

# The NEWSLETTER

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Mercury Amateur Radio Association - MARA  
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## CONTENTS

## OTHER STUFF

2

### **GRANDMA MARA'S RAMBLINGS**

- THOUGHTS OF AN OLDER PERSON
- GETTING READY FOR FIELD DAY - HOW ABOUT YOU?

3

### **TECH and other STUFF**

- MORE RASPBERRY PI 3 AND PI-HOLE STUFF
- STREAMING VIDEO ON THE PI 3
- MAGAZINE FOR THE PI FAMILY
- LOCATION FINDING DRILL BIT



5

### **FEATURE ARTICLE**

- QUICK NOTES ON NEAR VERTICAL INCIDENT SKYWAVE (NVIS)

7

### **I'M THROWING IT OUT (SOB!)...**

- GETTING RID OF YOUR JUNK? GIVE IT AWAY HERE FOR FREE



8

### **QUOTE OF THE MONTH**

- STEVE SKELTON - CARTOONIST

8

### **DI-DAH-DI-DAH-DIT**

- ARE YOU PLANNING A FIELD DAY OPERATION?



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# Grandma Mara's RAMBLINGS...

**A**nother month and a bit until Field Day! The detail planning has increased in intensity around here. What with the nicer weather, Walter has gotten all of the portable Field Day antennas out and inspected them for possible failure points, repairing or upgrading where necessary. He also got the random length antenna back up in the air which made him happier.

The Senior's group has taken over the bulk of the planning for Field Day. They said if Walter would take care of the antennas and the rigs they would take care of the rest, and so they have. When you think about it, as a group, they have a lot of life

experience in many fields, and not much chance to use it any more. Several of them were man-

**The Senior's group has taken over the bulk of the planning for Field Day.**

agers of large companies, either for profit or not. Some were in the food preparation field, others were in transportation, while others were public relations or communications .

Planning for the relatively small numbers involved in our FD operation must seem like small potatoes to them.

At one of the meetings early on this year, we were told to simply show up and have a good time on the radios, to let someone else worry about things for a change.

The food committee (dessert sub-group) did mention that a few of my chocolate cakes wouldn't be unwelcome!

The operating position committee has the radio gear, shelters, tables, and chairs all ready pledged to go.

As in years past, we will take the RV over to

the camp ground where we have our usual area reserved for us by the rangers. Really - what is a field day without a field! Walter has some new QRP gear he has been working on over the winter months he wants to try out. So, besides the two of us in the RV, it will be stuffed with radio gear and assorted test equipment. Sometimes I feel like we need a larger set of wheels just to fit all the ham gear inside. Maybe sell the house, buy a bigger RV, and travel around the countryside all year long, moving with the seasons, staying with the various scattered relatives, staying ahead of (or south of) the snow.

**Even his dog spends more time at our house than at his own.**

One thing the nicer spring weather has done is improve most everybody's spirits. There are some naturally grumpy individuals, of course. One of those is my neighbor a few houses down the street. He is so depressing to be around that his wife left him a few years ago. He has made things so unpleasant, his children and grand children never come to visit. Even his dog spends more time at our house than at his own. You have to wonder why people are that way, what with all of the good things there are in life. I suppose it could always be blamed on his childhood - that seems to be popular these days!

You know how some people are a delight to associate with? They just make you feel good about yourself just by being near them? This guy is just the opposite! Being around him, seems to suck the happiness right out of

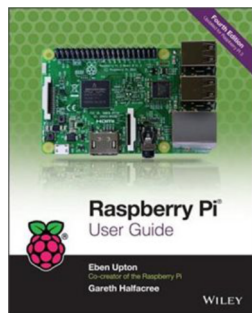
**You know how some people are a delight to associate with?**

you. Even the glorious spring sunshine and some of Grandma Mara's chocolate cake doesn't cheer him up! Heaven knows I've tried the latter.

