THE DUMMY LOAD

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Meetings

Meetings held at 8:00pm on the second Monday of each month , Board Room Preston Arena (Bishop St at Hamilton St) No meetings in July or August. Visitors always welcome.

Club Net

on the
VE3SWR repeater 146.790 Mhz
every Wednesday
at 2100R

VE3SWA

DXCC HONOR ROLL
(332/332)
WAZ, WAC, WAS.

Next Meetings

Mon Jun 14th 2010
Mon Sep 13th 2010
Mon Oct 18th 2010
Mon Nov 8th 2010
Mon Dec 13th 2010
usual location and time

CLUB NEWS

Excellent attendance at our May meeting with 15 smiling faces seated around the tables as follows: VA3CBE Calvin, VA3MP Mike, VA3QF Keith, VA3WIF Jeff, VA3YK Ken, VE3ANT Scott, VE3BGG Bert, VE3BHZ Dave, VE3FC Fraser, VE3IHM Hugh, VE3KVZ Steve, VE3NXV Gerry, VE3OAV Robin, VE3USP Steve and Ryan Alexander. Ryan is a student who is compiling a video documentary about Amateur Radio and was looking for advice. He was introduced by Hugh IHM who had suggested he attend a meeting. Robin OAV agreed to take care of him and show him the ropes as far as operating was concerned. Incidently he has indicated his intention to get his license and has obtained the necessary books and Qs & As to accomplish this. No doubt Mike MP will have another exam to administer very soon. Gerry NXV read the minutes of the April meeting which were accepted as read then Fraser FC gave a brief financial report, we are quite healthy and well in the black this was also accepted as read. Robin mentioned the Canwarn meeting which he attended and brought the membership up to date on ARES. Dave informed those present that he had finally been able to reserve our Field Day site at Valens and a short discussion on FD followed Ken YK informed us he will be coming out this year and Steve KVZ volunteered to look after the food and the cooking of same. Calvin took home $15 more than he came with and the meeting adjourned to coffee and doughnuts.

THE DIGITAL BLIGHT
or Rights in the CW Band Plans

Paul Veal N0AH

The most recent copy of the ARRL US Amateur Radio Bands clearly shows RED for data and RTTY allowed as one in the same on the US Band Plan effective 2-23-2007 only separating out for "CW Only" for Technicians on 10, 15, 40 and 80 meters and at the bottom of all license classes on 6 and 2 meters.

But is there room here for clarification and separation of modern data modes such as PSK from CW?

As time has evolved, more and more PSK is being heard inside what has always been considered the General Class CW windows such as +- 10KHz of 14.035MHz, 7.035MHz, etc…….

In fact, as I monitor on the lower end of the band now on 40 meters at 00:50 UTC on 26 March, 2010 in the past 20 minutes, I have already counted 8 different USA PSK operators CQ'ing and/or working other stations. From 7.028MHz up to 7.037MHz, there is more PSK right now than CW. Yet many stations seemed jammed in together ignoring what is an obvious neighborhood problem.

If you look at the more recent, yet out of date band plans, data has always been well above these band segments. So what has happened? Is 7.035MHz a newly established call frequency for PSK? Sure seems like most QSO's are stateside to stateside ops with a few DX contacts going on- but you get the idea……

How much longer until the Extra Class CW windows experience the same common practice of digital modes operating in these band segments and for what reason? Are the traditions of band plans going the way of the dinosaurs or are we at a point of newer and perhaps increasingly popular technology simply making more room for itself?

WHERE DOES 468 COME FROM?

Ward Silver - N0AX on May 4, 2010

eHam

We've all seen this number over and over again – the "magic number" that gives us the length of a half-wavelength dipole in feet from the dipole's resonant frequency: L = 468/f. In free-space the wavelength in feet is 492/f, but a practical half-wavelength antenna is shorter so the constant is smaller. The number 468 is on the license exams and in the literature. It's been there ever since I started reading about ham radio in the mid-1960s. It's a pillar of amateur antenna theory. Every ham is expected to memorize it. And it's wrong.

It would be more accurate to say that it's rarely correct. There are certain instances where it's close, but using it often leads to wasted wire. The usual instructions to a new ham are, "Calculate how much wire you need using 468/f and then add a couple of feet." What that really means is the value 468 is too small and we compensate for the error by "adding a couple of feet". If 468 isn't right, why do we use it? Answering that question requires a trip along the paths of history.

