The Newsletter of The Kings County Radio Club

KCRC Kings County Radio Club

April 2015 Volume 2, Issue 4

Next Club Meeting:

Wednesday, May 13th, 2015 at 7:30PM

Next Club Activities:

Next VE Session is planned for May 31st, 2015 at 1 PM at New York Methodist Hospital

Our Annual Field Day Planning Marathon continues. Try to come to our upcoming meetings so that you can put your *two cents worth* across on the subject.

Further details will be posted on www.KC2RC.com and www.KingsCountyRadio.com as they develop.

Contents

Our weekly Nets meet on Sunday at 11 AM on 28.380 (10 meters) and Tuesday on 146.730 PL 88.5 (2 Meters)

KCRC Meetings Schedule Change Notice!

Due to scheduling problems, the KCRC has had to adjust their monthly meeting dates for March, April and May. Our next monthly meeting is scheduled for Wednesday May 13th at The Methodist Hospital Executive Dining Room. Please make a note of this change!

Congratulations To The Most Recent KCRC Volunteer Examination Session Examinees!

Congratulations to all test takers! Five previously unlicensed individuals earned their Technician License, and one General Class License holder upgraded to an Extra class license.

Our next VE Session is planned for April 31st, at 1 PM, at New York Methodist Hospital, in the Executive Board Dining Room. Watch KC2RC.com for its status.

Our Government Brings You Less Services For More Money (again)!

Well, the FCC will be cutting more costs once again, this time they are shrinking their already feeble Enforcement Bureau! Although the FCC "spins" it that they are reconstituting their bureau as a "Tiger Team" of field agents as a flexible strike force, the numbers show that the FCC is in fact cutting two-thirds of its field offices and eliminating nearly one-half of its field agents!

Those *chuckleheads,* jamming Repeaters and acting up on 14.313 must have thrown a hell of a party when they heard all about this latest FCC decision.

The Kings County Radio Club is at www.KC2RC.com or www.KingsCountyRadioClub.com

KCRC is an ARRL affiliated club (see: www.ARRL.org)

H.R. 1301—"The Amateur Radio Parity Act Of 2015"

"The Amateur Radio Parity Act of 2015" - H.R.1301 - has been introduced in the US House of Representatives. The measure would direct the FCC to extend its rules relating to reasonable accommodation of Amateur Service communications to private land use restrictions. US Rep Adam Kinzinger (R-IL) introduced the bill March 4 with 12 original co-sponsors from both sides of the aisle - seven Republicans and five Democrats. Kinzinger also sponsored "The Amateur Radio Parity Act of 2014, which died at the end of the 113th Congress. H.R. 1301 is an essentially identical piece of legislation, H.R. 1301 has been referred to the House Energy and Commerce.

ARRL President Kay Craigie, N3KN encouraged ARRL members to urge their US House members to sign on to the bill as a co-sponsor. The ARRL has an H.R. 1301 resources page on its website at, http://www.arrl.org/hr-1301 . If the House member is already a co-sponsor, call the member's local office or send an e-mail via the member's official website to express their thanks. She called on League members to encourage other hams to do the same, and to be sure to refer to the bill by its number, H.R. 1301.

To youz guyz dat don't read to good, this does NOT mean that your landlord cannot limit your dream of building that 400 foot tower on his roof! Nor does it have ANY effect on the random police officer stopping your car when he sees you operating an HT and writes you a ticket.

This ONLY affects those Home Owner Association rules (that, no doubt, were spawned in the very depths of Hell) that severely limit or disallow any amateur radio aerial larger than a television antenna (at best).

Minutes of the April 2015 KCRC Meeting,

April 15th, 2015

The monthly meeting was called to order by our President, Howard N2GOT. Also present at today's meeting were Vice President Mitch N2RGA, Treasurer Richard KA2KDQ, Eddie W2DEV and Etienne.

Our successful VE session was discussed— we awarded five Technician's Licenses, one General Class License holder upgraded to an Extra License! Thanks to the efforts of our new VE Coordinator John WK2J and our dedicated group of VE Examiners Ed W2DEV, Howard N2GOT, and Roy AC2GS.

10 Meter Net—Despite poor propagation recently, the 10 Meter Net is still active, but not quite as much Dx. Most recent check-ins have been from the Greater Metropolitan area with a few contacts as fat away as California.

2 Meter Net—Richard, KA2KDQ reported that we are maintaining five to seven check-ins per net. Members are urged to join in (the time and frequency are, as always, listed on the first page of this Newsletter). Come on guys, you can't expect poor Hanley to always keep the traffic lively!

Treasury Report—Presently our Club has a healthy balance of $1,291.30.

(continued from page 2)

Old Business—The Club is still waiting for Yaesu to ship our new DR-1X Repeater that has been on backorder for a while. The new Repeater antenna still needs to be installed and contacting Tommy KB2GTO for help with this installation was discussed.

New Business—The next VE Session is planned to take place May 31st, 2015 at 1 PM in the Executive Board Dining Room of the New York Methodist Hospital. Our previous VE Session was very successful. Five new Technician Licenses were awarded, and a General License holder upgraded to Extra Class!