MARA

## MORE OF THE RASPBERRY PI

Being the curious type, I wanted to learn more about the inner working of the Raspberry Pi 3 so I did what I usually do - ordered a book! Up here in Canada, the major on-line bookseller is [Chapters-Indigo](#) so I went on their [web site](#) and did a search for "raspberry pi". That gave me two hundred and seventy-nine hits. I settled on the [Raspberry Pi User Guide Fourth Edition](#) by Eben Upton, one of the main players in the world of the R-Pi. The book covers all of the versions of the Pi to date with basic information on how to get it going, on through beginner programming in Python, and even how to set it up as a media center. Good book for us old beginners!



One of the several programming languages included on the installation micro SD card is Python. A book about Python that I found free on-line is [The Coder's Apprentice - Learning Programming with Python 3](#) by Pieter Spronck. It starts out assuming that you know nothing about Python (which in my case would be fairly correct), teaches you coding step by step, and has assignments (called *exercises*) along the way for you to accomplish. I'm slowly working my way through it, as my spare time permits.



## USING THE R-PI TO VIEW ON-LINE VIDEO

Out of curiosity, I loaded an 8-GB micro SD card with the standard Raspbian O/S. I

connected to the Internet via a hard wire connection to my high speed network. With the included browser, I clicked on [www.LDS.org](http://www.LDS.org) and went to one of the recent Conference streaming sessions. I noticed that while a still shot was very good, any movement was somewhat jerky (on full screen). When the Choir was singing and the camera was moving, the picture and sound would hesitate every now and then. Something that did not happen when using my HP laptop and either IE or Chrome to view the same session (also on full screen).

Next, I loaded a 32 GB micro card with Raspbian and did the same session. Same jerky results.

Both were with hard wire connections to the network. Switching to wireless was, of course, worse.

I suspect that it is the [video codec](#) used by the Pi browser that is the problem. I haven't tried downloading the session to a flash drive, and then playing it! Further investigation is warranted to see if there is a fix.

## MAGAZINE FOR THE PI

There is a magazine for the Raspberry Pi called the MagPi, available by paid subscription or for free as an on-line download. You can view it by going to

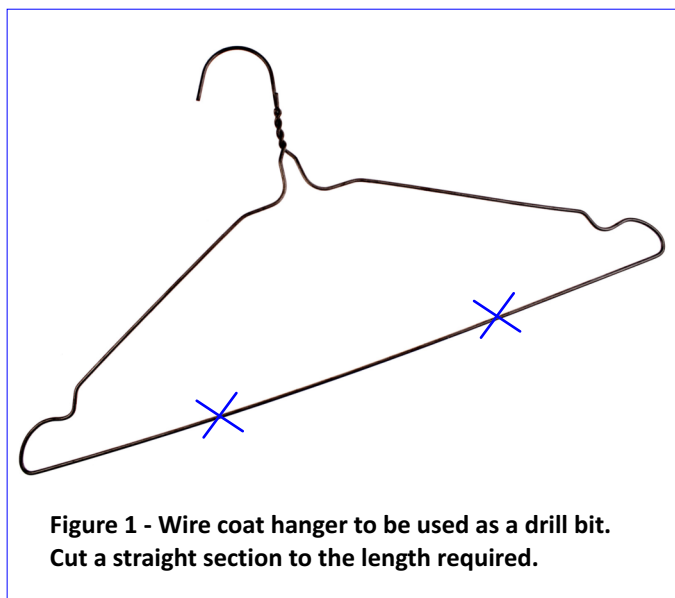
<https://www.raspberrypi.org/magpi/issues/>

and clicking on the issue you want to view. I have looked at a few month's worth of them but I haven't seen anything ham radio related yet. Games seem to be the most popular thing, something I've never developed a love for. Although I must confess a slight addiction for Spider Solitaire on the laptop.

