

GLAST LAT Project Weekly Report for the week ending Thursday, November 8, 2001

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*** WBS 4.1.1.2 PROJECT CONTROLS (Boysen)

PMCS implementation is considered complete for the following subsystems:

- 4.1.1 Instrument Management
- 4.1.4 Tracker
- 4.1.5 Calorimeter
- 4.1.7 Electronics
- 4.1.8 Mechanical Systems
- 4.1.9 Integration & Test
- 4.1.A Performance & Safety Assurance
- 4.1.B Instrument Operations Center
- 4.1.C Education & Public Outreach
- 4.1.E Suborbital Flight Test

All inputs directly necessary to PMCS system development have been received for the following subsystems, and are currently being incorporated:

- 4.1.2 System Engineering
- 4.1.D Science Analysis Software

4.1.6 ACD: The cost-loaded schedule was received on Friday. The PMCS team reviewed its fit to the LAT system. Estimated contingency needs were received. Still need to receive the Level 4 milestone list and planned commitments.

Work continues on identifying and incorporating the inter-subsystem schedule links.

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*** WBS 4.1.2 SYSTEM ENGINEERING (Davis for Thurston)

PDR Preparations - the draft outline/schedule of the PDR was presented at the Wednesday project meeting. Dave Lung has met with some of the subsystems managers (CAL, ACD, Mech. and I&T) to discuss the subsystem presentations. He will meet with the rest in the coming week.

System verification planning continues. The standing Friday meeting was held and verification of mechanical systems was discussed. The meeting will be held again next Friday to discuss ACD, tracker and instrument-level verification.

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*** WBS 4.1.4 TRACKER (R. Johnson)

TKR Mechanical

* The precision panel assembly tool is at PCI, where prototype panels are being assembled with it.

* A study was done of the importance of the closeout corner joints during vibration.

TKR Assembly

- * Engineering-model parts procurement is in progress.
 - * New, calibrated test equipment was received by Pisa for ladder assembly work.
 - * Work is in progress on all TKR assembly procedures.
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TKR Electronics

- * The new GTRC layout is nearly assembled.
- * The new GTFE layout is assembled.
- * We are preparing for a wafer submission of both chips (including 2 variants of the GTFE design) next week.
- * MCM production is in progress for the EM
- * A P.O. was sent out for right-angle interconnect flex.
- * The bias plane design was finished.

*** WBS 4. 1. 5 CALORIMETER (N. Johnson/Carosso)

4. 1. 5. 1 CAL Management

Review and update of CAL documentation is ongoing
Preparing PMCS monthly updates

France

For everybody the main activity was the preparation of the CNES review.

4. 1. 5. 3 Mission Assurance

- Completed material list deliverables prior to PDR and a copy was sent to Jeff Tice.
 - Completed LAT EEE part list deliverables along with Parts Control Board minutes and copies were distributed to the system leads, GSFC PCB members, and design engineers. This will be an ongoing activity.
 - Discussed GSFC code 300 response to EEE parts plan and action will be taken to address issues appropriately.
 - Prepared and released limited life shelf item document for PDR deliverables.
 - Working on CAL reliability analysis which will include block diagrams, FMEA and critical item list. This report will likely be completed by November 20th.
 - Prepared a verification matrix for test and verification.
 - Prepared presentations on risk management, wire bonding, and gluing.
 - Will be giving a seminar on Nov. 20th for implementation of close-loop, computer controlled, Access database work order authorization system for fabrication and control of flight hardware, problem records, data records, material review board and for a variety of reports generated at NRL.
 - Preparing a training program for contamination control and ESD for flight hardware.
 - Prepared samples of CAL electronics connection to PIN photodiode flex. Ideas will be presented to French for their input.
 - Prepared photographs of PIN photodiode and crystal bonding.
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4. 1. 5. 5 Crystal Detector Elements

4. 1. 5. 5. 1. 1 Bonding process

- New set of tools are done. The diodes have been glued on 12 CsI crystals.
- Thermal cycling is going on with diode glued on CsI for more than 40 cycles : for

FW GLAST LAT Project Weekly Report for the Week Ending Nov. 8 2001.txt
the DC 93- 500 no problem; for the epoxy Masterbond light delamination.
- Bonding GSE (for EM): The first electronic acquisition has been done.

