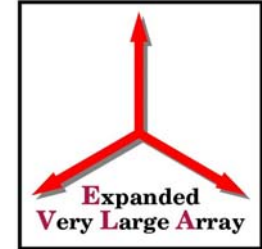# C-Band Feed
Design and Prototype Tests

S. Srikanth

NRAO/Charlottesville

EVLA Receiver Bands

Band	Freq. (GHz)	Bandwidth Ratio	Feed Type
L	1-2	2:1	Compact Horn
S	2-4	2:1	Compact Horn
C	**4-8**	**2:1**	**Compact Horn**
X	8-12	1.5:1	Linear Taper Horn
Ku	12-18	1.5:1	Linear Taper Horn
K	18-26	1.44:1	Linear Taper Horn
Ka	26-40	1.53:1	Linear Taper Horn
Q	40-52	1.3:1	Linear Taper Horn
Note: All horns are corrugated horns.			

C-Band Feed Details

Aperture ID = 22.118 (11.2 λ)
Aperture OD = 24.25
Length = 66 (33.5λ)
Input Dia. = 1.875
Θ input = 8°
Θ max = 12°

(all dimensions = inches)
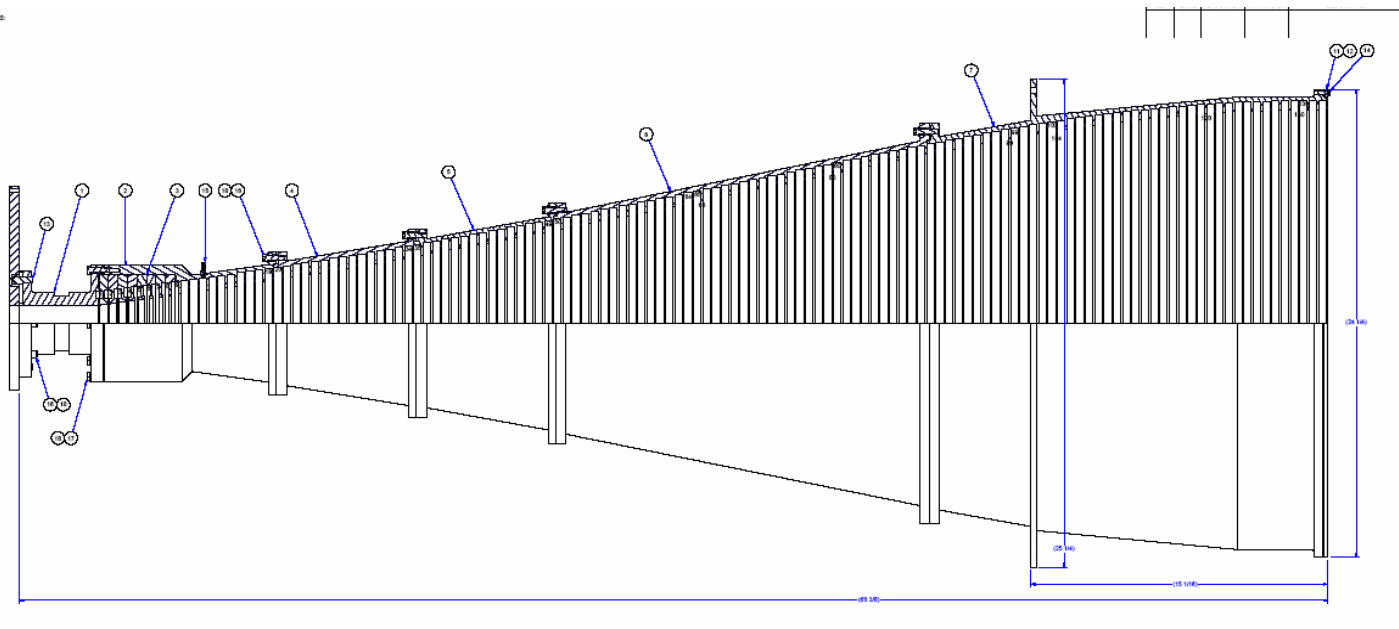
Corrugations
Total = 132
Ring-loaded = 7
Pitch = 0.563
Flange width = 0.090
Corrug. width = 0.473
No. per λ = 3.5

