# ANTENNA MODELING WITH MMANA

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# REASONS FOR MODELING

- Better understanding of antenna systems
- Means for testing new ideas

# Popular modeling programs

- Easynec 4+ A commercial program based on NEC2.
- Multinec A commercial Excel spreadsheet for use with Eznec. Allows for optimization.
- NEC-WIN PLUS Another commercial program based on NEC2
- MMANA and NEC2-MMANA Free programs based on MiniNEC and NEC2 respectively.
- There are other programs available

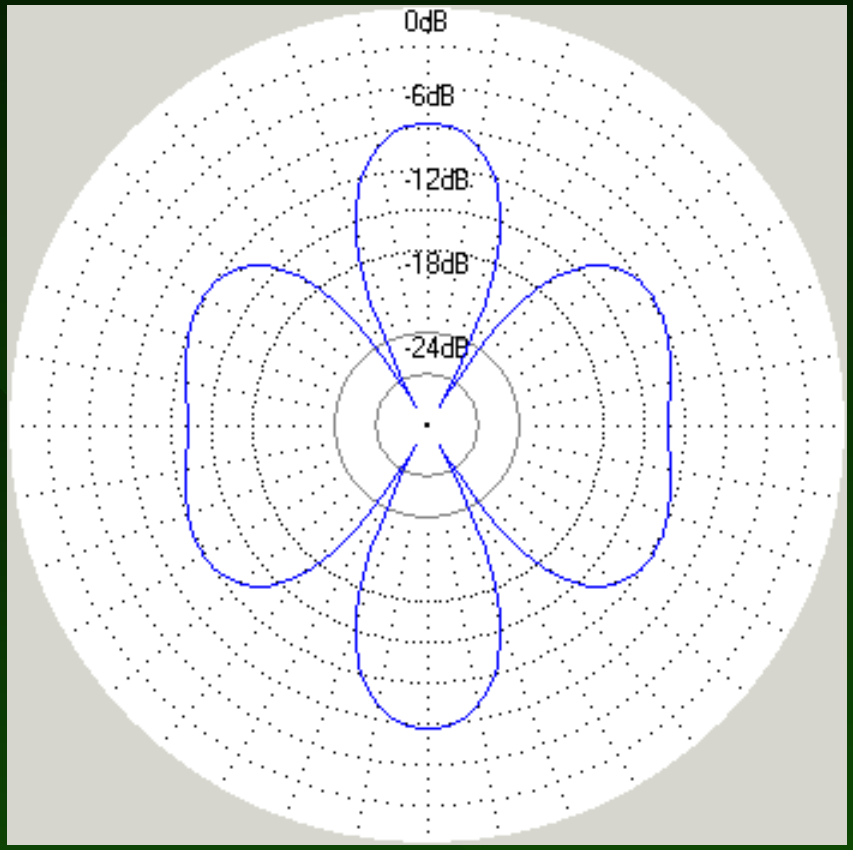
# National Electromagnetic Code

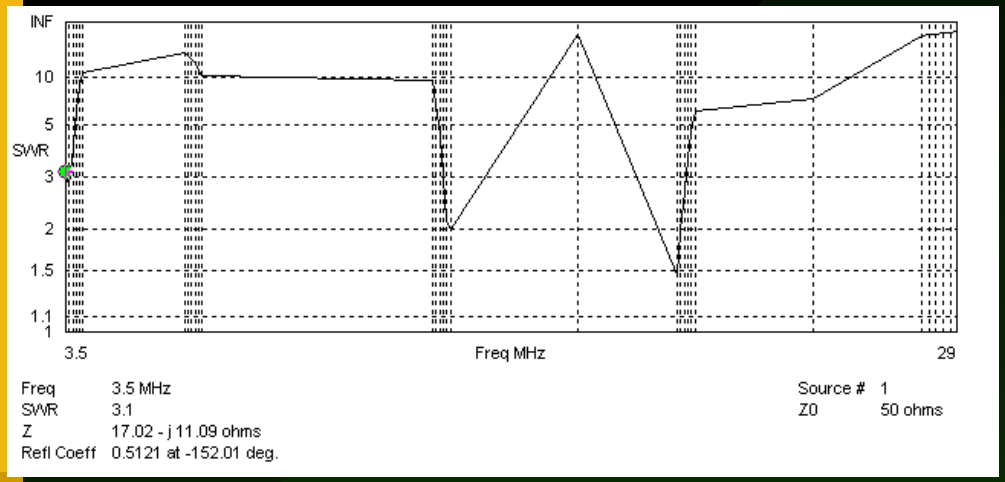
- Nec2 is the workhorse program originally developed for mainframes but now runs on PCs.
- MiniNEC was developed for the PC. It has fewer features and doesn't handle closely spaced wires.
- NEC4 requires special licensing and costs alot

