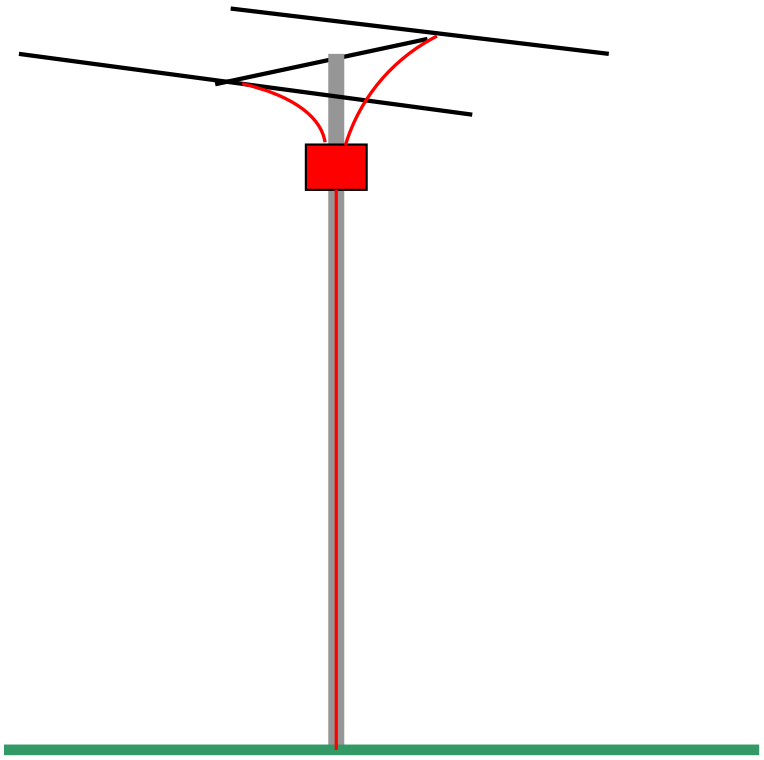
2-el OVF-yagi at OH1AJ

Version 1.1.1

2-el phased array for 40m at OH1AJ



- Antenna up 35m
  - coil loaded elements, 74% of full size
  - coils 3.06m from the element center
  - Boom length 6.5m
- Opposite-voltage feed system
  - both elements are tuned to 7100kHz
  - ½ wavelength cables from both element to the phasing box
  - opposite cable polarities in front and rear elements
  - current balun on both cables
  - equal current amplitudes in both elements
- Band divided into two sub-bands
  - 7000-7100 and 7100-7200kHz
  - This way better performance is achieved with shortened element
- Instant 180 degree direction switching

What is Opposite Voltage Feed?

OVF is a method to feed 2-element antennas. It makes possible to adjust current amplitudes and phases so that good radiation pattern can be achieved. The main advantage is insensitivity of radiation pattern to frequency change. The concept is that equal amplitude but opposite phase voltages are brought to the element feedpoints. By selecting proper detuning of the elements and taking into account their mutual impedance, it is possible to reach equal currents and wanted phase difference of the currents. When frequency is changed, both current phases move to the same direction and their difference remains almost constant, making the radiation pattern wideband.

Opposite phase normally is generated with half wavelength cable. It can be achieved also with cable polarity inversion and two cables, each half wavelength long. This method is used in this case.

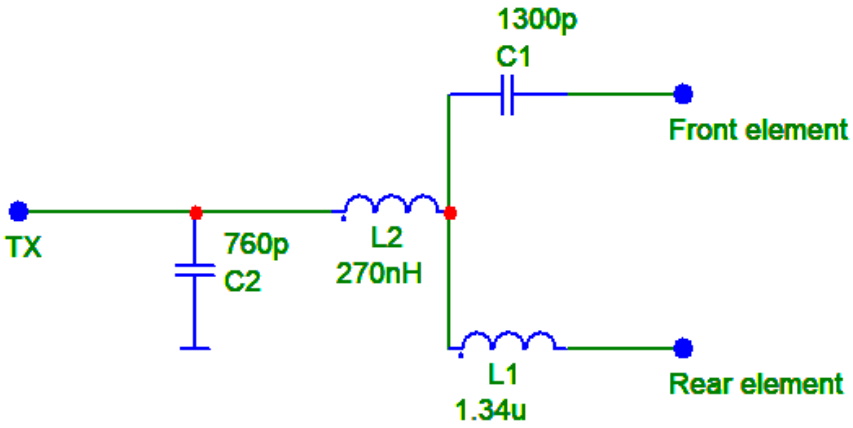
An approximation of phase reversal can be made using very short equal length cables and cable polarity inversion. This method is not perfectly accurate but in most cases adequate. Short cable method is not used in this case.

