

Status of the Data Acquisition System

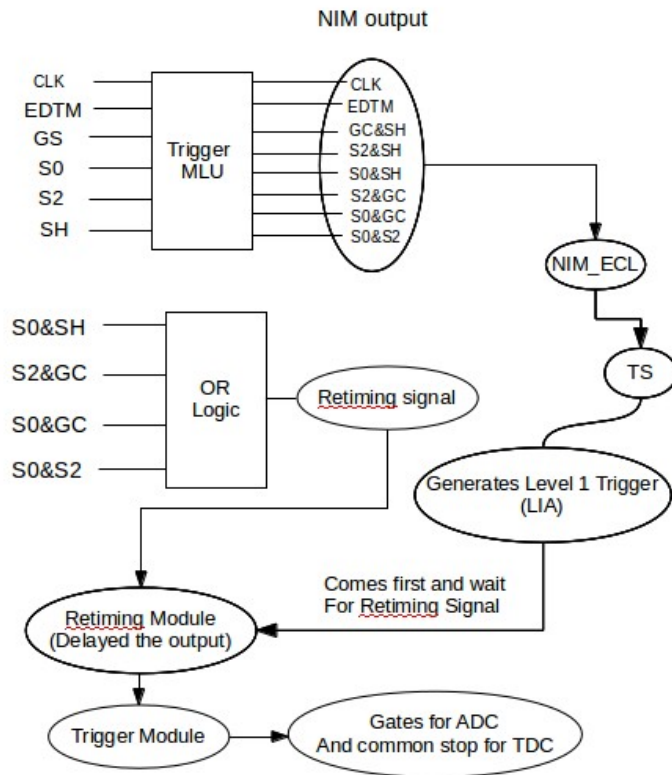
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Trigger System Design

- Signals from four detectors- S0 Scintillator, S2m Scintillators, Gas Cherenkov, and Calorimeter- are sent to front-end electronics
- Logical pulses from each of these detectors is sent to a trigger module based on vme programmable logic (MLU module)
- This allows various combinations of detectors in the trigger
- The analog signals from the VDC and FPP are discriminated by cards at the detectors and sent to the front-end of TDCs at the FastBus crates.

Trigger System Design

Schematic for Trigger System



- Input to MLU also include EDTM pulse and clock
- Output of MLU can be adjusted to either form coincidences between different inputs, or simply copy inputs
- The MLU output mode and the active triggers can be set in a GUI

Recording Signals

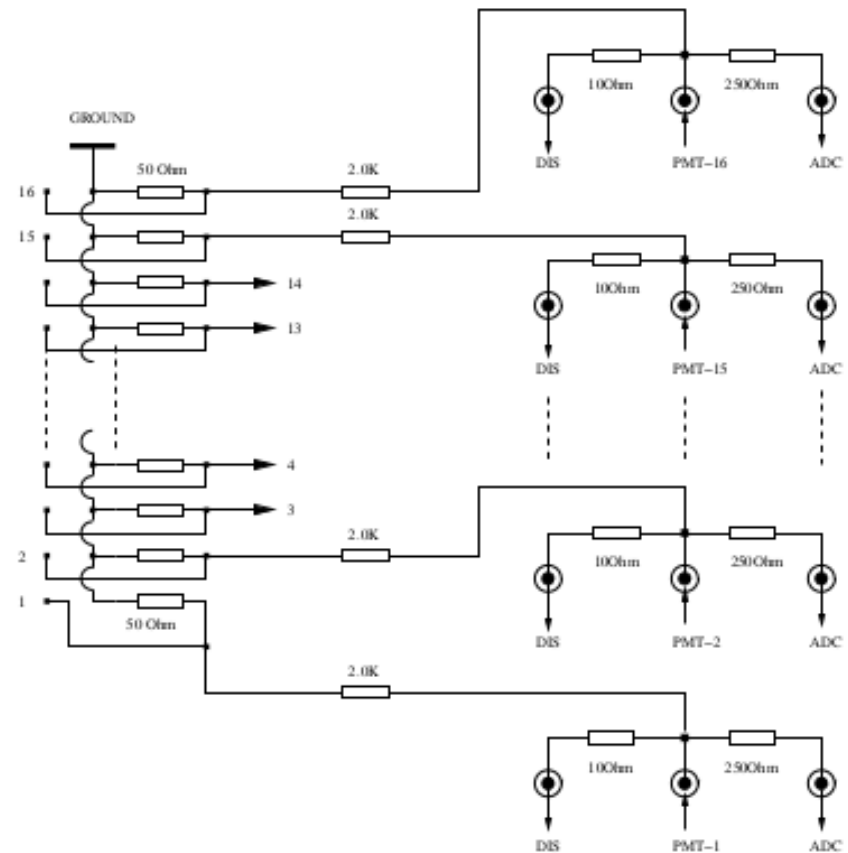
- Detector Signals sent to front-end electronics eventually proceed to ADCs and TDCs. (Individual calorimeter signals only go to ADCs)
- Each ADC module has 64 channels and operates with a common 100ns gate width.
- Each TDC module has 96 channels and operates in common-stop mode. The TDCs have a 1.5 microsecond window and operate at 0.5ns/ch
- A Latch Pattern cable is sent from the trigger supervisor to TDCs. This provides us with the triggers present in each event.

