Off-Center Fed Dipoles

Practical Applications

N1IW

Why?

- Looking for solutions for low band antennas
- Was abused by a counterpoise as a child
- Looking for multiband solutions
- Traditional low band wire arrays use dipoles or inverted vees
- Applications to driven & parasitic arrays

Off Center Fed Dipole Basics

- Half wave resonant antenna at lowest frequency of operation
- Even Harmonic resonances
  (*V/I ratio is approximately constant*)
  - 160M: 160, 80, 40, 20, 17, 12, 10
  - 80M: 80, 40, 20, 10
- Fed 1/3 of the way from the end vs. in the middle
- Feed point impedance is approximately 200Ω
  - 4:1 current balun does the trick

OCFD Data

- 80M
  - Used for 10 years
  - 136 feet in length (located at abt 30 feet)
  - Fed 44.5 feet from one end
  - Resonant on 80M, 40M, 20M, 10M (no tuner)
- 160M (measured data)
  - Recent addition
  - 264 feet long (located at abt 80 feet)
  - Fed 88 feet from one end; 4:1 homebrew balun
  - 200Ω on 160M and 166Ω on 80M at resonance
  - 2:1 BW: >200 kHz on 160M, 260 kHz on 80M

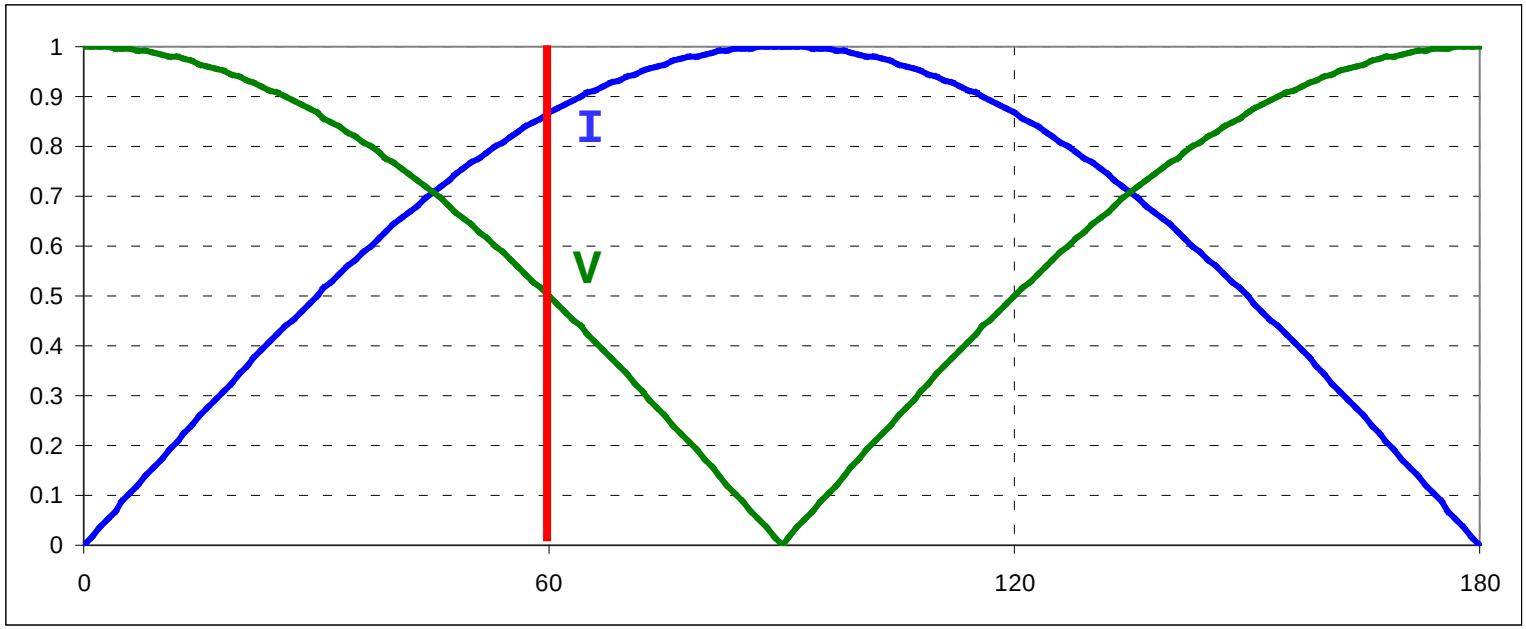
Why They Work

- It’s just a dipole!

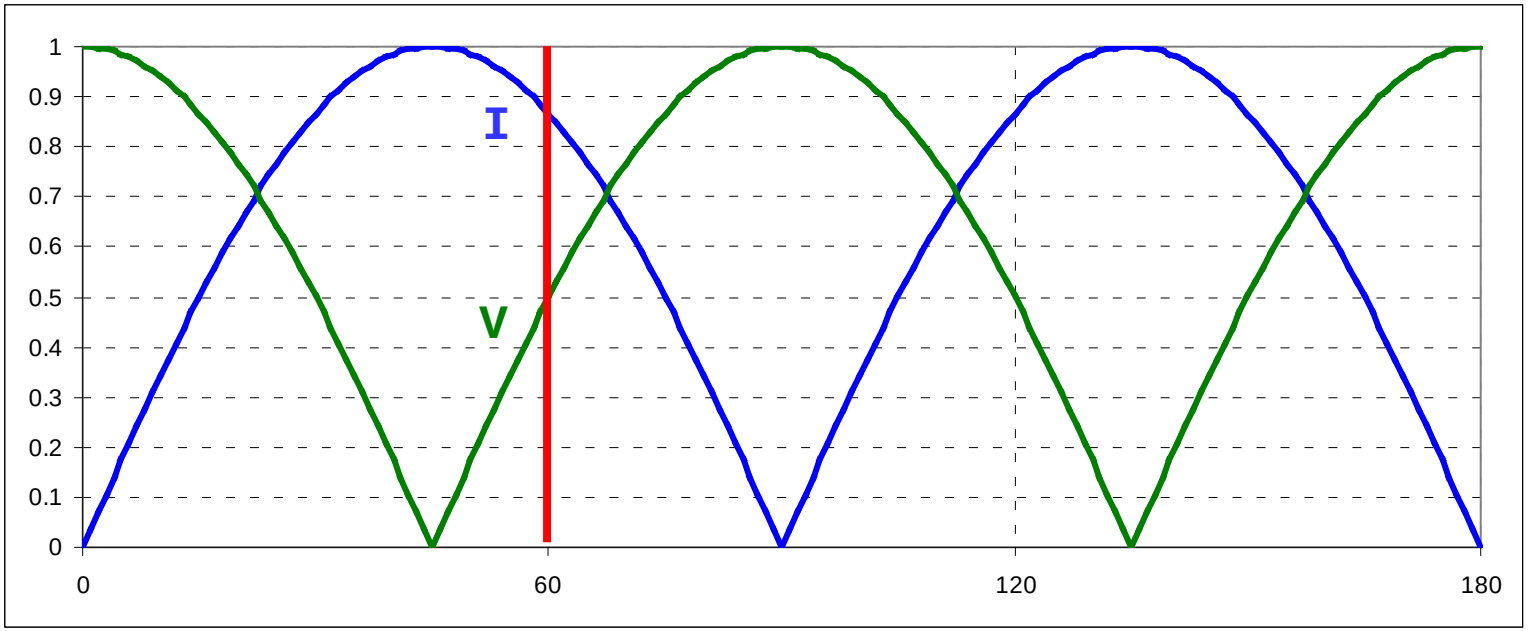
- But
  - ½ wave resonant element, then harmonic wire
  - Voltage/Current relationship at 1/3 feed point provides essentially constant ratio on even harmonics
  - Broadside null on harmonics

