

LAT Action Item Database

Jan 2002 Review Detailed Report (7/19/02)

4.1.1 - Cost

Action Item
Number 2

Date 1/11/02

Originator M. Reichanadter

Actionee T. Boysen

Summary Transition PMCS team to permanent support.

Full Description Continue the transition of the PMCS (Project Management Control System) team from consultant support to the permanent PMCS team.

Responses Agreed, the transition is in process.

Action Item
Number 1

Date 1/11/02

Originator M. Reichanadter

Actionee T. Boysen

Summary Complete a bottoms-up resource-loaded cost and schedule estimate for the LAT project.

Full Complete a bottoms-up resource-loaded cost and schedule estimate for the LAT project to support a Baseline Review. The WBS should be trackable in the mentioned subsystems (ACD,

Description I&T as examples) and supporting documentation related to the cost estimate should be available. A revised contingency analysis at the lowest WBS project should also be performed, and explicitly detailed.

Responses The bottoms-up resource loaded cost and schedule estimate traceable to the LAT Project WBS will be presented at the Delta Review. A revised contingency analysis will be presented at the Delta Review.

4.1.1 - Schedule

Action Item
Number

1

Date

1/11/02

Originator

M. Reichanadter

Actionee

T. Boysen

Summary

Determine which Level 2 milestones should be elevated to higher levels.

Full
Description

Review the comprehensive list of Level 3 and 2 milestones and determine which dates should be elevated to higher levels at intervals suggested above. This review should be done by the responsible individuals at each level.

Responses

This is under review by the LAT Project Management; results will be available at the Delta Review.

Action Item
Number

2

Date

1/11/02

Originator

M. Reichanadter

Actionee

T. Boysen

Summary

Define the DOE Critical decisions specific to this project and add them to the Level 1 Milestones.

Full
Description

Define the DOE Critical decisions specific to this project and add them to the Level 1 Milestones. Additional NASA milestones may also be needed. The level 1 milestones and definitions should be included in the GLAST Project Execution Plan.

Responses This is under review by the LAT Project Management; results will be available at the Delta Review.

Action Item
Number 3

Date 1/11/02

Originator M. Reichanadter

Actionee T. Boysen

Summary Develop high-level, one page linked schedules for all subsystems.

Full Description Continue to develop high-level, one page linked schedules for all of the LAT subsystems derived upon the PMCS baseline. These schedules should be monitored closely, particularly in FY02 to maintain the LAT within the available funding, and also used by subsystem managers to insure that sufficient slack exists in each of the individual subsystems.

Responses Agreed. This will be completed prior to the Delta Review.

4.1.1 - Proj Mgmt

Action Item
Number 2

Date 1/11/02

Originator S. Aronson

Actionee W. Althouse

Summary Expedite NASA/CNES and NASA/ASI International Agreements

Full Description Expedite NASA/CNES and NASA/ASI International Agreements.

Responses LAT Project Management is working with NASA Headquarters to expedite these agreements.

Action Item
Number 3

Date 1/11/02
 Originator S. Aronson
 Actionee W. Althouse

Summary Consider DOE/NASA supplement to LAT Project funding.

Full Description Consider DOE/NASA supplement to LAT Project funding to offset cost increases resulting from lack of DOE/NASA IA and supporting International Agreements.

Responses LAT Project Management will provide DOE/NASA with comprehensive contingency and risk analysis including analysis of cost increase due to lack of DOE/NASA Implementing Agreement and consequent delays in International Agreements.

Action Item Number 4
 Date 1/11/02
 Originator S. Aronson
 Actionee W. Althouse

Summary Maintain awareness that ACD org reports to LAT Project and not to GLAST Project.

Full Description Maintain awareness that the ACD organization needs to respond to the LAT Instrument Project management, and not directly to the GLAST Project Office.

Responses LAT Project Management has reinforced this concern with both the GLAST Project Office and with the ACD Subsystem Manager at GSFC.

Action Item Number 5
 Date 1/11/02
 Originator S. Aronson
 Actionee W. Althouse

Summary Finalize the PMP and complete a PEP.

Full

Description	Work together to finalize and approve the PMP, complete a PEP in a timely manner.
Responses	The PMP has been updated after discussion with both GLAST Project Office and Program Managers at NASA and DOE. The PEP is presently in draft, and is being completed by the DOE Site Office at SLAC.
Action Item Number	6
Date	1/11/02
Originator	S. Aronson
Actionee	W. Althouse
Summary	Inform the funding agencies when WBS level 3 elements are ready for baseline review.
Full Description	Inform the funding agencies when those WBS level 3 elements which are not now ready to be baselined are ready for a baseline review.
Responses	The Baseline Reviews of WBS elements that were not ready in January are now scheduled for the Delta Review.
Action Item Number	1
Date	1/11/02
Originator	S. Aronson
Actionee	W. Althouse
Summary	Sign the DOE/NASA Implementing Arrangement
Full Description	Sign the DOE/NASA Implementing Arrangement.
Responses	This document was signed January 19, 2002.

4.1.2 - System Engrg

Action Item Number	22
Date	1/11/02

Originator S. Scott
 Actionee T. Thurston

Summary Include EMI/EMC acceptance testing on all flight boxes in test plans.

Full Description EMI/EMC acceptance testing needs to be performed on all flight boxes except for the qualification unit (which receives qual level EMI/EMC testing). This needs to be included in the verification plans.

Responses The current plan for EMI/EMC testing includes qualification unit testing of electronic boxes and EMI/EMC testing of the fully assembled LAT prior to delivery to the GLAST project for observatory integration. The LAT Performance Verification Plan shall be updated to include EMI/EMC verification and acceptance testing. The updated LAT Performance Verification Plan shall be shown in the LAT CDR.

Action Item Number 14

Date 1/11/02

Originator S. Scott

Actionee T. Thurston

Summary Describe LAT redundancy levels.

Full Description Describe how levels of redundancy were determined. Is redundancy based on the assumption that all components will survive five years and redundant units are simply present as back-ups, or are reserve units required to meet the five-year mission life? Is the number of redundant units based on statistical analysis or simply to prevent Single Point Failures? Describe the influence Failure Modes and Effects Analyses have had on the design (e.g., list any design changes that have resulted from the FMEA's)?

Mission success, in conjunction with the mission life/reliability requirements, has been the primary driver for redundancy selections. Redundancy is required to meet the specified success probability of the LAT. The number of redundant units are based statistical analysis. As a result of this analysis and the inherent reliabilities of the instrument, there are no single point failures.

(continued) The reliability requirements of the ACD and the failure mode and effects have been

Responses a principle driver in the design of the ACD electronics, power supplies, micrometeoroid shielding (MMS), and tile layout. The reliability requirements and probabilistic failure rate from micrometeoroid damage has driven the design requirements of the MMS. As an example, this drove the power distribution to the ACD Electronics to the selection of bank feed to circuits and redundant Photo-Multiplier Tubes (PMT) (i.e. loss of a ACD power supply effects only a hot-redundant bank of circuits and PMT as oppose to only a single circuit and PMT). Details of the resultant reliability and FMEA can be found in the ACD FMEA & CIL report, LAT-TN-00523-01.

Action Item
Number 15

Date 1/11/02

Originator S. Scott

Actionee T. Thurston

Summary Provide a logistics support plan.

Full Description Develop/Provide a Logistics Support Plan and a list of all expected spares for the LAT Instrument, Ground Support Equipment, and Instrument Operations Center.

