance.

The Minutes from the July 8 and July 22, 2016 meetings were accepted with 1 opposed vote.

The Treasurer's report, as follows, was read and accepted unanimously.

Cash on Hand	\$ 119.20	Repeater Operating Reserve	\$ 793.65
Checking Account	\$ 921.20	Memorial Fund	\$ 310.00
Savings Account	\$ 8,277.84		
Total	\$ 9,318.24	Active Members	159

### Old Business:

- Welcome to all 1<sup>st</sup> time visitors at tonight's Club meeting.
- Repeater Update – All Repeaters are working well, however we had another cooling fan that failed.
- Eddy Paul, KY0F organized a group to take down antennas for Harry Wilson, KA0JLN. A big Thank You to all that helped!
- Ensor Museum Volunteers – The Club is responsible for providing 2 volunteers during the month of October. The Museum is open on Saturdays and Sundays from 1:00 pm – 5:00 pm.
- Ensor Auction and activities will October 28 and 29 with the Auction starting on Saturday October 29 at 11:00 am.

### New Business:

- Welcome to our new Vice President Jaimie Charlton, AD0AB. And a Big Thank You to Aaron Boots, AA0RN for his service as Vice President. Aaron is headed off to Missouri S&T in Rolla to study Electronics. Good Luck Aaron.
- Jack Holzer, W0YZF of the Johnson County Sherriff Dept. recently underwent cancer surgery. He is doing well and is now going through cancer treatments. I was suggested that the Club send him a Get Well card. For those not familiar with Jack, he has, for years, supplied the Club with surplus items from the Johnson County Sherriff's Dept. for our Auction.

### Reports:

- 6 m – None.
- 10 m SSB Roundtable – NR.
- 440 Wheat Shocker net – NR Check-ins on Aug 10 and 17 Check-ins on Aug 3.
- 2m Wheat Shocker net – 18 Check-ins on Aug 11 and 18 Check-ins on Aug 4.
- HF Activity – NR.

### Announcements:

- Hawk 100 - Lawrence, KS Sept 10 and 11. Contact Bill Gery, KA2FNK.
- Hamclass.org Technician Class Aug 20 and 27 at Paola Fire Station.
- Summer Breeze, August 28. Contact Herb Fiddick, NZ0F.
- MS Ride, Sept 17 and 18. Contact Herb Fiddick, NZ0F.
- Bikers for Babies, Sept 18. Contact Matt May, KC4WCG.
- Jamboree-on-the-Air Boy Scouts of America, October 15.
- Watch Larry's List for upcoming events.

Business meeting adjourned at 8:03 PM

### Program:

The Program for this meeting was a presentation on DMR by Chuck Kraly, K0XM.

## ***Johnson County Radio Amateurs Club - August 26, 2016***

Attendance: Self introduction with name and call sign. 27 signed the check in sheet. This was followed by the Pledge of Allegiance.

The Minutes from the August 12, 2016 meetings were accepted with 1 opposed vote.

The Treasurer's report, as follows, was read and accepted unanimously.

Cash on Hand	\$ 119.20	Repeater Operating Reserve	\$ 793.65
Checking Account	\$ 921.20	Repeater Operating Reserve	\$ 793.65
Savings Account	\$ 8,277.84		
Total	\$ 9,318.24	Active Members	159

### Old Business:

- Welcome to all 1<sup>st</sup> time visitors at tonight's Club meeting.
- Repeater Update – Bad cooling fan has been replaced.
- Ensor Museum Volunteers – The Club is responsible for providing 2 volunteers during the month of October. The Museum is open on Saturdays and Sundays from 1:00 pm – 5:00 pm.
- Ensor Auction October 28 and 29 – We would like to raffle off a new Yaesu FTM-400XDR 144 / 430 MHz Dual Band C4FM Digital / Analog FM Mobile radio. In order to do so, Cal Lewandowski, KC0-CL Club Treasurer asked the Club for a maximum of \$550 to purchase this radio from Associated Radio at a discounted price. A short discussion took place and it was suggested that tickets sell for \$5 each or 5 tickets for \$20. Winner does not need to be present at the Auction to win. After the discussion a motion was made, seconded, and passed unanimously.

