Gamma-ray Large Area Space Telescope
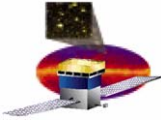
GLAST Large Area Telescope

Monthly Mission Review

LAT Flight Software Status

November 30, 2006

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Stanford Linear Accelerator Center

FSW Status

- **Running at Spectrum with B0-6-15 + LSW V0-1-1 (bug fix for trace facility)**
  - *We haven't seen any new reboots since the install on November 20*
  - *More in Erik's RRT report*

- **B0-7-0 was installed yesterday (Wednesday, November 29)**
  - *This build includes full science data compression*
    - *B0-7-0 does not treat non-standard splits generically (TEM10, RC0 addressed specifically)*
  - *Repeatable problems with LPASTART being diagnosed*
  - *Observatory integration will take place using this (corrected) build or B0-6-15 + LSW V0-1-1*

- **B0-7-1 is planned to incorporate JIRAs that address reboots**
  - *Full and robust LSW trace facility is the driver for this build (~ 2 weeks)*

- **There are other outstanding JIRAs which have lower priority than addressing reboots, but will be included in future builds opportunistically**
  - *Most of these are small potatoes, trivial fixes*
  - *Some are already addressed*
  - *These will *not* interfere with the reboot effort*

- **Future builds culminating in B1-0-0 can be released with minimal project risk**
  - *Use third shift for testing of newly uploaded software, trolling for reboots*
 - *We will maintain the ability to run with B0-6-15*

Build naming conventions

- **For the sake of mapping out a build schedule, I've adopted a naming convention for future builds. As bugs are discovered and new builds are needed, the minor revision number will be incremented.**
- **B0-7-0 (11/06: prior to LAT-SC integration)**
  - **refers to the *working* build that incorporates compression**
- **B0-7-1 (12/06: immediately following LAT-SC integration)**
  - **refers to the build that incorporates the JIRAs that we believe may address reboots**
- **B1-0-0 (1/07: prior to observatory test)**
  - **refers to the build we launch with**
  - **Driver is GRB algorithm**
- **B2-0-0 (11/07?: after launch)**
  - **Refers to the first post-launch build**

- **In reality, if B0-7-0 has a fatal flaw, we may release a build called B0-7-1 to correct that flaw and the JIRAs that address reboots will actually go into B0-7-2 (or B0-7-3…).**
- **For now, assume there are no bugs and define the builds as though we were building them today.**
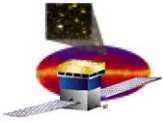
Build 0-7-0

- **B0-7-0 release**
  - **Compression code was a significant release**
  - **Unit testing of compression code cut short in favor of meeting integration schedule and getting experience with compression on the LAT**
  - **From the time that the code for a build is placed into production, the release of a new build requires 3 days when error-free**
    - **Clock doesn't start until all code is approved and in production**
    - **Any errors found reset the clock**
    - **One bug often hides many other bugs**
    - **Normally, the contents of a build are in SLAC production (and in use by many developers) for weeks prior to a build**
      - **Because FSW is adapting to requirements of the Project CCB, key elements of B0-7-0 could not be put into SLAC production ahead of time**
      - **Code was not "shaken out" in advance of sanity check**
      - **Sanity check found several bugs in interactions between different packages**
  - **We had at least 3 iterations of the build process with rounds of debugging in between**
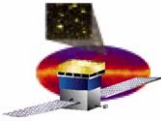
B0-7-1 (available ~12/15/06)

- **Approved by project CCB and already fixed:**

| FSW-821	Split memory allocations which allocate I/O buffers and non-I/O memory structures in the same function call
FSW-822	Disable memory controller Maximum Bank Active Timeout
FSW-820	Need unique access to all cache lines of LCB I/O buffers during hardware operation
FSW-823	Correct write to memory beyond allocated LCB request (a.k.a. command) list structure in LTX