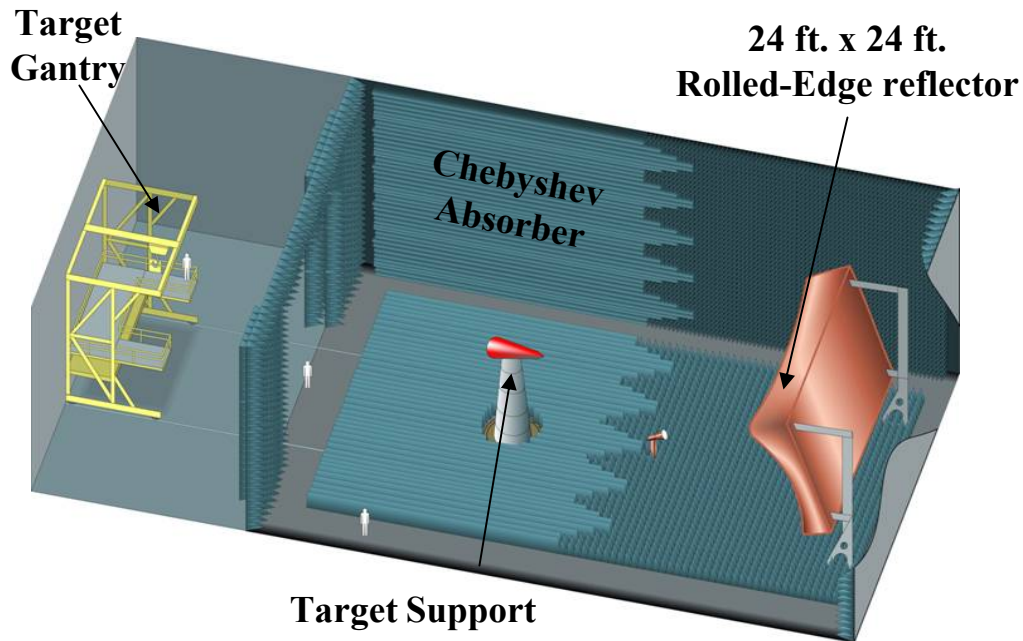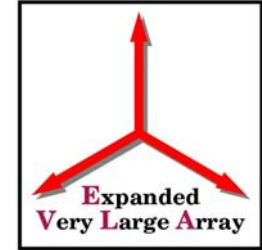# C-Band Prototype Work in Progress

MIT Lincoln Laboratory Compact Range

Target Gantry

Chebyshev Absorber

24 ft. x 24 ft. Rolled-Edge reflector

Target Support

Frequency coverage: 400 MHz - 100 GHz
Quiet zone size: 12 ft.
Max target weight: 2,000 lb

- Range: 400 MHz – 100 GHz
- Chamber: 66′ L x 44′ W x 38′ H
    36″ pyramids – feed to reflector
    36″ – 44″ wedge – feed to back wall
    36″ – 44″ pyramids – back wall
    Temperature: 68° - 72° F
- Reflector: Rolled–edge;
    Aperture – 24′ x 24′
    Parabolic Section – 10′ x 10′;
     rms < 0.0015″
    Focal length – 24′
- Quiet Zone: 12′ x 12′ x 12′; 19′ center
- Isolated concrete slab

