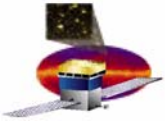


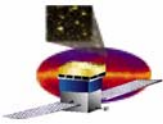
GLAST Large Area Telescope: LAT System Engineering

Pat Hascall
SLAC
System Engineering



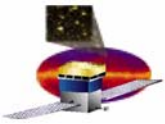
Topics

- **Action Item Status**
- **Technical Baseline Management**
- **Requirements Management and Verification Planning**
- **Interface Control Documentation**
- **RFA Closure**
- **Key Metrics**
- **Risk Management**



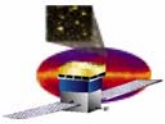
Monthly Action Item Status

| Action Item ID | Actionee | Description | Status |
|----------------|---------------|--|--|
| 7-30-03-006 | Haller | For TEM/TEM PS to be provided to CAL Qual/Accept program; provides a specific list of differences from flight (hardware/software/performance), include any constraints for use (T/V, EMC.....) | OPEN: ECD 27 August; ECD 29 October - Further definition required, plan in work. |
| 7-30-03-008 | Jerry Clinton | Define and maintain the production readiness/execution plan to include vendor selection and associated schedule to ensure unit availability dates are met | OPEN: Draft production plan completed & provided to GSFC. Refinement required as vendors are selected. Update provided early December, 2003. Next update ECD: Mid-January. |
| 7-30-03-009 | Dick Horn | Establish subsystem metrics to ensure critical design elements are closing (e.g. drawings) and fabrication issues are monitored for closure and adverse trends (e.g. NCRs), phase in as possible | OPEN: Initial drawings and process status in place. Power & mass updates complete, NCR status and plans for future metrics presented by D. Marsh. |
| 1-28-04-013 | Dick Horn | Provide risk assessment of LAT power requirements to support GSFC decision with respect to S/C power capability | OPEN |



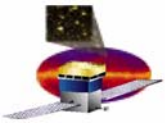
Monthly Action Item Status (Cont.)

| Action Item ID | Actionee | Description | Status |
|----------------|----------------------|--|-------------------------------------|
| 1-28-04-014 | Johnson/ Thompson | CAL & ACD to include a summary of internal subsystem NCR's for info only and maintain a monthly summary. | OPEN |
| 1-28-04-015 | Andrews | Finalize and document ISIS detailed requirements. | OPEN - Draft Complete, ECD:? |
| 1-28-04-016 | Dick Horn | Plan a I&T Readiness Kick-off. | CLOSED- 9 March 04 |
| 1-28-04-017 | B. Graf | Drive parts radiation issues to closure. | OPEN |
| 1-28-04-018 | A. Whipple | Clarify S/C power system failure scenario and signature (42v/100ms). | CLOSED |



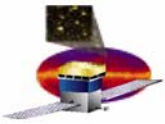
Drawing Release Status

- **Drawing release still falling behind**
 - Discussed in Subsystem presentations
 - Initiated process (me) to push DAQ drawings and speed signoff
- **Drawing count changes**
 - Tracker has 18 (not yet in metrics)
 - 10 for the Tracker to Grid interface change
 - 8 to capture Gerber files for the flex cables
 - Mechanical added 9 drawings and rescheduled remaining
 - ACD provided replan
 - Calorimeter provided replan