4. 1. 5. 5. 3 Dual Pin Photodiode

- Measurements, mechanical & electrical, of the 200 DPD are near end.
- New dark current test bench in progress (16 DPD in parallel).
- Optical test bench for the DPD in progress.

4. 1. 5. 5. 4 PIN Interconnect:

- Work on the design of the EM flex form is at end.

4. 1. 5. 5. 5 CDE A&T

Gluing of Dual Photodiodes on 12 CsI crystals.

4. 1. 5. 5. 5. 4 CDE test GSE

- Upgrade of the CEA cosmic bench for the measures on the VM2 CDE. Work on electronic card

4. 1. 5. 6 Pre Electronics Module

- Preparation of the VM2 environmental tests
- Facilities: Building of clean room for PEM integration in progress.
- PEM GSE In progress.

4. 1. 5. 6. 1 PEM Structure

- Structure : production of parts for VM2 model
- Structure GSE: Are ready

4. 1. 5. 7 Analog Front End Electronics

The calorimeter GCRC digital chip design in VHDL is nearing completion of the first version to be tested. We are developing a thorough VHDL testbench for testing the GCRC digital design. The GCRC design will also be tested with real hardware, running the code in a Xilinx programmable device on the Calorimeter VMI test board.

Testing of the version 2 GCFE is continuing. We have been making corrections to how the GCFE chip is controlled, and modifying our test board hardware/ software for appropriate changes. A functional test document for the GCFE is being written.

For updating our documentation, a Calorimeter electronics interface document (ICD) is currently being written.

4. 1. E. 3 CAL Balloon Flight

Data analysis is continuing.

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*** WBS 4. 1. 6 ANTICOINCIDENCE DETECTOR (Thompson/Larsen)

Management -

- The PDR agenda was explained to the ACD team, along with due dates of materials leading up to the PDR.
- On November 27 we will have an internal review of the ACD PMCS materials.
- The Peer Review Presentation package is being updated in support of the Day 3 PDR agenda.
- A new Instrument manager will be officially named from Code 556 very

FW GLAST LAT Project Weekly Report for the Week Ending Nov. 8 2001.txt
shortly, and the current manager is transitioning into another position. Continuity will be maintained.

- Overall GSFC effort Contingency numbers have been provided to Bill Althouse. Several PMCS deliverables are still due.

Electronics

- Electronic design details are continuing to be worked. Wire bonding is being performed on our latest ASIC delivered from the foundry.

Materials -

- Randy Hedgeland is stepping in to provide contamination control expertise and to keep that activity on track.

Detector Assemblies -

- Bob Hartman has been working on the PMT procurement. He is insuring that sufficient quantities of PMTs are being purchased for calibration of the LAT.

- Alex Moiseev is performing functional tests on the prototype Tile Detector Assemblies.

Mechanical -

- The Mechanical parts list is being provided to the LAT Project. A trip to Fermi Lab is being set up for December 10.

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*** WBS 4.1.7 ELECTRONICS (Haller)

This time I am claiming that there are no news with the exception of PDR preparation.

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*** WBS 4.1.7.9 FLIGHT SOFTWARE (Russell)

Filter Study Progress

- Received detailed and (almost) complete set of cuts from SRitz
- Thank you Steve.
- Some criteria involves simple energy sums on the CAL so began coding this in software.
- Unfortunately the Monte Carlo files I am using have a mistake in the CAL energy -> ADC conversion, rendering the CAL data useless.
- Dan Suson working on correcting this.
- Nevertheless did the coding and can get an upper limit on the time it takes to do this calculation.
- Once I get the correct MC files, I can get the right answer and a real timing number.

