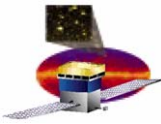


# GLAST Large Area Telescope Instrument Science Operations Center

## Monthly Status Review 6 March 2007

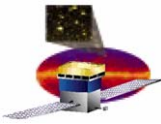
Rob Cameron



# ISOC Management

---

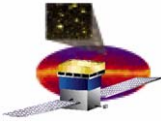
- ❑ **Recent Events**
  - Successful GRT6, Feb20-21
  - Successful Mini-ETE, Feb 25
    - First LAT commanding from the MOC
- ❑ **Current Activities**
  - Mission Planning Exercise#1 underway
- ❑ **ISOC Operations Facility**
  - All furniture now installed
- ❑ **Upcoming Events**
  - ETE1a: 17 March2007
  - ETE1b: 24 March 2007?
  - LAT Collaboration meeting
    - GSFC, 25-30 March 2007
    - <http://glast.gsfc.nasa.gov/science/resources/meetings/lat/march07/>
  - ISOC workshop at SLAC, 30 Apr – 2 May 2007
  - Mission Operations Review, GSFC, 31 July 2007



# End-to-End Test Support

---

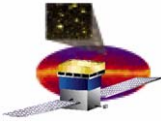
- Supported the mini-ETE test during USN test on Feb 25
  - Very successful test from ISOC perspective
    - Simple LAT commands issued to LAT from the MOC
      - LAT NOOPs and dwell telemetry request
    - Real-time telemetry monitoring performed at LISOC and LAT I&T
    - Realtime and playback telemetry received at LISOC
      - Data checks in progress
    - Diagnostic data was not received by LAT I&T at GD
      - exact cause being investigated, though GD I&T configuration issue is suspect
    - Great practice for the upcoming ETE1 test



# End-to-End 1 Preparation Status

---

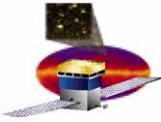
- ETE1a test currently scheduled for 17 March 2007
  - Weekly coordination meetings held to address issues and plan for future tests
    - With uncertain test dates, NRL staff (Grove, Sandora) will help to support LAT activities in the MOC at GSFC
  - LAT test-bed time reserved for Mon, 3/5 and Wed, 3/7 to re-validate the STOL PROCs with the new T&C database and to address a few changes in the PROCs
  - A white paper documenting a command cross-validation process between ITOS and LICOS finalized – cross-validation will be performed as soon as the new command list file is received from the MOC
  - The most recent version of the ETE1A Test Procedure is under review
- Issue:** The HK telemetry dropouts is still an issue for LAT, though it is no longer identified as a lien against ETE1



## **Beyond ETE1 & Mission Simulations**

---

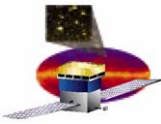
- **Began discussion on the ISOC goals and potential issues for the ETE2, currently scheduled for May 21-23**
  
- **No Active LAT Instrument participation planned for the Launch & Early Orbit 1 (LEO1) Simulation**
  
- **Started Planning for the Instrument Commissioning Exercise #1, currently scheduled for April 17-18**
  - **Began identifying the primary LAT players during the simulation**
  - **Eric Grove will continue as LAT Commissioner for the on-orbit L&EO and will help with planning LAT activities for the Instrument Commissioning Ex. # 1**



## Other CHS Activities

---

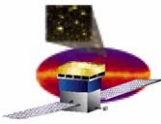
- ❑ **Mission Planning Exercise for March 5-16 is underway**
  - Objective is to exercise ISOC mission planning software, processes, and interfaces with MOC and GSSC
  - Simulation begins with mission week 21 in progress and focuses on planning for mission weeks 23-25
    - ISOC will create ATS timeline and PROC requests using CHS Mission Planning System
    - Review Integrate Observatory Timelines
    - Participate in mission planning meetings with all ground elements
- ❑ **Update of LAT-SS-00021 ISOC Level III Specification out for review**
- ❑ **GIMGOM – identified proposed changes to ICD**
  - Additional PROC-request file for PROCs with command arguments that exceed a total of 255 characters
  - File format for input to GSSC's Remote Planning System
    - Used by ISOC to request pointed observations and identify periods of time where no science will be taken
  - Format of the “command reject” message from GSSC