Responses A Logistic Support Plan will be developed before the CDR. The LAT instrument hardware spares plan consists of modules spares for the Tracker, Calorimeter, and Electronics. The ACD spares consists of component spares for electronics, tiles, PMTs, connectors and misc. hardware but does not include spares for the major structure, support structure, thermal blankets, and MMS. The LAT GRID, thermal system and blanketing are not spared. The EGSE/MGSE equipment will spared as necessary. Most EGSE has multiple identical units which upon LAT integration will as spares. Major mechanical fixturing will not be spared (i.e.. unique lifting, positioning, test, and shipping fixtures). The IOC hardware consists entirely of COTS products with the exception of the Flight Software Test bed. In order to meet availability requirements, two approaches are being used for spares for the COTS products. With the exception of disk storage, all workstations and peripheral functions will be meet with a primary system and a hot spare, both under 24 hour onsite maintenance contract. Primary disk storage will be in RAID arrays with significant margin on total required storage capacity and with cold spares sufficient for two days of data storage. To meet maintainability requirements, a time phased replacement procurement strategy will be used that supports IOC system and peripheral upgrades during the MO&DA phase. Further detail will be provided for LAT CDR.

Action Item
Number 16
Date 1/11/02
Originator S. Scott
Actionee T. Thurston

Summary Describe plans for verification of flight software.

Full Description How will all the LAT Flight Software Requirements be verified before delivery to Instrument Integration and Testing? Describe the plans for Formal Qualification Testing (Acceptance Testing) of the Flight Software (a copy of the Software Test Plan or Software Development Plan containing this information would suffice). Describe any plans for a regression suite of software tests (subset of the full Software Qualification Test) to verify that previously qualified/accepted software continues to function properly after changes have been made or problems resolved.

Responses A draft LAT Flight Software Test Plan shall be available for review by 3/30/2002.

Action Item
Number 17
Date 1/11/02
Originator S. Scott
Actionee T. Thurston

Summary Describe the role of IV&V in LAT software development.

Full Description Describe the role, if any, of the West Virginia Software Independent Verification and Validation Facility in the LAT Software development, verification, and validation program.

Responses IV&V activity with the GLAST Project Office started in mid-February. The IV&V staff will spend 60 days reviewing the current instrument software approach, requirements, etc. and generate two items. The first is a Critical Functions List, which will then be monitored during the program; the second is a Program Plan in which they will propose/recommend a role and level of IV&V involvement for the duration of the program.

Action Item 18

Number
 Date 1/11/02
 Originator S. Scott
 Actionee T. Thurston

Summary Describe validation of EGSE.

Full Describe how Electrical Ground Support Equipment Hardware and Software used to determine
 Description the correct functioning and performance of the LAT Instrument will be verified and validated.

Responses EGSE units will undergo acceptance testing prior to release for use with flight hardware. The acceptance test will verify that the equipment functions as designed and are compatible with the flight hardware. The acceptance test will be performed per approved procedures and the test data will be recorded, reviewed and approved prior to release of each EGSE unit. The EGSE test data will be archived. EGSE will be subject to recurrent validation testing to verify its acceptability for use throughout its required life. The validation test will be performed after changes to the EGSE configuration, such as shipment to a new location or repair to an EGSE component. The validation test will likely be a subset of the acceptance test. Test cables will also be verified against the cable drawings and for continuity and isolation prior to use with flight hardware and after a change of the test configuration. Test software will undergo a Final Qualification Test (FQT) prior to release for use with flight hardware. This test will verify that the test software operates as required with the EGSE. The FQT will be performed per approved test procedures and the test results will be recorded, reviewed and approved prior to the release of the test software for use with flight hardware. The requirements for EGSE validation will be included in the LAT test plan. Draft EGSE test procedures will be available by CDR.

Action Item
 Number 19
 Date 1/11/02
 Originator S. Scott
 Actionee T. Thurston

Summary Describe the software maintenance approach.

Full Describe the Software Maintenance approach from delivery of the Instrument to Observatory-
 Description level Integration and Testing through Launch plus five years.

Responses Following delivery of the launch version of flight software, the LAT IOC will maintain the Flight Software Test bed to perform validation and verification of command procedures, on-board databases changes, on-board command sequence modifications, and flight software modifications, prior to providing those changes to the MOC for uplink and use. The Flight Software Test bed is a hardware based test bed consisting of an engineering model of the LAT data acquisition system including TEMs, GASU, EPU, and SIU. Detector emulators provide realistic science data to the TEMs to exercise the system which supports full command response capability. The VxWorks development environment is maintained to support software maintenance. Further detail will be provided for LAT CDR.

Action Item Number 21
 Date 1/11/02
 Originator S. Scott
 Actionee T. Thurston

Summary Re-examine the operational and survival temperature limits.

Full Description Re-examine the operational and survival temperature limits prior to the start of component qual testing. Consider whether it is feasible to establish survival limits that are 15 degrees beyond normal operational ranges, so that operational performance 10 C beyond the normal operational range can be verified without significant risk of exceeding survival limits.

Responses As part of the on-going effort to define the test levels in the LAT Performance Verification Plan (LAT-MD-00408 – Draft1). In light of the modified Radiator design and updated thermal requirements the operational and survival limits are being re-established. Currently, the hot-case hot survival limit is at least 15 degrees C beyond the operational limit for all subsystems. The cold-case cold survival limit is at least 10 degrees C below the minimum operational lower limit.

Action Item Number 11
 Date 1/11/02
 Originator S. Scott
 Actionee T. Thurston

Summary Describe LAT CPT, LPT and AT.

Full Description Provide descriptions of the LAT Comprehensive Performance Test, Limited Performance Test, and Aliveness Test and determine where they will be conducted in the Instrument Integration and Test Flow and in the Observatory Integration and Test Flow.

Responses These tests are currently under development and will be fully described in the LAT Performance Verification Plan (LPVP). The LPVP will be completed prior to the Instrument CDR. They will conform to the definitions given in sections 4.3.2, 4.3.3 and 4.3.4 of the LAT Mission Assurance Requirements (433-MAR-0001). The LAT Test Matrix, which was presented in the PDR (see Section 10.0, slide 4), identifies where these tests will be conducted in the Integration and Test Flow. The matrix will be expanded to include Observatory integration as part of the Observatory-level test plan development. The completion of the LPVP has been added to the LAT CDR check list. The current LAT CDR checklist is shown in the LAT-LR-00559.

Action Item Number 23
 Date 2/12/02
 Originator C. Jackson
 Actionee T. Thurston

Summary Finalize Systems Engineering Management Plan

Full Description Finalize, sign-off, and begin implementation of the Systems Engineering Management Plan (SEMP). It calls for the validation of requirements allocation when the SS requirements documents are signed-off, and also specifies the technical parameters that will be tracked and reported on (via trending and/or budgets/margins) during the life of the project.

Responses The SE Management Plan is being reviewed and updated. The plan shall be signed and released by Delta Review.