Event Format

- Almost have an interface document describing the event format as it will be received on the TEMs complete.
- It has been passed through Gunther numerous times to make sure it is implementable.
- Adding finishing touches to support a diagnostic mode.
- This is data not normally to be taken with the event.
- Includes the CAL accept bits
- The trigger signals on the TEM
 - This one has me the most nervous. Do we believe the trigger signals are really only useful for diagnosing the trigger. (All the information content in these trigger signals can be gotten from the data.)
- Always including this data would greatly inflates the size of an event (+ ~400 bytes for an event out of a current size

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of ~1Kbyte.)

- Unsettled is the detailed mapping of the ACD tiles, but this impacts the ICD only at the finest detail.
- The lack of this mapping makes doing detailed timing studies harder. All one can do is set an upper limit based on worst case and a lower limit base on best case scenarios.
- Of course all these options take time to code..
- The ICD event format document will also come with a supporting study of the deadtime vs. input trigger rate for the proposed architecture and data format.
- Hope to release this for peer-review next week.

SIU Functionality

- Put together a preliminary list of drivers, services, utilities and high level functions that the SIU will need.

TEST Stand Support

- With bandwidth/deadtime studies drawing to a close, Curt is now able to devote to test stand support.
- Will be working with Elliot's group (mainly Ric Claus) and Dan Wood (CAL support).

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*** WBS 4.1.8 MECHANICAL SYSTEMS ENGINEERING (Nordby)

1. Management

Still tweaking the PMCS budget and schedule. Adding links to other subsystems.

2. Mechanical Design Integration

In preparation for working the problem with Radiator/SC/LV interferences, Mike Foss has gotten CAD models of the PAF and Delta-II fairing from the project, and has independently contacted Boeing to confirm all dimensions. This will be used to definitively establish the working volume for the LAT and Radiators, so we can re-design the Radiators just once.

Martin Nordby has developed a design to resolve the interference problem, and this will be detailed in the next weeks (working around PDR preparations).

3. Thermal Engineering

The "Links-and-Lumps" thermal radiation model is nearly complete, with John Hodgson finishing all radiation and conduction links through the ACD and electronics boxes. These are preliminary values, since we do not yet have thermal analysis results for either subsystem. The final step in the process, underway now, is to link the detailed Radiator model to the L-and-L model. Then we will be ready to complete the on-orbit radiation analysis.

The Radiator thermal model has been completed, as well, and is ready for combining with the LAT instrument model.

4. Grid Design

No progress of note.

6. Specifications

No progress.

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*** WBS 4.1.9 INTEGRATION AND TEST (Bloom/Grist)

This week I&T was again focused on PDR preparations. We are making good progress towards finalizing the I&T PDR report by November 16. First indications of costs for

FW GLAST LAT Project Weekly Report for the Week Ending Nov. 8 2001.txt
commercial airplane flights for the LAT transport to NRL (including in flight testing) are beginning to come in. The RFI for Environmental Testing has almost been completed. I expect to get it out to the vendors by early next week. We established the I&T interface milestones with the ACD, with final approval from D. Thompson yet to occur. We held our weekly I&T telecon. The main topic of discussion was science verification and calibration of the LAT, led by Eduardo. The meeting agenda and minutes can be found at <http://www-glast.slac.stanford.edu/lat/int/weekly%20minutes/>. Brian Grist has a new baby boy. Wife and son are doing well (don't really know about father).

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***** WBS 4. 1. A PERFORMANCE AND SAFETY ASSURANCE (Marsh)**

Another iteration of a "draft" letter was received from the GSFC GLAST Project Office on the LAT Parts Program Control Plan (PPCP). The letter indicated specific GSFC Project Office comments need to be incorporated into the PPCP prior to GSFC approval. The LAT EEE Parts Engineer and P&SA Manager believe the majority of the recommendations are without merit. This issue has been elevated to LAT Project Management for resolution.