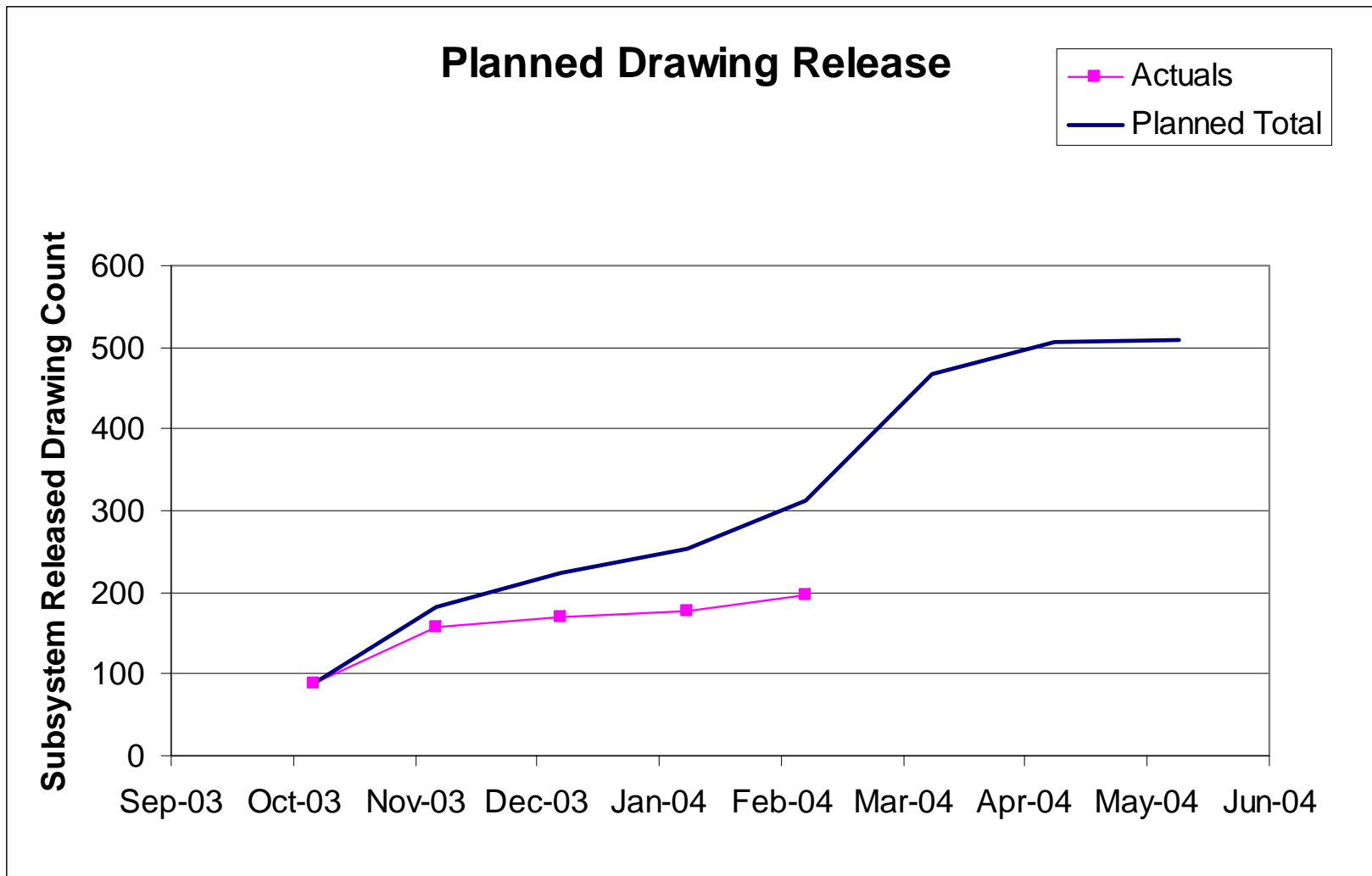


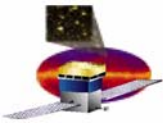
Cumulative Released Drawing Metrics

| Subsystem | | Oct 03 | Nov 03 | Dec 03 | Jan 04 | Feb 04 | Mar 04 | Apr 04 | May 04 |
|-------------|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| Tracker | Plan | 28 | 75 | 97 | 97 | 97 | 97 | 97 | 97 |
| | Actuals | 28 | 49 | 61 | 62 | 64 | | | |
| ACD | Plan | 28 | 41 | 41 | 47 | 57 | 95 | 105 | 105 |
| | Actuals | 28 | 41 | 41 | 47 | 57 | | | |
| Cal | Plan | 28 | 28 | 28 | 28 | 28 | 36 | 36 | 36 |
| | Actuals | 28 | 28 | 28 | 28 | 28 | | | |
| DAQ | Plan | 0 | 0 | 19 | 42 | 86 | 172 | 191 | 191 |
| | Actuals | 0 | 0 | 0 | 0 | 8 | | | |
| Mechanical | Plan | 4 | 39 | 39 | 39 | 44 | 53 | 63 | 64 |
| | Actuals | 4 | 39 | 39 | 39 | 39 | | | |
| Integration | Plan | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 15 |
| | Actuals | 0 | 0 | 0 | | | | | |
| Total | Plan | 88 | 183 | 224 | 253 | 312 | 468 | 507 | 508 |
| | Actuals | 88 | 157 | 169 | 176 | 196 | | | |



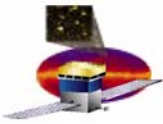
Flight Drawing Release





Issues

| No. | Title/Description | Description/Status | Due Date | Actionee |
|-----|---|--|----------------------------|-------------|
| 3 | Technical baseline | Drawing Tree completion by end of Oct. All drawings under CM prior to flight build. CIDL out for review, Flight drawing release plan generated. | Mar 04 | P. Hascall |
| 8/9 | GTRC TOT timeouts, GTRC extra clock delay | Cause understood. Fix would require GTRC redesign or correct in TEM. Plan presented at 29 Oct 03 Monthly Review. Revisit when chip is complete. Fix verified by test | Closed | R. Johnson |
| 10 | Tracker EM program completion | Interface design complete, TV test planning in work. TV test planned for 8 March . | March 04 | R. Johnson |
| 11 | ACD TDA flexure / fiber interference | Rerouted fibers, tapered flexures and moved some flexures. Performing final analysis, drawings in review. –Presented in Engineering review in November. All related drawings done | Closed | D. Thompson |
| 12 | ACD – LAT interface definition not complete (blanket attachment, grounding, cable tie downs, optical survey mounts) | Cable tie downs to be addressed by the LAT. Remainder in work at low priority. (Will be broken into several issues as Martin plans effort) Have new engr assigned to task | 19 Dec for plan TBR | M. Nordby |