Tapering plan for one half element

- Dia/mm Length/mm
- 34.8 1000 (from ele center point)
- 30 1850
- 25.8 1005
  - 210 (to coil center)
    - Coil 9.5 turns dia 94, length 95, wire 6mm alu, 5.3uH
  - 795 (from coil center)
- 22 419
- 19 1170
- 16 920
- 13 1000
- 10 400
- Total 7764

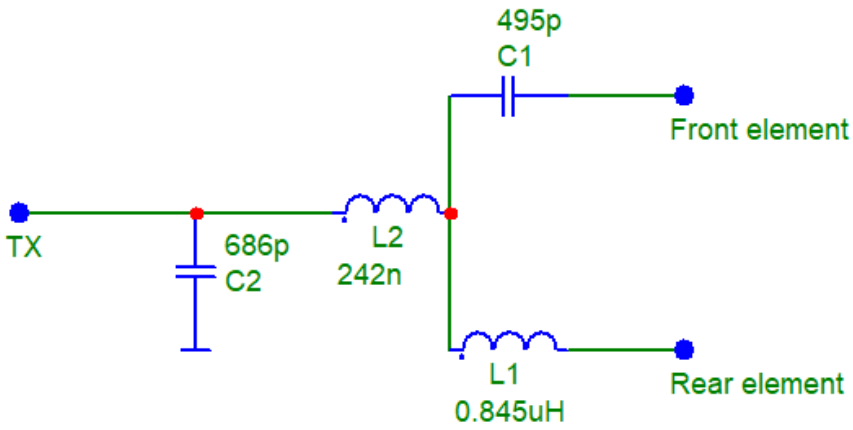
Mitat päivitetty 27.8.18

40m OVF-array at OH1AJ
Antenna height 35m, shortened elements 15.5m long
Elements tuned to 7100kHz
Electrical length of feed cables is 21.11m (7100kHz)
Element spacing 6.5m
Center frequency 7050kHz
Phasing box for band 7000-7100kHz



28.8.2018
OH1TV

40m OVF.array at OH1AJ
Antenna height 35m, shortened elements 15.5m long
Elements tuned to 7100kHz
Electrical length of feed cables is 21.11m (7100kHz)
Element spacing 6.5m
Center frequency 7150kHz
Phasing box for band 7100-7200kHz



