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GLAST LAT ACD OPERATIONAL CONSTRAINTS
ACD-Plan-000383 Rev. -

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1.0 Introduction

The GLAST LAT AntiCoincidence Detector (ACD) consists of particle-sensitive scintillator tiles and ribbons, wavelength shifting fibers and clear fibers that collect and transmit light, phototubes powered by High Voltage Bias Supplies, and readout electronics to produce signals that are sent to the LAT.

1.1 Purpose and Scope

This document summarizes the operational constraints for the ACD.

2.0 NASA Standards and Documentation

The following NASA Technical Standards will be followed and adhered to unless otherwise stated.

Note: Only Engineering documentation can override the following NASA Standards.

Title	Number
Standard for Electrostatic Discharge Control (Excluding Electrically Initiated Explosives Devices)	NASA-STD-8739.7

Note: All personnel performing any operations stated herein must have completed required NHB training and be NASA certified.

2.1 QA Requirements

The ACD Quality Assurance (QA) Representative will inspect all ACD hardware and witness or monitor test activities as applicable.

2.2 Safety Requirements

All ACD activities at GSFC will adhere to the occupational safety requirements described in the following instructions and directives:

Directive	Discription
GMI-1700.2	GSFC Health and Safety Program

GMI-1780.1	GSFC Confined Space Policy
GMI-1800.1	Occupational Medicine
GPD-8870.1	Environmental Program

3.0 ACD Operational Constraints

Although the ACD is designed to operate without problems on the ground or in space, there are some operational steps that are prudent in order to minimize any risk. These constraints are listed here.

3.1 No High Voltage in the Corona Pressure Range

The ACD phototubes (PMTs) are powered by High Voltage Bias Supplies (HVBS) that are capable of generating up to 1300 V. In certain low-pressure conditions, any source of high voltage is subject to corona, an electrical breakdown between the HV and a nearby ground.

Do Not operate any HVBS/PMT's at a pressure between 500 torr and 1*10^ –5 torr, nor during transition from 1 atm. to vacuum (<1*10^ –5 torr).

Because the HVBS/PMTs are in an enclosed (although not sealed) volume, a recommended implementation of this constraint is for the HVBS not to be turned on for 24 hours after the ambient pressure around the ACD has fallen below **1*10^ –5 torr.**

3.2 Limit the Range of High Voltage Applied to the Phototubes

During testing, the ACD team found that a few of the ACD phototubes became noisy when operated at the maximum voltage produced by the HVBS (1300 V). In most case, the noise was temporary and the phototubes recovered. The tubes that exhibited persistent noise were replaced in the ACD assembly. All the ACD phototubes have been tested to the maximum voltage of the HVBS, but it seems sensible to limit such testing.

Because the nominal voltages needed to achieve the ACD performance are typically 800 V, well below the maximum, we adopt this constraint as a precaution:

During normal testing, do not operate the ACD HVBS at voltages above 1000 V.
During any testing, do not operate the ACD HVBS at voltages above 1100 V.

3.3 Limit the Rate of Change of the High Voltage

Rapid changes of high voltage produce higher stresses on the electronic components of the HVBS. Although the HVBS is designed with ample margin against such stresses, the

ACD team recommends that the HVBS not be regularly switched on or off directly to operating voltage.

Always bring up and shut down the ACD High Voltage in at least two steps – with one intermediate step being the level used for the South Atlantic Anomaly, 300 V. For any voltages above 900 V, a second step at 600 V is recommended.