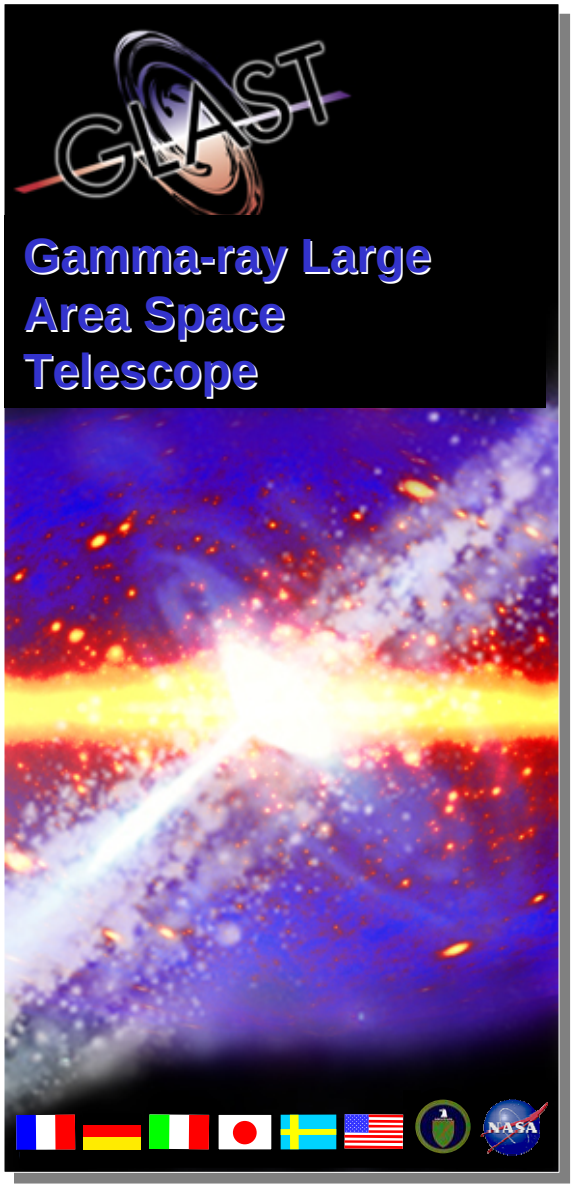

GLAST Large Area Telescope

LAT Flight Software
System Checkout TRR

Test Suites (Backup)

Stanford Linear Accelerator Center

Test Suites

- **CMDFNC - Command Functional**
  - **Verifies telecommands and telemetry can be exchanged across the 1553 interface between the spacecraft and the LAT**
  - **Verifies that all LAT commands are exercised through the 1553 interface, at a rate of up to 20 commands per second, with command execution and completion status reported in telemetry when command verification features are switched on**
  - **Verifies that the FSW validates commands and command parameters prior to command execution**
  - **Verifies that FSW responds properly to valid boot-related and a subset of telecommands not validated in other test suites**
  - **Verifies that *invalid* telecommands of all types are correctly rejected by FSW**
  - **Verifies that SIU FSW receives the information contained in the Timetone, Attitude, and Ancillary data messages from the spacecraft**

Test Suites (2)

- **DCMODE – Diagnostic Mode**
  - **Verify that the SIU FSW properly transitions to diagnostic mode upon command, then properly executes the requested diagnostic algorithms.**
- **EVTFIL – Event Filtering**
  - **Verifies that fully assembled, properly formatted events are received directly into EPU memory, where they can be processed by EPU FSW**
  - **Verify that the filtering algorithms provide acceptable results for a set of scenarios derived from Monte Carlo simulations**
  - **Verify that the filter software can pass a pre-scaled sample of unfiltered events on command**
  - **Verifies that the filter may be reprogrammed via the SIU, and that any changes to the filter configuration are reported in telemetry**

Test Suites (3)

- **EVTPMO – Event performance monitoring**
  - **Verify that the FSW operates properly in every science mode, monitoring event data for integrity, tracking changes in event and detector statistics, generating a report of any detected anomalies, as well as monitoring deadtime (during normal observations and during GRB observations) and reporting deadtime statistics in telemetry**
- **FECALB – Charge injection calibration**
  - **Verify that the FSW properly transitions to calibration mode upon command, then properly executes the requested calibration algorithms according to configurations read from the CPU file system**
  - **Verify the end-to-end processing of a known pattern of data from the LAT electronics to the EPUs**
- **FILMGT – File Management**
  - **Verify that the FSW can, on command, report file system status, create and delete file directories, dump directories, delete files, copy files (on a single SIU or EPU, and from an SIU to an EPU), dump files and file directories, load files during (SIU) primary boot and application modes, and cancel active file uploads**

