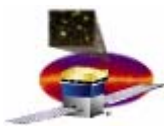


GLAST Large Area Telescope:

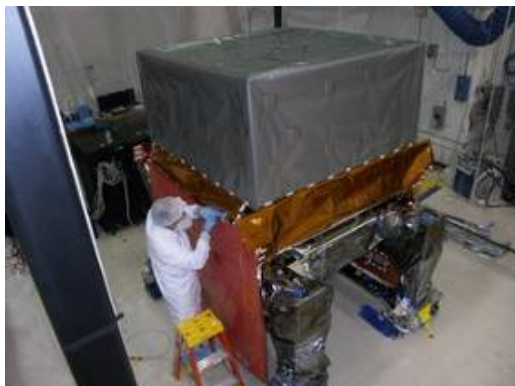
LAT Status and Observatory Integration

**W Neil Johnson
Naval Research Lab**

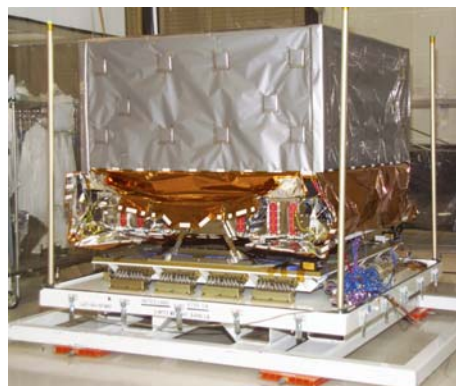
**neil.johnson@nrl.navy.mil
(202) 767 - 6817**



LAT Status



LAT w/ Radiators (pink) on test stand



LAT ready to ship

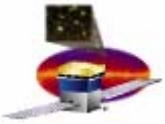


LAT in transport container

- ❑ LAT successfully completed environmental testing at NRL on Sept 14th, 2006
 - PreShip Review with NASA, Sept 15th
- ❑ Left NRL on Sept 16th, 2006 for General Dynamics in Phoenix, AZ by dedicated truck
 - Arrived Sept 18th
 - Post ship CPT completed, Sept 22nd
 - New Flight Software Load, Sept 28th
- ❑ Official delivery of LAT to NASA – Oct 6th



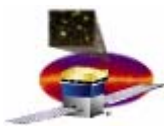
GLAST S/C bus waiting for LAT installation at General Dynamics. GBM installation in progress.



LAT Status (2)

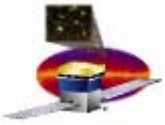
- ❑ Mechanical Integration on the observatory completed Dec 8th
- ❑ Electrical integration and safe to mate completed Dec 18th
- ❑ Functional testing of LAT via the Observatory command and telemetry systems completed Jan 13th, 2007.
 - Performance of LAT installed on the observatory is essentially the same as delivery.
 - Test time for LAT on the bus is limited by other activities. A complete characterization of LAT has not been possible yet.





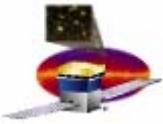
LAT Requirements Verification

- ❑ **LAT has 459 requirements to verify**
 - **detector performance, system performance, interface characteristics, environmental operability, etc**
 - **340 requirements have been verified and reports submitted to NASA (317 have been approved)**
 - **51 additional requirements satisfied with release of TVAC test report (expect compliance)**
 - **56 requirements are deferred until load of final LAT flight software**
 - **2 requirement issues are being worked.**
- ❑ **LAT meets or exceeds all of its requirements related to instrument performance and science objectives**



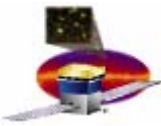
LAT Issues - Reboots

- ❑ **Unexpected reboots of LAT SIU and EPU computers**
 - **Have seen >20 reboots of processors over the last 10 months. These are generally watchdog timer or cpu or bus controller exceptions.**
 - **Investigations in flight software (FSW)**
 - **Trace context changes to trap software bugs or unanticipated interferences.**
 - **Address errata relating to RAD750 functionality by modifying FSW.**
- ❑ **Ability to modify, release and load new FSW to LAT has slowed progress.**
- ❑ **Limited test time has been frustrating.**