# Narrative Procedure Development

---

- ❑ Total of 94 narrative procedures in development
  - 90 for on-orbit operations (some also used for L&EO)
  - 4 for L&EO use only
- ❑ 61 procedures ready for PROC development
  - 57 on-orbit procedures
    - Includes all NPs needed for ETE1 and ETE2
  - 4 L&EO procedures
- ❑ Development of ARR and ToO procedures on-hold until B1-0-0
- ❑ Observatory-level procedures being worked with GD in bi-weekly meetings
  - LAT Power On
  - Observatory Command Checkout
  - ARR and ToO Tests
  - Earth-pointed Observation



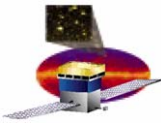
# Narrative Procedure Status

Status by ETE								
ETE	Date	# of Procedures	Level					
			1	2	3	4	5	6
ETE 1	Mar-07	9	0	0	0	0	9	0
ETE 2	May-07	21	0	0	17	3	1	0
ETE 3	Jul-07	23	1	1	21	0	0	0
ETE 4	Aug-07	41	7	3	10	0	0	0
		94	8	4	48	3	10	0

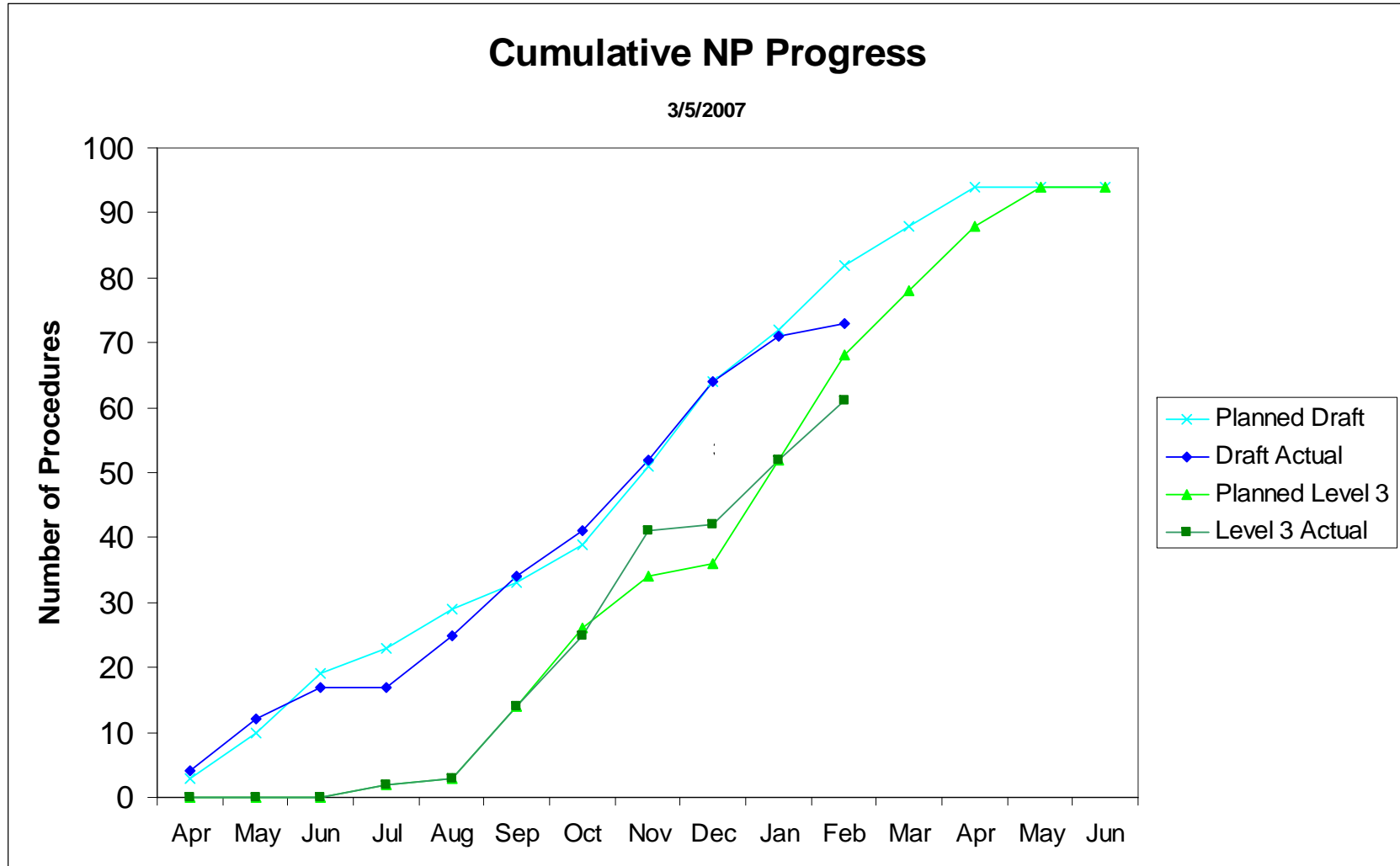
Schedule				
	Planned Draft	Draft Actual	Planned Level 3	Level 3 Actual
Apr	3	4	0	0
May	7	8	0	0
Jun	9	5	0	0
Jul	4	0	2	2
Aug	6	8	1	1
Sep	4	9	11	11
Oct	6	7	12	11
Nov	12	11	8	16
Dec	13	12	2	1
Jan	8	7	16	10
Feb	10	2	16	9
Mar	6	0	10	0
Apr	6	0	10	0
May	0	0	6	0
	94	73	94	61