### New Business:

- “Van” Van Daveer, K0HCV brought up to the Club the possibility of bring the 146.2282 Repeater back on the air as a DMR UHF repeater. Its current location is on top of City Hall in KCMO. The original owner of this repeater was Kansas City Amateur Radio Club. After a lengthy discussion it was determined that a committee should be formed with Bill Gery, KA2FNK as chair to study this opportunity. After the discussion a motion was made, seconded, and passed unanimously.

### Reports:

- 6 m – None.
- 10 m SSB Roundtable – NR.
- 440 Wheat Shocker net – 15 Check-ins on Aug 24 and NR Check-ins on Aug 17.
- 2m Wheat Shocker net – 20 Check-ins on Aug 25 and 18 Check-ins on Aug 18.
- HF Activity – NR.

### Announcements:

- Kansas QSO Party August 27.
- Hawk 100 - Lawrence, KS Sept 10 and 11. Contact Bill Gery, KA2FNK.
- MS Ride, Sept 17 and 18. Contact Herb Fiddick, NZ0F.
- Bikers for Babies, Sept 18. Contact Matt May, KC4WCG.
- SET Exercise on October 1.
- Jamboree-on-the-Air Boy Scouts of America, October 15.
- Watch Larry's List for upcoming events.

Business meeting adjourned at 8:19 PM

### Program:

In place of the tonight's Program was the UHF Shootout that took place before the meeting.

## ***Johnson County Radio Amateurs Club - September 9, 2016***

Attendance: Self introduction with name and call sign. 35 signed the check in sheet. This was followed by the Pledge of Allegiance.

The Minutes from the August 26, 2016 meetings were accepted with 1 opposed vote.

The Treasurer's report, as follows, was read and accepted unanimously.

Cash on Hand	\$ 119.20	Repeater Operating Reserve	\$ 798.65
Checking Account	\$ 575.27	Memorial Fund	\$ 310.00
Savings Account	\$ 8,278.14		
Total	\$ 8,972.61	Active Members	158

### Old Business:

- We welcomed all 1<sup>st</sup> time visitors to tonight's Club meeting.
- Repeater Update – All are just fine!
- Ensor Museum Volunteers – The Club is responsible for providing 2 volunteers during the month of October. The Museum is open on Saturdays and Sundays from 1:00 pm – 5:00 pm.
- Ensor Auction October 28 and 29 – David Schulman, WD0ERU will be or auctioneer again this year. Continue to look for donations and consignment items.
- The 146.2282 Repeater project has been dropped.
- Lon Martin, K0WJ presented Patrick Davidson, KE0IDD a plaque for winning the UHF Shootout in August.

### New Business:

- None.

### Reports:

- 6 m – None.
- 10 m SSB Roundtable – NR.
- 440 Wheat Shocker net – 17 Check-ins on Sept 7 and 17 Check-ins on August 31.
- 2m Wheat Shocker net – 17 Check-ins on Sept 8 and 22 Check-ins on Sept 1.
- HF Activity – Qatar 20m SSB, National Parks, Battleship Iowa, Nagoya, Japan.

### Announcements:

- Hawk 100 - Lawrence, KS Sept 10 and 11. Contact Bill Gery, KA2FNK.
- MS Ride, Sept 17 and 18. Contact Herb Fiddick, NZ0F.
- Bikers for Babies, Sept 18. Contact Matt May, KC4WCG.
- SET Exercise on October 1.
- WW1USA October 8 – 9.
- Jamboree-on-the-Air Boy Scouts of America, October 15.
- Watch Larry's List for upcoming events.