## LOCATION FINDING DRILL BIT

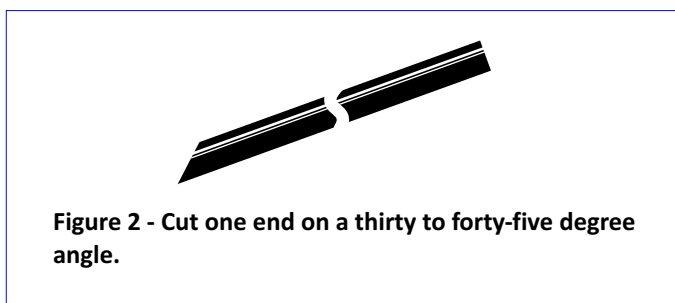
Sometimes, when you are trying to find a

spot to run a wire inside a wall from down in the basement, it can be a challenge. The thing to do is to drill a tiny hole right next to the



baseboard on the upper floor and locate that hole in the basement, then measure from that back to the center of the wall and drill the final hole.

The easy way to do it is to use a section of wire coat hanger as the drill bit to go through



the floor. See Figures 1 and 2.

The manufactured drill bit will be quite floppy if more than a few inches in length. For longer (and more convenient) lengths, hold the wire between your thumb and forefinger about midway to steady it, and start at a fairly slow speed. If you are drilling through carpet, the coat hanger bit will not snag and unravel the carpet like a standard fluted drill bit.

If you are drilling through a wood floor with the coat hanger bit, the hole will be very small

and easy to fill with a suitable wood filler of an appropriate color.

The end of the hanger protruding into the basement is usually fairly easy to find. Once located, measure back to the inside middle of the upstairs wall and drill the larger hole for the wire.

If trying to place a hole in a wall from the attic, use the coat hanger drill to make a hole near the wall/ceiling junction. After removing the coat hanger bit, fill the hole with a tiny amount of drywall filler or a little dab of white toothpaste.



The company, that many of us grew up with, has been an up and down thing for the last number of years. There have been web announcements, every now and then, claiming that it was back but nothing ever really seemed to happen.

They now have a web site at <https://www.heathkit.com/>. Some links don't do anything, so perhaps the site is still "in progress".

One item on their web site is their *Pipetenna*<sup>TM</sup>, a "stealth" (their word!) antenna for 2m and 440. There is only a partial picture (at the time this is being written) but what is shown looks anything but stealthy! And at \$149 for what appears to be ABS pipe seems to be a trifle over priced!

I, for one, would like to see them return, but I don't know that the times and conditions for that business model will ever come again.

Seems like they are relying on the reputation of, and the nostalgia for, the old HeathKit. From what I see, so far on their web site, it doesn't appear very likely to happen.





# FEATURE ARTICLE

## QUICK NOTES ON NVIS\*

### \*Near Vertical Incident Skywave

by a contributor, who for job related reasons, requests anonymity until retirement - and perhaps even after!

- The best amateur frequencies to use for NVIS are between 1.8 and 7.3 MHz. NVIS does occur up to approximately 30 MHz but as the frequency rises above 8 MHz the F Layer of the ionosphere become much less efficient at reflecting the signal back to earth. Below 1.8 MHz D Layer absorption occurs and insufficient signal is reflected back to support frequent NVIS operation. Keep in mind F Layer Reflection and D Layer Absorption vary dramatically making prediction of utility of a particularly frequency a swag at best.

- The utility of propagation of a frequency is dictated by the ionosphere which varies dramatically with changing geographic locations. What works well in one location often does not work well in another. An NVIS system that works well in Sumter, SC may not work well in Virginia Beach, VA.

- Military services utilization of NVIS normally occurs on frequencies between 2 – 4 MHz and 5 – 7 MHz with the lower frequencies used at night and the higher used during the day.