Action Item Number 24
 Date 2/12/02
 Originator D. Betz
 Actionee T. Thurston

Summary	Provide a diagram that delineates responsibility for each component
Full Description	Provide an overall flow diagram which delineates, to the PCB or component level, what major organization (SLAC, NRL, International partner, GSFC) is responsible for the development, test and qualification. Include where and when the delivery occurs. Include integration and test at the next level of assembly. Please provide this information as a chronological flow rather than a tabular presentation. Include all software development, test, qualification and deliveries.
Responses	<p>The LAT Project Office is working on an overall project level flow diagram to track qualification, test, and delivery of subsystems and major components. The PERT flow chart will be available by LAT CDR. The delivery schedules for subsystems and major LAT components are captured within the PMCS Level III milestones. Assembly, qualification, testing, and responsible organizations are captured within the PMCS Level IV milestones and WBS.</p>
Action Item Number	20
Date	1/11/02
Originator	S. Scott
Actionee	T. Thurston
Summary	Conduct a Peer Review of the cabling and harnessing
Full Description	Conduct a Peer Review of the cabling and harnessing.
Responses	<p>A complete review of the cabling and harnessing of the LAT Instrument shall be conducted as part of the Electronics (WBS: 4.1.7) Critical Design Review. The LAT electronics SS-CDR is identified in the LAT CDR check list. The current LAT CDR checklist is shown in the LAT-LR-00559.</p>
Action Item Number	12
Date	1/11/02
Originator	S. Scott
Actionee	T. Thurston

Summary Describe LAT alignment tests and LAT to S/C alignment requirements.

Full Description Describe the LAT internal Alignment tests and where they will be conducted in the Instrument Test Flow. Describe the LAT Instrument to Spacecraft Alignment Requirements and how they will be measured and verified during the Observatory Integration and Test Flow. Determine whether an Alignment Test needs to be performed between LAT dynamics and Thermal Vacuum Testing. Determine whether a LAT to Spacecraft Alignment Test needs to be performed between Observatory Dynamics and Thermal Vacuum Testing. This could all be summarized in an Alignment Plan.

Responses The LAT internal alignment tests will be conducted in accordance with assembly and verification procedures. These procedures will be conducted in concert with the LAT Performance and Verification Plan (LPVP). The LPVP is currently maturing, it will be complete prior to the CDR. The completion of the LPVP has been added to the I-CDR check list. The current I-CDR checklist is shown in the LAT-LR-00559. The alignment process of the subsystem modules/components is controlled through precision fixturing and geometric inspection at multiple points throughout the assembly. All verification measurements will be documented as part of the quality assurance document for the modules/components. Deviations and corrective actions will be addressed via provisions established by Configuration Management and Mission Assurance. Alignment and alignment verification of the assembled LAT will follow a very similar pattern in that precision fixturing, geometric inspection and verification documentation will be employed throughout the assembly process. Instrument alignment fiducials will be incorporated into the backbone of the instrument structure, the LAT Grid. These fiducials will be used for both verification of the internal alignment of subsystem modules/components, pre-&post-test verification, and for instrument verification during integration of the spacecraft and GBM instrument. Precision measurement or calibration measurement of the LAT detector elements will be performed in accordance to the LAT Calibration plan. The LAT calibration plan will be coordinated with LPVP. Calibration measurements will be proceduralized and documented in accordance with the LPVP. If it becomes necessary create a separate alignment plan, it will be subordinate to the LPVP.

Action Item Number 10

Date 1/11/02

Originator S. Scott

Actionee T. Thurston

Summary Describe transition of LAT CM and PFR processes to observatory integration.

Full Describe the (expected) transition of LAT Configuration Management and Problem Reporting and Corrective Action Processes from Instrument Integration and Testing to Observatory Integration and Testing and from Observatory I&T to Observatory Operations. Provide the appropriate section of the Configuration Management Plan if it addresses this.

The CM/PRACA of the LAT instrument will be under the control of LAT Project Management throughout the instrument construction, observatory integration, launch, and instrument operational checkout. After instrument operation checkout, the primary responsibility for the LAT instrument is transferred to the LAT Instrument Operations. During the LAT construction the lead for the LAT CM/PRACA resides with the LAT Project Management. At delivery to the LAT instrument for observatory integration, launch and early flight operations, the primary responsibility for LAT CM/PRACA activities remains with the LAT project but becomes subordinate to GLAST project CM.

Responses

(continued)The history of all LAT CM/PRACA activities will be transmitted to the GLAST project. Open LAT CM/PRACA issues and new LAT related GLAST CM/PRACA issues that extend beyond instrument delivery will continue to be identified, tracked and closed through the LAT CM/PRACA system. All open LAT CM/PRACA issues are expected to be closed prior to instrument delivery for spacecraft integration. The LAT System Engineering Management Plan and the LAT Configuration will be updated to reflect this process. The completion of the SEMP and CMP has been added to the I-CDR check list. The current I-CDR checklist is shown in the LAT-LR-00559

Action Item
Number 9

Date 1/11/02

Originator S. Scott

Actionee T. Thurston

Summary Provide list of cables and harnesses.

Full Provide a list of cables and harnesses and who is responsible for designing and fabricating them.

Dave Nelson is responsible for all cables and harnesses. The following is a complete list of

Responses LAT cables, with the number of each type of cable in parentheses. PDU-SIU (2), PDU-SHIELD (2), SIU-SHIELD (2), GASU-TEM (16), GASU-EPU (3), GASU-SIU (2), GASU-ACD-SHIELD (24), ACD-SHIELD (24), TRACKER-TEM (128), CAL-TEM (64).

Action Item
Number 8

Date 1/11/02

Originator S. Scott

Actionee T. Thurston

Summary Provide list of internal RFA's.

Full Description Provide the list of RFA's (Action Items) from the Subsystem and System Engineering Peer Reviews and their closures.

Responses The following is a list of the Subsystem Peer Reviews Reports including RFAs (A copy is included in LAT-LR-00559). The Systems Engineering Manager and the Instrument Integration Manager review and approve closure of each subsystem RFAs. (1) Q&A from the System Engineering Internal Design Review LAT-LR-00620 (2) Report for the Tracker Internal Design Review LAT-MR-00261 (3) Report for the Calorimeter Internal Design Review LAT-MR-00324 (4) Report for the ACD Internal Design Review LAT-MR-00323 (5) Report for the Electronics Internal Design Review LAT-MR-00351 (6) Report for the Mechanical Systems Internal Design Review LAT-MR-00350 (7) Q&A from the I&T Internal Design Review LAT-LR-00497 (8) Q&A from the IOC Internal Design Review LAT-LR-00503 (9) Q&A from the SAS Internal Design Review LAT-LR-00492.

Action Item
Number 7

Date 1/11/02

Originator S. Scott

Actionee T. Thurston

Summary Provide status of dwgs and tracking plan.

Full Description Provide a status of technical drawings and provide the plan for how they will be tracked.

Responses The current status is presented in LAT-LR-00559. The set of metrics to track the LAT design including drawings are: (1) Level II/III/IV specification traceability status (2) Level V Drawing and Process status (3) Number of specification parameters (Level II/ III/IV) linked within DOORs (4) Subsystem specification/drawing/procedure tree status. A monthly status telecom has been established with the GLAST Project Office Systems Engineering Manager.

Action Item Number 6
Date 1/11/02
Originator S. Scott
Actionee T. Thurston

Summary Provide list of S/C reqts & constraints from Instrument reqts.

Full Description Provide a list of Spacecraft Requirements and Constraints derived from the unique Instrument requirements. Provide a list of the Instrument requirements and constraints derived from using an RSDO Spacecraft Bus for the GLAST Mission.

Responses These requirements and constraints are in the LAT Instrument - Spacecraft Interface Requirements Document 433-IRD-0001.

