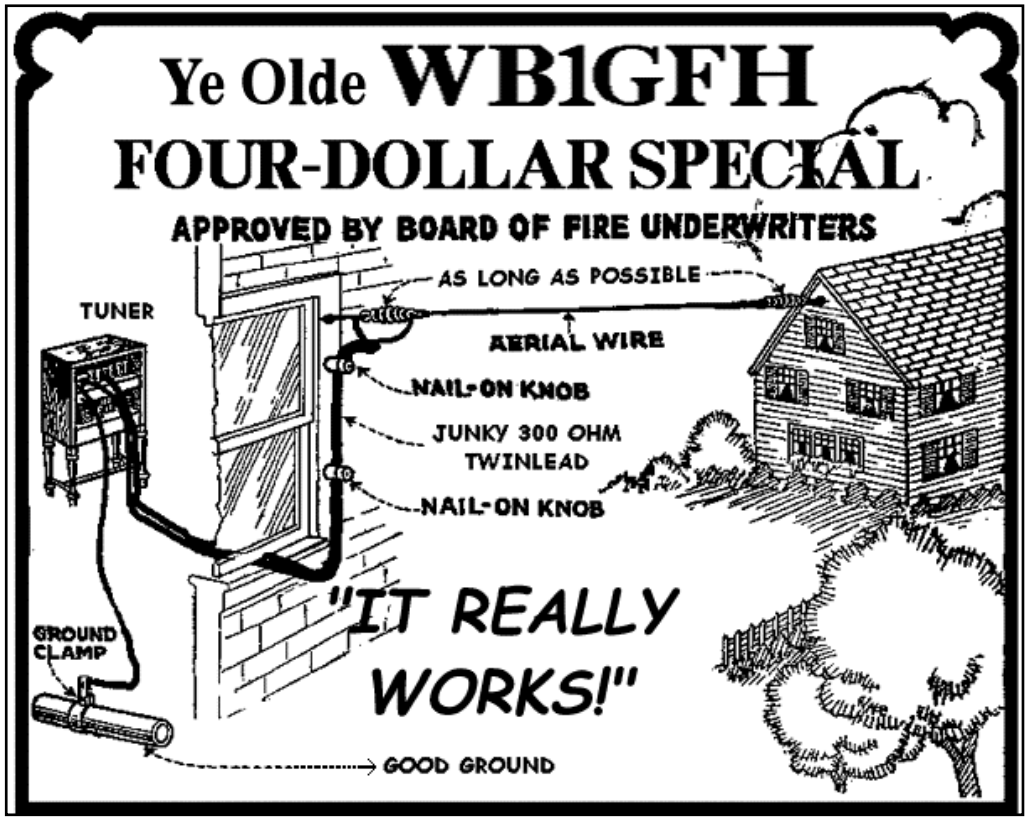
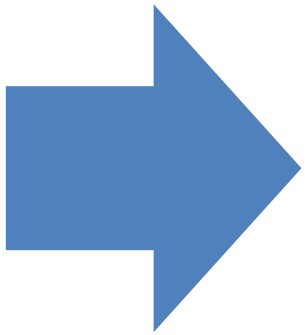
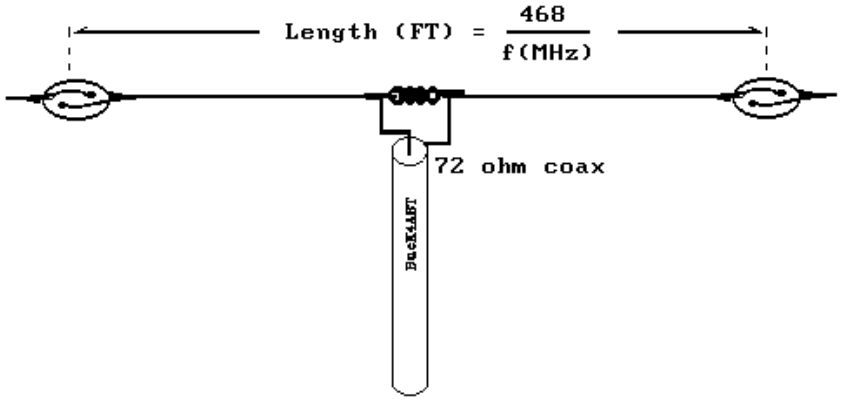


Fun With Basic Low Cost VHF Antennas

By Jon Platt, W0ZQ

- ✓ Tools – Analyzers & Software
- ✓ The dipole
- ✓ Yagis
- ✓ Converting TV antennas
- ✓ Quads
- ✓ Wire Antennas





A dipole is a half-wave antenna fed at the center.
The impedance at the center is near 72 ohms.

- Fun to build
- Fun to experiment
- “Antenna here is a homebrew!”
- This is how we learn
- Did I mention fun?
- Applicable to home stations, FD, and emergency communications