S. Srikanth

EVLA Feed CDR
February 17, 2005

EVLA Feed Horn Under Test in the New Lincoln Laboratory Compact Range (11 August 2004)
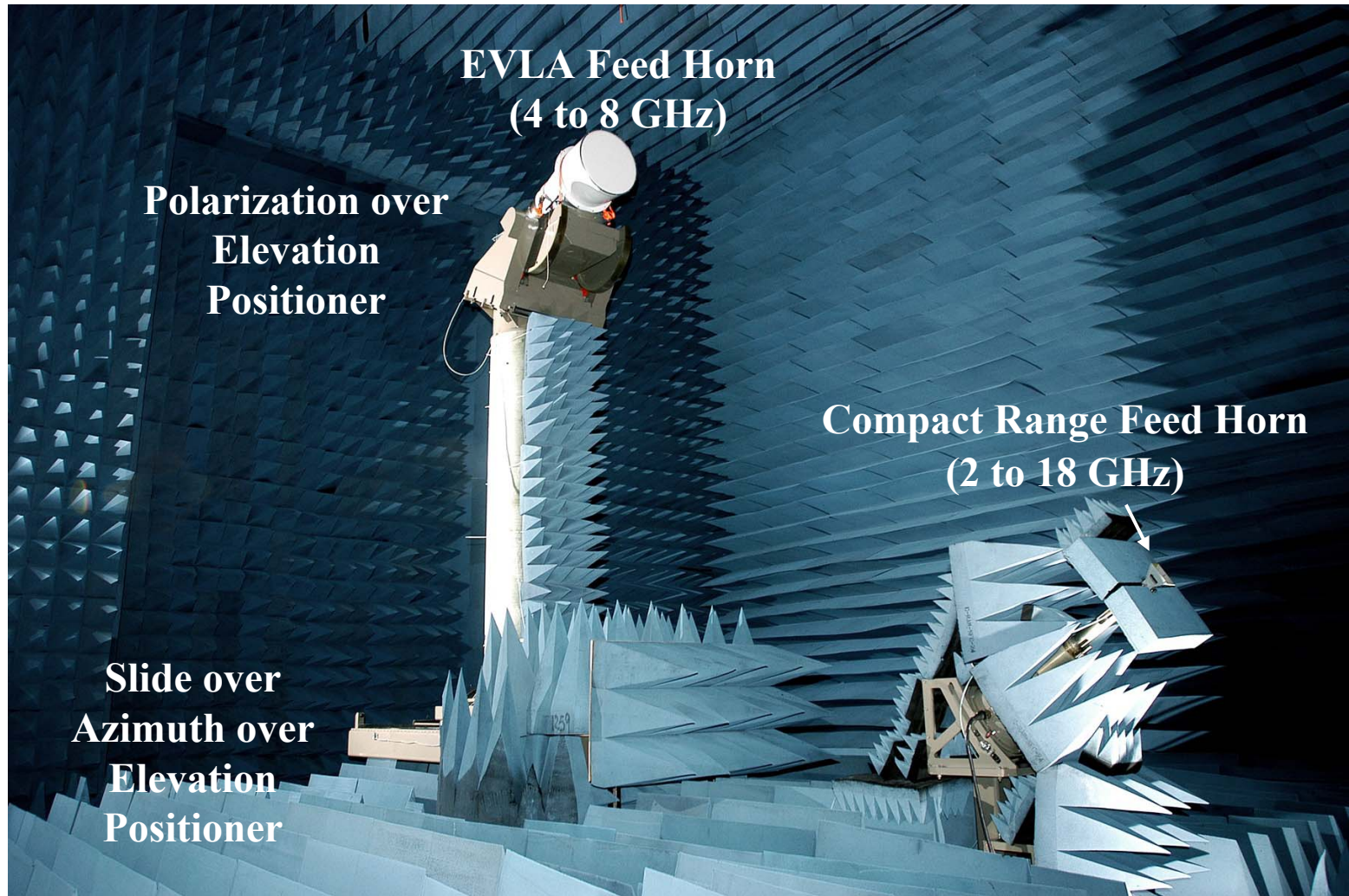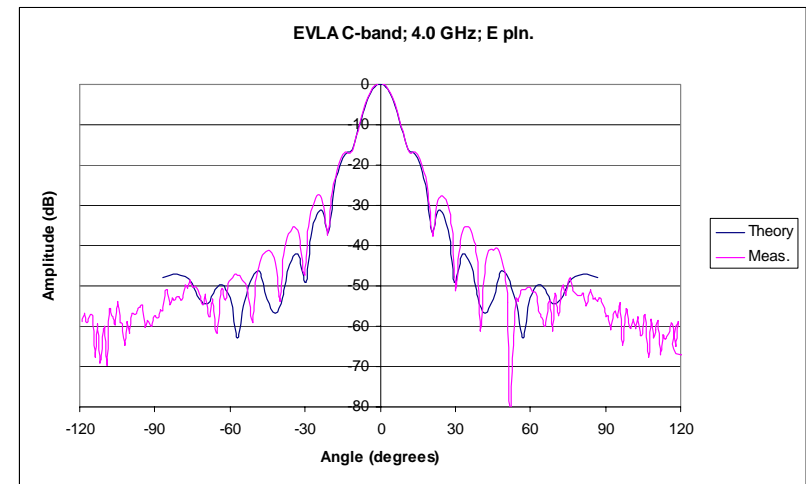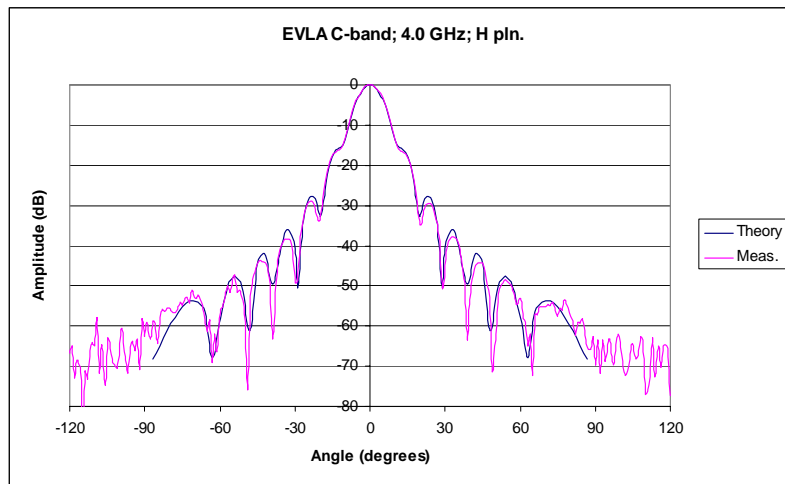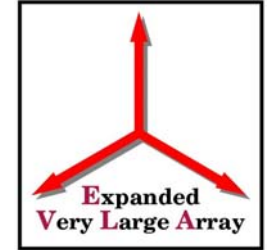
Test Adapters

- 3.95 to 5.85 GHz

  Need: 1.875 dia. to WR–187 (1.872 x 0.872)

  Built: 1.875 dia. to WR–187 stepped transition; 12 sections; 11″ long; $S_{11} < -20$dB

- 5.85 to 8.20 GHz

  Need: 1.875 dia. to WR–137 (1.37 x 0.622)

