

Why I Like the NVIS Antenna

By John R. Williams

It was during the summer of 2011, that I heard Earl (N4ZFA), my Elmer, affirm that I had in fact arrived at being a real ham radio operator. This declaration was perpetuated by the fact that I had actually made a “DX” contact. Having installed a G5RVjr antenna along with a new HF radio and in possession of my newly earned General license, I did make contact with a station in the Canary Islands - a distance of about 3800 miles! Yes, Sir! I had arrived! I had talked with another station far away! Yes, yes, you have guessed correctly, I was now, at least in my own mind, a real ham radio operator!

And probably like me, you, too, felt that you had achieved a worthy goal early on in your ham career once you had made that initial contact of a great distance, most likely outside of the country. It did not seem of importance if our distance contacts were off-shore or within the boundaries such as Hawaii, or Alaska, or California, or Rhode Island. Just the fact that we could communicate long distances seemed to make us feel successful.

Also early on in my ham career I noticed that I could not reach many of the ham radio operations advertised in the Special Event Stations of *QST Magazine*. This seemed odd to me since many were fairly close, some of which were well within 400 miles or so. Was it possible that I wasn't such a hot ham after all? Since I could not contact many of the hams who were basically my neighbors, I suspected I was doing something wrong. And when I could not make contact with a lot of the Summits on the Air (SOTA) participants operating just across the state line, I was convinced that I needed to become more knowledgeable about the propagation of my signal.

During my studies I became familiar with an interesting type of signal transmission, produced by an odd antenna construction technique resulting in near vertical propagation. The resulting signal transmission's refraction would cover a distance of between 40 and 400 miles and also could be counted upon to defeat the typical signal degradation caused by the ridges and mountains of our area.

The answer to poor communications locally and regionally seemed to be the Near Vertical Incidence Skywave antenna, commonly called the NVIS antenna, and often nicknamed the “Cloud Burner Antenna”.

Near Vertical Incidence Skywave (NVIS) is a propagation mode which uses high angle radiation to send signals almost straight up to be reflected back to Earth for very effective short to medium distance communications. This mode of operation makes it ideal for in-state communications during disasters or other emergency situations. The military has used NVIS techniques for decades to provide short haul communication with distant units on the ground.

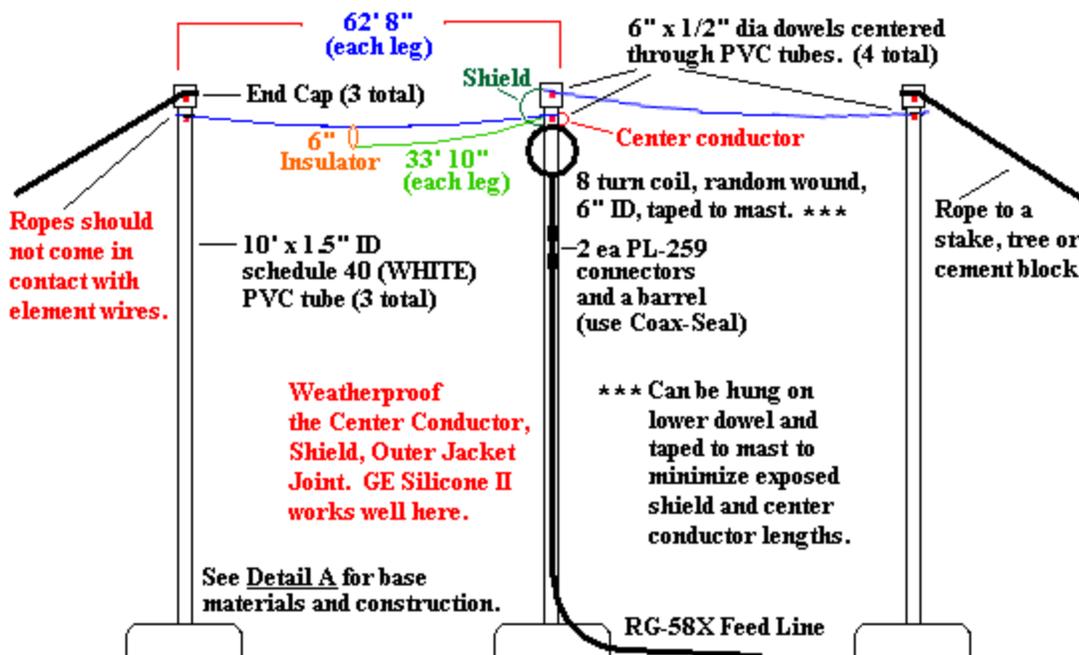
In other words, Near Vertical Incidence Skywave (NVIS) is a propagation mode which uses high-angle radiation that results in an omni-directional pattern by sending signals almost straight up! This antenna is not a beam. It is not directional. One does not need to be concerned about lobe direction, since the only lobe is going vertical.