A rough draft Performance & Safety Assurance PDR "Day 1" presentation was completed and submitted to the LAT PDR "Czar". The draft presentation was reviewed with representative from LAT Systems Engineering and Project Management for comments. The Performance & Safety Assurance PDR "Day 1" presentation will be complete after incorporation of two slides that need to be developed.

The contract to secure the services of a contamination control expert with space flight experience is close to being finalized. The contamination control expert will develop the LAT Contamination Control Plan and provide review and validation of the contamination control plans and procedures provided by LAT subsystems and/or collaborators. A rough draft of the LAT Contamination Control Plan is scheduled to be completed by 11/19. It is planned to have the document reviewed and approved by the LAT before the LAT PDR.

Sam Pullen from Stanford University initiated contact with Performance & Safety Assurance with regards to the possibility of providing reliability analysis support to the LAT. Mr. Pullen was identified by the Office of Naval Research (ONR) as a potential resource for the LAT to utilize. Tentatively, it is planned for Mr. Pullen to meet with Systems Engineering the week of Nov. 19-21. for initial discussion.

A Parts Control Board (PCB) meeting was held this week by the LAT EEE Parts Engineer. The LAT Performance & Safety Manager was not able to attend due to short notification but it is understood the meeting went very well. It is the intention of the LAT EEE Parts Engineer to coordinate future PCB meetings with the LAT Project Office to assure adequate notification to all PCB members.

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***** WBS 4. 1. B INSTRUMENT OPERATIONS CENTER (Williams)**

4. 1. B. 1 IOC Management

Provided inputs on earned value methods to be used for tracking IOC performance in the PMCS.

4. 1. B. 3 Mission Operation Planning

Reviewed proposed changes to the Operations Concept Document including a new command and telemetry dataflow diagram.

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*** WBS 4. 1. C EDUCATION AND PUBLIC OUTREACH (Cominsky)

Work continues on the AGN poster. We have received replies from several of the GLAST Ambassadors on ways to improve the poster, and many of these suggestions are being implemented. The responses have been very positive, both for the artistry and the potential use of the poster in classrooms.

At least two of the Ambassadors have already been discussing GLAST with their classes and in public talks. Again, the response has been very positive.

Tim Graves and Phil Plait have installed and are testing a bulletin board on the GLAST E/PO webpage (<http://www-glast.sonoma.edu/ambassadors/board/index.php>, for the moment) which will allow the Ambassadors and team members to discuss the project.

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*** WBS 4. 1. D SCIENCE ANALYSIS SOFTWARE (Dubois)

PDR support

We used the SLAC batch farm to regenerate 1M all_gamma and 50M orbit average background events. We turned the gammas around in 4 hours and in 48 for the backgrounds. Excellent support from the computing center. We'll get an in-depth status report on the instrument performance studies from Steve at next week's IDT meeting, and in the software workshop.

General

Otherwise, we are preparing for the (virtual) software workshop next week. Note that the Tuesday start time has been pushed back to 09:30 Pacific to accommodate the IDT meeting.

<http://www-glast.slac.stanford.edu/software/Workshops/Nov01Si mRecon/>

The TKR group has started the big reorganization of their recon packages in prep for the major overhaul they are embarking on. Details at the workshop.

There will be a big GEANT4 workshop at SLAC (hosted by G4 & SLAC) from 18-22 February. We are working on plans to subject the core software group to the G4 workshop and follow it up with a week-long meeting of our own.

<http://geant4.slac.stanford.edu/UsersWorkshop/>

We have a new scientific programmer who has just joined us this week at SLAC - Alex Schl essinger.

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*** WBS 4. 1. E BALLOON FLIGHT (Thompson)

The balloon flight team made four presentations at the IEEE Nuclear Science Symposium in San Diego this week - three posters and one oral - covering an overview, the instrumentation, the simulations, and data analysis. Interest in the instrument and flight seemed to be high.