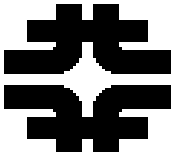


Fermilab

Particle Physics Division/CDF Upgrade Project

DRAFT

Specification for Stereo XFT Finder Modules

Revision1	S. Holm	12/10/04	Changed cell ordering of Pixels to Slam
Revision2	T. Shaw	12/28/04	Fixed some errors in VME Memory map
Revision3	S. Holm	1/19/05	Bit description for Memory Map
Revision4	T. Shaw	5/19/05	Fix to describe version 2 of Stereo Finder
Revision5	T. Shaw	6/27/05	Fix errors in memory map
Revision6(V7)	S. Holm	8/1/05	Bit description for Memory Map
Revision7(V7)	S. Holm	8/25/05	L2-Pulsar Bit description for Memory Map

Introduction

The Stereo Finder Board is being designed in order to provide segment finding ability within the stereo COT layers. Segments are identified within "core" 4-cell units, where a cell represents a group of 12 COT wires. Additionally, each core worked on by the segment finding algorithm has access to neighbor wires. Figure 1 presents a snapshot of the wires used when segments a searched for within a 4-cell core.

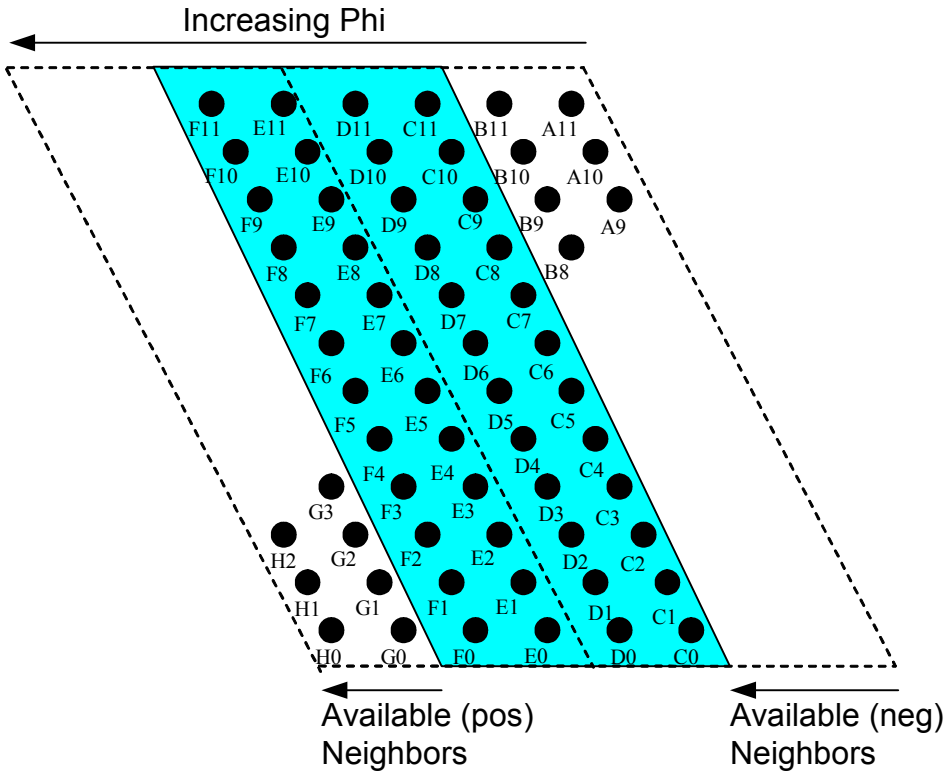


Figure 1. Stereo Finder 4-cell core unit and neighbor wires.

Finder Module Overview

The Stereo Finder module is being designed to fit into the standard CDF electronics infrastructure. It will be a 9Ux400mm module which conforms to the recommended specifications of CDF2388.

The Finder Module is being designed so that it can implement two concurrent 18-cell segment finding algorithms. Segment finding algorithms will be implemented in Altera EP2S60F484C5 FPGAs. Each FPGA will contain the logic to work on an 18-cell group.

Other than the backplane connection to VMEbus, all data entering and leaving the Stereo Finder is via optical data links. Ten data fibers are used to input the COT wire information, six data links drive segment information to the SLAM boards and a dual fiber link is provided to drive data into the L2 processor.