Issues (Continued)

| No. | Title/Description | Description/Status | Due Date | Actionee |
|-----|---|---|------------------|------------|
| 13 | Tracker MCM attachment and wire bonding | TIM held in Italy week of Jan 16, agreement for Tower A with potential improvements identified. Tests in work to determine if mfgr rates can be met given hardware tolerances | May 04 | R. Johnson |
| 16 | Fly away instrumentation not finalized | Locations in the instrumentation plan must be finalized to be able to assess impacts to Tracker Grid and DAQ. Accel counts may be significantly reduced. Resolution expected within a few weeks. | 31 Jan 04 | Hascall |
| 17 | New coupled loads results may create negative margins | Analysis complete. Results positive – critical loads went down. LAT Structural Analysis Report in work. Environmental Spec update in process, CR on Feb 24 | 30 Jan 04 | J. Ku |



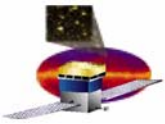
Issues (Continued)

| No. | Title/Description | Description/Status | Due Date | Actionee |
|-----|--------------------------------------|---|-------------------------|-------------------------|
| 18 | EMI/EMC requirements and test | System analysis tool under development, requires subsystems help. Will result in test requirements documented in the environmental spec | 9 Jan 04 | F. Blanchette |
| 19 | ACD channelization (+X and -X faces) | ACD right FREE card (on the +X and -X) channel numbers are not consistent with the ICD. Change proposed, reviewed in weekly engineering meeting on Nov 4 04. CR signed off | Closed | Hascall |
| 20 | PMT exposure to helium | The heat pipe pinch off tubes are close to the BEA, with the resulting potential for PMT helium exposure. Have leak rates from vendor, reviewing. New susceptibility definition in work. | 16 Jan 04 TBR | Nordby |
| 21 | PMT Tube failures | Glass seal broke on three tubes during thermal vacuum testing. PMT Crack Tiger Team investigating | TBD | T. Johnson/ D. Thompson |



Issues (Continued)

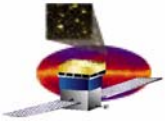
| No. | Title/Description | Description/Status | Due Date | Actionee |
|-----|---|--|-----------------------|-----------------|
| 22 | ASIC radiation sensitivity | GARC shows sensitivity to laser during radiation testing | March 15, 2004 | Sadrozinski |
| 23 | ACD bit map parity bit | The parity bit for the ACD is not set correctly. Ritz to confirm that there are no system hangups . Next step is to determine ground software impacted. | Feb 27, 2004 | Ritz |
| 24 | GARC turn-on hangup | There is a potential for the GARC to hang at power up. ACD and DAQ team developing and testing mitigation options | | Thompson |
| 25 | High Voltage Cap life test failure | Two capacitors (HVBS and phototube resistor network) failed life test. Potential overtest under review. | | Thompson |



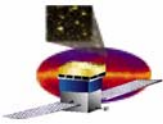
Requirements & Performance Verification Progress

Test Planning

- **Post CDR LAT-MD-00408 update**
 - Held a document walk through during the second week in February
 - Incorporating comments
- **Working flow of test plans with I&T**
 - Based on the approach taken by Martin Nordby with the Integration Sequence
 - Eliminated one layer of plans
 - Kickoff of working group to refine electrical test requirements within a week

