

THE NEWSLETTER OF THE KINGS COUNTY RADIO CLUB

KCRC



June 2017

The Semi-Ridiculously Abridged Edition

Volume 4, Issue 6^A

Minutes of the June 2017 KCRC Meeting, June 7th, 2017

Our June “Pre-Meeting Question and Answer Session” was focused on the basic stuff this month, since we were being visited by a gentleman, who was very new to the hobby, looking for advise once he passes his Technician exam.

The monthly meeting was called to order at 8 PM, by our President, Mitch N2RGA. Also present at tonight’s meeting were Vice President Howard N2GOT, Treasurer Richard KA2KDQ, General Secretary Roy AC2GS, Executive Board Member at Large Howard K2IGJ, John WB2LFU, Simon KD2LQE, Lloyd K2JVX, Al, Alain K1FM, John K2BAG, Chris KE2A, and our guests James W3EMD and Bob, who is studying for his Tech license!

Treasurer Report—Richard KA2KDQ, reported that our Treasury currently has \$889.45 in assets in our bank account, and \$27.27 in our Club PayPal account, for a total of 916.72. We have three new Club members since last month—Todd K8MLB, Ervin K9NYC, and David KG2RY.!

2 Meter Report—Richard KA2KDQ reported that the 2 Meter Net was doing well, with an average of a dozen check-ins each week. Plans to upgrade the Net Control Operator’s antenna have been place on permanent hold for the foreseeable future. An effort for the 2 Meter Net to cross promote other Club activities was discussed. Mitch N2RGA suggested that Roy AC2GS do a “refresh” of the 2 Meter Net script, posted on the Club website, and that Richard KA2KDQ follow the new script.

10 Meter Report—*In Absentia*—Our Net Control operator, Milen KG2C is presently enjoying a well earned vacation in Bulgaria, and other KCRC members will act as temporary Net Control Operator until Milen’s return. Roy AC2GS reported that last week’s 10 Meter Net benefitted from excellent propagation conditions, with 19 participants, including participants in Iowa, Georgia, Missouri, Florida, and Alabama! The 10 Meter Net often features lively discussions regarding technology as well as such topics as “the Brooklyn accent”! If you can put out a 10 Meter signal, please consider checking into our weekly Sunday 10 Meter Net and participating in it with us! Remember that the 10 Meter Net as well as all other club Nets are simulcast over the Internet—just point your browser at bit.do/KC2RC.

KCRC TechNet —Our Net Control Operator and Host Roy AC2GS reported that the TechNet is a live and well and has many active participants that regularly extend its original one hour schedule into as long as the 1 3/4 hour episode, last time! The puzzles seem to be an enjoyable feature, as well as the Internet streaming. During our last TechNet one of the participants filled out his membership form and paid his dues using PayPal before that TechNet concluded! In addition to regular promotions during Club functions, we have arranged with local ARES, Big Apple NTS, and LIMARC to promote the KCRC TechNet!

Old News: Our most recent VE Session was May 21—we had four examinees and three were awarded their new Technician Licenses—no doubt some of them will soon be back to upgrade their tickets! Our next VE Session will be on July 16th, at 1PM. Remember that the venue has been changed for the next VE Session. It will be given at 501 6th Street, called Wesley House, in room 6B on the 6th floor (an elevator is available). The Club

is always looking for new VE's to join our VE Sessions. For ANY interested individuals, please contact any Executive Member of the Club, or the return email address for these emails of our Club Meeting's minutes. People took time out of their busy lives to help get you licensed - pass on the favor!

We presently have 49 Club Members in good standing!

Repeater status was reported by Mitch N2RGA—We are still awaiting a *friend of the Club*, Andy WA2CDL, who will give our repeater a good check up when he has time available in his busy schedule. The repeater seems to be experiencing very rare lock-ups when used for long periods in its digital mode. Please email Mitch N2RGA if you notice anything strange with the repeater. We will need to further investigate this problem. Mitch discussed the possibility of upgrading our Yaesu DR-1X for a not yet released DR-2X model. The DR-2X has a few refinements, a more sturdy final power amplifier stage, and a dual Tx/Rx so that off frequency control codes could be used without any other radios. Since this model has not been released yet, and its ability to work correctly with our control board have not been ascertained, the decision to pay for an upgrade was tabled for a later meeting.

Field Day was discussed. An information table was discussed for extra points. Howard N2GOT suggested that Roy AC2GS write up the necessary pamphlets and sign-in sheets to obtain credit for this. **Please keep up to date with the Field Day 2017 spreadsheet, and volunteer what you can, to make this Field Day our most successful one!**

If all else fails there might be radio!? But in case that doesn't work out so well and technical issues lessen your radio experience, keep in mind that the club (via Roy AC2GS) has been streaming events over the Internet using the <http://bit.do/KC2RC>. Remember that we now offer a chat facility on the lower right hand corner of our club website: www.KingsCountyRadioClub.com.

