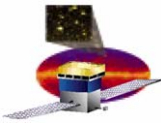


# GLAST Large Area Telescope

## Instrument Science Operations Center

**Monthly Status Review  
30 November 2006**

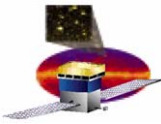
**Rob Cameron**



# ISOC Management

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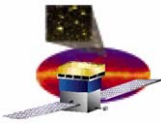
- ❑ David Decotigny from IN2P3 started working for ISOC as software developer under LAT OCF
  - Currently working on LAT config validation tool for use with MOOT
- ❑ Ric Claus now leading CHS software development team
- ❑ ISOC Operations Facility
  - Construction completed
    - operations area and dataflow lab extension
  - Furniture expected to be installed in mid-December, shortly before SLAC end-of-year shutdown
  - Final facility will not be ready to support ETE1 test in Dec, but ISOC operations workstations are up and ready to support the test
    - Hope to use it for ETE test in Jan 2007
- ❑ First Service Challenge Workshop: Nov 29-Dec 1 (now!)
  - <http://www-glast.slac.stanford.edu/software/ServiceChallenge/SC1/default.htm>



# Narrative Procedure Development

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- ❑ Total of 91 narrative procedures in development
  - 83 for on-orbit operations (some also used for L&EO)
  - 8 for L&EO use only
  - Changes since last monthly review
    - Added 3 procedures to account for new LPA commands (new since the schedule was put together)
    - Added 2 procedures to provide flexibility for ToO operations
    - Added 5 procedures to provide flexibility for using LIM commands
    - Deleted 1 L&EO procedure for a test that will not be run (register test)
    - Deleted 8 L&EO procedures that are replaced by using existing on-orbit procedures (*4 more L&EO procedures may also be deleted, pending further discussion*)
    - Reclassified 1 L&EO procedure to be an on-orbit procedure (SAA refinement)
- ❑ 37 procedures are at level 3 – have had a walk-through review with systems engineering and FSW and are ready for PROC development
  - 33 on-orbit procedures
    - Includes all 4 NPs needed for ETE1
  - 4 L&EO procedures

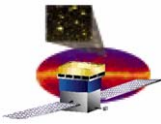


# Narrative Procedure Status

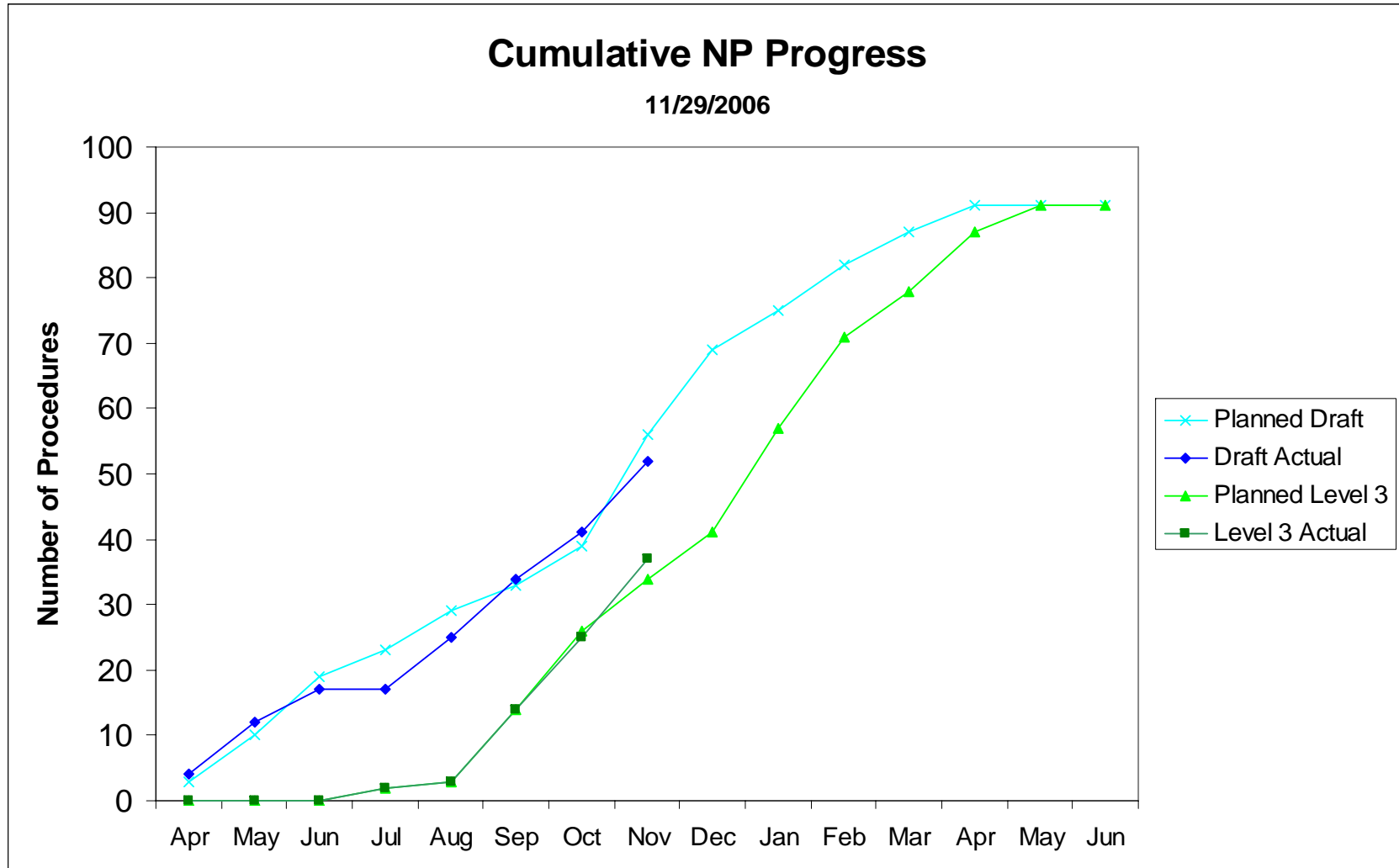
Status by ETE								
ETE	Date	# of Procedures	Level					
			1	2	3	4	5	6
ETE 1	Dec-06	4	0	0	4	0	0	0
ETE 2	Mar-07	26	0	2	24	0	0	0
ETE 3	Apr-07	25	3	3	9	0	0	0
ETE 4	Jun-07	36	2	5	0	0	0	0
		91	5	10	37	0	0	0