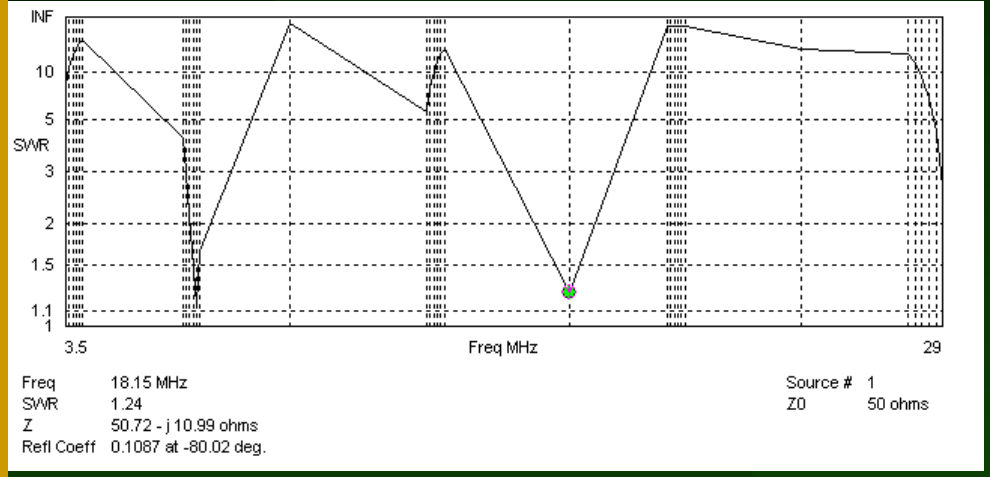
# Main features of MMANA and NEC2-MMANA

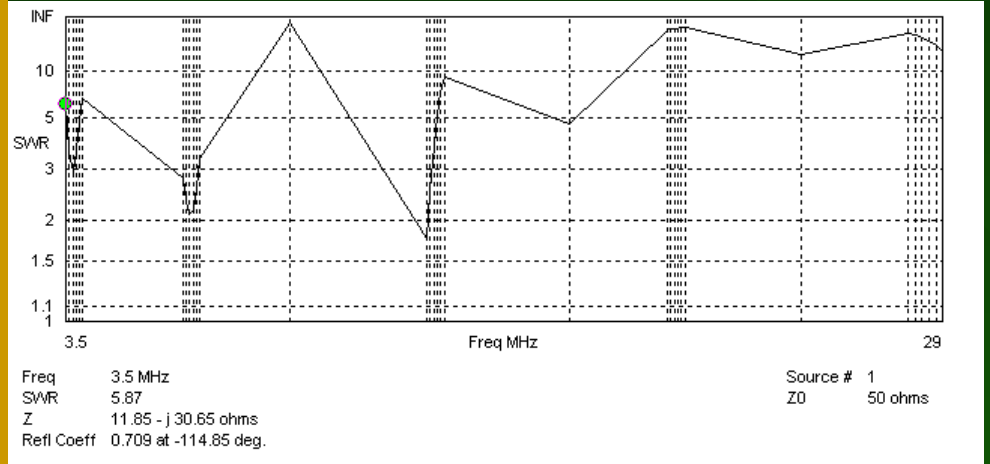
- FREE
- MMANA has built in optimization, feed line calculations, matching networks, inductor design. Plotting of various results like SWR and Z across a band and 2D plots of gain.
- NEC2-MMANA improves accuracy, allows for insulation on wires, allows viewing of the NEC2 input cards and the NEC2 output files.

