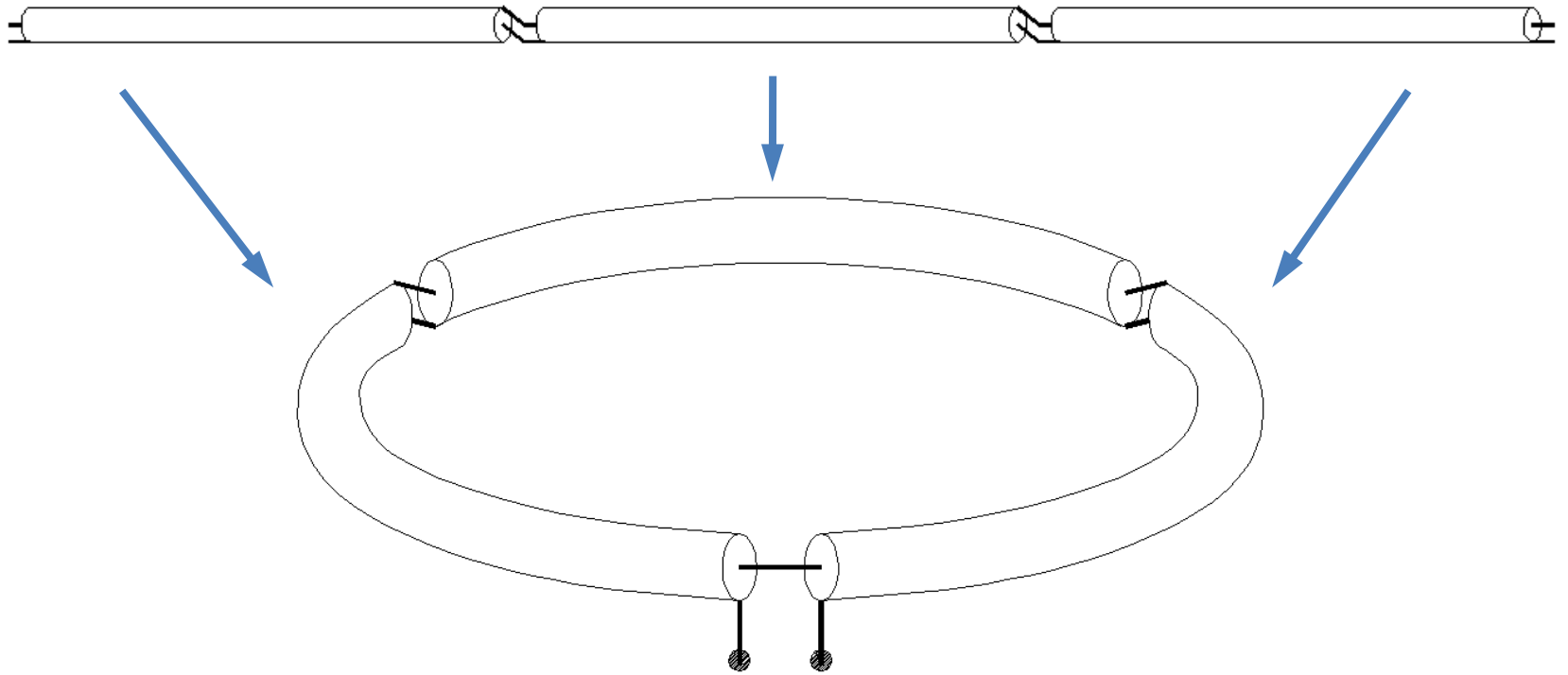




Circular Collinear Arrays

Horizontally Polarized - Omnidirectional

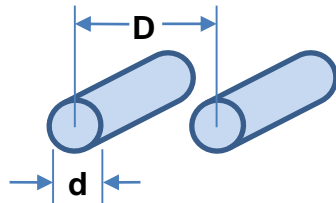
CIRCULAR ELEMENT



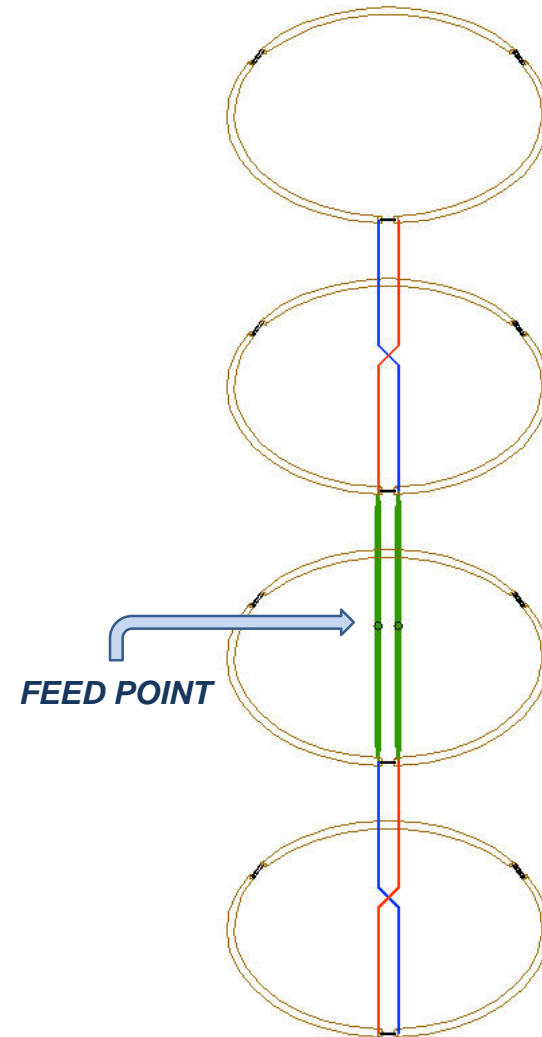
- COAXIAL COLLINEAR IS WRAPED INTO CIRCLE
- THREE $\lambda/2$ COAXIAL ELEMENTS PER TURN
- RADIATION PATTERN IS SIMILAR TO A “BIG WHEEL”
- SINGLE SIDE FEED IS MUCH SIMPLER THAN 3 RADIAL FEEDS

ARRAYS OF CIRCULAR ELEMENTS

- Arrays of stacked wheels
- Wheel elements are fed with open wire lines
- Impedance control of open wire lines provide equal load sharing