- NVIS antennae are generally deployed  $1/10\lambda$  to  $1/4\lambda$  above ground. They are generally  $1/2\lambda$  in length to avoid use of an antenna tuner. Shorter lengths work but high ground losses due to ground proximity often only add to losses due to less than optimal matching networks. Generally the shorter the antenna, the greater the Q requirement on matching network components to mitigate matching network losses. Most antenna tuners lack the necessary Q to keep losses down. 3 dB or more loss in tuners is not infrequent and losses often worsen rapidly when dealing with mismatches at an antenna with as little as 100  $\Omega$  reactance.

- Do not expect to have 20 over S-9 contacts even within the anticipated best performance zone of the NVIS system.

Notice in the plot shown below in Figure 3, the pattern of an 80 Meter dipole  $1/2\lambda$  above ground. Also notice the antenna gain is 8.17 dB over an isotropic antenna. (The 2.1 dBi gain quoted in theoretical

literature for the dipole is the gain of a dipole in FREE SPACE. When operated over earth  $1/2\lambda$  above the surface the dipole exhibits nominally 8.2 dB of gain. This

is due to the signal being reflected as opposed to being absorbed by the earth. The simulated ground used was 'Rolling Hills and Rocky Pasture.

Now compare the pattern of the same antenna when lowered to  $1/4\lambda$  above the ground surface (see Figure 4). Notice how the lobes at  $67.5^\circ$  have vanished and the energy which was once

concentrated at a low angle is now focused overhead from about a  $45^\circ$  angle to  $0^\circ$ . Previously the power radiated overhead was 0 dB, but has now risen to just over 6 dB.

The plot in Figure 5 displays the radiated signal

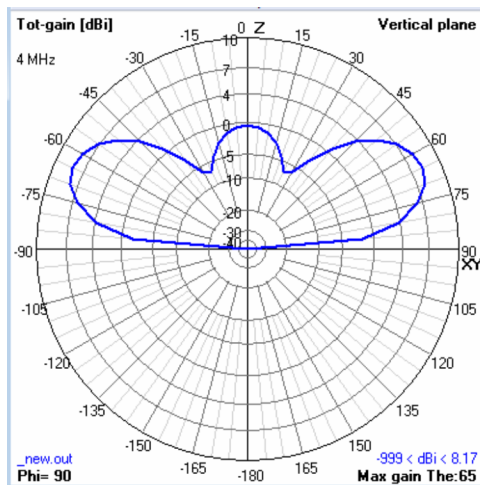


Figure 3. A 3.75 MHz dipole antenna  $1/2\lambda$  above ground exhibits a gain of 8.17 db.

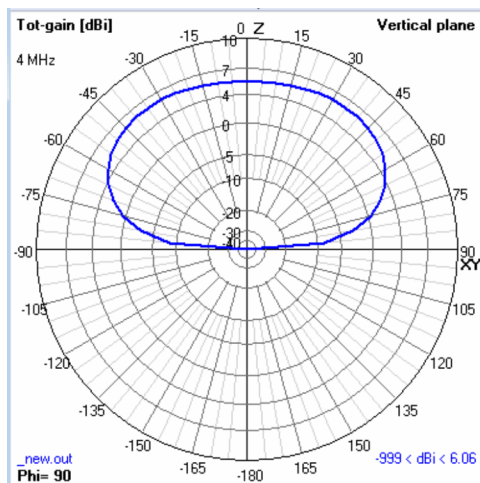


Figure 4. A 3.75 MHz dipole antenna  $1/4\lambda$  above ground exhibits a gain of 6.06 db.

pattern of the antenna after it has been lowered again, this time to  $1/8 \lambda$  above ground. Also note the radiated power has been confined to a smaller area. The

power radiated overhead is still nearly 6 dB but the power radiated at angles closer to the horizon vanished. One would typically

anticipate the power density

would increase (in Figure 5) given the smaller area the energy is confined. Since energy is neither lost nor created where did it go? If, like most ops, you are energy conscious when it comes to RF Power, then this can be quite disconcerting. The losses can be attributed to ground losses.