Action Item Number 5
Date 1/11/02
Originator S. Scott
Actionee T. Thurston

Summary Provide list of open trade studies.

Full Description Provide a list of all open technical trade studies cutting across subsystems.

Responses A list of all open technical trade studies as of July 2002 is: (1) Wide Area Networks for interconnection with the other elements in the GLAST ground segment including the acquisition of GLAST level 0 data and transmission of LAT command and data uploads (IOC,

SAS, MOC, SSC). (2) Data management and real-time display software (Subsystems, I&T, IOC). (3) Data analysis and visualization software (Subsystems, I&T, IOC, SAS).
 (4) Command and telemetry database software (I&T, IOC, SAS).

Action Item
Number 4

Date 1/11/02

Originator S. Scott

Actionee T. Thurston

Summary Provide key LAT technical budgets

Full Description Provide a list of key LAT Technical Budgets that are monitored regularly (e.g., Mass, Power, Thermal, Processing Resources, Alignments, etc) or will be.

Responses The current list of key LAT technical budgets includes Mass, Power and science parameters. Thermal, processor power, geometry, and communications parameters are being considered for regular monitoring and reporting. At major program milestones the LAT parameters will be statused as they were in the PDR documentation and handouts. Mass, Power, geometry, data rate processor power, and c.g. are managed as design constraints in the Level III specifications. Key Technical budgets will be reported in the LAT Project Quarterly report.

Action Item
Number 3

Date 1/11/02

Originator S. Scott

Actionee T. Thurston

Summary Provide risk list

Full Description Provide a copy of the current Risk List (that is full summary of risks to date) and the plan for updating it and using it on the project.

Responses The risk list or risk watch list as referred to in the Risk Management Plan will be formulated and tracked. The risk watch list and database status will be reported in the quarterly LAT progress reports. The initial risk watch list and updated plan will be updated and released

before the delta review.

Action Item Number	2
Date	1/11/02
Originator	S. Scott
Actionee	T. Thurston
Summary	Provide reqs. verification traceability matrix or dev. plan.
Full Description	Provide a copy of the (integrated) Requirements Verification Traceability Matrix. A plan for developing it would be acceptable for PDR.
Responses	The detailed subsystem and system verification methods, plan, traceability and test levels have been captured in the LAT Program Instrument Performance Verification Plan (LAT-MD-00408).
Action Item Number	1
Date	1/11/02
Originator	S. Scott
Actionee	T. Thurston
Summary	Provide min. mission science requirements and descope plan.
Full Description	Provide a list of the Minimum Science Mission Requirements and a copy of the Descope Plan. A copy of the Science Requirements Document and Descope Plan from the proposal would be sufficient if they are still relevant.
Responses	(1) The Minimum Science Mission Requirements are defined in the GLAST Project Science Requirements Document (SRD), Document No. 433-SRD-0001. This information has been placed into the Systems Engineering RFI document, LAT-LR-00559 and will be forwarded to reviewers. (2) The Descope Plan is given in paragraph 2.2.10 - Descope Options and the Performance Floor of the GLAST LAT Flight Investigation proposal. This information has been updated and added to the SE PDR RFI document LAT-LR-00559.

Action Item
Number 13
Date 1/11/02
Originator S. Scott
Actionee T. Thurston

Summary Provide time accuracy requirements and allocation.

Full Description Provide a list of the Time Accuracy requirements allocated to and affecting the LAT Instrument and Instrument Operations Center. Describe the Instrument, Observatory, and Mission Time Management Approach and how it will be verified.

Responses The GLAST Mission System Specification (MSS) specifies the time base for use in GLAST operations and data processing. The S/C to LAT IRD specifies the use of GPS for external time reference, as provided by the spacecraft Pulse Per Second (PPS) signal and associated timing message. This approach, with internal clocks, was successfully used during the beam test and balloon flight to meet timing requirements. Operationally, sufficient timing information is included in the data to unambiguously reference each event to GPS time, and to provide diagnostics on clock drifts and latency in data processing and delivery to the SSR. A detailed memorandum will be developed consistent with the GSFC Project Office study of time base to be used.

4.1.4 - Tracker

Action Item
Number 1
Date 1/11/02
Originator H. Spieler
Actionee R. Johnson

Summary Baseline the Tracker with increased contingency

Full Description Baseline the Tracker with increased contingency.

Responses This will be reviewed by an independent SLAC chartered "GLAST Internal Review Committee", March 16-18, 2002. The results of that review will be summarized and made

available at the Delta Review.

Action Item
Number 2

Date 1/11/02

Originator H. Spieler

Actionee R. Johnson

Summary Thoroughly evaluate pre-production ICs

Full
Description Evaluate pre-production ICs thoroughly to ensure success of full production run.

Responses This has been planned from the beginning and is being implemented. At present the first generation prototypes are still being tested intensively at UCSC, and that will continue until the pre-production parts are available in early March of 2002. The pre-production parts will be tested at UCSC (amplifier chips) and SLAC (controller chips) using existing test boards and probe cards (with the intent of the latter being mainly to test the wafer probing system that is under development and to find good die for loading MCMs). The two designs will then be tested together at UCSC on the mini-MCM boards that already exist, along with support electronics, and are presently being used with the existing chips. The mini-MCM board will be connected to a full detector ladder to give a realistic system. Fully loaded MCM boards will also be supplied at that time to the electronics subsystem for their test program and to Pisa for their team to become familiar with the electronics and contribute to the testing. In parallel, full MCM boards for the Engineering Model will be produced at Teledyne, using wafer-probed pre-production chips. Those MCMs will be thoroughly tested at UCSC without detector load and then will be shipped to Italy for mounting onto Engineering Model trays. The final system tests will be carried out on the completed trays.

Action Item
Number 3

Date 1/11/02

Originator H. Spieler

Actionee R. Johnson

Summary Refine assembly and test procedures

Full Description Refine assembly and test procedures.

Responses Test procedures for the electronics exist, but the review noted some inconsistencies and variations in quality and thoroughness from one document to the next. The Tracker subsystem manager and engineers will rectify this, concentrating first on the documents relevant to the ASIC testing described above. Also, a search is in progress for an engineer to work at UCSC specifically on the electronics testing and documentation. The assembly procedure documents are in progress at Teledyne and in Italy. The procedure for SSD receiving and testing has been completed, and present work is concentrated on the procedure for ladder assembly and testing.

4.1.5 - Calorimeter

Action Item Number 2

Date 1/11/02

Originator R. Ray

Actionee N. Johnson

Summary Finalize agreement on responsibilities of French institutions

Full Description The French collaborators, LAT management, and the relevant agencies should quickly reach and implement a final agreement on the responsibilities of the French institutions.

Responses A draft agreement has been agreed upon and can be signed off as soon as NASA/CNES agreement is approved.

Action Item Number 1

Date 1/11/02

Originator R. Ray

Actionee N. Johnson

Summary Do not baseline Calorimeter until French commitments are finalized.

Full Description The calorimeter project should not be baselined until the French commitments are finalized and changes in the scope of the US contribution are fully understood.

Responses The calorimeter project is not baselined. The French commitments are being finalized with CNES. The French commitments and scope change will be incorporated for baselining at the Delta Review.

Action Item Number 3
 Date 1/11/02
 Originator R. Ray
 Actionee N. Johnson

Summary Establish a new budget and schedule

Full Description The LAT calorimeter management team should establish a new budget and schedule reflecting the change in scope of the US commitment and the delay in CDE assembly.