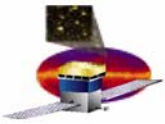


Interface Management



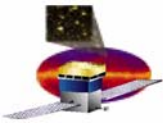
LAT-SC Interface – Open Issues

| System | Subject | Closure Path | Need Date | Promise Date | Comments |
|--------|--------------------------|--|------------|--------------|--|
| Data | Digital signal grounding | SAI capture agreements from 2-20-04 meeting | 6/1/2004 | 2/13/2004 | Meeting held on 2-20-04. SAI to document agreements. |
| Mech | LAT Connector Locations | LAT Provide | 10/15/2003 | TBD | Need X, Y and Z locations with connector orientations. X,Y,Z coordinates have been extracted. After final concurrence, ICN will be drafted. |
| Mech | Harness Routing on LAT | LAT Provide | 10/15/2003 | TBD | Concept developed. After final concurrence, ICN will be drafted. |
| Mech | Harness Support on LAT | LAT Provide | 10/15/2003 | TBD | Concept developed. After final concurrence, ICN will be drafted. |
| Therm | LAT Thermal Model Size | Update IRD and ICD | 10/15/2003 | TBD | Update IRD and ICD to clean up compliance. Delivery to GSFC finished. CCR approved by LAT. |
| Elec | LAT current transients | LAT Provide | 10/15/2003 | 3/15/2004 | LAT to perform measurements on EM units. Test postponed due to Cristek connectors not delivered on time. Plan to sign up to measured values and close then. |
| Elec | LAT Impedence | LAT Provide | 10/15/2003 | 3/15/2004 | LAT to perform measurements on EM units. Test postponed due to Cristek connectors not delivered on time. Plan to sign up to measured values and close then. |
| Elec | 42 V Input Voltage | SAI to test actual clamping voltage of transorbs | ASAP | TBD | LAT submitted request to reduce 42V input voltage tolerance req. LAT benchtests show that converters operate nominally at room temp with a 42V input. SAI continues to perform transorb test. Initial results show clamping voltage is less than 40V at room temp. |
| Elec | LAT startup plan (??) | LAT Provide | 10/15/2003 | TBD | GSFC/SAI to define this. |



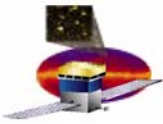
ICN's

- **LAT signed this month**
 - **ICN-040 Unused Pins Correction**
 - **ICN-041 Power Realloc in Test Verif Matrix**
- **Currently under signature review**
 - **None**
- **Currently in draft or revision**
 - **ICN-33 LAT Analog RTD Part Type and SC Sensing Circuit Accuracy**
 - **ICN-043 LAT Voltage Monitors Spares Use**
 - **ICN-044 Relax Helium Exposure Req**



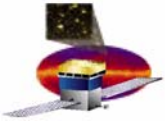
Interface Documentation Status

| Document | Status |
|--|--|
| LAT-SC Interface Control Document (Spectrum Astro Managed Document) | |
| 1196 EI-Y46311-000 B | Released 9 Jan 04 |
| 1553 Bus Potocol Document (Spectrum Astro Managed Document) | |
| 1196 EI-S46310-000 | Released 25 Apr 03 |
| GBM-LAT Interface Control Document (GSFC Managed Document) | |
| 433-ICD-0001 | In sign-off??? |
| LAT | |
| LAT-DS-00040-11: LAT Instrument Stay-Clear | Released 28 Oct 03 |
| Calorimeter | |
| LAT-DS-00233-6: CAL-LAT Interface Definition Drawing | Released 6 May 03 |
| LAT-SS-00238-4: CAL-LAT Mech, Therm, Elec Interface Control Document | Released 13 Mar 03 |
| ACD | |
| LAT-DS-00309-3: ACD-LAT Interface Definition Drawing | Released 22 Apr 03 |
| LAT-SS-00363-5: ACD-LAT Mech, Therm, Elec Interface Control Document | Released 28 Apr 03 Rev 6 update in-process |
| Tracker | |
| LAT-DS-00851-1: TKR-LAT Interface Definition Drawing | Rev 2 sign-off on hold pending resolution of bottom tray design. |
| LAT-SS-00138-5: TKR-LAT Mech, Therm Interface Control Document | Released 14 Apr 03 |
| LAT-SS-00176-2: TKR-LAT Elec Interface Control Document | Released 27 Jan 03 |
| Electronics | |
| LAT-SS-01794-1: Elec-LAT Mech, Therm, Elec Interface Control Document | Second draft in-process Targeting Mar 26 for release |
| Radiator | |
| LAT-DS-01221-1: Radiator-LAT Interface Definition Drawing | Released 14 Oct 03 Rev 2 update in-process |
| X-LAT Plate | |
| LAT-DS-01247-2: X-LAT Plate Source Control Drawing | In sign-off |
| SAS | |
| LAT-SS-02365-1: SAS-LAT Interface Control Document | First draft in-process. On-hold until after DC-2. |