Current Distribution on a Dipole

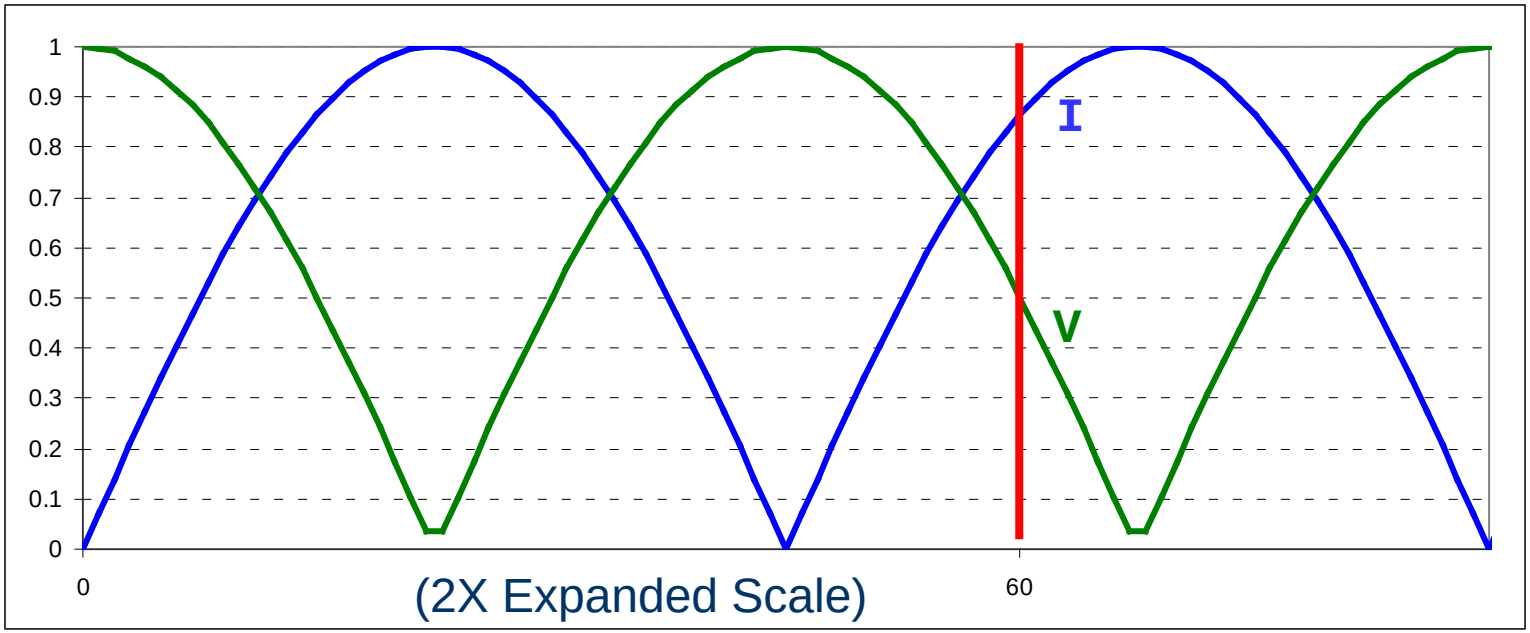
Current & Voltage at Fundamental



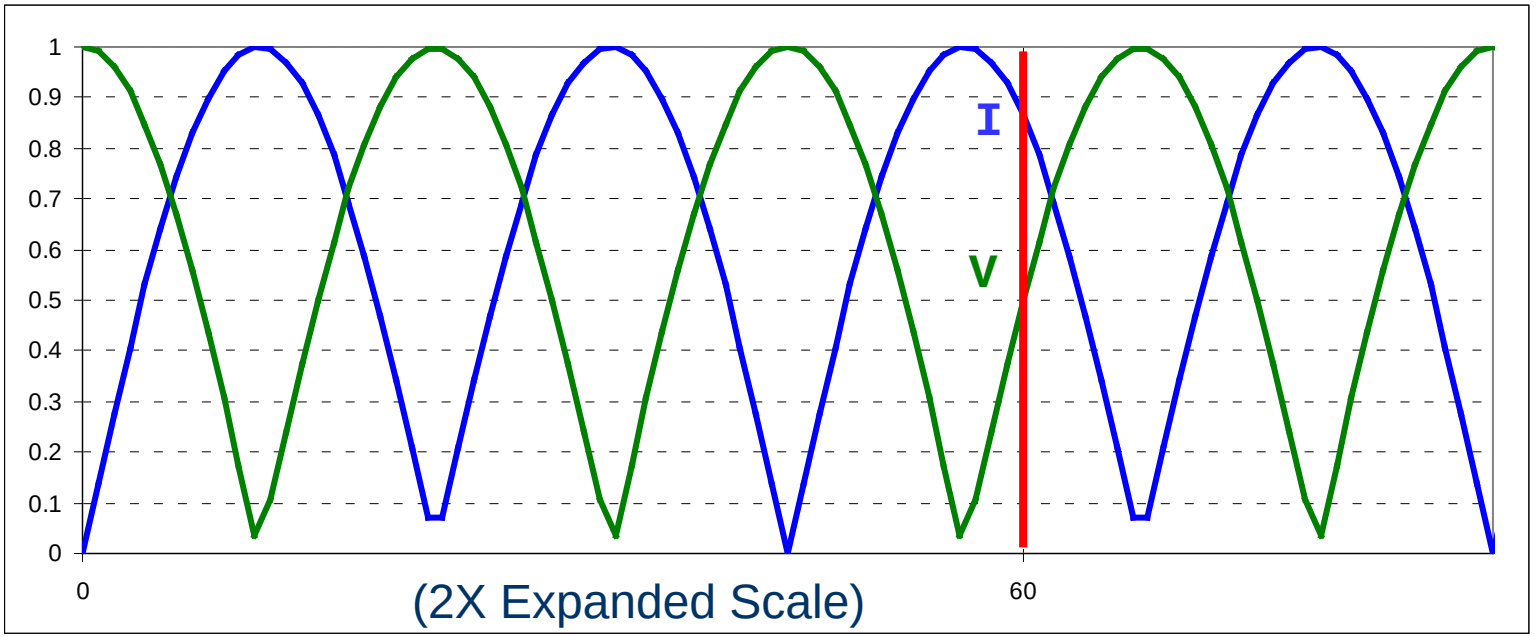
I & V at 2nd Harmonic



I & V at 4th Harmonic



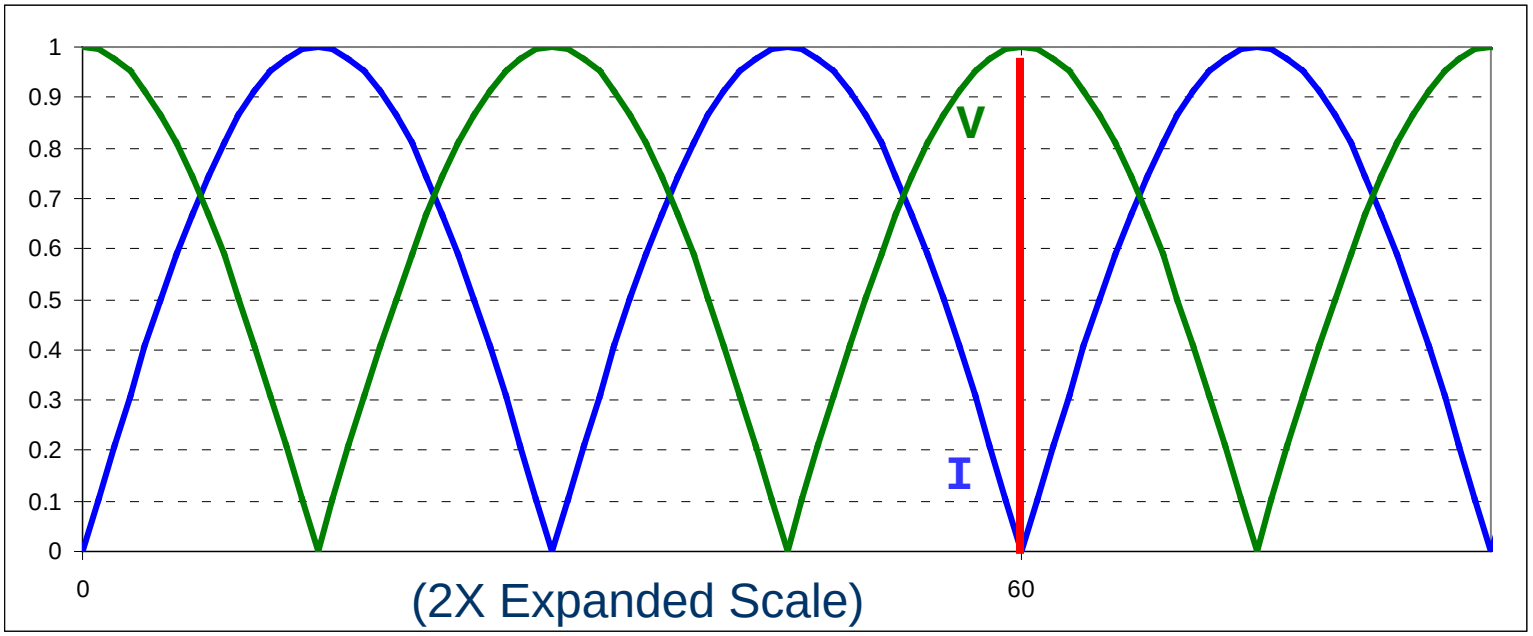
I & V at 8th Harmonic



But what about the 6th harmonic?