Tools – Antenna Analyzers

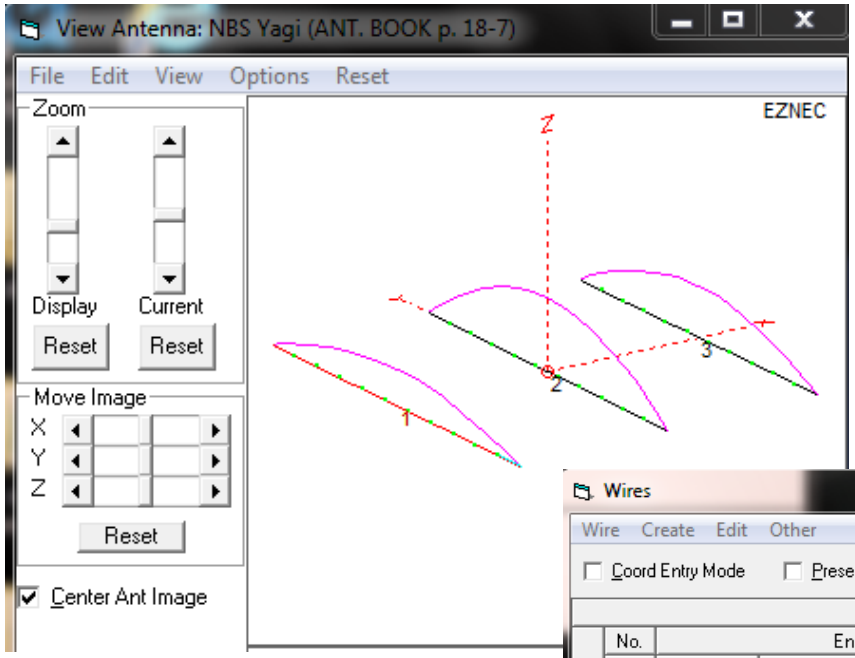
$$C(pF) = \frac{1}{.00003948F^2L}$$

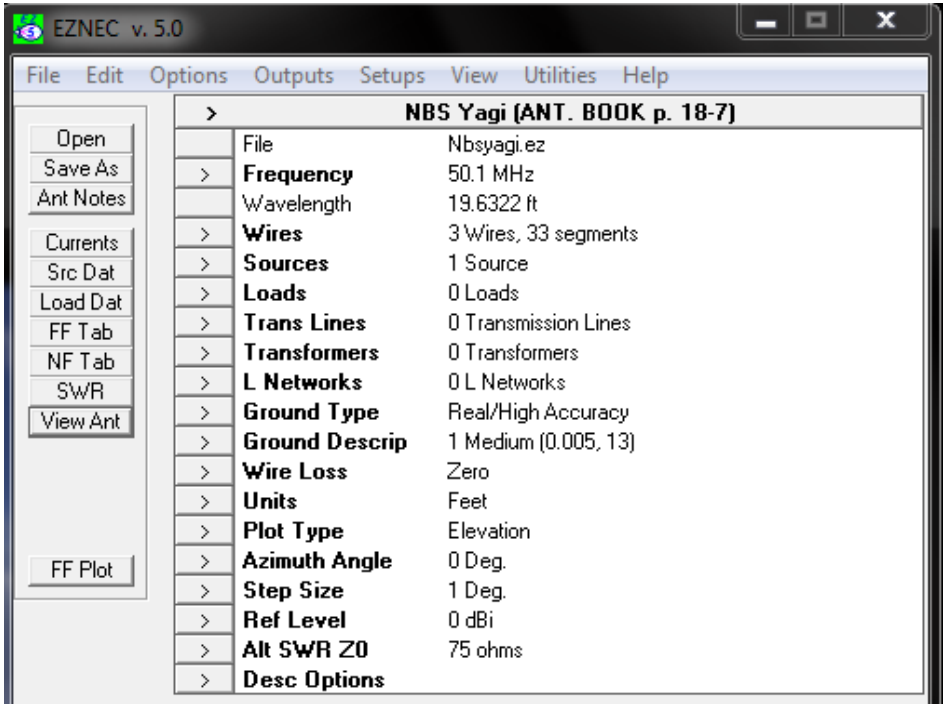
$F = MHz \quad L = \mu H$

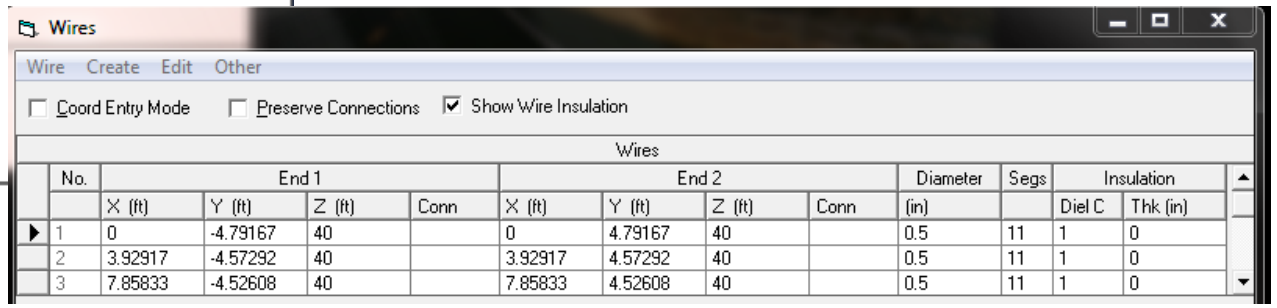
$$L(\mu H) = \frac{1}{.00003948F^2C}$$

$F = MHz \quad C = pF$

Tools – Software





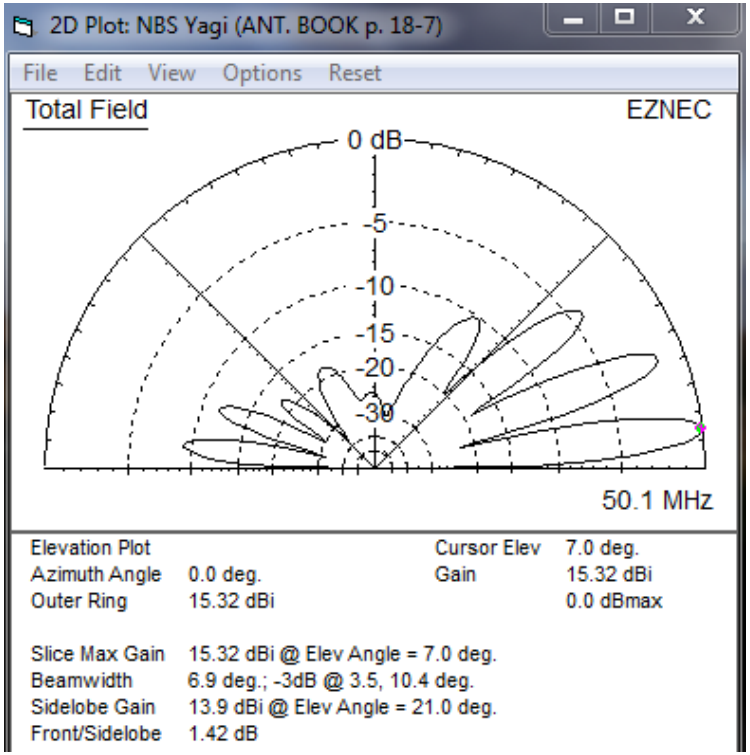


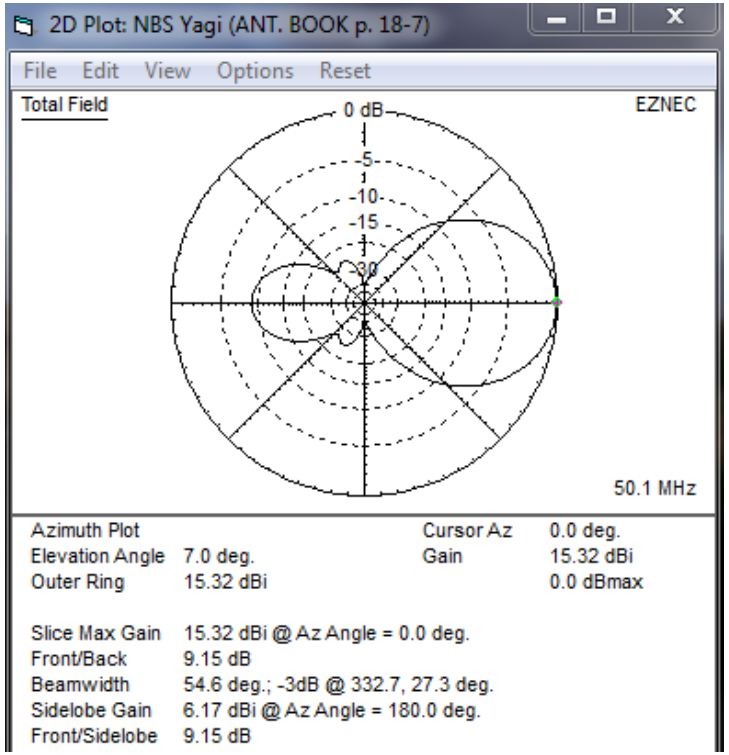
Wires

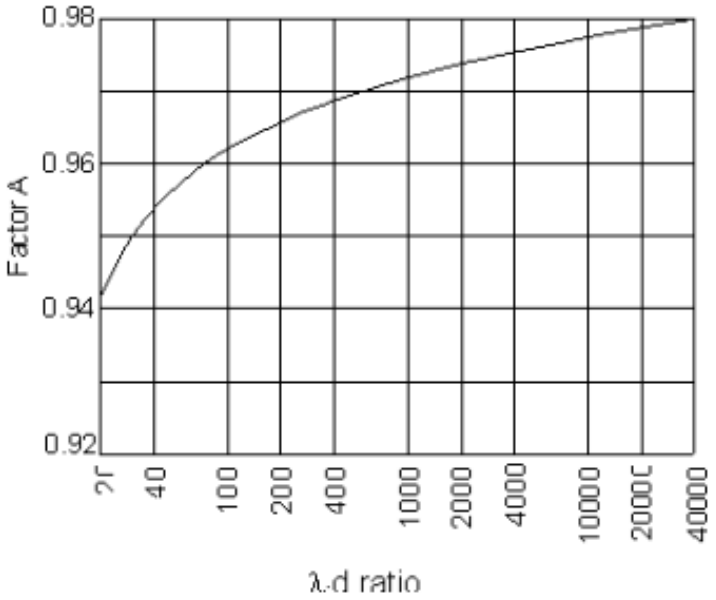
No.	End 1				End 2				Diameter	Segs	Insulation	
	X (ft)	Y (ft)	Z (ft)	Conn	X (ft)	Y (ft)	Z (ft)	Conn	(in)		Diel C	Thk (in)
1	0	-4.79167	40		0	4.79167	40		0.5	11	1	0
2	3.92917	-4.57292	40		3.92917	4.57292	40		0.5	11	1	0
3	7.85833	-4.52608	40		7.85833	4.52608	40		0.5	11	1	0

Tools – Software

```
Source 1        Voltage = 12.8 V at 23.48 deg.
                Current = 1 A at 0.0 deg.
                Impedance = 11.74 + J 5.101 ohms
                Power = 11.74 watts
                SWR (50 ohm system) =  4.305  (75 ohm system) =  6.418
```



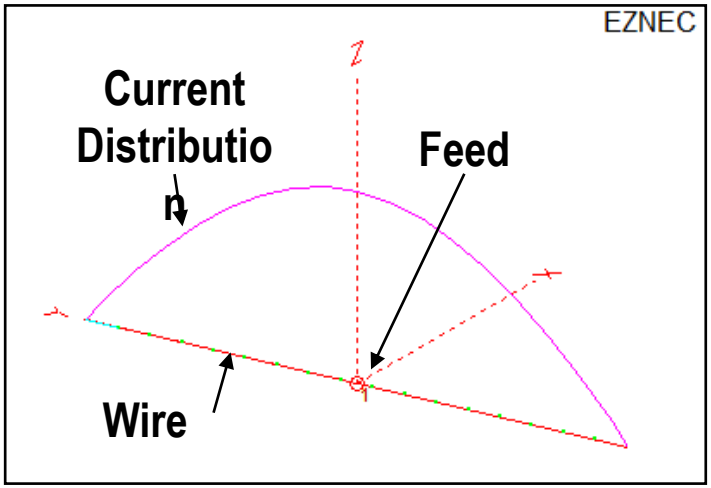




The Dipole

Dipole Length (inches)
= (5905 * A) / MHz
where A is a function of
Wavelength/Diameter ratio

Freq	Wavelength	#12 (0.0808")		1/2"		1"	
		Wavelength/D	A	Wavelength/D	A	Wavelength/D	A
50	235	2908	0.975	470	0.970	235	0.968
144	81.8	1012	0.972	164	0.963	82	0.960
432	27.4	339	0.968	55	0.957	27	0.950



The Dipole

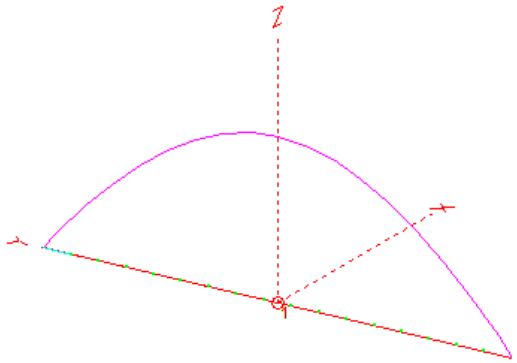
Now Lets Build A 6m Dipole Using #12

(5905 * .975)/50.2 = 114.7”

```
Voltage = 76.29 V at 10.94 deg.
Current = 1 A at 0.0 deg.
Impedance = 74.9 + J 14.48 ohms
Power = 74.9 watts
SWR (50 ohm system) =  1.594  (75 ohm system) =  1.213
```

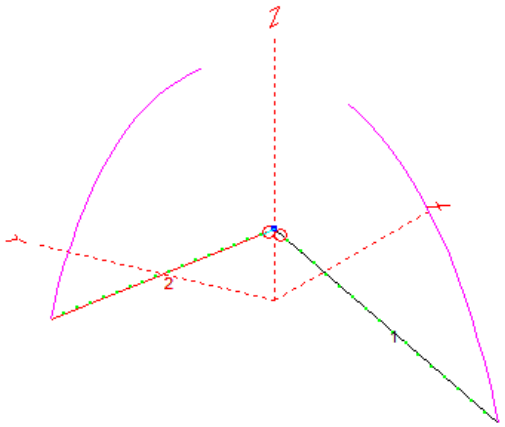
Simple Dipole
Inverted Vee

EZNEC




```
Voltage = 76.29 V at 10.94 deg.
Current = 1 A at 0.0 deg.
Impedance = 74.9 + J 14.48 ohms
Power = 74.9 watts
SWR (50 ohm system) =  1.594  (75 ohm system) =  1.213
```