New News: The HOSARC Hamfest and NYC Skywarn class were mentioned (but since these are/were planned for the week of June 5th, you probably missed them by now).

John WB2FLU brought in some literature for the Total Solar Eclipse QSO Party planned for Monday, August 21, 2017. There is a load of useful information at: www.hamsci.org/basic-project/2017-total-solar-eclipse, as well as: radiojove.gsfc.nasa.gov/eclipse2017.html. Here in New York it will only be a partial eclipse, beginning at 1:23 PM, reaching its maximum at 2:44 PM, and ending at 4:00 PM. Please do NOT stare up at the Sun without adequate protective filters. The eyesight you save may be your own!

Mitch threw a little impromptu 50/50 raffle and the winner was our guest Bob!

At 10 PM the meeting was adjourned.

See ya' all in July (still in Room 6B)! *(We'll probably start talking about the next Field Day...)*

Disclaimer: The views and opinions expressed in this publication are those of the author and do not necessarily reflect the official policies or positions of the Kings County Radio Club, its Executive Board, nor its General Membership.

These minutes were respectfully recorded and submitted by Roy AC2GS on this day, June 7th, in the two thousandth and seventeenth year of our Lord of Propagation...

(AC2GS would like to thank all the people that maintain the program and the keyboard used to type these minutes, as well as those that supply his food and shelter.)

The Kings County Radio Club is at www.KC2RC.com or
www.KingsCountyRadioClub.com
KCRC is an ARRL affiliated club (see: www.ARRL.org)

Is My Antenna's Efficiency Important?

Or

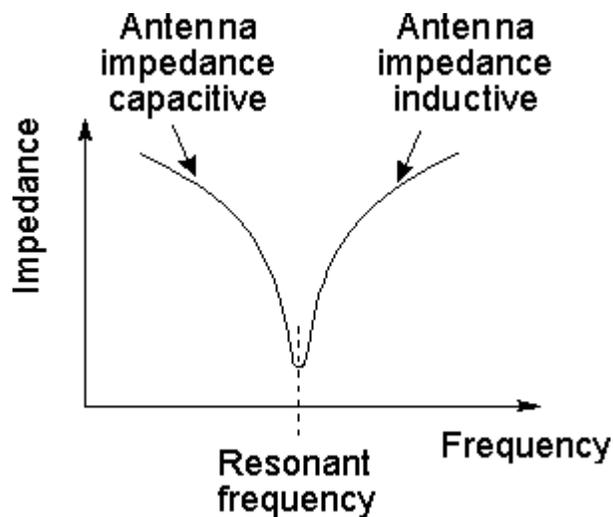
Why Does My Hamstick© Suck?

First, my apologies to *Hamstick*© owners. I am sure that many people are quite happy with this compromise shortened vertical and wouldn't leave home without it mounted on their cars - but for those who have decided to use it as their primary base antenna...

Lotsa luck.

Like *'any port in a storm'* - whatever antenna gets you on the air, but every Ham should understand the price they pay for the compromises that they decide to make.

First a little fundamental antenna theory - most antennas are standing wave devices. They are actually tuned LC circuits with some resistance thrown in for good measure. They operate best at resonance - if your antenna is too long it will demonstrate additional inductive reactance, if it is too short it will show additional capacitive reactance. When an antenna is operating at resonance all the capacitive reactance is cancelled by its inductive reactance and the load is purely resistive!



Ah, if life could be that simple!

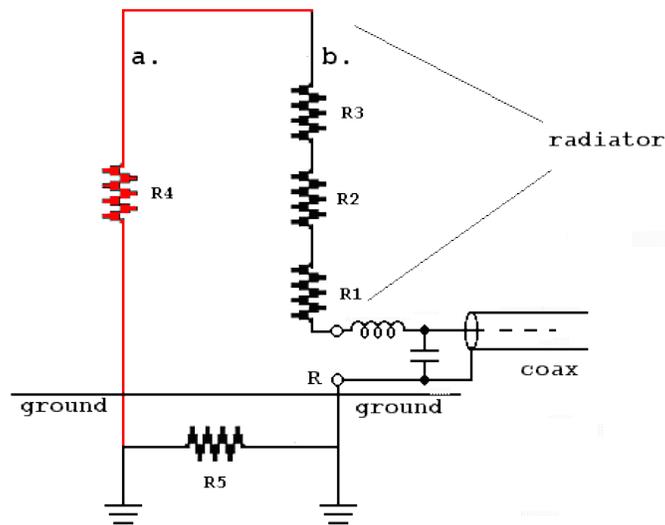
You also have to deal with impedance matching throughout your antenna system (antenna->balun->transmission line->antenna tuner->transmitter). Unfortunately, an antenna at resonance is not necessarily the 50 ohms that everyone expects and wants. Different antenna designs have different resonant impedances, and modifying antennas or placing them closer to earth ground will affect this impedance,

Even the simple half wave dipole in free space has a nominal impedance of 73 ohms, not 50 ohms!

