



RMC VI – Risk Management: An Astronaut's Perspective  
STS-114 PLT Jim "Vegas" Kelly 12/7/05



- STS-114 Overview DVD
- ET Foam and Gap Fillers
- #1 risk prior to STS-114 (Crew)
- 3 risk trades
  - Control Moment Gyro (CMG) Return Configurations
  - Re-supply Stowage Rack (RSR) Thumbscrews
  - Cure-In-Place Ablative Applicator (CIPAA) System
- Q&A



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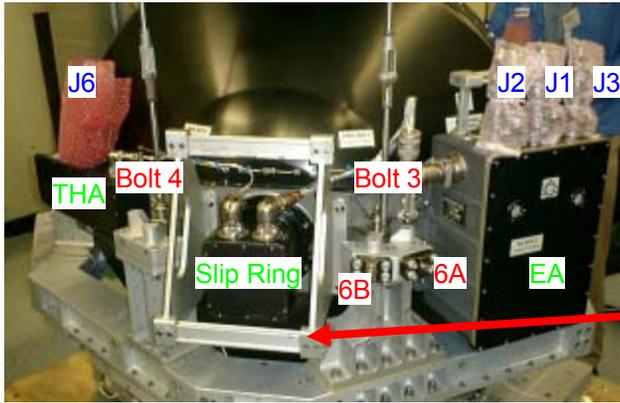




- **CMG Entry Configuration**
  - Structural analysis resulted in all 6 bolts and 4 shims required for Entry loading
  - No-friction analysis (standard)
  - Ops is required to look at all 1 failure cases
    - 5 – 10K hours of work for Ops community
    - Numerous NBL runs and VR lab runs
    - Included throw away and temp stow scenarios
  - Catastrophic Failure?

# CMG Nomenclature

- Remove CMG sequence (try this on Oct.28 run)
- Connectors; J1, J2, J3, J6
  - shims; EV1 does 3c&3d, EV2 does 6c&6d
  - Bolts; 3-4-5-6-1, tether, then 2(last bolt)

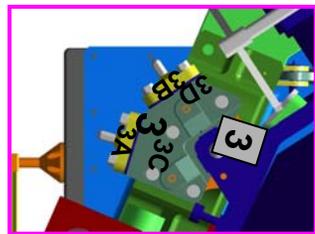


CMG on FSE(Aft-STBD)

