

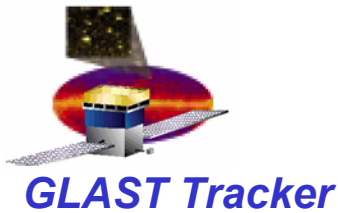
**Weekly Technical / Schedule Review
GLAST LAT Tracker
July 2003**

30 July 2003

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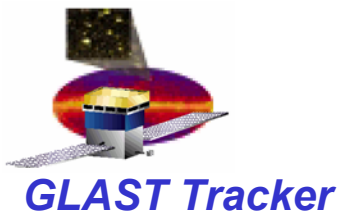
University of California at Santa Cruz



Outline

*LAT Monthly
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- ❑ Last Month's Accomplishments
- ❑ Summary of issues & concerns (and closure plan for them)
- ❑ Open Design/Engineering model/manufacturing issues and closure plan for them
- ❑ Status of Subsystem's Parts List & qualification program
- ❑ Key Milestones for next 3 months



Accomplishments & Status

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❑ **SSD procurement**

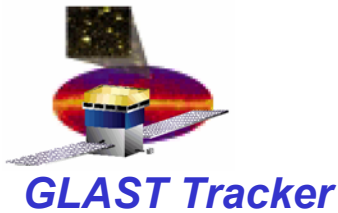
- Funding in place for final SSD purchases from Italy.
- Well over 50% of SSDs purchased and tested.

❑ **Ladder assembly**

- Both vendors qualified and working. About 450 ladders completed and tested.
- 150 more assembled and ready for testing at G&A.
- Enough ladders assembled already for 4 tracker tower modules.

❑ **ASIC procurement**

- 123 GTFE wafers and 20 GTRC wafers in hand (100% of flight needs).
- About 80% of the wafer probe testing is done.
 - ?? Yield on the GTRC
 - 94.8% yield on the GTFE
- Wafer lapping, dicing, and inspection contract is in place, and wafer lapping is in progress.
- MCM and IC qualification plan is in progress.



Accomplishments & Status

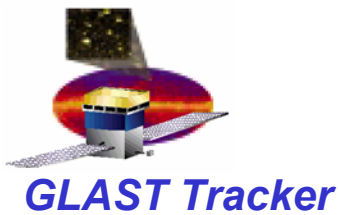
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❑ **MCM Front-End Electronics**

- Mini-tower MCMs were successful electronically, but still some manufacturing issues related to the pitch-adapter attachment that are being worked.
- An order went out yesterday to Teledyne to implement a program to resolve remaining MCM manufacturing issues.
- An RFQ is out to Teledyne for the flight order.
- 50 preproduction MCM PWBs have been manufactured.
- For the flex-circuit pitch adapter the bids from manufacturers are due today.
- All SMT parts are on order and most received. No remaining issues.
- The Omnetics connectors are in hand for preproduction.

❑ **MCM issues to resolve before starting preproduction:**

- Test our plans for resolution of several pitch-adapter alignment and gluing issues by assembling pitch adapters to several boards.
- Test staking of the large tantalum capacitors (vibe test).
- Revising the encapsulation procedure to include a dam along the pitch adapter.
- Add grounding screws to the assembly fixture, and add a cover to the fixture to protect wire bonds during electrical test.



Accomplishments & Status

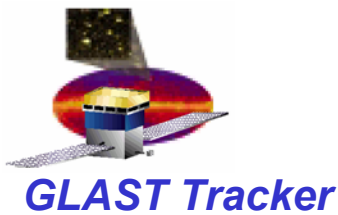
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❑ Flex-circuit cables

- SOW and specification are in progress.
- New mini-tower cables with Omnetics connectors worked well.
- Drawings are being revised to make the cactus arms more narrow and flexible, to facilitate installation.

❑ MCM testing and burn-in

- Work progressed on improving the MCM test stand, for use at Teledyne, to bring it up to the standards for flight production.
- Work progressed on the MCM burn-in station
 - Flex-circuit cables and twist-pair extensions are in production.
 - Fixture for holding the MCMs has been designed.
 - Programming is in progress for controlling the thermal chamber and executing continual testing during burn-in.



Accomplishments & Status

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❑ Mini-tower

- Assembled and now functioning in Pisa, taking cosmic-ray data.
- One ladder (out of 24) was damaged while doing optical inspections of MCM pitch-adapter issues.
- Several pitch-adapter issues made the MCM integration onto the tray difficult. We believe that we understand the manufacturing issues and are starting to make more test pieces to resolve these issues.
- The 5th functional tray was assembled and tested.