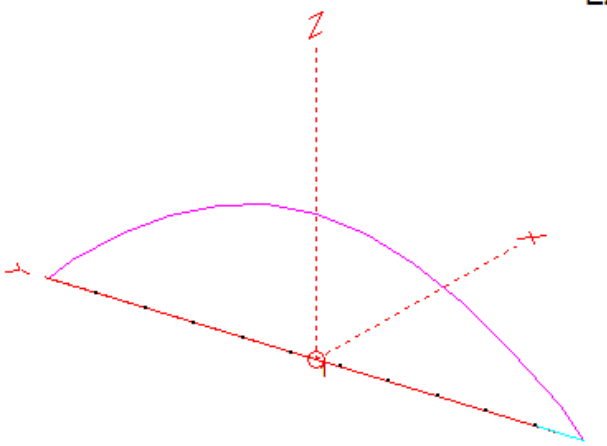
EZNEC



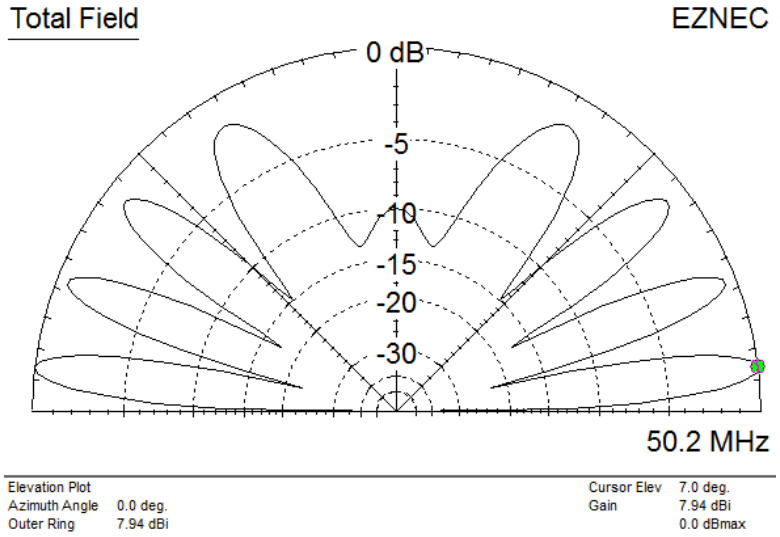

```
Voltage = 59.26 V at 2.22 deg.
Current = 1 A at 0.0 deg.
Impedance = 59.21 + J 2.299 ohms
Power = 59.21 watts
SWR (50 ohm system) =  1.190  (75 ohm system) =  1.270
```

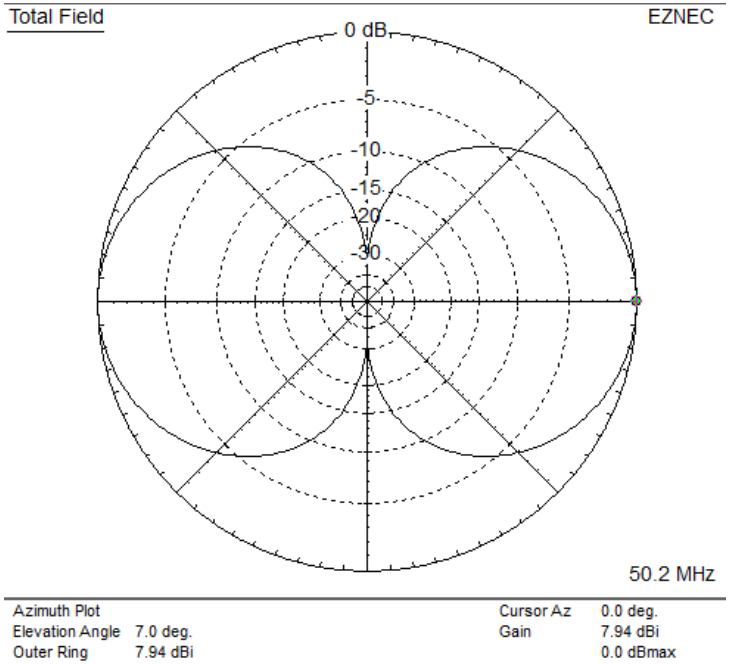
Simple 6m Dipole At 40’

9.3’ end-to-end, ½ Aluminum




```
Impedance = 70.56 + J 0.289 ohms
Power = 70.56 watts
SWR (50 ohm system) =  1.411  (75 ohm system) =  1.063
```

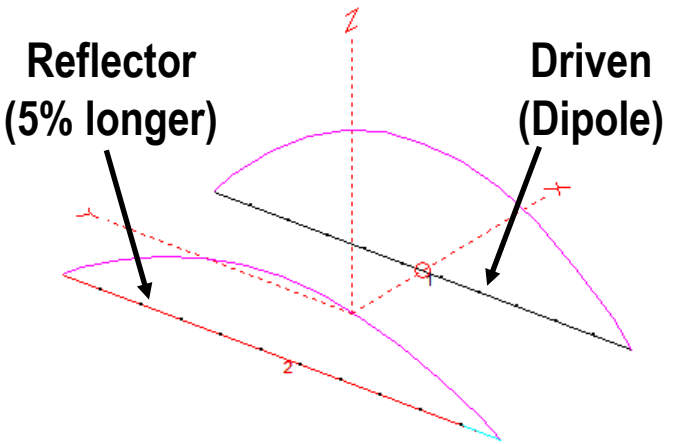




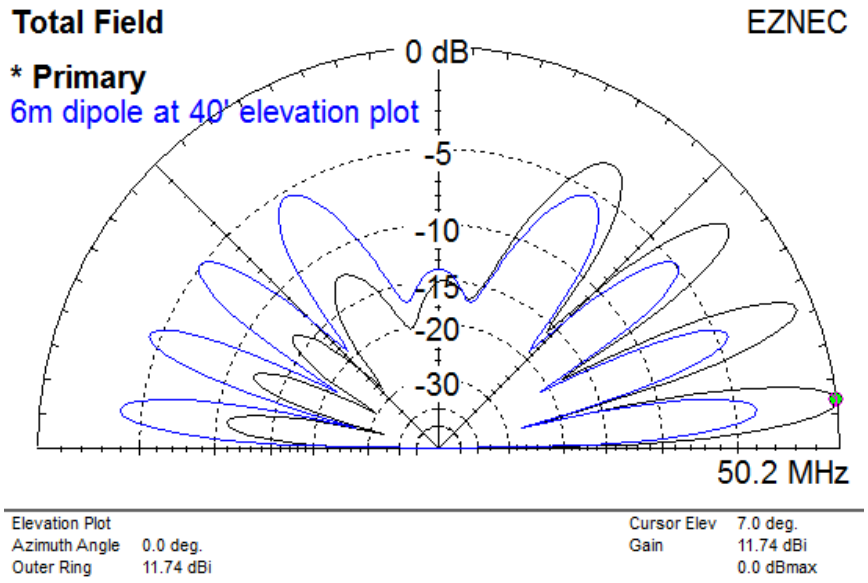
6m 2-Element Yagi At 40’

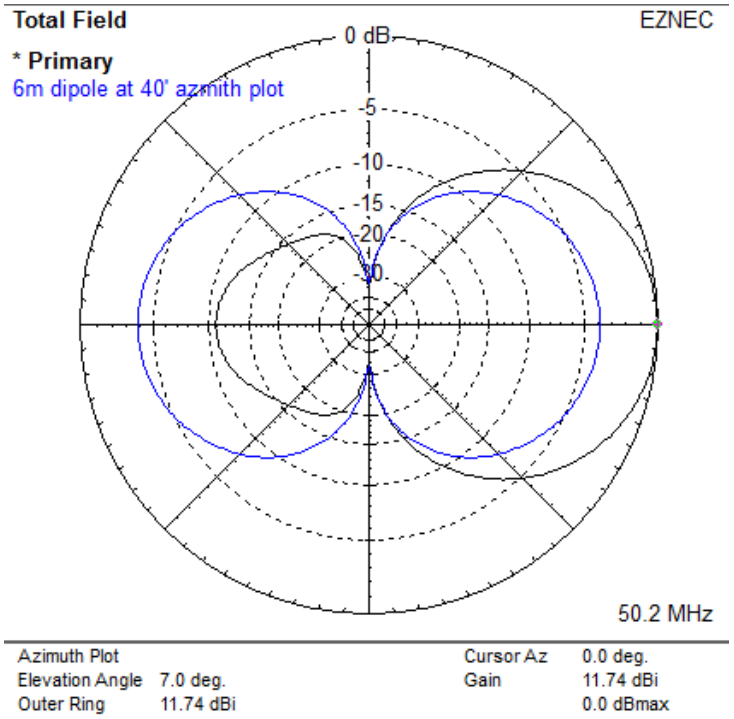
4 foot boom

EZNEC



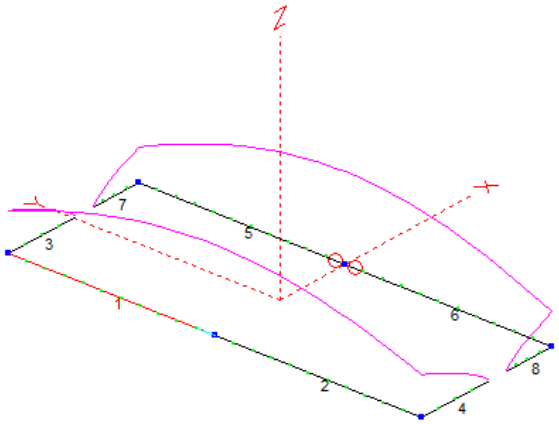
Impedance = 60.9 - J 0.4125 ohms
Power = 60.9 watts
SWR (50 ohm system) = 1.218 (75 ohm system) = 1.232



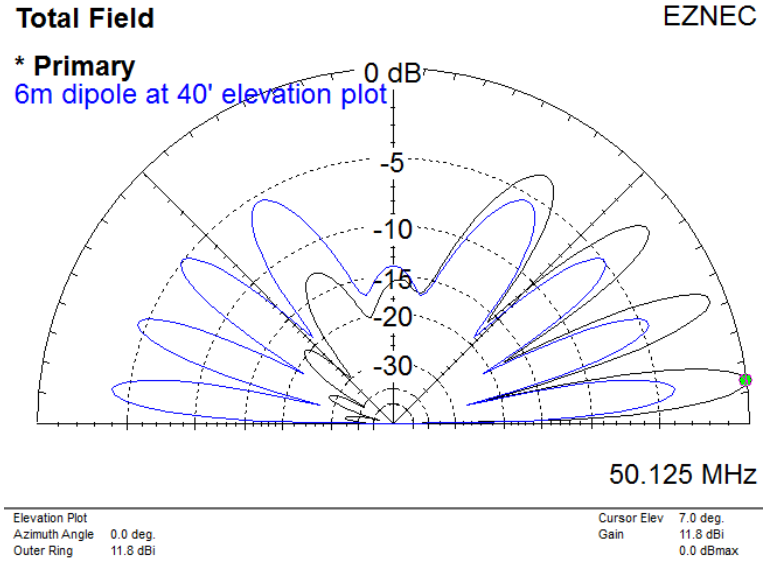


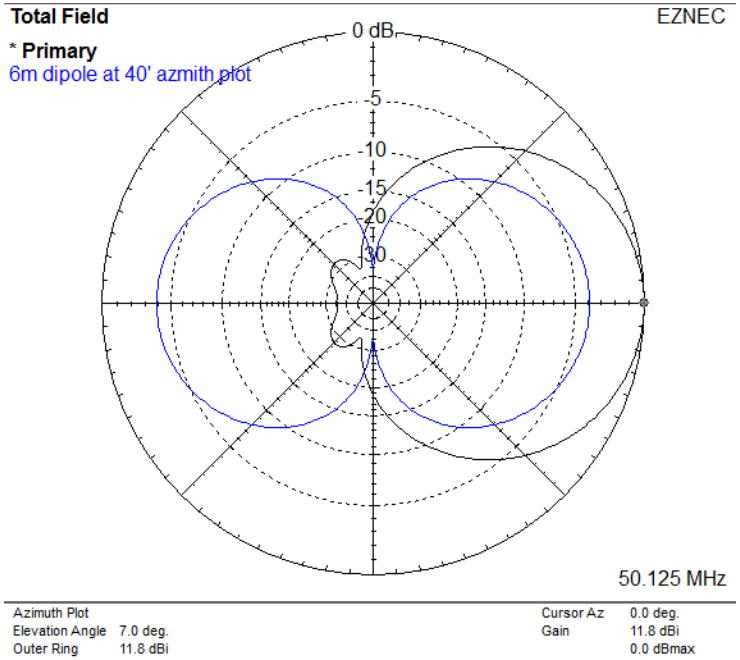
6m Moxon At 40’

