# THE DUMMY LOAD

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*serving the community since 1964*

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

## CLUB NEWS

Excellent turn out for our June meeting, must have been the location Hi. 15 smiling faces sat around the tables for the last meeting of the season. VE3ANT Scott, VE3BHZ Dave, VA3CBE Calvin, VE3FC Fraser, VE3IHM Hugh, VA3JSP Judi, VE3KVZ Steve, VA3MP Mike, VE3NXV Gerry, VE3OAV Robin, VA3QF Keith, VE3USP Steven, VA3WIF Jeff, VA3YK Ken and Ryan Alexander the videographer. Judi has just obtained her license and was looking for any assistance in getting the family boat set up radio wise for a trip down to the sunny south somewhere. Fraser and Mike looked after that for her. Gerry read the minutes of the May meeting which the membership accepted as read. Fraser gave a financial report which was also accepted, we are in good health financially. With the reduced cost of the monthly news letter there has been some discussion about reducing annual dues. This will be discuued further.Arrangements for Field Day were finalized and Steve VE3KVZ volunteered to look after the catering for the Saturday Bar B Q. Scott managed to go home with an extra $13.50 and there being no further business the meeting was adjourned to coffee, doughnuts and the usual rag chew. Results for our Field Day adventure appear elsewhere in this news letter. Solar figures have been improving slowly and some openings for DX on 10 and 15 meters have been showing up, perhaps we are now beginning to get out of the low spot in the cycle and can look forward to better propagation. False alarm, solar flux figures have gone down again and are in the 70’s once more. oh well maybe next month Hi.

## The Disbanding of the Netherland Antilles

*W3UR*

Radio One from the Netherlands reported yesterday the Dutch Senate (Eerste Kamer der Staten-Generaal) agreed to disband the Netherland Antilles. The effective date is October 10, 2010 (10-10-10). The breakup will give the Dutch Caribbean islands of Curacao and Sint Maarten independent country status within the Kingdom of The Netherlands, much like it did with Aruba back in 1986. The split up will continue to keep the BES islands (Bonaire, St. Eustatius and Saba) as special municipalities (bijzondere gemeenten) of TheNetherlands.

During the creation of the ARRL's first post war (WWII) DXCC Countries List the Netherlands West Indies (PJ) was one DXCC entity, which included the islands of Aruba, Bonaire, Curacao, Saba, St. Eustatius and Sint Maarten. During the late 40's and early 50's these islands were forbidden radio communications be - tween their amateur stations and amateur stations of other countries. The ban was lifted on March 11, 1952.

In 1954 The Netherlands advanced the Netherlands West Indies from a colonial territory to a domestic autonomy within the Kingdom of the Netherlands, which was the beginning of the Netherland Antilles. The- May 1955 issue of QST Magazine (page 152) announced the recognition of two DXCC entities within the Netherland Antilles, which was effective July 1, 1955, but with a starting date back dated to November 15, 1945 for DXCC credit purposes. During this time period there was not a set distance rule but rather a "does it have adequate geographical separation from a parent nation" rule. So then there were two DXCC entities. One in South America which at the time included Aruba, Bonaire and Curacao and a second in North America including Saba, St. Eustatius and Sint Maarten.

On January 1, 1986 Aruba was constitutionally separated from the Netherland Antilles, shortly afterwards receiving the P4 prefix directly from the Netherlands and not the ITU.

So with the date now official as to the termination of The Netherlands Antilles DXers, and no doubt DXpeditioners, are probably asking how will all of this affect the DXCC program.

Let me first state from this point on the below comments are the thoughts and opinions as seen by your editor (W3UR Daily DX) as things stand as of today.

Once the Netherland Antilles are disbanded both of the current DXCC entities should then be deleted per DXCC rules. The Netherland Antilles were put on the DXCC Country list prior to many of the modern day rules, including the separation of the two and any measurable distance rule. From that point it is clear that Curacao (PJ2) and Sint Maarten (PJ7) would become two new DXCC Entities. This would leave the BES islands of Bonaire (PJ4), St. Eustatius (PJ5) and Saba (PJ6). Clearly the distance from the homeland, The Netherlands (PA), to the first island is obviously more than 350 kilometers. There by giving a third DXCC Entity of St. Eustatius and Saba. These two islands are too close to each other and must be one DXCC entity. However Bonaire is just barely over the 800 kilometer distance from PJ5 and PJ6 so it would then be a fourth new DXCC Entity.

