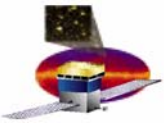


GLAST Large Area Telescope:

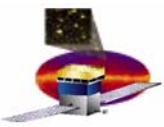
LAT System Engineering
LAT Quality Assurance

Pat Hascall
Joe Cullinan



Topics

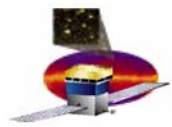
- **NCR Metrics**
- **Significant NCRs**
- **NCR List**
- **LAT Level Verification Status**
- **LAT Power Update**



LAT NCR Metrics 3/28/06

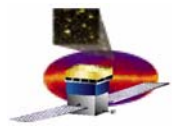
Subsystem	Open NCRs	Closed NCRs last 30 days	NCRs Open 30 days or more	NCRs open 90 days or more	NCRs ready to close (disposition complete; need final QA/MRB review to close)
DAQ	20	13	20	15	15
Tracker	3	5	3	3	3
Mechanical	3	4	3	2	2
CAL	0	0	0	0	0
ACD*	0*	0	0	0	0
I&T	63	20	37	17	15

* All NCRs related to ACD are now categorized as I&T NCRs (including 5 open ACD PRs and PFRs from GSFC)



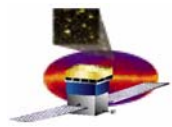
Open I&T NCR Metrics 3/28/06

Open I&T NCRs	February	March
	61	63
New NCRs created	14	22
NCRs closed	3	20
NCRs Ready to Close (analysis complete, need final QA/MRB review to close)	21	11
NCRs with Analysis in Progress	36	46
NCRs to remain open to monitor trend or performance	4	6



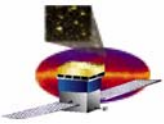
NCR 863

- **Anomaly Description**
 - LCI script TkrNoiseAndGain causes the LAT to enter a state of continuous Busy. Livetime stops incrementing, and all TREQs are discarded.
- **Investigation**
 - Similar tests worked on LAT via LATTE
 - Preliminary investigation shows that a TEM is Busy, with corresponding TKR and CAL contributing to Busy. Monitoring of VSC FIFO flags shows no evidence that downstream backpressure is contributing to the Busy state
 - Determined that the data rate is too high coupled with a known timeout setting error (already a FSW JIRA)
- **Resolution**
 - Reduce the rate of data collection
 - Modify TEM settings during LCI runs to minimize/eliminate susceptibility to overrun



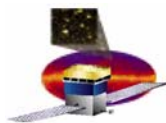
NCR 855

- **Anomaly Description**
 - Intermittent LATC verify errors, indicating that the registers are not set up properly
- **Investigation**
 - All instances have been readout controller (RC) registers
 - LATC verify report bug fixed to allow visibility into problem
 - Last 2 events provided some clues which are being investigated offline
- **Resolution**
 - Testing has been moved to the Dalek
 - LAT is being monitored with a plan to use LATTE to capture LAT state if the problem repeats



NCR 684

- **Anomaly Description**
 - Tracker modules have occasional out-of-spec noise occupancy in isolated layers (“noise flares”).
- **Investigation**
 - Analysis showed similar noise at INFN.
 - Occupancy still within spec.
 - Noise flares have been observed from 4 layers (out of 576 layers) during 21 hours of 16-tower muon data monitoring. Two of the layers are in flare states for 10-20% of time while the others are in flare states for 1-2% of time.
 - TKR meets data occupancy and trigger occupancy requirements even during flares.
 - No noise flares have been observed in review of 230 hours of online Tracker FM 8 data taking, a more detailed review of offline data is in process.
- **Resolution Plan**
 - Continue extended testing on Tracker module 8 to further characterize.



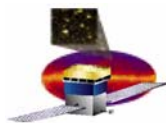
Open I&T NCR List

NCR	Date Opened	Affected Hardware	Problem Description	Status
458	5/10/05	TEM/TPS	Observed GTCC and GTRC phasing errors within the TEM	FinalMRB required
477	5/23/05	TEM/TPS	TEM FIFO errors observed during FMA and FMB	Final MRB required
529	6/16/05	TKR	TEM register test on PDU1 and GASU redundant failed, Twr 3	Monitor
532	6/16/05	TEM/TPS	TEM register test (Trigger Interface Controller) failed.	Final MRB required
535	6/20/05	TKR	Monitor trend data for TKR 4 thru LAT testing (spin-off NCR)	Monitor
549	6/27/05	TKR	Temperature alarm and setpoints, Bay 1	Final MRB required
604	8/11/05	TKR	Bay 4 TkrReadingConfigurationTest failure on x0, FE0	QA to close
624	8/27/05	ACD	Fluctuations in temperature reading (originally an ACD PR)	Monitor
625	8/27/05	ACD	AcidVetoHitmapPha failed (originally an ACD PR)	Monitor
626	8/27/05	ACD	ACDMonitor script high counts during T/V (originally ACD PR)	Monitor
648	9/13/05	ACD	I&T ACD Receiving Test - AcidGafeNoise failure	Disposition Required
684	10/3/05	TKR	Noise Occupancy failures due to intermittent hot strips.	Disposition Required
685	10/3/05	ACD	HldCal runs had excessive counts for GARC11, GAFE13	Disposition required
690	10/6/05	PDU	NCR to trend LPT failures observed in box level NCR #00631.	Disposition Required
718	10/27/05	ACD	VETO threshold for channel 1123 can't be set below minimum value of 0.45pC (originally an ACD PR)	Monitor
741	11/11/05	Integration	HIB Cables to short or wrong orientation.	QA to Close