But let's sweep this complication under the *technical rug* somewhere, and let's just deal with an antenna's purely resistive components, when forced, either mechanically or electrically, into resonance. After all, the reactive aspect of an antenna system is *imaginary*. Impedance is written like any other complex number, containing a real number as well as an imaginary component $Z = R + iX$, where "*i*" is the square root of -1. Electronics has way too many values that use "*i*", so they have used "*j*" as the square root of -1. Reactance messes with RF transmission's phase relationship between its current and voltage, but it does not cause waste heat loss that most electrical resistances cause.

Most electrical resistance?

Yup! It gets complicated, but you can consider your antenna as possessing a number of *resistances*, making up its total resistance.



R1 = radiator mast
 R2 = loading coil
 R3 = radiator rod
 R4 = radiation resistance
 R5 = ground resistance

$R_{\text{feedpoint}} = R1 + R2 + R3 + R4 + R5$

This is a simplified view of a shortened vertical radiator, which is what your average Hamstick is.

Radiative Resistance is not your average form of resistance - rather than the energy being dissipated into waste heat, as is the case with the other resistances listed, this energy is radiated from your antenna as effective RF radiated energy used in your QSOs! This is the kind of resistance that you *really* are looking for!

Consider that, as the values of the resistances that are not the *radiative resistance* increases, and as the *radiative resistance* value decreases, more and more energy is going into heating those resistors and less and less is going into the apparent resistance that is actually the radiating of your RF into space for all your fellow Hams to receive!

In a perfect world, your antenna would just have its *radiative resistance* and no other kind...

But this isn't a perfect world.

Now, smarter people than myself have written extensively about something called *the infinitesimal dipole*, but you can just as well apply it to an *infinitesimal ground plane vertical* as well. Suffice it to say, as long as you cancel out an extremely *mechanically* shortened antenna's inherent high capacitive reactance with the inductance of a loading coil, it should have the same *antenna aperture* (the effective area, or receiving cross section as a measure of how effective an antenna is at receiving the power of radio waves, or transmitting them) with only a slight 1/2 dB drop in gain. According to the theory, that Hamstick should be sheer magic...

So, why isn't it?

It sounds great for whatever energy successfully reaches the radiating portions of your antenna...

But that isn't most of the energy that you originally sent up there from your transmitter, in the first place!

Well, let's forget about the ground loss issues in these antennas, which are problematic and compound the central limitation of shortened antennas.

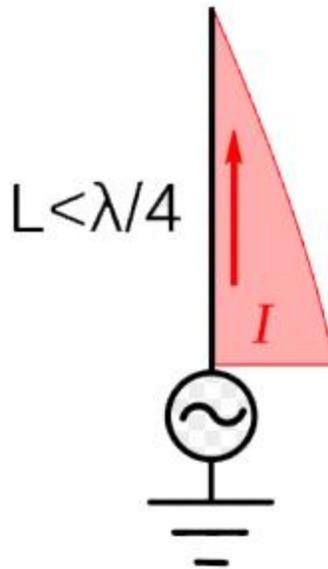
The mechanically shorter you make your antenna's radiator segment, the more inductance you have to add, to electrically bring it back into resonance at your transmitting frequency. The greater your inductor, the greater your inductor's resistance adds to the total resistance of your antenna, and the heat that your inductor radiates instead of RF!

Again, there are a lot of complicating factors, like where you stick the loading coil - an antenna's base usually has its highest currents and coils perform poorer down there. Placed at the tip usually has mechanical problems with heavy coils causing your vertical to take on a *bend* from the extra weight at the tip. Sometimes you will see the loading coil placed in the middle of the radiating antenna, which is probably the best compromise, but many shortened verticals just place them at the most mechanically sturdy bottom and don't really concern themselves with the ensuing losses.

So, there's the ground losses, the insertion losses, the interactive losses. Gee, that doesn't sound too good. But at least that's all the losses, right?

No, not really.