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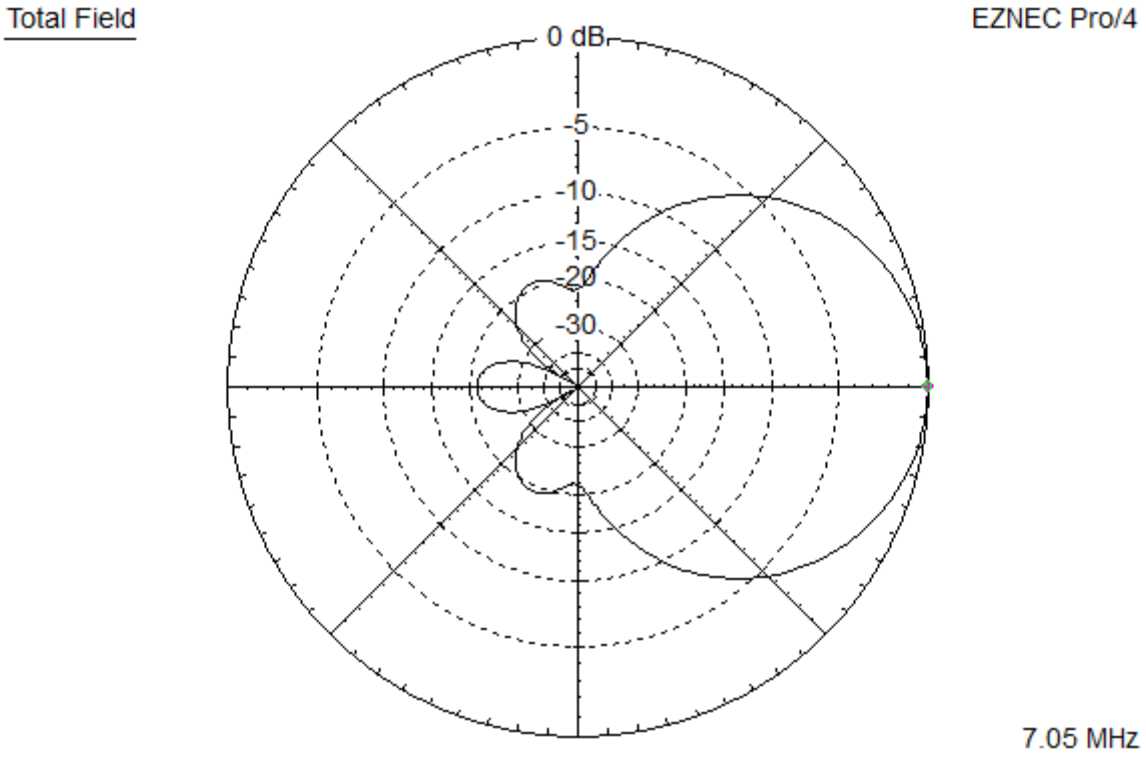
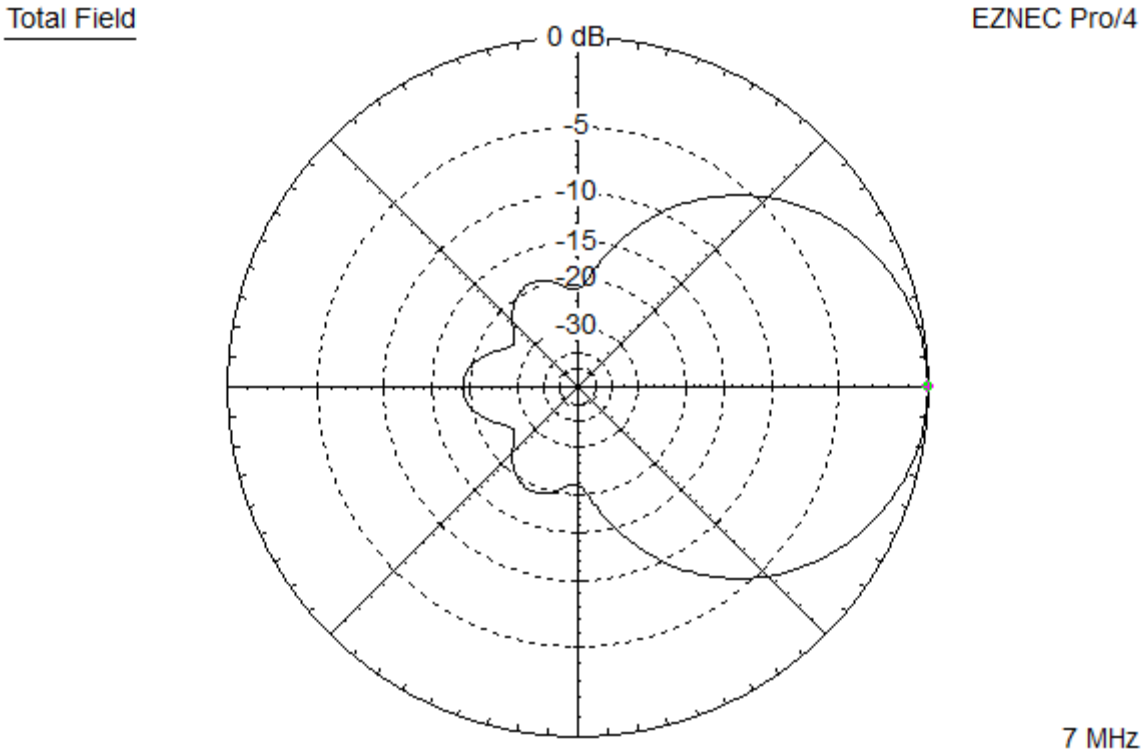
7050kHz, height 35m, horizontal at elevation 17 deg



Azimuth Plot	
Elevation Angle	17.0 deg.
Outer Ring	11.08 dBi
Cursor Az	0.0 deg.
Gain	11.08 dBi
	0.0 dBmax

Slice Max Gain	11.08 dBi @ Az Angle = 0.0 deg.
Front/Back	21.28 dB
Beamwidth	73.8 deg.; -3dB @ 323.1, 36.9 deg.
Sidelobe Gain	-8.21 dBi @ Az Angle = 113.0 deg.
Front/Sidelobe	19.29 dB