Business meeting adjourned at 8:20 PM

### Program:

- The Program for this evening was a video presentation of Field Day 2016 put together by John Raydo K0IZ.

## ***Johnson County Radio Amateurs Club - September 23, 2016***

Attendance: Self introduction with name and call sign. 34 signed the check in sheet. This was followed by the Pledge of Allegiance.

The Minutes from the September 9, 2016 meetings were accepted with 1 opposed vote.

The Treasurer's report, as follows, was read and accepted unanimously.

Cash on Hand	\$ 119.30	Repeater Operating Reserve	\$ 814.65
Checking Account	\$ 977.19	Memorial Fund	\$ 310.00
Savings Account	\$ 8,278.14		
Total	\$ 9,374.63	Active Members	159

### Old Business:

- We welcomed all 1<sup>st</sup> time visitors to tonight's Club meeting.
- Repeater Update – All are working well!
- Ensor Museum Volunteers – The Club is responsible for providing 2 volunteers during the month of October. The Museum is open on Saturdays and Sundays from 1:00 pm – 5:00 pm.
- Ensor Auction October 28 and 29 – Continue to look for donations and consignment items.

### New Business:

- Cal Lewandowski, KC0CL treasurer announced that in place of the wallet sized membership cards the Club will be offering a Membership Certificate (pdf emailed) suitable for framing.
- Tom wheeler, N0GSG presented to the Club the idea of Solarizing parts of the Field Day supporting infrastructure (like the network, logging, lighting etc.). A motion was made for Tom to assemble a team, study the possibilities, and report back to the Club in about a month. A vote was taken and approved unanimously.

### Reports:

- 6 m – None.
- 10 m SSB Roundtable – 3 participated on Sept 22.
- 440 Wheat Shocker net – 12 Check-ins on Sept 21 and 12 Check-ins on Sept 14.
- 2m Wheat Shocker net – 16 Check-ins on Sept 22 and 19 Check-ins on Sept 15.
- HF Activity – Kentucky TV Station on 836 MHz. St. Helena in South Pacific. Lithuania, Caribbean, Argentina, Brazil on 20m. Europe and Japan.

### Announcements:

- SET Exercise on October 1.
- WW1USA October 8 – 9.
- Jamboree-on-the-Air Boy Scouts of America, October 15.
- Watch Larry's List for upcoming events.

Business meeting adjourned at 8:20 PM

### Program:

- The Program for this evening was a presentation on SimSmith – A Smith Chart Program” by Dennis Baker, KE0QM.

## ***New Yaesu Fusion Hot Spot in Olathe -- Harold "Van" Van Deveer, KØHCV***

There is a new Yaesu Fusion repeater on the air in Olathe Kansas. It is on 444.400 with a +5 Mhz offset and located at my QTH in Olathe.

I put this repeater at my house for several reasons. I have been unable to find a good site in the Olathe area and I wanted to provide handheld coverage for hams in the Olathe area. Also it serves as a readily accessible test platform where the features of Wires-X can be tested and observed. It is still an emerging technology and immediate access to the hardware can be an asset. It is very difficult to find a repeater site that has internet access.

The Wires-X nodes currently pointing to the 146.910, 442.400, 442.600 and 443.275 repeaters are known as "remote nodes". That means the equipment required to provide Wires-X support is located remotely from the repeater. These nodes require a Fusion capable radio, the Wires-X interface box and a personal computer with internet access.

Having the 444.400 repeater at my house means I can connect the Wires-X interface box directly to the repeater and the internet. I still have to provide the personal computer and internet access. This configuration has advantages over remote nodes.

This repeater now hosts the Wires-X "Kansas-City" room (#28952) and is linked via Wires-X to the 146.910 Overland Park, 442.400 Raytown, 442.600 Shawnee and 443.275 Plaza KCMO repeaters. This means that you can use any of these repeaters and be heard on the others. This gives us a tremendous footprint in the metro Kansas City area.