❑ EM Tower

- All trays were completed and stacked up.
 - The tower assembly fixture worked well.
 - Very good precision in the trays and fixture \Rightarrow 50 micron alignment up the tower!
- The vibration fixture was assembled and tested at Alenia.
- Flex-circuit cables are ready and are being installed today.
- The sidewalls are late (tomorrow), and they were incorrectly made, with a ply missing from each face. This delays the vibration test into mid September.

Engineering Model Tracker Module, upside down in the assembly fixture.

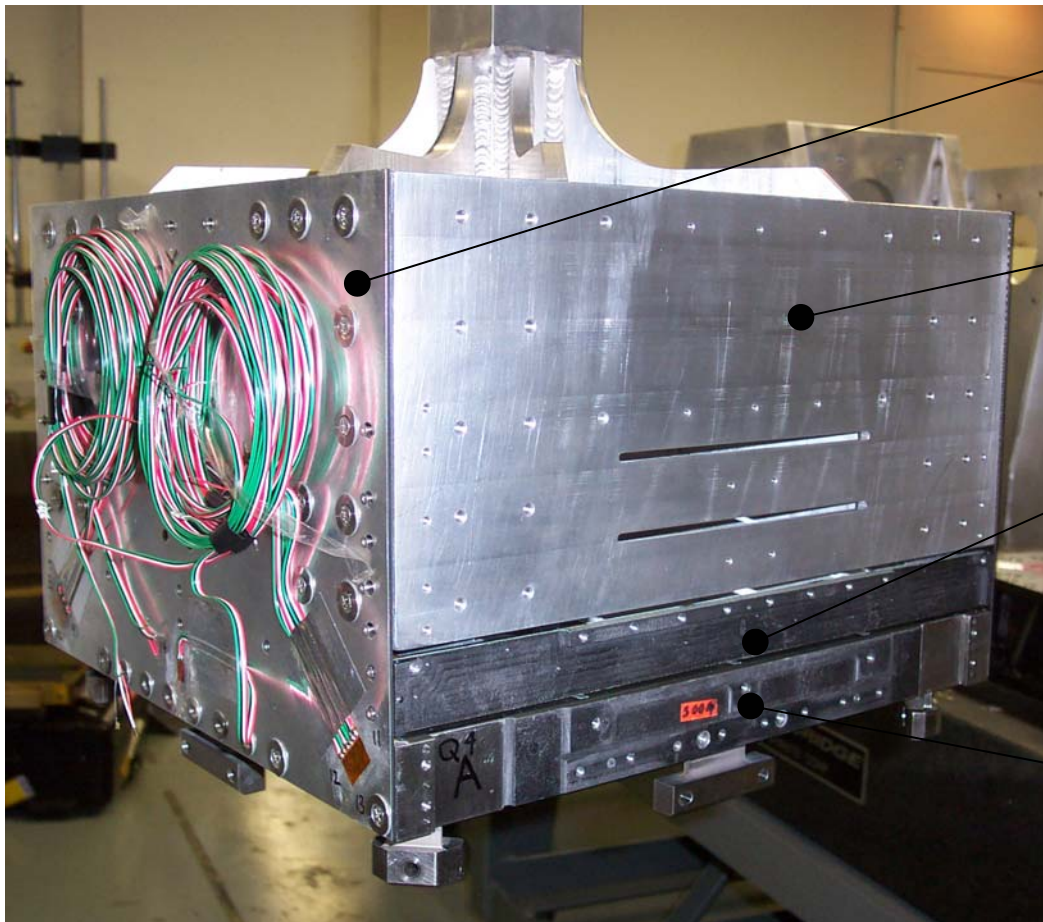
The next step is to install 8 cables, followed by the sidewalls.



□ Bottom tray static testing

- Two bottom trays were assembled and fitted with flexures.
- One was tested so far in a static test fixture as follows:
 - Tension in z
 - 12,670 N, or 40 g
 - Push and pull in y (more severe loads than expected in x)
 - 8600 N, or 27 g
 - Push and pull in x,y (i.e. at 45 degrees in the transverse plane)
 - 9550 N, or 27 g
- The levels envelope by a factor of 3 the rms loads at the flexure mounts expected from the qualification random vibration test.
- The tests were successful. The stress-strain curves look as expected, and no damage was observed.

