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## EGSE Workstation and Software Validation Plan

**CHANGE HISTORY LOG**

<b>Revision</b>	<b>Effective Date</b>	<b>Description of Changes</b>
01		Initial Release

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**1. Purpose**

This document presents a plan for validating and verifying the Online System software.

**2. Scope**

The scope of this document covers the plan for validating and verifying the Online System software.

### 3. Definitions

#### 3.1. Acronyms

ACD	AntiCoincidence Detector
API	Application Program Interface
CU	Calibration Unit
EGSE	Electronics Ground Support Equipment
EM1	Engineering Model 1 EGSE
EM2	Engineering Model 2 EGSE
FITS	Flexible Image Transport System
FSW	Flight SoftWare
FU	Flight Unit
GASU	Global trigger ACD Signal distribution Unit
GEM	Global trigger Electronics Module
GLT	GLobal Trigger
GUI	Graphical User Interface
I&T	Integration and Test
ICS	Interface Control Systems – makers of SCL
IDL	Interactive Data Language
LAT	Large Area Telescope
NFS	Network File System
QU	Qualification Unit
ROOT	Rene's (?) Object Oriented Tool
RTE	Run Time Engine
SCL	Spacecraft Control Language
TBD	To Be Determined
TBR	To Be Reviewed
TBS	To Be Supplied
TEM	Tower Electronics Module

4. **Applicable Documents**

LAT-SS-00456 GLAST LAT I&T Online Requirements Document

## 5. Plan

The Online System has been, and is being, designed to command and read out a generic system composed of software and/or hardware. The model used is based on the client/server technique. In an application of the Online System, the system to be controlled and read out is described to the software. Scripts can then be written against this description to activate features of the controlled system and to read out its data.

In the application of the Online System to the LAT, software components were created to mimic the LAT's register and data model. With the exception of the trigger, the components are completely passive. This allows the creation of register-testing scripts that verify that values are correctly addressed, written and read back.

This is largely true for the trigger function as well, with the only exception being the activation of the internal (software) trigger causing canned data events to be delivered. The "canned" data events consist of a so-called "golden" event that is stored in the LAT simulation code and events stored in data files, which can be generated by the actual LAT hardware (offering a re-play ability), Monte Carlo, or other means (e.g., constructed by hand). Data event handling by the Online System is verified by comparing the events in the data files written by it with the source events.

The LAT consists of one or more embedded systems connected to electronic hardware that is in turn connected to detector elements or a front-end electronics simulator. An example configuration is shown in Figure 1. In the early development stages of the instrument, the embedded system processor runs software that only provides access to hardware registers, event data readout and access to testing equipment (e.g., pattern generators). This will be supplanted with flight software as the system matures.

