

L1 Muon Initialization



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DAQ Trigger Meeting

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Outline



- Muon Trigger Crate Boards
 - Matchbox, Pre-Match, MTSC
 - FRAM0
 - FRAM1
 - Additional Masking for Missing Hardware
- TDC Mezzanine Cards
 - TDC FRAM1
 - Register Overwrites

Matchbox/Pre-Match



■ FRAM0

- Stores programming information for FPGAs containing muon trigger logic.
- Presently loaded from files stored on disk, but Ron Moore is working on moving these files to Hardware Database.
- Each loaded FPGA asserts a version number which is checked during initialization.

Matchbox/Pre-Match



- The FPGA version numbers are a parameter of the Trigger Table. The definitions of the 20 muon bits available at FRED are a function of the FPGA version numbers.
- In the Hardware Database each of the bit-streams used for FPGA programming will be assigned a type (MB or PM) and a version number.
- The Hardware Database will maintain a programming history for each card.

Matchbox/Pre-match



■ FRAM1

- Holds data phasing chip parameters (pick-off points and pipeline depths).
- Also holds board register parameters which are loaded during board initialization.
- The list of register parameters include B0 offsets, input/output masks, L2 control bits, error bit masks, and serial load checksums.

Matchbox/Pre-Match



- Thanks to recent work by Ron Moore, FRAM1 is now loaded directly from parameters stored in the Hardware Database.
- For each muon trigger card there is an associated version number in the Hardware Database which also gets loaded into FRAM1.

Matchbox/Pre-Match



- Whenever a card parameter in the Hardware Database is modified, the version number is incremented manually.
- At the beginning of each run, the version number loaded in the FRAM is checked against the most recent value retrieved from the database.
- The Hardware Database maintains a history of run number versus version number.

MTSC



- The Muon Trigger Summation Card has similar initialization issues but requires a slightly different implementation due to the fact that the board has only a single FLASH memory for both functions.
- Some additional work will be required to allow for the direct loading of the FRAM on this board from the Hardware Database.

Missing Hardware Masks



- Another feature which has recently been implemented is the masking of trigger inputs from hardware not included in a particular run.
- Each muon trigger input is associated with a specific TDC or XTRP data board.
- The Hardware Database forms an additional set of mask bits during initialization based on the run configuration.

TDC Mezzanine Cards



- TDC Mezzanine Cards are used to form the trigger primitives associated with each of the different muon subsystems.
- There are three different types of cards used for forming muon trigger primitives (Delta T, CMP, and Scintillator).
- The Delta T and Scintillator cards are used in multiple subsystems. Different initialization parameters and FPGA programs are required for each subsystem.

TDC Mezzanine Cards



- TDC FRAM1 contains both the bit-stream for programming any FPGAs on the mezzanine card and parameters for initializing registers on the mezzanine card.
- In general, the mezzanine FPGA programs are not Trigger Table dependent.
- These programs are stored in and loaded directly from the Hardware Database.

TDC Mezzanine Cards



- The programs are identified by a type (CMP, CSP, etc...) and a version number.
- The Hardware Database maintains a loading history for each TDC in the system.
- The one FPGA program that is Trigger Table dependent is the one for the CMP card. We have one design for requiring 2/4 layers and another for requiring 3/4 layers.
- This will require some sort of check from the Trigger Database (not presently done).

TDC Mezzanine Cards



- Mezzanine register contents are presently stored in the Hardware Database as two long character strings.
- The first string is a list of 8-bit register addresses and the second is a list of 8-bit data words to be written to those addresses.
- At the moment it takes a good deal of effort to sort through this string to find a particular value and modify it.

TDC Mezzanine Cards



- It would be really useful if we could modify the hardware database so that a TDC board associated with a specific subsystem could have a set of unique mezzanine parameters.
- I can imagine that there would be a separate piece of code for each subsystem that would convert these parameters into the two long character strings which presently exist for each board in the system.

TDC Mezzanine Cards



- Mezzanine card register parameters can be broken down into several classes.
- One class is those that are Trigger Table dependent such as Delta T thresholds and Scintillator gate widths. At the moment these values are not checked against those in the Trigger Table at initialization.
- A second class are the register parameters used to mask individual channels. Presently, these masks are all set by hand.

TDC Mezzanine Cards



- The final class are those parameters which are hardware specific such as B0 offsets, pulse stretching widths, etc...
- Implementing checks of Trigger Table register parameters should be relatively straight-forward.
- For the channel masks and hardware specific parameters, it is also straight-forward to put in a hardware database version number.

Register Overwrites



- One could also consider being able to program Trigger Database parameters at the beginning of each run (without reprogramming the FLASH memory).
- There are some aspects of the TDC itself which make this a little bit risky.