Test Suites (4)

- **FSWINI – FSW initialization**
  - **Verify that the SIU and EPU(s) can be correctly booted and that during boot, the FSW boot code can calculate boot image checksums, perform memory scrubbing, and carry out other required error mitigation procedures; report system errors during primary boot in housekeeping telemetry; establish a reference state based upon information in nonvolatile storage; signal boot status over a discrete line to the spacecraft (SIU only); and then, power and initialize the remaining LAT subsystems in an orderly manner, resulting in a known reference state at the end of the process**
  - **Verify that the SIU and EPU(s) can write a boot error log and return the contents of the log in telemetry, on command.**
  - **Verify the mechanisms for recovery should the LAT or one of its processors become non-operational or lose communications, either internally or with the spacecraft**
  - **Verify compliance with all reboot requirements**
- **IPCFNC – SIU to EPU Communications**
  - **Verifies the LATp communications protocol for sending and receiving information between the CPUs, including timing, acknowledgments, and other transport level functions**

Test Suites (5)

- **MEMMGT – Memory Management**
  - **Verify that FSW can successfully upload data into a specified block of CPU memory and verify the correct memory contents**
  - **Demonstrate the successful dump of the status and contents of a specific block of CPU memory**
  - **Verify the FSW's ability to cancel active memory dumps.**
- **NBTLMV – Narrowband Telemetry Verification**
  - **Verifies the successful transmission of housekeeping health and safety telemetry, alert telemetry, and diagnostic telemetry over the CTDB**
  - **Verifies the ability of the FSW to issue demand telemetry**
  - **Tests the bulk of the diagnostic telemetry issued by FSW**
  - **Verifies that FSW responds properly to valid housekeeping-related telecommands and low-rate science counter and thermal control FSW commands not covered in other test suites**

Test Suites (6)

- **OPMODE – Operational modes**
  - **Verify that FSW supports the observatory modes of (1) sky survey, (2) pointed observation, and (3) repointed observation, and supports the necessary commanded, autonomous, and GRB-driven transition among these observatory modes**
  - **Verify that FSW supports all required safety modes, and can correctly control the transition to LAT safe mode, correctly respond to load shedding messages from the spacecraft, and correctly manage entry into SAA and subsequent recovery from SAA**
  - **Confirms proper operation of the LAT in these observatory and safety modes, and proper reporting of mode changes in telemetry**
- **SIUCFG – Configuration of subsystems**
  - **Verify the ability of the SIU FSW to communicate with the LAT instrument subsystems for the purposes of configuration and retrieval of housekeeping and low rate science data (rate counters)**
  - **Verify the ability of FSW to configure the LAT power systems and the T&DF, TKR, CAL, and ACD subsystems as desired and read back the necessary configuration information to completely determine each subsystem's configuration.**
  - **Verify that the FSW reports all configuration changes in telemetry**

Test Suites (7)

- **THRMCS – Thermal control system**
  - **Verify that the SIU FSW can properly execute the algorithms of the TCS implementation**
- **TIMPRC – Time signal processing**
  - **Verifies that the LAT FSW correctly processes the 1 Hz GPS "time hack" and the 1 Hz GPS time message from the spacecraft to provide a mapping of external time to the LAT internal 20 MHz clock, and that the resulting mapping allows event time measurements to be accurate to within 10 µsec of spacecraft time**
  - **Verifies that SIU FSW receives and records the GPS status information contained in the Ancillary Data message from the spacecraft**
- **VSGIFV – Vehicle Signals Interface Verification**
  - **Verifies the timing and processing of all discrete signals from the spacecraft**
  - **Verifies proper transitioning from primary to redundant signals**

Test Suites (8)

- **WBTLMV – Wideband telemetry verification**
  - **Verify the correct formatting and transmission of data through the external LAT science data interface in a format and sequence that may be correctly decoded**
  - **Confirm that data is delivered through the science data interface at the proper rate and within specified daily volume limits**