



# ALMA OMTs

John Payne Tribute Day

October 26, 2006



ALMA Front End IPT

John Payne Tribute Day - October 26, 2006

*NRAO is a facility of the **National Science Foundation**  
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# What's an OMT?

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- OMT = Orthomode Transducer
- A device that separates the incoming beam into orthogonally-polarized components.
- Required for maximum receiver sensitivity.
- Can be waveguide or quasi-optical (wire grid).
- Low loss and good match are critical.



# OMT Development at NRAO

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- OMTs for cm-wave RXs
  - Tapered quad-ridge waveguide with coax outputs.
- OMTs for mm-wave RXs
  - Boifot junction type (symmetric E-plane arms), with square WG input and rectangular WG outputs.
  - Inherently broadband (full WG band coverage)
  - R&D begun by Ed Wollack at CDL, late-1990s.
  - **John Payne was the catalyst for pushing development to W-band (3mm) and beyond.**





# Development Hurdles for mm-wave OMTs

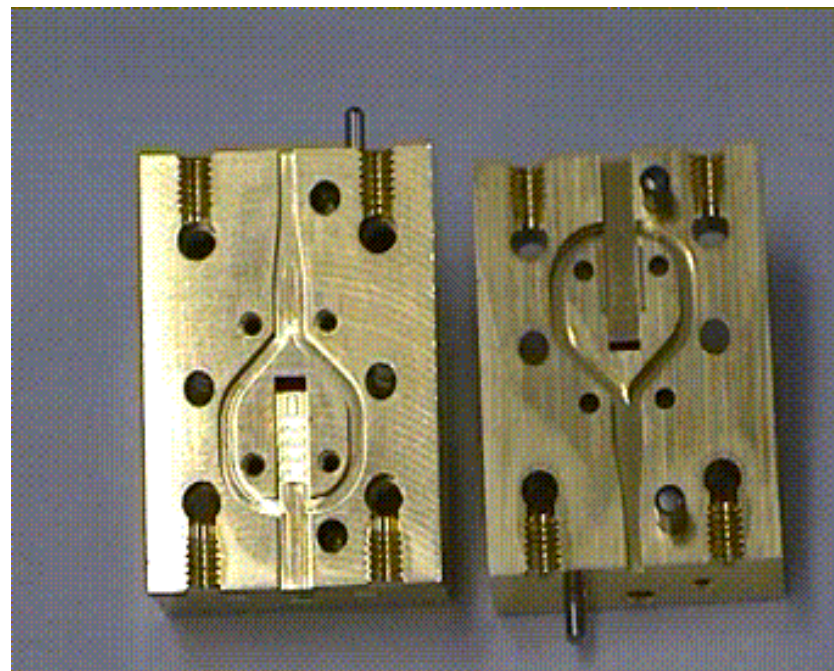
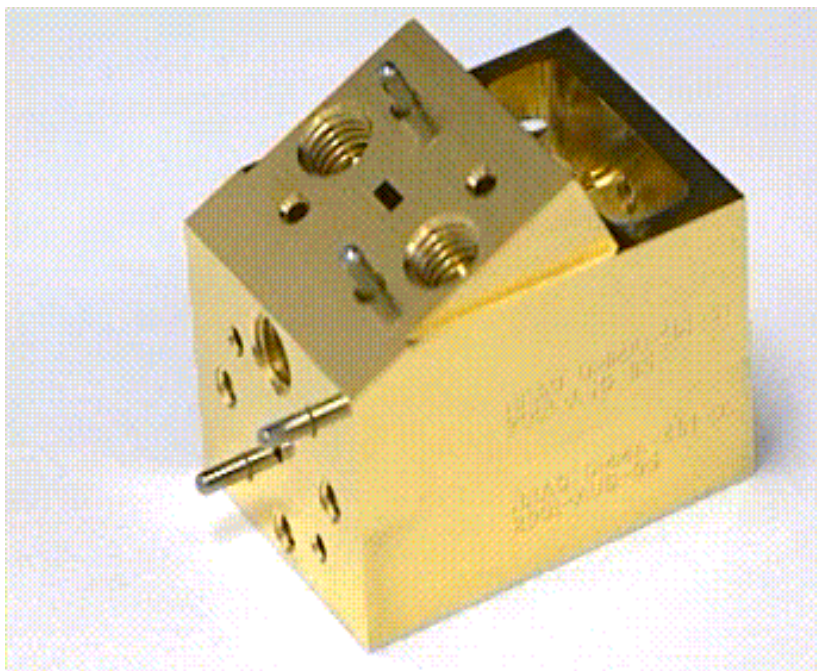
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- Difficult to machine (high tolerances)
  - Costly test equipment (up to 275 GHz!)
  - Fairly high risk (no backup option)
  - A leap of faith (will it actually work at 1mm?)
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- Thanks to John Payne's vision and unwavering support, OMT development for ALMA was a success. Also used on AMiBa, GBT.