# DEMONSTRATION





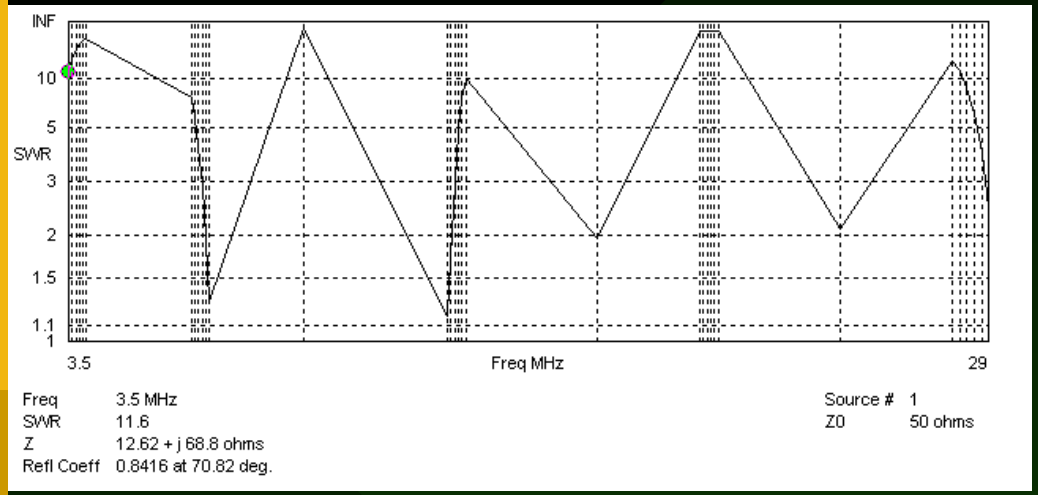



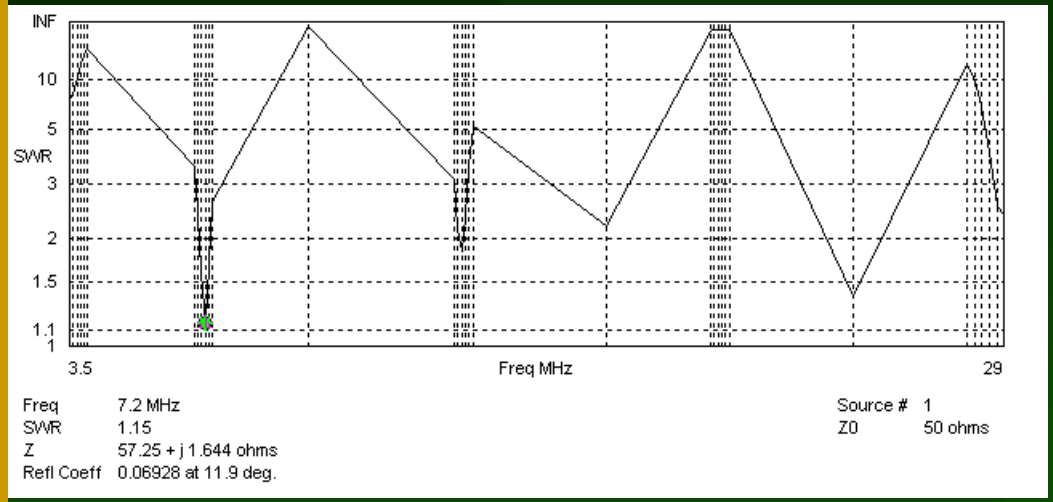

- Standard G5RV 102 feet and 30 foot matching section

- G5RV fed with 37.75 feet of 400 Ohm line.