Accomplishments & Status



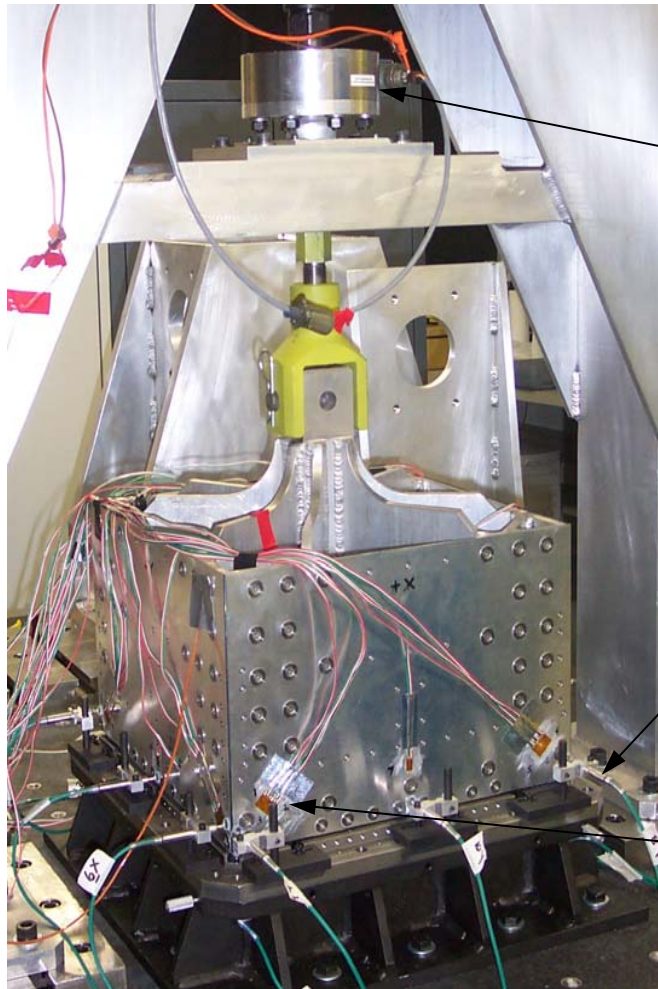
Thermal/Mechanical
Sidewalls (YS-90A)

Tower Simulator with
this sidewall removed

Tray #2
(from prototype tower)

Bottom Tray
(SN 2)

Accomplishments & Status

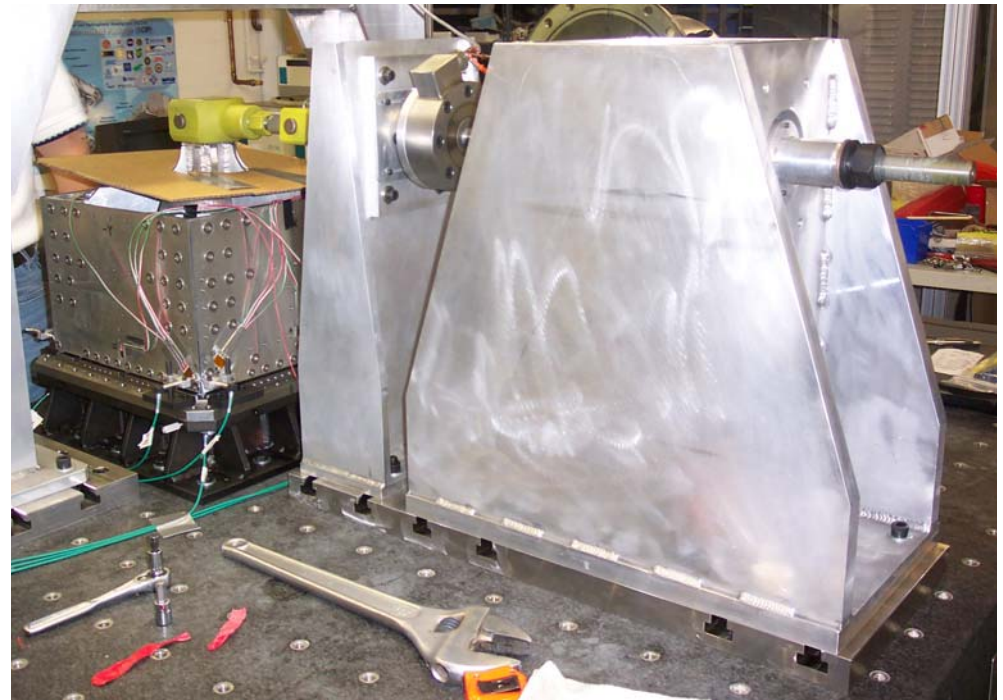
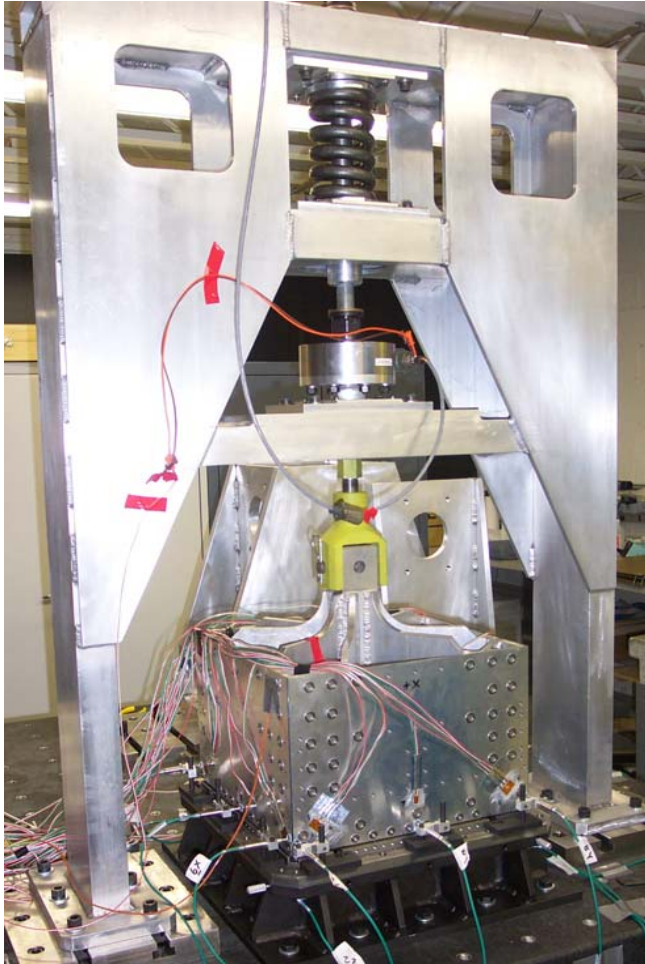