To implement the input optical links which carry COT hit information, the Stereo Finder makes use of three 4-channel RX_Mezzanine cards.

Figure 2 provides a simple block diagram of the Stereo Finder Module.

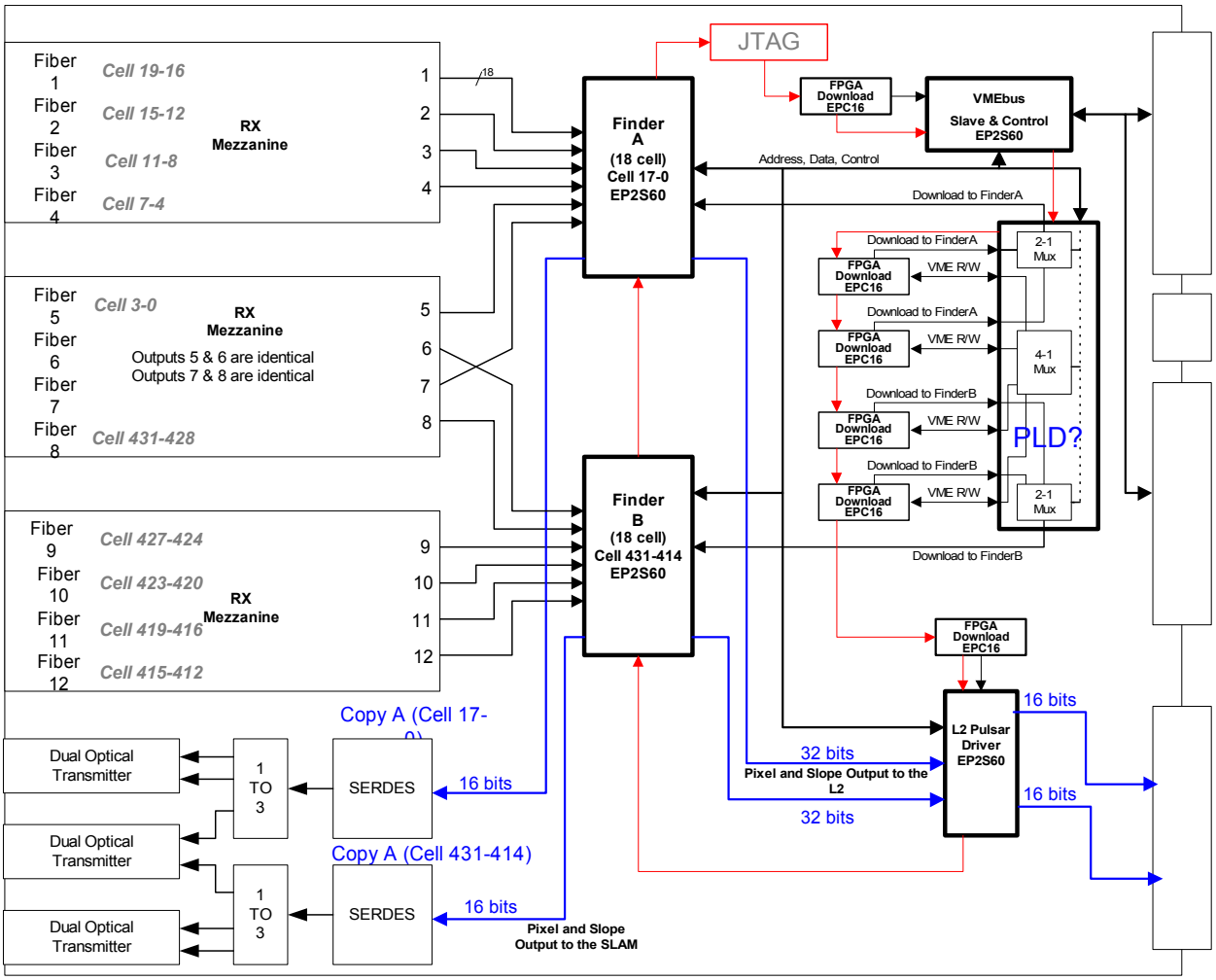


Figure 2. Block Diagram of Stereo XFT

Details of Stereo XFT Data Source

The sources of the XFT data are TDC modules. Each of these modules contain timing information for 96 wires. The TDC produces 6 bits of timing information for each wire. This data identifies whether a wire has a "hit" on it for a particular time slice. There are 6 identified time slices within each 396ns period, or 3 CDF_Clock cycles.

