

## GLAST LAT ACD Failure Modes

(D1) RCH, June 11, 2001

Component	Function	Failure Type or Cause	Failure Effect	Possible Mitigation	Performance after Mitigation	Remarks
ACD Subsystem	Background rejection	Elec. power loss	1) ACD unavailable to L1T; 2) Charged particle filtering much more difficult =>Large reduction in LAT throughput	none	---	Category 2
ACD TEM	ACD interface	Total	"	Redundant TEM	Nominal	Category 2R
ACD Side (1 of 4)	Background rejection	Elec. power loss	1) ACD less effective in L1T; 2) Charged particle filtering more difficult =>Significant reduction in LAT throughput	none	---	Category 2 or3 (may not be possible)
Event board	HV generation and signal (9 or 18) processing	Elec. power loss	Efficiency loss for 9(18?) tiles (0.9997=>0.997)	Reduce thresholds for redundant PMT's	possibly some LAT efficiency loss	Category 3
Event board	HV generation and signal (9 or 18) processing	Command/data clock loss	1) 9(18?) VETO thresholds fixed; 2) 9(18?) CNO thresholds fixed; 3) Loss of PHA data for 9(18?) PMT; 4) Partial loss of VETO MAP	none	---	Category 3
Event board	HV generation and signal (9 or 18) processing	Command loss	1) 9(18?) VETO thresholds fixed; 2) 9(18?) CNO thresholds fixed; 3)Test mode unavailable	none	---	Category 3
Event board	HV generation and signal (9 or 18) processing	Loss of output data signal	1) Partial loss of VETO MAP; 2) Loss of PHA data for 9(18?) PMT's	none	---	Category 3
Event board	HV generation and signal (9 or 18) processing	Loss of TRIGACK	1) Partial loss of VETO MAP; 2) Loss of PHA data for 9(18?) PMT's	none	---	Category 3

<b>Component</b>	<b>Function</b>	<b>Failure Type or Cause</b>	<b>Failure Effect</b>	<b>Possible Mitigation</b>	<b>Performance after Mitigation</b>	<b>Remarks</b>
HVPS failure	Activate 9 PMT's	Failed internal component	Efficiency loss for 9 tiles (0.9997=>0.997)	Switch to redundant HVPS(?)	Nominal(?)	Category 3or 4
ASIC	PMT signal (9) processing	Elec. power loss	Efficiency loss for 9 tiles (0.9997=>0.997)	Reduce threshold for redundant PMT	Probably some loss of efficiency	Category 3 or 4
ASIC	PMT signal (9) processing	Channel loss due to internal failure	Efficiency loss for 1 tile (0.9997=>0.997)	Reduce threshold for redundant PMT	Probably some loss of efficiency	Category 4
PMT	Detect light from scintillator tile	Internal failure or loss of HV connection	Efficiency loss for 1 tile (0.9997=>0.997)	Efficiency loss for 1 tile (0.9997=>0.997)	Efficiency loss for 1 tile (0.9997=>0.997)	Category 4
PMT	Detect light from scintillator tile	Degradation (some expected)	Signal degradation	raise HV or lower thresholds	nominal	Category 4
VETO Signal	VETO function	Loss	Efficiency loss for 1 tile (0.9997=>0.997)	Efficiency loss for 1 tile (0.9997=>0.997)	Efficiency loss for 1 tile (0.9997=>0.997)	Category 4
Scintillator Tile Assembly	Detect charged particles via scintillation light	Light-exposure - penetration of light-tight wrap	Loss of functionality => some loss of DAQ filtering efficiency	none	---	Category 3 or 4
Fiber coupling	Conduct light from tile to PMT	Degradation due to vibration or aging	Signal degradation	raise HV or lower thresholds	Possibly some efficiency loss	Category 4
Fiber	Conduct light from tile to PMT	Break	Reduced efficiency in related portion of tile	raise HV or lower thresholds	Possibly some efficiency loss	Category 4
Analog sensor	Diagnostic information	Loss	Diagnostic information lost	none	---	Category 4