Copies of our Club Constitution and By-laws were distributed to attendees. A copy has been posted on the Club Website.

Copies of a letter from the Department of Motor Vehicles, clarifying whether ham radio equipment falls under the *no cell phone* law, were distributed to attendees. A copy of this has been posted on the Club Website too.

A request for help was made, by Bob Jordan KD2BQM, Emergency Coordinator for Kings County Amateur Radio Emergency Services, regarding the Saturday May 16th Brooklyn Half Marathon (Bob can be contacted via his QRZ.com contact info).

Etienne mentioned that he will ask his supply department Commanding Officer about getting a tent from the Marine Corps.

The possibility of moving our monthly meetings from Methodist Hospital to another venue that might attract more members to attend was discussed, but was tabled for a time, when more members will be present to discuss something this important.

...and with that, the April session of the KCRC meeting was called to a close.

A Message From Our President.

Hello friends and fellow KCRC members,

You wouldn't know it was late April by the mostly cooler temperatures we are still experiencing.

We’re already more than halfway into April and Field Day is rapidly approaching.

I have been slowly beginning to gather and organize the gear that l plan on bringing down to operate. It's time to get out those batteries, wires, headphones, connectors and all the necessary accessories to

Thanks to Mitch, N2RGA for providing notes on this session’s minutes.

use our radios.

Conditions on the HF bands have been fairly opened these last few weeks and I have been enjoying working DX on 10, 20 and 40 meters. I've been mostly operating on phone and using some CW as well. I've been also rag chewing on the 75 meter band at night with some of the local hams in the tristate area late in the evenings.

The twenty meter band is rich with much digital activity if you've ever tuned your transceiver between 14.060 and 14.120. It doesn't take much power or an elaborate antenna system to work stateside and DX stations on a digital mode such as PSK-31. I usually run between 10 and 20 watts to my dipole or vertical (when I use 10 meters) and get solid copy under most conditions).

There are many other modes to experiment with aside from PSK-31. RTTY baud is heavily used by contesters and even some rare DX stations. If anyone would like a demo of the digital modes, I'm sure we could arrange for a learning clinic at a future meeting.

Check out http://wb8nut.com/digital/ for some more in depth descriptions and sound samples.

The KCRC still needs to replace our club's repeater antenna. We'd like to get this done on a future Sunday when the weather cooperates. Contact me or one of the club officers if you are interested in helping out and visiting the repeater site.

Our new club repeater will be shipped to us soon and I'm very excited about having it online by the summer.

I'd like to urge all of our members to at least attempt to support our 2 meter and 10 meter nets if you are able to. We need to stay active on the air and even encourage non members to check in and participate in our nets as well as club members. The nets need additional stations to add to the conversations. I don't believe it should just be the regulars that chime in every week.

Please spread the word!

Hope to see you on Wednesday, May 13th!

73,

Howard N2GOT

Capacitance Does Not Affect Bandwidth In A Tuned Circuit?

By Professor Alouisus Σ. Obscura

This is based on an article in the recent *Radcom*, the Journal of the Radio Society of Great Britain (they have excellent technical articles, I heartily recommend that you take a look through an issue if you ever have a chance!). This is a bit of algebra that indicates that "Capacitance does not affect bandwidth in a tuned circuit."

The initial equation is for f_0, the formula for the resonant frequency of either a series or parallel circuit:

$$f_0 = \frac{1}{2\pi\sqrt{LC}}$$

This can be simplified by combining all of the constants into a constant called alpha sub one ($\alpha 1$).

$$f_0 = \alpha_1 \frac{1}{2\pi\sqrt{LC}} \qquad \text{(Equation 1)}$$

The Q factor in both series and parallel resonant circuits is:

$$Q = \left(\frac{1}{R}\right)\sqrt{\frac{L}{C}}$$

Where R represents the loss resistance in both capacitor and inductor. This equation also can be simplified removing extraneous values into another constant, alpha sub 2 ($\alpha 2$)

$$Q = \alpha_2 \sqrt{\frac{L}{C}} \qquad \text{(Equation 2)}$$

The bandwidth (BW) of a tuned circuit is the difference in frequencies at the half-power and is given in the equation:

$$BW = \frac{f_0}{Q} \qquad \text{(Equation 3)}$$

Now, substitute Equation 1 for $f0$ and equation 2 for Q into equation 3, (call the new constant factor $\alpha 3$) which gives you:

$$BW = \alpha_3 \frac{\frac{1}{\sqrt{LC}}}{\sqrt{\frac{L}{C}}} \qquad \text{(Equation 4)}$$

Square both sides:

$$(\mathrm{BW})^2 = \alpha_3^2 \frac{\frac{1}{LC}}{\frac{L}{C}} \qquad \text{(Equation 5)}$$

Do a little simple algebra:

$$(\mathrm{BW})^2 = \alpha_3^2 \left(\frac{1}{LC}\right)\left(\frac{C}{L}\right) \qquad \text{(Equation 6)}$$

A little more simple algebra:

$$(\mathrm{BW})^2 = \alpha_3^2 \left(\frac{1}{L^2}\right) \qquad \text{(Equation 7)}$$