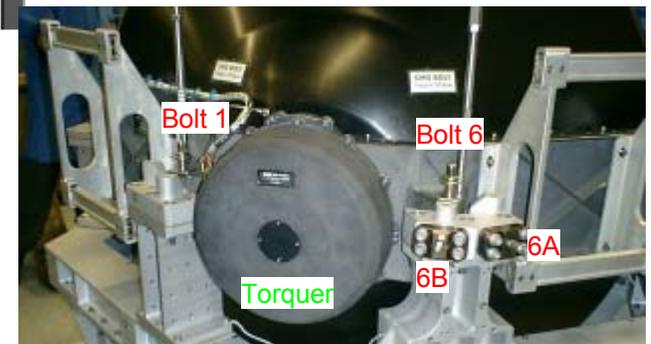
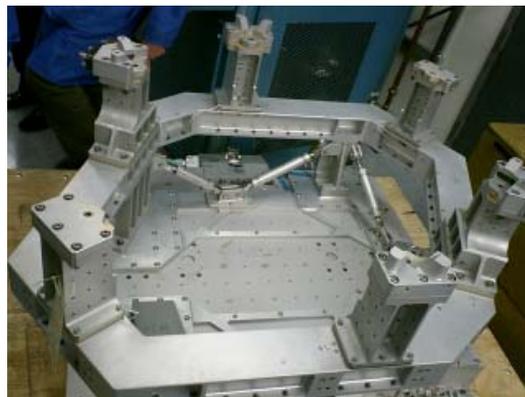
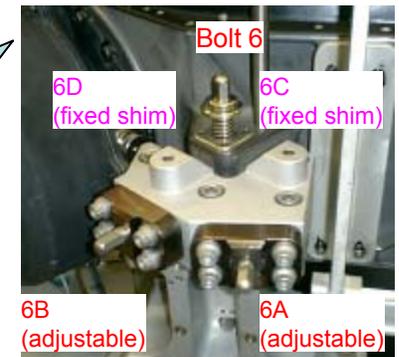
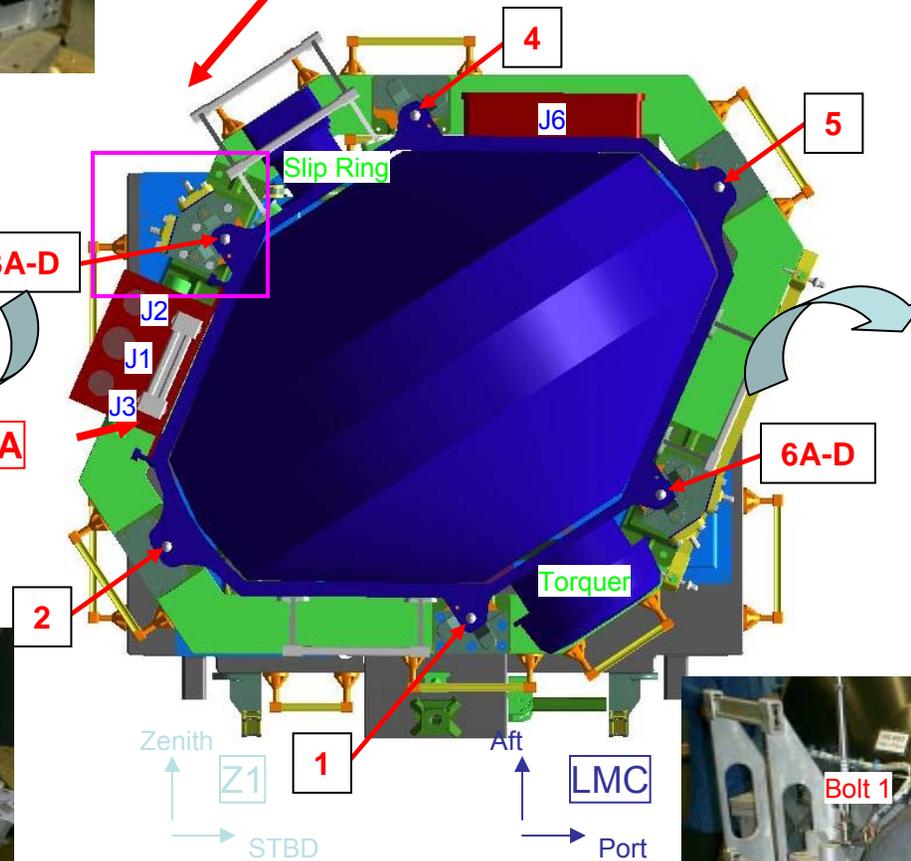


Simulated CCTV B view  
(From orbiter Aft-Port looking STBD)