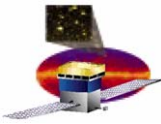
Cumulative NP Progress				
	Planned Draft	Draft Actual	Planned Level 3	Level 3 Actual
Apr	3	4	0	0
May	10	12	0	0
Jun	19	17	0	0
Jul	23	17	2	2
Aug	29	25	3	3
Sep	33	34	14	14
Oct	39	41	26	25
Nov	51	52	34	41
Dec	64	64	36	42
Jan	72	71	52	52
Feb	82	73	68	61
Mar	88		78	
Apr	94		88	
May	94		94	





# Narrative Procedure Development Progress

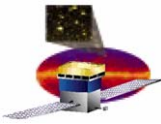




# PROC Development

---

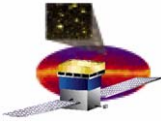
- ❑ 20 PROCs currently in development
- ❑ 12 PROCs for ETE1
  - LATNOOP
  - LATDWELLTLM
  - LATSTOPDWELLTLM
  - LATTASKMSGENAB
  - LATTASKMSGDISA
  - LATCREATEDIR
  - LATDELETEDIR
  - LATCMDCONFIRM
  - LATCOPYFILE
  - LATDELETEFILE
  - LATDUMPPDIR
  - LATFILEDUMP
- ❑ MOCR board convened and approved 9 PROCs for ETE1
- ❑ Since the MOCR, PROCs updated to address FOT concerns (global PROC issues) and to improve telemetry checking in file system PROCs
- ❑ Remaining PROCs and all updated PROCs to be boarded at MOCR on 3/12



## ISOC/Flight Operations Software Progress

---

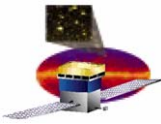
- ❑ **Software development**
  - Telemetry Table Display tool
  - Alert/paging tool
  - Mission planning tool
  - Software package deployment tools
  - Configuration tools
  - Physics event data dispatch (pipeline 0.5)
- ❑ **Also supporting issues with data collected by I&T at GD**
- ❑ **LICOS support for C&T DB enumerations**
  - Big job for FSW or Online, rejected for now by FSW CCB
  - But: PROCs with command enumerations tested against LAT Testbed prior to use with LAT
  - ITOS-LICOS command binary comparison will use non-enumerated commands



# Ground System Testing

---

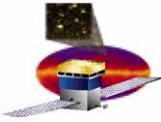
- **GRT 6 conducted on Feb 20-21**
  - **2-day (~20-hour) test – most extensive GRT to date**
  - **verified backup capabilities of ground systems, including**
    - **RT data receipt from PRI/BKUP MOC & Burst Alert Processor systems (BAP) to PRI/BKUP ISOC RT computers**
    - **FASTCopy exchanges to/from GSSC and MOC PRI/BKUP computers using PRI/BKUP ISOC FASTCopy computers**
    - **access to MOC trending app**
    - **access to MOC/ITOS Java realtime displays**
  - **verified submission of data products to MOC**
    - **data retransmission request**
    - **LAT SAA Definition Update**
  - **~6 SOARS issues resulted**
    - **none for ISOC**
  