- Feed point is at a current minimum
- Very high impedance

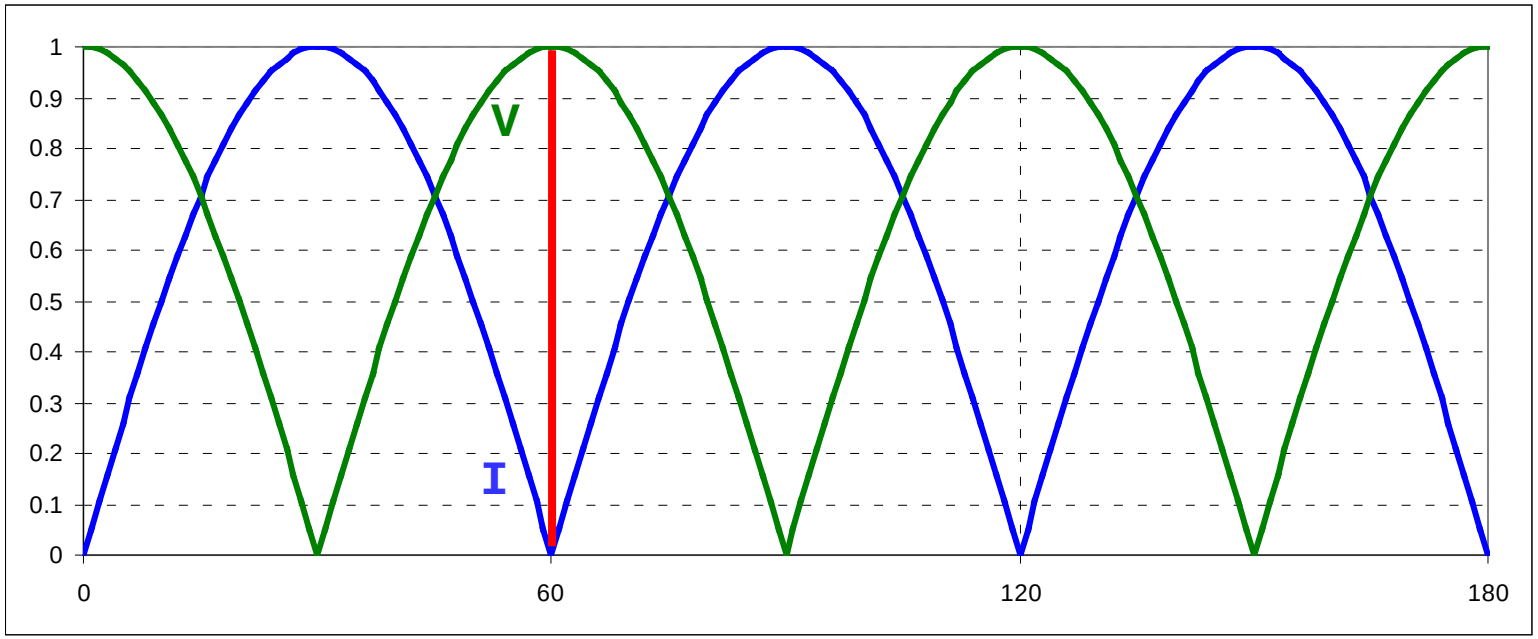
I & V at 6th Harmonic (Bad Dog!)



And Odd Harmonics?

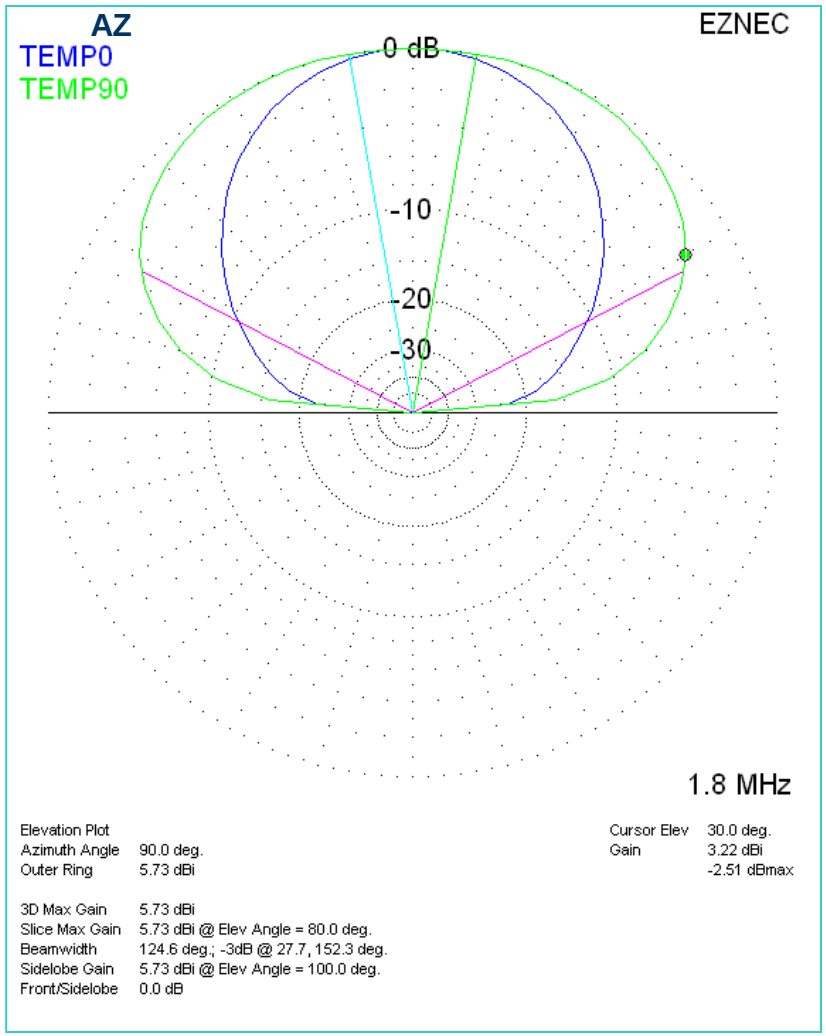
- Same problem: Current minimum

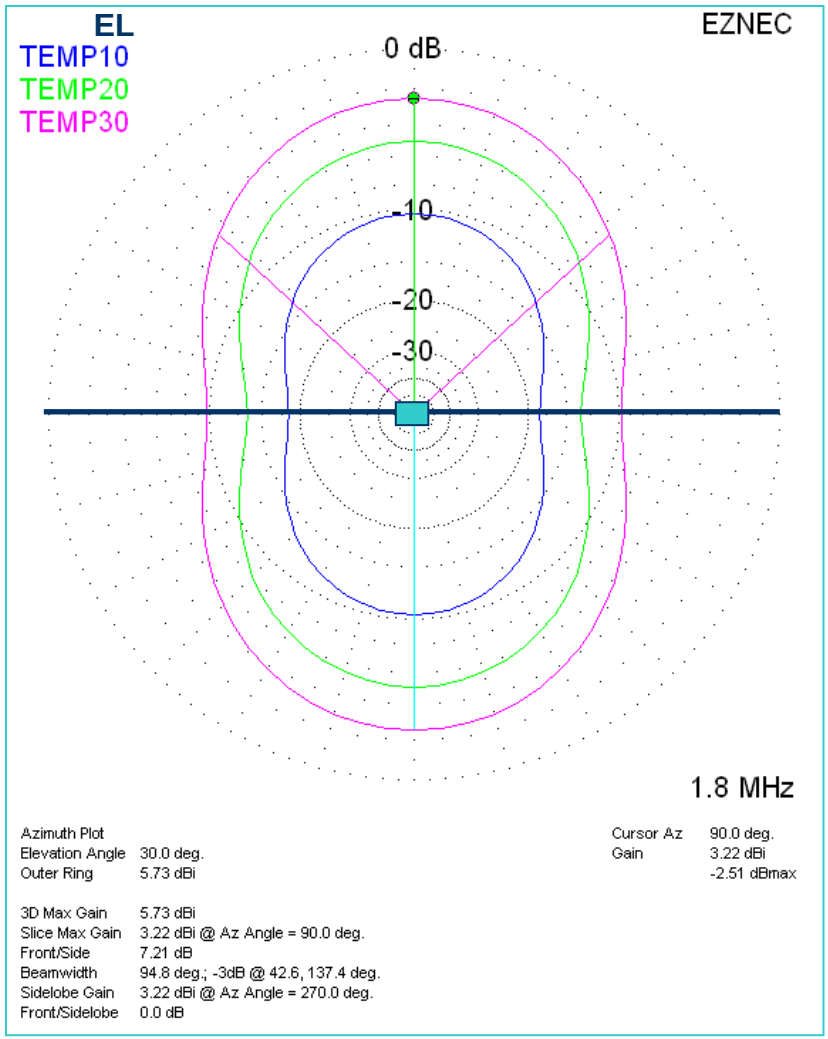
I & V at 3rd Harmonic (Bad Dog!)