In addition to sending up the hit information for each wire, it is desirable to tag the information with a Beam_Zero marker, to identify its position in time as well as some type of identification tag to mark the source of the data.

The plan is to send the data from the TDC modules to the XFT modules via an 8B/10B encoded serial optical bitstream. Furthermore, we would like to limit the data rate on such a link to ~1.25Gbps which is supported by a wide variety of commercial products available for Gigabit Ethernet.

The following tables show the data packing using a 16 bit SERDES part, the TI TLK1501. Each TDC Transition module will need to drive 2 optical fibers, each carrying the data from 48 wires. In some cases, the TDC transition module must drive an additional copy of one data set to allow for neighbor sharing on different XFT Stereo modules.

Figure 3 represents the 96 channels of wire information from a single TDC. It also illustrates the naming convention used in the data transmission scheme.

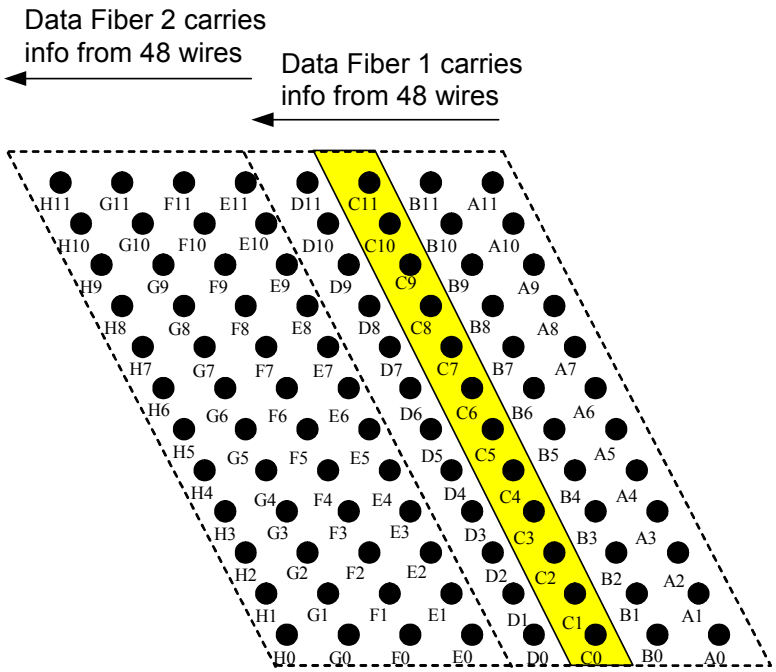


Figure 3. COT TDC Wire Map – Each TDC module spans 96 COT wires, or 8 Cells. A cell consists of 12 wires. An example cell has been hi-lighted above.

Data Fiber # 1 carries information from TDC wires 0-47

Data Word	Beam_Zero Marker 1 bit	Word Zero Flag 1 bit	Group Identifies 2 bits	Wire data time slice (0-5) 12 bits
1	beam_zero	1	00	t0 (A0-A11)
2	beam_zero	1	01	t0 (B0-B11)
3	beam_zero	1	10	t0 (C0-C11)
4	beam_zero	1	11	t0 (D0-D11)
5	beam_zero	0	00	t1 (A0-A11)
6	beam_zero	0	01	t1 (B0-B11)
7	beam_zero	0	10	t1 (C0-C11)
8	beam_zero	0	11	t1 (D0-D11)
9	beam_zero	0	00	t2 (A0-A11)
10	beam_zero	0	01	t2 (B0-B11)
11	beam_zero	0	10	t2 (C0-C11)
12	beam_zero	0	11	t2 (D0-D11)
13	beam_zero	0	00	t3 (A0-A11)
14	beam_zero	0	01	t3 (B0-B11)
15	beam_zero	0	10	t3 (C0-C11)
16	beam_zero	0	11	t3 (D0-D11)
17	beam_zero	0	00	t4 (A0-A11)
18	beam_zero	0	01	t4 (B0-B11)
19	beam_zero	0	10	t4 (C0-C11)
20	beam_zero	0	11	t4 (D0-D11)
21	beam_zero	0	00	t5 (A0-A11)
22	beam_zero	0	01	t5 (B0-B11)
23	beam_zero	0	10	t5 (C0-C11)
24	beam_zero	0	11	t5 (D0-D11)

Note: “beam_zero” represents the state of the CDF Beam_Zero gate. It will be set high for an event occurring in the beam zero bucket and will be low otherwise.