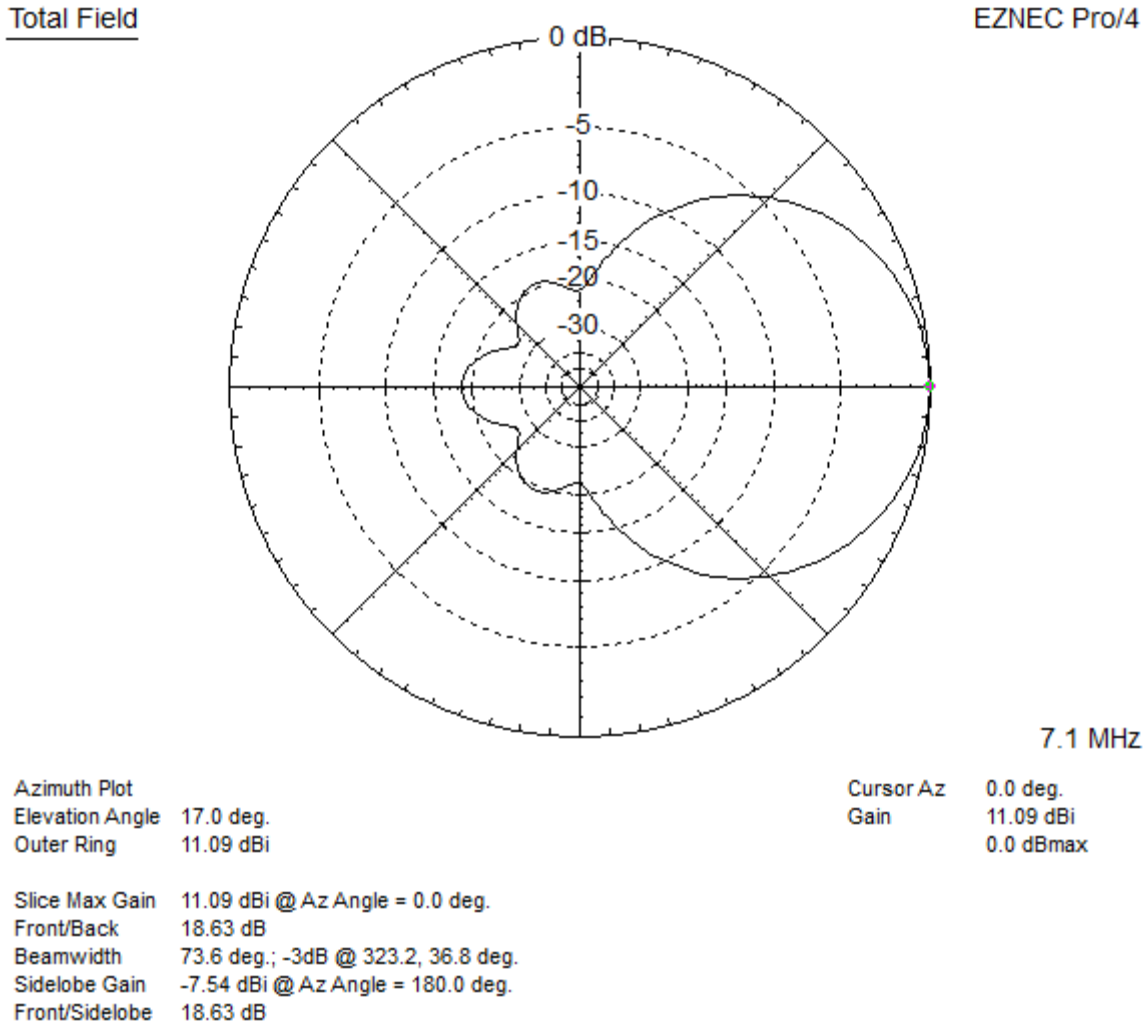
7050kHz, height 35m, horizontal at elevation 17 deg



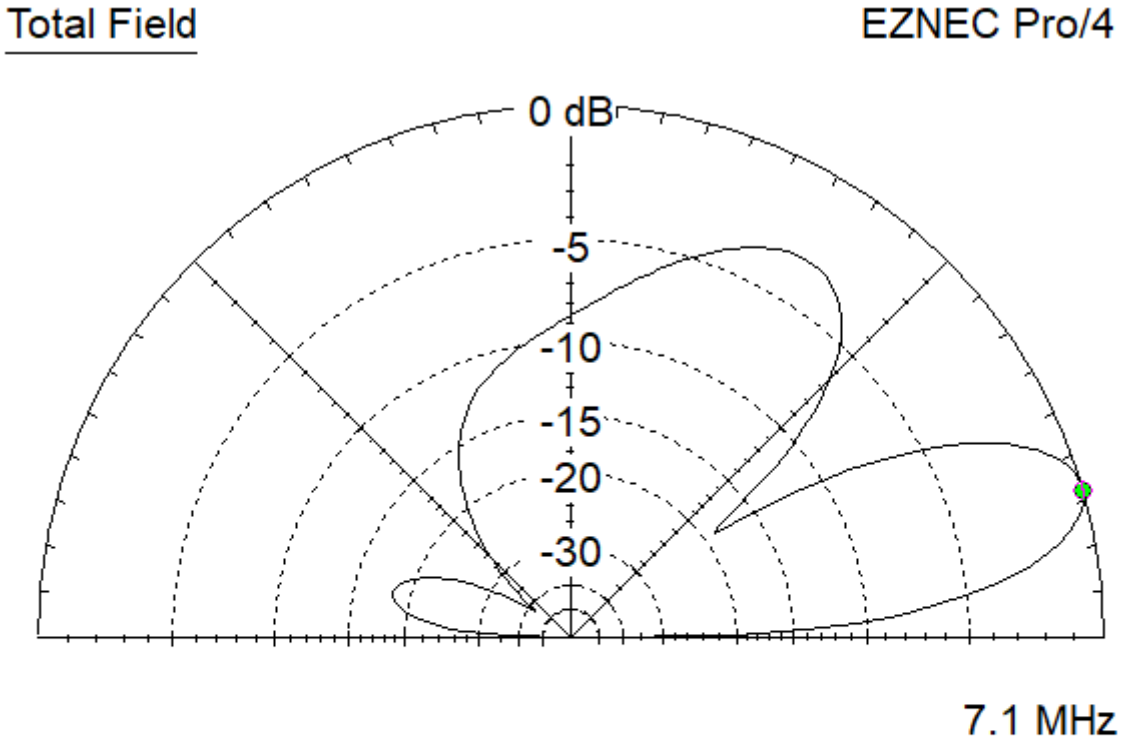
Azimuth Plot		Cursor Az	0.0 deg.
Elevation Angle	17.0 deg.	Gain	11.05 dBi
Outer Ring	11.05 dBi		0.0 dBmax