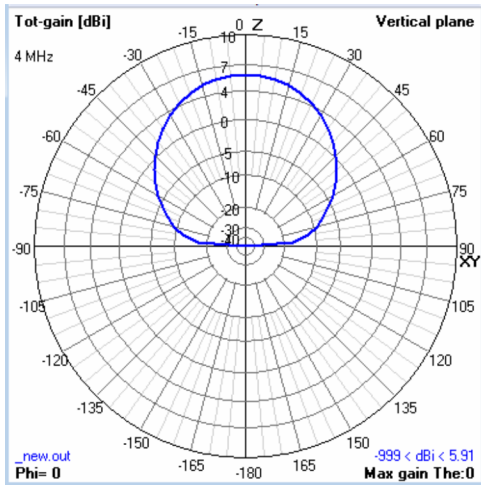
The plot shown below is the dipole still  $1/8 \lambda$  (32.8 feet) above the ground, but with an added reflector 10% longer than the dipole. The reflector was

elevated 1 meter (3.28 feet) above ground. Gain increased from 5.9 dB to 6.6 dB.

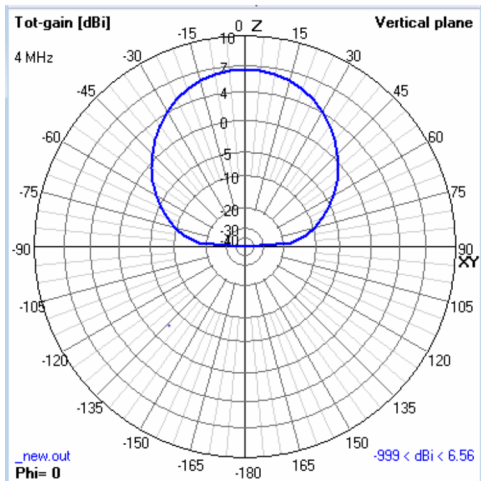
Some ops run their NVIS antenna lower to the ground surface.

Examining the effect of lowering the antenna even more to  $1/16 \lambda$

(5 meters or 16.4 feet) without the reflector reveals



**Figure 5. A 3.75 MHz dipole antenna  $1/8 \lambda$  above ground exhibits a gain of 5.91 db.**



**Figure 6. A 3.75 MHz dipole antenna  $1/8 \lambda$  above ground with a reflector directly below the dipole 1 meter above ground level exhibits a gain of 6.56 db.**

one incurs even more loss. The radiated power peak is reduced to 3.15 dB. See Figure 7.

In Figure 8 the dipole is still at  $1/16 \lambda$  (5 Meters or 16.4 feet) above ground level with the reflector placed directly below the dipole again at a height of 1 meter above ground level. Gain improved just over 1.5 dB

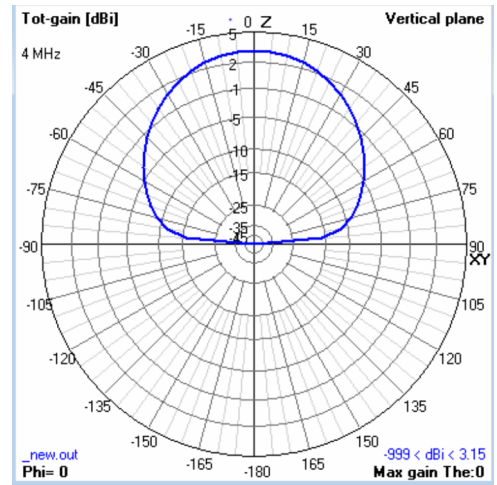
but is still less than half of the radiated power of a dipole  $1/2 \lambda$  above ground.

A lot of the NVIS users place their antenna on top of privacy wood fences or similar non metal fences about four feet above ground. These antennae do radiate but the next plots should reveal the impact reduced height above ground has on radiated power as well as station operation.