Data Fiber # 2 carries information from TDC wires 48-95

Data Word	Beam_Zero Marker 1 bit	Word Zero Flag 1 bit	Group Identifies 2 bits	Wire data time slice (0-5) 12 bits
1	beam_zero	1	00	t0 (E0-E11)
2	beam_zero	1	01	t0 (F0-F11)
3	beam_zero	1	10	t0 (G0-G11)
4	beam_zero	1	11	t0 (H0-H11)
5	beam_zero	0	00	t1 (E0-E11)
6	beam_zero	0	01	t1 (F0-F11)
7	beam_zero	0	10	t1 (G0-G11)
8	beam_zero	0	11	t1 (H0-H11)
9	beam_zero	0	00	t2 (E0-E11)
10	beam_zero	0	01	t2 (F0-F11)
11	beam_zero	0	10	t2 (G0-G11)
12	beam_zero	0	11	t2 (H0-H11)
13	beam_zero	0	00	t3 (E0-E11)
14	beam_zero	0	01	t3 (F0-F11)
15	beam_zero	0	10	t3 (G0-G11)
16	beam_zero	0	11	t3 (H0-H11)
17	beam_zero	0	00	t4 (E0-E11)
18	beam_zero	0	01	t4 (F0-F11)
19	beam_zero	0	10	t4 (G0-G11)
20	beam_zero	0	11	t4 (H0-H11)
21	beam_zero	0	00	t5 (E0-E11)
22	beam_zero	0	01	t5 (F0-F11)
23	beam_zero	0	10	t5 (G0-G11)
24	beam_zero	0	11	t5 (H0-H11)

The Finder Algorithm

The Stereo Finder FPGAs have the job of identifying track segments in a given stereo superlayer of the COT. The Finders are implemented with Altera Stratix 2 EP2S60 Field Programmable Gate Arrays (FPGAs), specifically the Altera EP2S20F484C5. Finders flag "hits" by setting pixels that indicate the position and/or slope of an identified track segment. Each "18-cell" Finder FPGA will report 12 pixels and for each COT cell.

The Stereo Finder FPGAs receive their inputs from six optical data cables driven by TDC transition modules. Each of these six optical cables contains 4-cells of information. In order to have the necessary neighbor information, the finder algorithm actually operates off a "center" set of 18 cells. It treats these center 18 cells as "4-cell" units. The finder algorithm will cycle "4-cell" units through a single mask set. See Figure 4.