Now the questions and the answers get a little tricky as to when thesenew DXCC countries will come on line because the ARRL DXCC Rules are clear on what and how "Political Entities" are added to the list. These rules affect Curacao and Sint Maarten. DXCC Rule 1a) asks if the potential new one is a member state of the UN. Neither one is andneither one is expected to be one. This is just like Aruba. Rule 1b is not likely to apply, in the near future and most likely not by 10-10-10. That being the ITU is doubtfully going to assign a new prefixin time for the expected date. Most likely rule 1c is the one that will get these two fledgling DXCC Entities on the list. The U.S. Department of State's "Dependencies and Areas of Special Sovereignty"list will most likely be updated around the birth date of these two new DXCC counters.

The BES islands should immediately be added to the DXCC list on 10/10/10 (exact time of day is yet to be determined) as they clearly met the DXCC criteria per the "Geographic Separation Entity" rule.
That being the first set of islands (Saba and St. Eustatius) is 350 kilometers or more away from the parent country (rule 2bii) and a second island (Bonaire) being 350 kilometers from the parent country and just over 800 kilometers from "any other island attached to that Parent" (rule 2biii).

Again I want to emphasize the last four paragraphs are the opinion of your editor and not the official word of the ARRL or DXCC. The new DXCC Entities would be:
Curacao (PJ2)
Bonaire (PJ4)
St. Eustatius (PJ5) and Saba (PJ6)
Sint Maarten (PJ7)
So there you have it. Is your station ready for these new DXCC Entities? If not you've still got a few months to get those antennas up and ready for the fun in mid October. See you in the pileups!

Imagine there's no heaven It's easy if you try

## PLASMA PHYSICS FOR THE RADIO AMATEUR

## Part III

*from Eric Nichols, KL7AJ on April 30, 2010*

Radio would be a lot simpler if the Earth was flat. Actually, a lot of things would be simpler if the Earth was flat. In fact, if you look back in history, to when the Earth actually was flat, it's pretty clear that life was a lot simpler for all involved.

Alas, Christopher Columbus and his henchmen had to really mess things up, especially for us radio amateurs. The biggest problem with Mr. Columbus' invention of a round Earth is that radio waves are still flat. Mr. Columbus, in one glaring oversight, totally failed to take this into account. Five hundred years later, we are left to deal with the fallout of Mr. Columbus' ill-conceived adventure.

To be perfectly accurate, radio waves aren't really flat, but they do travel in straight lines unless they find a truly compelling reason to do otherwise. The fact that there are radio amateurs on the wrong side of a round Earth is not generally a compelling enough reason, in and of itself, for radio waves to make the effort.

Lacking additional incentive, the farthest a radio wave will travel is to the horizon, another unfortunate side-effect of Mr. Columbus' "new and improved" round Earth. For a neck-height wire antenna, the horizon is about nine miles. In reality, the "radio horizon" is about 30% farther than the visible horizon. We usually use the "4/3 Earth" rule-of-thumb for radio horizon distance. Calculate the geometrical horizon using an Earth that's 4/3 as big as its actual diameter, and you come pretty close. Now, if you have two radio amateurs on opposite sides of the radio horizon with neck-height antennas, you can actually communicate a little under 18 miles; not quite as grim a picture, but certainly nothing to write home about.

Now, it's no big mystery that the higher you go the farther the horizon is. If you want to talk farther you just raise your antennas above neck height. That's the good news. The really bad news is how quickly you reach the point of diminishing returns by making your antennas higher. The radio horizon only increases as the square root of the antenna height. Look at it like this. Going from moose-neck height to giraffe-neck height gains you a lot. Going from giraffe-neck height to Empire State Building height gains you almost nothing!

What, oh what is a round-Earth bound ham to do, other than to have no friends more than 18 miles away?

There are actually two main approaches to this problem. The first is to use the round-Earth itself to bend the radio waves. There is actually sort of an ironic poetic justice in this method. It's really "sticking it to The Man," The Man being, of course, Christopher Columbus.

So far, all our previous discussion of radio wave propagation has involved propagation through a vacuum, or through air, which, as far as radio is concerned, is about the same thing.

Radio waves traveling through, or in contact with, something other than free space, behave differently. When a radio wave travels through a solid material like dirt, it slows down a little bit. (It also loses some energy due to heating loss, but we can ignore that for now). The important thing to know is that a radio wave passing through dirt moves a little more slowly than a radio wave passing through air. This is not too hard to grasp.