- **Recently approved by project CCB and/or not yet fixed:**

FSW-831	Event packet reassembly code review issues
FSW-830	Fix LPA Processing of Multiple DB Instances
FSW-829	Expansion of LSW facility for diagnosing reboots and monitoring the state of the onboard flight software.
FSW-826	Command and response lists must have exclusive use of 32-byte blocks
FSW-825	Response list allocation uses the wrong routine
FSW-809	Stale context in first datagram of some runs
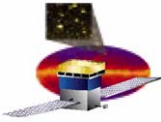
Schedule Forward to B1-0-0

- **Build1-0-0**
  - **Includes GRB algorithm**
  - **Includes FSW Standards**
    - **5.4.1 System of Units (metric system)**
    - **5.4.2.x Coordinate Systems (3 requirements)**
    - **5.4.3 Resource Margin**

- **Available around 2/07**

- **Delta-FQT-B**
  - **Complete 183 of 183 requirements**
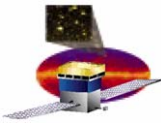
B1-0-0

FSW-794	Update compression code to handle assymmetric splits
FSW-292	Implement GRB detection algorithm
FSW-808	Problem enabling periodic triggers
FSW-811	Modify the sample parameters of the Gamma, MIP, and Heavy
FSW-747	Correct two separate errors with the extended counters
FSW-576	Bug in CAL data compression algorithm
FSW-305	Summary/statistics telemetry stream needs to be created for or
FSW-763	EFC IVV code issues
FSW-456	EMP and LCM do zlib compress with malloc/free, should use M

FSW-790	Tracker calibration doesn't work correctly with uneven splits
FSW-582	Capture of layer splits in LATC does not consider the FE mode
FSW-789	LCI event data is inconsistent if TEM errors or diagnostics pres
FSW-833	SIU exception occurs during LAT power down
FSW-729	LATC verify error response
FSW-764	LATC IVV code issues
FSW-723	LATC (and RIM) XML contains duplicate tag names
FSW-164	Add LATC Telecommand Interface to LIM
FSW-703	Ensure all registers are set

FSW-828	Expose the "repair" flag on the chkdsk utility

FSW-802	CTDB Bus timeout messages time tags 4.2 seconds fast
FSW-800	LHK stopped sending telemetry

FSW-693	Command confirmation configuration report
FSW-732	Task messaging configuration report
FSW-699	Create report to identify configuration files in use
FSW-799	Decide on desired level of command execution verification, abil