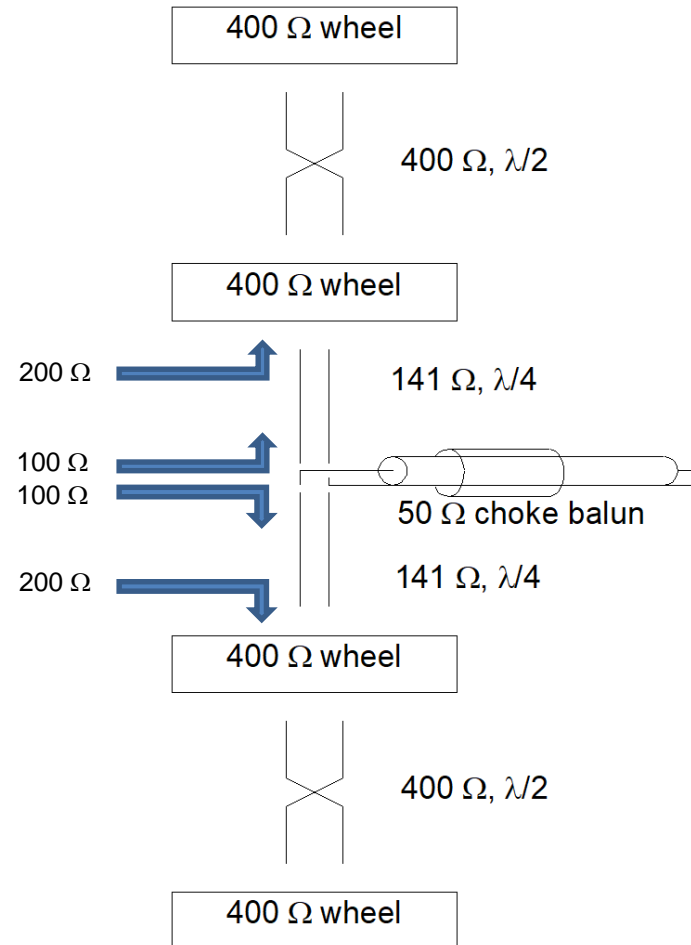


$$Z_o = 120 \cosh^{-1} \left(\frac{D}{d} \right)$$



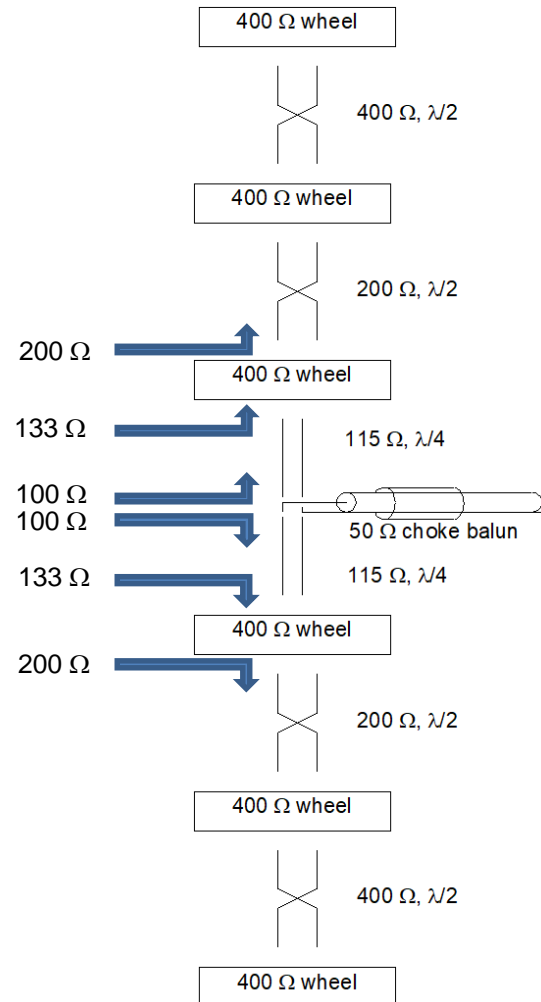
FEEDING THE FOUR WHEEL ARRAY

- Collinear connected RG-316 segments form wheels
- Driving point Z of wheel is approximately $400\ \Omega$
- Four wheel elements stacked
- All elements are spaced $\lambda/2$
- Open wire feed line provide equal load sharing