Basic Gain Plots

160M center fed dipole at 80 feet





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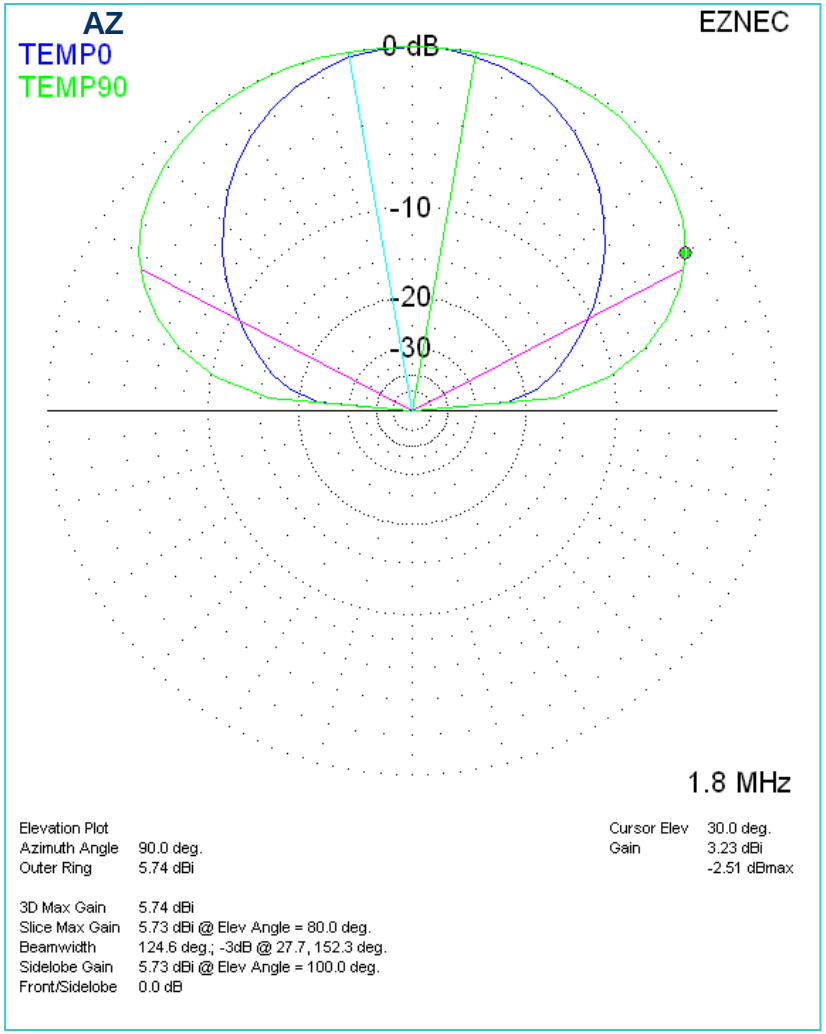
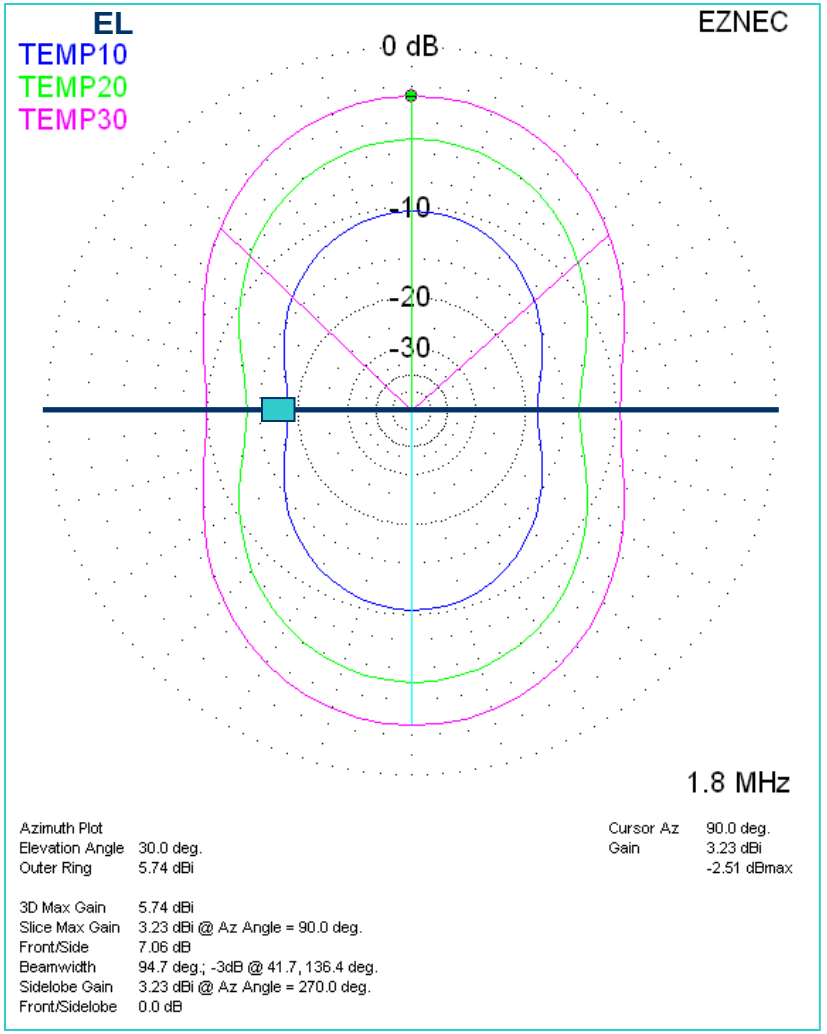
160M OCFD at 80 feet