Slice Max Gain	11.05 dBi @ Az Angle = 0.0 deg.
Front/Back	19.06 dB
Beamwidth	73.8 deg.; -3dB @ 323.1, 36.9 deg.
Sidelobe Gain	-8.01 dBi @ Az Angle = 180.0 deg.
Front/Sidelobe	19.06 dB

7050kHz, height 35m, horizontal at elevation 17 deg



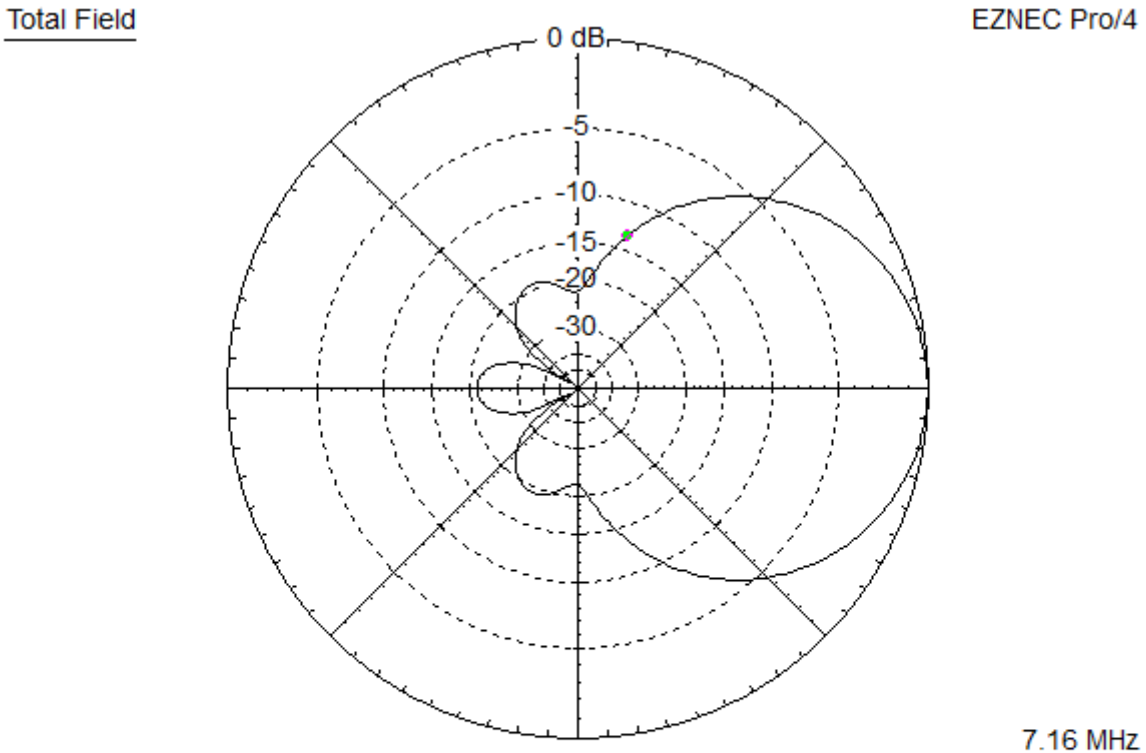
7050kHz, height 35m, vertical pattern



Elevation Plot	
Azimuth Angle	0.0 deg.
Outer Ring	11.09 dBi
Slice Max Gain	11.09 dBi @ Elev Angle = 16.0 deg.
Beamwidth	17.6 deg.; -3dB @ 8.1, 25.7 deg.
Sidelobe Gain	8.02 dBi @ Elev Angle = 57.0 deg.
Front/Sidelobe	3.07 dB

