

LAT Monthly Status Review

2 March 2005

Design Integration and Analysis

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The logo for the GLAST LAT Project, featuring a stylized satellite or probe with a blue and white body and a red and yellow orbital path, set against a black background with a starry sky.

Subsystem Design Support Status

- **Mechanical systems**
 - X-Side Blanket Bar design finalized; drawings in-work (ECD: 3/18)
 - Connector panel modifications nearly complete: final design of Blanket Bar is holding this up, but is now done (ECD: 3/11)
- **DAQ**
 - Cable Ways: drawings released with analysis not completed; analysis on hold pending MGSE analysis completion; this is low risk (ECD: 3/25)
 - Internal cables: some drawings revised and released per manufacturer checks; supporting fabrication
 - External fly-away instrumentation cables: finalizing of these cables is in queue, once Blanket Bar design is complete (ECD: 2/28)
- **MLI**
 - ICD and IRD revisions in release—these reflect final design of LAT and SC MLI
 - LAT MLI modeling is largely complete; next step is to work details of individual blanket design → waiting until all remaining external flight hardware has been completed



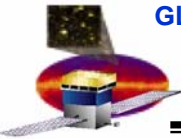
LAT Top Assembly Drawings Status

- **LAT-DS-02559-01 CAL-TEM-PS Module Assembly**
 - Complete and approved
 - No known liens on this assembly
- **LAT-DS-02560-01 LAT Tower Assembly**
 - Drawing revised to capture known liens
 - TKR flex cable mounting to Grid: process prototyping and procedure completed by TKR and I&T; final design incorporated into this drawing
 - Added integration design detail to support integration procedures
 - Drawing out for final check now; expect release by 3/11
- **LAT-DS-02561-01 Cable Installation Kit**
 - This shows routing of all internal LAT cables
 - Delayed by revision of many of the cable part assemblies
 - Bill of materials nearly complete, with drawing to follow
- **LAT-DS-02561-01 LAT Tower and Electronics Assembly**
 - Updated fly-away accelerometer placement to match LAT Instrumentation Plan and Dynamics Test Plan draft
 - Drawing in first check now; expect release of clean check print for review by 3/11, with final out by 4/1



LAT Top Assembly Drawings Status (cont.)

- **LAT-DS-02563-01 LAT Instrument Assembly**
 - **Model is still in-work**
 - **Known issues still needing work:**
 - Instrumentation and their cabling need finalization (ECD: 3/25)
 - MLI Blanket Bar design is complete—being added to this assembly now
 - Heat Pipe mounting hardware design still in-work (ECD: 3/25)
 - Notes and detailed bill-of-material review still needed (ECD: 4/15)
 - **This has slipped over past month due to need to work on upstream assembly revisions and Blanket Bar design issues**
- **LAT-DS-01624-01 LAT Assembly**
 - **Model in-work**
 - **Known issues still needing work:**
 - MLI blanket conceptual design is complete, but need to complete details (ECD:)
 - Radiator as-built design needs to be incorporated (ECD:)



Interface Drawings

- **LAT-DS-00040-12 LAT Instrument Stayclear**
 - Revised drawing released
 - Draft/model incorporated into IRD and ICD and revised
- **LAT-DS-00309-04 ACD-LAT IDD**
 - This is complete; working final cable routing details that may require slight mods
 - Plan to release this by 3/25
- **LAT-DS-00233-07 CAL-LAT IDD**
 - Released 12/9/2004 with no known liens
- **LAT-DS-00851-03 TKR-LAT IDD**
 - Released 11/10/2004 with no known liens