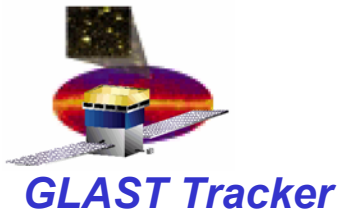
Load Cell
(7500 lb Max)

LVDT Displacement
Probes
(12 Channels)

Strain Gages
(20 Channels)

Accomplishments & Status

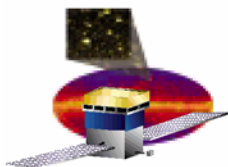




Issues / Concerns

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- ❑ **Difficulties in starting the MCM assembly line**
 - Parts procurement now seems to be coming together okay.
 - Biggest issue is to finalize details of the manufacturing, especially the flex attach.
 - A contract should be in place by the end of the week to get Teledyne moving in working with us on the remaining issues.
- ❑ **Risk in committing silicon to trays too early, given that the EM will not prove 100% all aspects of the design and fabrication.**
 - Set aside the first 4 production trays for intensive tests with cosmic rays (new “mini tower”)
 - Do qual-level vibration thermal-vacuum tests on a few of the first trays off the assembly line (as well as the 5th EM functional tray).
 - Do not attach MCMs to trays of Tower B before Tower A has been fully functionally tested (and possibly also environmentally tested).
 - Attach ladders to trays before MCMs, to reduce the schedule impact of this.
- ❑ **Delays in getting the EM work completed**
 - Taking manpower away from preparations for flight-unit manufacturing.
- ❑ **TKR assembly and test plan relies on a large number of prototype TEM/PS (~9)**
 - Need to reach an agreement within the project on when these will be delivered, at what cost, and so forth.



- ❑ **Tray core grounding and carbon-carbon surface passivation.**
 - These should be getting closed to closure with recent trials carried out during the EM tray assembly.
- ❑ **MCM attachment and wire-bond encapsulation.**
 - Being verified with EM trays and 5th functional tray.
 - This interface required thermal-vacuum testing asap.
 - I believe that further verification of this interface should be carried out asap with the first trays off of the flight production line.
- ❑ **Poor performance so far with the pitch-adapter bonding.**
 - The second production of functional EM MCMs was much better than the first but still failed on all but 2 MCMs to satisfy our goals.
 - Most of the latest problems were due to the PWB manufacturing, particularly of the raised edge and radius. We believe that we have resolved this issue and will verify it within a few days.
 - An alignment offset of 200 microns was fixed in the tooling but needs testing.
 - Expansion of the pitch adapter during bonding may be an issue, which can be resolved by lowering the cure temperature.
 - Some signal traces separated in the processing. This may be due to the problems with the underlying PWB, but this needs verification.
 - Need to implement better inspection of the gluing and trimming prior to SMT attach.