- **Completed acceptance test report for ISOC/CHS release 2.2 & submitted to LATDocs**



# Requirements Tracking

Requirement Category	Release Status & Plan (as of 03/02/07)									total
	1 6/05	1.2 11/05	1.3 2/06	1.4 5/06	2 7/06	2.1 10/06	2.2 2/06	3 4/07	4 6/07	
	GRT2	GRT3			GRT5		GRT6 ETE1 MPE	GRT7 ETE2-3	ETE4-6	
Misc (Facility, Redundancy, Security, Doc, etc.)	3	1		2	7	2	4	16	27	62
Mission Planning	2	2					30	14	4	52
Telemetry Processing	1	3	1	7	4	13	1	11	3	44
Science Data Processing				1	2	3		29	1	36
Telemetry Monitoring		1	1	2	1	15	1	10	2	33
Logging			3			4		3		10
Trending			12		6	3		1		22
Anomaly Tracking & Notification						6	3	7	1	17
# new reqts verified	6	7	17	12	20	46	39	91	38	276
cumulative total	6	13	30	42	62	108	147	238	276	

Key:	
	Incremental release (only new requirements tested)
	Major release (all requirements satisfied to date tested)



# Science Operations

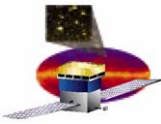
---

## □ SO general

- At upcoming LAT collaboration meeting, splinter sessions are planned between the ISOC and the AGN and GRB science groups, to define specifics of how transient sources will be detected, characterized and followed up, and the respective roles of SO and the science working groups
  - GRB handling from onboard algorithms to final catalog
  - Source identification
  - Processing variable sources: from the ISOC to the Science Groups
- ISOC workshop planned for April 30-May 2 at SLAC, to bring together the SO working groups and to plan in more detail what the SO shift takers will see and do in the control room

## □ Data Processing

- L1 pipeline
  - The L1 pipeline tasks now register their data sets (by run number) with the Data Catalog. Merging of the pipeline output into FT1 files is being implemented. The last remaining major tasks are incorporating position and attitude information from the L0 data as well as accumulation of livetime by run



# Science Operations

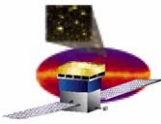
---

## □ Monitoring

- The architecture for a 'fast monitoring' system to interpret pre-digi LAT data, including a configurable LSF-ROOT converter, has been defined (INFN/Pisa)
  - heritage from tools developed for the beam test
- Using DC2 data the IRF monitoring working group has prototyped scripts for monitoring the effective area (IN2P3/CENBG) and PSF (INFN/Perugia). These prototypes are being used to refine the techniques (e.g., choice of phase ranges for the bright pulsar 'standard candle' sources)
- The background monitoring group has used recent large background simulations to investigate how the primary proton and albedo lepton (at low and high energies) backgrounds could be monitored (Hiroshima)
- Developing tools for monitoring time dependent items, e.g. rates

## □ Optimization

- Impacts of (simulated) failures of LAT hardware on the science data quality and rates are being investigated (INFN/Bari)



# SAS Status: Service Challenge



## □ Service Challenge Work

### – Working to 3 near term goals

#### • 1-year gtobssim run (mid March)

- New orbit in test. Fleshing out some small problems
- Sky model updates due 3/7
- Include diffuse response and exposure cubes in pipeline
  - » Nicola Omodei (Pisa) to take over pipeline responsibility

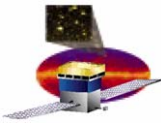
#### • 1-day Gleam run with pointing

- Pointing, new background interleave scheme
- Backgrounds generated; rates extracted
- Testing done; will do trial run this week
- Leading to new 55 day run (mid/late Mar)

#### • L0 Gleam run (leading to single downlink runs)

- L0 file simulation now being tested; first runs happening
- First looks have no surprises
  - » In use for L1 pipeline testing
- L1 processing chain being updated
  - » Processing chain defined and input to pipeline
  - » Dry run to happen 3/7
- INFN/Bari folks looking at LAT failure modes etc for downlink tests
- Started discussions on how to do interleave for L0 sims

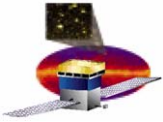




# Sundry Items

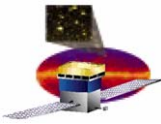
---

- ❑ **Shift Log installed**
  - Currently being customized for Science Ops needs for ETE1
  
- ❑ **Ordered 50 TB disk**
  - Ship date now mid-March; install end May due to power limitations in SLAC SCS computing building
  - Planning remaining hardware purchases. Same issue on power.
  