Responses New budget and schedule will be presented at the Delta Review.

4.1.6 - ACD

Action Item Number 4
 Date 1/11/02
 Originator P. De Barbaro
 Actionee D. Thompson

Summary TDA thermal cycling

Full Description Perform thermal cycling of fully assembled tiles and ribbons. Verify that no damage to tile/fiber assemblies takes place and light yield is not decreased.

Responses The performance of the TDA need to be quantified after being subjected to their temperature extremes. The following steps have been taken to closeout this action. 1. Write Test Plan. 2. Prepare test sample. 3. Perform test. The results will be reported in the Delta Review.

Action Item 5

Number	
Date	1/11/02
Originator	P. De Barbaro
Actionee	D. Thompson
Summary	Prepare test plan
Full Description	Prepare a plan for Quality Control (tile response uniformity and broken fibers) and initial calibration (ADC/minimum ionizing particle) of the ACD system prior to the delivery to the Stanford Linear Accelerator Center.
Responses	The test & verification plan is being written. This will be included in CDR submittal. The following steps are being taken: (1) Develop and demonstrate test techniques to test the ACD. Complete (2) Write a verification plan. ECD: 9/15/02
Action Item Number	3
Date	1/11/02
Originator	P. De Barbaro
Actionee	D. Thompson
Summary	Fiber routing mock-up
Full Description	Complete full mockup of ACD, including clear fiber layout to photomultiplier tubes.
Responses	A fiber routing mockup will be completed and presented at CDR: The following steps are being taken. 1. Fabricate ACD mock-up. Completed 2. Route fiber cables. ECD: 8/15/02
Action Item Number	8
Date	1/11/02
Originator	P. De Barbaro
Actionee	D. Thompson
Summary	Critical path analysis

Full Description Perform the critical path schedule analysis for the entire subsystem. Provide detailed documentation (at the lowest level of WBS) for the Basis of Estimate of the costs, in particular the on-project and off-project labor costs.

Responses Critical path analysis has been performed and will be presented at the Delta Review.

Action Item Number 6

Date 1/11/02

Originator P. De Barbaro

Actionee D. Thompson

Summary Provide schedule margin for ASIC development

Full Description Additional time should be added to the ASIC production schedule to provide some schedule margin.

Responses Just prior to PDR it was learned that additional time for screening of the ASICs was required. There is a parts engineer currently working on reducing the amount of time it takes to screen the ASIC. Schedule margin is being identified in the ASIC schedule. The new schedule will be presented at the Delta Review.

Action Item Number 1

Date 1/11/02

Originator P. De Barbaro

Actionee D. Thompson

Summary Finalize TDA bottom row design

Full Description Finalize the design and generate the engineering drawings for the tile and fiber layout, including the lowest row of the ACD.

The reviewer mentioned that the design that we currently have for our bottom row of tiles may not work because of the long length of Wave Shifting Fiber used. He recommended an alternate

Responses method of routing the Wave Shifting Fibers. We will design a new lower TDA using this alternate method of routing. We will then fabricate both types of TDAs. The TDAs will be tested and the TDA that provides the highest performance will be selected. The following steps will be taken to resolve this action. The finalize/optimal results will be presented at CDR. -----
 (1) Choose a fiber layout design based on the required performance and mechanical constraints of the fiber routing. ----- (2) Fabricate a prototype. ----- (3) Test the prototype.

Action Item Number 2
 Date 1/11/02
 Originator P. De Barbaro
 Actionee D. Thompson

Summary Perform light yield measurement

Full Description Perform light yield tests and muon detection efficiency measurement of the final optical system (scintillator tiles; and fiber ribbons, connector, clear fibers, and photo multiplier tubes).

Responses These measurement will be performed and results will be included at CDR submittal. The following steps have been taken to closeout this action. 1. Fabricate TDA prototype. 2. Fabricate clear fiber bundle. 3. Test the TDA prototype.

Action Item Number 9
 Date 3/27/02
 Originator P. De Barbaro
 Actionee D. Thompson

Summary Demonstrate low electronic noise

Full Description Demonstrate that electronic noise of the system is low enough not to affect the muon rejection efficiency and efficiency for gammas by more than one percent.

Responses The ACD subsystem shall demonstrate that the flight electronics do not have a noise problem, either in normal operation or under EMI/EMC conditions. The following steps have been

planned to resolve this action: 1. Measure noise performance of flight electronics. ECD: 10/1/2002 2. EMI/EMC test. ECD: 2/10/2003

Action Item Number	10
Date	3/27/02
Originator	P. De Barbaro
Actionee	D. Thompson
Summary	Perfrom contingency analysis of the subsystem
Full Description	Perform the contingency analysis of the subsystem. In particular, assess contingency for the off-project labor tasks.
Responses	The contingency analysis has been included in the PMCS and will be available for the Delta Review.
Action Item Number	11
Date	3/27/02
Originator	P. De Barbaro
Actionee	D. Thompson
Summary	Subsystem is not ready for baseline
Full Description	Due to lack of a verifiable Work Breakdown Structure (cost estimate) for the ACD, the subsystem is not ready to be baselined at the present time. Consider the following streamlining steps: - Separate materials and services from the labor tasks at lowest WBS level - Identify all the off-project labor costs at the lowest WBS level - Use the actual, fully loaded costs for technicians, specialists, engineers, etc., in all WBS labor estimate
Responses	The streamlining of the WBS has been carried out within the constraints of the PMCS and GSFC management systems. Streamlining of the WBS schedule/costs is complete and available for the Delta Review.
Action Item	12

Number
 Date 3/27/02
 Originator P. De Barbaro
 Actionee D. Thompson

Summary Conduct a Subsystem Baseline Review

Full Description Conduct a Subsystem Baseline Review as soon as the work on the subsystem Work Breakdown Structure is completed.

Responses Agreed.

Action Item Number 7
 Date 1/11/02
 Originator P. De Barbaro
 Actionee D. Thompson

Summary Complete bottoms-up WBS

Full Description Complete the bottom-up WBS in the Primavera framework.

Responses This will be completed and presented at the Delta Review. The following steps have been taken: (1) Organize the WBS. (2) Schedule activities. (3) Load manpower, materials and supplies.

4.1.7 - Electronics

Action Item Number 2
 Date 1/11/02
 Originator F. Huegel
 Actionee G. Haller

Summary Ensure 100% surge current testing and conservative derating for flight tantalum caps

Full Description Ensure that flight tantalum caps receive 100% surge current testing and conservative derating to provide for maximum protection against short circuit failures.

Responses Agreed.

Action Item
Number

3

Date

1/11/02

Originator

F. Huegel

Actionee

G. Haller

Summary

Review power supply schedule and budget

Full Description Review the schedule and budget for the power supply development to ensure adequate resources have been identified.

Responses Agreed. We have reviewed the schedule and budget; the cost for power supplies is still considered a risk. We are pursuing steps to mitigate this.

Action Item
Number

4

Date

1/11/02

Originator

F. Huegel

Actionee

G. Haller

Summary

Verify approved use of optocouplers

Full Description The LAT parts engineer should verify that the use of the optocouplers in the SWRI power supplies falls within GSFC approved guidelines.

Responses Agreed. This is being addressed in conjunction with SWRI.

Action Item
Number

6

Date

1/11/02

Originator F. Huegel
 Actionee G. Haller

Summary Review ASIC screening and burn-in schedule.