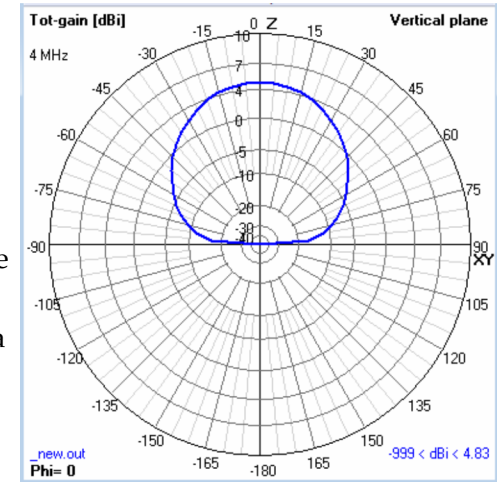
The plot shown in Figure 9 displays the result of using a  $1/2 \lambda$  dipole at a height of 1.25 meters above ground on top of a wooden fence or similar

insulating material. As can be seen, the ground losses are very high, reducing the  $1/2 \lambda$  dipole's gain from a peak of 8.2 dB to -3.3 dB for a total of 11.5 dB loss. This works out to 2 S-Units lower signal on the distant operator's receiver.

The dipole at 1.25 Meters above ground (Figure 10) with the reflector provides a 1.9 dB gain increase



**Figure 7. Dipole at  $1/16 \lambda$  above ground without reflector. Notice the 50% power reduction in radiated power from  $1/8 \lambda$  above ground.**



**Figure 8. Dipole  $1/16 \lambda$  above ground with reflector. Gain increases just over 1.5 dB.**

over the dipole without the reflector.. Still the delta between 8.2 dB of a dipole at  $\frac{1}{2} \lambda$  above ground vs. the NVIS antenna on a fence with a reflector is 9.6 dB or about the gain increase you would see with a legal limit amplifier.

The NVIS antenna will allow an op to get on the air, and will favor contacts with those within a nominal 200

to 300 mile radius when D and F Layer conditions are optimal. While I am not impressed by the NVIS systems observed thus far, it is the operator's choice. If one

is deed restricted or HHRW (Hate Ham Radio Wife) impaired, the NVIS mounted on a fence may be a solution. If NVIS behavior is

the desired mode the operator can place the dipole  $\frac{1}{8} \lambda$  wavelength above ground and not incur draconian losses.

Just to put things into perspective, here are some comparisons assuming the operator is using a typical 100 watt station:

- -1dB reduction in signal will be about a 20 watt decrease or 80 watts.
- A 3 dB reduction will be a 50% decrease or 50

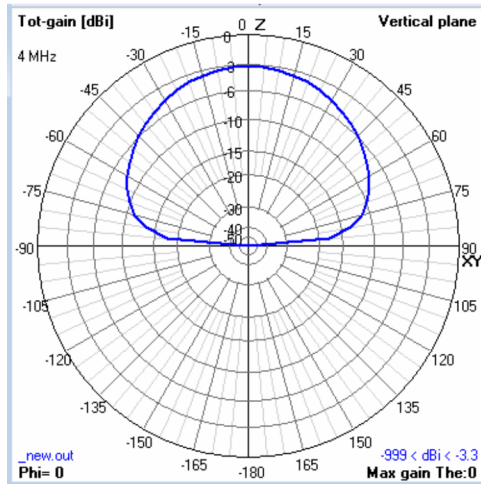


Figure 9.  $\frac{1}{2} \lambda$  dipole elevated 1.25 Meters above the ground with no reflector..