  Available: 1.75 dia. to WR–187

  Built: (a) 1.875 dia. to 1.75 linear transition

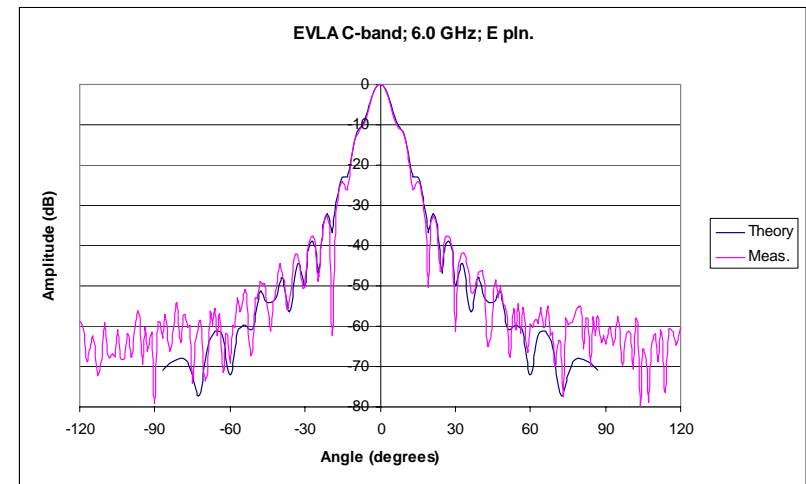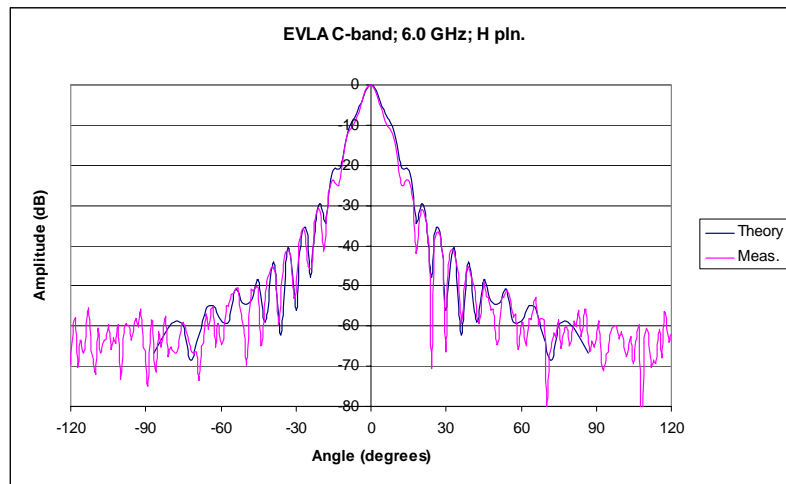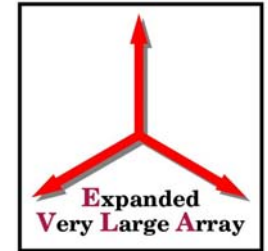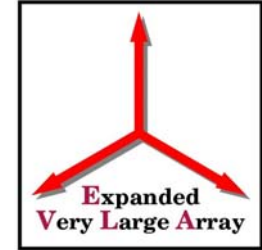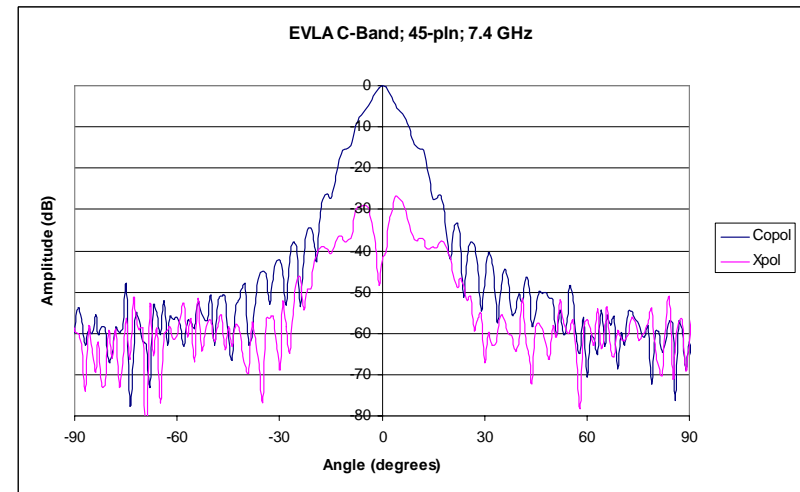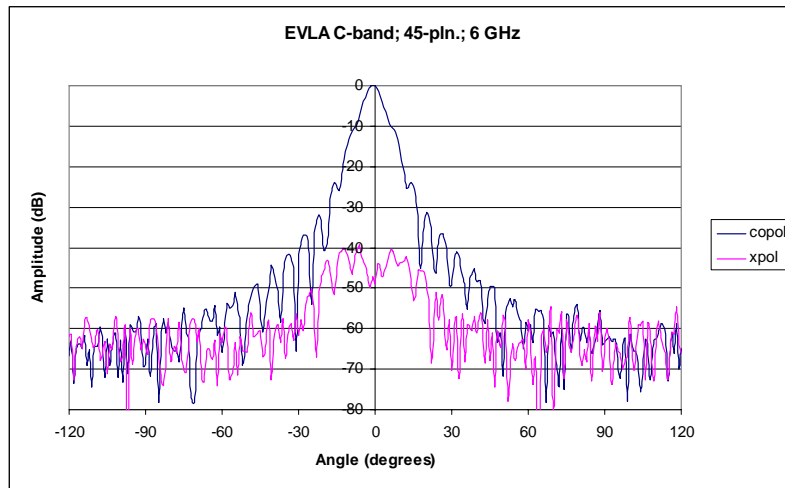 (b) WR–187 to WR–137 stepped transition; 9 sections; 5″ long

