



**LAT Monthly Status Review**

**1 Dec 2005**

**Design Integration and Analysis**

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The logo for the GLAST LAT Project, featuring a stylized satellite or probe with a colorful, multi-layered structure and a small image of a starry sky in the upper left corner.

## Design Support Status

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- **Flight/fly-away hardware designs (all known remaining hardware listed)**
  - **MLI blankets: second check of drawings completed in November; final review in process prior to release cycle (hardware need date: 2/06)**
  - **Radiator shims: layout complete; drawings in work**
- **LAT Assembly drawings**
  - **LAT-DS-01624-01 LAT Top Assembly**
    - **Modeling complete; drawing in-process (ECD: mid Dec)**
  - **Other key assemblies are being updated as-needed to collect redlines and disposition NCR's from LAT integration**
- **Integration planning**
  - **Configuration drawings**
    - **All drawings complete**
  - **Integration MGSE (all remaining integration MGSE listed)**
    - **All integration MGSE complete**
  
  - **No known planning activities left to support LAT integration other than supporting integration issues and non-compliances**

# Environmental Test Status: Documents and Configuration Drawings

| Document        | Document Title  | Status                             |
|-----------------|---|------------------------------------|
| LAT-MD-02717-01 | LAT Environmental Test Sequence                             | Released                           |
| LAT-MD-01196-03 | LAT Dynamics Test Plan                                      | Released 10/28                     |
| LAT-MD-02726-02 | LAT EMI/EMC Test Plan                                       | Released 10/28                     |
| LAT-MD-01600-03 | LAT Thermal-Vacuum Test Plan                                | Released 10/28                     |
| LAT-SS-06640-01 | LAT Environmental Test MGSE/STE Requirements                | Released 9/30                      |
| LAT-PS-06898-01 | LAT Environmental Test Implementation Plan                  | Final draft in work with I&T group |
| LAT-MD-06560-01 | Plan for Integrating and Testing the LAT on the Observatory | No progress                        |

| Drawing         | Configuration Drawing Title                      | Status   |
|-----------------|--|--|
| LAT-DS-06188-01 | Acoustic Test Configuration Assembly             | In release cycle (11/22)                           |
| LAT-DS-06185-01 | Thermal-Vacuum Test Configuration Assembly       | 3 <sup>rd</sup> draft out for review; ECD: mid Dec |
| LAT-DS-06187-01 | Horizontal Vibration Test Configuration Assembly | 2 <sup>nd</sup> draft in check; ECD: early Dec     |
| LAT-DS-06190-01 | Vertical Vibration Test Configuration Assembly   | 2nd draft in check; ECD: early Dec                 |
| LAT-DS-06186-01 | Handling Configuration Assembly                  | In release cycle (11/22)                           |
| LAT-DS-06184-01 | Transport Configuration Assembly                 | Waiting Transport Container model                  |
| LAT-DS-06189-01 | EMI/EMC Test Configuration Assembly              | 2 <sup>nd</sup> draft in work; ECD: mid Dec        |
| LAT-DS-06191-01 | Mass Properties Configuration Assembly           | Not started  |

## Environmental Test MGSE/STE

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- **Transport Container**
  - **Being fabricated at NRL**
- **Test Interface Plate**
  - **Complete**
- **Test Stand/Spreader Bars**
  - **Being fabricated at Allied Engineering, Alameda CA—ECD: 12/20**
- **T-Vac Sink Plates and Cal-Rod Cage**
  - **Radiator Heater Cage Assembly: in fabrication at NRL**
  - **ACD Sink Plate Assembly: drawings in release cycle; fabrication preparations started at NRL**
  - **SC Simulator Plate: drawings in release cycle; fabrication preparations started at NRL**
- **Acoustic Simulator**
  - **Drawings released in November; fabrication preparations started at NRL**
- **Mass Properties Plate**
  - **Not started**