❑ **K13D Sidewalls**

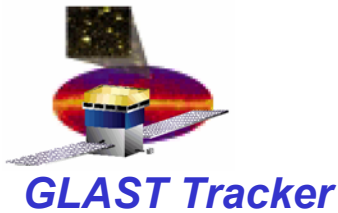
- Use recently made coupons to verify the material strength and thermal conductivity against expectations.
- Firm up specifications of the layup and make sure that the vendor (Plyform) is able to meet the specified fiber volume content and panel thickness.

❑ **EM Environmental Tests**

- Further delayed by the need to redo the sidewall panels.
- Vibration testing in mid to late September?
- Thermal vacuum testing in early October?
- Need confirmation of lead times on the new sidewall panels.

❑ **Completion of bottom tray static testing**

- Need to converge with GSFC on goals and specifications of the test.



EEE Parts List and Qualification Plan

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❑ **ASICs**

- Wafer probing, lapping, dicing, wafer inspection all approved and in process.
- Qualification plan (MCM level) needs completion and approval.

❑ **PWB**

- Spec, drawing, and procurement approved.
- 50 preproduction boards are in hand. They and coupons need to be evaluated to release the remaining production.

❑ **Pitch-adapter and bias circuit flex**

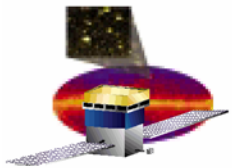
- Final drawings and specifications need to be approved.

❑ **Nano connectors**

- Omnetics was approved, and the first lot is in hand and awaiting approval to continue production. A detail change in the jack screw (improvement) is being worked for approval.

❑ **Micro-D connectors**

- Approval in progress.



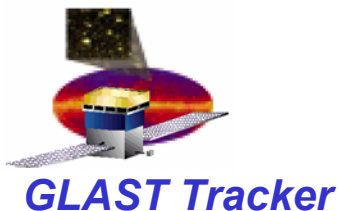
EEE Parts List and Qualification Plan

❑ SMT Parts

- All are approved and in procurement.
- Agreed upon flight-lot qualification tests are in progress on the polyswitches.

❑ Flex-Circuit cables

- Spec is out for approval.
- Drawing revisions are in progress, primarily to make the arms more flexible, to facilitate installation.
- The SOW and contract with Parlex is being worked.



Tracker Near-Term Milestones

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Milestone ID	Milestone Description	Completion Date	Major Reqmnts to Achieve Milestone	Notes
4T43200035	Static Test Bottom Tray	7/25/2003	Agreement with GSFC on goals of test.	<i>This was completed for one of the two bottom trays. Testing of the second is on hold pending a decision on test goals.</i>
4T43200045	Vibration Test of EM Tower	8/1/2003	Fabricate conforming sidewalls.	<i>Delayed to mid September due to failure to manufacture conforming sidewalls.</i>
4T1001430	Delivery of mini-tower to I&T	8/22/2003	More cosmic-ray testing in Pisa.	<i>On track.</i>
4T038927	Deliver 36 MCMs and 8 flex cables to electronics	9/15/2003	Teledyne contract. Resolution of MCM assembly issues. MCM pre-production review. Set up burn-in station at SLAC. Cable design completed. Contract with Parlex.	<i>Electronics is making 20 MCMs (without pitch adapters) now for the interim. Some fraction of the 36 will have to go first to Italy for study and approval. This date may not be practical for the cables, but burn-in cables can be used for many tests in the interim.</i>
4T014500 4T014505	Composite panels assembled for towers A/B	9/30/2003	EM tower vibration and T/V testing.	<i>This date can, and will need to, move out by about 2 months.</i>
4T039730	Deliver 1st lot of flight MCMs to Italy	10/29/2003	Resolution of manufacturing issues. 50 preproduction MCMs. Completion of the PRR.	<i>Late delivery can be mitigated by installing ladders onto trays before MCMs.</i>
4T045410	Begin Test of completed trays for towers A/B	12/18/2003	New "mini-tower" test	
4T045430	Complete Assembly of towers A/B	2/3/2004	Tower assembly procedures; PRR; fixtures	
4T053400	Deliver Towers A/B to I&T	4/19/2004	Environmental tests. Shipping containers.	