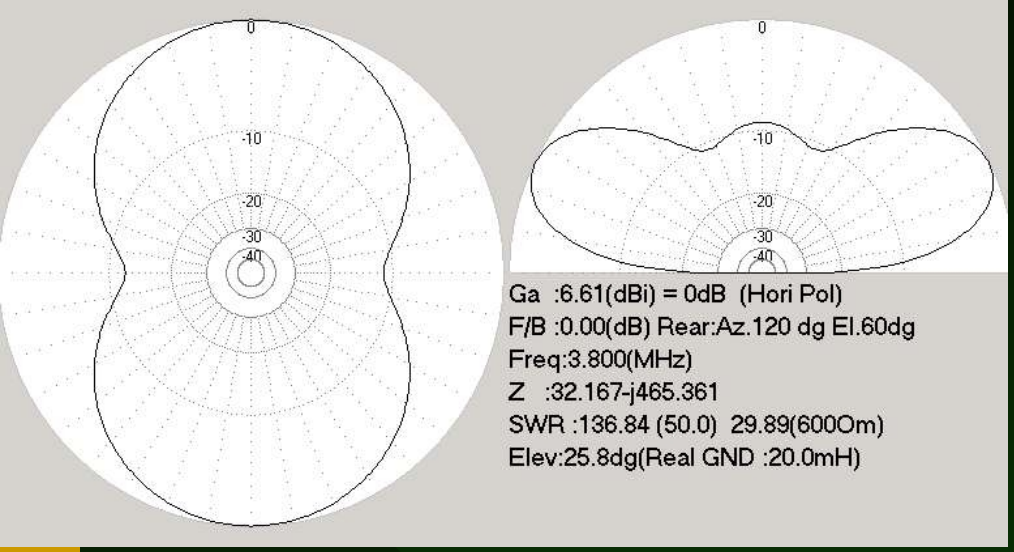
- G5RV fed with 35.7foot 300 Ohm . 9 Vf matching section



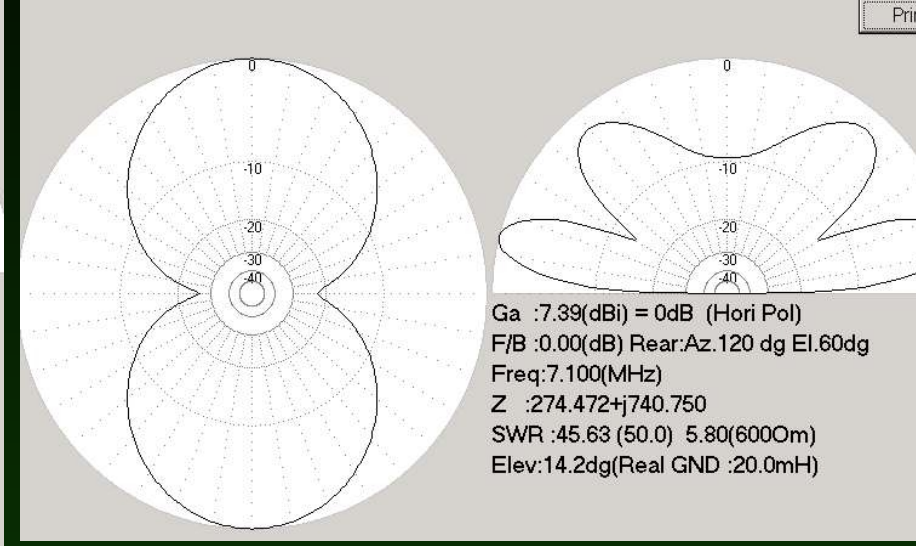

- 94 foot fed with 40.25 feet 400 Ohm.