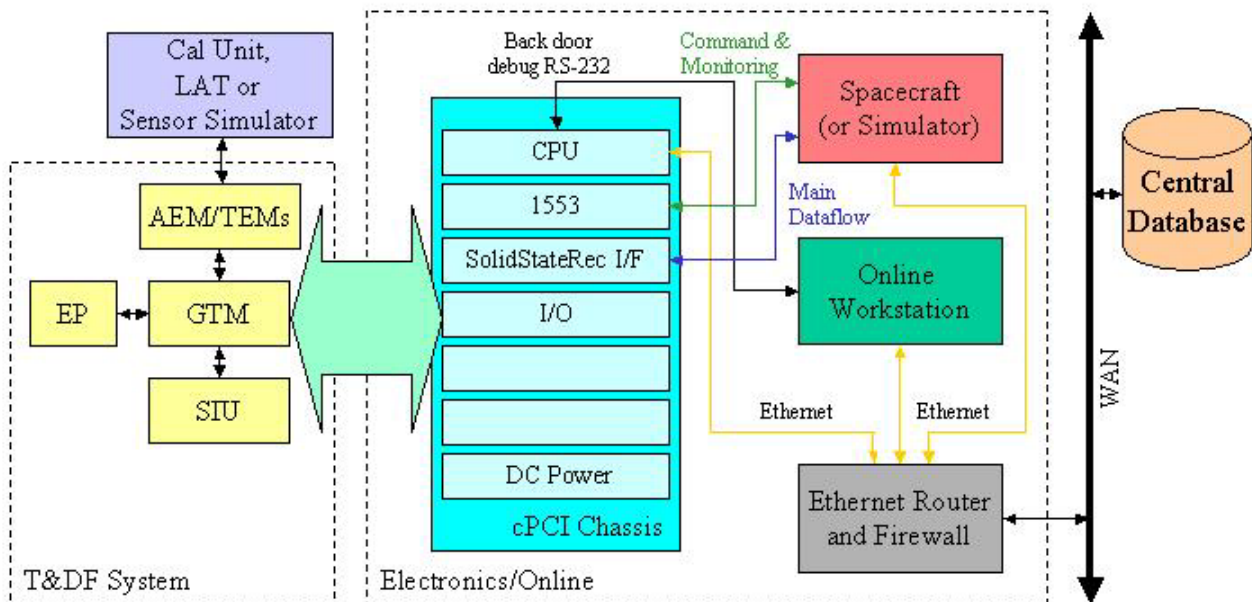


Figure 1 - EGSE Configuration

The Flight Software Group developed the low-level embedded system code that accesses the hardware and verified its functionality. The Online Department provided the initial means to get this

low level code activated under control of the Online System. Scripts were written and verified to set up each of the various subsystems and to acquire data from them. The data acquired in this way was determined to be in the correct format and to display the expected properties for the given situation (e.g., noisy, fixed pattern if the hardware supported it, etc.). These scripts are typically run as part of the software release process of the Online System. These scripts also serve as examples for subsystems developing subsystem-specific test scripts.

The Online System was designed to allow application developers to configure *constraints* and *rules*. Constraints are used to limit values before they are written to the hardware. Rules are evaluated after hardware is read to detect out of range conditions. These features are used to provide restriction on the hardware settings beyond what the hardware naturally provides.

The LAT electronics hardware is built such that there are no values that can be written to hardware registers that can cause damage. In addition, none of the test equipment that is being used, or is anticipated to be used, can cause damage to the instrument hardware. Furthermore, there are no register write rates that can cause damage; in other words, no damaging resonances can develop. This design choice is articulated in LAT-MD-00366.

The Electronics Group will build a LAT Test Bed (Figure 2). The Test Bed uses front-end electronics simulators in place of subsystem electronics for 15 of the 16 towers. The 16<sup>th</sup> tower is a

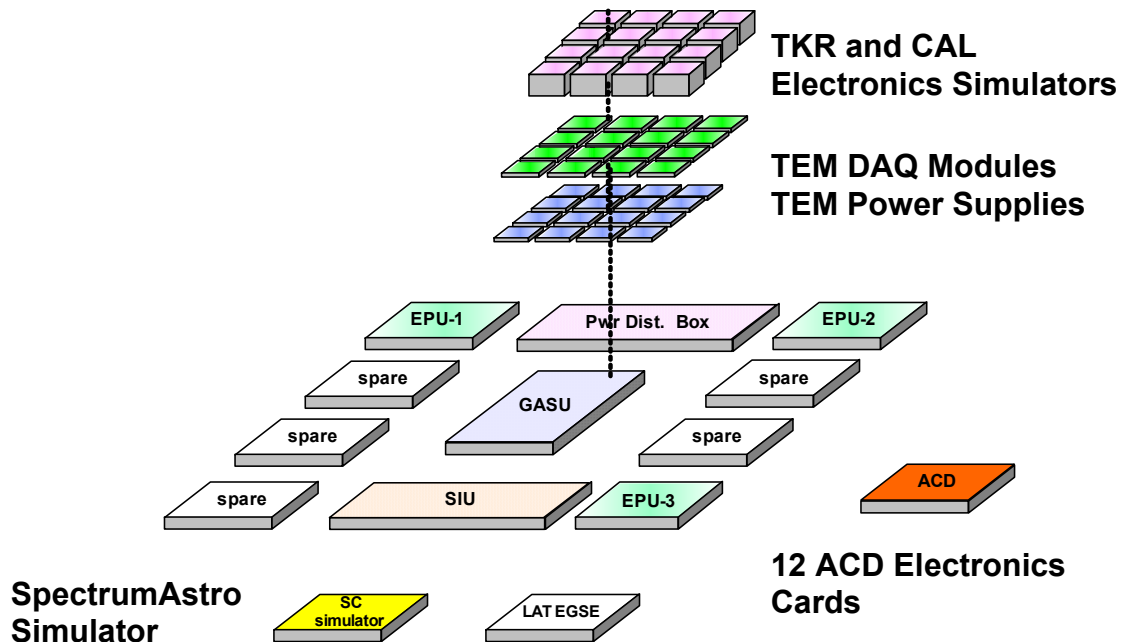


Figure 2 - The LAT Test Bed

full flight-like unit. The simulated towers will not have a full complement of registers and only provide a source of data for triggering and data acquisition. The Online System will be used in conjunction with the LAT test bed to verify the no-damage assertion and to validate the functionality of the Online System and hardware.