# Structural Analysis: Accomplishments

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- **LAT System Level**
  - **Grid Static Load Test (GSLT)**
    - **Assisted with Configuration set-up and debugging**
      - With each step, there can be hang-ups, and SLAC's presence is useful to keep things moving as well as helping get to the solution
    - **Completed Load Frame model**
      - Load frame has some motion but can be accounted for with this model
    - **Completed TIP Proof Test and quick data review**
      - Some non-linearity due to load train misalignment, but not a concern
    - **Completed Drumhead and Torsion Stiffness Test and quick data review**
      - Very good correlation, drumhead static stiffness within 7% of predictions
    - **Completed Drumhead and Torsion Twang Test and quick review**
      - Good correlation for torsion mode because it is the primary mode for this configuration. Drumhead mode could not be excited well, but still showed "okay" correlation.
    - **Completed Observatory Lift Strength Test and quick data review**
      - Observatory lift loads successfully imparted into structure with no problems.
- **LAT Subsystem Level**
  - **Mechanical Subsystem**
    - **Initial radiator strength qual concept complete**
      - Discussion between Marc Campell, Paul Baird and John Ku on test setup, objectives and pass criteria

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## Structural Analysis: Near-term Milestones and Status

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- **LAT System Level**
  - **Grid Static Load Test (GSLT)**
    - Complete Strength Testing @ NTS
  - **LAT Dynamics Testing**
    - Update LAT vibration test predictions – ECD = Dec 2005
      - Work with GSFC on test levels
    - Support Pathfinder activities at NRL – ECD = ongoing through Dec 2005
    - Continue planning with I&T and NRL for LAT environmental testing – ECD=ongoing through test
  - **MGSE for I&T: augment MGSE analysis with additional I&T needs, as required**
  
- **LAT Subsystem Level**
  - **Mechanical Subsystem**
    - Finalize radiator qual test plan
    - Support radiator static tests @ SLAC ECD=12/30/05

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## Thermal Engineering Activities – Completed

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- **Design Engineering and Support**
  - **Instrumentation Plan – update of detailed test thermal sensor list.**
- **LAT Level Thermal Analysis and Tests**
  - **Modified LAT orbit thermal model for ground operation.**
    - **Eliminated radiation from Radiators to environment**
    - **Added Four Grid HEXs**
    - **Forced convection added for electronics and free convection for ACD outside surface**
    - **Environmental sink temperatures changed to 22 C.**
  - **Ground operation prediction showed max TKR  $T < 31$  C for HEX input temperature of 8 C**
    - **8C is dew point for 22C dry bulb and 38% RH**
- **Subsystem Support and Oversight**
  - **N/A**
- **LAT Thermal Control System**
  - **N/A**
- **Lockheed Thermal Control System Hardware**
  - **N/A**

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## Thermal Engineering Activities – Current

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- **Design Engineering and Support**
  - Environmental Specification – change Tracker Acceptance Level Tests (35C to 45C).
  - Supporting NRL regarding STE issues.
  - Supporting I&T with temperature sensor installation issues.
  - Reviewing MLI blanket drawings and developing fabrication specification.
- **LAT Level Thermal Analysis and Tests**
  - Thermal math model for LAT TVAC Test almost complete; LAT support stand GSE will be incorporated into model when time becomes available.
  - Comparison of heat pipe subroutines – LM and C&R – in LAT thermal math model with intent to replace LM with C&R so model is not LM proprietary- in progress, waiting to hear from NASA/GSFC.
  - Updated LAT thermal math model with new ACD thermal math model. Max TKR temperature decreased by 1C.
- **Subsystem Support and Oversight**
  - Reviewing ACD thermal vacuum test report.
  - Support TVAC tests of all eboxes.
- **LAT Thermal Control System**
  - Correlation of radiator Protoqual test data with LAT thermal math model, in progress.
- **Lockheed Thermal Control System Hardware**
  - Radiator MLI blankets shipped to SLAC.



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## Thermal Engineering Activities - Planned

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- **Design Engineering and Support**
  - Send MLI blanket drawings out for quotes as soon as reviews and fabrication specification are finished.
- **LAT Level Thermal Analysis and Tests**
  - Thermal Math Model, Ver. 6.1, reduced node
  - Thermal Math Model, Ver. 6.2, LAT TVAC test configuration and test predictions.
  - Document analysis of LAT transition from Survival to Operating Mode
  - 200 Node Launch Vehicle Thermal Math Model
- **Subsystem Support and Oversight**
  - Support VCHP triple joint thermal test to verify joint thermal conductance.
- **LAT Thermal Control System**
  - TCS verified in LAT TVAC tests at NRL
- **Lockheed Thermal Control System Hardware**
  - N/A