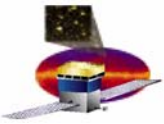
Open I&T NCR List

NCR	Date Opened	Affected Hardware	Problem Description	Status
743	11/13/05	Integration	EMI shield mechanical tolerances not met.	QA to Close
744	11/13/05	Integration	X-LAT plate mechanical hole tolerances not met.	Disposition required
765	12/5/05	Integration	X-LAT Heat pipe shims bonding fixture cannot be removed.	MRB Required
774	12/8/05	Integration	Cannot mate harness LAT-DS-02092-53.	MRB Required
777	12/13/05	Integration	DAQ-ACD Internal RF shield to GASU cable rework.	MRB Required
788	12/21/05	GASU	GASU AEM temperature alarm	MRB Required
789	12/21/05	TKR	TKR test software isn't reading in bad channel lists	Disposition Required
791	12/22/05	ACD	ACD CPT script turns off/on all TEMs simultaneously	Disposition Required
793	12/28/05	ACD	GARC digital 3.3V current is slightly below allowed range	Disposition Required
795	12/30/05	ACD	ACD TciRegRange test gives bad linearity fits	Disposition Required
796	12/30/05	ACD	ACD TciHighRange test GARC 0 GAFE 11 Upper Gain slightly below limit.	Disposition Required
799	1/5/06	DAQ	TKR Analog voltage overshoot during power on sequence	QA to Close
805	1/16/06	Mechanical	Mapping problem with hgrid temperature points 2,3 vs. 4,5	Disposition required
806	1/17/06	Trigger	CAL is retriggering during SVAC run	Disposition required
808	1/17/06	Integration	Harness connector backshell is loose (not properly torqued)	QA to Close
811	1/23/06	Integration	1553 cables rejected for workmanship	MRB Required



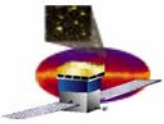
Open I&T NCR List

NCR	Date Opened	Affected Hardware	Problem Description	Status
823	2/6/2006	ACD	FREE Board 0 failed to initialize during PowerOn using FSW	QA to Close
824	2/6/2006	Integration	VSC required reboot by resetting SBC	Disposition required
827	2/9/2006	Mechanical	Insufficient screw thread engagement	Disposition Required
829	2/10/2006	ACD	ACD coherent noise at 1000 system clock ticks after each event collected in flight config.	Disposition Required
830	2/10/2006	Integration	EPU J5, J8 connectors interfere with HIB connectors J5, J6 in Bays 00 and 12	Disposition Required
832	2/16/2006	TKR	Calibration DAC correction factor did not work as expected on TkrThresholdCal.py	MRB Required
833	2/17/2006	DAQ	SIU/EPU crates to be removed from LAT for RAD750 EEPROM bonding inspection	MRB Required
834	2/23/2006	Mechanical	Accel mount bracket interferes with EPU screws	Disposition Required
836	2/27/2006	Mechanical	MLI bar bracket does not mount flush, has insufficient thread engagement	Disposition Required
838	2/28/2006	DAQ	Spare HCB had moisture condensation occur after T/V chamber was opened	Disposition Required
839	3/6/06	Integration	Upper cable trays misoriented 90 deg. on +X and -X sides	Disposition Required
840	3/8/06	DAQ	RunControl software problems observed on spare PDU during T/V test (NCR #794); opened NCR to track FSW updates	Disposition required
841	3/8/06	Mechanical	Need to perform HiPot test on radiator heaters	Disposition required
842	3/9/06	Integration	Velcro outgassing properties to be verified at GSFC	Disposition required