- ❑ **Xrootd**
  - DC2 files (some 32k of them) imported to xrootd to test functions and latencies to/from tape
  - Testing underway for writing to xrootd from pipeline. So far, so good.
  
- ❑ **Pipeline2 @ Lyon**
  - Pipeline2 interface to bqs batch system done; in test now.
  - Will likely be plenty of details controlling jobs there, but no showstoppers foreseen



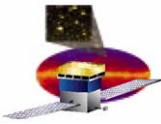
# Backup slides

---



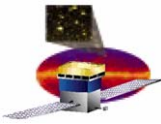
# LAT Procedures (1/4)

Number	Ver.	Level	initial draft	level 3	Name	Author
L-LCM-01	0.9	5	april	july	Change Task Messaging	Bator
L-LCM-02	0.8	5	april	july	Change Task Command Confirmation	Bator
L-LHK-02	0.8	5	april	august	Request Dwell Telemetry	Bator
L-LAT-03	0.7	5	october	october	Send No-op Commands	Bator
L-FIL-01	0.6	4	june	november	File Upload	Bator
L-FIL-02	0.3	3	may	november	File Copy from SIU to EPU	Bator
L-FIL-03	0.3	4	september	october	File Upload Cancel	Bator
L-LEO-01	0.19	3	june	october	LAT Start Up	Pineau
L-LEO-03	0.22	3	june	october	HVBS Power On	Pineau
L-LFS-01	0.9	5	may	september	File Copy	Bator
L-LFS-02	0.9	5	may	september	File Delete	Bator
L-LFS-03	0.10	5	may	september	Directory Create	Bator
L-LFS-04	0.9	5	may	september	Directory Delete	Bator
L-LFS-05	0.9	5	may	september	Directory Dump	Bator
L-LFS-06	0.5	3	may	october	File System Status	Bator
L-LFS-07	0.9	5	may	october	File Dump	Bator
L-LFS-08	0.6	3	september	october	File System Check	Bator
L-LIM-07	0.6	3	september	october	Configure GBM Interface Handling	Condamoor
L-LPA-01	0.14	3	september	october	Initiate Physics Observation	Pineau
L-LPA-02	0.9	3	september	october	Terminate Physics Observation	Pineau
L-LPA-03	0.3	3	november	november	Enable/Disable GRB Messages	Bator
L-LPA-04	0.3	3	november	november	Set Active Event Handler Configuration	Bator
L-LPA-05	0.3	3	november	november	Associate Event Handler Configuration	Bator
L-LPA-06	0.4	3	november	november	Set Event Data Output Stream	Bator
L-MEM-01	0.11	3	april	september	Memory Dump	Bator
L-MEM-03	0.4	3	september	october	Memory Write	Bator
L-MEM-04	0.4	4	june	september	Dump Memory Pool Statistics	Bator
L-MEM-05	0.4	3	june	september	Dump System Symbol Table	Bator
L-MEM-06	0.5	3	august	september	Dump Memory Relative to Symbol	Bator