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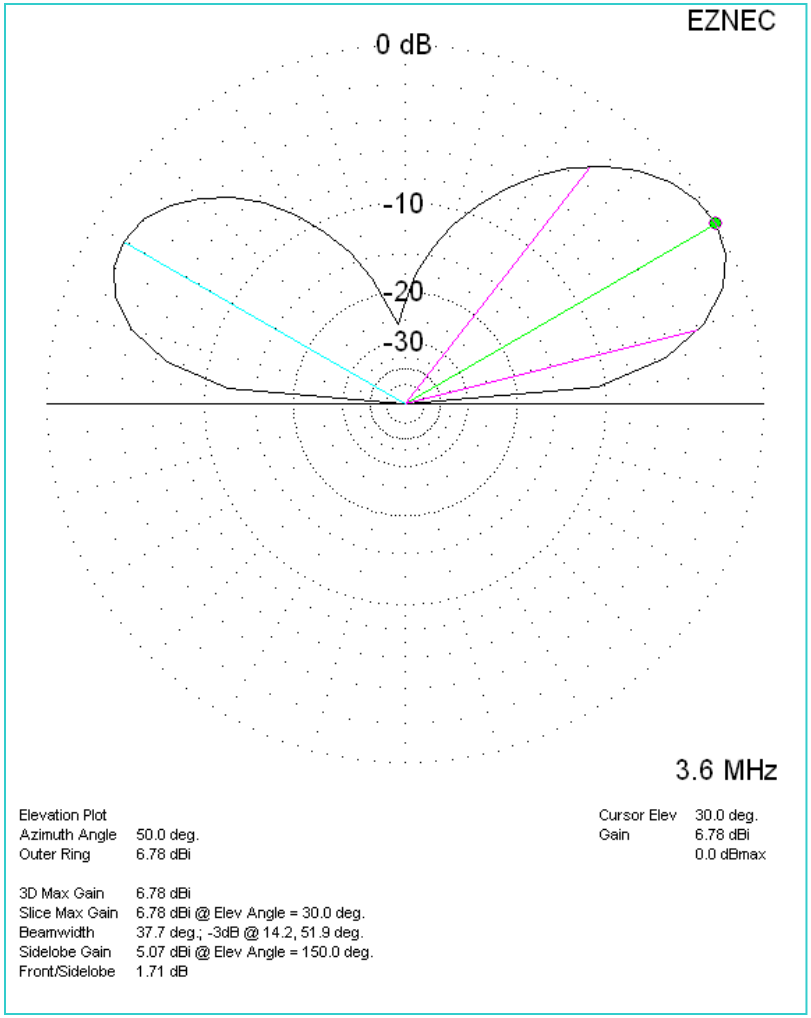
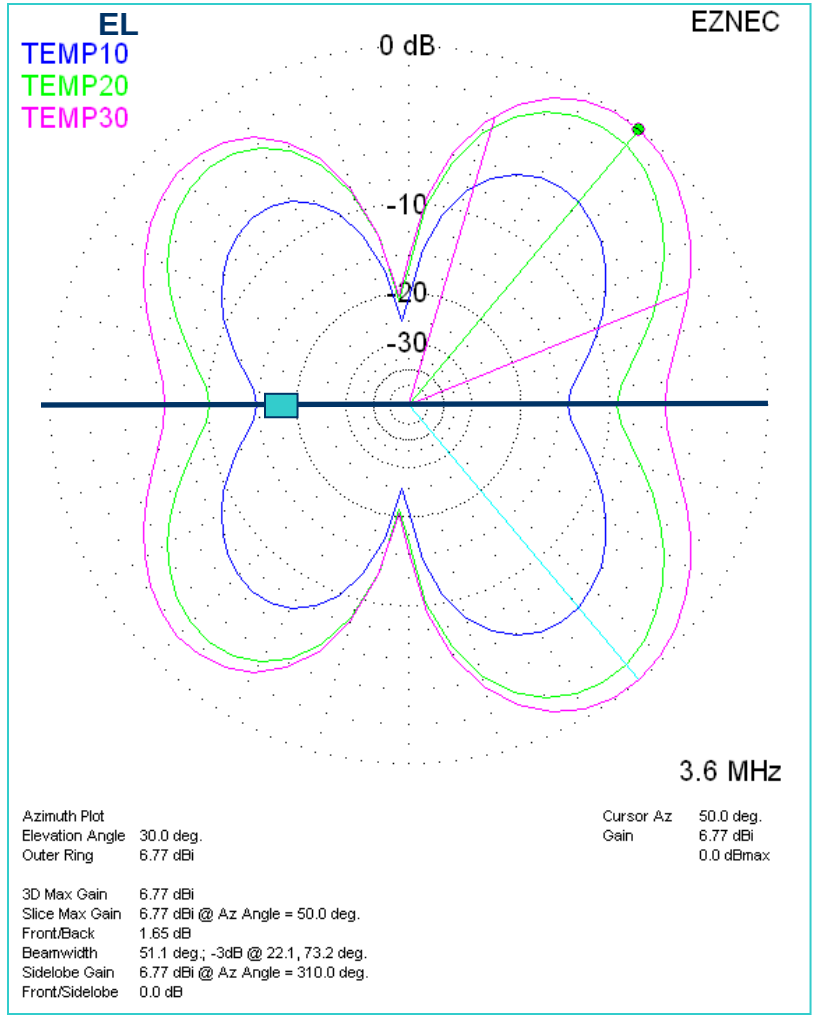
160M OCFD on 80M (x2)





