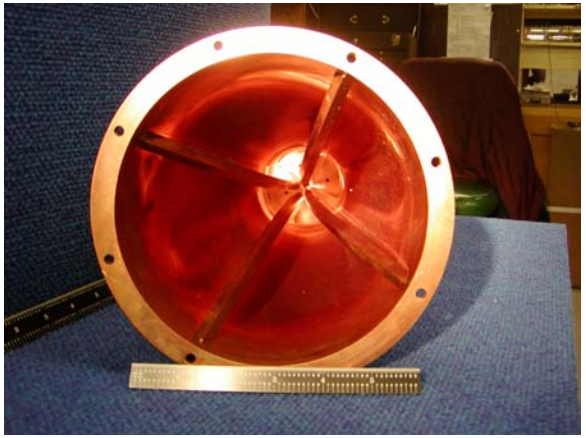
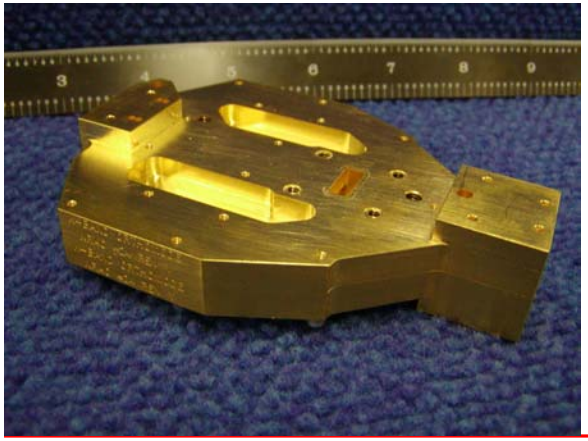
EVLA Front Ends

- 1 – 50 GHz Coverage
- In 8 Bands
- Dual Circular Polarization

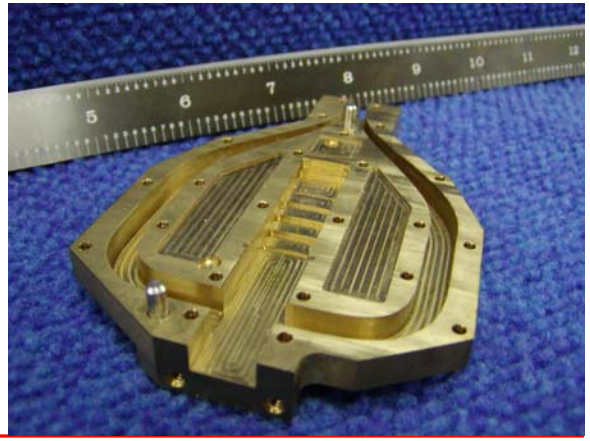
OMTs

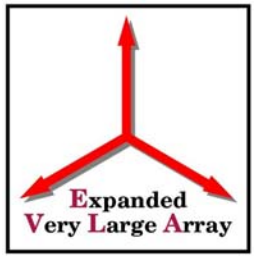
Quad-ridge





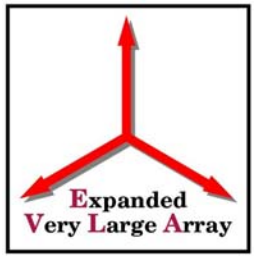
Bøifot Symmetric Junction





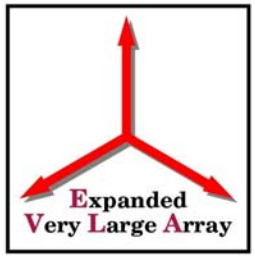
Bands 1 – 2, 2 – 4, 4 – 8

- Quad-Ridge OMT & 90º Hybrid
- Design Scaled for frequency
- Commercial Stripline Hybrids



Bands 12 – 18, 18 – 26, 26 – 40

- Corrugated Phase Shifter
- Bøifot OMT
  - 18 – 26 GHz in Production Now.