- Impedance control of open wire line is important

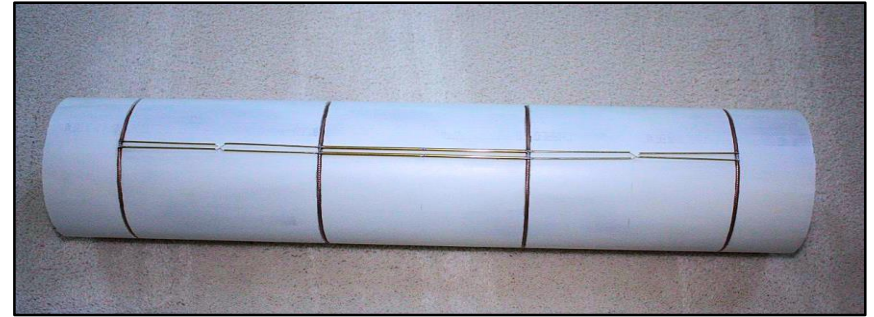
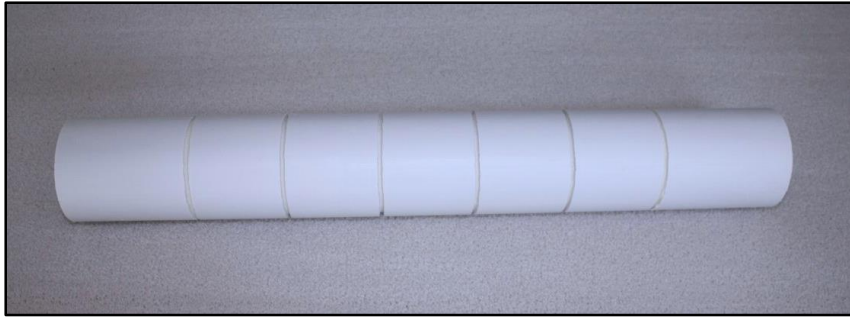


FEEDING THE SIX WHEEL ARRAY

- Collinear connected RG-316 segments form wheels
- Driving point Z of wheel is approximately $400\ \Omega$
- Six wheel elements stacked
- All elements are spaced $\lambda/2$
- Open wire feed line provide equal load sharing
- Impedance control of open wire line is important



