ALMA OMTs

John Payne Tribute Day
October 26, 2006
What’s an OMT?

• 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

• 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

- 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?)

- 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)