

[http://www-ppd.fnal.gov/tshaw.myweb/Xft\\_upgrade/Stereo\\_Finder/Stereo\\_XFT\\_Spec.pdf](http://www-ppd.fnal.gov/tshaw.myweb/Xft_upgrade/Stereo_Finder/Stereo_XFT_Spec.pdf)

## 1. Normal Mode

Consult the memory map on the web for register address and bit meaning.

To operate in normal mode and receive data the RX boards must be enabled(Registers- 18, Enabled and OSC ON, 1C-Enabled).

The Finder should be in “Operate” mode bit 23 of Control(Register 4).

Wire Data will be captured and aligned within the FPGA and converted to Pixel data.

To send the Pixel data to the SLAM board the TX section will need to be enabled(Finder register -4 bit 17, Finder FPGA Control Registers – 20 0004 and 30 0004, Bit 11 in each on).

## 2. Diagnostic Mode

To operate in diagnostic mode the Operate bit should be off and the Diagnostic Loop Mode bit should be on in the Control(Register 4). The RX and TX sections will need to be enabled as in the operate mode above.

Routines will start on a HRR, followed by a beam zero signal from the backplane. Loops will turn off either by setting the control register bits low or doing a diagnostic reset. ! Fifos are cleared on a diagnostic reset.

### *Finder FPGA*

#### 1. Finder Wire Capture

In general this capture mode acquires 120 slices of data in each of the 6 Input FIFOs, the FIFOs can be read out over VME. The “Wire Capture Loop Enable” bit 1 needs to be turned on for the capture and turned off for the readout. The Finder will start the capture under the following conditions, bit 1 is on, a HRR sequence occurs followed by a Beam Zero on the backplane – this enable s the capture. The next Data Valid, Beam Zero(on), Cell Zero(on), Group Identifier value(00) of data bits(15-12) combination received at the FIFO input along with the data will be stored in the next 120 slices of the FIFO(only data that is accompanied with the Data Valid signal will be stored).

This capture routine can also be used to acquire data that would be going to the SLAM board, 18 slices per bucket. BIT 26 of the Finder FPGA control register should be on, this allows the FIFOs to store 126 slices(7 buckets of 18) as opposed to 120 slices(XTC data=5 buckets of 24).

2. Finder Pixel Capture  
Similar to above except the Pixel data is stored in FIFOs after processing in the Mask set. Pixel data can then be read out of the FIFO's through VME.
3. Finder Wire Driver  
Wire data is loaded into 6 RAMs that represent the data from the XTC. The data is then shifted through the MASK, captured in the Pixel Capture routine, captured in L2 Buffers, sent to the SLAM, etc.
4. Finder Pixel Driver  
Load up the RAM block in the Finder FPGA with appropriate data, beam zero, cell zero, start bit, end bit, etc. Turn on the correct driver bit, perform a HRR, Beam zero on the backplane. The data will shift out of the Pixel Driver section. I usually leave it run and then perform capture routines and verify the data captured.
  - a. As XTC data  
Set bit 27 in the Finder FPGA control register. The data is sent out as 24 slices for 5 buckets and then repeated.
  - b. As SLAM Data  
Data is sent out as 18 slices every 396ns for 7 buckets and then repeated.

!The current Driver routines send data for 30 CDF clocks followed by 26 CDF clocks of abort gap.

#### *L2-Pulsar FPGA*

*Similar to FINDER FPGA routines the Finder at the moment sends a walking 1 pattern to the L2-Pulsar FPGA on a Pixel Driver Loop enable of the Finder.*

1. L2-Pulsar Pixel Capture
2. L2-Pulsar Pixel Driver  
Will send data out of the FPGA through the backplane to the TX board located on the Mezzanine module.
  - a) As XTC data
  - b) As SLAM data
  - c) As L2-Pulsar data

The routines I have been using are in SXFT-V2 repository, advance menu. Item 6 sends data from the TX section to the RX section of the Finder as XTC data. Item 8 sends data from the Pulsar Mezzanine module to the RX section of the Finder as XTC data. Item 9 starts data pumping out of the TX section to the SLAM board as SLAM data.

The Files I have been using are in my CDTEST directory, PD\_XTC\_A.txt for item 6 PRD\_SEQ.txt for item 8, PD\_to\_SLAM for item 9.

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