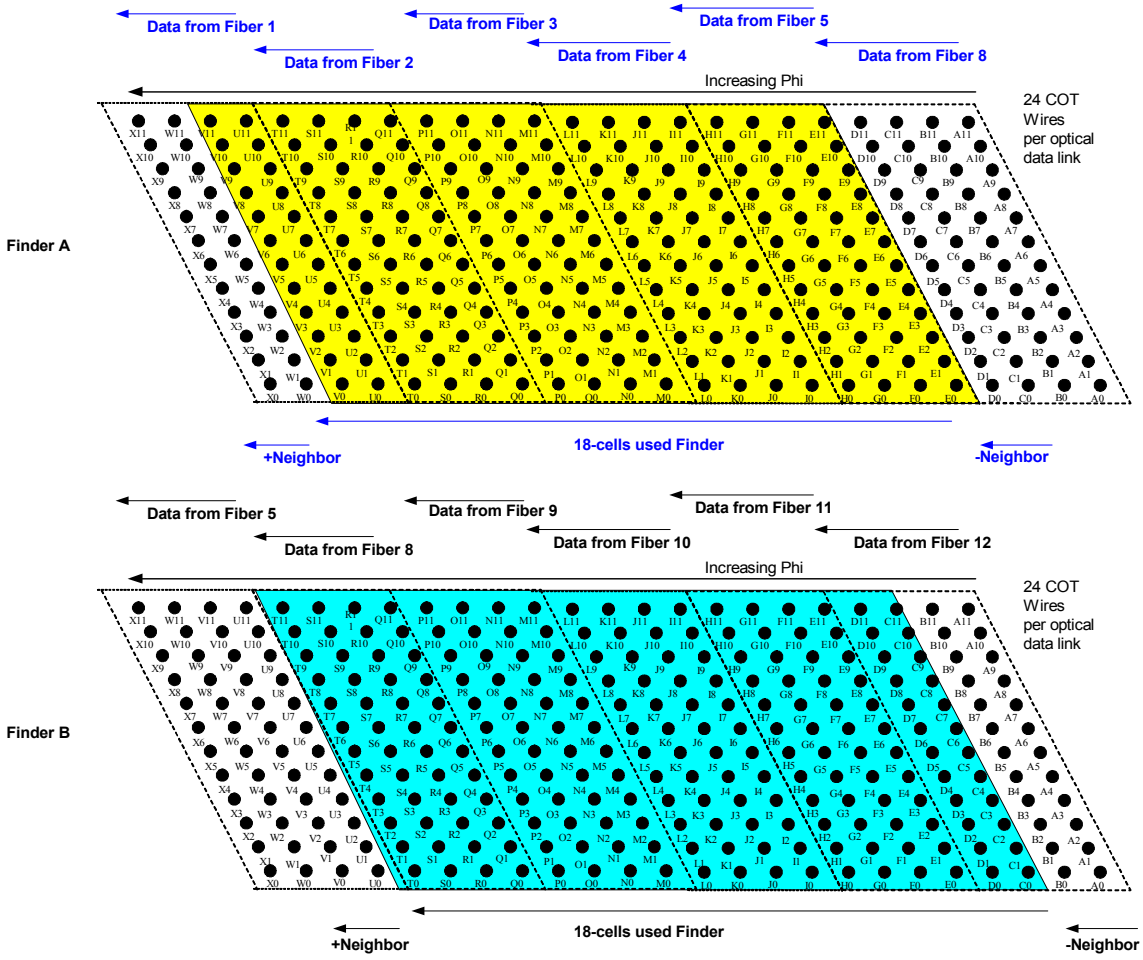
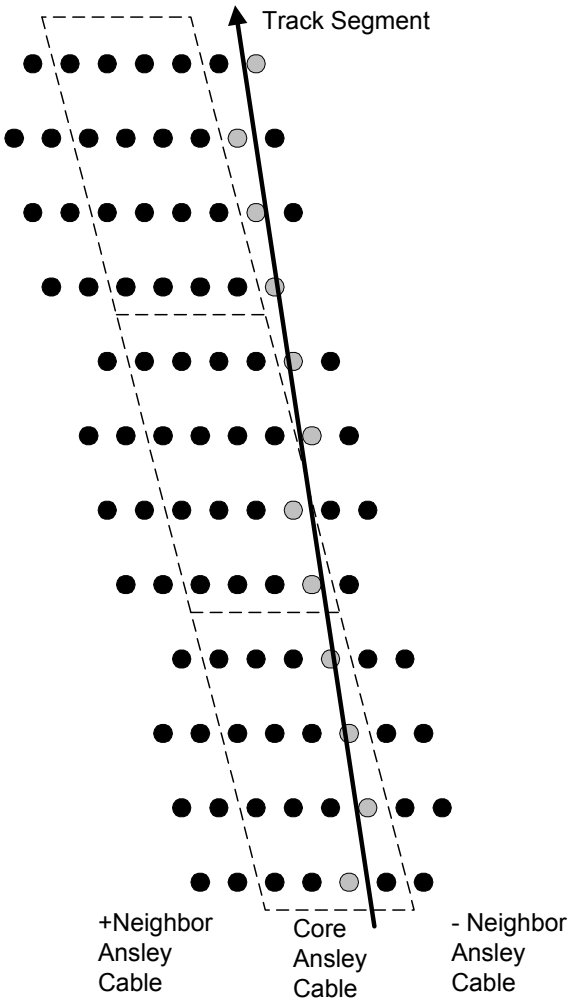


Figure 4. Finder FPGAs will operate on 18-cell groups

A “hit” is identified to have occurred whenever at least 9, 10 or 11 out of 12 wires in a mask have been hit. Figure 5 shows a mask set(gray dots) of 12 wires that may be used to identify the sample track passing through a given 4-cell grouping.