Full Description Review the schedule for the burn-in and screening of the flight ASICS. The time currently allotted appears to be a minimum.

Responses ASIC schedule was reviewed. To mitigate this risk, the ACD schedule has been modified and a new CAL burn-in approach has been identified. This will be presented in the Delta Review.

Action Item Number 7
 Date 1/11/02
 Originator F. Huegel
 Actionee G. Haller

Summary Correct the discrepancies in the ACD flight ASIC schedules

Full Description Correct the discrepancies in the ACD flight ASIC schedules.

Responses Agreed. This will be available for Delta Review.

Action Item Number 8
 Date 1/11/02
 Originator F. Huegel
 Actionee G. Haller

Summary Consider additional resources in software development

Full Description Based on the upper level estimate of 300K lines of code for the flight software and the current support level of 5.5 FTEs it appears that the development pace will be comparable to the intensive effort on the balloon flight. With the added testing requirements for flight software the schedule could be very difficult to meet. It is recommended that the LAT project re-evaluate the need for additional resources in this area.

Responses We have completed the evaluation and agree that additional personnel are called for. We are actively investigating resources to provide the needed personnel.

Action Item Number 1
Date 1/11/02
Originator F. Huegel
Actionee G. Haller

Summary Qualify polyswitches for tracker electronics

Full Description Work with GSFC parts branch to study the feasibility of qualifying polyswitches for use in the tracker electronics.

Responses Agreed. Qualification testing is under way at UC Santa Cruz, including radiation and thermal-vacuum testing. ECD:12/31/2002

Action Item Number 9
Date 2/12/02
Originator S. Scott
Actionee J. Russell

Summary Conduct software peer reviews.

Full Description Conduct software peer reviews. I suggest the following as a minimum: Software Requirements Review, Software Preliminary Design Review, Software Critical Design Review, Software Test Readiness Review (per build), Software Acceptance Review, and Operations Readiness Review.

Responses We agree that holding software peer reviews would be very helpful, and have begun arrangements to get these started. We are working with Erik Andrews of GSFC and Terry Schalk of UCSC to define the LAT Flight Software Review Porcess.

Action Item 10

Number
 Date 2/12/02
 Originator S. Scott
 Actionee J. Russell

Summary Provide LAT Software Requirements Specification

Full Description Provide a copy of the GLAST LAT Software Requirements specification, an item which should be fairly mature at PDR

Responses The LAT Software Requirements Specification (LAT-SS-000399) is in the release process.

Action Item Number 5
 Date 1/11/02
 Originator F. Huegel
 Actionee G. Haller

Summary Monitor RAD750 development. Investigate backup options.

Full Description Continue close monitoring of RAD750 development and continue to investigate backup options. Evaluate schedule, cost and technical impacts of candidate backups.

Responses Agreed. The RAD750 development program will be constantly monitored. The LAT project has initiated a back-up plan to develop and implement an engineering model of the PowerPC 603E in a cPCI.

4.1.8 - Mechanical

Action Item Number 3
 Date 1/11/02
 Originator J. Ryan
 Actionee M. Nordby

Summary	Estimate impact of replacing a Tracker module on complete LAT
Full Description	Provide an initial, top-level estimate of the cost/schedule impact of replacing a Tracker tower after complete instrument assembly.
Responses	The I&T subsystem is addressing this action Item. A new action, I&T #7, has been created for the I&T Subsystem. Refer to I&T #7 for response.
Action Item Number	6
Date	1/11/02
Originator	J. Ryan
Actionee	M. Nordby
Summary	TV cycle grid and heat pipes alone
Full Description	Perform TV cycling testing of the assembled grid with heat pipes (no other components) to evaluate workmanship.
Responses	This has been added to the Mechanical Systems Test Plan.
Action Item Number	7
Date	1/11/02
Originator	J. Ryan
Actionee	M. Nordby
Summary	Determine survival heater config.
Full Description	Determine configuration of survival heaters, i.e., S/C control or thermostats.
Responses	The LAT is responsible for survival heater control. There are two sets of survival heaters for the LAT. One set deactivates the VCHPs, and is run off a watch-dog switch in the SIU (using the Surv-1 power bus from the SC). The second set of survival heaters will be controlled by thermostats, and draw power from the Surv-2 bus off the SC. These heaters are mounted on

the Grid and X-LAT Plate.

Action Item
Number 8

Date 1/11/02

Originator J. Ryan

Actionee M. Nordby

Summary Inform RSDO contractor of LAT thermal time constant & effect on TV schedule

Full Description Ensure that the Rapid Spacecraft Development Office contractor is aware of the long time constant LAT instrument which will effect the duration of performing 4 thermal vacuum cycling. Also consider the thermal time constant effect on the LAT thermal vacuum test.

Responses A crude approximation of LAT thermal time constants will be forwarded to the GLAST Mission Office for the benefit of the RSDO contractor (The current estimate is 12 hours time constant on the grid, and 24 hours soak at temperature). The in-chamber thermal performance and ramp times will be analyzed prior to LAT-CDR. This information will be provided to the GLAST Mission Office. These factors were considered in developing the I&T schedule.

Action Item
Number 9

Date 1/11/02

Originator J. Ryan

Actionee M. Nordby

Summary Conduct a delta PDR for thermal/mechanical changes.

Full Description Conduct a delta mechanical/thermal PDR to evaluate technical, cost and schedule impacts of the thermal changes necessary to meet requirements with margin.

Responses Agreed.

Action Item
Number 10

Date 1/11/02

Originator	J. Ryan
Actionee	M. Nordby
<hr/>	
Summary	Consider second sourcing VCHPs and CCHPs.
Full Description	Consider second sourcing thermal control components, such as VCHP's and CCHP's, due to LM facility relocation to Mississippi.
Responses	LM is no longer relocating their facility to Mississippi. LAT management does not feel that investigation of second sources is currently required.
Action Item Number	11
Date	1/11/02
Originator	J. Ryan
Actionee	M. Nordby
<hr/>	
Summary	Complete mech/therm ICDs
Full Description	Internal mechanical/thermal ICD's need to be completed.
Responses	ICDs and drawings are currently in their 3rd draft, with completion expected shortly after Delta PDR.
Action Item Number	12
Date	1/11/02
Originator	J. Ryan
Actionee	M. Nordby
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Summary	Pursue fabrication of radiators on original schedule
Full Description	Pursue with the GLAST Project whether funding can be found to fabricate the radiators on the original schedule (rather than the year slip apparently mandated by the funding profile). This is a programmatic risk that should be avoided if possible.

Responses	The schedule risks associated with late fabrication of the Radiators has been discussed with the GLAST Project Office. The six-month extension of the LAT has provided adequate schedule float.
Action Item Number	13
Date	1/11/02
Originator	J. Ryan
Actionee	M. Nordby
Summary	Do not baseline mech system until thermal design changes complete and contingency reassessed.
Full Description	Mechanical system not ready to be baselined at this time. Contingencies must be reassessed based on thermal design changes/radiator repackaging are understood.
Responses	Cost estimates and schedule have been fully updated, based on the current Delta PDR implementation of the thermal system.
Action Item Number	25
Date	2/12/02
Originator	J. Ryan
Actionee	Nordby
Summary	Examine providing positive shear restraint at critical interfaces.
Full Description	Reexamine all primary structure and alignment sensitive interfaces for LAT Instrument and provide positive shear restraint, if possible, at these critical interfaces. Also, ensure that locking features have been incorporated into bolted joint designs.
Responses	Positive shear restraint is being used where possible. The CAL-Grid interfaces will use pre-loaded bolts and friction connections. The joint is being prototyped to qualify the joint design, and all pre-loaded bolts will include locking features.
Action Item	5

Number
 Date 1/11/02
 Originator J. Ryan
 Actionee M. Nordby

Summary Investigate radiator coatings with higher emissivity

Full Description Investigate using thermal coatings with higher emissivity (while maintaining a low absorptivity) for the radiator.