Recently, I had the opportunity to spend a few days at ARRL Headquarters to plan upcoming writing and editing projects. The ARRL has a great Technical Library with every edition of ARRL publications and technical publications going back decades. (If you ever get close to Connecticut, it's well worth dropping in on the ARRL for a tour!) I had some time one afternoon and decided to find out when and how the number 468 first appeared in the ham literature.

My first stop was the *ARRL Antenna Book's* initial edition in 1939. Sure enough, on page 13 in the chapter on "Antenna Properties", the familiar formula 468/f appears. The *Antenna Book* states that the "end effect" due to the attachment of insulators at the ends of the antenna results in the approximately 5% reduction in length from the free-space 492/f to 468/f. The text goes on to state that the percentage "varies slightly with different installations", but doesn't say how, nor is a citation provided to identify how the value of 468 was obtained.

Since it is unlikely that the value of 468 appeared in the *Antenna Book* without any "prior art", I next turned to the *ARRL Handbook's* first edition in 1926. That turned out to be a dry hole – no formula for antenna length and nothing in 1927 or 1928 either. Then, in the 1929 edition's "Antennas" chapter on page 128, I hit pay dirt! The text defines natural wavelength as the highest wavelength (the lowest frequency) at which the Hertz antenna (a half-wavelength dipole) will resonate. It is stated that "The natural wavelength of the wire…will be its length in meters multiplied by 2.1" Hmmm…2.1 is 5% longer than would be the free-space value of 2. (Remember, the text is discussing wavelength, not frequency.) Farther down the page I saw, "Speaking in terms of feet, the natural wavelength of the antenna will be its length in feet divided by 1.56." That equation translates to L = (300 x 1.56)/f and 300 x 1.56 is 468! Here were the headwaters of the mighty River 468!

Still, no background for the correction was given. Where does the use of a correction factor originate? Back to the stacks! Did I really want to go through all of the *QST* magazines until I found my answer? Well, not really, but inspiration struck in the form of the online *QST* archives. I logged into the ARRL Web site, brought up the *QST* archive search page, and…hit another roadblock. I couldn't very well search for "468" because it was unlikely to be a keyword. "Dipole" would return hundreds of hits. Then I realized that in the early days, a half-wavelength dipole would have been referred to as a "Hertz antenna" or "Hertzian antenna". I entered the former and scrolled down to the very earliest entries.

The oldest article on Hertz antennas was in the July 1925 issue by 9BXQ and titled "The Hertz Antenna at 20 and 40 Meters" but it didn't discuss a formula for length. The next oldest article, October 1926's "The Length of the Hertz Antenna" by G. William Lang, turned out to be what I was looking for. In the article, Lang (who was apparently not a ham, but worked in the Dept of Radio Operations for Radio Station WBZ in Boston) set up some Hertz antennas at amateur station 1KA and also measured antennas at station 1CK and 1KF. He used an oscillator and a wavemeter to determine the frequency at which the antenna resonated then measured the entire antenna - tip-to-tip, including the counterpoise. A table of correction values was derived, with the free-space wavelength in meters multiplied by an average value of 1.46 to get the antenna's resonant wavelength in feet. This corresponds to an equation of L = 438/f. This is the first suggestion that the actual resonant length of a practical amateur antenna can be predcted by using a correction factor to a free-space wavelength.

The early experiments of 1925 and 1926 took place on or near 40 meters. In those days, CW operation on what we now call the "low bands" of 80 and 40 meters was the norm. At these wavelengths, a half-wavelength dipole was of a reasonable length. It could be made of ordinary copper wire, probably #8 to #14 AWG, and installed in the back yard at heights of 20 to 40 feet. For these antennas, 1/8th to 1/4th wavelengths above ground, a value of 468 is about right, resulting in the equation printed in the *ARRL Handbook* in 1929.