4 foot boom



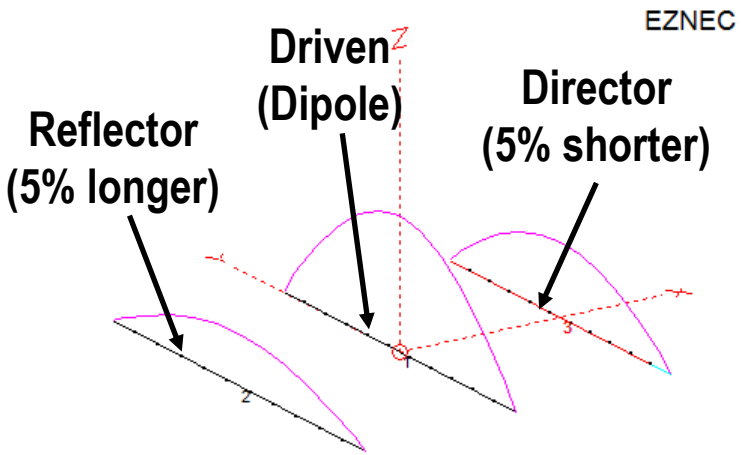
Impedance = 51.95 - J 2.353 ohms
Power = 51.95 watts
SWR (50 ohm system) = 1.062 (75 ohm system) = 1.446



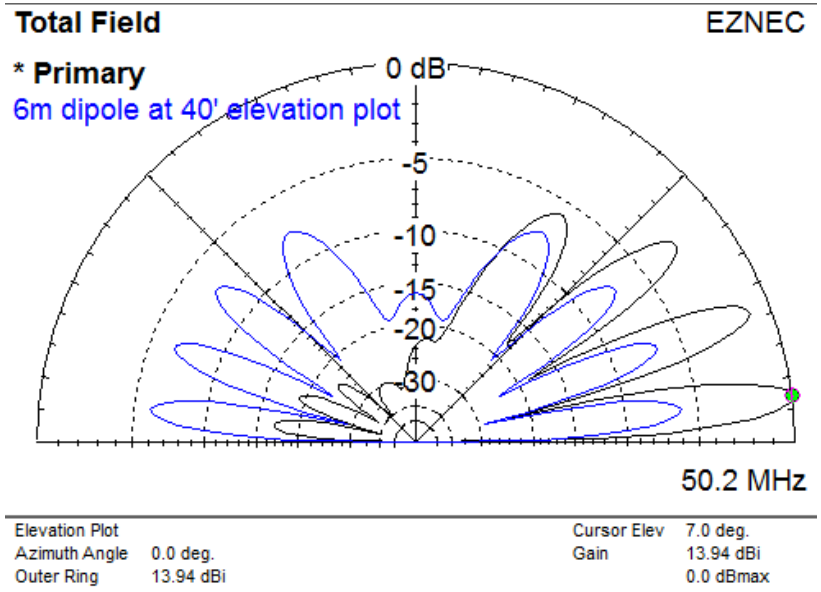


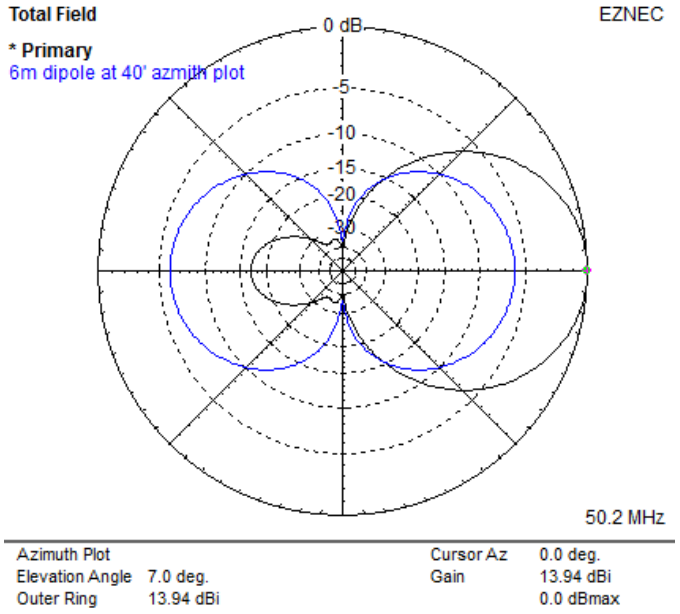
6m 3-Element Yagi At 40’

8 foot boom

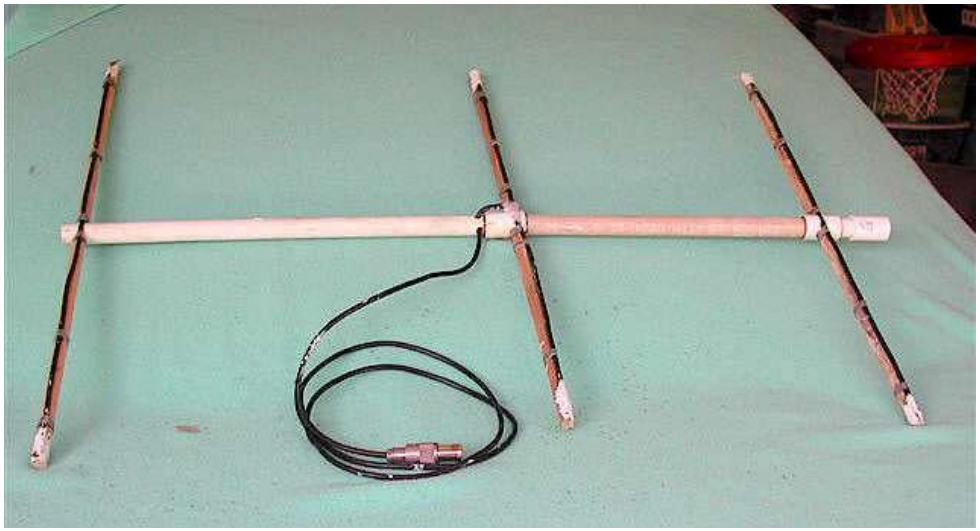


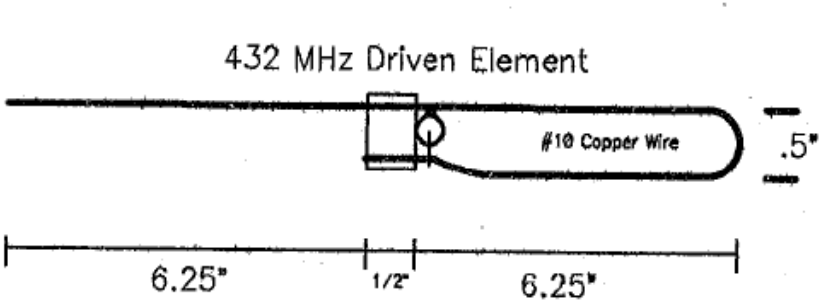

```
Impedance = 33.55 + J 0.1402 ohms
Power = 33.55 watts
SWR (50 ohm system) =  1.490  (75 ohm system) =  2.236
```