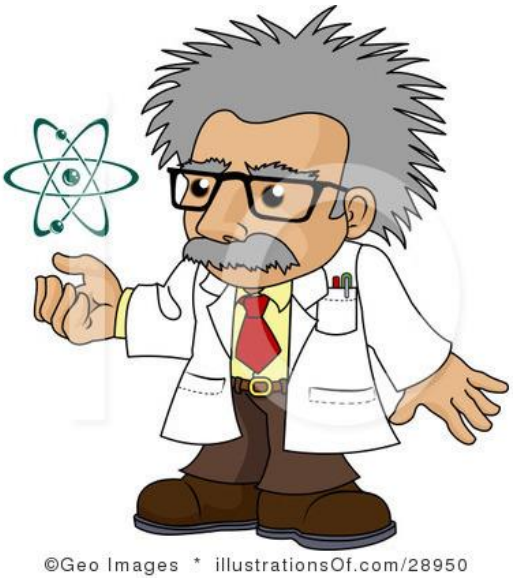
and then take the square root of both sides:

$$\mathrm{BW} = \alpha_3 \left(\frac{1}{L}\right) \qquad \text{(Equation 8)}$$

And so the final equation would indicate that capacitance does not affect bandwidth in a tuned circuit!

I think that this is a bit of a "dodge" since altering C, capacitance, will alter the resonant frequency and require the inductance L to be altered in order to maintain the same frequency, which will change the bandwidth, so given a constant frequency, C seems to be a hidden factor that still affects bandwidth (in a circuitous way)!

(Herr Professor Alouisus Σ. Obscura is the holder of the prestigious Sloof-Lirpa chair of Applied Dubious Mathematics at the University of Wossamotta U (http://www.wossamotta-u.com). He is taking a very low profile while he dedicates himself to his present project of discovering a breakthrough understanding in the field of Temporal Field Mechanics, as it can be applied to effective procrastination, which he is arduously working on. He can be contacted via “The Editor” at TheEditor@kc2rc.com)



The Monty ~~Python~~ Hall Problem

By Professor Alouisus Σ. Obscura

Even something as complex and powerful as the human brain has its limitations, but intriguingly, we seem to use a lot of "shortcuts" unconsciously to "get the job done". Often it turns out well, but sometimes, as optical illusions demonstrate, we have to deal with accepting an erroneous result as our best estimation of reality. One aspect of this is that the human brain is particularly ill designed to possess a "native" appreciation for probabilities – we just seem to have an erroneous "gut sense" of what our "chances" are (I guess this is one of the reasons that the gambling industry is so lucrative)? A perfect example is how we can fail to realize what the real probability of events are in something like "The Monty Hall Problem" (see: http://en.wikipedia.org/wiki/Monty_Hall_problem).

The Monty Hall Problem is named after the emcee of the old game show "Let's Make A Deal", in which similar choices are offered to their contestants:

You have three curtains. Monty tells you that behind one of them is a beautiful new sports car, but behind each of the other two are a rather scrawny, old goat! You choose one of the curtains. Monty knows where the goats are and where the car is. Monty shows you that one of the two remaining curtains that you didn't choose hides a scrawny old goat and asks you whether you wish to stick with your first choice or choose the other remaining unopened curtain? What do you "feel" to be the best plan of action: stay with your original choice, or switch to the remaining curtain that you didn't choose at first?

You need to have an idea what the chances are, and go with your best chance. Is it:

Your odds are the same for each of the remaining curtains.
Or is there something special about one of the two remaining curtains that makes it the best choice to pick over and the other one? Think about it for a minute or two BEFORE you continue with this…

A) When Monty removed one of the three choices he left two remaining – the car is either behind the curtain you chose originally or it is behind the curtain you didn't choose. The odds are therefore 50:50 and there is no benefit for switching your choice. If you stand "pat" or switch it's the same 50/50 – there is no "better" curtain to choose.

Or

B) When you chose your curtain the first time you had a 1:3 chance of being correct. Monty's action did not change that initial probability, so if you you keep this curtain you will still only win a car one third of the time! Since selecting "all" of the curtains by definition gives you a chance of 100% of getting the car (Monty is not lying to you – there's a car behind one of the curtains), but it is definitely not behind the curtain that Monty already showed you, the remaining curtain that you DIDN'T choose has a 2 out of 3 chance of having a car behind it (the curtain you chose has a 1/3 chance, the curtain you didn't choose has a 2/3 chance and the chance of one of these two curtains is hiding a car is 100%)! Therefore, if you always switch to the remaining unopened curtain that you didn't choose first,

you have TWICE the chance of getting the car! If you believe this you should ALWAYS choose the remaining unopened curtain that you didn't choose first!

These are two very different assessments of your chances, and unless you have taken a lot of courses in Probability or run a lot of successful gambling establishments, the average human has an innate "sense" that the first case is correct – the probability for both unopened curtains are, 50:50, one to one, each curtain is just as likely to be hiding your new car, BUT IT'S NOT!

Think about it a while and "roll it around in your mind" – some people have required running computer simulations to prove to themselves that by switching to the unopened curtain not first chosen you get the car 66.666… percent of the time!

