Attached are the "tinker-thinking" results for two antennas (UHF-446 MHz)

1. ¼ Wave on perfect ground (a.k.a. truck/car roof)

2. ¼ wave elevated 1.5 inch above a perfect ground plane w/8 radials

Note that the beginning ½ inch of antenna is in there to facilitate the feed point connection calculations, otherwise a 6 inch vertical.

Some Notes (Read in order):

- A dipole is Z=70 (equal both legs) in free space

- If you fold the dipole 90 degrees to make it into a vertical with one radial, the folding lowers the Z to about Z=60, and you must adjust the leg lengths to bring it back into resonance (shorter)

- As you add radials… at about qty=4, the Z passes through 50 ohms, and you are again adjusting the lengths (equally) to re-resonant the Antenna

- As you pile on the radials 4-8-16-32, etc, the Z comes down to ~Z=36, with a lengths adjustment for each move (still free space)

- Now, understand that the impedance (Z) for an ideal vertical over perfect ground (counterpoise) is Z=36 ohms. It then takes a ¼ matching stub to get the Z up to 50

- As you elevate the antenna (say 1.5 in) and add 4 radials to the feedpoint ground, you can expect that the impedance will rise into the low/mid Z=40's. This move also shortens the lengths needed for resonance. As you go to an 8 radial model the impedance begins to again fall to Z=40 toward the ideal Z=36 – all this just above the nice large rooftop of your mobile

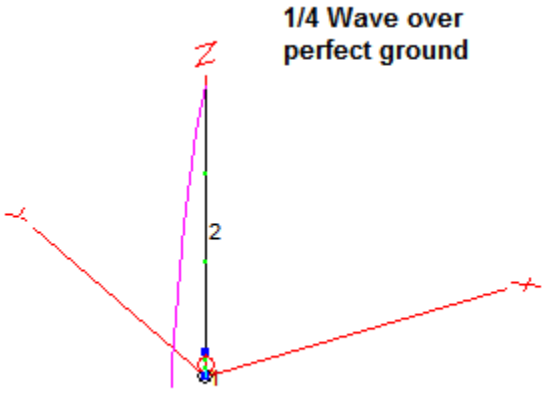
- So now we play feedpoint offset games… make the vertical longer and the redials shorter. The purpose is as you offset, the impedance increases… and we want Z=50

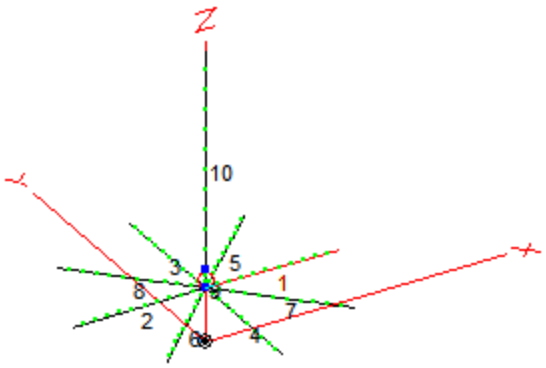
- The offset adjustment is way disproportional… more shortening of the radials than the increase length of the vertical element. Each increment you make as you experiment requires you adjust lengths for resonance… (notice in "wires" how short the elevated radials became for resonance= 3.75 in)

- This whole exercise will show you that the antenna pattern is almost inperceivably changed as is the gain… maybe 0.1dB But you had fun doing it!

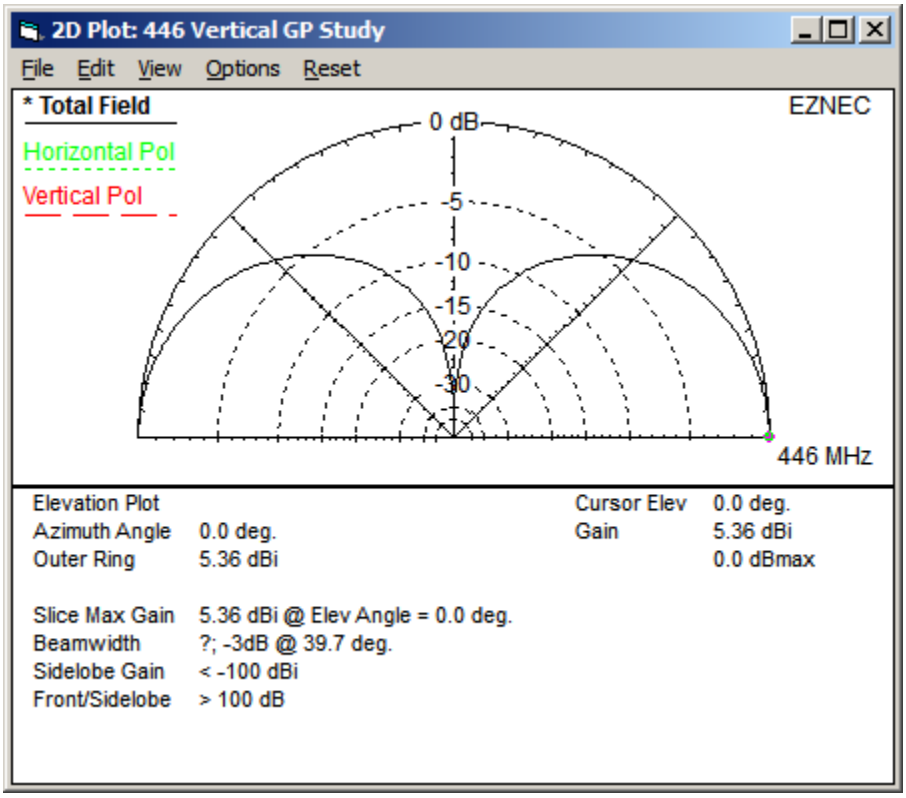
Conclusion:

