



DAQ/Control Lab Support Overview

Nathan Whitehorn

Presenter Introduction

Nathan Whitehorn

Michigan State University

Discipline: HEP, Cosmology

Previous experience: SPT-3G DAQ, PB-2 DAQ, limited involvement with SO DAQ, SPT-3G miscellany (readout, software, analysis), IceCube (calibration, software, analysis)

Goals and Design Drivers

1. Provide tools to labs during development, *avoiding effort duplication and ensuring test exposure pre-deployment*
2. Enable authorship of DAQ components for small components (thermal sensors etc.) by hardware groups, *limiting scope creep and the number of controlled interfaces*

Scope of Work

1. Provide and update documentation for, in particular, slow-control framework
2. Provide technical support for installation and use
3. Connect outputs of DAQ to common lab tools (e.g. KST)
4. Provide and update hardware shopping list
 - a. NB: We do *not* provide hardware, to avoid budget creep. If extra teststands are required, DAQ hardware costs should be booked with the test stand rather than coming out of the DAQ budget.
 - b. This set of things will change as the project progresses -- computer availability and state-of-the-art will be different five years from now

Schedule drivers

CQ6

Key schedule drivers:

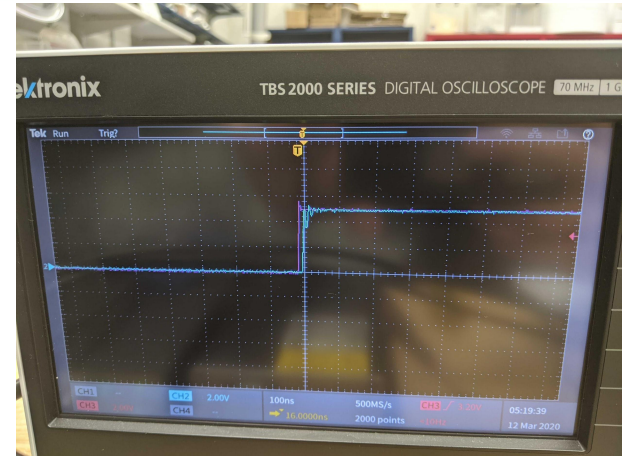
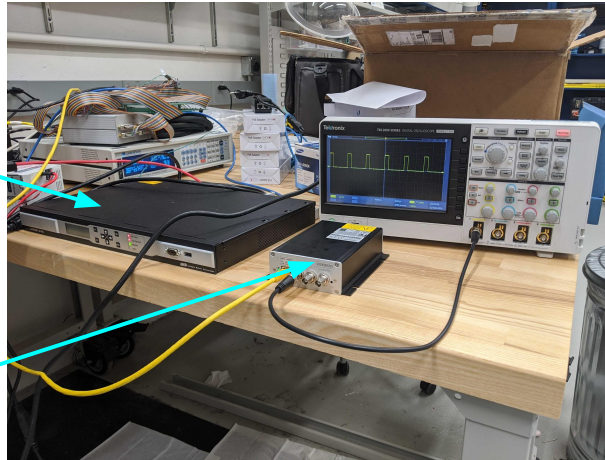
1. Late 2021: Readout board prototypes
2. July 2022: S4 cryogenics: (driven by SAT DR procurement)
3. Apr 2023: SAT telescope mount (installation and test fixture)
4. May 2024: LAT telescope mount: (LAT control system I&T)
5. Mar 2023: Majority of housekeeping:
 - Mar 2023: SAT telescope mount 'structure housekeeping'
 - May 2024: LAT Receiver components

We need to be in the labs with the hardware when it is delivered

Timing System

Meinberg Grandmaster
GPS Time card (outputs
PTP, IRIG, 10MHz,
PPS, ... highly
configurable)

Boundary clock: PTP
timing to IRIG, 10MHz,
PPS (configurable)



Boundary clock and Grandmaster
aligned to 16ns (fluctuates within
100ns spec)

Status:

- Identified readily-available and affordable deployment-quality hardware.
- Tested here.
- Earliest schedule priority since it defines hardware interfaces.

Software (control system)

- After completion of downselect, working on a canned configuration for test-lab deployment
- Minimal system set up at MSU
- Working on packaging, documentation, and portability testing (C. Weaver)
- Will provide to SAT group as an early test bed at Harvard/CFA

Conclusions

- Providing lab deployment of DAQ systems to:
 - Minimize risk later on
 - Reduce duplication of effort
 - Provide testing
 - Validate interfaces
- Non-computer parts of shopping list completed
- Planning to provide software test system in next few months to SAT group