The correct answer seems "counter intuitive"! How can it possibly be true?

Humbling, ain't it?

Just think what other "gut" perceptions we have that are just as faulty?

(Herr Professor Alouisus Σ. Obscura is the holder of the prestigious Sloof-Lirpa chair of Applied Dubious Mathematics at the University of Wossamotta U (http://www.wossamotta-u.com). He is taking a very low profile while he dedicates himself to his present project of discovering a breakthrough understanding in the field of Temporal Field Mechanics, as it can be applied to effective procrastination, which he is arduously working on. He can be contacted via "The Editor" at TheEditor@kc2rc.com)

Closing statements (from the Editor):

Well, it's a little late for April Fools, but I couldn't pass up the opportunity. Although *tongue in cheek,* all of this month's technical articles are as rigorously true as any previous technical article!

For your ideas, your thoughts, your dreams, your kind words or even your epithets, I can be contacted at TheEditor@KC2RC.com .

- The Editor -

(April 2015 Supplement)

Guest Column

(cut and pasted from the internet (QST July 2000)—it's Homage, not IP theft!)

Everything Works

Your enjoyment of Amateur Radio is directly related to your antenna—although anything will "work".

By Thomas H. Schiller, N6BT

Bravo Tango, this is NO Papa Golf. Tony, Iowa, number 69591." I made it with one call: February 5th, 2000. my first contact with "The Illuminator," KB9TQL Indiana; NOIJ, Minnesota; K4CIH, Alabama; WA9TPQ, Illinois; N5MT. Texas; KBOMZG, Kansas; and, KX9DX, Illinois were other contacts made in the 10/10 Contest, slipping into the radio room from time to time while working in the yard. The path to Indiana was the far-thest on record for me with the 150-W light bulb perched on a fence post. What a pleasant surprise, and there was more to come.

One of the most important aspects of building and evaluating antennas is actually using them in environments where the performance can be measured in a meaningful manner. Claims for how well various antennas "work" are as plentiful as snow flakes in winter and this subject has surfaced in one way or other at every forum or club discussion I have presented since 1978. How many times have we heard someone say, "My antenna really 'works'"?

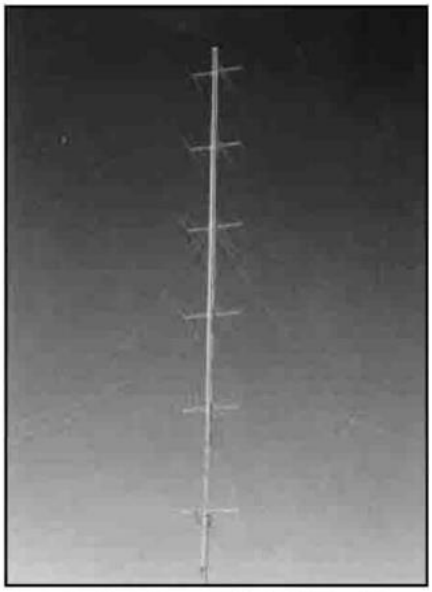
Performance Envelope

What does the word, "work" mean? The answer is, everything does work, to one degree or another. I hope that everyone will agree that this statement is absolutely true. How well it "works" is the issue and this is the "performance envelope" of the antenna system.

A single Illuminator. Notice the balun attached to the side of the post.

The first time I presented this idea was at the ARRL Pacific Division Convention in the fall of 1998. It was well received and I was encouraged to completely rewrite all of my material. My revised presentation was first viewed at the ARRL Southwestern Division Convention in the fall of 1999. It was further augmented and presented a couple weeks later to a packed double room audience at the ARRL Pacific Division Convention. There were more than a few eyebrows raised when I began with the digital slide, "Everything Works." It seemed to be out of character, because I always focus on efficiency.

I followed with an example of my first antenna. which enabled me to make contacts all over the West Coast on the 40-meter Novice band. I was WV6KUQ and the year was 1959. It was a very simple antenna, since it was the screen on my bed-room window. I made contacts, so I thought it was doing all right. My high school science teacher, the late "Doc" Gmalin, W6ZRI, tactfully informed me that it probably was not the best antenna and that it could be improved. He was the one who had given me my Novice test, became my Elmer and later was my high school physics teacher. At his suggestion, and with my Dad's assistance (both he and my Mom always encouraged and supported my adventures), we put up a Windom antenna. It was easy and did not require coax. The Windom certainly was not the greatest, but it was a tremendous improvement over the window screen. The performance envelope of the antenna system had been extended.



A stack of six Force 12 C-3s (30 to 180 feet) on a 190-foot rotating tower at N7ML.

A triangular, phased kW Illuminator "array."