**This Handrail attaches to MUT EE**



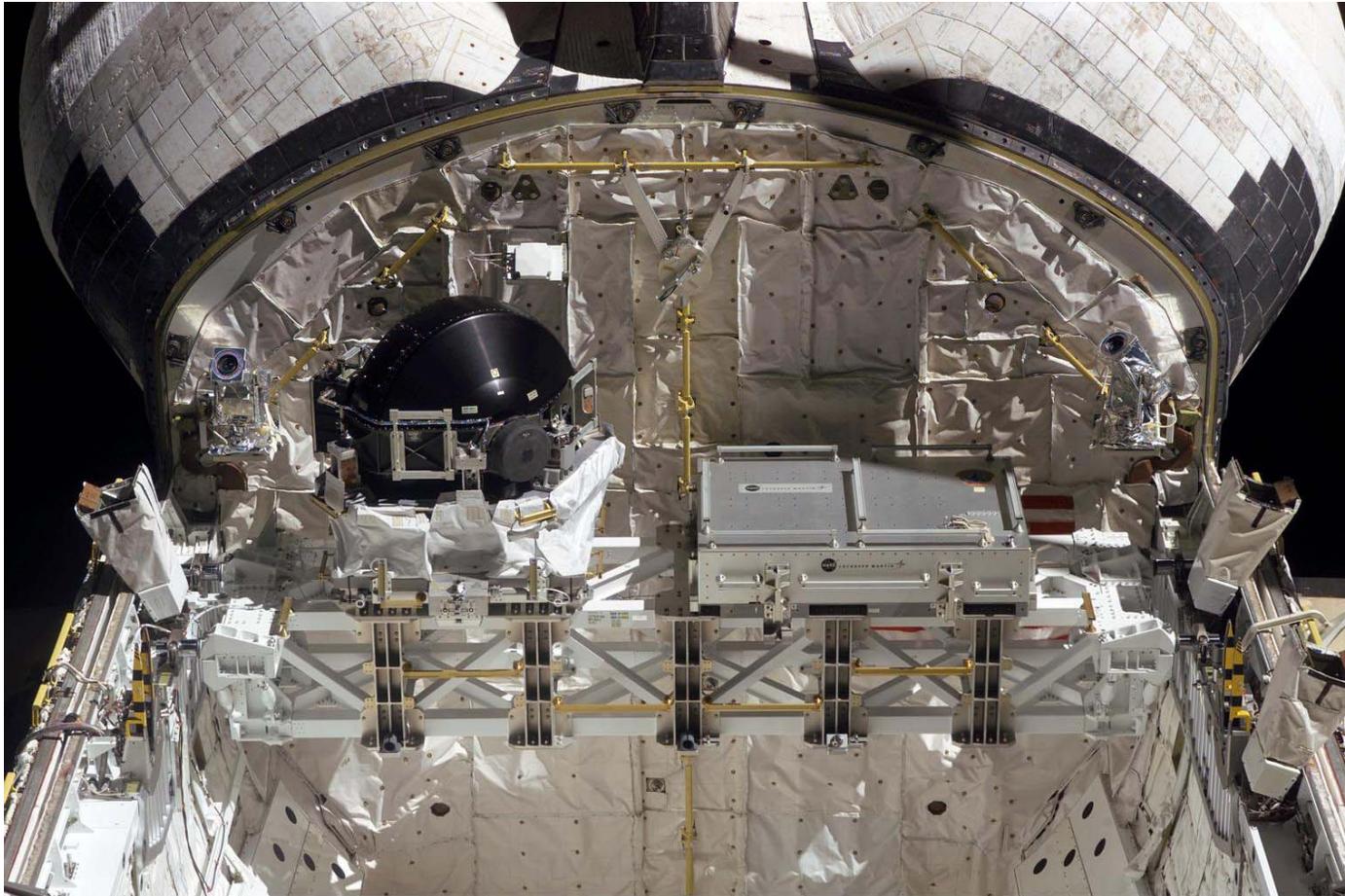
**EV1 Tether(sm/lg) attaches to EA**



CMG on FSE(Fwd-Port)