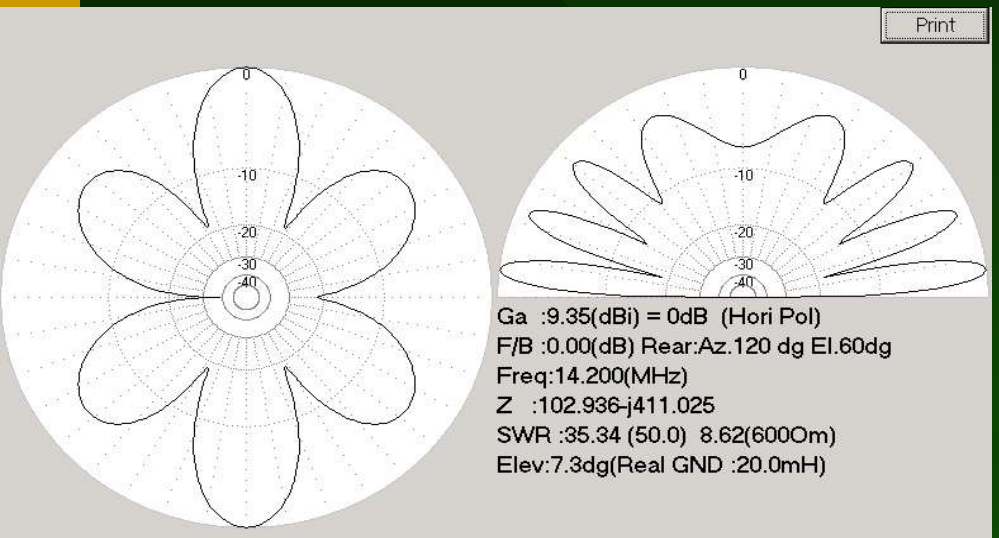

- 88 foot fed with 43.2 feet 400 Ohm.



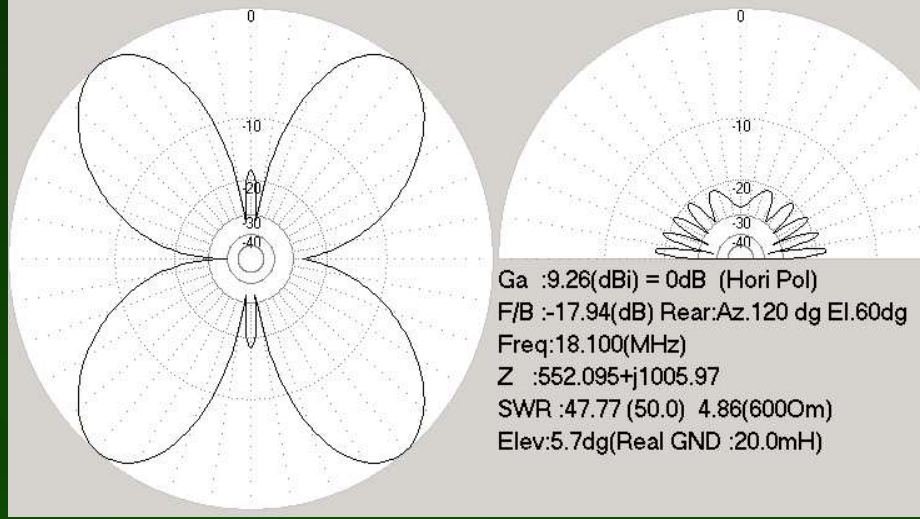

•80 meters




•40 meters




•20 meters




•17 meters

- LADDER LINE

- Relatively low cost about $.20/ft
- Light weight
- Low loss when dry
- Must be kept away from metal etc
- Very high loss when wet…should be waxed if water stops beading
- Balun for coax feed

**Line Parameters @ 50 MHz**

| | Line Dry | | | | Line Wet | | | |
|---|---|---|---|---|---|---|---|---|
| **Type** | **$R_O$** | **$\varepsilon_{eff}$** | **$V_P$** | **dB/100'** | **$R_O$** | **$\varepsilon_{eff}$** | **$V_P$** | **dB/100'** |
| 551 | 405 | 1.23 | 90.2% | .33 | 387 | 1.34 | 86.4% | 5.8 |
| 552 | 379 | 1.19 | 91.7% | .38 | 362 | 1.28 | 88.4% | 5.2 |
| 553 | 397 | 1.23 | 90.2% | .38 | 381 | 1.33 | 86.8% | 4.8 |
| 554 | 359 | 1.16 | 92.8% | .41 | 343 | 1.27 | 88.7% | 6.1 |
| 16 AWG @ .75" | 399 | 1.01 | 99.5% | .30 | No Change | No Change | No Change | No Change |

# Close

- Modeling shows what are the facts and what are the myths on the subject of the G5RV types of antennas
- The most important factors concerning antenna performance are location, location, and location.
- Don’t be fooled by a low SWR reading into thinking that you have an efficient antenna system