In truth, many variables affect the resonant frequency of a half-wavelength dipole, the two primary factors being the length-to-diameter ratio of the antenna conductor and most strongly, the antenna's height above ground. These can combine to change the actual correction factor quite a bit! (Insulation can also affect an antenna's electrical length.) In my November 2009 *QST* column, "Hands-On Radio: Antenna Height", I modeled a typical 20 meter dipole made of #12 AWG un-insulated wire at heights from 1/8th to 2 wavelengths over realistic ground and calculated the correction factor at each height. It varied from 466 to 481 over that range! Clearly, using 468/f would lead to an antenna being too short most of the time.

If 468 is too small and rarely correct, what should you do? Realistically, you should expect to trim your dipole to get the resonant frequency you want. Instead of being frustrated that the calculations aren't exact, learn to adjust the antenna's length efficiently by using an instrument such as an antenna analyzer. Start with an estimated value based on a more realistic formula such as 490/f that results in a small amount of extra wire for attaching insulators. During tuning, twist the wire connections together or use clamps, then raise the antenna into position and measure. When it's right, only then solder and weatherproof the connections. Recognize that every antenna's circumstances are slightly different – height, ground conductivity, thickness of wire, nearby conductors, and so forth. Another lesson to learn from this exploration is to realize that "magic numbers" in formulas have often been determined through experimentation under specific circumstances. As such, they likely depend on a variety of factors that you may not be able to replicate. They will only approximate what you actually encounter. If the assumptions behind the value are given – you can use that information by comparing it to your situation. If the assumptions are not known – you should allow for variations or try to find a more accurate model representative of your own circumstances.

I hope you've enjoyed reading about this journey as much as I enjoyed taking it, opening the covers of books nearly 80 years old and mapping the stream of knowledge back to its sources - finding there the footprints of wireless pioneers that set ham radio on the course we travel today.

GOLDEN YEARS

VE3FC

A group of 40 year old buddies discussed where they should meet for dinner. Finally it was agreed upon that they should meet at the Ocean View restaurant because the waitresses there had low cut blouses and were very young.

10 years later at 50 years of age, the group once again discussed where they should meet for dinner. Finally it was agreed that they should meet at the Ocean View restaurant because the food there was very good and the wine selection was good also.

10 years later at 60 years of age, the group once again discussed where they should meet for dinner. Finally it was agreed that they should meet at the Ocean View restaurant because they could eat there in peace and quiet and the restaurant had a beautiful view of the ocean.

10 years later, at 70 years of age, the group once again discussed where they should meet for dinner. Finally it was agreed that they should meet at the Ocean View restaurant because the restaurant was wheel chair accessible and they even had an elevator.

10 years later, at 80 years of age, the group once again discussed where they should meet for dinner. Finally it was agreed that they should meet at the Ocean View restaurant because they had never been there before.

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A doctor examining a woman who had been rushed to the Emergency Room, took the husband aside, and said, "I don't like the looks of your wife at all."

"Me neither ,doc," said the husband, "But she's a great cook and really good with the kids.'

SEAMUS & BESSIE...

VE3FC

An Irish farmer named Seamus had an accident with a lorry ,and was sueing the lorry company,
In court their hot-shot solicitor was questioning Seamus..
Solicitor
'Now didn't you say to the Police at the scene of the accident, 'I'm fine?'
Seamus
'Well, I'll tell you what happened. I had just loaded my favorite cow,Bessie, into the...'
Solicitor
'I didn't ask for any details','Just answer the question. Did you not tell the police officer, at the scene of the accident, 'I'm fine!'?'
Seamus
'Well, I had just got Bessie into the sidecar and I was driving down the road.....'
The solicitor interrupted again and said,
'Your Honour, I am trying to establish the fact that, at the scene of theaccident, this man told the police on the scene that he was fine. Now several weeks after the accident, he is trying to sue my client. I believe he is a fraud. Please tell him to simply answer the question.'
By this time, the Judge was fairly interested in Seamus's answer and said to the solicitor:
'I'd like to hear what he has to say about his favourite cow, Bessie'.
Seamus thanked the Judge and proceeded.
'Well as I was saying, I had just loaded Bessie, my favourite cow, into the sidecar and was driving her down the road when this huge lorry and trailer came through a stop sign and hit me right in the side. I was thrown into one ditch and Bessie was thrown into the other. I was hurt very bad like, and didn't want to move. However, I could hear old Bessie moaning and groaning.I knew she was in terrible pain just by her groans. Shortly after the accident, a policeman on a motorbike turned up. He could hear Bessie moaning and groaning so he went over to her. After he looked at her, and saw her condition, he took out his gun and shot her between the eyes.
Then the policeman came charging across the road, gun still in hand, looked me up and down, and said, 'How badly are you hurt?'
'Now what the .... would you have said'?