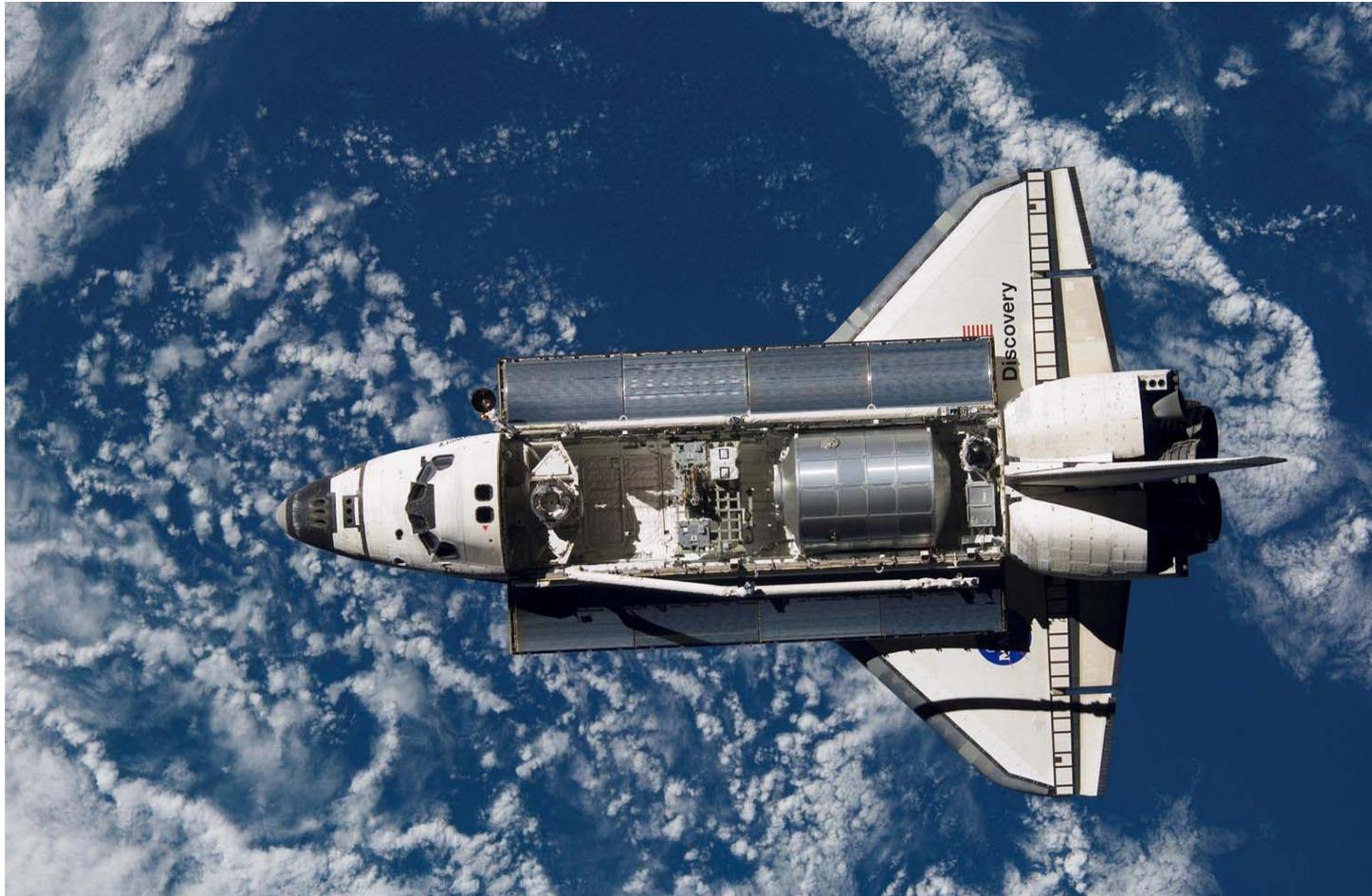
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S114E5736



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- 3 options from a risk perspective
  - Structural analysts attempt to include friction
  - Ops community plans for back-up options
  - Management accepts risk up-front
- #2 chosen by default
  - Need to have S&MA driven decision based on risk for each scenario
  - No method identified to quantify work risk



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S114E7087



- RSR Thumbscrews (safety critical fastener) - no secondary locking feature
  - Required by safety rule if there is a catastrophic failure mode
  - Discovered within 2 months of flight during an RTF review of payload safety compliance
  - Change made to tape as secondary feature