# LAT Procedures (2/4)

Number	Ver.	Level	initial draft	level 3	Name	Author
L-MEM-07	0.4	3	august	september	Dump PCI Device Header	Bator
L-LCI-01	0.2	3	november	december	Calibration Data Collection Run	Pineau
L-LEO-02	0.10	3	august	september	SIU/EPU Hardware Functional	Pineau
L-LEO-12	0.4	3	october	november	LAT GRB Handling Setup	Pineau
L-LIM-01	0.4	3	october	january	Hold Mode	Condamoore
L-LIM-09	0.4	3	october	january	Dump Power System Configuration	Condamoore
L-LIM-10	0.4	3	october	january	Dump Detector Configuration	Condamoore
L-LMC-01	0.4	3	august	november	CAL Low Rate Counter	Condamoore
L-LMC-02	0.5	3	august	november	TKR Low Rate Counter	Condamoore
L-LMC-03	0.4	3	august	november	ACD Tile Counter (Pair)	Condamoore
L-LMC-04	0.4	3	august	november	ACD Tile Counters (All)	Condamoore
L-LMC-05	0.4	3	august	november	TEM Deadtime Counter	Condamoore
L-LIM-11	0.7	3	october	november	Initiate ToO Observation	Pineau
L-LIM-12	0.4	3	november	november	Abort ToO Observation	Pineau
L-LIM-13	0.2	1	november	due Jan	Monitor ToO Completion	Pineau
L-PBC-03	0.2	2	november	due Feb	EPU Secondary Boot	Condamoore
L-LTC-01	0.3	3	december	february	Start LAT Thermal Control	Bator
L-LTC-02	0.3	3	december	february	Stop LAT Thermal Control	Bator
L-LTC-03	0.3	3	december	february	Change LTC Mode	Bator
L-LTC-04	0.3	3	december	february	Restart LAT Thermal Control	Bator
L-LTC-05	0.3	3	december	february	Set LTC Parameters	Bator
L-LTC-06	0.3	3	december	february	Control LTC Heaters	Bator
L-LTC-07	0.3	3	january	february	LTC Diagnostic Data	Bator
L-LPA-07	0.4	3	january	january	Compression Debug	Pineau
L-FIL-04	0.1	1	january	due Feb	File Upload to SIU in Boot Mode	Bator
L-FIL-05	0.1	1	january	due Feb	File Upload to EPU in Boot Mode	Bator
L-LCM-03	0.4	3	september	january	Generate CPU Code Module Listing	Condamoore
L-LCM-04	0.4	3	september	january	Generate CPU Task Listing	Condamoore
L-LCM-05	0.4	3	september	january	Configure MSG Output Interface	Condamoore



# LAT Procedures (3/4)

Number	Ver.	Level	initial draft	level 3	Name	Author
L-LCM-06	0.3	3	november	january	Run Memory Scrubber	Condamoore
L-LCM-07	0.3	3	november	january	Internal Communication Statistics Monitor	Condamoore
L-LCM-08	0.3	3	december	january	Configure CPU Error Handling	Condamoore
L-LCM-09	0.3	3	december	february	Configure Memory Scrubber	Condamoore
L-LHK-01	0.1	1	january	due Mar	Restart and Reinitialize LHK	Bator
L-LIM-02	0.1	1	january	due Mar	Load Shed	Condamoore
L-LIM-03	0.2	2	december	due Feb	PID Signals	Condamoore
L-LIM-04			due Feb	due Apr	Set ACD Bias Voltages	Condamoore
L-LIM-05			due Feb	due Apr	Set CAL Bias Voltages	Condamoore
L-LIM-06			due Feb	due Apr	Set TKR Bias Voltages	Condamoore
L-LIM-08			due Feb	due Apr	Configure ACD High-Voltage Handling	Condamoore
L-LIM-14	0.3	3	december	february	Main Feed On	Condamoore
L-LIM-15	0.2	2	december	due Feb	Component Power On	Condamoore
L-LIM-16	0.2	2	december	due Feb	Component Power Off	Condamoore
L-LIM-17			due Dec	due Feb	ARR Abort	Condamoore
L-MEM-02	0.1	1	february	due Mar	SIU Memory Dump (Boot)	Bator
L-MEM-08			due Feb	due Mar	Dump PCI Device Header (Boot)	Bator
L-MEM-09			due Feb	due Mar	Write PCI Device Header	Bator
L-MEM-10			due Mar	due Apr	Write PCI Device Header (Boot)	Bator
L-MEM-11			due Mar	due Apr	Access RAD750 CPU Register	Bator
L-MEM-12			due Mar	due Apr	Memory Write (Boot)	Bator
L-LAT-01	0.7	3	october	november	LAT Turn On	Pineau
L-LAT-02	0.7	3	november	november	LAT Power Down	Pineau
L-PBC-01			due Mar	due Apr	SIU Secondary Boot	Condamoore
L-PBC-02			due Mar	due Apr	SIU Primary Boot (Warm Reset)	Condamoore
L-PBC-04	0.1	1	january	due Feb	EPU Primary Boot (Warm Reset)	Condamoore
L-PBC-05			due Feb	due Mar	Load RTOS Image to RAM	Condamoore
L-PBC-06			due Feb	due Mar	Load Secondary Boot Code to RAM	Condamoore
L-PBC-07			due Feb	due Mar	Load Secondary Boot Script to RAM	Condamoore