If you have a Fusion radio please try this repeater and let me know how well it works for you. It has

public service announcements, text messages and photos in the News area so check it out.

Since the repeater went on the air other nodes are linking to the Kansas-City room. Some are on a full time basis and others on a mostly full time or part time basis. Currently the following nodes are linking to the Kansas-City room:

**KØHCV** – 444.400 Olathe Kansas (hosts the Kansas-City room)

**KC0KW** – 146.910 Overland Park Kansas (full time)

**NØFB** – 443.275 Plaza KCMO (full time)

**K2SDJ** – 442.600 Shawnee Kansas (full time)

**NØEIR** – 442.200 Raytown Missouri (mostly full time)

**NØIAI** – 443.700 Harrisonville Missouri (mostly full time)

**KSØLNK** – Minneapolis Kansas (mostly full time, affiliated with K-Link)

**WBØAOD** – Palm Coast Florida (part time, Steve used to live in Olathe)

**WØKHP** – Wamego Kansas (mostly full time)

**WBØOUE** – Edgerton Kansas (part time)

We also have several regulars from England connecting to our room as well as hams from all over the world.

### ***Use Amazon to support the JCRAC***

If you begin your Amazon shopping by visiting <http://smile.amazon.com/ch/48-1071416> (or, just go "smile.amazon.com" and search for the JCRAC) Amazon will donate 0.5% of your eligible purchases to the JCRAC.



# Hambone vs. the Extra Test?

A Hambone Adventure  
by Jaimie Charlton, ADØAB

A bright, sunny end-of-summer day it is in America's heartland. One of those perfect, almost Fall days that are still warm, but have a hint of crispness auguring the start of a new season. So, why are these two young guys moping along the railroad tracks outside of Union Station where a really great hamfest and swap meet was still in progress?



"It just doesn't seem fair. I studied for six months to take that test and now they've changed the questions," moaned Rick, a tall, good looking railroad enthusiast and ham radio buddy of Hambone. Rick and Hambone are the same age and both share a passion for everything ham radio.

Rick has always wanted to be an engineer on a major railroad and is devoting his life to making that happen. He takes part-time jobs doing everything from selling snacks in the Union Station lobby to sweeping out the train cars. Now he is taking college courses to prepare him for a full-time railroading career.

Hambone on the other hand, has devoted himself to becoming an electrical engineer. And, given his proven abilities behind the wheel of a car, it is unlikely that he will ever be allowed to drive a locomotive, not even an electric one.

"Yeah, this really sucks," added Hambone. "I memorized the answer to every question, but they

gave me questions I've never seen before, what gives?"

"Me too. I wasted \$14 not to mention what I spent on books. I guessed my way through enough of the questions on nets and solar winds and stuff like that. But the questions about those filters stumped me. I had no clue about anything like that."

"Oh no, here comes my uncle," groaned Hambone. "He's gonna get on my case. He's really against memorizing as a way to pass ham tests."

"Hi boys," greeted Elmer, "why the long faces?"

"Hi Unck, this is my friend, Rick. Rick, this is my uncle Elmer."

"Hi mister Elmer."

"Hi Rick, just call me Elmer, that's good enough. So, what's the problem?"

"Well, Unck, me and Rick just took the Extra Class test at the hamfest. We flunked."

"How did that happen?"

"We've been studying the test questions for the last six months," said Rick, "and got them pretty well memorized. But the test had new questions that we didn't even know about."

"Yeah Unck, and they were really hard!"

"If you recall, Hammy," said Elmer copping his preachy, pro-

fessorial attitude that Hambone really disliked, "I told you to learn the over-all material, not just memorize the answers to specific questions. If you know it, you know it. But, you didn't do that, did you?"

"Okay, okay, we memorized the questions, all right? I still think I can guess my way through most of the new questions except for those on weirdly named filters. I know about low-pass, band-pass and high-pass filters. But I've never heard of those other ones. I don't even know what they're talking about."