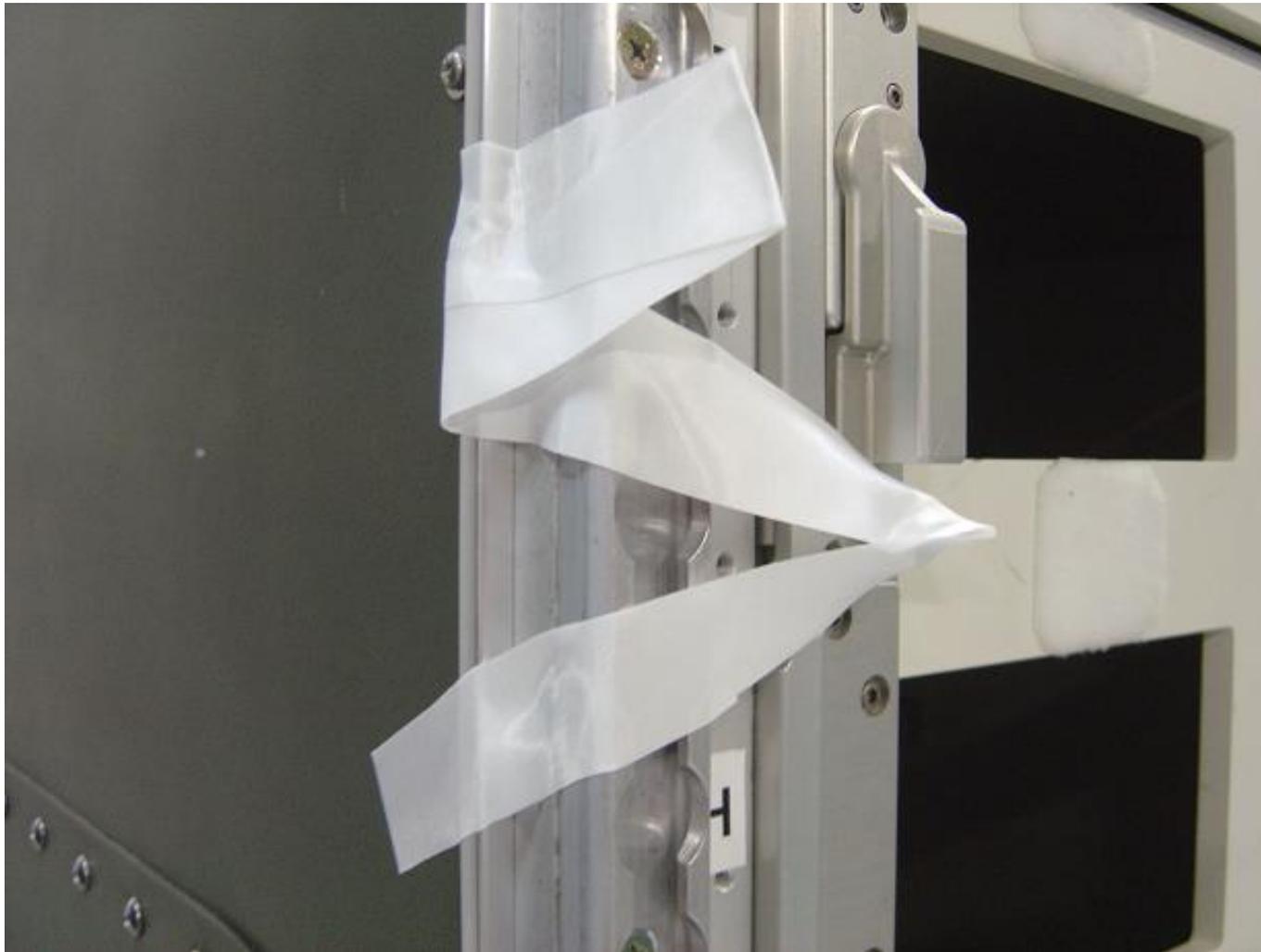
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- Failure mode
  - Thumbscrew backs off (no history)
  - Latch rotates 90° (friction not considered)
  - Door opens 90° (friction/interference not considered)
  - Contents come out (acceleration vector?)
  - Fall to back of MPLM and put a hole in the module; depress causes catastrophic failure
- See CMG options



- CIPAA Manifest Decision
  - 2.5 years and \$10s (\$100s?) of millions
  - Still no consensus on many aspects, including basic material properties/sunshine reports
  - $\approx$ 15 MLE stowage hit to 114
  - “Emotional” decision making process
  - Will get more testing and then be shelved
  - Where was the risk community (Program and Technical)?



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