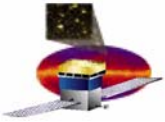
Working CDRL Delivery List

| NO. | ITEM | PURPOSE | FROM | TO | MATURITY | Promise DATE | STATUS/NOTES |
|-----|--|---|-------------------|-------------------|----------------------|-------------------------------|--|
| 1. | LAT Safety Input to Launch Vehicle Documentation | Meet Range Safety Requirements | LAT | SAI | Preliminary FINAL | 3/31/04 Nov. '05 | Prelim delivery on track. |
| 2. | Spacecraft I & T Support | Obs. Development | LAT | SAI | N/A | Dec. '05 | |
| 3. | Launch Vehicle I & T Support | | LAT | SAI/LV | N/A | Dec. '05 | Items 2 & 3 previously combined |
| 4. | Support Development of S/C I & T Procedures | Obs. Testing | LAT | SAI | N/A | Nov. '05 | |
| 5. | LAT Delivery | Obs. I & T | LAT | SAI | FM | Dec '05 | |
| 6. | LAT GSE (Mechanical and Electrical) | Obs. I & T | LAT | SAI | FM | Dec '05 | |
| 7. | Flight Connectors | Obs. I & T | SAI | LAT | Test FM | Oct '03 | Third delivery received and verified. |
| 8. | LAT Thermal Model - Full TMM - Launch Vehicle Model (200Nodes) - TMM ↔ FEM Mapping - Correlated Full TMM | STOP & Observatory TA Obs. Case Studies & LV Delivery | LAT LAT | SAI SAI | CDR CDR | Oct '03 Mar '06 | Oct '03 – Done |
| | | Support LAT T/M Distortion/STOP Observatory TA | LAT LAT | GSFC GSFC | CDR Correlated | 2/13/03 Feb '06 | Mapping complete. Report in-process. |
| 9. | LAT FEM (Full) | Obs. Strength (10.03) CLA STOP | LAT LAT LAT | SAI SAI SAI | CDR CDR+ CDR+ | Oct. 30 1/30/04 2/13/04 | Oct '03 - Done 10.07 delivered - Done 10.07S delivered -Done |
| 10. | LAT STEP | ICD Documentation (harness routing, connectors, etc) | LAT | SAI | CDR | TBD | |
| 11. | LAT Mass Properties Information | SAI to build mass simulators for S/C structural qualification | LAT | SAI | CDR | Dec '03 | November mass report released - Done |
| 12. | LAT Radiation Source Survey | Identify sources of radiation for range | LAT | SAI | CDR | Dec '05 | |
| 13. | LAT Instrument/Spacecraft Simulator | Obs. Development | LAT | SAI | FINAL | Apr '04 6/15/04 | New delivery date. |
| 14. | Spacecraft/LAT Instrument Simulator | LAT Development DIIS SIIS | SAI | LAT | Preliminary FINAL | Jul '03 3/04 5/7/04 | New delivery date. |
| 15. | LAT Input to ICD | ICD Development | LAT | SAI | Updates | | Rev B released. |
| 16. | S/C Flexures (Flight Like) | LAT Testing Model Hardware | SAI | LAT | Test | 10/30/03 3/04 7/1/04 | New delivery date. |
| 17. | Drill Template | LAT | SAI | LAT | | 4/04 3/04 | On hold pending SC-LAT I/F resolution |
| 18. | S/C Acoustic Simulator | LAT Model (FEM) Hardware | SAI | LAT | | 12/04 4/05 | |
| 19. | Ground Ops Plan (Hazardous & Safety Critical Operations) | LAT Testing | LAT | SAI | Preliminary Final | 3/31/04 3/31/05 | Prelim delivery on track. |

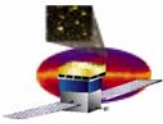


RFA Closure

- **37 CDR RFAs total, submitted 27 answers, have 4 draft answers**
- **Other priorities are driving RFA closure priorities, but we are making steady progress**
- **Current status of all RFA's on SE website**



Key Design Metrics



LAT Mass Status

| | | |
|------------------------|--|--------------------------|
| LAT Mass Status Report | | LAT-TD-00564-09 |
| LAT Mass Status | | Effective Date: 7-Jan-04 |
| Martin Nordby | | Print Date: 7-Jan-04 |

Jan-04

| Mass (kg) | Estimate | Alloc. |
|------------------|---------------|---------------|
| TKR | 508.7 | 510.0 |
| CAL | 1374.3 | 1440.0 |
| ACD | 278.8 | 280.0 |
| Mech | 360.4 | 386.6 |
| Elec | 226.2 | 240.0 |
| Systems | 7.0 | 8.0 |
| LAT Total | 2755.5 | 2864.6 |
| Rsrv/Margin | 244.5 | |
| Rsrv/Margin* | 8.9% | |
| Allocation | | 3000.0 |

* AIAA G-020 recommended min reserve = 6.0%
Current allocations per CCB action on 18 Nov 03

