

Field NVIS Antennas

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I am going to make this as practical as possible. If a deployable antenna is the goal then it needs to be very practical.

- Antenna - The antenna is probably the easiest part.
 - Material - I buy 500 foot rolls of 14 gauge stranded insulated house wiring. I use black for stealth. However yellow is good for field antennas as it is easier to see. All insulators are PVC pipe which is inexpensive. For a center dipole insulator a tee is good.
 - Frequency – You should cut the antenna for a half wave at the lowest operating frequency. However, there is a caveat to this: the frequency range for NVIS will be from the resonant frequency to two times the resonant frequency. Therefore if you cut the dipole for 2.3 MHz then the dipole will only give you a NVIS pattern up to about 4.6 MHz. If you need to operate with a NVIS pattern above this frequency then this dipole is not best for your use. Now that we are in Daylight Savings Time and sunspots are a bit more numerous now we can probably limit our lowest frequency to 3.2 or 4.0 MHz. Therefore an 80 meter dipole cut to about 135-140 feet would now be appropriate as it would give us NVIS from about 4.0 MHz to about 7 or 8 MHz. Use the formula $468/\text{Freq}(\text{MHz})$, so for 4 MHz you would cut the dipole for $468/4=117$ feet.
- Feedline – If you want to use coax, you are fine for the resonant frequency for the dipole but at other frequencies the SWR on the coax can be as high as 212:1. This results in a 12 dB loss in 100 feet of LMR400 coax. You can shorten the coax to have less loss. You can add another set of antenna wires for another frequency such as in a fan dipole. But since MARS operates on many frequencies a fan dipole is not that practical.
 - Ladder line – If you can use ladder line for a feedline the loss will go down to about $\frac{1}{2}$ dB. However you need to connect the ladder line to a tuner. Some tuners have a built in 4:1 balun of questionable quality, but for field use and only 100 Watts this is certainly an option. Another option is to use a heavy duty 1:1 current balun near the tuner and then connect the balun to the tuner with a real short piece of coax, thus minimizing the coax loss. The April QST had an article on how to make a coreless 4:1 coreless balun. Since the ferrite core of a balun is what gives a loss this design has a real potential. You can make it out of coax.
 - Don't use any feedline – If you have a heavy duty auto tuner you can attach a random end fed wire to it. The coax to the tuner from the radio can be any length.
 - Coax to a tuner at the center of the dipole. This is a good deployable antenna but it can be rather expensive. Put the auto tuner at the center of the two dipole wires. You need to put the tuner at the top of the center pole for the dipole, but then you can run Any length of coax from the radio to the tuner.

- Tuner- For ladder line I use a complicated balanced tuner that I made. You can use a conventional tuner like an MFJ-949E, and also a heavy duty 1:1 current balun.
- Height above ground- Several people have shown that for 80 to 40 meter dipoles (or for radio frequencies between 3.5 and 7 MHz) if a dipole is between 25 and 45 feet off of the ground it will be a pretty decent NVIS antenna. The higher in this range the better but it will work very well at 25 feet.
For field work it is said that the height is always a compromise as compared to a home station, but I disagree with this. My MARS antenna at home is probably about 20 feet off of the ground. When I go to the field I may be able to get my antenna up at the center as high as 30 feet. So which antenna is better? They both work equally well.
- Orientation- In the field it is almost a given that your dipole will have only one support which will be at the center. Therefore the dipole will have an inverted vee configuration. Inverted vees in the field work very well. Try not to have the wires go too steeply down. I try to put about 50 feet of ropes at the end of my field dipoles and then I use ten foot poles to keep the end of the ropes about ten feet off of the ground. The end of the dipole wire will then be higher than ten feet. This works well.
- Center support pole. These come in 4 foot lengths of fiberglass or aluminum or telescoping poles. They all probably need to be guyed in two places: the top and the middle. Putting the pole up is probably the hardest part of this antenna.
- Above all, try to keep it simple.
- References- If you go to www.pituch.net and then to the Amateur Radio Pages you will see a list of articles on antennas. If you go to the MARS page you will see info on my home antenna and also my field antenna used at the fall MARS field day.