Cursor Elev	16.0 deg.
Gain	11.09 dBi
	0.0 dBmax

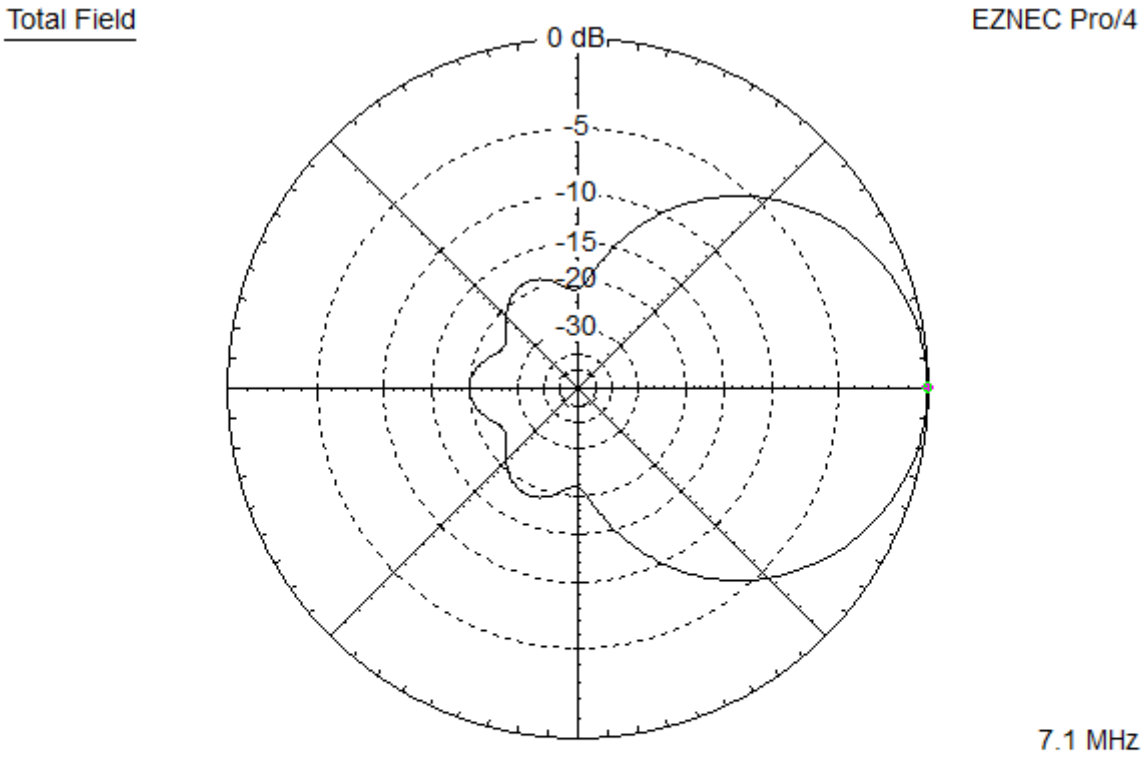
7150kHz, height 35m, horizontal at elevation 16 deg



Azimuth Plot	
Elevation Angle	17.0 deg.
Outer Ring	11.04 dBi
Slice Max Gain	11.04 dBi @ Az Angle = 0.0 deg.
Front/Back	21.28 dB
Beamwidth	73.8 deg.; -3dB @ 323.1, 36.9 deg.
Sidelobe Gain	-8.25 dBi @ Az Angle = 113.0 deg.
Front/Sidelobe	19.29 dB