The Stereo Finder FPGAs have the job of identifying track segments in a given stereo superlayer of the COT. Finders flag “hits” by setting pixels that indicate the position and/or slope of an identified track segment. Each “8-cell” Finder FPGA will report 12 pixels for each COT cell.

A “hit” is identified to have occurred whenever at least 9, 10 or 11 out of 12 wires in a mask have been hit. Figure 5 shows a mask set(gray dots) of 12 wires that may be used to identify the sample track passing through a given 4-cell grouping.



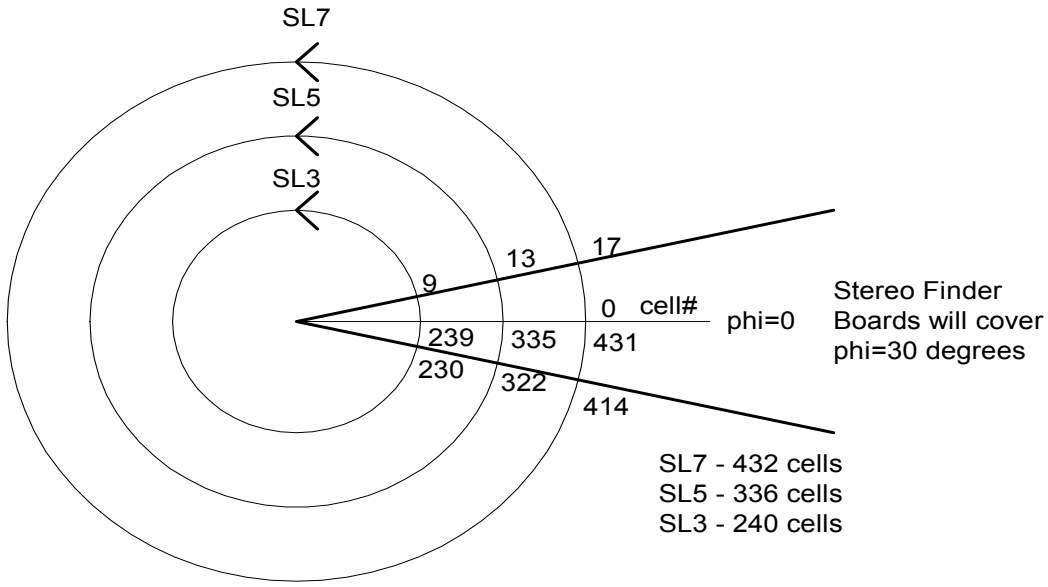
Gray Wires indicate 12 wire mask for the depicted track segment

Figure 5. Possible Mask Set for a Sample Track

The Pixel Driver

Each Stereo XFT Finder will cover a 30˚ phi slice. Figure XX illustrates which COT cells are covered by the first of 12 Finder modules required for SL3, SL5 and SL7. For example, the first Stereo Finder board which instruments SL7 will cover COT cell groups 414-431 and 0-17. For each of these 36 cells, a 12 bit pixel field is produced by the Finders which needs to be sent to the SLAM modules.

To further illustrate this mapping, two tables are provided below showing which TDC fiber optic cables are plugged into the module and which onboard Finders produce the pixel information.



Stereo Finder Mapping to the COT

Front Panel Fiber Input	TDC Cells	Finders Receiving Information
1	19-16	A
2	15-12	A
3	11-8	A
4	7-4	A
5	3-0	A
5copy		B
6copy		A
6	431-428	B
7	427-424	B
8	423-420	B
9	419-416	B
10	415-412	B

Table showing Fiber Input connections for first SL7 Stereo Finder

Finder	Pixel Information Output for:
A	Cells 17-0
B	Cells 431-414

Table showing which SL7 Finder FPGA produces which pixel output

Each FINDER FPGA contains 1 mask set

The below implementation assumes 1 mask set in a Stereo Finder FPGA Design – each mask set finds pixels for 18 cells; (12 pixels from each Finder Chip to the Pixel Driver Chip)

Time = 132/8 = 16.5ns

Time	Finder	Cell	Finder	Cell
t0	A	17	B	431
t1	A	16	B	430
t2	A	15	B	429
t3	A	14	B	428
t4	A	13	B	427
t5	A	12	B	426
t6	A	11	B	425
t7	A	10	B	424
t8	A	9	B	423
t9	A	8	B	422
t10	A	7	B	421
t11	A	6	B	420
t12	A	5	B	419
t13	A	4	B	418
t14	A	3	B	417
t15	A	2	B	416
t16	A	1	B	415
t17	A	0	B	414

The Cell Pixel data must be sent off the board in two 15˚ slices. Two data paths will be used to provide these 15˚ paths. The first data path will contain data from cells 17-0 and the second data path will contain data from cells 431-414.