One of my research sources stated, “The Near Vertical Incident Skywave (NVIS) antenna is a half-wave dipole antenna mounted not over 1/8th wave above ground (at the highest operating frequency). While 1/8th wave works reasonably well, better coverage is obtained if the antenna is mounted at about 1/20th wavelength above ground. A second advantage of lowering the antenna to near 1/20th wavelength is a lowering of the background noise level.

A recent S.E.T. communication on 75 Meters was started with a dipole at approximately 30 feet. We found communication with some of the other participants to be difficult. A second 1/2 wave dipole was built and mounted at 8 feet off of the ground. The background noise level went from S7 to S3 and communications with stations in the twenty-five and over mile range were greatly enhanced. Simply stated, you want as much of your signal going up as possible and ten to fifteen foot height has shown to function very well."

The Near Vertical Incident Skywave (NVIS) antenna is one that provides the majority of its radiation at an extremely high angle. That is to say the major lobe is between 75 and 90 degrees to the earth's surface. This will provide excellent omni-directional communication out to a distance of 300 to 500 Kilometers. The maximum frequencies involved will be as low as 1.8 Mhz under very poor conditions to as high as 14 Mhz under excellent conditions (which we have not seen in many years), with the most usable being between 3.5 Mhz (80M) and 7.3 Mhz (40M).

Portable 75/40 Meter NVIS Antenna



The antenna height above ground seems to be the single most controversial subject in discussion of NVIS antennas. Some say anything below 1/4 wave works. Others say anything below 1/8th wave and yet others - myself included - say ten to fifteen feet works very well. You will note that there is negligible difference in antenna gain between 1/8 wave and 1/4 wave height. There is however a significant difference in the logistics of placing an antenna at 70 some feet in the air versus 35 feet in the air. And 10 to fifteen feet above ground is even better.

I have been experimenting with this antenna for the last couple of months. My first construction resulted in a 40 meter dipole at 10 feet in height. It provided excellent communications at 5 watts with about 30 stations. The SWR results were 1.4:1. My second attempt was at the home of Tom Price (KI4CVU) with a similar setup, except we added a ground wire underneath the dipole. Again, we got great results using about 80 watts, but the

SWR reading was 1.7:1. The third endeavor with this type of antenna was as we operated the Special Event Station for Fire Prevention Week . While we did not get as many contacts as before, we still did fairly well with it, and again the SWR issue was 1.7:1 at five to twenty watts.

If you are interested in gaining communications skills with stations within the 40 to 400 mile radius, then I suggest you will find the NVIS antenna could be an essential part of your operation. I have just covered the basics of this type of antenna - there is a lot more to learn. You might find the following two sources to be of help. Cut and paste these two sites into your browser.

<https://www.facebook.com/100542266666207/videos/1146673335479948/>

<http://arrl-ohio.org/SEC/WP-NVIS-Rev3.pdf>

Little of this article is my own work, most of the information herewith I “stole” from others and do not claim authorship of any of it. Do a Google search on “NVIS antenna” and learn as I have. This is an easy antenna to construct and an easy antenna to operate, which I think you will find irresistible in learning about. You can count on this antenna to get your signal out to the 40 to 400 mile range while overcoming the obstructions poised by mountains and ridges, all at a reduced noise level. Be a happy ham and have fun! Seventy-threes to all,

KJ4ZFK