Manufacturing and Test

Feeds and Polarizers
Outline

• Scope
• Manufacturing
• Machining
• Electroforming
• Plating

• Moisture & Corrosion Control
• Window & Radome
• Testing
## Scope

<table>
<thead>
<tr>
<th></th>
<th>QTY. (7yrs.)</th>
<th>Manufacturing Method</th>
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<tbody>
<tr>
<td><strong>Feeds</strong></td>
<td></td>
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<tr>
<td>Linear Taper</td>
<td>90</td>
<td>Machined</td>
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<tr>
<td>Profiled</td>
<td>90</td>
<td>Laminated</td>
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<td><strong>OMT</strong></td>
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<tr>
<td>Quad-ridge</td>
<td>90</td>
<td>Electroformed</td>
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<td>Boifot Sym.</td>
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<td>Machined</td>
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<td><strong>Phase Shifters</strong></td>
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<tr>
<td>Waveguide</td>
<td>90</td>
<td>Electroformed</td>
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<tr>
<td>Hybrid</td>
<td>90</td>
<td>Purchased (COTS)</td>
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<tr>
<td><strong>Transitions</strong></td>
<td>180</td>
<td>Electroformed</td>
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</tbody>
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OMTs

Quad-ridge

Bøifot Symmetric Junction
Phase Shifter and Transitions
Manufacturing

• Top Level Plan
  – Update Existing Drawings (K & Q Band)
    • Dimensions
    • Solid Models
  – Feeds
    • L, S, & C Band (Ruff)
    • X-Q Band (Szpinztor)
  – Polarizers (Szpinztor)
Machining

- Prototype Options
  - CV/Green Bank
  - VLA
  - NMT
  - Albuquerque

- Production
  - Mexican Partner (Primary)
  - VLA, CV/Green Bank, NMT, Albuquerque (Secondary)
Electroforming

- Prototypes
  - CV
  - AJ Tuck Brookfield, CT (VLBA L-band OMT)

- Production
  - Mexican Partner (Primary)
  - CV
  - AJ Tuck
  - Custom Microwave Inc. (Longmont, CO)
Plating

- Plating thickness and galvanic issues
- Prototypes
  - CV
  - Albuquerque (10 shops)
- Production
  - Mexican Partner (Primary)
  - New Mexico (18 shops)*
Moisture & Corrosion Control

- **Feeds**
  - Chromate Conversion
  - Sealed Junctions
  - Dry Environment
    - Desiccant
    - Pressurized Dry Air
    - Nitrogen

- **Polarizers**
  - Minimized by putting all components in dewars
  - Minimize galvanic voltages
Window & Radome

• Design for minimum reflections and losses at up to 2:1 BW
• K/Q Band Model
  – Radome: environmental protection, non-absorbent, good UV characteristics
  – Feed Window: moisture seal, protect against insect/rodent access and nesting
  – Vacuum Window: Interface feed to receiver
Testing
Feeds and Polarizers

• Prototypes
  – Full amplitude and phase characterization
  – RF Leakage
  – CV
  – Green Bank

• Production
  – SWR and Patterns
  – Min. every 3\textsuperscript{rd} to 5\textsuperscript{th} unit
  – Monitor process variation and personnel turnover
Testing
Resources & Options

• AOC Test Equipment upgrades for S-parameter measurements for 1-50 GHz

• Pattern Measurement Options
  – Develop Socorro Range (existing HW + acquire surplus HW)
  – In State Ranges
    • Sandia/AFRL, Albuquerque
    • New Mexico State University, Los Cruces
    • Army/ Air Force, WSMR
  – Out of State Ranges
    • Green Bank
    • JPL, Pasadena
  – Cost Evaluation (Equipment, Travel, Shipping, Range Time)