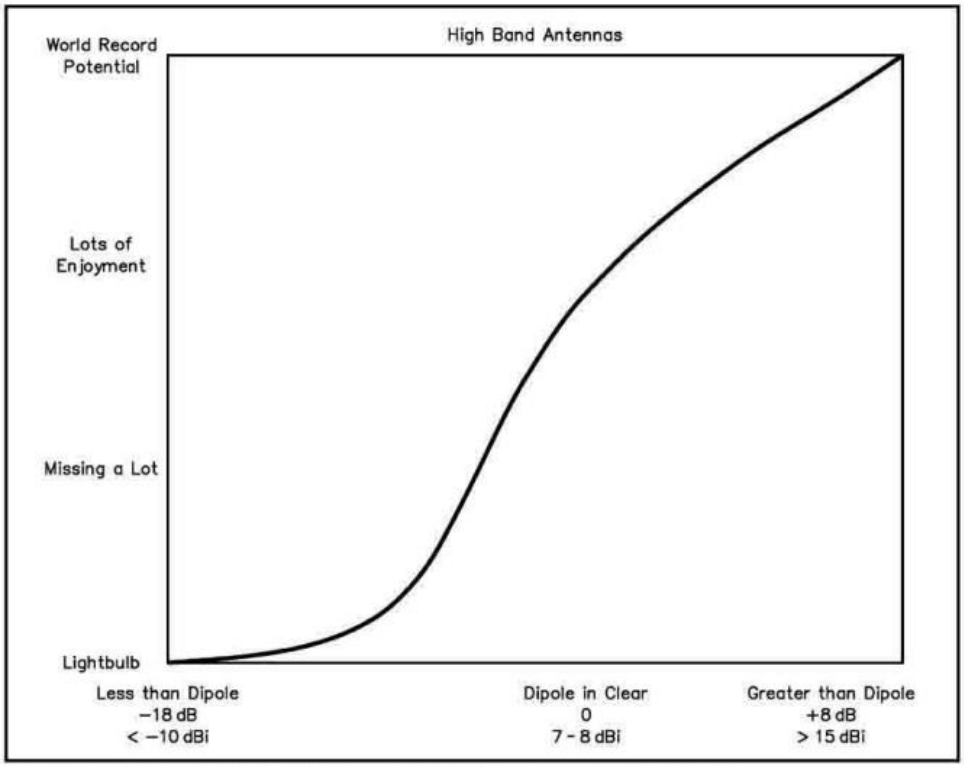


Figure 1—A chart relating "enjoyment" to HF antenna performance.

Witnessing the obvious improvement between the window screen and the Windom sparked my long-term interest in antennas. The performance difference between the two could best be summarized as. "Wow! This is going to be a lot more fun,- The Windom antenna enabled me to make my first out-of-state QSO with a fellow Novice hack in Delevan, Wisconsin. This was almost 2,000 miles away and we talked for more than 30 minutes. We then put up a vertical antenna for 40 meters made by attaching a large. insulated stranded wire on a wooden 2 x 4 frame. The ground system was a single ground rod (not very efficient, I later learned). This antenna enabled me to make my first DX QSO with JA2CMD. With my Dad's help again, we graduated to a 2-element, trapped tribander, which we managed to raise to 30 feet on a telescoping mast atop the roof. From my experience it was so impressive that l thought it must be the absolute best antenna possible.

This impression, of course, was incorrect. It was only the best one I had used so far. It was my personal, limited perception; certainly not an accurate assessment of the true situation. Strange as it might seem, it has taken years to realize that most everyone goes through this same learning process. Today, even with all the hooks on various antenna subjects, there remains a similar gap between perception and reality. My reality came into sharp focus in 1983.

Gary Caldwell, VA7RR (WA6VEF at the time), and I went to Saipan for the CQWW CW contest (AHOC). I had operated twice before from the southern end of the island utilizing the existing quad antennas of Byrd Brunemeier and Don Bower who worked for Far East Broadcasting Company (FEBC). After setting up the stations, we were asked if we would rather move to the north end of the island and use the FEBC short-wave broadcast antennas. These were located on Marpi Cliff, about 400 feet above the ocean. That decision took about two seconds.

We had brought along a typical trapped (new) tribander and a 30 -foot mast. We also had about 1200 feet of coax. The antennas made available for us at FEBC's site were three TC1-61 I curtains, designed for opera-tion between 8-18 MHz (we used them on 40, 20, 15 and 10 meters). Each one cost about $300,000 (in 1982 dollars) and consisted of a pair of 240-foot towers with 61 phased

dipoles between them. There was a passive reflector behind all the dipoles and a switching system to move the main lobe from side-to-side. These are huge antenna systems! We set up the stations in the main operations building and the slew controls were behind us on a large panel. These curtain antennas were specified to provide 21 dBi gain and a FIB ratio of 20 dB. The tribander was specified to provide about 8.5 dBd, or 10.6 dBi. It was a fascinating observation that to achieve an additional (theoretical) [0 dB over the trapped tribander required so much more hardware (and money).

I have kicked myself ever since for not having a tape recorder to share the experience of the difference between our trapped tribander and the curtains. We had been listening on the tribander while we did other things. The sun had already slipped below the rim of the Pacific Ocean when Gary suggested we hook up the curtain for 15 meters. It was late evening by the time we had attached a 4:1 coaxial balun to the large open -wire feed line heading out to one of the curtains. We were ready to do the classic "antenna A, antenna B" comparison, but the band was almost dead. We plugged the curtain feed line into an antenna selector. flipped the switch and were not ready for what we heard: the band came alive with all kinds of signals. It sounded more like mid-day. It was like turning on a light bulb in a dark room. We had an incredible QSO with HZ' AB that is etched in our minds forever.