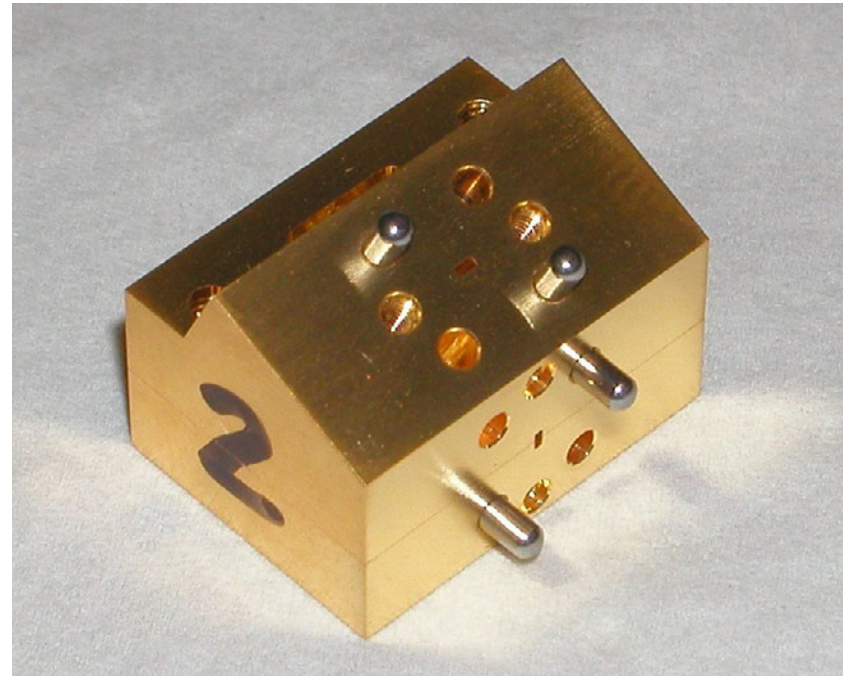
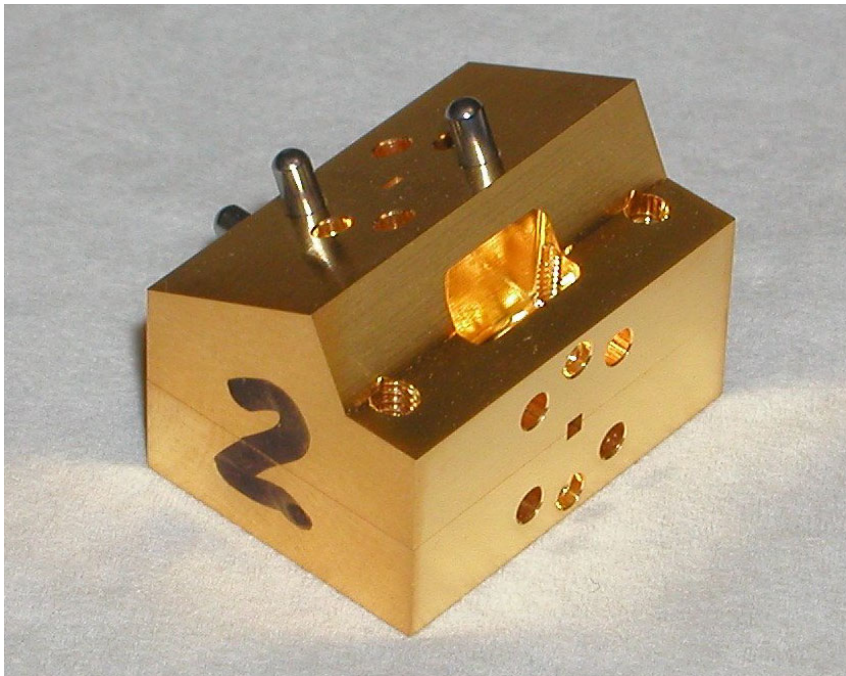
# Band 3 OMT (84-116 GHz)