Responses Three coating options have been investigated: a specific white paint, 0.25 mm thick FOSR, and OSR. Our choice is the thicker FOSR, which has an EOL emissivity of 0.85 (compared to 0.8 for the PDR coating). White paint was rejected because of its lack of flight heritage, and OSR was rejected since it is brittle and difficult to handle, resulting in a large increase in risk of damage.

Action Item Number 14
 Date 2/12/02
 Originator D. Hewitt/T. McCarthy
 Actionee Nordby

Summary System solution to radiator repackaging

Full Description Pursue a system solution to the thermal design needed for the radiator repackaging effort. Insure system margin is provided via heat rejection capability (margin of 20%) and by the consideration of margin to be added to temperature predictions for modeling uncertainties. The system solution should strive to return to single radiators on the +/- sides of LAT using 5.4 m² by: a) Expanding the max EOL temperature level of stack detectors, b) Reducing the specified instrument max power level, c) Incorporating realistic solar array transient temperature profiles into analysis, and d) Increasing the survival heater allocation. The system solution should also strive for simplicity and testability, especially at the LAT T/V and TB level. The system solution should address robustness for failures.

Responses Design carries 8 degC temp margin with respect to AT temperatures, and thermal test strategy has been developed (to be shown at dPDR). Re-packaging design effort is complete, and system-level trades accomplished with GLAST Mission input.

Action Item Number 2
 Date 1/11/02
 Originator J. Ryan
 Actionee M. Nordby

Summary Provide sine test philosophy for LAT

Full Description Provide the sine test philosophy for the LAT instrument/subsystems.

Responses Sine test philosophy has been added to the LAT Verification Test Plan as part of the deliverable for CDR.

Action Item Number 15
 Date 2/12/02
 Originator D. Hewitt/T. McCarthy
 Actionee Nordby

Summary Show test matrix for TCS

Full Description Provide a matrix that shows TCS qualification and acceptance testing from component to subsystem to all-up LAT testing. Include mechanical and thermal environments.

Responses This is included into the LAT Verification Test Plan. Thermal test table and matrix are complete. Structural/vibration strategy is finalized, but values are provisional (pending final CLA done by SC contractor).

Action Item Number 16
 Date 2/12/02
 Originator D. Hewitt/T. McCarthy
 Actionee Nordby

Summary Review box temperature requirements

Full Description	Review individual box temperature requirements to ensure these limits are based on box capability not on the TCS capability.
Responses	Box test temperatures have been established, and are detailed in the LAT Verification Test Plan.
Action Item Number	17
Date	2/12/02
Originator	D. Hewitt/T. McCarthy
Actionee	Nordby
Summary	Provide summary of candidate thermal interface materials
Full Description	Provide a summary matrix showing candidate interface materials to be used in the thermal design. This should show location and advantage/disadvantage of each.
Responses	This was part of I-PDR presentation and support data. A more concise list of interface materials and interface descriptions is included in the Delta PDR material.
Action Item Number	22
Date	2/12/02
Originator	D. Hewitt/T. McCarthy
Actionee	Nordby
Summary	Evaluate TKR tray temperature wrt thermal gasket
Full Description	Evaluate the sensitivity of the tracker tray temperature with respect to the thermal interface gasket. Verify heat transfer coefficient in T/V cycling.
Responses	Thermal analysis shows that TKR tray temperatures are relatively insensitive to changes in the thermal gasket conductivity. Thermal-vacuum testing of candidate gasket materials is underway.

Action Item Number	23
Date	2/12/02
Originator	J. Ryan
Actionee	Nordby
Summary	Test designs using composite joints for joint allowables.
Full Description	All LAT Instrument designs incorporating composite joints should have these designs tested for joint allowables. In some cases, testing was already planned.
Responses	Strength qualification testing has been included in the LAT Verification Test Plan for CDR.
Action Item Number	24
Date	2/12/02
Originator	J. Ryan
Actionee	Nordby
Summary	Procure fasteners in accordance with GSFC requirements.
Full Description	LAT Instrument and subsystems should be procuring fasteners in accordance with GSFC Fastener Integrity Requirements, 541-PG-8072.1.2.
Responses	Fastener design, procurement, and test requirements are identified in the LAT-SS-00107 "LAT Mechanical Parts Plan." These requirements are compliant with the LAT MAR.
Action Item Number	21
Date	2/12/02
Originator	D. Hewitt/T. McCarthy
Actionee	Nordby
Summary	Investiage freezing and thawing scenarios for ammonia
Full	How will the risks of freezing and thawing the VCHP/CCHP ammonia be mitigated. Identify

Description	freezing and thawing scenarios. Identify operational limitations.
Responses	Heat pipe freezing is not predicted. However, to assure that freezing is not possible the Radiator baseline design includes anti-freeze heaters mounted to the VCHP's, activated by thermal switches. Heater power for these heaters is included in the survival power budget.
Action Item Number	1
Date	1/11/02
Originator	J. Ryan
Actionee	M. Nordby
Summary	Generate LAT strength qual plan
Full Description	Generate a comprehensive strength qualification plan for the LAT instrument.
Responses	Strength qualification plans have been added to the LAT Verification Test Plan as part of the deliverable for CDR.
Action Item Number	20
Date	2/12/02
Originator	D. Hewitt/T. McCarthy
Actionee	Nordby
Summary	Perform a high beta angle analysis
Full Description	Perform a high beta angle analysis to ensure the selected PDR analysis worst case hot/cold cases properly envelope all orbital scenarios. Also analyze "rocking" sky survey modes.
Responses	High-beta angle analyses were performed for I-PDR and have been re-run using the final hot-case model. Conclusion: beta = 0 is the LAT hot-case orbit. Rocking analyses will be performed after the Spacecraft selection.
Action Item Number	4

Date 1/11/02
 Originator J. Ryan
 Actionee M. Nordby

Summary Evaluate modifying the requirements being used for thermal design analyses in the following areas: a) Temperature profile for solar arrays for hot, cold and survival cases. b) The EOL temperature margin that could be achieved by raising the allowable operating temperature of the tracker detectors. c) Evaluate increasing the survival heater power allocation. d) Evaluate the maximum power that the thermal system should reject

Full Description Evaluate modifying the requirements being used for thermal design analyses in the following areas: a) Temperature profile for solar arrays for hot, cold and survival cases. b) The EOL temperature margin that could be achieved by raising the allowable operating temperature of the tracker detectors. c) Evaluate increasing the survival heater power allocation. d) Evaluate the maximum power that the thermal system should reject

Responses Results will be presented at dPDR. Updated status as of 17 July 2002:(a) The LAT team has analyzed more realistic hot-case solar array heat loads, and the GLAST Mission has incorporated new requirement values in the IRD. (b) The thermal requirement was reviewed. It was concluded that no change to the TKR temperature should be made. Ref to LAT-TD-00603-01 (c) The GLAST Mission has allocated additional survival heater power of 300 W. Initial LAT analysis indicates that this will provide >30% control margin (per MAR requirement). (d) Total hot-case process heat rejection capability of the LAT instrument is 602 W. The LAT power allocation is 650 W, but 48 W of this has been reserved for the Radiator VCHP heaters, and is not part of the hot-case heat load, since the heaters are not in use in the hot-case regime.

