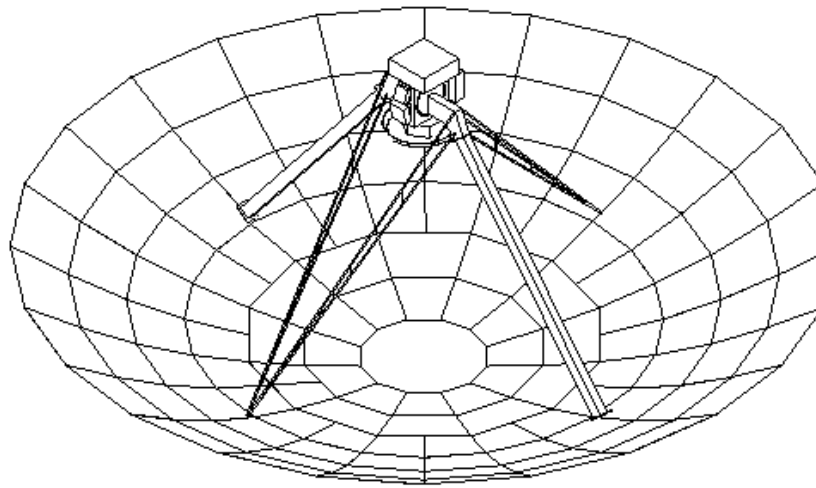
Choice of Cassegrain Geometry

SUMMARY

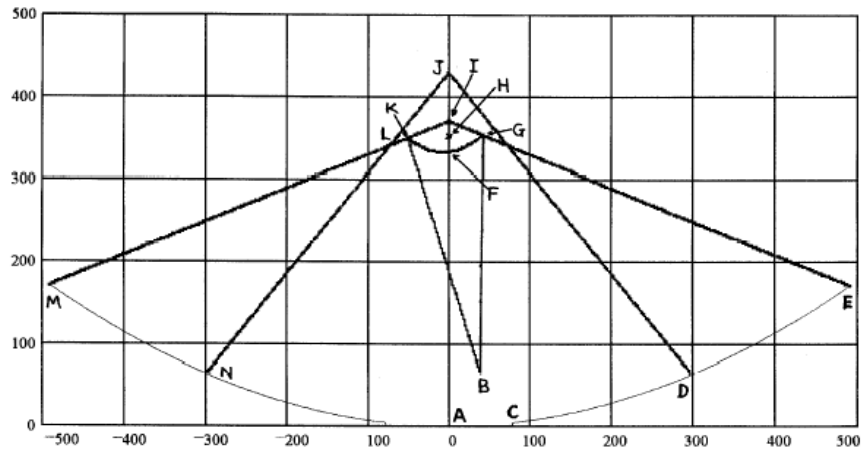
- Background
- The problem of long wavelengths
- The possibility of a larger subreflector
- The possibility of an ultrawideband feed

Requirements Impacting Feed System Design

- Phase I : provide secondary focus feeds for 1- 50 GHz
- Phase II : provide prime focus feeds for 0.3 – 1 GHz
- Keep all bands working during transition period
- Budget constraints



Long Wavelength Problems



• Subreflector subtends 18 deg. Feed aperture is 7 wavelengths. Feed is large at L Band.

•Possible solutions:

(a) Use a larger subreflector

(b) Move the secondary focus closer to the subreflector

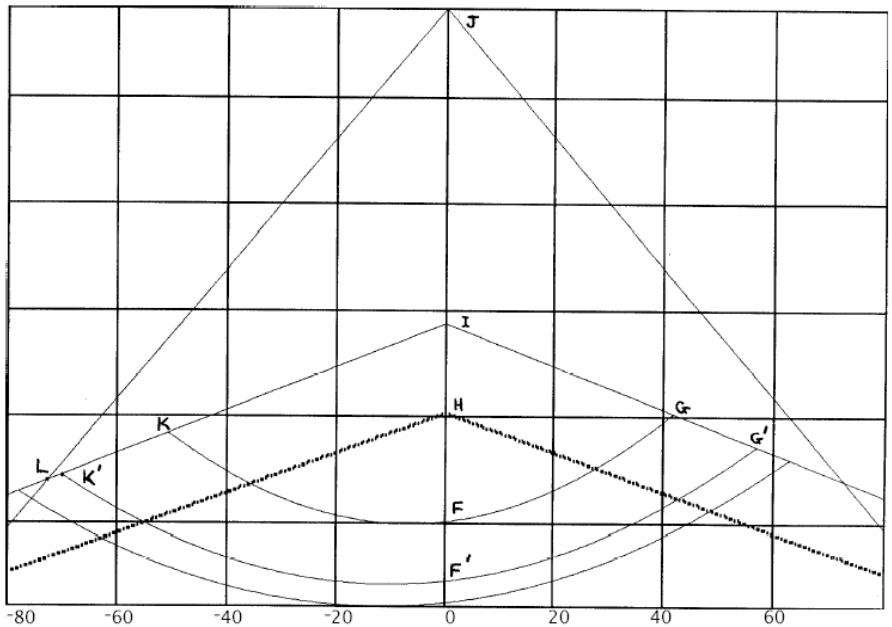
A Larger Subreflector

Advantages

- Smaller feeds
- Better long wavelength performance

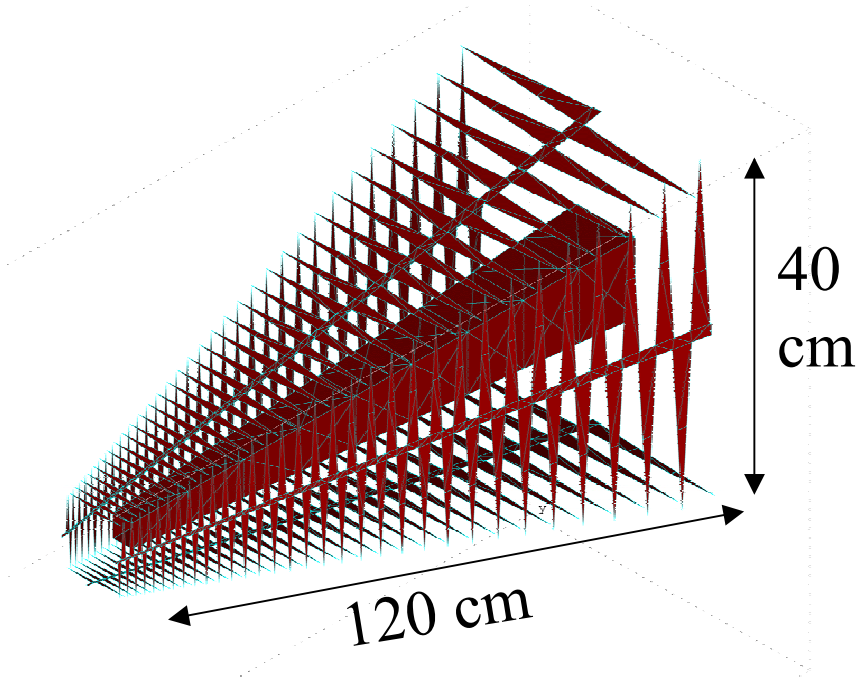
Disadvantages

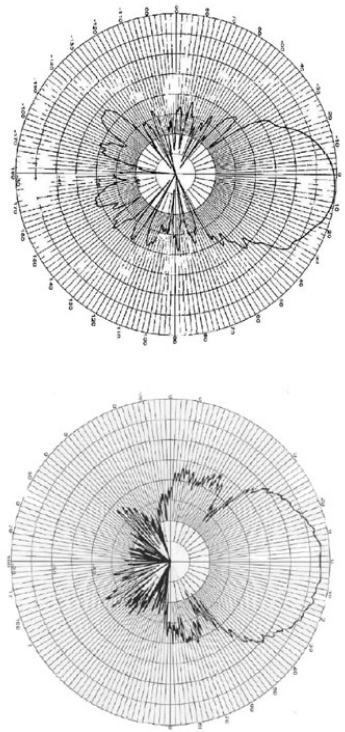
- Large cost for small gain
- Existing feeds do not work
- 300 MHz feed does not work
- Phase II subreflector rotator more difficult
- Greater risk to high frequencies