ARRAY CONSTRUCTION PHOTOS

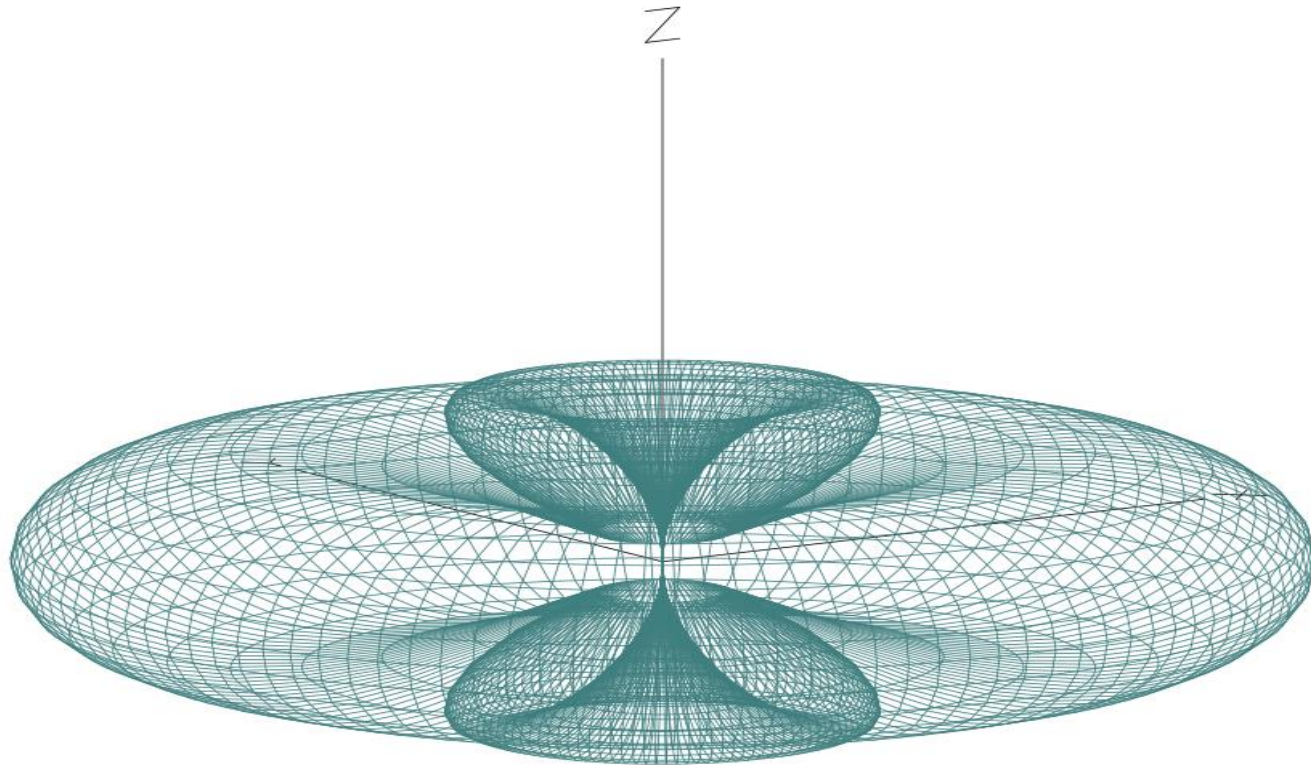


1296 MHz – SIX WHEEL ARRAY



3D RADIATION PATTERN

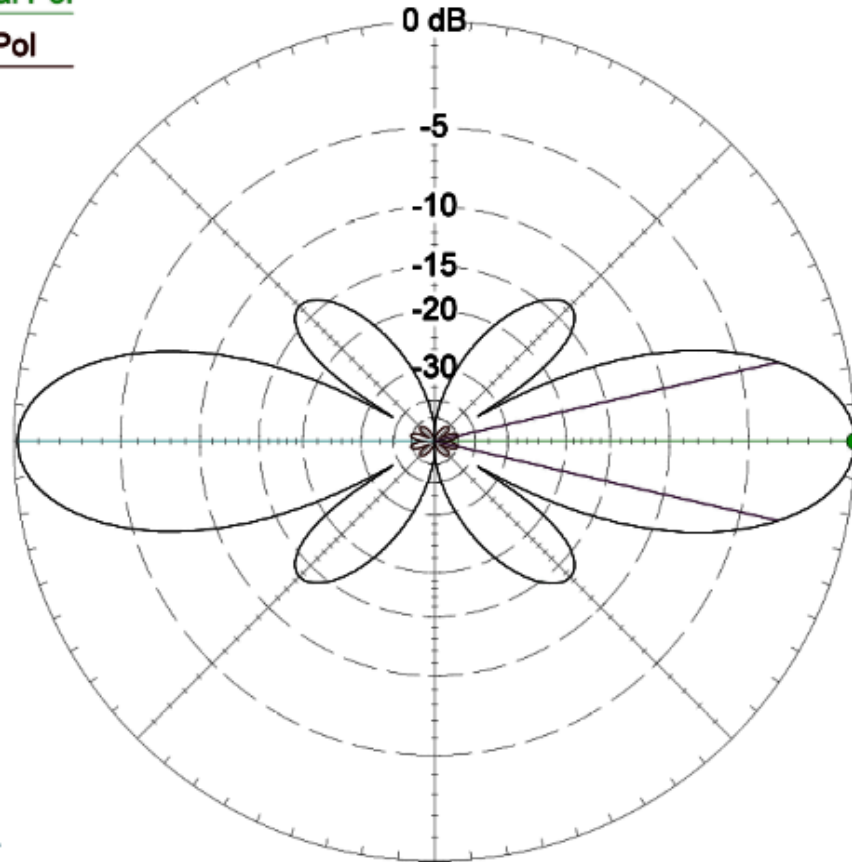
EZNEC



FOUR WHEEL ELEVATION PATTERN

*** Total Field**
Horizontal Pol
Vertical Pol

EZNEC



Elevation Plot
Azimuth Angle 0.0 deg.
Outer Ring 6.28 dBi

Slice Max Gain 6.28 dBi @ Elev Angle = 0.0 deg.
Front/Back 0.14 dB
Beamwidth 26.0 deg.; -3dB @ 347.0, 13.0 deg.
Sidelobe Gain 6.14 dBi @ Elev Angle = 180.0 deg.
Front/Sidelobe 0.14 dB