"Me neither," added Rick.

"You know, Hammy, I believe you should know a bit about electronics and radio if you are going to hold the highest class license. It's important to know how your equipment works. But, on the other hand, you have to start someplace so, maybe memorization is okay. First you memorize and then you learn," said Elmer, apparently softening his hard stand against memorizing tests.

"I can't teach you everything you need to pass the license tests, but I can give you a few quick tips about filters. Come on back to my shack."

"Thanks Unck, we'll be right over."

"Wow, your uncle's great! We'll pick up a few tips and then we can run back and take the test again."

**see HAMBONE on page 9**

**from HAMBONE on page 8**

“Maybe. Unck sometimes gets carried away when explaining techy stuff. He’s the sort of guy that if you ask him the time, he’ll tell you how to build a clock.”

\* \* \*

“I don’t see why all these electrical things have such strange names,” wondered Rick as he gazed in awe at the complete library of handbooks, technical journals, carefully labeled boxes of components he’d never heard of and an amateur radio station that looked like a NASA communications center in what Elmer called his ‘shack’.

“That’s easy,” responded Elmer. “Back in the beginning of engineering there were only civil and mechanical engineers because electricity hadn’t been invented yet. Those guys, trying to be helpful, gave things good, clear names like speed, torque, wheels, dams, gears, pulleys etc.

The problem with those names was that anybody, especially non-engineers, could understand what the engineers were talking about. In a sense, the names gave away their secrets. Eventually, those non-engineers began doing the engineering-type work themselves instead of paying the engineers to it. This pissed off the engineers.

Then electricity was invented and along with it came electrical engineers. Seeing the plight of their civil and mechanical colleagues, the EEs decided to do things differently. They decided to name their stuff after old dead guys. That’s why we have ohms, amperes, volts, henries, maxwells etc. It’s a secret code that prevents the great

unwashed from figuring out that what we do is really pretty simple.”

“That’s pretty stingy,” said Rick.

“Stingy or not, it’s been working for over a hundred years and will continue to guarantee every EE and electrical tech a good job, once they learn it,” said Elmer with a wink to Hambone. He loved leading young guys on to see how far he could go before they discovered his subterfuge.

“Okay, Unck. We get the joke. Now, what’s with the filters?”

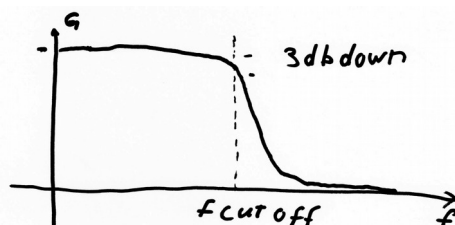
“You’re right, Hammy, the three basic filter functions are low-pass, band-pass and high pass. There are lots of others such as notching filters, all-pass filters, phase-shifting filters, but lets stick with the basics.

The ‘weird names’ you were talking about refer to different ways of obtaining those basic functions.”

“But, don’t you just build filters out of capacitors, resistors and inductors?” asked Rick.

“Yes, but the names refer to specific ways of optimizing those functions by selecting the proper circuits and component values.

Let’s start with a Butterworth low-pass filter.” Said Elmer taking out his sharpie and drawing a graph on his ever-present sketch pad.



“Notice that the gain is relatively high at low frequencies, but as the frequency goes above what is called

the cutoff frequency, the gain drops sharply.”

“I didn’t know filters had gain,” said Rick.

“It’s a relative term. When you only have passive components like capacitors, resistors and inductors, the gain can never be greater than 1. It takes amplification to get more.”

“Why is this called Butterworth instead of just a low-pass filter?” asked Hambone.

“It’s called a Butterworth filter because a guy by that name discovered how to get the steepest possible transition from the pass-band to the stop-band *and still maintain smooth pass-band and smooth stop-band gain.*”

“I don’t want to seem dumb, but what’s a pass-band and stop-band?” asked Rick.