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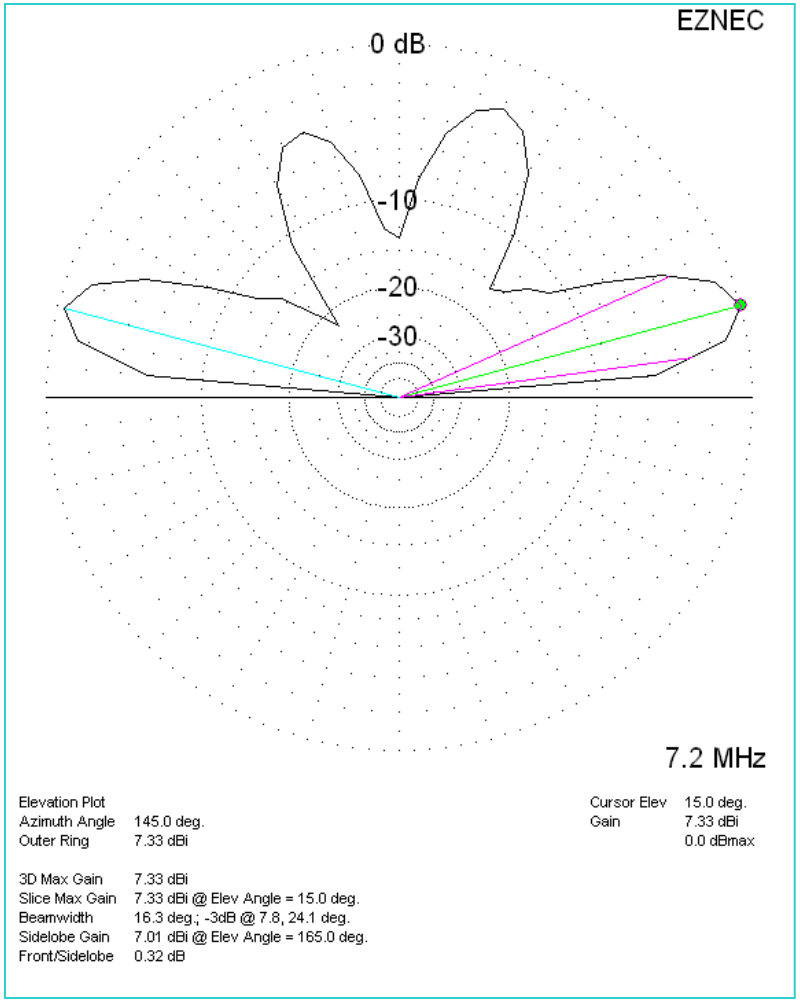
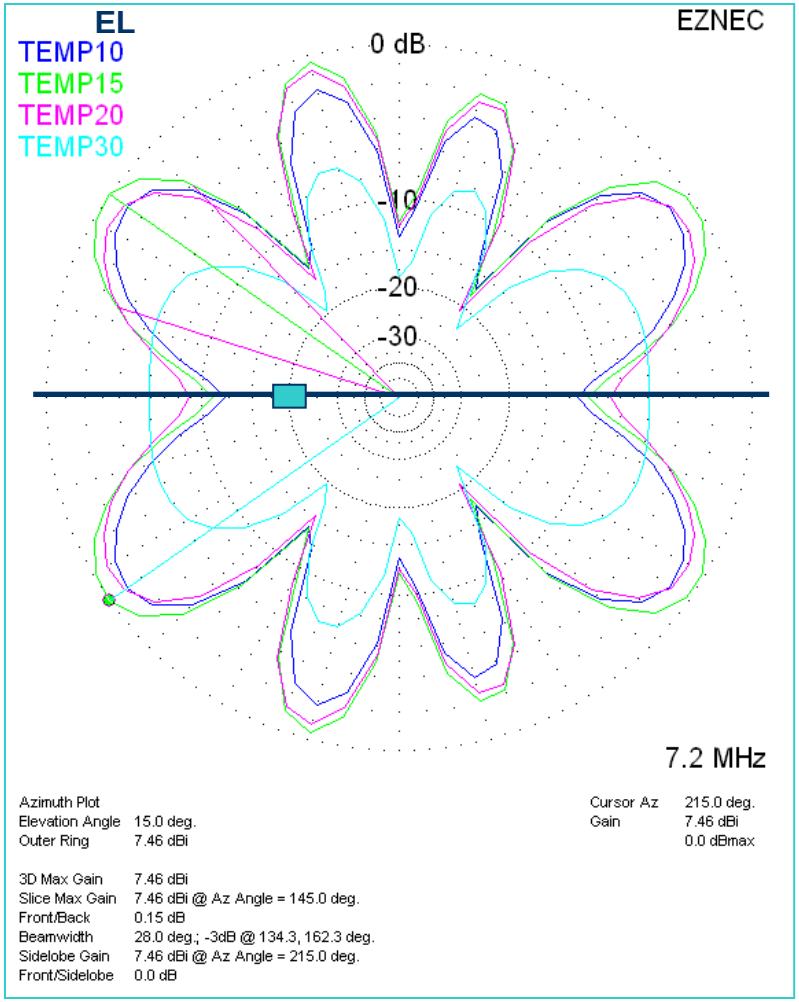
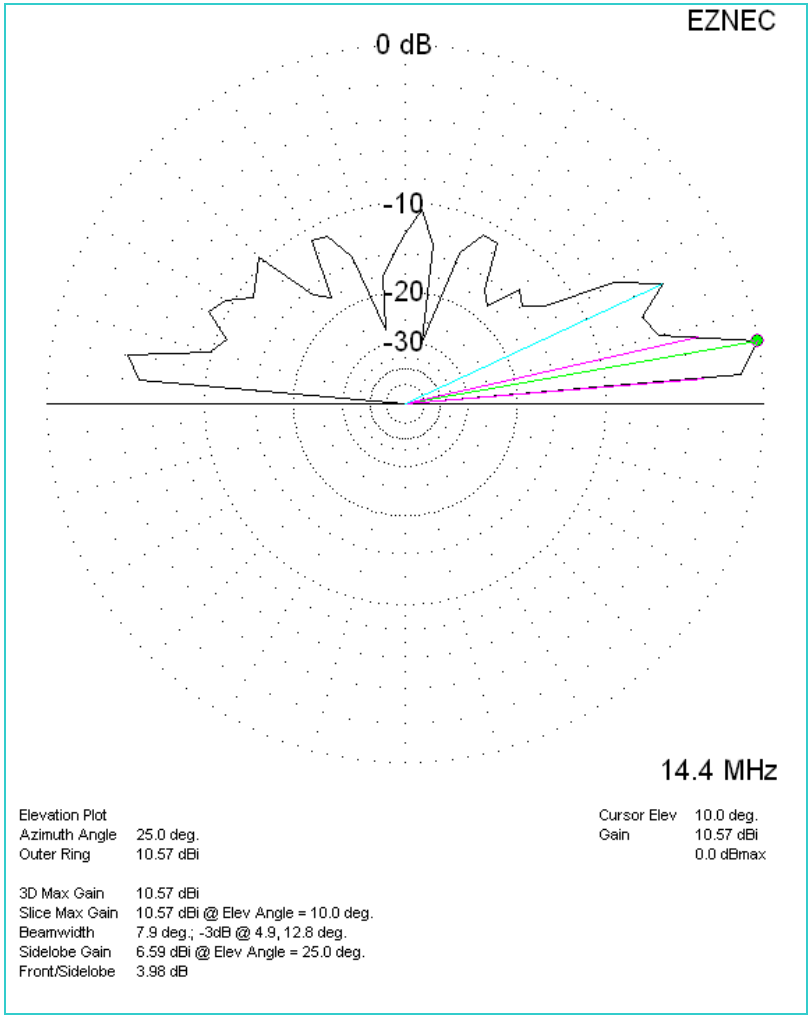
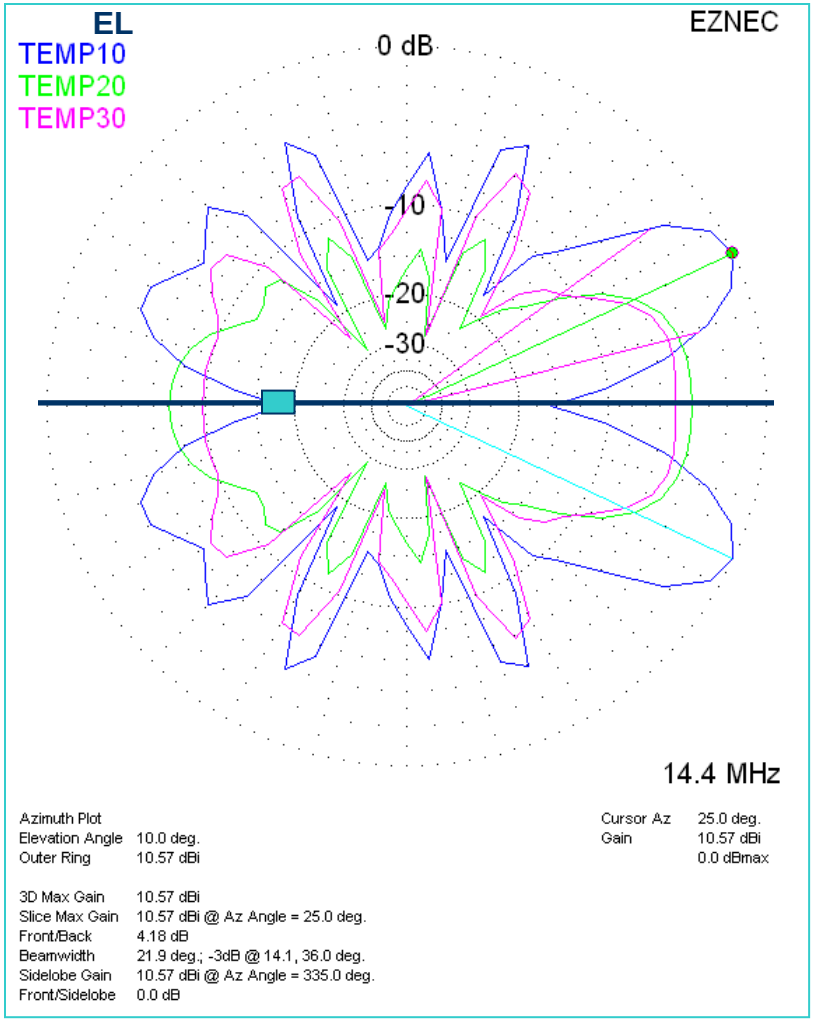
160M OCFD on 40M (x4)





160M OCFD on 20M (x8)