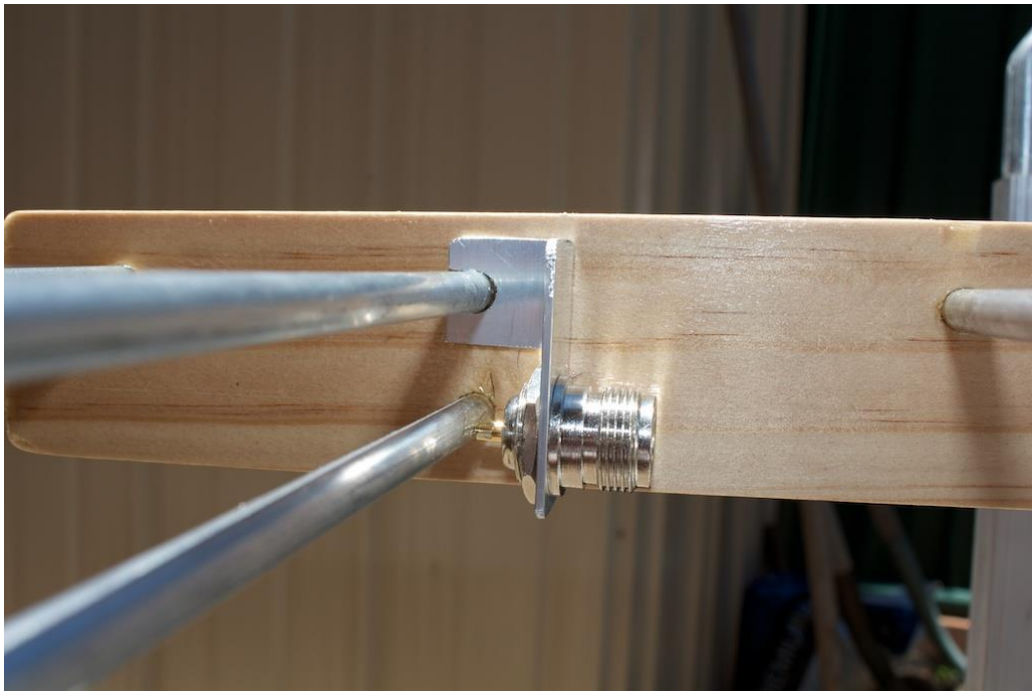




Cheap Construction







Cheap Construction

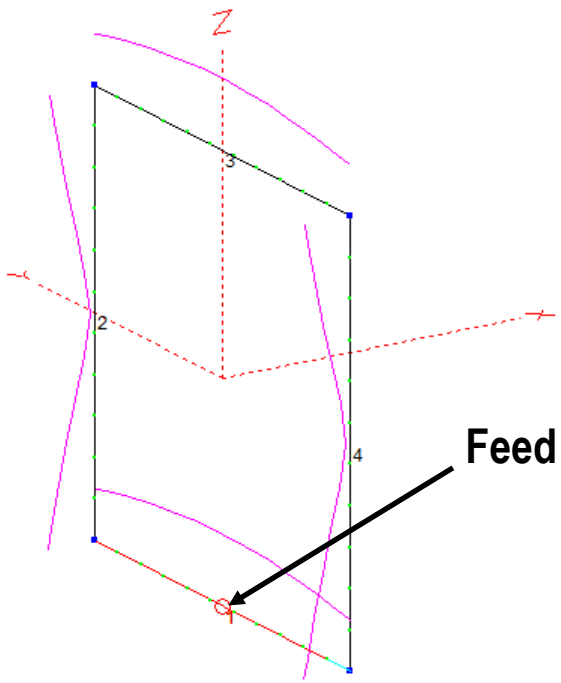
WA5VJB Cheap Yagis
2m through 1296

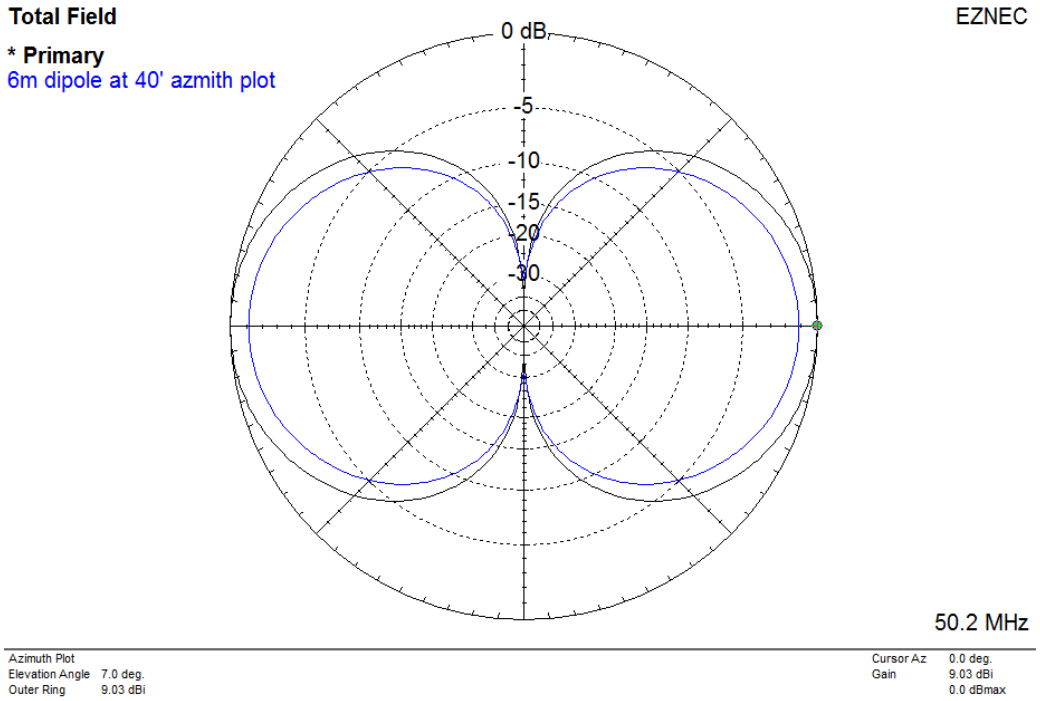
TV Antenna rescued from the neighbors scrap pile ..... Hmmmm, looks like a 222 yagi to me !

6m Loop – Center at 40’

1 wavelength (19.6’ circumference)

EZNEC

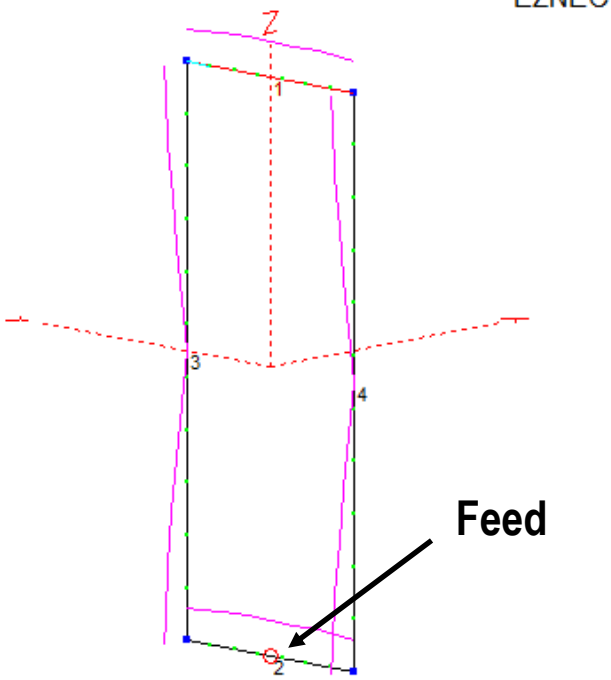


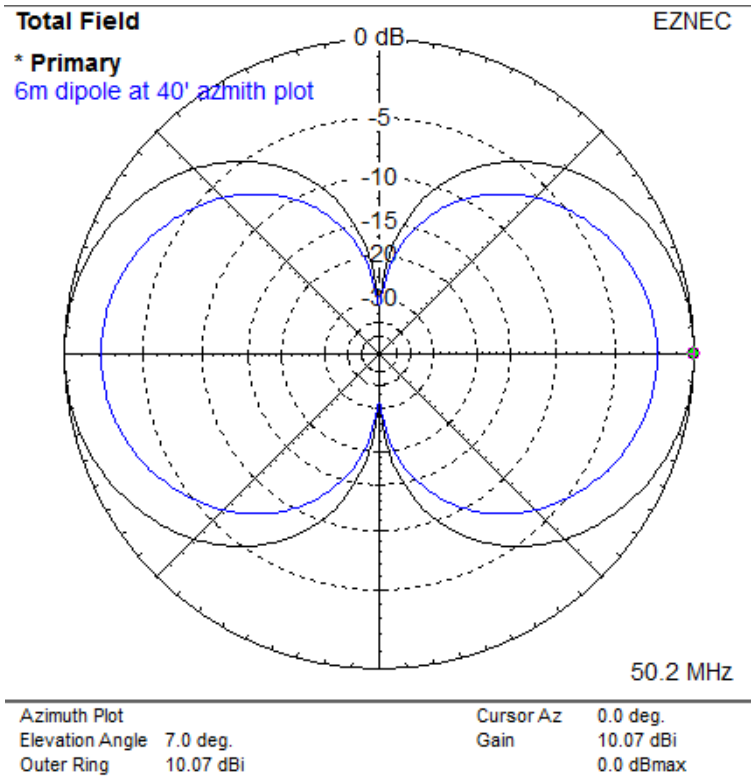



```
Voltage = 126.7 V at -0.2 deg.
Current = 1 A at 0.0 deg.
Impedance = 126.7 - J 0.4339 ohms
Power = 126.7 watts
SWR (50 ohm system) =  2.534  (75 ohm system) =  1.689
```

6m Squished Loop

1 wavelength (19.6' circumference)

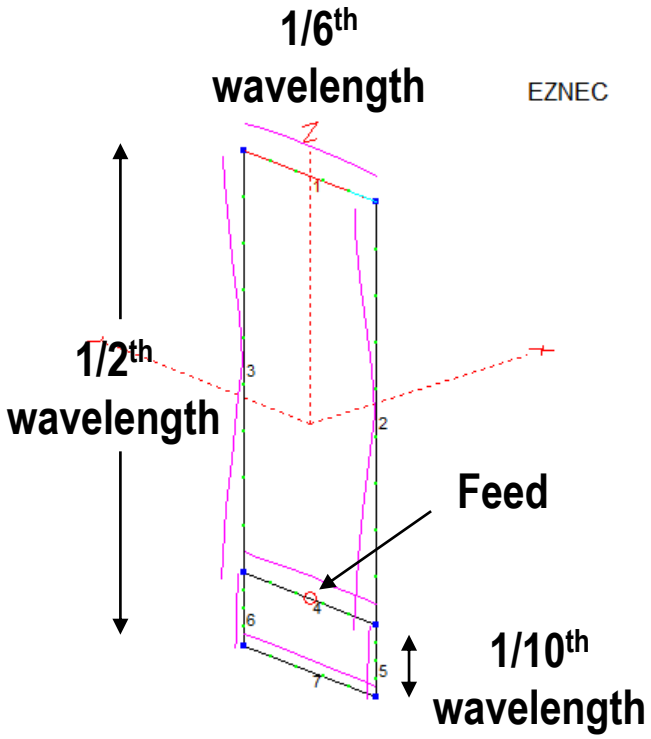


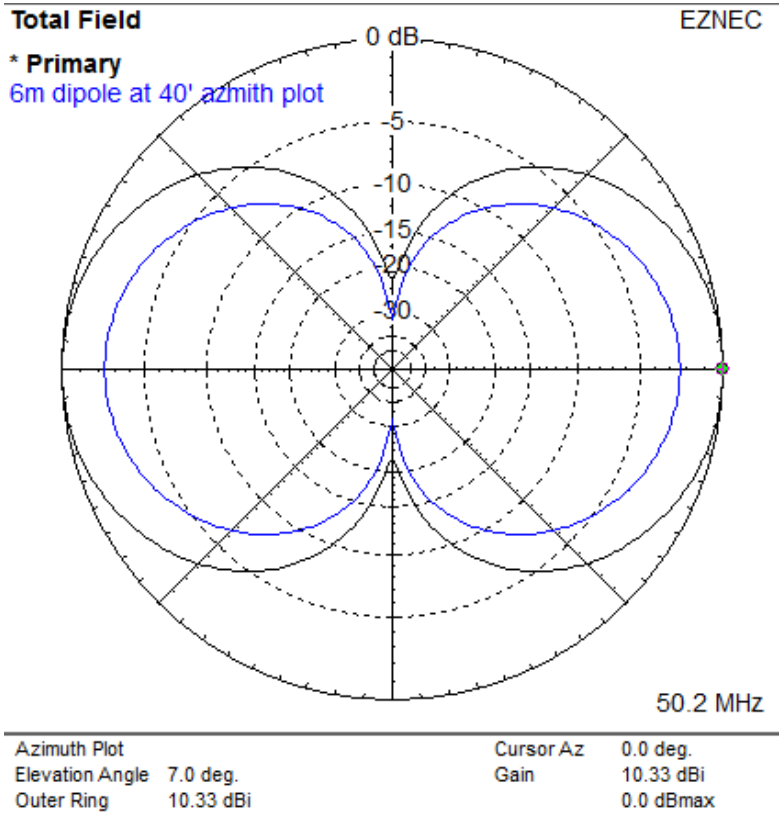



```
Voltage = 36.25 V at 6.35 deg.
Current = 1 A at 0.0 deg.
Impedance = 36.03 + J 4.012 ohms
Power = 36.03 watts
SWR (50 ohm system) =  1.406  (75 ohm system) =  2.089
```