We made signal comparisons, both with 100 W to our antennas and with another station on Guam who was running 1 kW to a larger tribander. The difference between the antennas was unbelievable. HZ1AB said both tribanders were S7 and the curtain was at least S9+40: an S-meter difference of about 50 dB.

Part of the signal level difference can be attributed to the location and the take-off angle of the cliff. Our 100 W to the tribander was the same as the kilowatt on Guam, so the cliff location made up the power difference, or about 10 dB: however, both our tribander and the curtain were looking over the same cliff. To try to satisfy everyone on this comparison. let us make an impossible assumption that the difference between the curtain and our trihander locations (in reference to the same cliff) accounts for 30 dB. The remaining difference is still 20 dB and must be attributed to the performance en-velopes of the tribander and the curtain.

The true difference between the anten-nas was so far removed from the specifications that something did not make sense.

Our performance envelope had been recalibrated to a limit that can be achieved only by a handful of antenna systems used in Amateur Radio. The challenge to understand the observed difference in performance envelopes led me to design, build, and evaluate hundreds of antennas. These efforts answered the questions about performance and also became the genesis and core of an antenna design philosophy, which has since been produced and mar-keted under the name "Force 12."

The Illuminator Project

The performance envelope addresses the practical relationship between enjoyment of Amateur Radio and antenna performance. The entire station should be considered. However, the radios available today are all pretty good, so the antenna system is the major key. The primary effort in "The Illuminator" project was to quantify antennas (performance in dBi) and relate this to true performance. The basic chart relating performance to enjoyment is shown in Figure I. It was developed with the assistance of many knowledgeable people, including typical amateurs, DXers, contesters and manufacturers.

The chart is intended to indicate the relationship between generalized antennas and expected enjoyment of Amateur Radio. It is certainly not a comprehensive representation of all antenna types and what can be accomplished. The ranges across the bottom of the chart, however, are pretty good indicators of antennas amateurs have used. The chart does not indicate take-off angle, which is very important for working DX, but not everyone is interested in working long distances. Figure 1 is used to represent relative increases in enjoyment of radio through improvements in antenna efficiency.

The center "Dipole in Clear" is a hori-zontal dipole in the clear at about V3-V2 wavelength high. This is an efficient antenna and it is horizontally polarized, so it has ground reflection gain. It is directional (figure 8 pattern), which

produces additional gain and assistance in reception (front to side ratio to reduce noise). A rotary dipole is quite impressive, especially on the low bands where apparent small changes can make large improvements. The most common dipole on the 80 and 40 meter bands is an inverted V type. After performing more than 30 tests, I've determined that an inverted V dipole will be 6-10 dB down from a hori-zontal dipole at the same apex height.

The range to the right of the chart in Figure I (not the extreme right of the chart) indicates 13-14 dBi gain, which is approximately 6-7 dB more than the dipole. This can be achieved by using a well-designed Yagi with a minimum boom length of around I/2 wavelength (35 feet on 20 meters). The extreme right of the chart is for systems with more gain. The largest 1-IF arrays for amateurs rarely approach 20 dBi including ground reflection gain. The stack of six Force 12 C-3s (30 to 180 feet) on a 190-foot rotating tower at N7ML is in this range, as are the multi-element vertical dipole arrays on salt water at 6Y2A/4M7X.

The left-hand side of the Figure 1 chart refers to antennas that are very inefficient. As one moves from the center to the left of the chart (efficiency and gain decreasing), the ability to make QSOs, and hear what is going on, decreases rapidly. The extreme left side is pegged to a light bulb. Before approaching very poor performance (light bulb), we go through antennas that are either inefficient by design (intentionally or not), or by necessity (installation restrictions).

We should note the range across the bot-tom of the chart. My best estimate is that from –5 dBi to +13 dBi is the practical range of typical, installed (not in free space) amateur antennas. This represents inefficient verticals up to efficient Yagis at reasonable heights and is shown in the chart in Figure 2. Notice that this range is not all that large: 18 dB; and people with severe antenna restrictions will have a larger difference than 18 dB. If we take the center dipole, moving + or – a few dB makes a noticeable difference in the performance. Yagis and other horizontally polarized antennas receive a benefit from being over ground and will achieve ground reflection gain that can represent about 4 to 5.