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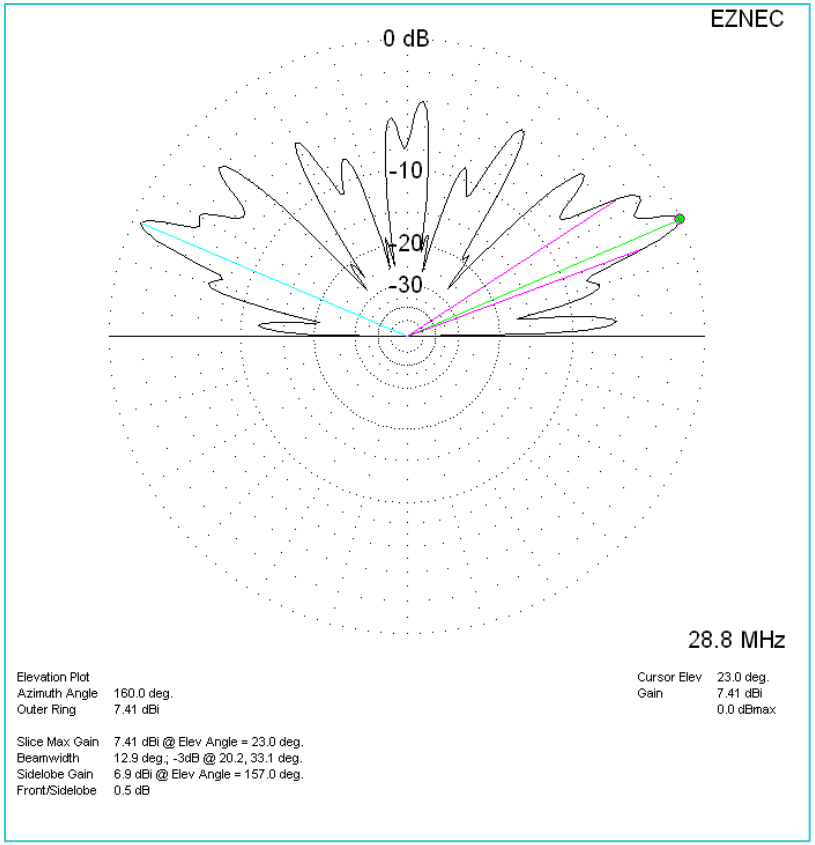
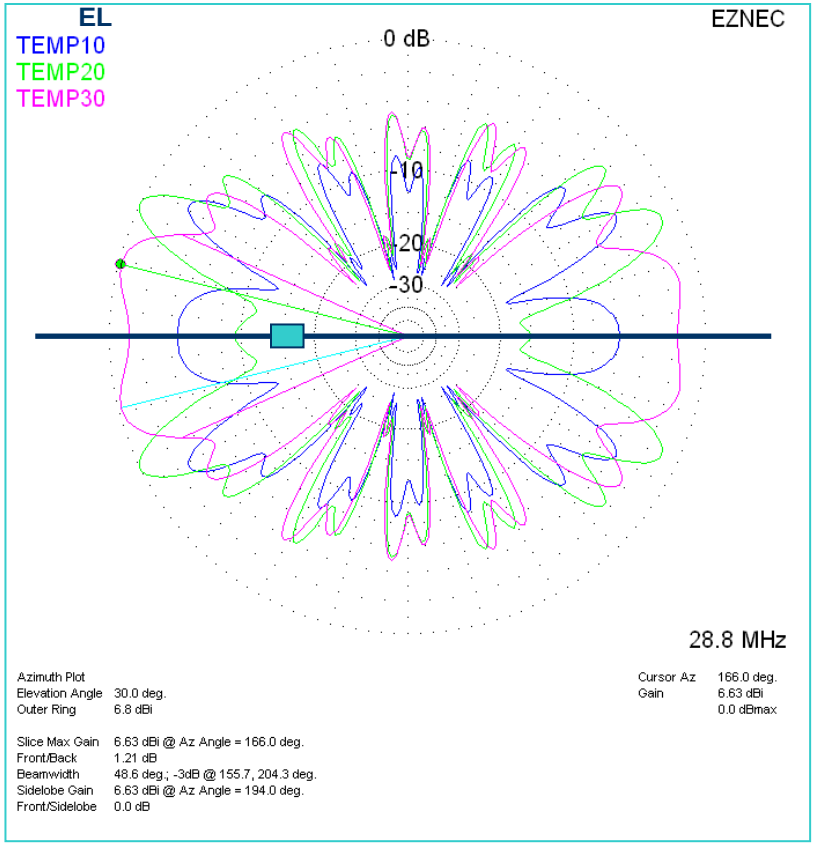
160M OCFD on 10M (x16)





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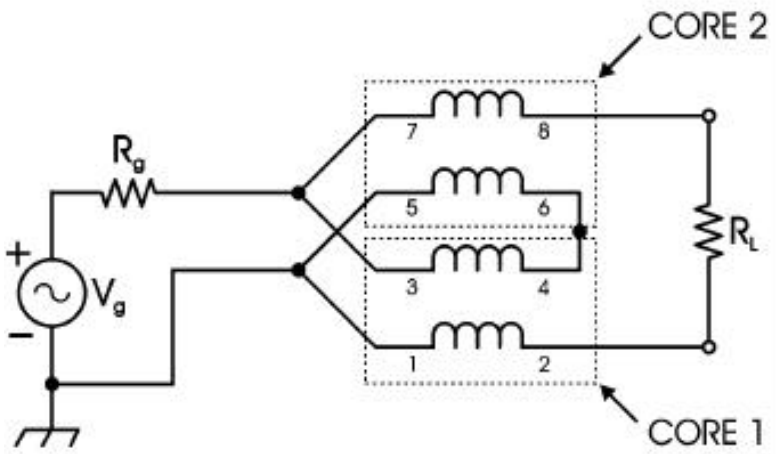
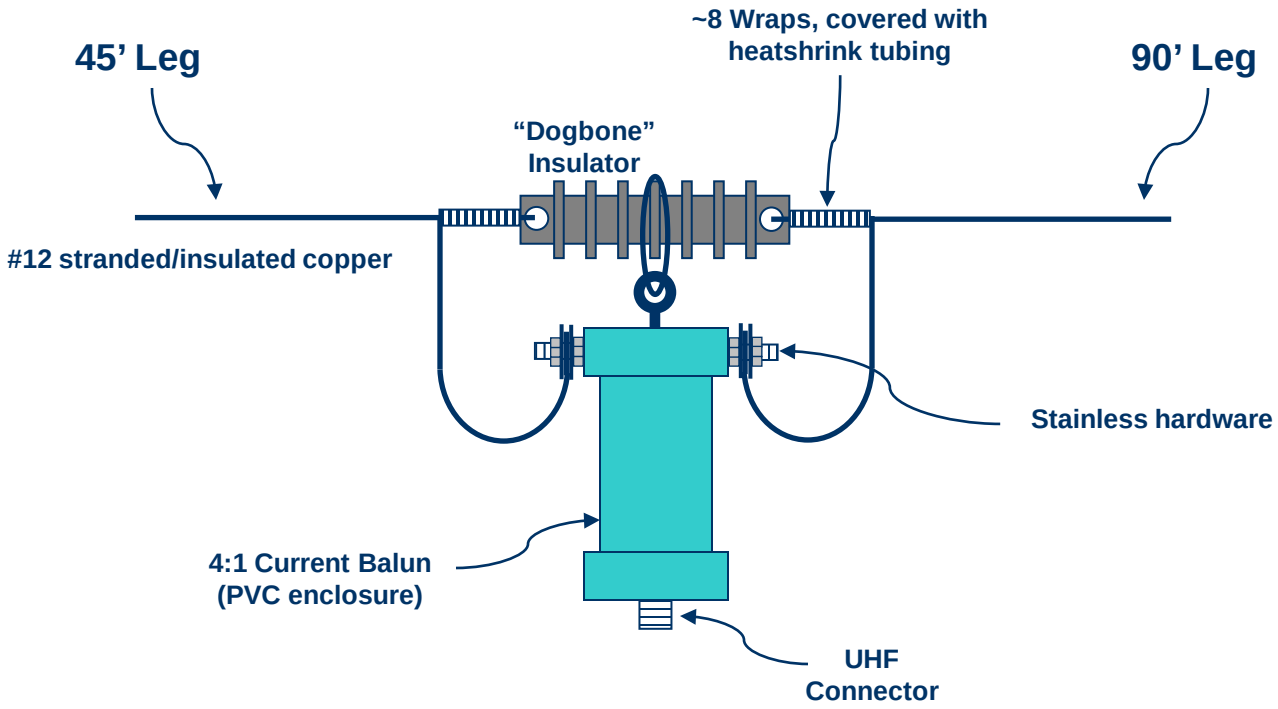
Geometry/Height

- Old 80M design: 45.3 ft, 90.7 ft; 30 ft high
- New 160M design: 88ft, 176 ft; 80 ft high
- Both use 4:1 Guanella balun design
  - 80M variation: 45/65 ft flat+26 ft dropper
- Feed point impedance at resonance drops as effective height above ground decreases
  - Recommend 1/3 λ up for 4:1 balun to work well

