

GLAST LAT System Engineering

LAT Test Planning Meeting -

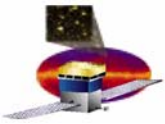
ACD Testing

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GSFC

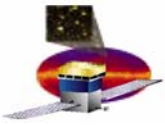
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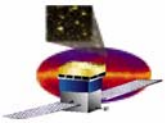
ACD Testing Outline

- ❑ Types of tests done at GSFC
- ❑ Tests to be done at SLAC before integration
- ❑ EGSE
- ❑ MGSE and Handling - Worked out during visit to SLAC, week of 7/18-22, by Tom Johnson and Craig Coltharp. No further information in this presentation about this topic.
- ❑ Testing suggested after integration
- ❑ Suggested testing with other subsystems



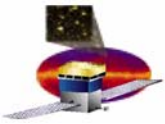
Types of ACD Tests Done at GSFC

- **Comprehensive Performance Test (CPT); includes**
 - Full Functional Test (next 2 slides) - nominal voltage and frequency
 - Abbreviated functional using redundant interface - nominal voltage and frequency
 - Margin tests (high and low voltages, high and low frequencies)
 - ACD-triggered operation, using ROI coincidence mode - nominal voltage and frequency
 - Externally triggered operation (triggered by two small NIM-based hodoscopes, with the trigger signal translated and input to a Tracker port on the GASU) - This was done with the ACD in several orientations, to get vertical muons through all faces of the ACD.



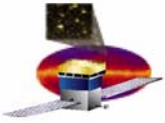
ACD Full Functional Test

- ❑ Completely script-based (nested suites)
- ❑ Content Outline
 - Power-up scripts (2)
 - Register tests (GARC and GAFE registers)
 - GARC (digital ASIC) parity test
 - GAFE (analog ASIC) tests (next slide)
 - Hitmap timing test
 - Crosstalk test
 - Hardware counter test
 - HVBS and PMT aliveness test



GAFE Tests

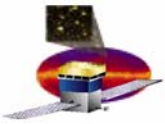
- ❑ (part of Full Functional)
- ❑ Content
 - Bias calibrations
 - Hold Delay scan
 - Hitmap Delay scan
 - GAFE noise test
 - VETO discriminator calibration
 - HLD (CNO) discriminator calibration
 - Discriminator enable/disable test
 - Charge injection and PHA calibration test (high and low ranges)
 - Pedestal test



Pre-Integration Testing at SLAC

- All of CPT except External Triggering
 - Full Functional 3 hours
 - Redundant Interface 1 hour
 - Margin Tests (probably) 6 hours
 - Triggered Operation 3 hours

 - Total 12-13 hours

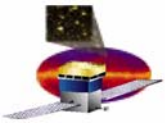


EGSE

- ❑ ACD will bring the system we have been using - *GASU*, workstations, cables, margin test interface boxes, temperature readout system, and power supply, plus all other LAT-supplied EGSE except one system kept at Goddard for testing. Some items (e.g. temperature readout) are Goddard property and will not stay at SLAC.

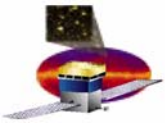
- ❑ Pre-integration tests will be run using the existing ACD system.

- ❑ Once on the LAT, we assume the *GASU* will be one being used by I&T (which has known differences from the *GASU* ACD has been using). We have the choice of using an I&T workstation (since all the ACD test scripts are in the CVS repository with the Online group) or the ACD system.



Suggested Testing after Integration

- Try starting the Full Functional
 - Power-up tests
 - Register tests - At this point it is conceivable that clock phase error will cause failures. In that case, it will be necessary to go into a debug mode, using the initial power-up script, the GARC register test (which exercises the registers with many pattern), and an existing script which commands the GARCs to flip the phase of the return data, to clarify the clock phase requirement for each GARC.
 - If permanent clock phase changes are needed, the Full Functional script will need (simple) modification.
 - Once the clock phase question is settled, the Full Functional, the Redundant Interface Test, and the Triggered Operations can be run as before.
 - There is no intention to run margin tests or external triggering with the hodoscopes while on LAT.
 - **TOTAL TIME after clock phase resolution, 6-7 hours**



Suggested Testing with Other Subsystems

- ❑ Crosstalk test - All subsystems running in a noisy mode (ACD can use the Noisy Mode script from EMI testing.)
- ❑ Operations triggered by Tracker and Calorimeter - ACD needs data of this type to complete the demonstration that it meets efficiency requirement. In addition, we need (off-line, for analysis) muon trajectories from Tracker, to correct for cosine effect on pulse heights.
- ❑ VETOing test - Test ROI VETOing to prevent triggering by muons. (Assumes FSW is ready to do this.)