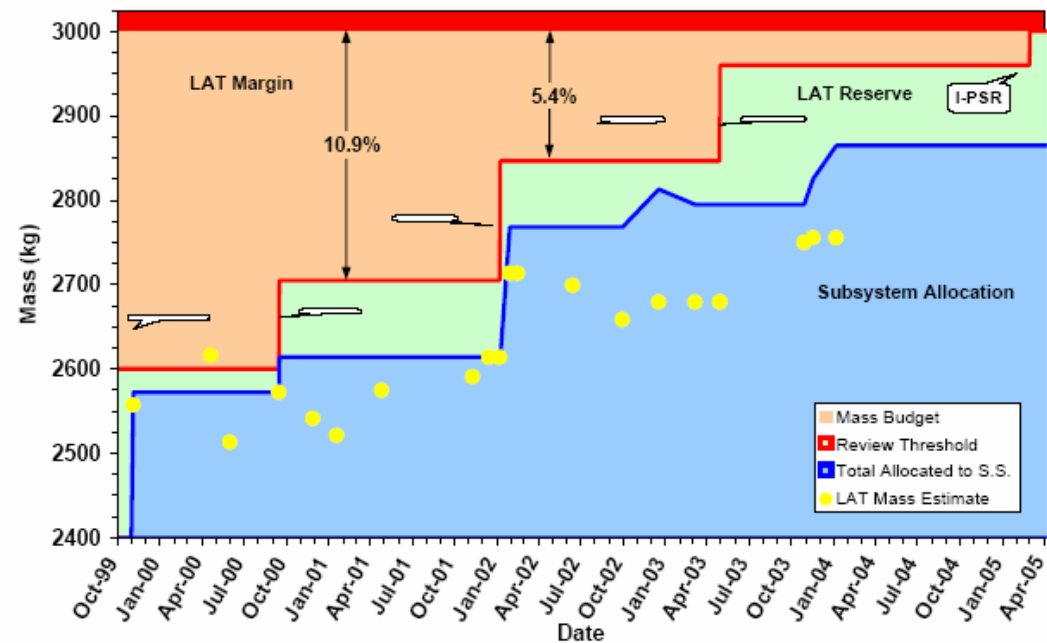
Center of Mass (mm)

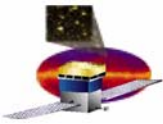
| | | |
|------------|--------|----------------|
| CMx | -0.67 | -20 < CMx < 20 |
| CMy | -0.94 | -20 < CMy < 20 |
| CMz | -71.45 | CMz < -51.2 |
| Ht off LIP | 164.75 | Ht < 185 |

Second Moment of Inertia (kg-m²)

| | | |
|-----|--------|--------|
| Ixx | 1050.0 | 1500.0 |
| Iyy | 1006.2 | 1500.0 |
| Izz | 1388.9 | 2000.0 |

| Mass Estimate Breakdown | | |
|-------------------------|---------------|-------------|
| | (kg) | % |
| Parametric | 230.7 | 8.4% |
| Calculated | 585.5 | 21.2% |
| Measured | 1939.4 | 70.4% |
| Total | 2755.5 | 100% |





November 03 LAT Power Status

- Operational Power**

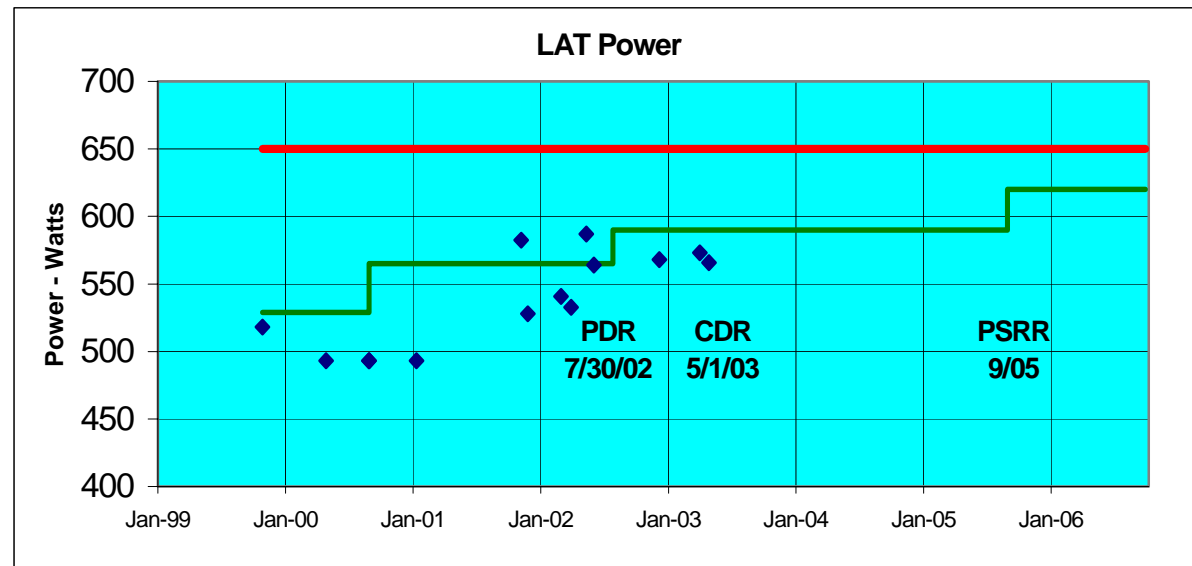
| Item | 10-Nov-03 Estimate (Watts) | PARA (Watts) | CALC (Watts) | MEAS (Watts) | ALLOC. (Watts) |
|-----------------------|----------------------------|--------------|--------------|--------------|----------------|
| ACD | 9.4 | 2.3 | 3.9 | 3.2 | 10.5 |
| Tracker | 152.4 | 1.5 | 0.0 | 150.9 | 153.0 |
| Calorimeter | 64.9 | 0.0 | 0.0 | 64.9 | 65.0 |
| Trigger & Data Flow | 318.6 | 44.5 | 87.3 | 186.8 | 327.5 |
| Grid/thermal | 20.4 | 20.4 | 0.0 | 0.0 | 35.0 |
| Instrument Total | 565.7 | 68.7 | 91.1 | 405.8 | 591.0 |
| Instrument Allocation | 650.0 | | | | |
| % Reserve | 14.9% | | | | |