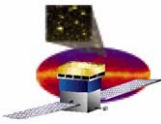
Schedule				
	Planned Draft	Draft Actual	Planned Level 3	Level 3 Actual
Apr	3	4	0	0
May	7	8	0	0
Jun	9	5	0	0
Jul	4	0	2	2
Aug	6	8	1	1
Sep	4	9	11	11
Oct	6	7	12	11
Nov	17	11	8	12
Dec	13	0	7	0
Jan	6	0	16	0
Feb	7	0	14	0
Mar	5	0	7	0
Apr	4	0	9	0
May	0	0	4	0
	91	52	91	37

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	56	52	34	37
Dec	69		41	
Jan	75		57	
Feb	82		71	
Mar	87		78	
Apr	91		87	
May	91		91	
Jun	91		91	



# Narrative Procedure Development Progress

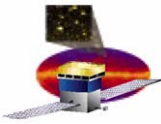




# PROC Validation

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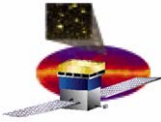
- ❑ NASA/FOT staff currently at SLAC to validate LAT PROCs against the LAT testbed:
  - Elizabeth Ferrara (NASA Project: LAT Instrument Specialist)
  - Aaron Nguyen (Omitron/FOT: LAT Operations Engineer)
- ❑ Testbed usage coordinated through Jana Thayer, to avoid conflict with FSW and RRT needs
  
- ❑ Validated PROCs include those needed for ETE1, using B0-6-14 T&C DB
  - LAT\_1TASK\_MSG\_ENAB
  - LAT\_ALLTASK\_MSG\_ENAB
  - LAT\_TASK\_MSG\_DISA
  - LAT\_CMD\_CONFIRM
  - LAT\_COPY\_FILE
  - LAT\_CREATE\_DIR
  - LAT\_DELETE\_DIR
  - LAT\_DELETE\_FILE
  - LAT\_DUMP\_MEM\_POOL
  - LAT\_DWELL\_TLM
  - LAT\_NOOP
  - LAT\_STOP\_DIAG\_TLM
  
- ❑ PROC validation is proceeding well
  - PROC changes: 1 command updated from FSW B0-6-12 used for PROC development and B0-6-14 to be used for ETE1.