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Integration Planning

- **LAT Integration Sequence (LAT-MD-00676-03)**
 - Revised document with new integration sequence released this month
 - We plan to revise this again in conjunction with finalizing Tower and Electronics Assembly drawing
- **Configuration drawings**
 - **Single Bay Configuration Assembly: completed and released**
 - **LAT Tower Configuration Assembly: working on**
 - Modeling is complete
 - Detailing on hold pending completion of integration MGSE fixtures (ECD: 3/18)
 - **LAT Instrument Configuration Assembly**
 - Not started
 - **Shipping Configuration Assembly**
 - Not started
 - Need to work details of Interface Plate to determine basics of shipping configuration, then finalize the Transport Container
- **Integration MGSE**
 - **Identifying and designing MGSE fixturing as-needed as part of validating integration processes**
 - CAL-TEM/TPS positioning fixture completed and built this month—in-use
 - EM-PDU and EM-GASU support frames being detailed now—needed for two-tower testing, so this is high priority
 - Chill bar design still needs to be finalized, then plumbing worked out

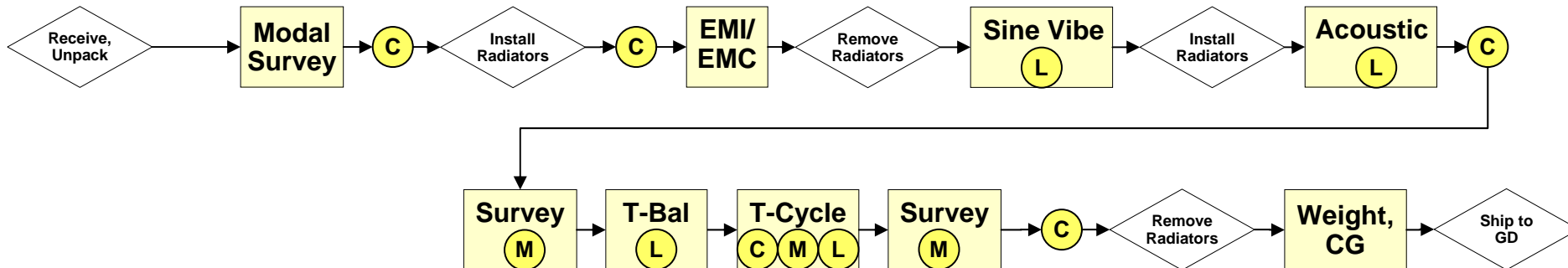


Environmental Test Planning

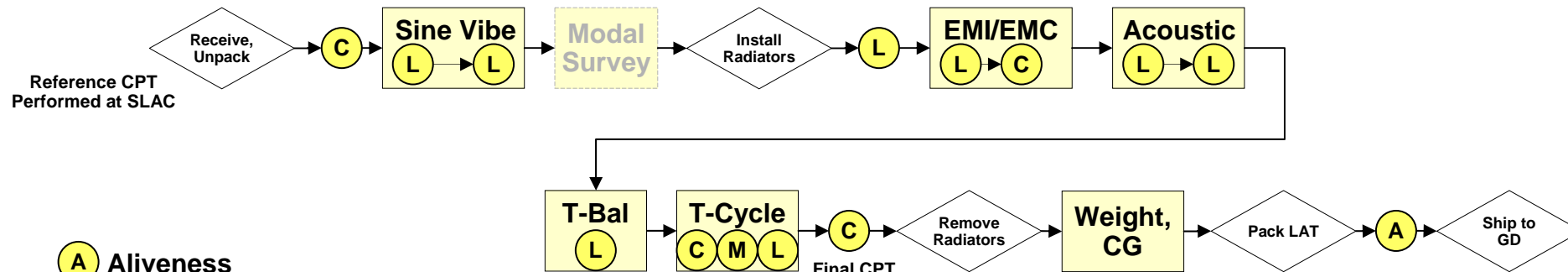
- **Environmental Test planning meeting**
 - **Held successful meeting at SLAC in mid-February to re-initiative activity on test planning**
 - Identified all Test Directors
 - Identified all but one key test personnel, including ; we have since identified the last key position (MGSE manager)
 - We established a “working baseline” test sequence—we agreed to use this sequence in all test planning and work to baseline it by our mid-April planning review
 - Walked through all tests, in order, and added more than 100 action items and issues to be worked to our active list of actions being tracked
 - **Test Directors committed to track all actions and planning activities for their tests**
 - **Next planning meeting scheduled for March 14-16 at NRL, with Test Directors convening test-specific meeting to work details of their test**
- **LAT-MD-02717-01: Environmental Test Sequence**
 - **Completely updated this document**
 - Re-ordered to match our “working baseline” test sequence
 - Added details of logistics and handling
 - **Draft out for review now**
 - **Expect this to be in draft form until sequence is baselined after April planning review**
- **Started working test planning strategy regarding:**
 - **Personnel interfaces between SLAC and NRL have been identified**
 - **MGSE: new, cleaner concept for multi-purpose test STE is in-work**
 - **EGSE: test cabling needs are being identified so cables can be designed**
 - **Test configurations: test config models have been started for vibe test**
 - **Facilities: developing facility and equipment models and drawings for all tests**