“The pass-band is the range of frequencies that the filter lets through and the stop-band is everything else. The cutoff frequency is the frequency at which the one band ends and the other begins. Of course, there can be high-pass and band-pass Butterworth filters, but the names still apply.

Notice that the cutoff frequency is the frequency at which the gain of the filter has dropped by 3 dB. That’s important to remember because it could be on the test.”

“So, if Mr. Butterworth figured out the best possible filter, why are there these other ones?”

“Remember, I said that the Butterworth filter has the steepest possible transition between its pass-band and stop-band *while*

**see HAMBONE on page 10**

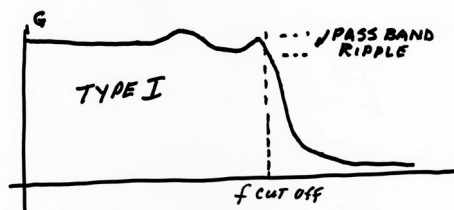
from **HAMBONE** on page 9

*maintaining smooth gain?* Well, if that transition isn't steep enough, you could use a type 1 or type 2 Chebyshev filter."

"Here we go with the strange names, again," sighed Hambone.

"The name may be a bit difficult to spell, but the filter is really useful. Its low-pass version has a curve that looks like this. Oh, this is also called a Cauer filter. You can remember that because both names begin with the letter C--unless, the test question spells the Russian name Tschebychev,

Tschebyscheff or Tchevysheff -- which don't begin with C."



"Ugh!" grunted Hambone.

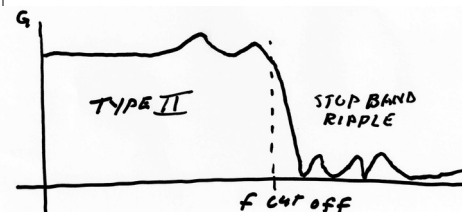
"Notice that the pass-band gain is not smooth, but the transition from the pass-band to the stop-band is very steep.

The variation in pass-band gain is called pass-band ripple and in most designs it's around 0.1 – 0.3 dB. Besides the ripple, the big thing with this filter is how the cutoff frequency is defined.

The cutoff frequency is the frequency at which the gain of the filter passes outside the specified ripple. For example, if a low-pass filter is designed to have 0.2 dB of pass-band ripple, the cutoff frequency is defined as the frequency at which the gain drops below 0.2 dB. That is a much tighter spec than for the Butterworth filter."

"I get it," said Hambone, his eyes lighting up. "The weird names sort of tell how good the different filters are at doing their basic low-pass, band-pass or high-pass functions. So, what's the difference between the type 1 and type 2 Chubby, or whatever it was you said, filters?"

"More or less," said Elmer, rolling his eyes and sketching another graph. The type 2 Chebyshev filter has even faster transition between its pass-band and stop-band, but it adds ripple to its stop-band gain.



If your application can tolerate that extra stop-band gain ripple, you can get an even sharper transition between the pass-band and stop-band and a sharp transition is what you really want."

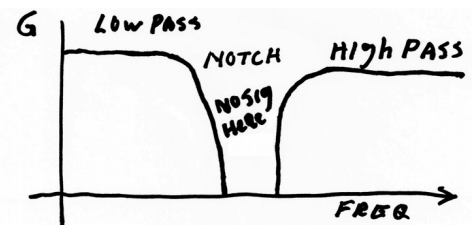
"How much ripple are we talking?" asked Rick.

"That's up to the designer, but it's usually less than 1 dB in either case. The design trade-offs are the steepness of the slope between the pass and stop-bands and the amount of ripple. Generally, the steeper it is the more ripple you get.

So, you see, it's not so tough to memorize a few more things. Butterworth means smooth--like Mrs. Butterworth's pancake syrup--pass and stop-bands and the cutoff frequency is when the transition changes by 3 dB. Chebyshev means sharper transitions and ripple. But don't forget that the cutoff frequency is determined by the ripple, *not* the 3 dB point."