6m Hentenna

1.3 wavelength (25.5’ circumference)





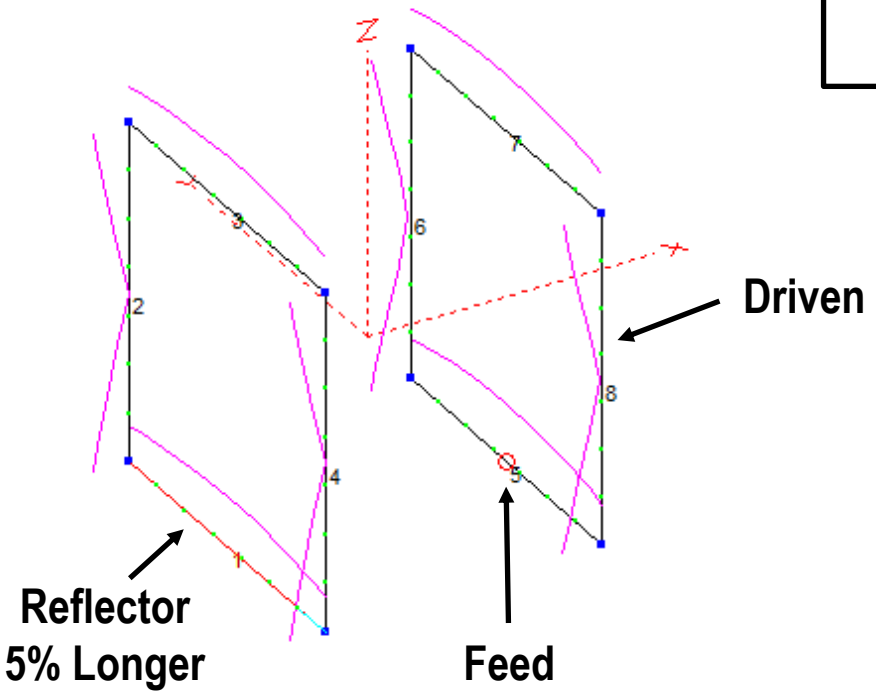

```
Voltage = 87.76 V at 1.7 deg.
Current = 1 A at 0.0 deg.
Impedance = 87.72 + J 2.601 ohms
Power = 87.72 watts
SWR (50 ohm system) =  1.757  (75 ohm system) =  1.173
```

The 50-MHz-Reflector-Hentenna
built by Luis, HI8LAM
in FK58BL

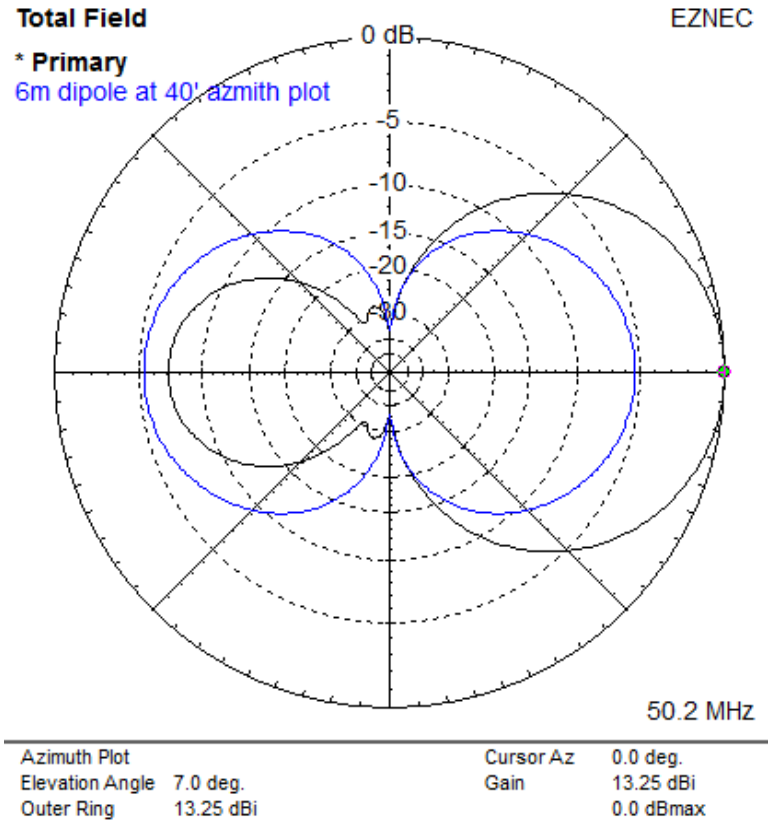
http://dk7zb.darc.de/Quadlong/Hentenna.htm

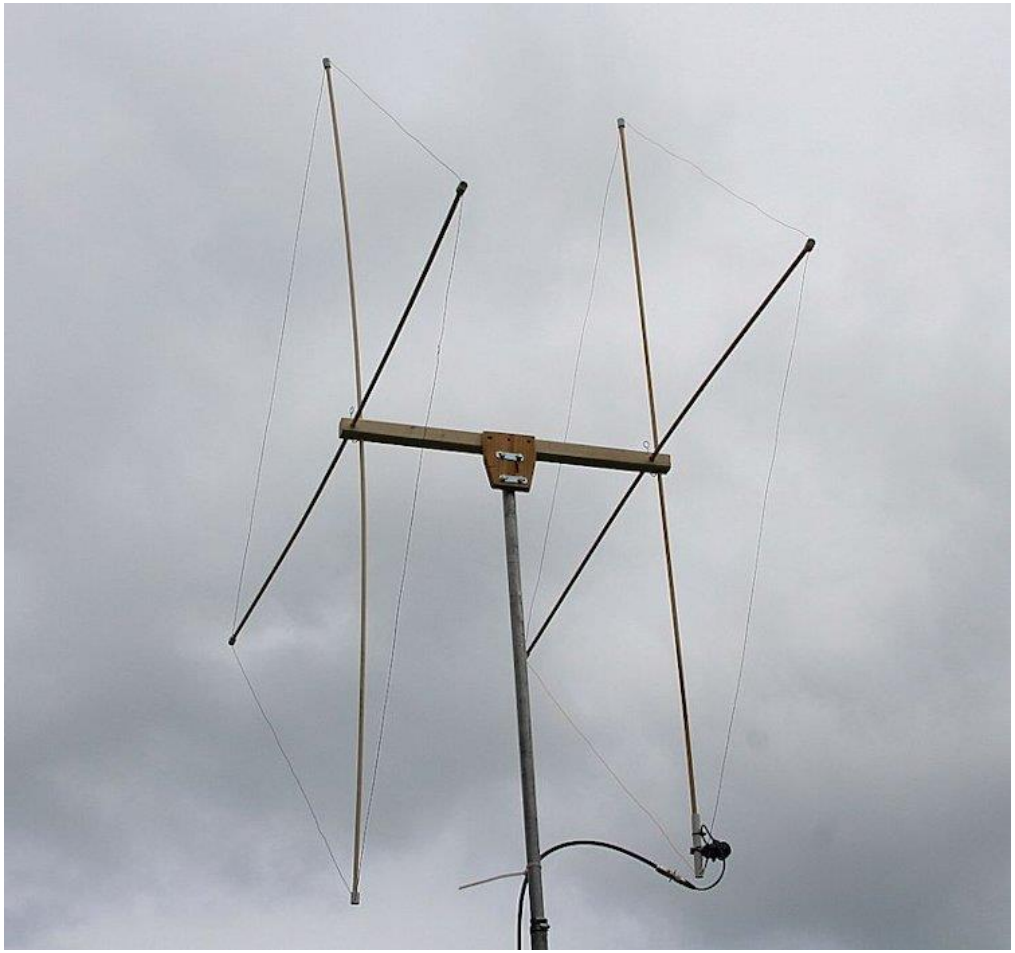
6m Quad – Center at 40’

4 foot boom

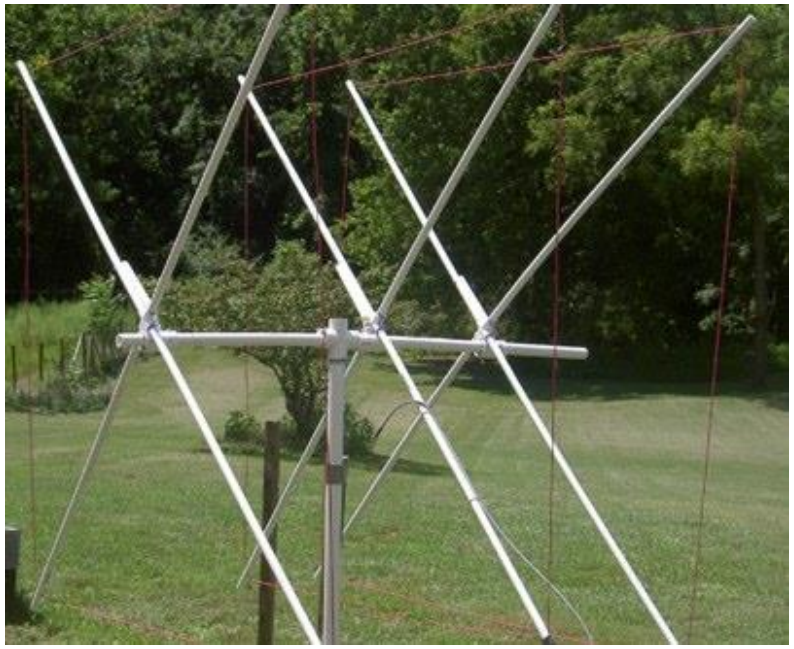



```
Voltage = 109.3 V at -1.11 deg.
Current = 1.0 at 0.0 deg.
Impedance = 109.3 - J 2.126 ohms
Power = 109.3 watts
SWR (50 ohm system) =  2.186  (75 ohm system) =  1.458
```