# CHS: Software Development Activity (1/2)

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- ❑ **Software Releases:**
  - **Work on CHS release 2.2 in progress**
    - **Code freeze / start of Acceptance Testing scheduled for 8 Dec**
    - **Release scheduled for 15 January 2007 in support of DITL1**
- ❑ **Supporting I&T**
  - **Updated Offline event-delivery software to support decoding of compressed data for B0-7-0.**
  - **Installed production MySQL database instance for MOOT, with replicated slave on the MCR.**
- ❑ **Supporting ETE's:**
  - **Implement additional real-time display features in LICOS**

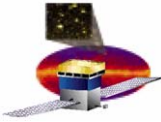


## CHS: Software Development Activity (2/2)

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- ❑ **Supporting Service Challenges:**
  - **Update level-0 data converter for simulation output to produce MOC-like L0 transfer package.**
  - **Implement code to import calibration results into the calibration trending database tables.**
- ❑ **Supporting DITL1:**
  - **Continued mission planning database and application development.**

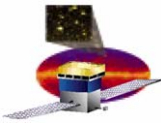




# CHS Testing

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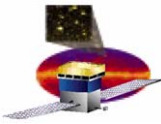
- **ISOC/CHS 2.2 acceptance test procedure development**
  - **incremental acceptance test (verify just new features)**
    - **fully verify 41 reqts**
    - **partially verify 7 more**
  - **major new feature is Mission Planning, but also includes SAA updates, Narrative Procedure reqts, anomaly-tracking, et al**
  - **five new AT procedures**
  - **updates to four previously-run AT procedures**
  - **test execution to start 8 Dec & complete by 15 Jan**



# Requirements Tracking

Requirement Category	Release Status & Plan (as of 11/24/06)									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 1/07	3 3/07	4 5/07	
	GRT2	GRT3			GRT5	GRT6	DITL	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	16	3	53
Telemetry Processing	1	3	1	7	4	13	3	10	2	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	41	92	36	277
cumulative total	6	13	30	42	62	108	149	241	277	

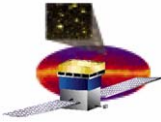
Key:	
	Incremental release (only new requirements tested)
	Major release (all requirements satisfied to date tested)



# End-to-End 1 Preparation Status

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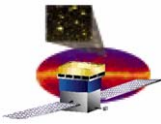
- ❑ **Two LAT/LISOC liens against ETE1 removed/resolved**
  - **No-op commands that are planned to be exercised during the ETE1 were successfully exercised against LAT**
    - **LICOS procedure developed and run as STR**
  - **Two long Physics runs (12 hours & 16 hours) successfully dry performed as a dry run for the long LAT physics run planned for ETE1**
- ❑ **The ITOS PROCs for commanding LAT during the ETE1 are being validated this week**
- ❑ **LISOC will support the Preliminary ETE scheduled for December 19. Agreement with NASA testers: no LISOC participation in the Prelim ETE if it delays into the SLAC shutdown period (Dec. 20- January 1)**
- ❑ **ISOC staffing level for supporting ETE1 in mid January at SLAC and the MOC defined:**
  - 1 real-time monitoring Engineer/Operator (SLAC)**
  - 1 pipeline Engineer/Operator (SLAC)**
  - 1 Test Lead (SLAC)**
  - 1 Science Ops Engineer/scientist (SLAC- To be decided)**
  - 1-2 LAT Operators/Engineers in the MOC**



# Science Operations Activities

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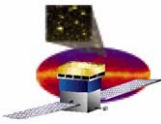
- ❑ **Daily Operations Group formed in Science Operations**
  
- ❑ **The group is formed by LAT Collaborators from all over the world (and SLAC)**
  - **Jan Conrad, Eric Grove, Luca Latronico, Benoit Lott, Tsunefumi Mizuno, Dave Thompson**
  - **Seth Digel, Eduardo do Couto e Silva, Hiro Tajima, Gregg Thayer**
  - **Meets via VRVS**
  
- ❑ **Goals**
  - **Define roles and responsibilities for shift takers in Science Operations**
    - compare experiences from other missions
    - review/provide input/test tools developed for shifts by Science Operations crew
    - ensure smooth interfaces between groups during operations
    - prepare an operations manual
  - **Define processes for calibrations and anomaly resolution**
    - assess how timescales required for updates impact on the exchange between Flight and Science Operations
      - » include control room operations and offline analysis
    - discuss documentation and validation steps
  - **Define training and testing of Science Ops**
    - increase complexity during Service Challenges and End-to-End tests



## Science Operations at the SC workshop

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- ❑ **Science Operations is a main topic of the Service Challenge Workshop**
  - **55 registered participants**
- ❑ **The entire scope of science operations is included in the agenda, including optimization topics, e.g. the Onboard Filter that have not been presented in detail before**
- ❑ **The workshop also includes discussion of the simulations needed for testing Science Operations functions**
  