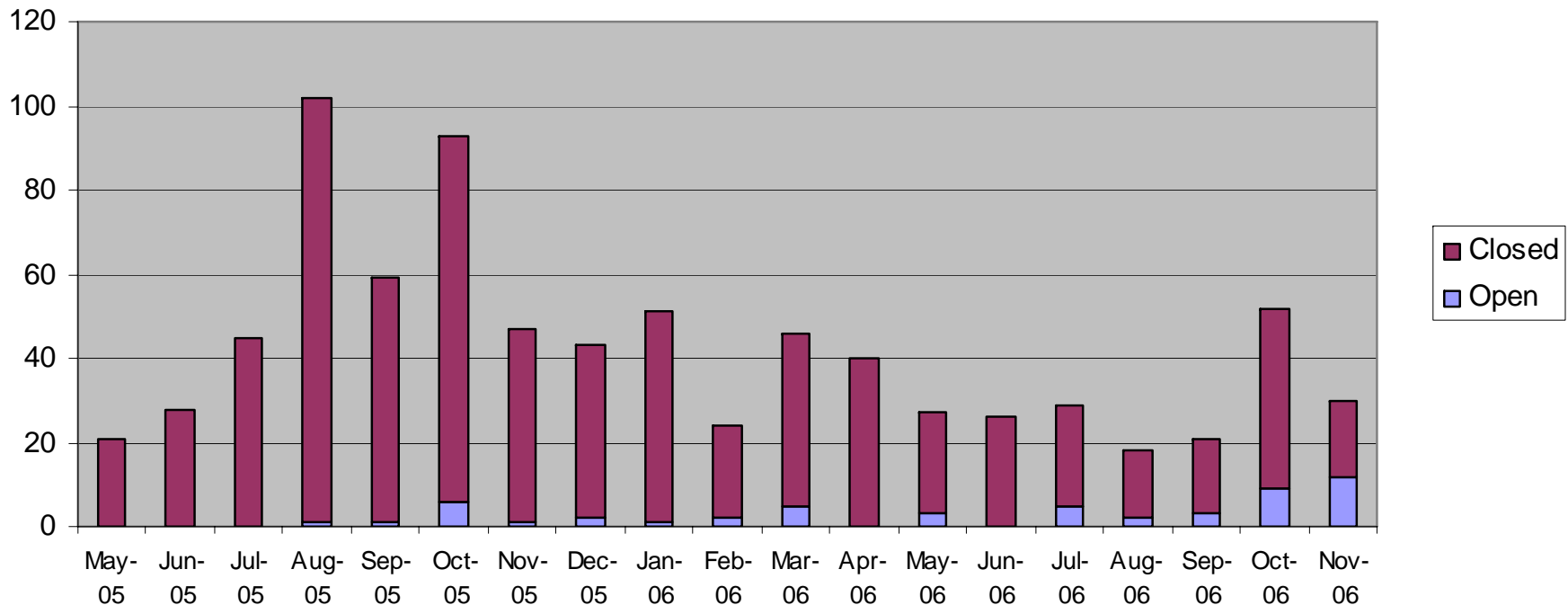"Blocks" can be worked in parallel

Yellow boxes are "must-haves"

Everything else is "nice to have" or requires further investigation to understand.
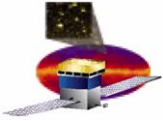
Priority within each block goes from most important (top) to least important (bottom).

JIRA Metrics as of 28 November 2006

- **Relatively high number of issues in November due to introduction of compression and aggressive documentation of every change**
- **Open issues are divided as follows**
  - **4 planned for B0-7-1**
  - **16 planned for B1-0-0**
  - **8 planned for B2-0-0 (post L+60)**
  - **14 deferred indefinitely**
  - **15 unscheduled (being assessed by FSW team or awaiting Project CCB adjudication)**

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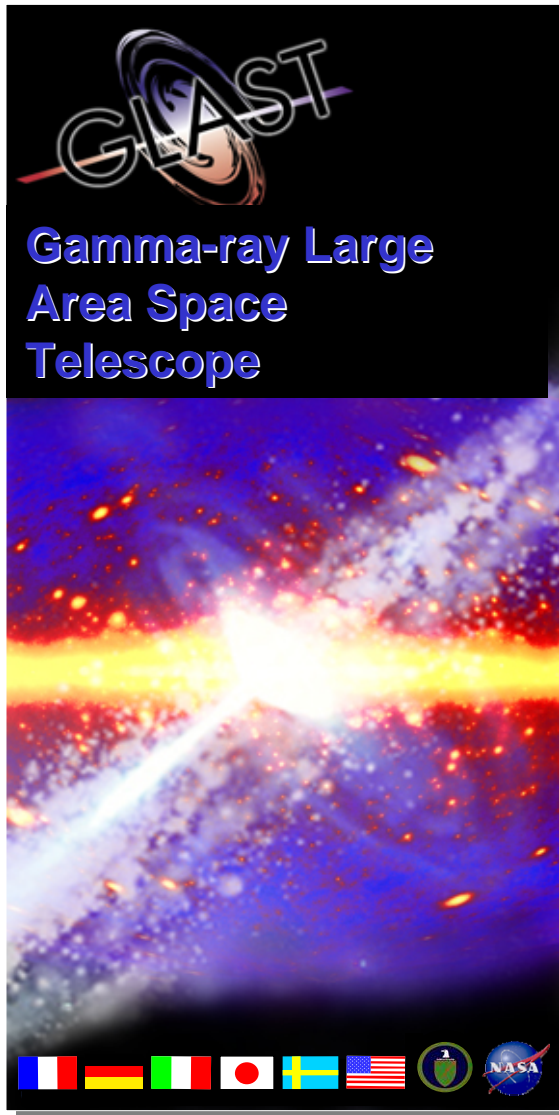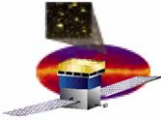
Backup