Dead-Time Measurements

- Accurate dead-time measurements are necessary to reconstruct correct rates
- Studies have shown that the data acquisition system saturates around 6000Hz. (Read-out time ~200microseconds.)
- The DAQ dead-time can be determined by comparing the number of triggers recorded to the number counted on scalars
- During the March 2014 commissioning run, the DAQ took data at ~4500HZ with 15% dead-time

Electronic Dead-Time Monitor (EDTM)

- On the LHRS, logical EDTM pulses have been mixed with signals from the Gas Cherenkov, S0, and S2m detectors.
- Monitoring the number of 'tagged' EDTM pulses that are recoded will provide a better understanding of the dead-time.



Start-Of-Run Information

Log entry time 05:18:28 on March 30, 2014

Entry number 388135

keyword=Start_Run_1326.Run_type=Commission.target_type=15 cm LH2 top.comment_text=T1 prescale=1, ps1 =1 sieve out, P0=2Gev, raster 2x2mm, I=2uA, LH2 target (loop1)

Run Timestamp: Sun Mar 30 05:18:16 EDT 2014
Beginning-of-run EPICS data for Run Number 1326 at Sun Mar 30 05:18:19 EDT 2014

Shift Worker Info

Run_type=Commission
target_type=15 cm LH2 top
comment_text=T1 prescale=1, ps1 =1 sieve out, P0=2Gev, raster 2x2mm, I=2uA, LH2 target (loop1)

Prescale Values

```
;This file is automatically generated from L-HRS prescales GUI.  
;To generate this file, type "prescaleL" without quotes on adaq@adaq1  
;Input the desired prescales and Save.  
;T1 = L-arm s0 && S2m trigger  
;T2 = L-arm s0 && GC trigger  
;T3 = L-arm s2 && GC trigger  
;T4 = L-arm s0 && Shower trigger  
;T5 = L-arm s2m && Shower trigger  
;T6 = L-arm GC && Shower trigger  
;T7 = L-arm EDTM trigger  
;T8 = 103.7 KHz pulser
```

End-Of-Run Information

User name adaq

Log entry time 05:19:40 on March 30, 2014

Entry number 388137

keyword=End_of_Run_1326

Run Number: 1326

End of Run Comment:

Run_type=Commission,target_type=15 cm LH2 top,comment_text=T1 prescale=1, ps1 =1 sieve out, P0=2Gev, raster 2x2mm, I=2uA, LH2 target (loop1)

PRESCALE FACTORS:ps1=1 ps2=0 ps3=0 ps4=0 ps5=0 ps6=0 ps7=0 ps8=0

EVENTS : 275840

TIME : 1.117 mins

DEAD TIME: 15.96%

TRIGGER RATES: PRES/REAL

T1:T1:4896.8/4896.8 Hz T2:T2: 0.0/1323.0 Hz T3:T3: 0.0/1893.3 Hz T4:T4: 0.0/2018.4 Hz T5:T5: 0.0/2888.7 Hz T6:T6: 0.0/1694.0 Hz T7:T7: 0.0/0.0 Hz T8:T8: 0.0/103700.0 Hz

TRIGGER TOTALS: PRES/REAL

T1:T1: 328254/328254 T2:T2: 0/88687 T3:T3: 0/126914 T4:T4: 0/135303 T5:T5: 0/193639 T6:T6: 0/113557 T7:T7: 0/0 T8:T8: 0/6951402

AVERAGE CURRENT

BCM 1 : -0.0984uA

APPROXIMATE BCM CHARGES (C)

BCM u1 : -6.441

BCM d1 : -6.751

Online Analysis

- Detector and Trigger rates can be monitored with a GUI (xscalar)
- DAQ dead-time can be monitored during a run (datamon)
- Basic Detector responses can be easily monitored as well

Other Items

- Some work has been done to understand multiple hits on a TDC channel
- Trigger requirements for DVCS on LHRS?