Cursor Az	72.0 deg.
Gain	-2.34 dBi
	-13.38 dBmax

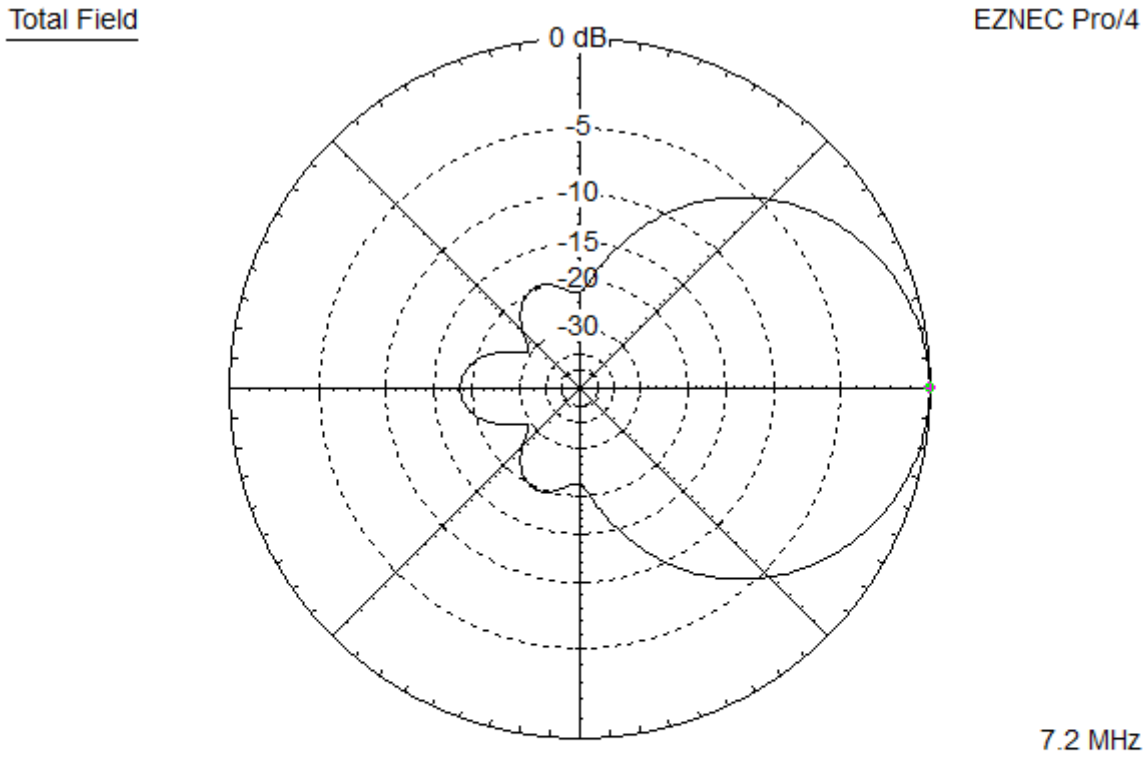
7150kHz, height 35m, horizontal at elevation 16 deg



Azimuth Plot	
Elevation Angle	17.0 deg.
Outer Ring	10.99 dBi
Slice Max Gain	10.99 dBi @ Az Angle = 0.0 deg.
Front/Back	20.02 dB
Beamwidth	74.0 deg.; -3dB @ 323.0, 37.0 deg.
Sidelobe Gain	-7.66 dBi @ Az Angle = 115.0 deg.
Front/Sidelobe	18.65 dB

Cursor Az	0.0 deg.
Gain	10.99 dBi
	0.0 dBmax

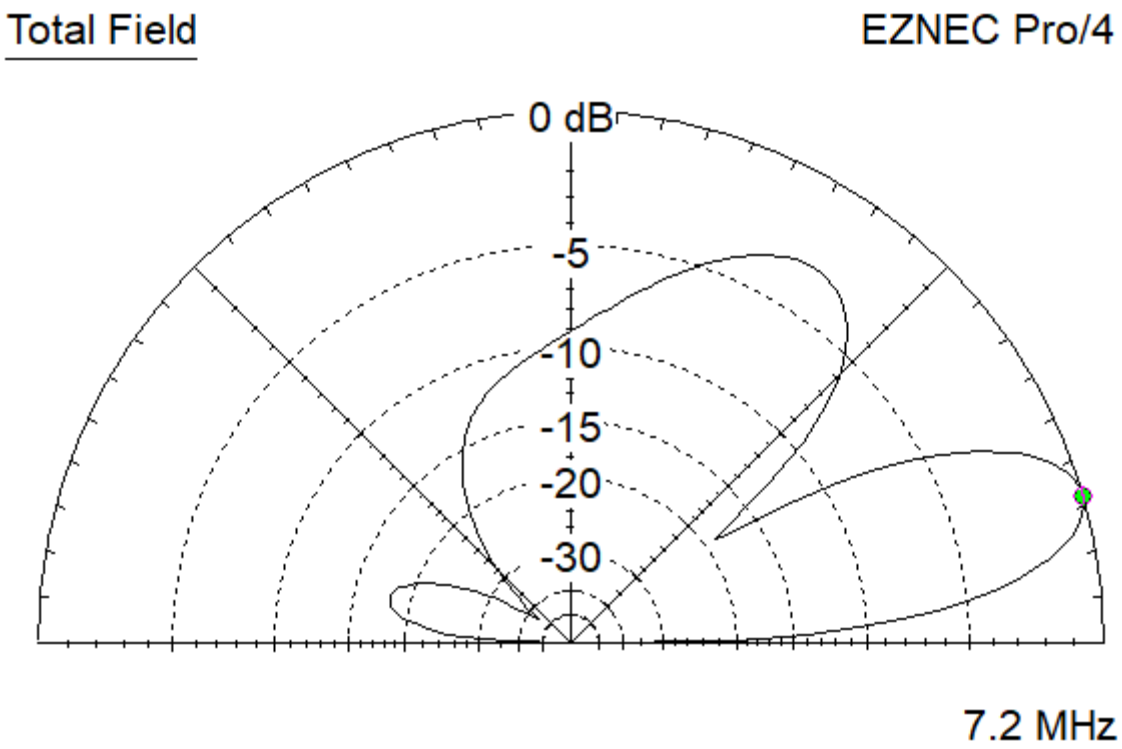
7150kHz, height 35m, horizontal at elevation 16 deg