Theory & Measured
4.0 GHz

Theory & Measured 6.0 GHz

Theory & Measured
8.0 GHz

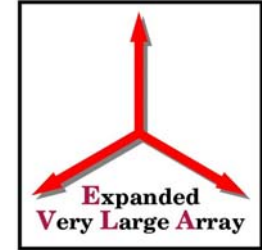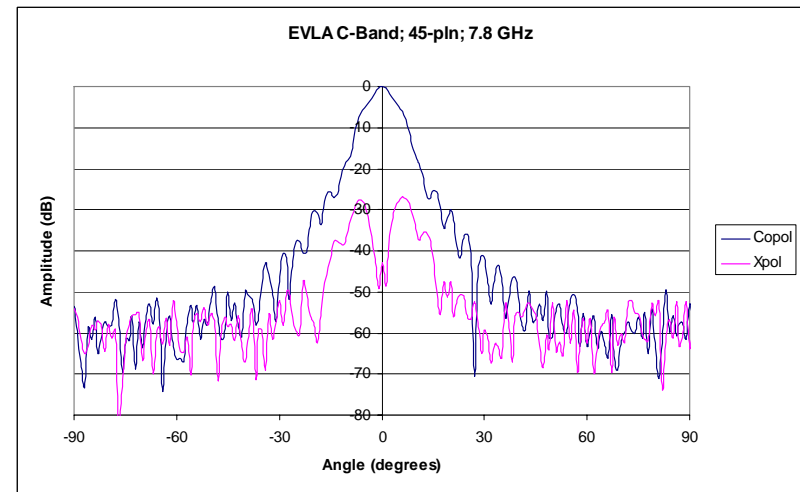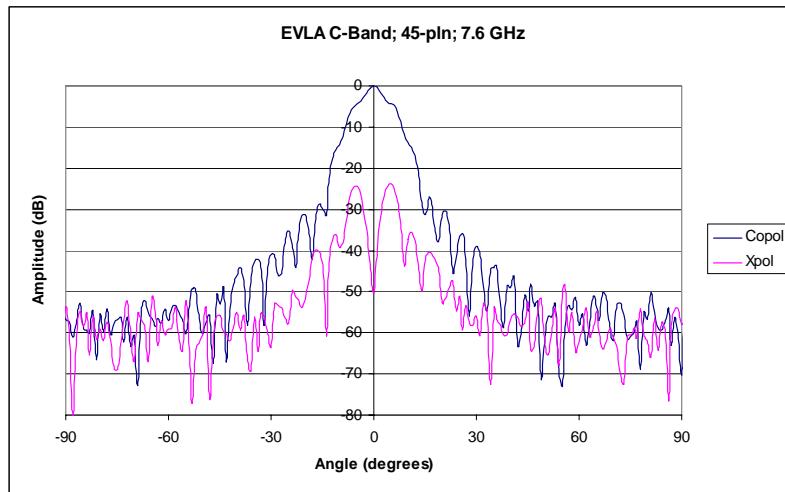EVLA C-band; 8.0 GHz; H pln.
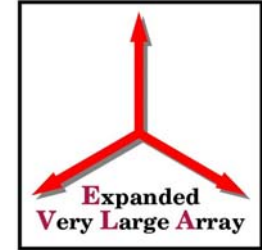
EVLA C-band; 8.0 GHz; E pln.
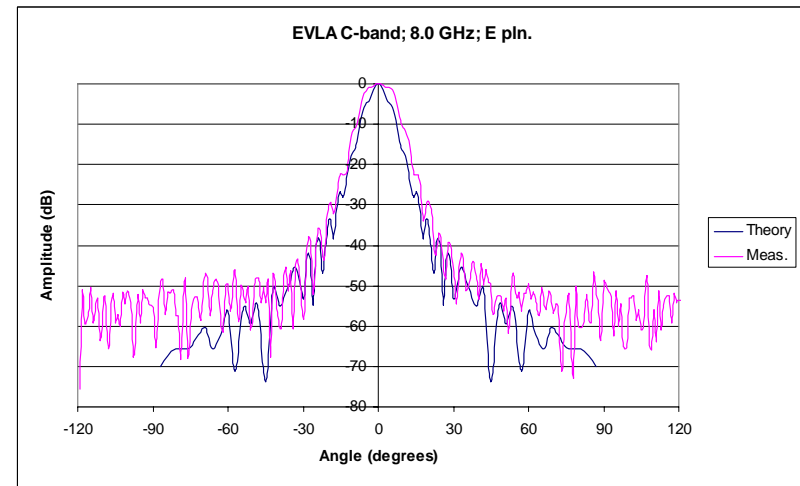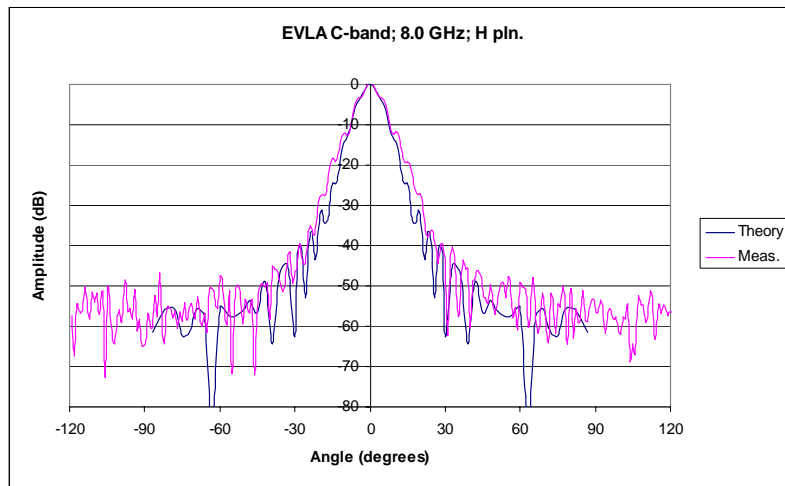
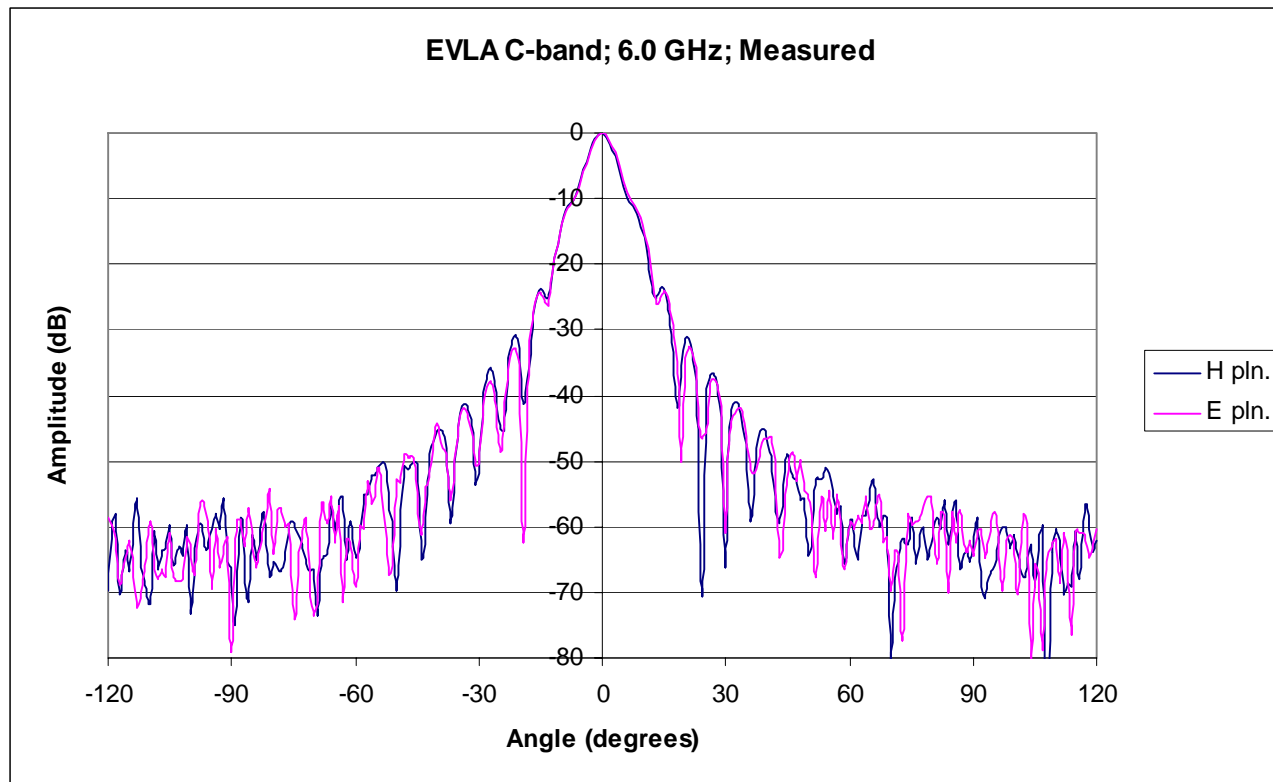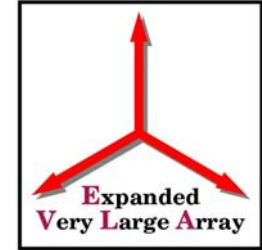# Co- & X-Polarized Field Patterns - Measured