Open I&T NCR List

NCR	Date Opened	Affected Hardware	Problem Description	Status
843	3/9/06	DAQ	Design change to DAQ-ACD Internal cable	Disposition required
844	3/16/06	FSW	SIU included in round-robin scheduling for events	Disposition required
845	3/16/06	FSW	TEM register set to incorrect values;TCC event timeout was 0	Disposition required
846	3/16/06	FSW	When LPA sets EBM destination, other fields in register are also changed	Disposition required
847	3/16/06	FSW	Incorrect TEM config register resulted in incorrect bit positions of redundant GEM/EBM	Disposition required
848	3/16/06	FSW	LPA returns a success when LATC verify fails	Disposition required
849	3/16/06	FSW	LATC output of problem report is unavailable	Disposition required
850	3/16/06	FSW	LATC XML parser created files with occasional errors	Disposition required
851	3/16/06	DAQ	One or more EPU resets unexpectedly due to large number of events and interaction with end of run activities	Disposition required
852	3/16/06	DAQ	LCB errors observed during muon run	Disposition required
854	3/23/06	FSW	Digi report occasionally shows ACD header parity non-zero	Disposition required
855	3/23/06	FSW	LATC verify occasionally reports errors in CRC, SPT, ARC	Disposition required
856	3/23/06	FSW	LATC verify error at CRC occurs at first LPA run after power up	Disposition required
857	3/23/06	FSW	TKR LCI datataken with pedestal strip are corrupt	Disposition required

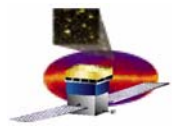


Open I&T NCR List

NCR	Date Opened	Affected Hardware	Problem Description	Status
858	3/23/06	FSW	Datagram overflow in some CAL and TKR LCI scripts	Disposition required
859	3/23/06	FSW	CAL LCI data compression less than expected, results in very large datagrams	Disposition required
860	3/23/06	FSW	Bias iteration in ACD not working properly	Disposition required
861	3/28/06	DAQ	RF shield to SIU cables need serial numbers	QA to close

Not on summary list

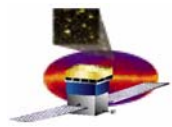
862	3/28/06	FSW	LCI for lehebiascal does not iterate for bias_dac	New
863	3/29/06	FSW	LCI script TkrNoiseAndGain causes TEM to enter a state of continuous Busy	New
864	3/28/06	FSW	Power off runs 77001940 to 77001942 had issues	New
865	3/28/06	FSW	Strange packets in run 077001868	New



LAT Level Verification Status

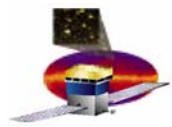
Category	Verification Method					Requirements		
	Test	Demonstration	Analysis	Inspection	Children	# Comp	Total	% Comp
	# Complete	# Complete	# Complete	# Complete	# Complete			
Requirement Identified	-	-	-	-	-	456	456	100.0%
Flow Down Complete	-	-	-	-	-	456	456	100.0%
Draft Verification Plan	133	72	179	35	37	456	456	100.0%
Final Verification Plan	87	59	134	17	37	334	456	73.2%
Verification Plan Executed	0	0	2	0	37	39	456	8.6%
Requirement Sold	0	0	2	0	37	39	456	8.6%

- **Progress this month**
 - Review of ~25% of 456 VPs in progress, all others Final
 - 321 Level 2a/2b VPs and 123 Level 3 VPs
 - 144 more VPs now final, remaining VPs in review by requirement owners
 - VP review by Requirement/Verification Plan owner ~75% complete
 - All received reqt owner comments have been have been incorporated
 - VPs continue to iterate based on test case design & owner comments
- **Status**
 - VCRM version 15 released
 - Updated version of the -00010 in review
 - Req't issues identified by req't owner and test case development are being incorporated in this version as they are discovered



Mass and Power Status Summary

- **Mass**
 - **No Change**
- **Power**
 - **LAT Power Consumption Estimate has decreased by 12.8 W**
 - **Primarily due to measured GASU data**
 - **A margin of 16.9% exists to LAT Power Allocation with 96% of the Estimated Power measured.**



LAT Power Status

LAT Power Consumption Estimate has decreased by 12.9W.

- ACD Estimate no change.
- TKR Estimate no change.
- CAL Estimate no change.
- T&DF Estimate decrease by 12.9 W due to GASU measured data.

Item	30-Mar-06 Estimate (Watts)	PARA (Watts)	CALC (Watts)	MEAS (Watts)	SPEC (Watts)
ACD	11.3	0.0	0.0	11.3	11.5
Tracker	159.2	0.0	0.0	159.2	160.0
Calorimeter	67.8	0.0	0.0	67.8	71.0
Trigger & Data Flow	297.3	0.0	0.0	297.3	327.5
Grid/thermal	20.4	20.4	0.0	0.0	35.0
Instrument Total	556.1	20.4	0.0	535.7	605.0
Instrument Allocation	650.0				
% Reserve	16.9%				

PDR Reserve Was 15.2%
CDR Reserve Was 13.4%
Goal for PSRR Reserve > 5%

PARA - Best Estimate based on conceptual design parameters
CALC - Estimate based on Calculated power from detailed design documentation
MEAS - Actual power measurements of components

Goals estimated using guidelines given in ANSI/AIAA G-020-1992 "Estimating and Budgeting Weight and Power Contingencies for Space Craft Systems"