- ❑ **The current version of the Science Tools is v7r6p1; this includes the first version of the ‘handoff’ instrument response functions implemented by the IRF working group (led by J. Chiang)**
  - **These response functions correspond to the performance demonstrated for the LAT at the handoff review**



# Discussing Science Operations Rehearsals

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- ❑ We will schedule rehearsals in 2007
  - success depends on participation of LAT collaborators

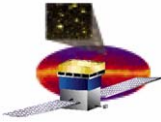
- ❑ Service Challenges with **simulated** Data
  - Data Processing
  - Monitoring
  - Offline Data Analysis
  - Reprocessing
  - Calibrations

timeline for tests will be built at the end of the Service Challenge workshop

- ❑ End-to End Tests (and Mission Simulations) with **real** LAT data
  - Control room activities and procedures
  - Interface with Flight Ops and GSSC
    - Mission Planning and Timeline
    - Alerts and Messages
    - Correlations of housekeeping and science data
  - Data Processing
  - Monitoring

great opportunity for Science Ops.  
Goal not a requirement !

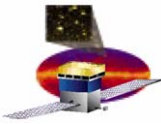
- ❑ Tools currently being developed by SAS will be used for both type of rehearsals



# Science Operations: Near Future

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- ❑ **Provide input to working groups that are developing tools**
  - **Using SC workshop to learn about existing tools and how they play together**
    - Data Servers (Julie),
    - Electronic Log (Anders),
    - IRF (Jim C.),
    - Monitoring (Eric C.),
    - Pipeline (Tom G.),
    - Data Portal
  
- ❑ **Define which functions to exercise functions in the End-to-End tests and Service Challenges**
  - **ETE1 in Jan 2007**
  - **Service Challenge data will be available soon**
    - start discussions on data analysis
  
- ❑ **Continue to broaden discussions to coordinate with Flight Operations, GSSC and ISOC management**
  
- ❑ **Anything else that comes up in the Service Challenge Workshop**

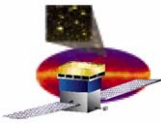


# SAS Status

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- ❑ **Beam test support**
  - GSI beamtest completed successfully
  - Beamtest workshop in Paris 14-15 Nov complete
  - Processed data successfully in pipeline
    - Measured cluster sizes in TKR for heavy ions
    - Confirmed anti-quenching effect in Csl
  - Work still underway understanding CERN data, especially CAL response.
- ❑ **TVAC support**
  - Ongoing
  - Planned computing center power outage moved to 12/11-18
    - We believe we can finesse the outage, to keep some key servers operating during outage, to minimize disruption for I&T
  - Disk usage at SASS has slowed down considerably
    - Not a crisis yet
    - SLAC has agreed to front IFC disk money. 50 TB purchase is starting to move through the system

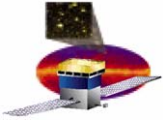




# SAS Status: Service Challenge

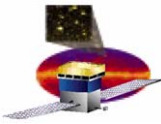
- **Service Challenge Prep**
  - **Working to 3 near term goals**
    - **1-year gtobssim run (Nov)**
      - Revised sky model
      - Done - late Nov
    - **1-day Gleam run with pointing (Dec)**
      - Pointing, new background interleave scheme
      - Backgrounds generated; some work to do extracting rates
      - Postponed completion to mid Dec
    - **1-downlink Gleam run (Dec)**
      - L0 file simulation
      - L1 processing chain updated
      - Trial instrument and ASP monitoring plots
      - Prototype ASP
      - Looking more like late Dec
  - **As always, we're both learning a lot from these exercises and triggering work and thinking**





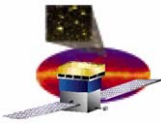
# Backup slides

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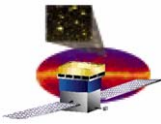
# LAT Procedures (1/4)