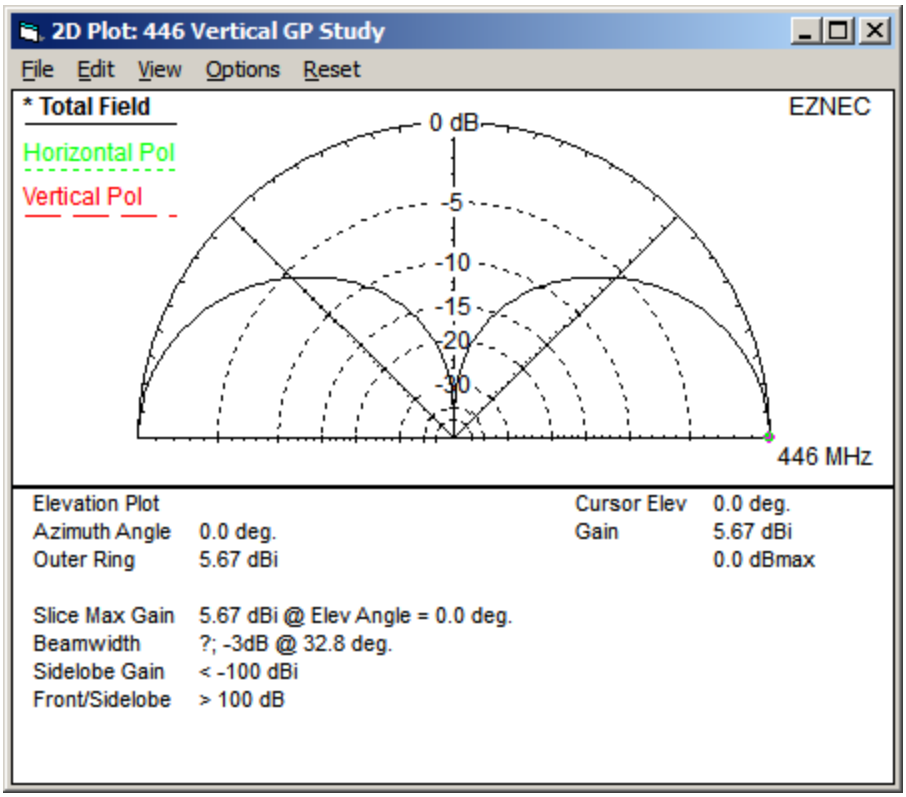
- This idea of ensuring a proper radial system is MAYBE important for the Magmount installation, but only if you are the purest type!
- There are slight/minor bandwidth difference, and the antenna length adjustment are critical (maybe you need a file).
- All this is greatly affected by the size (Dia) of your element choices.
- See pictures for Computer analysis -- theoretical results





1/4 Wave elevated 1.5 inch over perfect ground with 8 radials





Wires

Wire Create Edit Other

☐ Coord Entry Mode ☐ Preserve Connections ☐ Show Wire Insulation

Wires

	No.	End 1				End 2				Diameter	Segs
		X (in)	Y (in)	Z (in)	Conn	X (in)	Y (in)	Z (in)	Conn	(in)	
▶	1	0	0	0	Ground	0	0	0.5	W2E1	#12	3
	2	0	0	0.5	W1E2	0	0	6		#12	3
✳											