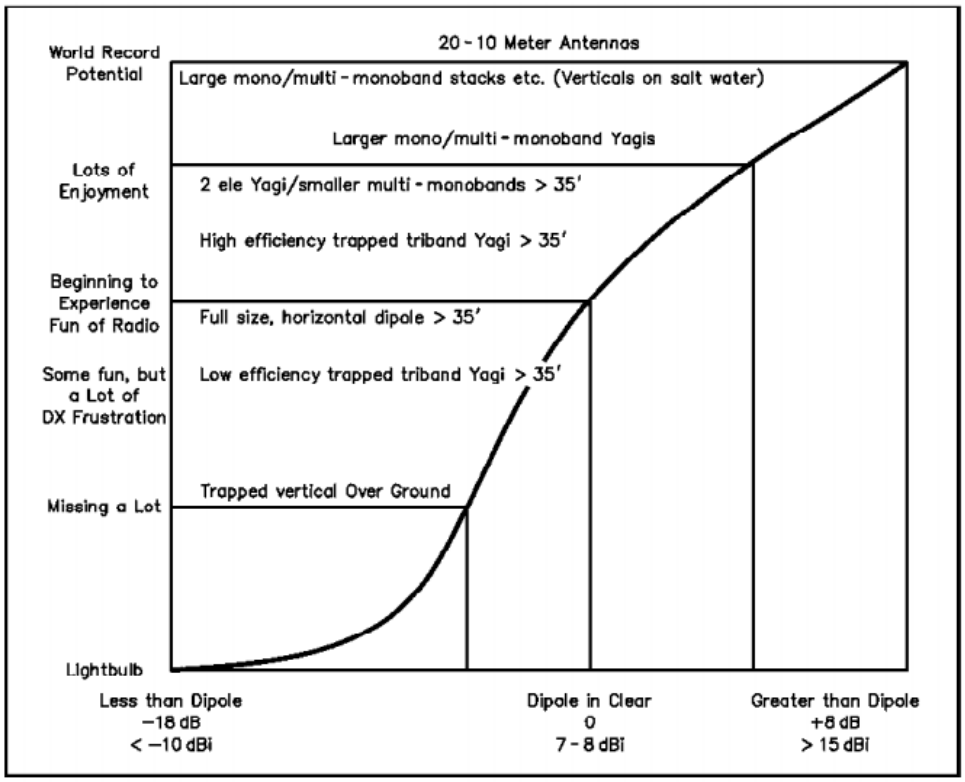


Figure 2—Comparing performance for specific antennas.

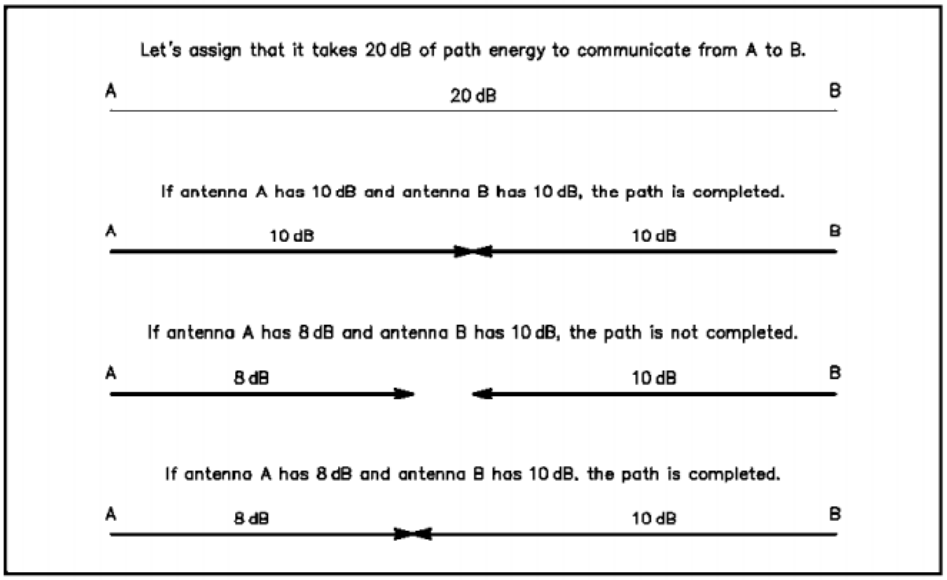


Figure 3—Comparing the gains necessary for success at both ends of the path.

dB of the stated figures. Vertically polarized antennas do not benefit from ground reflection gain and usually lose energy because of the ground (unless it is over salt water).

It is important to keep in mind that this chart applies to both ends of the circuit. Oftentimes, a QSO is made because one end has an efficient system that has enough gain at the right angle(s) to overcome the shortcoming of the antenna at the other end and complete the path.

Once we are at a horizontal dipole (in the clear) performance level, we are doing very well and will experience a lot of fun and enjoyment in Amateur Radio. Below this envelope, we will be able to make QSOs, but our understanding of the activ-ity on the air will be limited. If you think you are at this point, try something more efficient! Try something that "works better."

The charts are not intended to imply it is impossible to enjoy radio with something less than a dipole in the clear. Being able to hear anything and make QSOs can be enjoyable, but this will not necessarily move us along to share more of the enjoyment in radio. We should recognize the capability, the performance envelope, of our current antenna system and contemplate if there is another step we can take—just like my history, moving from one antenna to another and making discoveries

How much "better" does the antenna have to be to make how much difference? The chart in Figure 3 is a hypothetical communications path and the relationship between the antennas at both ends.

Translating the charts into practical antenna systems, the following becomes apparent:

More efficient antenna = expanded performance envelope
More efficient antenna = longer operating window to make contacts
More efficient antenna = more enjoyment of radio

Illuminator Antenna

A light bulb. Did someone actually say the left-hand side of the performance chart is a light bulb? Yes, it is. Can it actually "work"? Of course! As I stated in the beginning, everything does work. The difference is the performance envelope.

