GLAST LAT	Document # **LAT-MD-01598-01**	Date **Feb. 25, 2003**
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Document Title **LAT Weight and Center of Gravity Measurement Plan**		

Gamma-ray Large Area Space Telescope (GLAST)

Large Area Telescope (LAT)

Integration and Test Subsystem

Weight and Center of Gravity Measurement Plan

Change History Log

Revision	Effective Date	Description of Changes
-01	xx/xx/xx	Initial Release

Contents

1. PURPOSE

The purpose of the LAT Weight and Center of Gravity (Cg) Plan is to define methodology for validating verification associated with determination of LAT weight and Cg. Weight and Cg is predicted by rough order analysis, refined as design matures, measured at the subsystem level (prior to hardware turn over to the LAT Project), validation measured by I&T prior to subsystem integration and finally measured at the fully integrated LAT level. This plan will also define / establish weight capacity and measurement sensitivity and accuracy.

2. SCOPE

Subsystem hardware elements will be measured by I&T as part of the readiness for turn over validation process. The integrated LAT, minus the Radiators will be weighed at SLAC and Cg measured at the Navy Research Laboratory (NRL), prior to sine-vibration test. The final weight and Cg of LAT will be analytically derived using data from the NRL measurement of the integrated LAT and the SLAC measurement of the radiator panels / attachment to LAT hardware (i.e., will not include the SC bus provided radiator support struts and attachment hardware).

Weight and Cg will also be determined for the LAT Transport Container and the LAT Vibration Test Fixture with accuracy as defined herein.

3. ACRONYMS / DEFINITIONS

3.1. ACRONYMS

ACD	Anticoincidence Detector
CAL	Calorimeter
DAQ	Data Acquisition System
EPU	Event Processor Unit
EGSE	Electrical Ground Support Equipment
GLAST	Gamma-ray Large Area Space Telescope
GASU	Global Trigger Anti-coincidence detector Signal distribution Unit
I&T	Integration and Test
LAT	Large Area Telescope
MGSE	Mechanical Ground Support Equipment
PDU	Power Distribution Unit
SIU	Spacecraft Interface Unit
TEM	Tower Electronics Module
TBD	To Be Determined
TBR	To Be Resolved

TBW	To Be Worked
TKR	Tracker
TTB	Thermal Transfer Box

3.2. DEFINITIONS

LAT Subsystems	LAT subsystems are the Grid (turn over assembly level), Tracker, Calorimeter, Tower Electronics Module (TEM), Power Supply (PS), Event Processor Units (EPU), Power Distribution Unit (PDU), Global Trigger Anti-coincidence detector Signal distribution Unit (GASU), Spacecraft Interface Unit (SIU), Thermal transfer boxes, Cross LAT Heat Plate, Cross LAT Close Out Panel and Radiator
Thermal Transfer Box	Housing that is the same size as the EPU, but that contains no electronics. They are used to transfer heat from the TEM to the Cross LAT Heat Plates.

4. APPLICABLE DOCUMENTS

Documents relevant to the LAT Weight and Cg Measurement Plan.

- LAT-TD-00035 LAT Coordinate System
- LAT-MD-00408 LAT Instrument Performance Verification Plan
- LAT-SS-00138 LAT Tracker Interface Control Specification
- LAT-SS-00238 Calorimeter-LAT Interface Control Document
- LAT-DS-00233 Interface Definition Drawing, CAL-LAT Mechanical Interface
- NASA-STD-8719.9 Lifting Devices and Equipment

5. REFERENCE DOCUMENTS

- NASA-Std-5005A Ground Support Equipment
- ASME B30.1 Jacks

6. WEIGHT DETERMINATION

Weights of all LAT flight subsystem and MGSE elements will be measured to an accuracy 0.025% of its determined weight.

7. CENTER OF GRAVITY MEASUREMENT

Cg measurement of all LAT flight subsystem elements will be performed to an accuracy of ±1.0 mm [± 0.039 inch]for X, Y and Z axes (axes used herein are as defined in LAT-TD-00035, Revision current, LAT Coordinate System). Cg measurement of the integrated LAT (minus radiator hardware as described above) will be performed to an accuracy of ±2.0 mm [± 0.079 inch] in the X and Y axes and Z axes.

Cg measurement of the LAT Vibe Test Fixture will be performed to an accuracy of ±2.0 mm in the X, Y and Z axes.

Cg measurement of the LAT Transport Container will be measured to within ± 152 mm [± 6 inches] for the X, Y and Z axes. Definition of the LAT Transport Container axes is to be consistent with the LAT when mounted inside the container.

8. SCHEDULE

Development and verification of the Weight and Cg determination system(s) should be accomplished in time to support turn over of the flight Grid from Mechanical Systems to I&T.