"That's really cool," Mr. Elmer, exclaimed Rick. "But, what about other filters?"

"Good question, Rick. But, you actually already know the answer. Think of the filters in a more general way. We always set the starting frequency of a low-pass filter as zero hertz and its cutoff frequency as something higher. But, mathematically, the starting frequency doesn't have to be zero. A high-pass filter is just the same as a low-pass except you set the starting frequency to something higher than zero."



"There you go again, Unck, bringing in some weird math. Wake me (and the readers, if there are any left) when you're finished, please."

"No math this time, Hammy, filter math gets real complicated real fast. But, you can imagine how to make a notch filter for, say, taking out an interfering signal," said Elmer as he sketched a notch filter transfer function on his yellow pad.

"First, you build a low-pass filter with a cutoff frequency just below the frequency you want to remove. Then you build a high-pass filter with a pass-band starting just above the undesired frequency. Then, you just connect those two filters in parallel. The low-pass filter passes the frequencies below the undesired frequency and the high pass filter passes the frequencies above it. Nothing passes the frequencies in

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### from HAMBONE on page 10

the space between the low-pass filter's cutoff frequency and the start of the high-pass filter's pass band. Voila! a notch filter!"

"That's nice, Unck, but what about elliptical and FIR and IIR filters and poles and zeros and that stuff. This is getting way too complicated," asked Hambone no longer able to hide his angst and frustration with all this new stuff.

"Calm down, Hammy. Elliptical filters are just a form of Chebyshev

filters, or vice versa. I don't know all the exam questions related to filters, but I don't think they are going to go much deeper than what we've already discussed. After all, the Extra Class ticket is just an amateur radio license, not an electrical engineering degree.

But just in case, IIR stands for Infinite Impulse Response and FIR stands for Finite Impulse Response filters. These are two basic ways to digitally implement those basic functions we already talked about."

"I see what you meant about the clock," whispered Rick to Hambone.

"What was that?"

"Er, nothin', Unck. Rick was just noticing the time. We've gotta get going so we can memor, er, learn this stuff in time to take the exam again before the fest ends. Thanks for the help."

"Yeah, thanks, mister Elmer."

"Good luck, boys," said Elmer, adding under his breath, "You'll need it."

### UHF Shootout Results

Lon Martin, KØWJ conduct the JCRAC's first UHF antenna shootout. Martin noted that the winning entry was one of two contestants to use the height of his system to improve the results. He held his HT over his head.

Martin reported that he was disappointed that all contestants used either the manufacturer's supplied rubber duck antenna or a commercial after-market antenna. He hoped to see more creative homebrew designs at a shoot out next year.



Lon Martin, KØWJ presents Patrick Davidson, KEØIDD a plaque for winning the UHF Shootout

Call	Name	HT	Antenna	Output Watts	Output dBW	Received dBm	Adjusted dBm
KEØIDD	Patrick	FT60	Stock Duck	4.18	+6.21	-1.1	-7.31
NØGSG	Tom	TYT MD390	Stock Duck	1.1	+0.41	-7.7	-8.11
K6TBJ	Rod	TYT MD380	Stock Duck	4.15	+6.18	-2.1	-8.28
KYØF	Eddy	FT2D	Nagoya NA771	4.35	+6.38	-2.7	-9.08
ADØAB	Jaimie	FT1D	Stock Duck	4.371	+6.41	-7.1	-13.51
ADØAB	Jaimie	FT60	Stock Duck	4.15	+6.18	-7.7	-13.88
ADØAB	Jaimie	FT60	Cornet 2 Band Handi	4.15	+6.18	-7.7	-13.88
K6TBJ	Rod	UV5R	Nagoya NA771	2.5	+3.98	-11.1	-15.08
KB8TR	Jay	ADI AT600	Stock Duck	2.631	+4.20	-19.8	-24.00