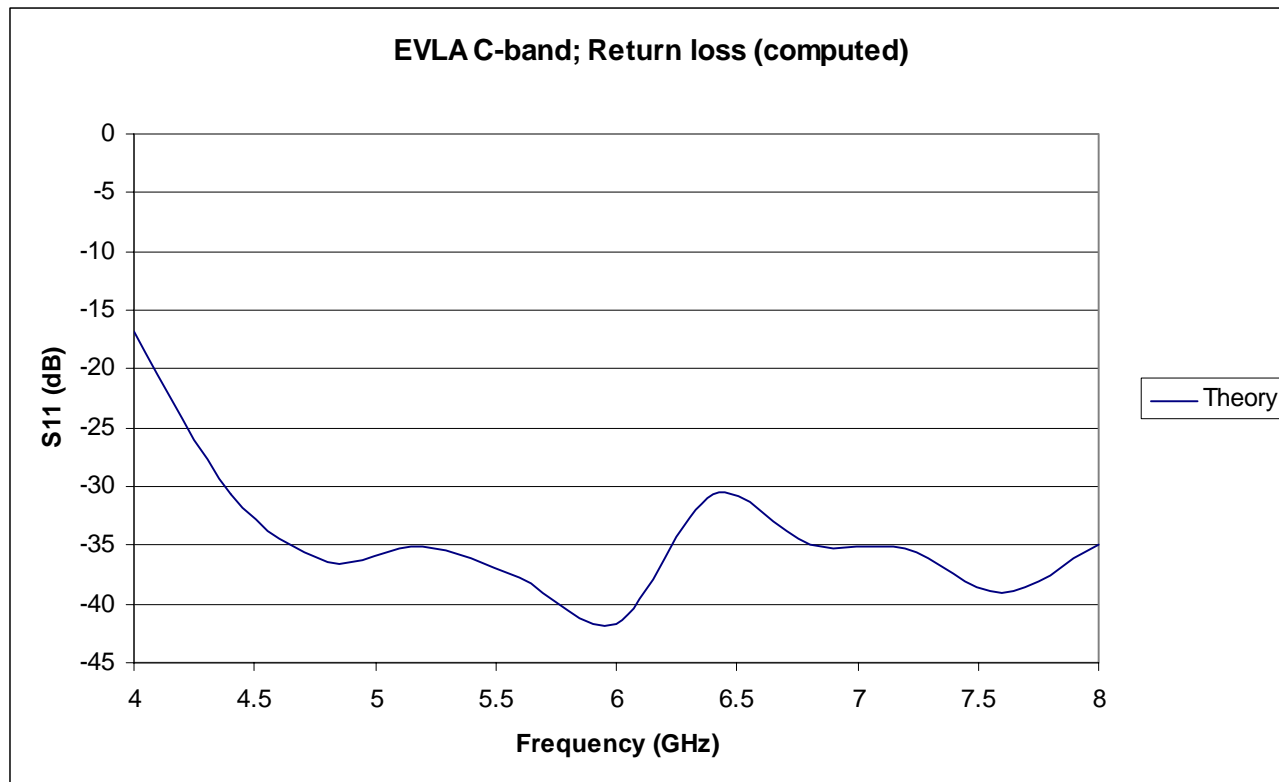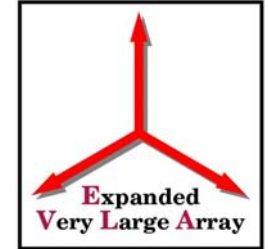# Co- & X-Polarized Field Patterns - Measured