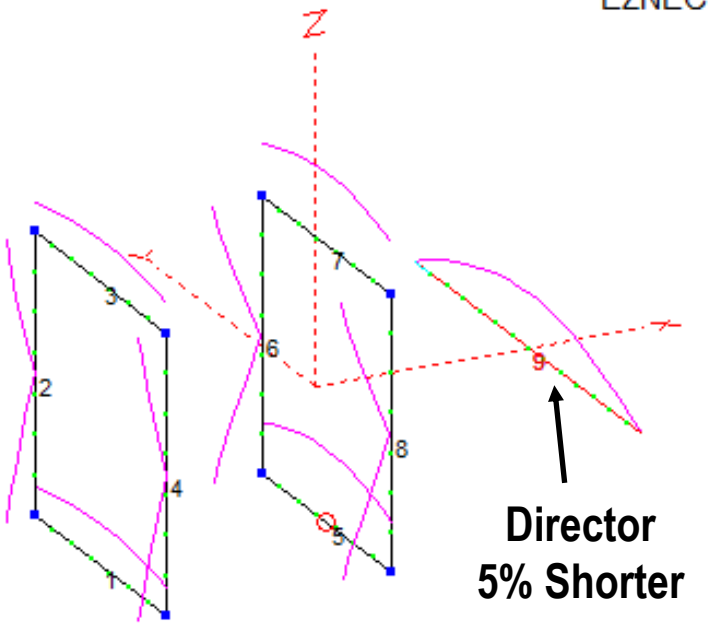
Cheap Construction



6m 3-Element Quagi At 40’

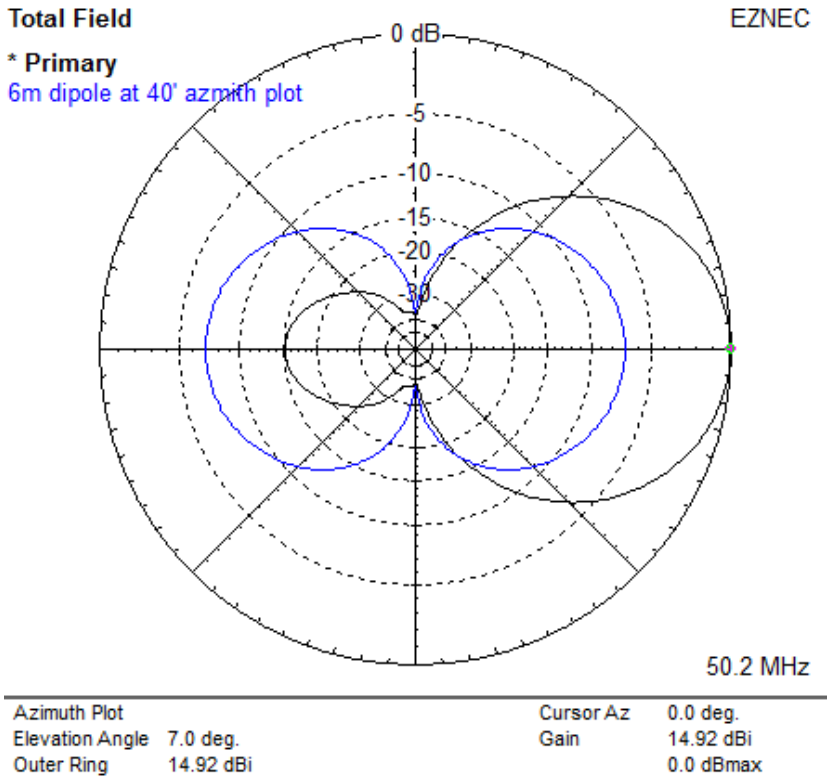
8 foot boom

EZNEC

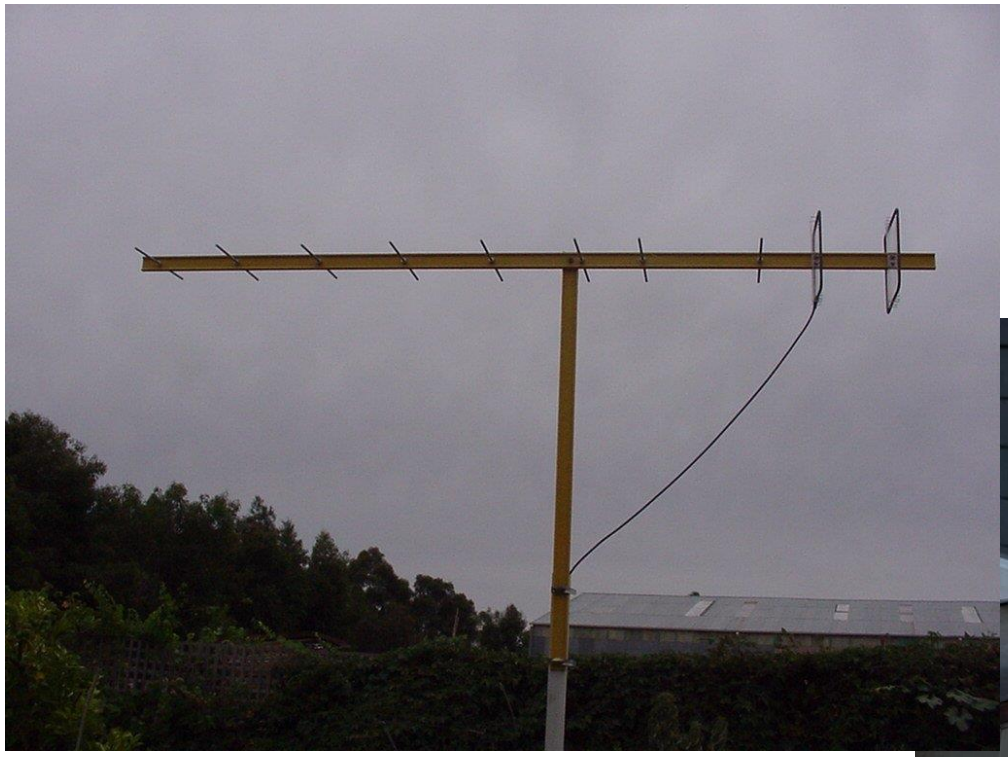


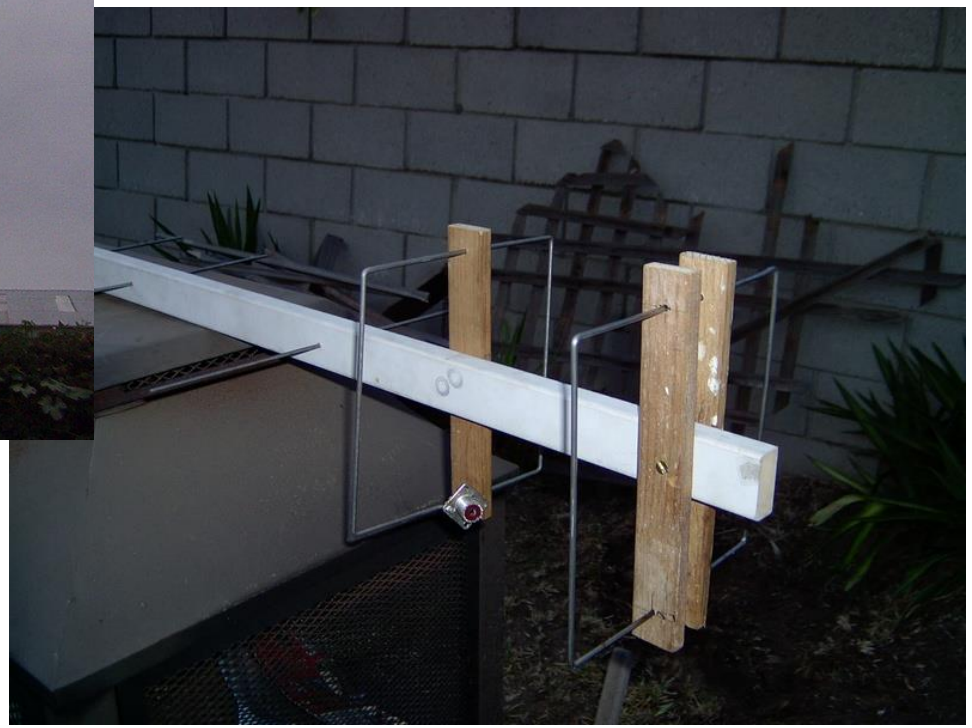
Director
5% Shorter

```
Voltage = 62.86 V at -33.53 deg.
Current = 1.0 at 0.0 deg.
Impedance = 52.4 - J 34.72 ohms
Power = 52.4 watts
SWR (50 ohm system) =  1.949  (75 ohm system) =  1.914
```