We gathered one day around a trio of laptop computers, a collection of coffee, soda and water, talking strategy for our contest team (6Y2A, 4M7X). The team leader, Kenny Silverman, K2KW shared some experiences he had many years ago using a light bulb. He was inside a building teaching code and using transceivers with light bulbs for dummy loads. He decided to move up into an amateur band and see what he could hear. Sure enough, he was able to make a couple QSOs on 20 meters. We all laughed at the incident and it was obvious an indoor light bulb had to be the worst antenna anyone could ever use.

In preparing Figure I, we decided to se-lect the light bulb for the left-hand side of the performance chart. QST Senior Assistant Technical Editor Dean Straw, N6BV, one of the contest team members and antenna collaborator for close to 25 years, agreed that the estimate of –18 dB to a dipole should be about right and proved to be so, at least on 10 meters. Note that the difference between a dipole and the world class performance an-tenna is much smaller than the difference between the light bulb and the dipole. I am my most staunch critic, so eventually it was time to test the light bulb (aka "The Illuminator") and see what it could do.

An Illuminating Experience

A 150-W bulb was selected for the an-tenna and a TS-850S transceiver was used. The Illuminator, ah, antenna, um, dummy load was mounted on a porcelain base atop a wooden fence post at a height of about 4 feet. The light bulb is fed through a Force 12 B-1 current balun with 3-inch leads and the feed line was 9913 Flex, to minimize loss. The balun was used to insure the feed line would not radiate. The VSWR of the l 50-W bulb was about 4:1 and the built-in tuner matched it easily. I later utilized an external tuner to make small changes as the filament heated up and changed impedance.

The first time The Illuminator was on the air was during the recent 2000 10-10 contest. I operated a total of about an hour. All of the contacts were in the midwest United States. Experimentation showed that if a station moved the S-meter to S-3, I was fairly sure we could make the QSO. Many of the QSOs were made with one call, no repeats, and no comment about how weak the signal was. Interesting. It was obvious that the station on the other end was providing the ma-

jority of the necessary system gain to make the path. Nevertheless, it "worked." I remem-bered the many times I have heard how well an antenna "works," because of the number of countries that have been worked. All right, then, maybe we can do even better.

The ARRL DX CW contest was coming. I have operated contests for more than 35 years, but I never felt so ill equipped to call someone. It was mid-morning on Saturday and the wind and rain made it impossible to work outside. I knew it was time to get on the air. I could hear several DX stations running pileups. The first station I decided to try was V47KP. I send my call at 36 WPM—he comes right back. One call. Perfect. It was just like using a "real antenna." Hey, that wasn't just my first DX with a light bulb, but a new distance record. My sporadic operating using The Illuminator antenna produced 14 countries on 10 meters the first day. I brought the log to the Paso Robles Amateur Radio Club potluck dinner that evening and Larry, W7CB, noticed I was missing Africa for Worked All Continents. Aha—another challenge!

I figured the best bet to work Africa would be if Jim Neiger, ZD8Z, was on because he is using very high gain antennas pointed at the US. The sun had begun to brighten the morning sky and I was tuning across the band with The Illuminator. By the way, the band is really quiet on this antenna. I hear some one. Sure enough, there he is. ZD8Z was having trouble maintaining his frequency and hearing through some European stations. His signal was less than S1 on the meter, so based on experience with The Illuminator, I knew I would have to wait for conditions to improve.

About 90 minutes later the sun was fully up, and so was ZD8Z, reaching S3/S4 on peaks. It took a few calls, but we made it: the first Worked All Continents on a light bulb. Now I was really motivated, but there was more work to be done outside before the next rain. I decided that short rest periods were necessary every hour. With casual operating, the country count at the end of the contest was 28, with 41 stations worked.

To date, the farthest QSO on 10 meters was with ZD8Z...all with a barefoot powered light bulb from California. To peg The Illuminator to other antennas you might have experienced, there have been only two stations whose signals reached S6-S7 on the meter, which pushes at least 59+25 signal on a 5-element monoband Yagi. The typical signal level required for contact runs between S 1 and S3 on the meter, measuring about 59+10 on the Yagi. Occasionally, success with signals reading less than S I is possible and is most assuredly due to an effective antenna system and quiet location on the other end. The obvious moral here is that if you do not hear many strong signals, the antenna system is not very ef-ficient.

Shedding Light

Achieving Worked All Continents in a few hours with a light bulb clearly sheds light on the idea that "everything works." Putting the performance envelope in the spotlight is the important message of this experiment. Although I had fun using the light bulb, it certainly would not promote my interest in Amateur Radio if it were my only antenna. Adding a kilowatt amplifier would allow more QSOs to be made, but I would not hear any better. If I only had one (poor) antenna at my house, I would not be aware of the sea of activity on our bands. If I had two antennas, one would always work better and I would quickly discover the difference between their performance envelopes.

The more efficient your antenna, the more QSOs and enjoyment you'll receive from our wonderful hobby. Looking back to the Figure 2 chart, a dipole in the clear is a very good antenna and having an antenna with the gain of a 2-element Yagi gets us a long way to a potential world-class station.

While everything "works," some antennas certainly "work" much better than others.

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