EVLA C-Band; 45-pln; 7.6 GHz

EVLA C-Band; 45-pln; 7.8 GHz

Measured E- & H- Plane Patterns - 6.0 GHz

EVLA C-band; 6.0 GHz; Measured

Computed Return Loss

EVLA C-band; Return loss (computed)

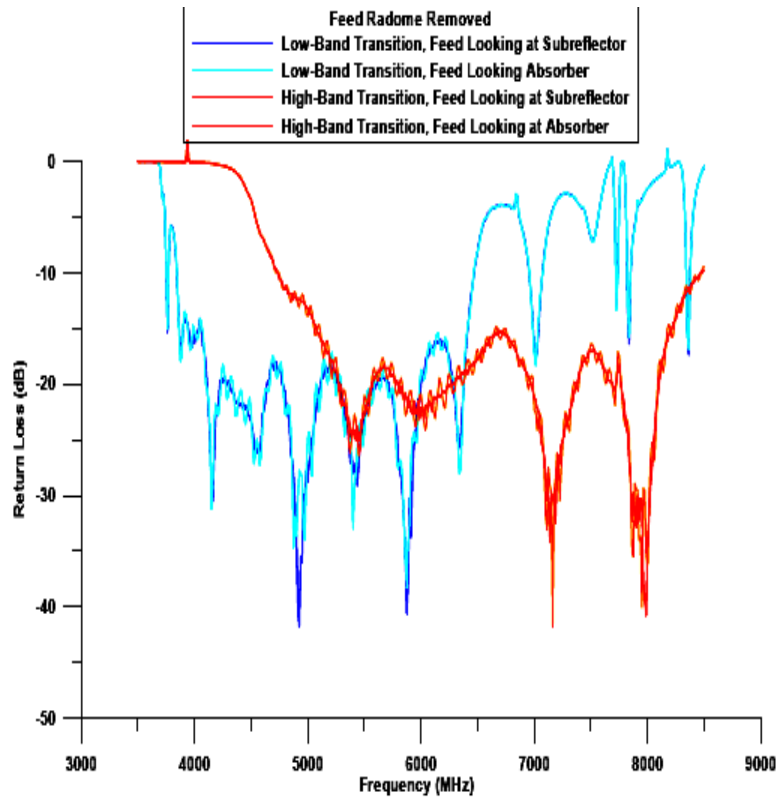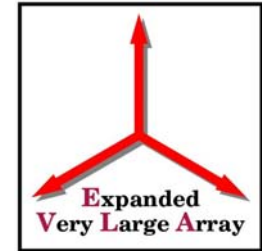# Return Loss of C-Band S/N 2 While Installed on Antenna 14
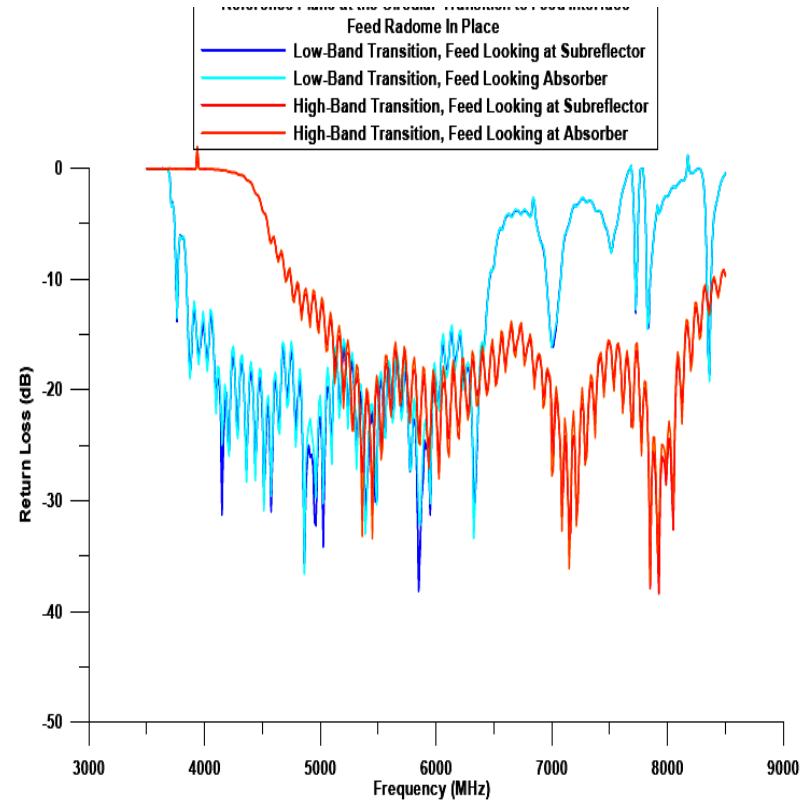
Feed As Installed On the Antenna