Comparison of Baseline with Proposed New Baseline

Baseline Sequence from LAT-MD-00408



Proposed New Baseline Sequence



Reference CPT Performed at SLAC

- A** Aliveness
- C** Limited Performance
- C** Comprehensive Performance
- M** Muon Survey

Structural Analysis: Accomplishments

- LAT System Level

- T** Continued LAT Static test plan development

- Decision made to test on Grid #2
 - Detailed Pre-test analysis started (based on Nov '04 static test plan presentation to GSFC)

- D I T** LAT Internal Instrumentation layout completed

- Final locations and routing for internal accelerometers complete

- D** Completed MLI support frame final analysis

- Final design is lightweight and stiff

- T** Supported LAT Environmental test TIM

- D I T** Supported MGSE GPR Corner Joint Slippage Resolution

- LAT Subsystem Level

- T** TKR Subsystem

- Supported TWR 1 Vibration Testing
 - In-person support in Italy
 - Simplified pass/fail criteria based on historical data
 - Created summary table for “at-a-glance” data trending
 - Agreed with INFN to have open communications over the course of the test, i.e. to provide a full time US contact, if desired
 - Proposed/supported new statistically-based pass criteria for bottom tray static test

- D T** Mechanical Subsystem

- Static Test Plan Details in-process (see above)

- T** EBOX Subsystem

- Reached agreement with GSFC regarding EBOX sine testing requirement

D = Flight Design
I = Integration Prep
T = LAT Test Prep

Structural Analysis: Near-term Milestones and Status

- LAT System Level

- **T** Integrate correlated ACD model into LATv10.09 – ECD = 2/11/05

- **T** LAT Static Testing: complete pre-test analysis and STE sizing

- **DIT** LAT Dynamics Testing

- Evaluate low freq acoustic loads into LAT in two configurations – ECD = 3/16/05

- Release LAT Dynamics Test Plan – ECD = 3/16/05

- Finalize external accelerometer locations and cable routing – one more design/analysis iteration anticipated – ECD = 3/16/05

- Update LAT vibration test predictions – ECD = 5/1/05

- Continue planning with I&T and NRL for LAT environmental testing

- LAT Thermal Distortion Analysis

- Final analysis and reporting of results pending further discussion – ECD = 4/1/05

- **I** MGSE for Integration Analysis: augment MGSE analysis with additional I&T requests, as required

- **I** Shipping Container Analysis report (analysis complete) – ECD = 4/1/05

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Structural Analysis: Near-term Milestones and Status and Summary of Issues and Concerns

- LAT Subsystem Level
 - TKR Subsystem
 - Other analysis support? No new analyses seem to be coming in (things are quieting down)
 - DT** EBOX Subsystem
 - Complete TEM/TPS Vibration test report – ECD = 3/18/05
 - Support Special Box Vibration test analysis and planning (mesh with EBOX schedules)
 - Need to get sine vibration profiles from GSFC
 - Analyze cable support tray analysis
 - Design may require retrofitting if not stiff enough
 - T** Grid Subsystem
 - Grid Static Test procedures/STE Released – ECD = 3/18/05
 - Static Test Grid TRR – ECD = 4/15/05
 - Proof Test Spectrum provided flexures TRR – ECD = 5/6/05
 - Shear plate qualification test report – 5/20/05
 - Support RAD and XLAT issues, as needed
- Summary of Issues and Concerns