Action Item Number 18
 Date 2/12/02
 Originator D. Hewitt/T. McCarthy
 Actionee Nordby

Summary Define the blanket equivalent sink temperatures for the XLAT panel

Full Description Define the blanket equivalent sink temperatures for the XLAT panel (facing the S/C) and the backside of the radiators. Ensure that these boundaries are reasonably assessed for the worst case hot and cold design cases.

Responses A more complete description of this interface was included in the May 2002 IRD. This has been added to our hot- and cold-case analyses.

Action Item Number 19
 Date 2/12/02
 Originator D. Hewitt/T. McCarthy
 Actionee Nordby

Summary Develop TCS risk list

Full Description Develop the thermal control system risks and risk mitigation list. Implement management of this list.

Responses A Mechanical Systems risk list has been developed, and includes TCS technical and development risks.

4.1.9 - Integ & Test

Action Item Number 7
 Date 7/18/02
 Originator J. Ryan
 Actionee E. Bloom

Summary Estimate impact of replacing a tracker module on complete LAT

Full Description Provide an initial, top-level estimate of the cost/schedule impact of replacing a Tracker tower after complete instrument assembly. (This AI was originally AI-Mech-03)

Responses

Action Item Number 6
 Date 1/11/02

Originator W. Craig
 Actionee E. Bloom

Summary Write Rev 0 assembly traveler prior to Qual Unit A arrival.

Full Description Rev 0 assembly traveler should be written and under configuration control before Qualification Unit A arrives.

Responses Agreed.

Action Item Number 5

Date 1/11/02

Originator W. Craig

Actionee E. Bloom

Summary Write a test plan for the airborne test.

Full Description Write a baseline level plan for the airborne test by March 2002 and ensure that any requirements on the subsystems levied by this test are flowed to subsystem managers.

Responses Agreed, the airborne test plan will be included in the integration and test plan. The integration and test plan will be reviewed and concurred upon by Systems Engineering and Subsystem Managers.

Action Item Number 4

Date 1/11/02

Originator W. Craig

Actionee E. Bloom

Summary Write integration plans

Full Description Write the integration and electronics integration plans and get them under configuration management by March 2002.

Responses	An integration and test plan will be written. This will be available and under configuration management before the Delta Review.
Action Item Number	3
Date	1/11/02
Originator	W. Craig
Actionee	E. Bloom
Summary	Hold a baseline review
Full Description	Recommend subsystem baseline review as soon as possible after the work on items 1 and 2 are complete.
Responses	Agreed.
Action Item Number	2
Date	1/11/02
Originator	W. Craig
Actionee	E. Bloom
Summary	Complete reworked cost and milestones.
Full Description	Complete the reworked cost and milestones with review and approval by project management by March 2002.
Responses	Agreed. Rework will be completed by the Delta Review.
Action Item Number	1
Date	1/11/02
Originator	W. Craig
Actionee	E. Bloom
Summary	Complete reworked WBS.

Full Description Complete the reworked WBS with review and approval by project management by February 2002.

Responses The reworked WBS has been completed. It is available through the LAT document system.

4.1.A - P & SA

Action Item Number 1
 Date 1/11/02
 Originator W. Craig
 Actionee D. Marsh

Summary Complete the GSFC Perf. Assurance Audit before the CDR

Full Description Complete the GSFC Performance Assurance Audit this spring, before the CDR.

Responses The tentative schedule for the GSFC Safety & Mission Survey of the LAT Performance Assurance Program is December 2002, before CDR.

Action Item Number 2
 Date 2/12/02
 Originator S. Scott
 Actionee D. Marsh

Summary Describe the metrology program

Full Description Describe the metrology program that will be used to ensure that equipment used in assembly and testing will measure and assemble correctly. For example, how does an assembler know that the tools and equipment being used are calibrated?

Quality System Procedure LAT-MD-00470, Inspection, Measuring & Test Equipment, has been established to ensure that monitoring and measurement can be carried out and are carried out in a manner that is consistent with the monitoring and measurement requirements. Where

Responses necessary to ensure valid results, measuring equipment shall: a) be calibrated or verified at specified intervals or prior to use, against measurement standards traceable to international or national measurement standards; b) be identified to enable calibration status to be determined; c) be safeguarded from adjustments that would invalidate the measurement result; d) be protected from damage and deterioration during handling, maintenance and storage.

4.1.B - IOC

Action Item Number 1
 Date 1/11/02
 Originator J. Branson
 Actionee S. Williams

Summary Baseline IOC

Full Description Recommend Baseline Approval: Technical, Cost, Schedule, Management.

Responses Agreed.

Action Item Number 2
 Date 1/11/02
 Originator J. Branson
 Actionee S. Williams

Summary Subprojects provide people to define interfaces to IOC

Full Description Subprojects which interface with the IOC should make people available soon to define interfaces

Responses The subsystem personnel responsible for participating in the interface definition with the IOC are identified in the post-PDR version of the IOC PDR report (LAT-TD-00428, sections 3.3, 5.7, and 5.13). No further action required.

Action Item Number 3

Date 1/11/02
 Originator J. Branson
 Actionee S. Williams

Summary Put a minimal MOC team in place

Full Description Input in place a minimal MOC team as soon as possible so that the IOC team can plan their interfaces together. It is also important that the other LAT subprojects teams begin to plan their interfaces with the IOC.

Responses No LAT action required. LAT will support GLAST Mission Office efforts to assemble this team.

4.1.D - SAS

Action Item Number 4
 Date 1/11/02
 Originator J. Branson
 Actionee R. Dubois

Summary Improve depth of organization at level of S/W architect and S/W engineers

Full Description The collaboration should continue to recruit talented manpower for the software project. In particular, a second person competent to serve as a software architect and additional core software engineers should be identified.

Responses We have completed the evaluation and agree that additional personnel are called for. We are actively investigating resources to provide the needed personnel.

Action Item Number 3
 Date 1/11/02
 Originator J. Branson
 Actionee R. Dubois

Summary	Plan for implementation of Science Analysis Tools
Full Description	The collaboration should move forward with the planning and early implementation of Science Analysis Tools. Some official planning is required soon. The three to four off-project full-time equivalents should be identified to begin implementation.
Responses	A joint LAT-SSC working group has been formed to plan and oversee the implementation of the Science Analysis Tools. The Working Group will present an update at CDR.
Action Item Number	5
Date	1/11/02
Originator	J. Branson
Actionee	R. Dubois
Summary	Fill the user support position
Full Description	The user support position should be filled as soon as possible in FY 2003.
Responses	Funds are budgeted for FY 2003. We expect to provide the needed personnel then.
Action Item Number	1
Date	1/11/02
Originator	J. Branson
Actionee	R. Dubois
Summary	Baseline SAS
Full Description	Recommend Baseline Approval: Technical, Cost, Schedule, Management.
Responses	Agreed.
Action Item Number	2
Date	1/11/02
Originator	J. Branson

Actionee	R. Dubois
Summary	Maintain current S/W effort
Full Description	The collaboration should at least maintain the current level of software effort that is not directly funded by the project.
Responses	No action required. SAS will maintain the current effort.

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