VOACAP goes Online

By OH6BG, Jari Perkiomaki

I am glad to inform that making point-to-point HF propagation predictions is now easier than ever as VOA-CAP Online (http://online.voacap.com) has been opened to the public. The service uses VOACAP (Voice of America Coverage Analysis Program) which is arguably one of the best HF prediction engines available on the market today.
VOACAP Online is free to all and makes using VOACAP a no-brainer. Just enter the coordinates of the transmitter and the receiver, and that's all. To find the coordinates, you can use the Google Maps based QTH Locator at http://www.voacap.com/qth.html

The prediction is given as a "circuit reliability" graph that shows the probability of achieving a CW-grade transmission quality betweenthe transmitter and the receiver.

VOACAP Online is brought to you by Jari Perkiomaki OH6BG (concept), James Watson HZ1JW (graphs) and Juho Juopperi OH8GLV (server-side programming).

Plasma Physics for the Radio Amateur, II

Eric P. Nichols (KL7AJ) on April 16, 2010

Who Has'ma Plasma?

It was really sad to see them demolish the old plasma lab down at UCLA. Though nearly all of the equipment was rescued and reinstalled in Knudsen Hall, a much more modern facility, the new home really lacks the “vibe” of an old time physics lab. The old lab was built about the time the term “plasma” was coined. It was a scary, creepy, dark place, filled with the fragrance of ozone and vacuum pump oil. Things continually hissed and buzzed in there. I tried my best to capture the flavor of that old lab in my novel, Plasma Dreams, but nothing is quite like BEING there. However, I recognized that the old lab HAD to go...it had been severely damaged in the Northridge earthquake, and had been standing erect more out of habit than out of any structural integrity.

Plasma is sometimes referred to as the fourth state of matter, which, I suppose, is descriptive enough. The real definition of plasma is much more concrete: it's any ionized gas. All plasmas are electrically conductive to some extent. They also exhibit a whole LOT of really weird behaviors besides, which is why plasma physicists will be fully employed for the foreseeable future. As we mentioned in the first part, most of the Universe is made of plasma, so your chances of discovering something relevant and practical to life on Earth by studying plasma is pretty high. I'd recommend any remotely technically minded person to think about plasma physics research as a career field.

Now, the ionosphere is, by any measurable standard, a plasma. There are some profound similarities between “lab plasmas” and “free ranging” plasmas, such as the ionosphere. And there are some differences. “Lab plasmas” encounter anomalous behavior when they encounter a boundary...i.e., the inside of the “can” in which they are contained. This boundary anomaly is one of the great technological hurdles, yet to be overcome, in the creation of contained nuclear fusion. If you didn't need the can, you could probably have controlled nuclear fusion by now.

On the contrary, the ionosphere has no can; it is contained entirely by GRAVITY, which is immensely uniform and consistent. This is why so many fusion power researchers are interested in the ionosphere...how can you contain a hot plasma without a container? If you can answer that question, you will be rich and famous.

Be my guest.

The ionosphere is much like many of the other spheres that circle the Earth, such as the Atmosphere, Troposphere, Mesosphere, and such. They're all—well—spherical. Sort of.

Which makes one wonder what people called the atmosphere back before Columbus, when the Earth was flat. The Atmosflat?

In any case, the Earth is surrounded by varying gases of different densities and pressures. The vast, vast, vast majority of these gas molecules are neutrals. They have no electrical charge, and have no effect on radio signals, whatsoever. In the Opus of Amateur Radio Knowledge and Lore, I have a chapter called Electrons:

The Tools of the Trade. We said that in all things electronic, it's really the electrons that do all the work. And they really can't do much if they're tied to molecules or atoms, other than keep the molecules or atoms company. Neutral gases are pretty invisible to radio waves; there's really nothing in them to even respond to radio waves.