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Thermal Engineering Activities – Completed

- **Design Engineering and Support**
 - MLI concept and interface agreed on with Spectrum Astro
 - Completed Grid heat pipe adhesive bakeout/cure
 - Supported TVAC test for TEM/TPS units 1 & 2
- **LAT Level Thermal Analysis and Tests**
 - Completed test instrumentation lists in LAT Instrumentation Plan; out for review
 - Completed LAT Test Thermal Requirements document; out for review
- **Subsystem Support and Oversight**
 - Finished developing TKR B TVAC temperature profile to account for operational mode with variable temperature chiller. Completed TKR pathfinder test to determine performance of new “cube” chamber. Alenia and INFN in discussions to resolve discovered problems
 - Completed TKR B TVAC Acceptance Test successfully
 - Developed TKR 1 TVAC acceptance test temperature profile based on TKR B test information. This profile will be used for all future tests
 - Supported installation of Grid +Z thermistors
- **LAT Thermal Control System**
 - New Grid thermostats and heaters ordered
- **Lockheed Thermal Control System Hardware**
 - No new activity

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Thermal Engineering Activities – Current

- **Design Engineering and Support**
 - **Environmental Specification – change Tracker Acceptance Level Tests (35oC to 45oC)**
- **LAT Level Thermal Analysis and Tests**
 - **Analysis of LAT transition from Survival to Operating Mode: preliminary results show about one day transition while keeping within power budget**
 - **Thermal math model for LAT TVAC Test almost complete; awaiting final design of LAT support GSE**
 - **LAT Thermal Vacuum Test Plan, Rev. 3, out for review**
 - **Working t-vac test action items list to solidify test plans and details**
- **Subsystem Support and Oversight**
 - **Tracker Tower 1 TVAC test**
 - **Test orientation/setup for TKR defined, fabricated and used for TKR B; TKR 1 TVAC test planned for 7 March '05**
 - **Multiple(2) TKR TVAC tests in planning stage; additional support structure completed**
- **LAT Thermal Control System**
 - **Development tests for VCHP assembly/disassembly procedure, issue is thermal conductance at triple joint using mold release material; no new additional activity**
- **Lockheed Thermal Control System Hardware**
 - **Proceeding with fabrication**



Thermal Engineering Activities – Planned

- **Design Engineering and Support**
 - Detailed MLI design. Review, and then fabricate MLI blankets; two sets, one set for tests and other for flight.
- **LAT Level Thermal Analysis and Tests**
 - Thermal Math Model, Ver. 6.1, reduced node
 - Thermal Math Model, Ver. 6.2, LAT TVAC test configuration
 - Document analysis of LAT transition from Survival to Operating Mode
 - LAT Thermal Vacuum Test Plan – finalize
 - LAT Thermal Vacuum Test Procedure – begin
 - Correlate integrated Thermal Math Model after LAT TVAC tests
200 Node Launch Vehicle Thermal Math Model
 - Finalize t-vac test plan details in preparation for env test review in mid-April
- **Subsystem Support and Oversight**
 - Support TVAC tests of all eboxes
 - Support TVAC tests of TKR 1 -16
- **LAT Thermal Control System**
 - Preliminary verification in LM Radiator Acceptance Tests
 - Finalize definition of LM TVAC tests for TCS
 - TCS verified in LAT TVAC tests at NRL, Q4/05
- **Lockheed Thermal Control System Hardware**
 - X-LAT Plate TVAC Test Procedures, begin writing
 - Radiator Acceptance Test Plan, finalize
 - Radiator TVAC Acceptance Test Procedures, begin writing