Number	Ver.	Level	initial draft	level 3	Name	Author
L-LCM-01	0.8	3	april	july	Change Task Messaging	Bator
L-LCM-02	0.8	3	april	july	Change Task Command Confirmation	Bator
L-LHK-02	0.8	3	april	august	Request Dwell Telemetry	Bator
L-LAT-03	0.6	3	october	october	Send No-op Commands	Bator
L-FIL-01	0.5	2	june	due Oct	File Upload	Bator
L-FIL-02	0.3	2	may	due Oct	File Copy from SIU to EPU	Bator
L-FIL-03	0.3	3	september	october	File Upload Cancel	Bator
L-LEO-01	0.15	3	june	october	LAT Configuration 1 Start Up (L&EO)	Pineau
L-LEO-03	0.17	3	june	october	HVBS Power On	Pineau
L-LFS-01	0.7	3	may	september	File Copy	Bator
L-LFS-02	0.7	3	may	september	File Delete	Bator
L-LFS-03	0.7	3	may	september	Directory Create	Bator
L-LFS-04	0.7	3	may	september	Directory Delete	Bator
L-LFS-05	0.7	3	may	september	Directory Dump	Bator
L-LFS-06	0.4	3	may	october	File System Status	Bator
L-LFS-07	0.7	3	may	october	File Dump	Bator
L-LFS-08	0.4	3	september	october	File System Check	Bator
L-LIM-07	0.5	3	september	october	Configure GBM Interface Handling	Condamoor
L-LPA-01	0.13	3	september	october	Initiate Physics Observation	Pineau
L-LPA-02	0.8	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	3	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	0.1	1	november	due Dec	Calibration Data Collection Run	Pineau
L-LEO-02	0.9	3	august	september	SIU/EPU Hardware Functional	Pineau
L-LEO-07			due Nov	due Dec	LAT Science Performance Diagnostics	Pineau
L-LEO-09			due Nov	due Dec	LAT Energy Measurement Calibration	Pineau
L-LEO-10			due Nov	due Dec	LAT SVAC Flight Config	Pineau
L-LEO-11			due Nov	due Dec	LAT Science Ops Demo	Pineau
L-LEO-12	0.4	3	october	november	LAT GRB Handling Setup	Pineau
L-LAT-4			due Nov	due Dec	SAA Area Refinement Configuration	Pineau
L-LIM-01	0.2	2	october	due Jan	Hold Mode	Condamoore
L-LIM-09	0.2	2	october	due Jan	Dump Power System Configuration	Condamoore
L-LIM-10	0.2	2	october	due Jan	Dump Detector Configuration	Condamoore
L-LMC-01	0.4	3	august	november	CAL Low Rate Counter	Condamoore
L-LMC-02	0.4	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	0.6	3	october	november	Initiate ToO Observation	Pineau
L-LIM-12	0.3	3	november	november	Abort ToO Observation	Pineau
L-LIM-13	0.1	1	november	due Jan	Monitor ToO Completion	Pineau
L-PBC-03	0.1	1	november	due Feb	EPU Boot	Condamoore
L-TCS-01			due Dec	due Feb	Start TCS	Bator
L-TCS-02			due Dec	due Feb	Stop TCS	Bator
L-TCS-03			due Dec	due Feb	Change TCS Mode	Bator
L-TCS-04			due Dec	due Feb	Restart TCS	Bator
L-TCS-05			due Dec	due Feb	Set TCS Parameters	Bator
L-FIL-04			due Jan	due Feb	File Upload to SIU (Boot)	Bator
L-FIL-05			due Jan	due Feb	File Upload to EPU (Boot)	Bator
L-LCM-03	0.2	2	september	due Jan	Generate CPU Code Module Listing	Condamoore



# LAT Procedures (3/4)

Number	Ver.	Level	initial draft	level 3	Name	Author
L-LCM-04	0.2	2	september	due Jan	Generate CPU Task Listing	Condamoore
L-LCM-05	0.2	2	september	due Jan	Configure MSG Output Interface	Condamoore
L-LCM-06	0.1	1	november	due Jan	Run Memory Scrubber	Condamoore
L-LCM-07	0.1	1	november	due Jan	Internal Communication Statistics Monitor	Condamoore
L-LCM-08			due Dec	due Jan	Configure CPU Error Handling	Condamoore
L-LCM-09			due Dec	due Feb	Configure Memory Scrubber	Condamoore
L-LFS-10			due Jan	due Mar	Reformat TFFS Partition	Bator
L-LHK-01			due Jan	due Mar	Restart and Reinitialize LHK	Bator
L-LIM-02			due Jan	due Mar	Load Shed	Condamoore
L-LIM-03			due Jan	due Mar	Safe Mode	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			due Dec	due Feb	ARR Abort	Condamoore
L-LIM-15			due Dec	due Feb	Main Feed On	Condamoore
L-LIM-16			due Dec	due Feb	Enable Component Power	Condamoore
L-LIM-17			due Dec	due Feb	Disable Component Power	Condamoore
L-LIM-18			due Dec	due Feb	PID Signals	Condamoore
L-MEM-02			due Feb	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	0.3	2	october	due Nov	LAT Turn On	Pineau
L-LAT-02	0.5	2	november	due Dec	LAT Power Down	Pineau
L-PBC-01			due Mar	due Apr	SIU Warm Reboot	Condamoore
L-PBC-02			due Mar	due Apr	Upload new RTOS image to SIU	Condamoore