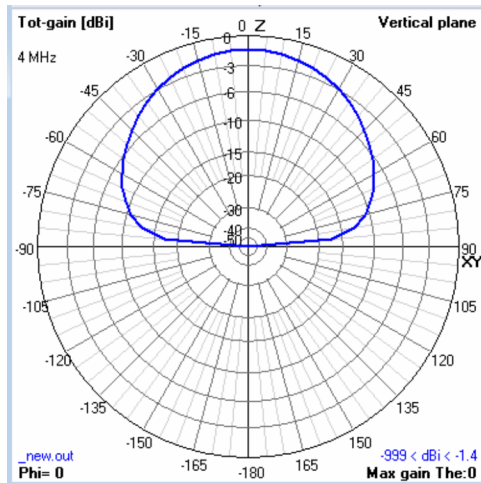


Figure 10.  $\frac{1}{2} \lambda$  dipole 1.25 Meters above ground and with reflector 0.1 dB above ground directly under the dipole. Gain was increased by 1.9 dB.

watts lost.

- -6 dB is a 75% decrease in power
- -10 dB is a 90% decrease in power.

If you wish to observe the change in signal level and their effects, arrange with another op to listen to your signal while changing power levels. If your rig has an RF Level Control, connect it to a dummy load. Adjust for 100 watts out, 50 watts out, and 10 watts out as measured on your station power meter. At each setting mark the RF Level control so you can immediately change to the three levels noted above when operating on the air. Then with your friend listening at his station ask him for signal reports while you are speaking at each power level. Be sure to run your calibration using an audio tone into the microphone, not in the tune mode. This will insure your SSB signal is the comparative parameter as opposed to an AM Carrier.

Note: The plots were created using NEC-4 which allows simulation of wires on and below ground. NEC-4's predecessor NEC-2 did not allow accurate simulation of wires near earth or under the soil. **MARA**



THE WAY IT WORKS IS THIS...

You have to be [a member of MARA NorthEast](#) to submit an item or items to give away - and it (or they) must be free (except for any shipping costs).

You must be a member of MARA Northeast to claim and receive an item or items.

The two of you will have to agree who is paying for the shipping, if you are not within driving distance to pick the stuff up in person.



Doesn't have to be amateur related. It can be anything you want to get rid of.

No getting it for free and then selling it on E-Bay. You (or a family member) have to personally have a use for it.

Submit your item or items to [ve1vq@eastlink.ca](mailto:ve1vq@eastlink.ca) to be listed in the next newsletter.

Provide some text describing what it is and its condition (and a picture if you have one).

The item/s will stay listed for six newsletters (or less, if you notify us that it has been given away).

MARA

## QUOTE OF THE MONTH

**"I suspect miracles are so common that we fail to see them.**

Spoken by Black Cow  
from the comic strip 2 Cows and a Chicken  
by Steve Skelton

## DI-DAH-DI-DAH?

**A**re you planning anything for Field Day this year? With a group or by your self? Some place away from home, or in your back yard? Perhaps not even that far but in your usual shack in the house. Right now, I'm "out of action" in both east and west locations. The loop antenna is still down on the ground in Nova Scotia, as I write this in mid April (although I plan on having it back up in the air by early May). I have nothing radiator-wise in the west.

We had the area around the house in southern Alberta intended for lawn, seeded last fall, and

the new spring green is showing again.

One of the "features" of the ground out here is that there is a large component of clay. When it rains, and you walk on it, it quickly turns your footwear into elevator shoes. If it dries on the soles, good luck in getting it off. I have a theory that this is how granite starts out. Grass makes it so you can walk on it, once the green becomes thick enough.

Since I have no trees taller than about four feet, I'm looking to start with the fiberglass squid pole antenna I made a few years ago. The design and build were covered in the Newsletters of *November* and *December* of 2012, *January, February, March*, and *September, October* and *November* of 2013. I'll need to transport the TenTec Rebel and associated equipment out west as well. I'm sure airport security have seen stranger things than what they see in my suitcase, but perhaps not by much. I think I'll bring a few things each flight. Sort of lessen the threat level.

Every year, I think this will be the one where I get out and on the air, and each year the weekend goes by without participation from me. Maybe this will be the one!

If **you** get on the air, how about an article for the Newsletter? And a picture or two would be nice. I probably ask this same thing each year. I figure if I ask enough times, someone will take pity on me and send me something.

Until next month,  
VE1VQ