ATA Wideband Feed

ATA Feed: 0.5-11 GHz, subreflector subtends 85 deg

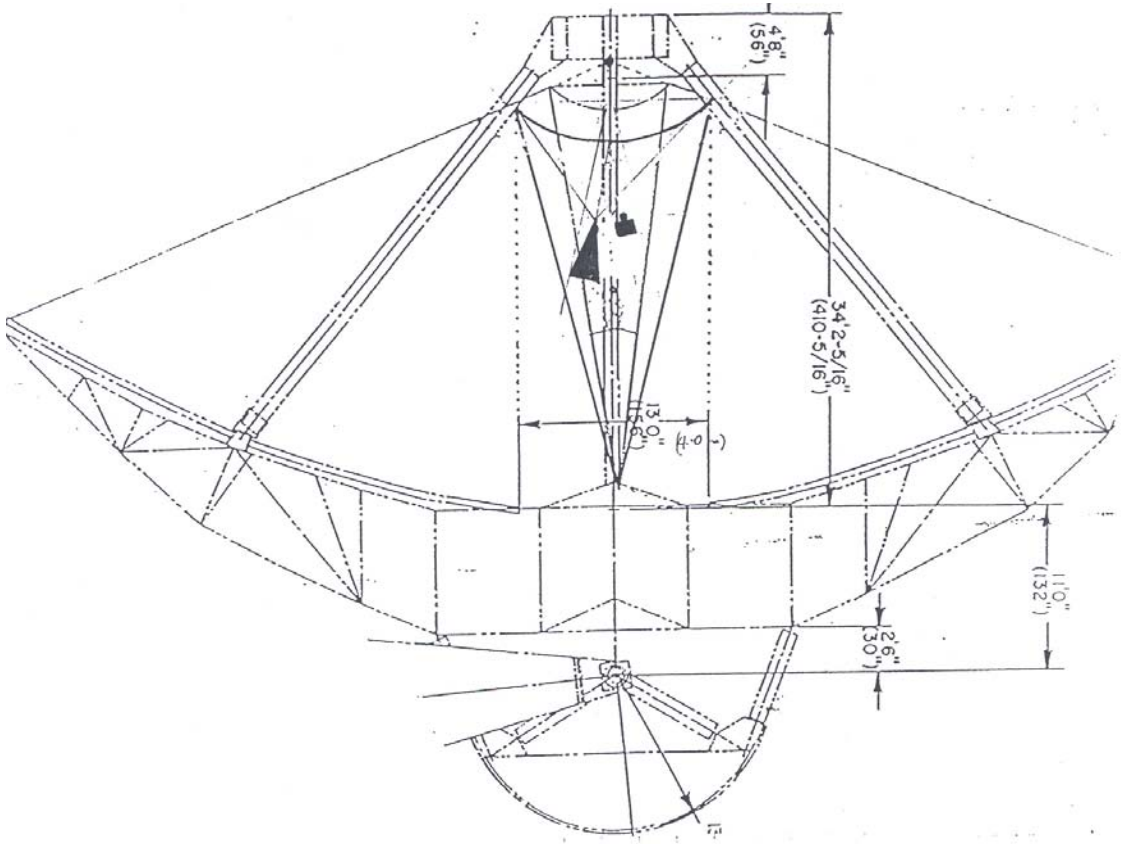




Use of ATA-type Feed on EVLA Antenna

ASSUME

- ATA-feed 0.3-18 GHz
- K, Ka, Q Band receivers used on new feed circle



Advantages/disadvantages of ATA-type Feed

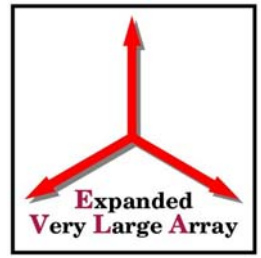
<u>Advantages</u>

- Lower cost

<u>Disadvantages</u>

- 0.75 G/T loss at zenith, 0.5 G/T loss at 45 deg elev
- High instrumental polarization
- Linear polarization – transition complexity
- Increased beamsquint
- Current feeds do not work
- Need feed focussing


NRAO


Expanded
Very Large Array