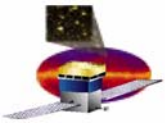
PDR Reserve Was 15.2%
CDR Reserve Was 13.4%

Goal for PSRR Reserve > 5%

PARA - Best Estimate based on conceptual design parameters
CALC - Estimate based on Calculated power from detailed design documentation
MEAS - Actual power measurements of components

Goals estimated using guidelines given in ANSI/AIAA G-020-1992 "Estimating and Budgeting Weight and Power Contingencies for Space Craft Systems"



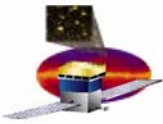


November 03 LAT Power Status (Continued)

- **Survival Power**

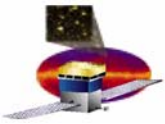
| Component | Current Alloc. | Subsystem Power Estimates (W) | | | | |
|---|----------------|-------------------------------|---------------|-------------|---------------|--------------|
| | | PARA | CALC | MEAS | Total | Margin |
| On-Orbit Average Power Total¹ | 278.00 | 0.00 | 230.40 | 0.00 | 230.40 | 20.7% |
| Regulated VCHP Power Total | 58.00 | 0.00 | 48.40 | 0.00 | 48.40 | 19.8% |
| Unregulated Passive Survival Power | 220.00 | 0.00 | 182.00 | 0.00 | 182.00 | 20.9% |

¹Power estimates reflect the LAT steady state orbit average. Numbers do not reflect transition into or out of survival mode, i.e. early orbit operations.



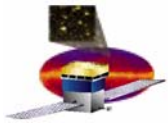
FSW Resource Usage Current Estimates

| Resource | Total Available | Anticipated Usage | Margin Factor |
|-------------------------------|------------------------|--------------------------|----------------------|
| EPU Boot PROM | 256 kB | 128 kB | 2 |
| SIU Boot PROM | 256 kB | 128 kB | 2 |
| EPU EEPROM | 6 MB | 1.5 MB | 4 |
| SIU EEPROM | 6 MB | 1.5-2.5 MB | 3 |
| EPU CPU cycles | 200% in 2 EPUs | 30% | > 6 |
| SIU CPU cycles | 100% in 1 SIU | 25% | 4 |
| EPU memory | 128 MB | 16-32 MB | 4-8 |
| SIU memory | 128 MB | < 16 MB | 8 |
| Bandwidth – instrument to EPU | 45 MB/sec | 10 MB/sec | 4.5 |
| Bandwidth – EBM to CPU | 20 MB/sec | 5 MB/sec | 4 |
| Bandwidth – CPU to EBM | 2.5 MB/sec | 20 kB/sec | 125 |
| Bandwidth – EBM to SSR | 5 MB/sec | 40 kB/sec | 125 |

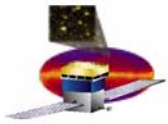


Key Science Performance Metrics

| Parameter | SRD Value | Present Design Value |
|--|--|---|
| Peak Effective Area (in range 1-10 GeV) | >8000 cm ² | 10,000 cm ² at 10 GeV |
| Energy Resolution 100 MeV on-axis | <10% | 9% |
| Energy Resolution 10 GeV on-axis | <10% | 8% |
| Energy Resolution 10-300 GeV on-axis | <20% | <15% |
| Energy Resolution 10-300 GeV off-axis (>60°) | <6% | <4.5% |
| PSF 68% 100 MeV on-axis | <3.5° | 3.37° (front), 4.64° (total) |
| PSF 68% 10 GeV on-axis | <0.15° | 0.086° (front), 0.115° (total) |
| PSF 95/68 ratio | <3 | 2.1 front, 2.6 back (100 MeV) |
| PSF 55°/normal ratio | <1.7 | 1.6 |
| Field of View | >2sr | 2.4 sr |
| Background rejection (E>100 MeV) | <10% diffuse | 6% diffuse (adjustable) |
| Point Source Sensitivity(>100MeV) | <6x10 ⁻⁹ cm ⁻² s ⁻¹ | 3x10 ⁻⁹ cm ⁻² s ⁻¹ |
| Source Location Determination | <0.5 arcmin | <0.4 arcmin (ignoring BACK info) |
| GRB localization | <10 arcmin | 5 arcmin (ignoring BACK info) |