Wires

Wire Create Edit Other

☐ Coord Entry Mode ☐ Preserve Connections ☐ Show Wire Insulation

Wires

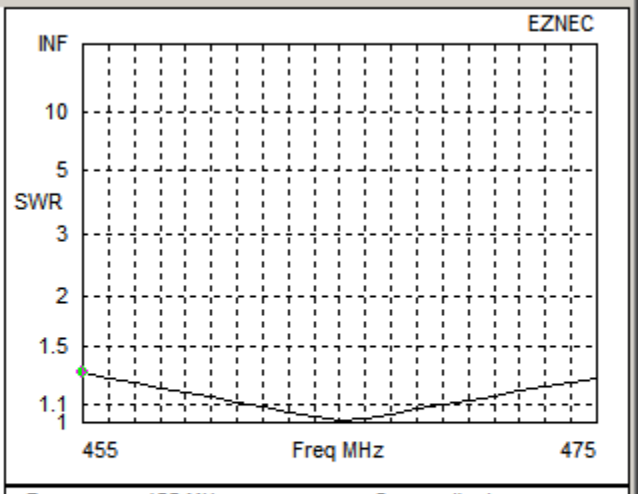
	No.	End 1				End 2				Diameter	Segs
		X (in)	Y (in)	Z (in)	Conn	X (in)	Y (in)	Z (in)	Conn	(in)	
▶	1	0	0	1.5	W2E1	3.75	0	1.5		#12	11
	2	0	0	1.5	W3E1	-3.75	0	1.5		#12	11
	3	0	0	1.5	W4E1	0	3.75	1.5		#12	11
	4	0	0	1.5	W5E1	0	-3.75	1.5		#12	11
	5	0	0	1.5	W6E1	2.65265	2.65265	1.5		#12	11
	6	0	0	1.5	W7E1	-2.65265	-2.65265	1.5		#12	11
	7	0	0	1.5	W8E1	2.65265	-2.65265	1.5		#12	11
	8	0	0	1.5	W9E1	-2.65265	2.65265	1.5		#12	11
	9	0	0	1.5	W1E1	0	0	2	W10E1	#12	3
	10	0	0	2	W9E2	0	0	8.15		#12	11
✳											

SWR Plot: 446 Vertical GP Study

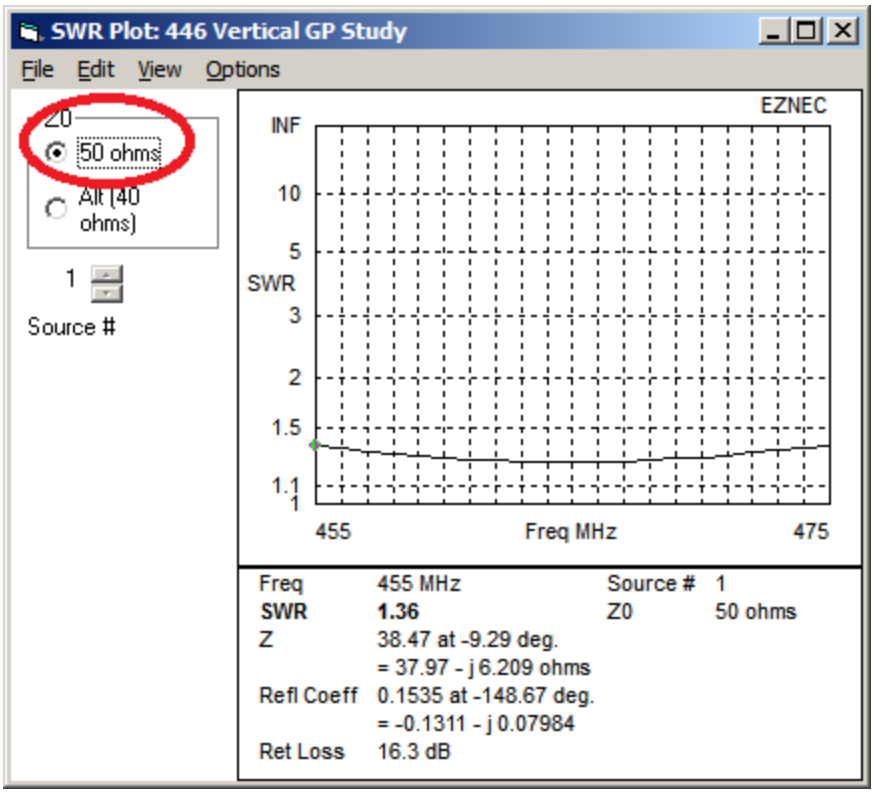
File Edit View Options

Z0
- ○ 50 ohms
- ◉ Alt (34 ohms)

1 Source #



Freq	455 MHz	Source #	1
SWR	**1.3**	Z0	34 ohms
Z	32.65 at -14.77 deg.		
	= 31.57 - j 8.322 ohms		
Refl Coeff	0.1312 at -99.04 deg.		
	= -0.02062 - j 0.1295		
Ret Loss	17.6 dB		


SWR Plot: 446 Vertical GP Study
File Edit View Options
Z0
50 ohms
Alt (40 ohms)
1
Source #
EZNEC
INF
10
5
SWR
3
2
1.5
1.1
1
455
Freq MHz
475
Freq 455 MHz Source # 1
SWR 1.36 Z0 50 ohms
Z 38.47 at -9.29 deg.
= 37.97 - j 6.209 ohms
Refl Coeff 0.1535 at -148.67 deg.
= -0.1311 - j 0.07984
Ret Loss 16.3 dB