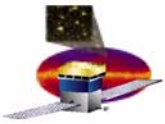


GLAST Large Area Telescope:

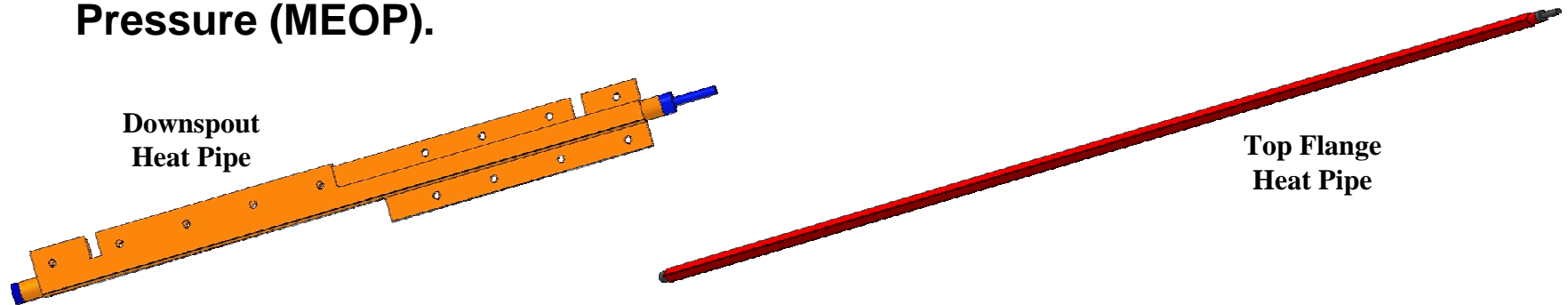
**Mechanical Subsystem
Downspout & Top Flange CCHP
Reproof Pressure Test**

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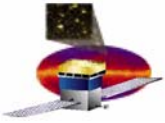


Background

- Downspout & Top Flange Constant Conductance Heat Pipes (CCHP's) were poof pressure tested to 1.1 times Maximum Expected Operating Pressure (MEOP).

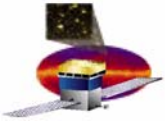


- CCHP's should have been tested to 1.5 times MEOP to be consistent with the pressurize system requirements per GLAST LAT Preliminary Hazard Analysis LAT-MD-00366, MIL-STD-1522, and EWR 127-1 safety requirements.
- CCHP Operating Pressure 490 PSI (MEOP)
 - 1.1xMEOP = 539 PSI Min
 - 1.5xMEOP = 735 PSI Min



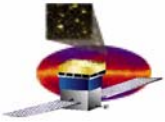
MRB Agenda

- **Present Documented Evidence/Facts of Failure or Non-Conformance**
 - **What, Where, Why, When, How**
- **Suspected Root Cause**
- **Impact to Inventory, WIP, Supplier PO, Already Built Product**
- **Corrective action to prevent recurrence**
 - **Test, Procedure Options, Recommendation**
 - **Impacts to other Subsystems**
 - **Affected Documentation (Dwg, ICD, Existing Analysis, Supplier EIDP - End Item Data Package)**
 - **Verification Plan to Validate Effective Corrective Action**
- **Effectiveness of Corrective action**
 - **Any Modification to Performance Capability**
 - **Impact on FMEA – Failure Mode & Effects Analysis, Reliability, Risk Assessment**
- **Recommended Final Dispositions**
 - **Rework, Repair, Return to Vendor, Reclassify, Scrap/Purge, Use-As-Is**

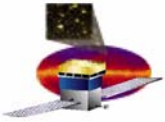


-
- **Documented Evidence/Facts of Failure or Non-Conformance**
 - **What - CCHP's not tested to 1.5 MEOP**
 - **DownSpout P/N's -- LAT-DS-01391, Right Handed (7 Ea)**
 - **LAT-DS-01392, Left Handed (7 Ea)**
 - **Top Flange P/N -- LAT-DS-01393 (6 Ea)**
 - **Where - Manufactured at Lockheed Martin**
 - **Why - Requirement change did not flow down to work orders**
 - **When - Testing took place in September/October 2003**
 - **How - Work orders did not have the correct pressure values**

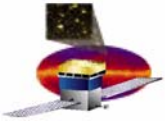
 - **Discrepancies Documented in Lockheed Martin's DR's - AN6384, AN6398, AN6412**



- **Suspected Root Cause**
 - Requirement change not flowed down to Lockheed Martin's Acceptance Test Procedure's (ATP's) or Work Orders – oversight.
- **Impact to Inventory, WIP, Supplier PO, Already Built Product**
 - The Impact is isolated to the Already Built Product. SLAC has not taken delivery of the CCHP's.
- **Corrective action to prevent recurrence**
 - Lockheed Martin's ATP's and work orders have been updated to reflect 1.5 times MEOP requirement, no impact to other subsystems. EIDP will contain re-proof test data.



- **Effectiveness of Corrective Action**
 - **No modification to performance capability**
- **Recommended Final Dispositions**
 - **Heat Pipes are to be re-proof pressure tested to correct value of 735 PSI min by exposing the pipes to a high temperature soak of 200F -0F to +10F for a duration of 1 hour. After the pipes have been tested at these temperatures, they shall be Ammonia leak checked. Each pipe is to be individually bagged and sealed with a strip of litmus paper soaked in Bromocresol solution for at least 4 hours. If the litmus paper turns color, it should be compared to calibration paper. Visible color changes with equal or greater depth of hue are deemed to have a leak rate exceeding 1×10^{-7} scc/sec (Fail).**



Conclusions

- **The testing of heat pipes has been done by Lockheed Martin using this method on heritage programs in the past. This method presents no risk to hardware and has been done on spaceflight programs.**