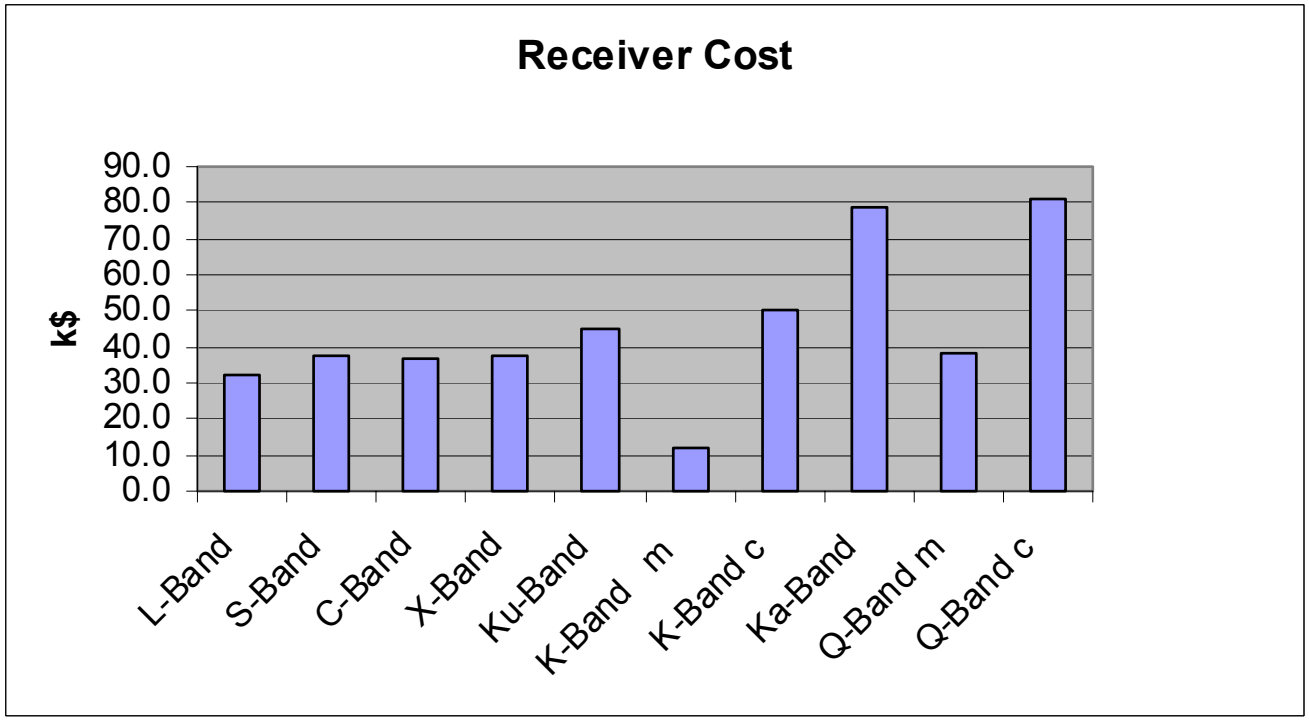
Band 8 – 12

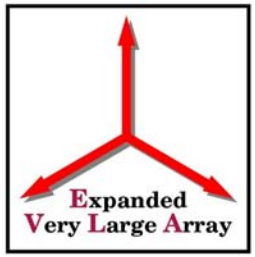
Quad-ridge or Bøifot; depends on size.

Band 45 – 50

Sloping Septum, in Production Now.

Cost per Receiver





Advice Sought:

- Octave Bandwidth Quad-Ridge OMT
- “Headroom”
- MMICS

Quad-Ridge OMT

Critical Areas

- Octave Bandwidth
  - 2:1 at ~20 dB has been done.
- Higher Modes
  - Above cutoff: affect beam
  - Below cutoff: "suckouts"
  - $TE21_L$ most troublesome

Quad-Ridge OMT

Design Approach:

Circular-to-Quad-Ridge Waveguide:

treat as impedance transformer

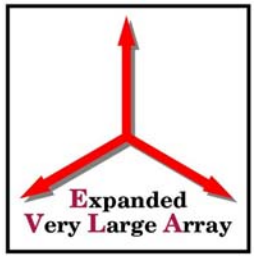
Quad-Ridge to Coax:

design for match

Q-R OMT Modes

Trapped Modes

- Q ~1000
- Coupling fairly weak, ~ -25 dB
  - Effect on beam?
  - “one-pass” loss ~ 0.014 dB

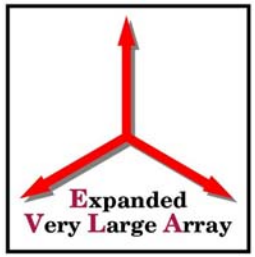


Shorting Pins at $\lambda/4$

- Short out TE11 modes
- Pass $TE21_L$ mode to absorber
  - Assures one-pass for $TE21_L$

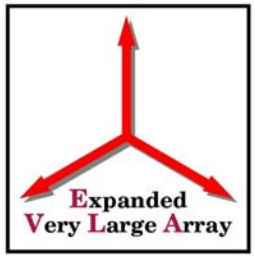
Headroom

- What is it?
- How Defined? (TOIP? 1dB? 1%?)
- How Measured?
- How Much Do We Need?
  - "As much as we can get, or..."



Headroom Against What?

- Narrow-Band
- Pulsed
- Noise-like
- Component Variations



How Much Can We Afford?

- Dollars
- Tsys
- Size and Power Dissipation

MMIC Solution for a High Dynamic Range "Solar" Capable Receiver
⇒ Ka-Band ⇐