Risk Management



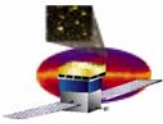
Risk Management Activity

- **No new Top Risks identified this month**



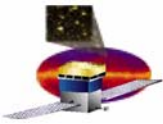
Top risks to cost

| ID # | Risk Rank | Risk Description | Risk Mitigation | Status |
|----------------|-----------|--|---|---|
| Proj Mgt - 005 | Moderate | Parts and vendor orders have not been completed therefore flight production cost may exceed projection | <ul style="list-style-type: none">•Manufacturing engineer added to expedite minimum cost closure•Clarification and purchase package review to ensure accurate bids | <ul style="list-style-type: none">• Processes in place•Remaining vendor selections per production plan |
| Proj Mgt - 006 | Moderate | Critical skilled positions (senior personnel) required to execute project remain open, potential impact to cost and schedule if not closed in short term | <ul style="list-style-type: none">•Management team has identified critical skill needs• Identify skilled personnel within Collaboration environment | <ul style="list-style-type: none">• Added SLAC Site Rep in Italy• Added Scientist to Tracker Team & Proj Eng•Continuing to expand FSW support•Identified additional QA support requirements•Added additional Structural analyst support•Added Design Eng Support |



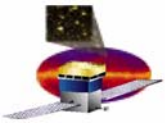
Top risks to schedule

| ID # | Risk Rank | Risk Description | Risk Mitigation | Status |
|----------------|-----------|--|--|--|
| Proj Mgt - 003 | Moderate | Completion of Tracker subsystem qualification program delayed due to EM closure or MCM electronics | <ul style="list-style-type: none">• Manufacturing Eng assigned to close MCM issues• Increased team integration with Italian partners• GSFC audit/support to Tracker EM closure | <ul style="list-style-type: none">• 50 Unit Pre-production run established with Teledyne, ECD: 9 Feb 04• Restructured SLAC engineering support• Additional INFN support in place |
| Proj Mgt - 002 | Moderate | ASIC's fail to meet requirements; results in schedule impact | <ul style="list-style-type: none">• Focused review & test. Margin for re-runs protected where possible• Individual risks Identified by subsystem | <ul style="list-style-type: none">• Tracker GTRC error found, plan in place• Cal/ACD ASIC's continued testing• ACD GARC Mitigation in progress |
| Proj Mgt - 004 | Moderate | TEM Power supply final design is delayed, final implementation may exceed current schedule | <ul style="list-style-type: none">• Key focus item identified for DAQ• Design peer review 9/03• Basing approach on flight proven designs where possible | <ul style="list-style-type: none">• Implementation plan in place and proceeding• Reduce to Low risk after successful Qual program |



Top risks to schedule

| ID # | Risk Rank | Risk Description | Risk Mitigation | Status |
|----------|-----------|--|---|---|
| SE-007 | Moderate | Critical component failure post LAT integration requiring de-integration impacting cost & schedule | <ul style="list-style-type: none">•Extensive use of EM test bed to support flight H/W & S/W development•Thorough qualification and acceptance tests•Pre planned I&T actions for de-integration | <ul style="list-style-type: none">•LAT Assembly plan under update to incorporate EM1 lessons learned, update complete, in review ,ECD: Mar 04 |
| Elec-004 | Moderate | Flight-Software development schedule is tight and depends on execution of LAT software development approach. Delays in incremental review process may impact cost & schedule | Detail and implement incremental development program, ensure sufficient software test on target hardware during development to drive out any requirement disconnects. Include adequate peer reviews before each spiral cycle prior to release | <ul style="list-style-type: none">•Adapting monthly demos•Enhanced software team and processes•Added software management support•Quick Look Review closure in work• EM2 Review 26 Feb |



3-Month Milestones

- Update the LAT-MD-00408 LATPVP – Incorporating comments from walkthrough
- Update System Metrics – Electrical updated in December, mass update in progress
- Complete CIDL update – Draft out for review
- Close all open RFAs – October->December->???
- LAT I&T Assembly Sequence – in review, update TBR
- Draft Dynamics Plan – 19 December TBR
 - Modal and Sine vib - Have first level agreement w/NASA on approach, manpower diverted
 - Accoustic – pretest analysis nearing completion
- LAT Survey Plan – 16 Jan 04 TBR
- LAT Instrumentation Plan – 16 Jan 04 → CR ECD 5 Mar
- LAT EMI/EMC Test Plan - First Release 3/04
- LAT Comprehensive Performance Plan, Limited Operational Performance Plan combined into one document, initial release - 3/04
- LAT Thermal Test Plan First release 1/16/04, final 3/04
 - Preliminary reassessment indicates no major changes, update to restart mid March