But, what happens if part of a radio wave travels through dirt, and part of it travels through air? Things get very interesting. The best way I know of to demonstrate this is with a Slinky. I trust you have a Slinky lying around someplace. Even one of those abominable plastic ones will work.

Now, if you were to lay the Slinky down on a flat surface and stretch it out a bit, the outline of that Slinky will be a perfect sine wave. (This is the geometric projection of a helix onto a plane, for you geometry whizzes). Now, let's pinch the bottom of the coil together, so each lower wave peak is slightly closer together than the upper wave peaks. What does the Slinky do? It bends toward the closer-together peaks. It has no choice, unless you allow the Slinky to break. Radio waves must be continuous-nature will not allow you to have a broken radio wave. The radio wave must bend toward the "slower" direction portion of itself. Voila, a curved radio wave!

This curved radio wave in contact with the Earth's surface is called a "ground wave," for pretty obvious reasons. Now, ground waves are really only practical for lower radio frequencies, such as the A.M. broadcast band and lower. The heat losses we mentioned a few paragraphs back increase with increasing frequency. Above a couple of megahertz, ground waves do little more than heat up the dirt. But at lower frequencies, they are the dominant mode for worldwide radio communications. And they REALLY work great when the Earth is made of sea water.

Take THAT, Mr. Columbus! No hell below us. Above us only sky

In fact, ground wave (or sea-surface) propagation for many decades was the primary means of over-the-horizon radio communications. 500 KC was the international maritime distress frequency until very recently, having served its purpose well for about 100 years. (It was the frequency used on the Titanic. The fact that nobody heeded the radioman's warning has nothing to do with the effectiveness of the radios or the propagation). I've talked to a few old time radio officers, and they say that 500 kc was like an international party line of telegraph operators-nearly 100% reliable communications over most of the earth.

The main problem with communications at low frequencies, at least as far as hams are concerned, is that antennas are necessarily large. The lowest frequency Amateur Band is 160 meters, which is really at the upper edge of where ground wave communications are possible. A good deal of your efforts to make a 160 meter ground wave antenna will serve little but to heat up earthworms.

Imagine all the people Living for today...

Fortunately, there's another approach to over-the-horizon communications, which is actually the primary means for most long-distance amateur radio communications. We can bounce signals off the ionosphere. Actually, bouncing isn't a very accurate description; it's a bending process much like our groundwave.

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. Remember our chapter, 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. Imagine there's no countries It isn't hard to do

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. Nothing to kill or die for And no religion too

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. (www.haarp.alaska.edu) 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.

## Imagine all the people Living life in peace...

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).

## Imagine no possessions I wonder if you can

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.

No need for greed or hunger A brotherhood of man

But alas, there are several flies in the ointment. First, many of our electrons do find their ways back to the ions from which they were slapped. Well, not the exact same ions, but ions from the same ion mob.

Recombination takes place, and our ions become neutrals, of no value for radio propagation. This recombination is relatively slow, which is why shortwave radio propagation doesn't suddenly quit the instant the sun goes down. In fact, a good number of electrons never do recombine, which is why you still have skywave propagation at night, at least on the lower H.F. frequencies.

Secondly, we have ionospheric weather. Remember, our ions are basically floating on top of the atmosphere. As tenuous as the connection is, genuine weather effects down here on the surface do eventually transfer to the ionosphere. It's certainly not a one-to-one correspondence, but there are storms and currents and other weather-like disturbances that all do one thing-they upset the nice calm layers of electrons we need for decent "reflection" to take place. Instead of a "mirror" we have a wall of rocks.

Sooner or later most hams will experience a sudden "blackout" of radio communications, also quite common on the lower frequency bands, during the evening when you're basically using those "leftover" un-recombined electrons. This is seldom if ever due to a sudden, spontaneous recombination, where gillions of electrons miraculously find their way back home to their family ions. No, these sudden outages are frequently caused by electron precipitation-all the electrons are quite literally being sucked down a hole in the bottom of the ionosphere, traveling down the Earth's magnetic field lines into the Earth's surface, where they are dissipated.

Electron precipitation events can be triggered by almost anything: a distant lightning strike, a burst of cosmic energy, auroral activity, or just sheer statistics.

The ionosphere is inherently unstable; it's much like trying to float water on top of oil. It can be done if you're really really really really really really really really really really careful. But the slightest disturbance will cause the liquids to suddenly change places, putting the water on the bottom where it belongs. In a similar fashion, there's only one place an electron wants to be (other than an atom from which it got slapped), and that's sliding down a magnetic field. Magnetic fields are irresistible water slides for electrons. The fact that a stable ionosphere can exist at all with the Earth having a magnetic field is nothing short of astonishing. The fact that radio works at all in Alaska, where the North magnetic field is concentrated, is astonishment on steroids.