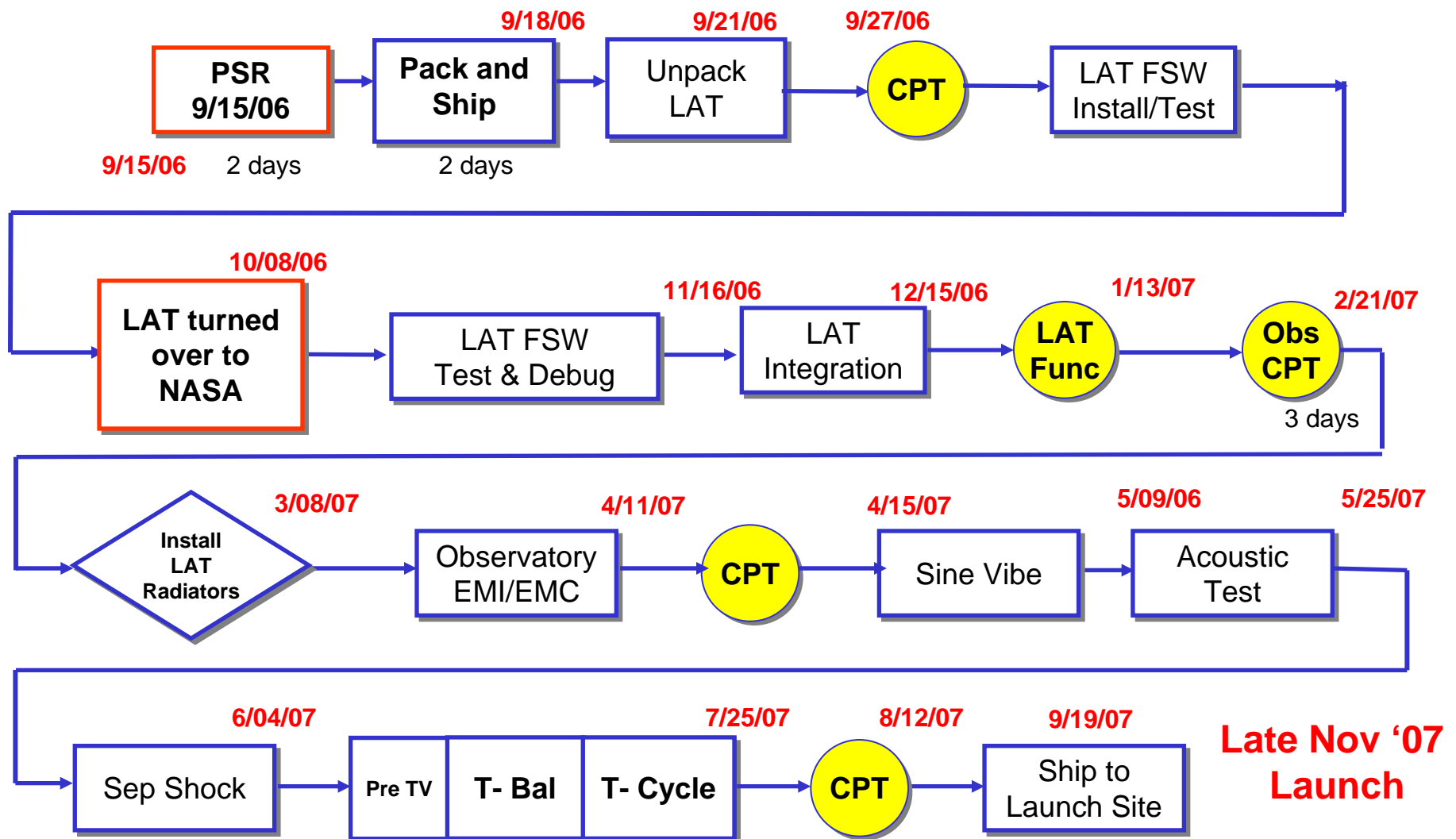


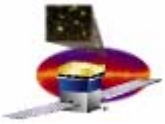
LAT Issues – Completion of Flight Software

- ❑ **LAT flight software (FSW) was not complete when we turned LAT over to NASA**
 - Known bugs that needed fixes
 - Reboot at an average of ~200 hrs of operation
 - Compression of science data not included
 - Gamma Ray Burst detection in LAT event stream not included.
- ❑ **Priorities were set**
 - 1) Reboots; 2) Compression; 3) GRB detection algorithm
 - Many code changes have been made to diagnose reboots but they are just now getting loaded to LAT.
 - Compression is essentially complete but not loaded on LAT.
 - GRB algorithm is in danger of not being available for the last pre-launch FSW load.
 - This is deemed acceptable by the project office and science team.
 - Work arounds:
 - Load full algorithm with limited testing prior to TVAC
 - Load improved FSW with full GRB algorithm after post launch checkout



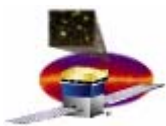
LAT Future – General Dynamics and beyond





Summary

- ❑ **The LAT has been completely assembled and thoroughly tested in its environmental extremes.**
 - **LAT meets its performance goals in all environments**
 - **No significant anomalies detected to date**
 - **Trending shows same instrument throughout assembly and test program.**
- ❑ **LAT has been successfully integrated to the GLAST Observatory bus**
 - **No interface issues detected.**
 - **LAT performance on the Observatory to date is essentially the same as prior to shipment.**
- ❑ **The LAT Flight Software completion continues to be challenging and a considerable sink for resources.**
 - **LAT can continue Observatory testing with existing software.**



Next Steps

2007 – Support observatory testing at General Dynamics and establish instrument ground systems including the operations center at SLAC. LAUNCH – Nov '07

2008 – Begin science with an all sky survey

2009 – 2017 – Continue discovery-based science