Production Version



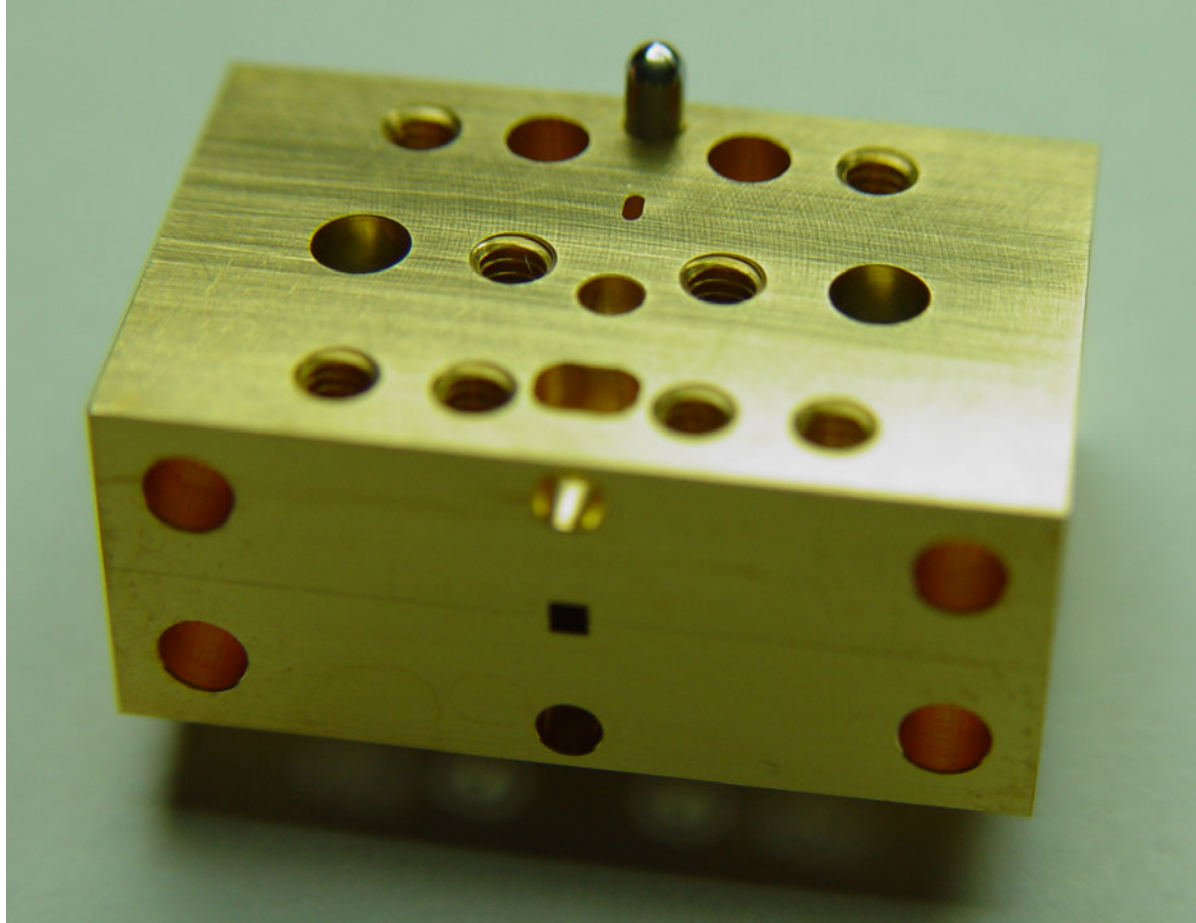
# Band 6 OMT (211-275 GHz)

0.37:1 scaled 'Proof-of-Concept' device



# Band 6 OMT (211-275 GHz)

Production Version - external (photo: G. Reiland)



# Band 6 OMT (211-275 GHz)

Production Version - internal (photo: G. Reiland)