Starting at an altitude of about 90 kilometers, however, a tiny number of these atoms can get their electrons slapped off their carcasses, which then become free electrons. Or at least, fairly cheap ones. The main electron-slapping ingredient is ultraviolet radiation from the sun, and you don't have to be a rocket scientist to conclude that probably much more electron-slapping happens during the day than at night.

Precisely how many of these electrons get slapped off their host atoms determines how much stuff we have to bounce radio signals off of. Now a whole lot of interesting things happen when electron-slapping happens, all of which falls into the field of plasma physics. Although I worked in the field for many years, I'll avoid the temptation to deliver a course on plasma physics in this chapter. You can get a much more entertaining introduction to that branch of science by reading my novel, Plasma Dreams. (Shameless commercial plug here).

One of the interesting things that happen is that these slap-happy electrons tend to organize in layers of sorts, and begin to exhibit collective behavior, must like your local Teamsters Union. Except they never ask for overtime. That's why they're called free electrons.

Now, the atoms that get their electrons slapped off them are called ions. Ions also exhibit a collective behavior, which is why we call that collection of ions the ionosphere. These ions don't generally affect radio signals directly, but they do give a certain sense of direction to the free electrons. Without the remaining ions, the free electrons would flail off in every direction, because they are, being like-charged, mutually repelled.

Perhaps you're asking why the ions don't go wandering off merrily as well, since they also are now mutually repulsive. Well they do, but very slowly. Even though they have the same magnitude of charge as their off-slapped electrons, they have thousands of times the mass! So, though the ions will gradually drift apart (diffuse), in most regards act mechanically like any other gas. In fact, you actually have weather-like phenomena happening in the ionosphere, just like in the atmosphere. Well not just like, but you do have recognizable patterns of movement and such way up there.

So, the end result is, we have this big sluggish ionosphere keeping free electrons on a very long leash. The result of all this couldn't work better for radio propagation if it was intentionally planned. (Actually, I'm one of those folks who sincerely believe the ionosphere was specifically created for bouncing radio signals off of. Just like believing that trees were created as antenna supports. But that's just me).

Now, there's an interesting little item called the electron density profile. It's sort of a perverted bell curve sort of thing lying on its side. You can see this as a black line on many ionograms available online. (I use the HAARP ionosonde, which shows conditions valid for most of Alaska. () You can find a nearby ionosonde by looking at the Lowell Digisonde site map.)

What the electron density profile shows you is the relative number of free electrons at any altitude from about fifty kilometers to about six hundred kilometers. This is the best indication of how good the sky is going to be at reflecting radio signals at any particular time. Now, why the funny curve, and not just a straight line? Good question. We actually have two conflicting things happening.

Since air pressure is highest at ground level, and decreases as we go up, there are more atoms available to get their electrons slapped off of. So the lower we go, the greater potential for the creation of free electrons. But—and it's a big but—the ultraviolet light has to travel farther though absorptive air to get to those high density atoms. So while there are more atoms to ionize at lower altitudes, it is easier to ionize them at higher altitudes. The breakeven point is usually at around 250 km altitude or so, the normal peak of the “bell curve”. It is generally around here where you will find the most number of free electrons milling about. There's also usually a smaller peak at around 100 km or so.

Now, we haven't really explained how an electron reflects a radio signal, though we've described how these electrons congregate. Actually, you CAN reflect a radio signal off a single electron, and there are scientific devices called incoherent scatter radars which do just that, but this is pretty science-geeky stuff. As radio amateurs, we're much more interested in reflecting radio signals off mobs of electrons.

If we have a decent, well-behaved ionosphere, we have more or less a sheet of electrons, which in some ways, acts a bit like a sheet of copper. We have a region of sky that is highly electrically conductive. Unlike a wire, it's conductive in all directions, north-east-west, and south, not just along a line. We also have some conductivity up and down, because our electron sheet can be many kilometers thick. Oh, I must also clarify one point here. Please do not get the impression that we have any significant volume of sky that consists of nothing but electrons, any more than we have any volume containing nothing but ions. Any region of the ionosphere we look at will have all three items: electrons, neutrals, and ions occupying the region in varying concentrations. High free-electron content just means there are a lot more free electrons at that height than at other heights.