Let's Get Critical

Imagine all the people Sharing all the world...

Probably the most useful information the radio amateur can get from the electron density profile is the critical height.

Let's illustrate this point with a little test setup. Let's build a transmitter and receiver, and put a super high gain antenna on each, so we can place them right next to each other without interference. We'll aim our transmitter and receiver antennas straight up into the ionosphere. While we transmit on one antenna, we listen for the ionosphere reflected signal with the other antenna. We actually do something similar to this in what is called NVIS (Near Vertical Incident Skywave) communications, a very reliable H.F. military mode.

If you shoot a radio signal straight up into the ionosphere, whilst listening for reflections, constantly increasing the frequency as you do so, there will be some frequency at which you get no signal reflected back at all. The frequency at which this happens is called the critical frequency, and the height at which this all happens is the critical height. Both of these are very useful for calculating radio propagation, but let's look at critical height first.

Critical height, interestingly enough, always corresponds with the maximum electron density! In other words, you can never get any reflections from anything higher than the maximum electron density point. This is a good thing to know.

Sometimes, critical height is called "the height of the ionosphere." This is not precisely true, but it's a useful enough misapprehension. A little simple geometry will show you that having a high ionosphere is better than a low one, when you're trying to bounce a signal beyond the horizon. Now, it's certainly possible to use multiple bounces when transmitting beyond the horizon, and indeed this is exceedingly common in amateur radio communications. But generally, it's best to get the job done with as few skips as possible, for at least two reasons. Number one, there are losses associated with every ionospheric bounce, so the fewer of them you need, the stronger your signal will be. Secondly, the prediction of multi-bounce skywave radio assumes the ionosphere at the other guy's end of the chain is the same as it is where you are, a very "iffy" assumption, indeed.

At any rate, the critical height is a good quick and dirty means of calculating how far you can get on your first bounce.

Now, critical frequency, on the other hand, has a lot more information to offer. And it also requires a much better understanding of the ionosphere. When thinking about critical frequency, we need to toss out our "mirror" analogy of the ionosphere, and replace it with a "prism" analogy. Remember when we said our "electron sheet" is very thick? A reflection from a thin layer, like the silver coating on a mirror, gives us something called a "specular" reflection. Radio reflections from the ionosphere are anything but specular, except for some really notable exceptions, which is why they're called "notable exceptions."

Most of us are familiar with a standard optical prism. You place this wedge of glass in sunlight, and it spits out all the colors of the rainbow, each one "bent" at a different angle. Well the ionosphere is very similar; different frequencies are bent at different angles. The net result is similar to a prism, but the internal workings are quite different.

The ionosphere's prism-like character results from the fact that the critical electron layer (or layers) are not only very thick relative to the wavelength of radio signals penetrating them, but they are of continuously varying density. We say that the ionosphere has a continuously variable velocity factor.

Remember our bent Slinky experiment? In that case, we were only dealing with two "velocity factors," that of air, and that of dirt. In the ionosphere, we have a continuously varying velocity factor with height, but also one that varies with frequency! The physics is exceedingly complex, but the intermediate results are fairly easy to visualize. The crux of the matter is that higher frequencies penetrate the ionosphere farther before being "bent" than lower frequencies. What this means is that the "height of the ionosphere" is dependent on frequency.

Now, things just begin to get interesting.

For about a century there has been a conspiracy of silence in amateur circles about a couple of things known as X-mode and O-mode propagation. This is really surprising since X-mode and O-mode propagation modes have been known about for at least sixty years, and are fully acknowledged by just about every communications professional.

Here's the scoop. If you transmit a radio signal through the ionosphere, unless you happen to be at precisely the magnetic equator, (which is about as likely as finding a politician who can utter a truthful statement), your radio signal splits into two signals. One of these signals will be clockwise circular polarized.

This is known as O-mode (for ORDINARY mode, in the northern hemisphere). The other signal will be counterclockwise circular polarized. This is known as the X-mode signal (for eXTRAORDINARY mode, in the northern hemisphere. You may say I'm a dreamer But I'm not the only one

(Yeah, I know, physicists can't spell, but at least it's memorable). At any rate, even if your transmitted signal is perfectly linear, such as generated by a simple dipole, by the time the signal gets up to the ionosphere and back down again, you have two signals, one spinning clockwise and one spinning counterclockwise. Now the plasma physics that creates this phenomenon is quite fascinating, but well beyond the scope of this course. The thing you need to know is that you will ALWAYS have an X-mode and an O-mode signal when you transmit through the ionosphere. This is so easy to prove with simple circularly polarized antennas that nobody has ever bothered to dispute it. But, true to form, most hams generally just ignore the whole topic and chalk up weird propagation to "black magic."