C-band feed layout
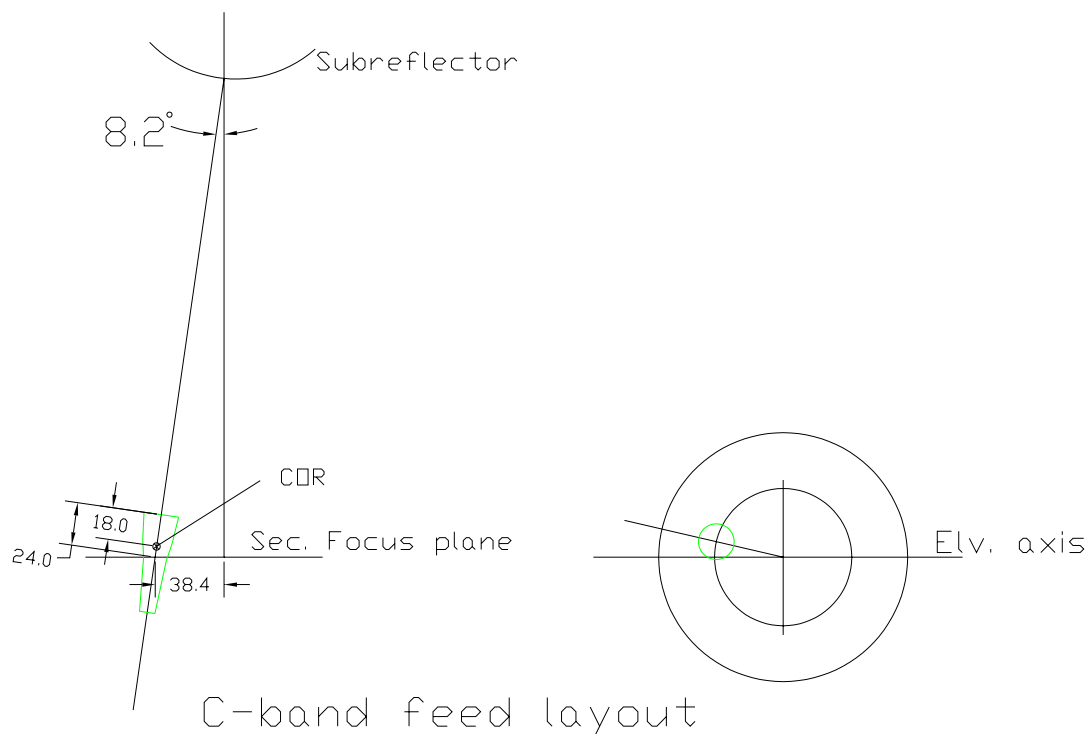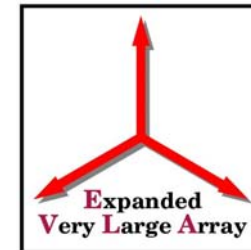
C-Band Feed Summary
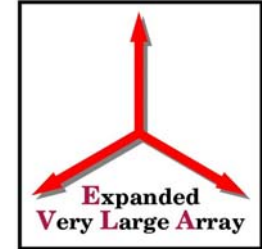
Freq. (GHz)	Taper at 9.3°		X-pol	PC
	H	E		
4.0	-11.9	-12.3	-34.1	14.2
4.4	-12.2	-12.0	-31.5	
4.8	-11.2	-11.8	-31.5	
5.2	-12.4	-11.8	-32.2	28.8
5.6	-11.6	-11.4	-36.7	
6.0	-13.0	-13.2	-39.2	42.6
6.4	-13.3	-11.9	-32.8	
6.8	-12.5	-13.5	-25.8	
7.2	-16.2	-15.9	-31.0	
7.6	-12.0	-12.0	-25.0	
8.0	-11.8	-10.2	-24.0	