You see, an antenna's *radiative resistance* is determined by the length of its radiator and its current distribution. It amounts to the area under a curve of the current flowing in a radiator:

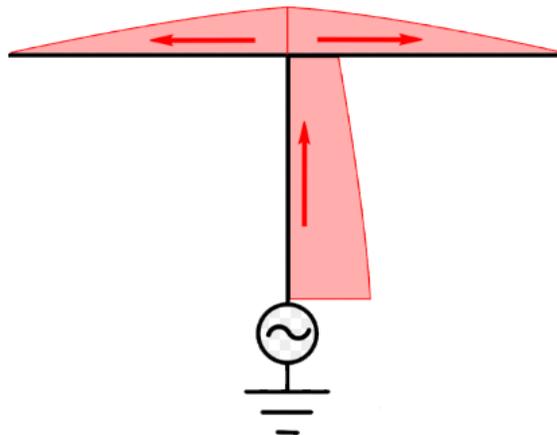


So, the more *colored area* the higher the *radiative resistance*, the greater the percentage of your transmitting power gets radiated into space as RF, rather than wasted in heating up your neighborhood! It might have become apparent to you, dear reader, that as your radiating elements grows shorter and shorter, the area shrinks accordingly as does your antenna's *radiative resistance*, and your resulting antenna efficiency. A lot more heat, very little radiating modulated RF signal.

So much for the infinitesimal antenna, be it a dipole or a vertical with ground planes.

RIP.

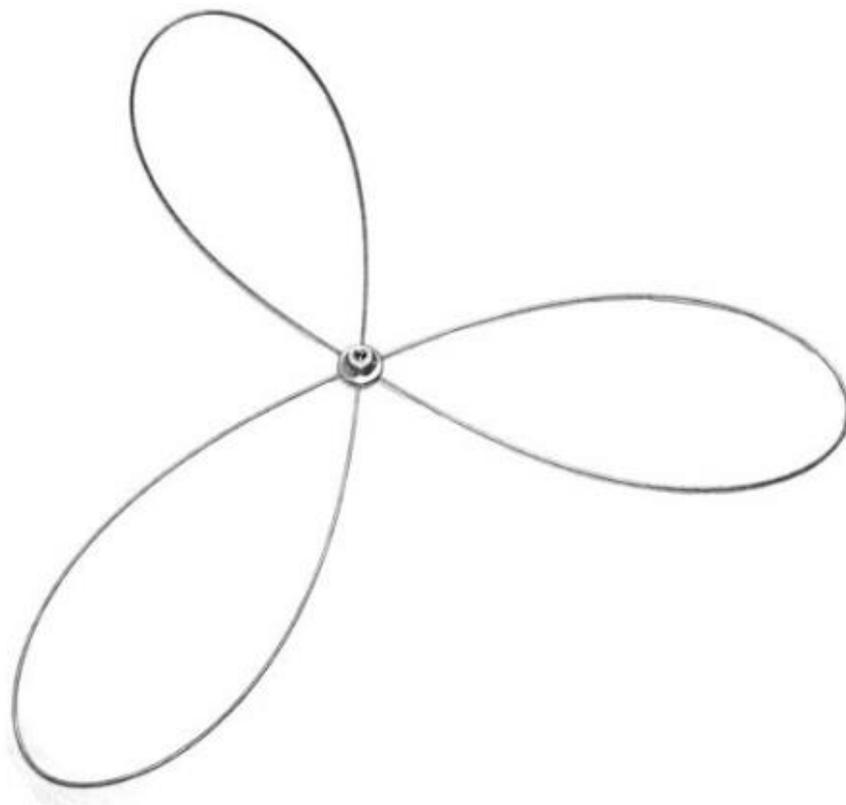
But, as long as I find myself on the subject of *tweaking* an antenna's *radiative resistance*, I might as well bring up a very useful addition to any mechanically short antenna - the *capacitive hat*!



By utilizing a *capacitive hat*, sometimes called a *T antenna* you can use a mechanically shortened vertical (the *capacitive hat's* coupling to earth ground negates some of the capacitive reactance inherent in a mechanically shortened antenna). The current in the capacitive hat, itself, is balanced and none of the RF will radiate directly from the capacitive hat, BUT it does increase the total current on the entire radiating portion of the antenna, and with it the *radiation resistance* and the efficiency of a given shortened antenna.

The simplest center-fed *half-wave* dipole has a degree of capacitive ground coupling at its tips - that's why a *half-wave* dipole is actually shorter than an actual half-wave. That is why people often quote the quick calculation of the length of a resonant dipole as approximately $468/\text{frequency in MHz}$. By adding capacitive hats at an antenna's tips, you are increasing this capacitive coupling and able to further shorten its mechanical length while still being resonant, and you get to increase its *radiative resistance* too!

It's a bit of a mechanical puzzle how to keep an antenna's capacitive hat stable and in place, but if you can figure that part out, it will improve the efficiency of any mechanically shortened antenna!



(And **PLEASE** don't call a capacitive hat an inverted ground plane! It just isn't, and when you say such things you make an Angel/Electrical Engineer cry!)

So, there you have it - why a mechanically shortened antenna *sounds* like a great trick, theoretically, but, as in most things, the devil is in the details.

Think about it!

And if you really like your *Hamstick*®, great! Enjoy them - your mileage might vary!

And don't forget to have fun!

73,

Roy AC2GS