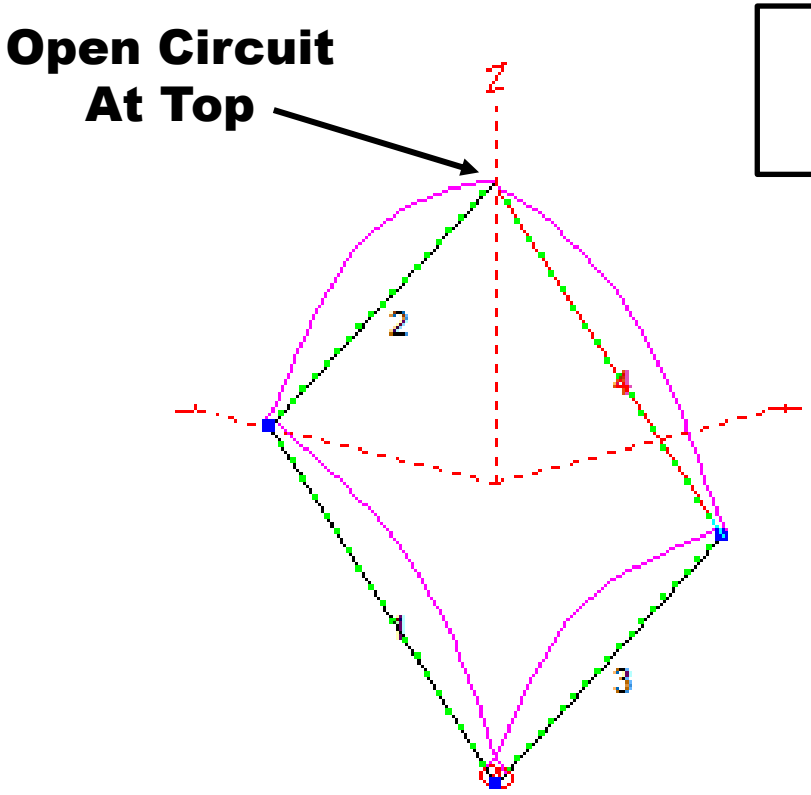
Cheap Construction



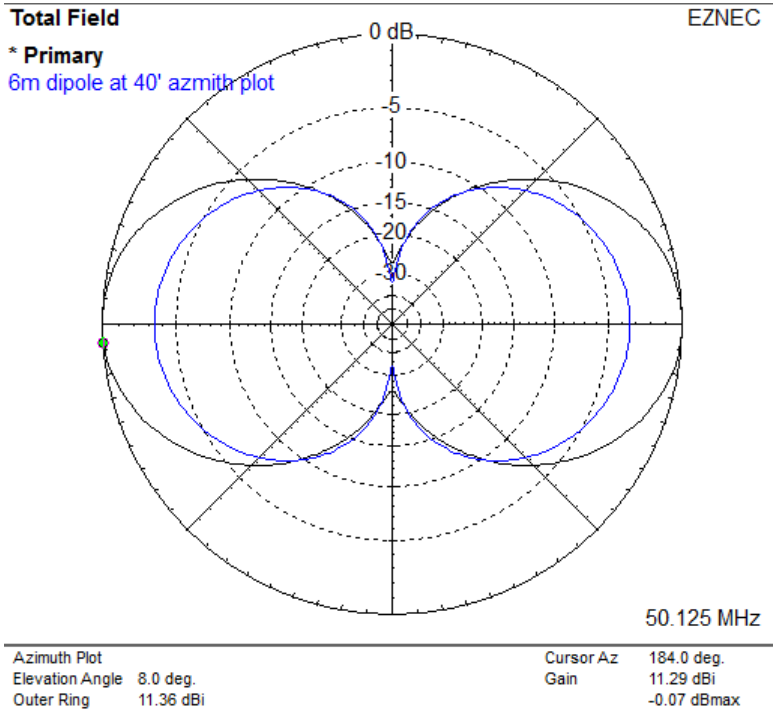


6m BiSquare – Center at 40’

2 wavelength (39.2’ circumference)

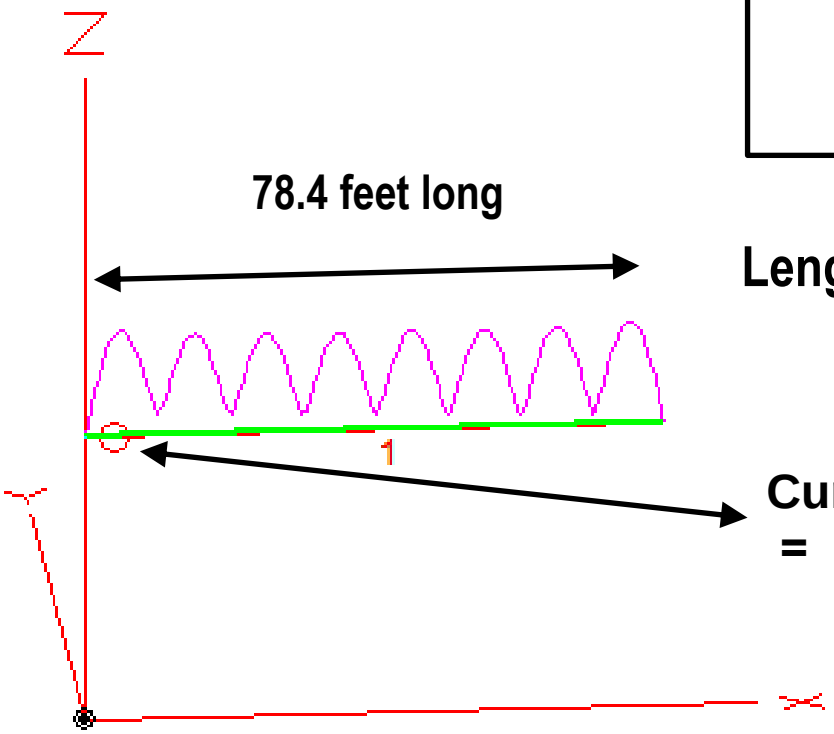


Voltage = 2494 V at 10.04 deg.
Current = 1 A at 0.0 deg.
Impedance = 2455 + J 434.6 ohms
Power = 2455 watts
SWR (50 ohm system) = 50.649 (200 ohm system) = 12.665



6m Long Wire At 40’

4 wavelengths (~80’ long)



Length = wavelength X 4 =19.6’ x 4 or 78.4’ long

Current Fed at ¼ wavelength
= X 0.25 = 4.9’ from end with 4:1 balun.

```
Voltage = 144.1 V at 1.87 deg.
Current = 1 A at 0.0 deg.
Impedance = 144 + J 4.691 ohms
Power = 144 watts
SWR (50 ohm system) =  2.884  (200 ohm system) =  1.390
```

Total Field

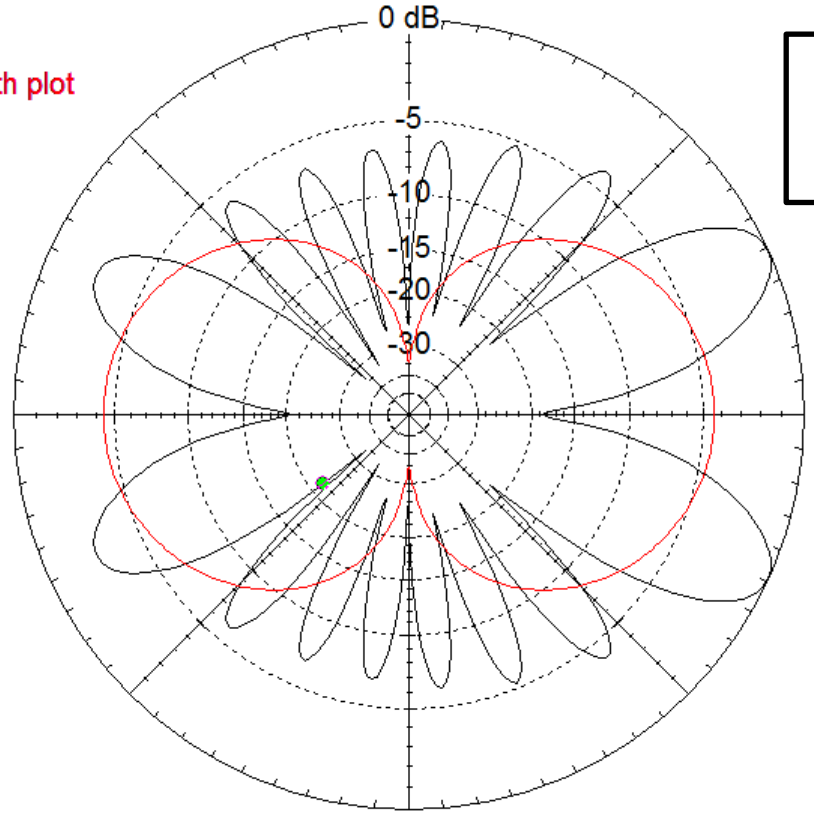
*** Primary**

6m dipole at 40' azmith plot

EZNEC

6m Long Wire

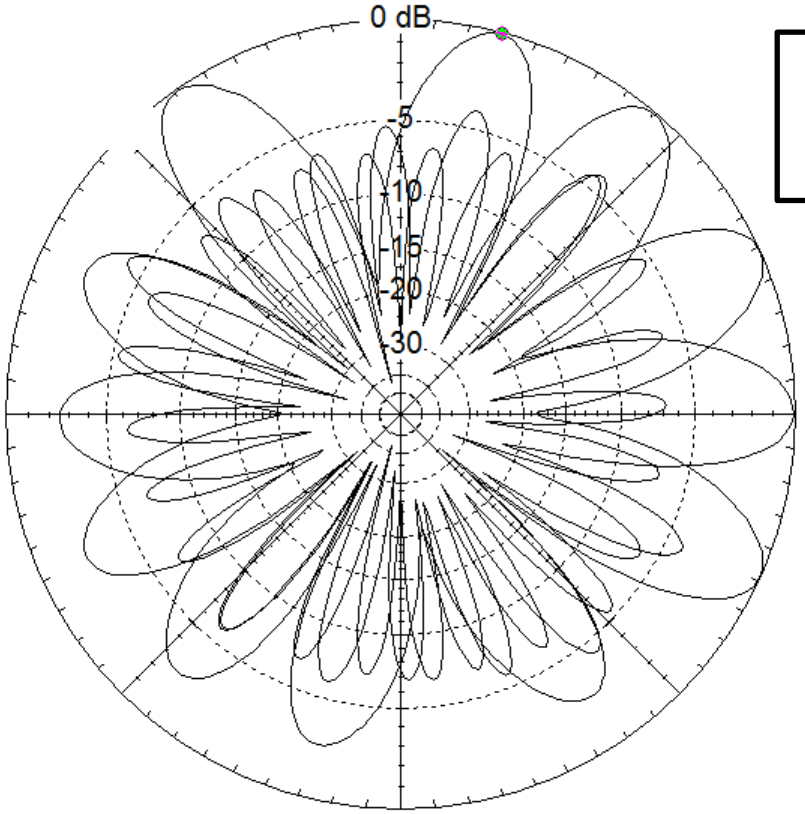
4 wavelengths (80’ long)



50.2 MHz

Azimuth Plot		Cursor Az	219.0 deg.
Elevation Angle	7.0 deg.	Gain	-9.63 dBi
Outer Ring	12.35 dBi		-21.98 dBmax

Total Field EZNEC



Three 6m Long Wire

4 wavelengths (80’ long)

50.2 MHz

Azimuth Plot
Elevation Angle 7.0 deg.
Outer Ring 12.42 dBi

Cursor Az 75.0 deg.
Gain 12.35 dBi
0.0 dBmax


73 de W0ZQ