The fact of the matter is that a good deal of the "weirdness" of H.F. radio propagation can be explained by exploring the X and O properties of the signals. Probably 99.9% of all radio amateurs are clueless about this very fundamental property of the ionosphere. You can't blame the hams though, because it's totally absent in the amateur literature as well. We intend to fix that.

The correct thing to do is to TAKE ADVANTAGE OF THESE DIFFERENT MODES! The X-mode and O-mode signals not only have two different paths in the azimuth, but also have different critical heights. This is the sort of thing that ordinary hams can experiment with and actually make a contribution to the technology and science. I hope someday you'll join us And the world will live as one

Take a look at a typical ionogram right here: http://digisonde.haystack.edu/latestFrames.htm. I've chosen the Massachusetts Digisonde, just so you don't think this whole X and O thing is an Alaskan aberration. Notice the well defined red and green traces? The red trace is your O-mode signal, and the green trace is your X mode signal. These are real time signals. The only difference is the polarization of the receive antenna. See how the green trace has a higher critical frequency AND critical height? This is real stuff, kiddies; not science fiction.

In a following chapter on practical antennas, we're going to describe some very simple circular polarized H.F. antennas, which you will not find in any other amateur radio literature! Consider yourself privileged.

## SCOTTISH TECHNOLOGY DISCOVERY

*RNARS Newsletter*

After having dug to a depth of 10 feet last year, Irish scientists found traces of copper wire dating back 100 years and came to the conclusion that their ancestors already had a telephone network over 100 years ago.

Not to be outdone by the Irish, in the weeks that followed an English archeologist dug to a depth of 20 feet, and shortly after, a story published in the Morning Herald read : English archeologists find traces of 130 year old copper wire, and have concluded that their ancestors already had an advanced high-tech communications network 30 years earlier than the Irish.

One week later, The Bnffshire Advertiser reported the following: After digging as deep as 30 feet in his farm near Enzie Braes, Banffshire, Jock Broon a self taught archeologist, reported that he found absolutely nothing. Jock has therefore concluded that 130 years ago, Scotland had already gone wireless.

**O would some power the giftie gie us to see ourse`n as others see us.**

## VE3SWA FIELD DAY JUNE 26/27 2010

| Band | CW QSO | Digital QSO | Phone QSO |
|---|---|---|---|
| 160 | 5 | 0 | 0 |
| 80 | 65 | 0 | 215 |
| 40 | 169 | 0 | 95 |

| | | | |
|---|---|---|---|
| 20 | 200 | 16 | 20 |
| 15 | 121 | 9 | 68 |
| 10 | 42 | 0 | 24 |
| 6 | 1 | 0 | 2 |
| Totals | 573 | 25 | 425 |

Points are scored as follows: for CW and Digital contacts score 2 points for each and for phone contacts 1 point. Total points are then multiplied by the power multiplier which in our case (150w or less) is 2
CW 573 x 2 = 1146  Digital 25 x 2 = 50  Phone 425=425 = 1621 x 2 =  3242 Total points.
Bonus points are obtained for various things like Press Releases (100), reading Fiel Day message (100), setting up in public place (100), using other than mains power (100 for each station) having an information booth (100) and submitting your score via the ARRL web page (50) for a total of 950, these points are added at ARRL after receiving proof . So, if ARRL are satisfied with the proof submitted we will receive 950 bonus points giving us a total of  4192. In 2009 we made 3620 and in 2008 3304


Mike looked after  10/15/20/40 phone


The crew raring to go

Gerry giving Ken a break on 80 phone

Grub up !!!

An enjoyable time was had by all and the Bar B Q on Saturday was well attended by the usual members Fraser, Jill, Gerry, Hugh, it was nice to see Ken back in the fold and extra nice to have his good lady in attendance with him. Steve of course was there to feed us all and he also had his good lady with him. The weather cooperated for the most part and it was good to see 10 and 15 meters open up quite well. During all the activity our intrepid videographer and film maker Ryan was busily recording all for posterity. I hope we've given you an insight to Amateur Radio Ryan and we are looking forward to viewing some of your work very soon.