Azimuth Plot		Cursor Az	0.0 deg.
Elevation Angle	17.0 deg.	Gain	11.06 dBi
Outer Ring	11.06 dBi		0.0 dBmax

Slice Max Gain	11.06 dBi @ Az Angle = 0.0 deg.
Front/Back	18.37 dB
Beamwidth	73.4 deg.; -3dB @ 323.3, 36.7 deg.
Sidelobe Gain	-7.31 dBi @ Az Angle = 180.0 deg.
Front/Sidelobe	18.37 dB

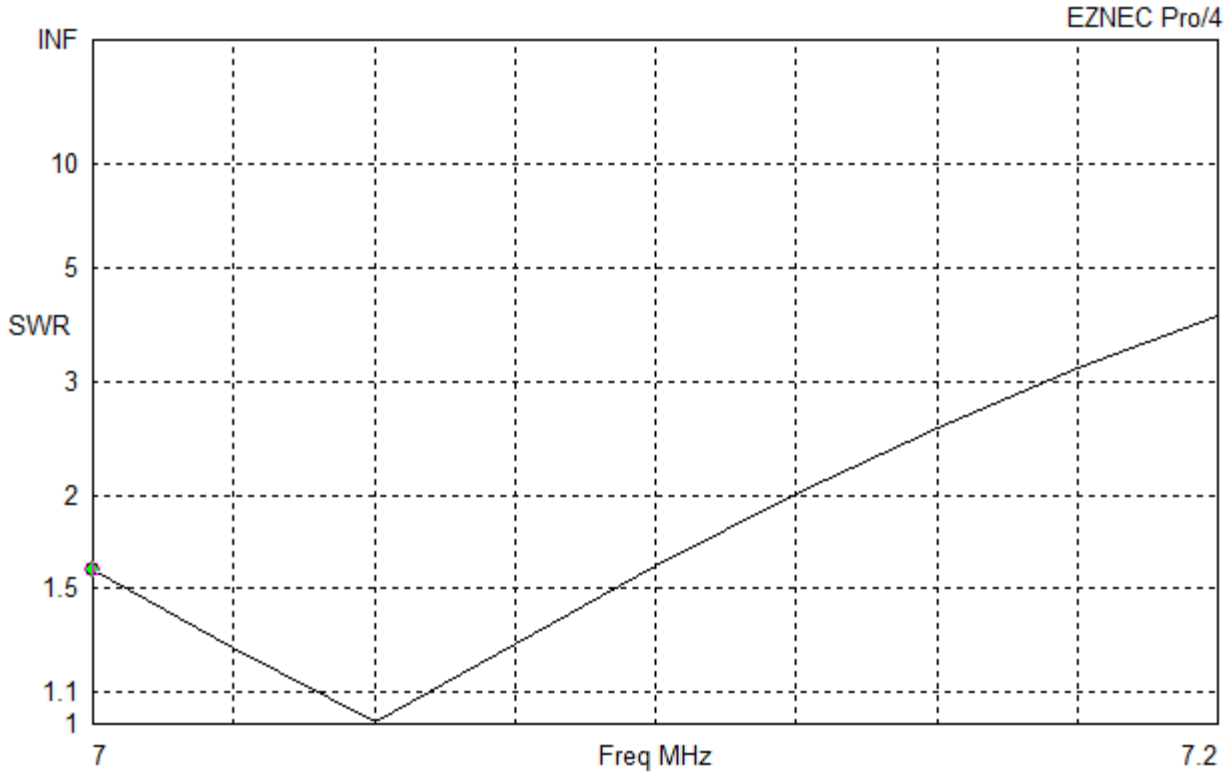
7150kHz, height 35m, vertical pattern



Elevation Plot	
Azimuth Angle	0.0 deg.
Outer Ring	11.07 dBi
Slice Max Gain	11.07 dBi @ Elev Angle = 16.0 deg.
Beamwidth	17.5 deg.; -3dB @ 7.9, 25.4 deg.
Sidelobe Gain	8.08 dBi @ Elev Angle = 56.0 deg.
Front/Sidelobe	2.99 dB

Cursor Elev	16.0 deg.
Gain	11.07 dBi
	0.0 dBmax

SWR alakaistalla



Freq	7 MHz
SWR	**1.58**
Z	32.52 at 8.73 deg.
	= 32.14 + j 4.937 ohms
Refl Coeff	0.2251 at 161.1 deg.
	= -0.213 + j 0.0729
Ret Loss	13.0 dB

Source #	1
Z0	50 ohms

SWR yläkaistalla