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Creating a new build

- **Procedurally, a build requires several steps (timescales given)**
  1. Define contents of build (which packages? Which JIRAs?)
  2. Document package upgrades using JIRAs (0.5 day/pkg)
  3. Get approval from project CCB for JIRAs (5 days)
  4. Push approved packages into SLAC production (0.5 day/pkg)
  5. …< developers use SLAC production heavily>
  6. Cmx build all: compile all code (6 hours)
  7. "Sanity check" build (12 hours)
     - Load build into processors using ethernet, run FQT
  8. If sanity check passes, continue; else, figure out what went wrong and go back to step 1.
  9. Upload build to Testbed EEPROMs (3 hours)
  10. Regression test build against onboard resources (12 hours)
  11. If tests pass, upload to LAT; else, figure out what went wrong and return to step 1.
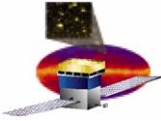
Top FSW JIRAs (Critical or Major Severity)

Priority	Key	Summary	Issue Type
Critical	FSW-292	Implement GRB detection algorithm	New Feature
Major	FSW-456	EMP and LCM do zlib compress with malloc/free, should use MBA_alloc/free	Improvement
Major	FSW-305	Summary/statistics telemetry stream needs to be created for on-board event processors	Improvement
Major	FSW-369	MSG needs to disable reports from within the MSG task	Bug
Major	FSW-576	Bug in CAL data compression algorithm	Bug
Major	FSW-623	CLONE -Documentation for several apids needs to be added to standard webpage	Improvement
Major	FSW-341	LPA Mode Change/Flush Behavior is Incorrect	Bug
Major	FSW-682	LTC estimation filter timescale is too short	Improvement
Major	FSW-680	Swap LHKPnxHP3DSIT and LHKPnxHP5DSIT to address miswiring of thermal sensor	Bug
Major	FSW-562	Make sure that PIG's power sequence is still correct	Improvement
Major	FSW-168	Add LIM mode status to regular housekeeping packet	New Feature

Major	FSW-684	There need to be general no-op commands for each task.	New Feature (7/21 ENHANCEMENTS MTG)
Major	FSW-685	Expand LHKDIAGAPID argument range for LHKREQDIAGPKT	Improvement (7/21 ENHANCEMENTS MTG)
Major	FSW-686	Mnemonic LHKSMEM0MPTID should be LHKSMEMDMPTID	Improvement (7/21 ENHANCEMENTS MTG)
Major	FSW-687	LHKT0TEM28V0ST and LHKT0TEM28V1ST et al are missing conversion	Improvement (7/21 ENHANCEMENTS MTG)
Major	FSW-270	mnemonics in telemetry packet 720/0x2D0 do not begin with ?L?	Improvement
Major	FSW-698	Separate LTC master config files into fof, data	Improvement (7/21 ENHANCEMENTS MTG)
Major	FSW-699	Create report to identify configuration files in use	Improvement (7/21 ENHANCEMENTS MTG)
Major	FSW-701	Add flexibility to MSG level output based on destination	Improvement (7/21 ENHANCEMENTS MTG)
Major	FSW-702	EPU secondary boot indication	Improvement (7/21 ENHANCEMENTS MTG)
Major	FSW-704	Read, report and clear flag registers	Improvement (7/21 ENHANCEMENTS MTG)
Major	FSW-703	Ensure all registers are set	Improvement (7/21 ENHANCEMENTS MTG)
Major	FSW-705	Support chip reset commands (and possibly others)	Improvement (7/21 ENHANCEMENTS MTG)
Major	FSW-688	LMEMPAD re-use	Improvement (7/21 ENHANCEMENTS MTG)