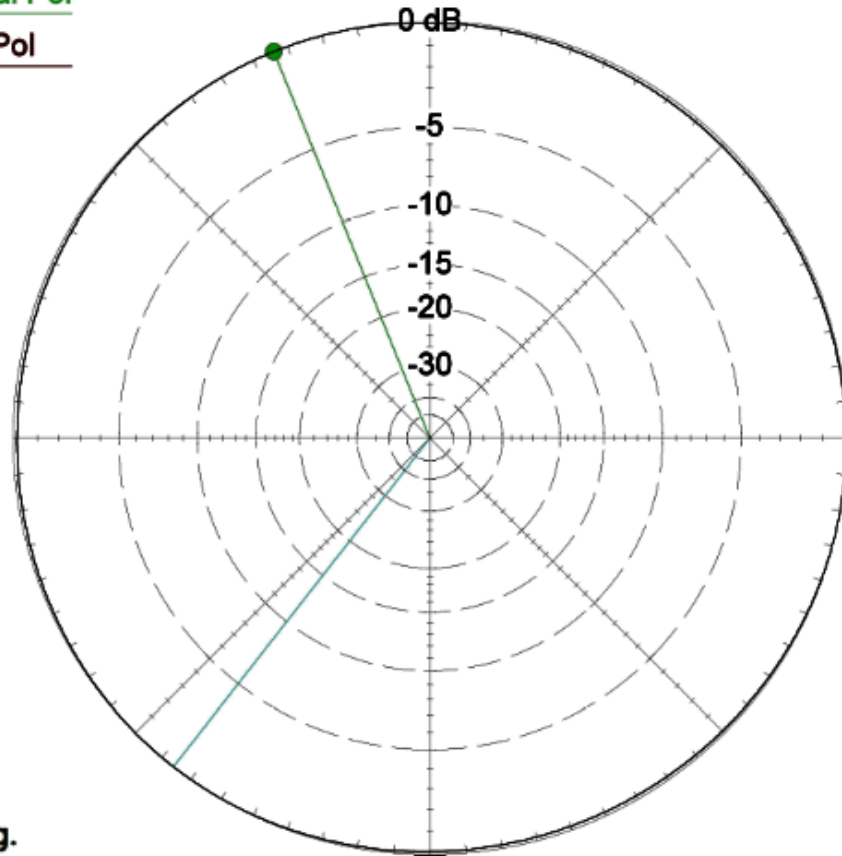
Helical Colinear

902 MHz

FOUR WHEEL AZIMUTH PATTERN

* Total Field
Horizontal Pol
Vertical Pol

EZNEC



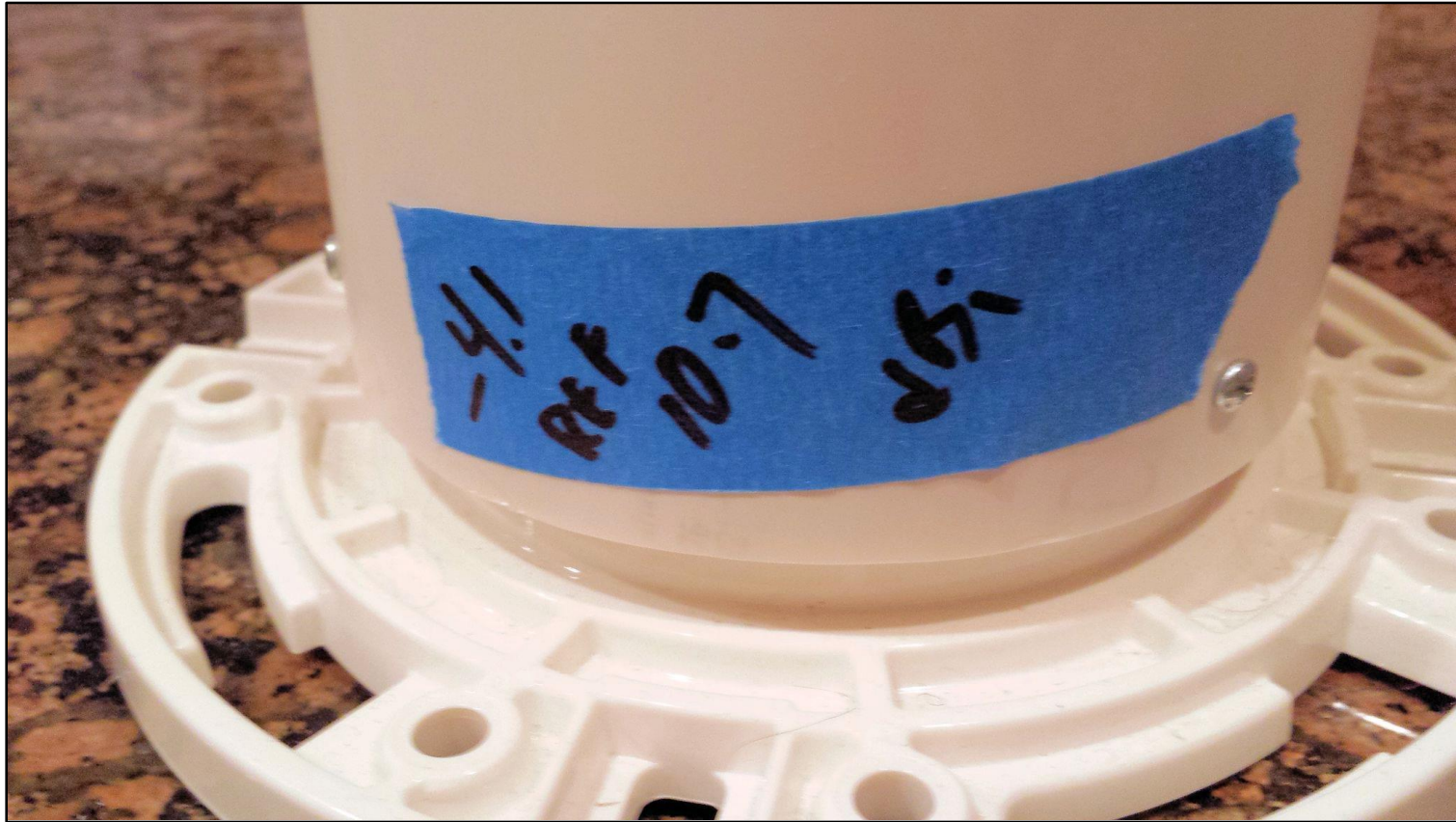
Azimuth Plot
Elevation Angle 0.0 deg.
Outer Ring 6.29 dBi

Slice Max Gain 6.29 dBi @ Az Angle = 112.0 deg.
Front/Back 0.16 dB
Beamwidth ?
Sidelobe Gain 6.29 dBi @ Az Angle = 232.0 deg.
Front/Sidelobe 0.0 dB

Helical Colinear

902 MHz

2014 CSVHFS ANTENNA RANGE MEASUREMENT



FOUR WHEEL ARRAY: $10.7 - 4.1 = 6.6$ dBi GAIN

Summary

- Circular elements
- Three $\lambda/2$ coaxial collinear segments in circle
- “Big Wheel” radiation pattern
- Single feed point
- Elements spaced $\lambda/2$
- Array of elements fed with open wire line
- Impedance control of open wire line controls element drive distribution
- Good results on air

23CM 6-WHEEL and 33CM 4-WHEEL ARRAYS