4:1 Guanella Current Balun



80M OCFD Construction Detail



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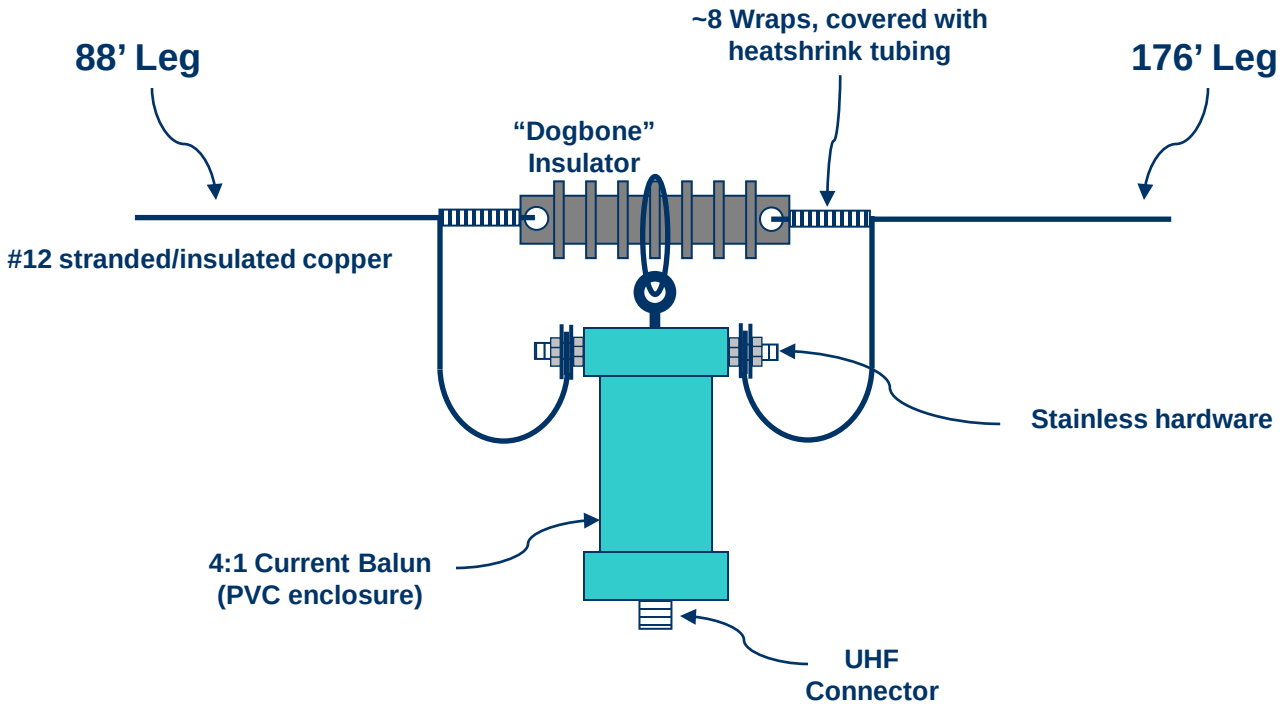
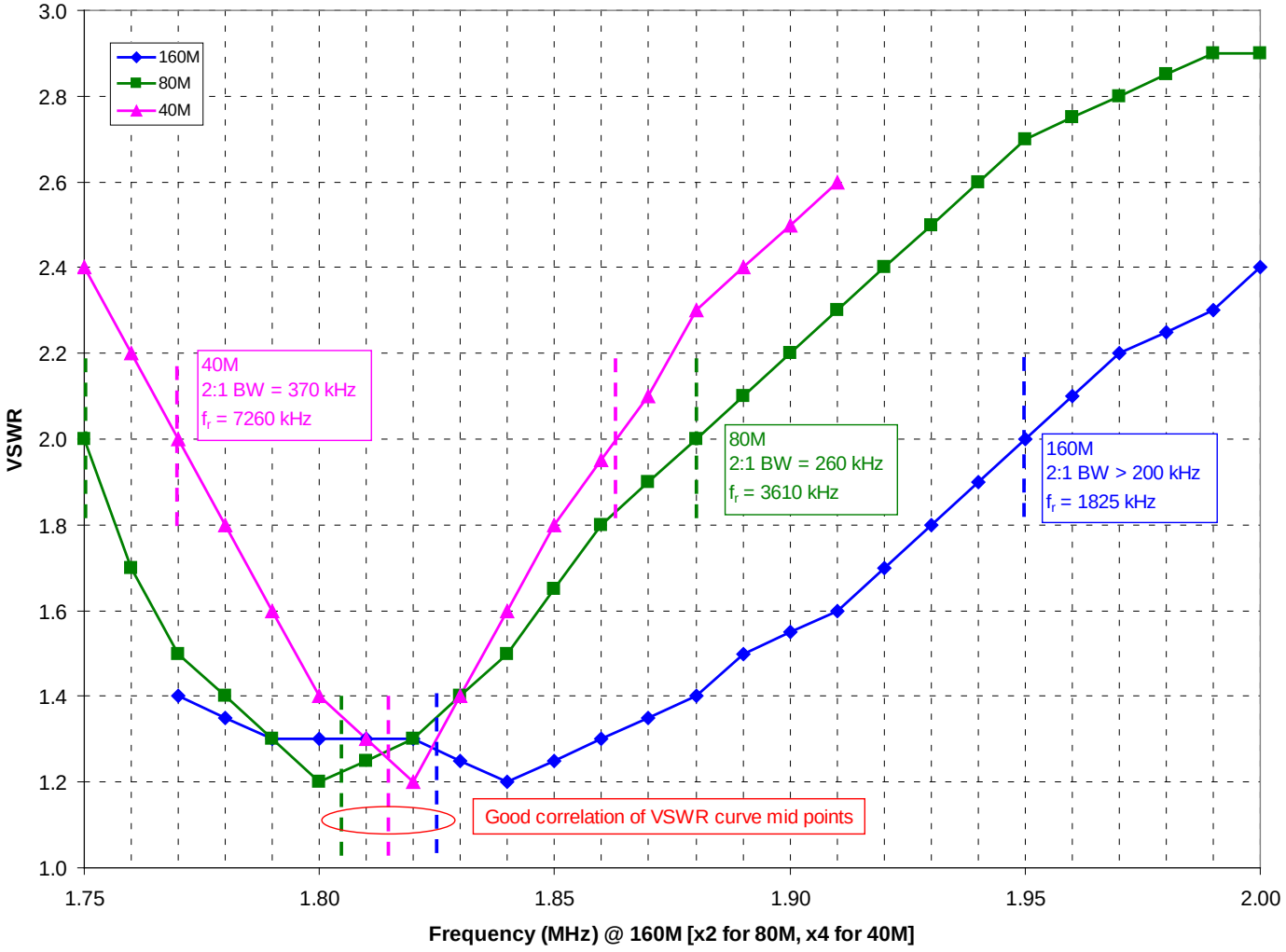
160M OCFD Construction Detail



160M OCFD Normalized VSWR Plots



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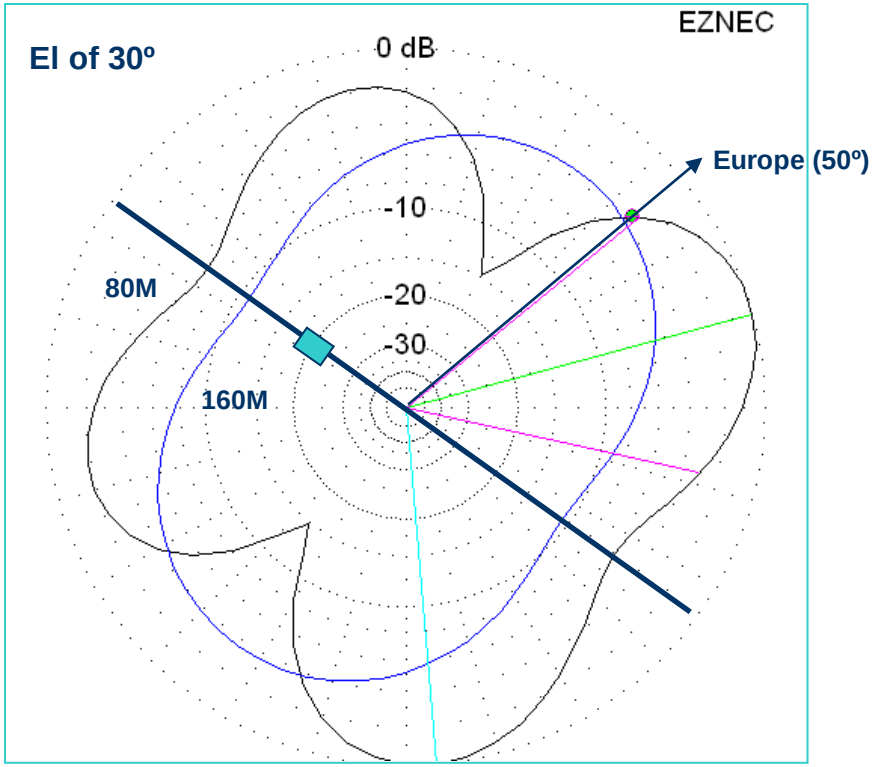
OCFD Orientation Issues

Single 160M OCFD at 125º, 160M/80M

- How to deal with the broadside null…
- Rotate antenna to achieve best gain compromise



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Disclaimer…

- Your mileage may vary
- Batteries not included
- Some assembly required
- Professional driver, closed course
- Void where prohibited
- Do not dispose of in fire
- Taxes, titles, license fees extra
- 10M band openings longer than 2 hours require immediate medical attention