Well, back to our conductive sheet analogy. The electrons are free to accelerate in any direction in response to a radio wave impinging on them. They will line up and slosh back and forth in accordance with the electrical part of the wave passing through their midst. But what do sloshing electrons do? Why, they create radio waves! This is why we were emphatic about the reciprocity theorem in the antenna chapter. It doesn't matter whether you're a slosher or a sloshee. One creates the other, and the other creates the one. (Important reminder: Remember, it's acceleration of electrons that creates electromagnetic fields, not their mere movement. This is a crucial distinction. The acceleration can be linear or angular, though for free electrons, it's usually linear acceleration we're most concerned about).

This is also why I was reluctant to describe the ionosphere as reflecting radio waves. It actually absorbs and re-radiates them. Looking at what happens from the vantage point of your station on the ground, this may seem to be a minor point of semantics, but it makes a big difference when we look at the more peculiar aspects of ionospheric or “skywave” radio.

Now, if all those nice slap-happy free electrons happened to coagulate in a nice spherical shell at about 250 kilometers, all around the round Earth, life would be wonderful all the time. Worldwide skywave communications would be possible anywhere at any time.

But alas, there are several flies in the ointment.

We'll discuss some of these flies in Part III

CHINESE A.R.E.S

VE3OAV

The 7.1 Ritcher scale earthquake that struck China?s Qinghai province on 14 April killed more than 2,000 people and relief efforts are continuing for those left homeless. A day of national mourning was held on 21 April.

Amateur radio operators in China were widely involved in the disaster relief actions. They were from Beijing, Sichuan, Shandong, Anhui, Qinghai and Jiangsu, travelling to the disaster centre.

There in poor weather conditions they helped in the transportation of medicines,tents, food and clothes to the disaster area.

The amateur radio operators were even directly involved in disaster rescue activities. One Beijing amateur radio rescue team saved 6 people.

The high altitude caused 90% of the amateur radio rescue team members to have Plateau Reaction (altitude sickness), but no one was injured during their efforts to help others affected by the disaster.

The CRSA reports that the experience and lessons learnt from the Great Sichuanearthquake in 2008, resulted in amateur radio disaster relief evolving into a practical level.

The radio hams were connected to government disaster relief organisations to synchronise the operation and enhanced the government disaster relief.

The CRSA says that this time hams joined Non Government Organisations such as Red Cross Society of China, China charity federation, volunteer rescue team, The One Foundation to get financial and facilities support to perform the task.

All amateur radio teams brought relief supplies such as clothes, tents, medicine,food and lighting to the disaster area, and one team brought AM/FM radio to the area to help get information from outside. With rich experiences gained by 2008 Sichuan earthquake, the Sichuan amateur radio rescue team arrived in Yushu very quickly, and set up a 70cm repeater to help communication and coordinate all amateur radio operators coming into the area. HF was also used during the disaster relief and mainly on the 40m band.

They gained good experience in the rescue. Due to high altitude, one generator did not work, one of the Beijing team had to reduce their communication power.

The Sichuan team has an operator who can speak local language, that greatly helped in disaster relief.

Now, all of the amateur radio heros have returned to their daily life, we will never forget their contributions in the disaster relief.

(Report provided by Fan Bin BA1RB, CRSA Coordinator IARU Region 3 Disaster Communications Committee and Chairman Jim Linton VK3PC)

WIA receives well wishes from around the globe

A number of IARU (International Amateur Radio Union) radio societies have written to the **Wireless Institute of Australia** extending their best wishes and congratulating it on its Centenary.

These are being received by the WIA President **Michael Owen VK3KI** and will be progressively posted on the WIA website.
Here are a few of them.

The IARU Liaison Officer for the Finnish Amateur Radio League (SRAL), Jukka Heikinheimo OH2BR said the WIA is one of the world's most respected national amateur radio associations.
It has developed into a modern organisation representing the radio amateurs of Australia.

RSGB General Manager Peter Kirby G0TWW on behalf of the RSGB President, Board and Members said the Centenary is a wonderful achievement.
He commented that it would not have been reached without the outstanding commitment of many thousands of volunteers who have worked tirelessly for the WIA over the past 100 years.

Irish Radio Transmitters Society President, Paul Martin EI2CA extended best wishes to all on the occasion of the Centenary celebrations and acknowledged the work of the Wireless Institute of Australia.

He added that the IRTS will be raising a glass to toast the WIA during its celebrations in Canberra.