If no time is lost to re-organizing the data order, the fastest way to get this data offboard to the SLAM is to push the data into two FIFOs as it is created. A controller would then monitor the FIFO and whenever data is present, it would read the FIFO and send the word to a serializer which would then transmit the data over a Fiber optic cable to the SLAM board. This simple design would lead to the following data order being received by the SLAM:

Data Word	**FIF0 A Data**	**FIFO B Data**
0	Cell 17	Cell 431
1	Cell 16	Cell 430
2	Cell 15	Cell 429
3	Cell 14	Cell 428
4	Cell 13	Cell 427
5	Cell 12	Cell 426
6	Cell 11	Cell 425
7	Cell 10	Cell 424
8	Cell 9	Cell 423
9	Cell 8	Cell 422
10	Cell 7	Cell 421
11	Cell 6	Cell 420
12	Cell 5	Cell 419
13	Cell 4	Cell 418
14	Cell 3	Cell 417
15	Cell 2	Cell 416
16	Cell 1	Cell 415
17	Cell 0	Cell 414

Please note that this is the data order in which information is sent out. Whenever there is not a word waiting in the FIFO, an “IDLE” pattern will be inserted in the data streams. These “IDLE” patterns help the links maintain sync and will smooth out the fact that we are transmitting data at a faster rate than we are actually providing it.

Data transmission between Stereo Finder and the SLAM will make use of the same fiber optic and SERDES technology as that which has already been described in the TDC fiber optic data transmission section.

Data Word	**Start Event Flag 1 bit**	**End Event Flag 1 bits**	**Error Flag 1 bit**	**Beam_Zero Marker 1 bit**	**Pixel data 12 bits**
1	1	0	error	beam_zero	1st cell data(11:0)
2	0	0	error	beam_zero	cell data(11:0)
3	0	0	error	beam_zero	cell data(11:0)
4	0	0	error	beam_zero	cell data(11:0)
…	0	0	error	beam_zero	cell data(11:0)
N-1	0	0	error	beam_zero	cell data(11:0)
N	0	1	error	beam_zero	last cell data(11:0)

Possible Data Transmission Format between Stereo Finder and the SLAM

The L2 Driver

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Mezzanine Modules

The plan to instrument the TDC->Finer optical links includes the production of a RX_Mezzanine card which is based upon the Common Mezzanine Card (CMC) standard format. This card format was chosen not only for its convenience, but also its ability to be used with the CDF Pulsar module. The Pulsar module is used extensively in the CDF L2 system and provides a firmware programmable base upon which these mezzanine cards can be used and tested.

Due to the fact we want to plug into the Pulsar, we are already somewhat constrained in how we assign the pins on the mezzanine connectors. In addition, we found that some additional functionality is desired within the Stereo XFT system, and have added a third connector (J13) to the two connectors (J1 and J3) which are used on the Pulsar card. This third connector will carry signals which give us more control over the individual mezzanine modules, but is not necessary to its operation when plugged into the Pulsar.

The 4-Channel Receiver Mezzanine

The 4-channel receiver module will provide the following functionality:

- Provide a full 16 bit data path which operates up to 1.25Gbps
- Provide access to the individual status bits. (RX_ER, RX_DV)
- Provide access to individual receiver clocks. (RX_CLK)
- Provide a copy of the system clock chosen to the motherboard. (GTX_CLK)
- Selectable capability to run off a x8 CDF_Clock frequency or an oscillator.

Pulsar Card ID Assignments

CARD_ID bit 3:0:
1 1 1 1 SLINK card or nothing plugged in
0 0 1 0 Hotlink Tx card plugged in
0 0 1 1 Hotlink Rx card plugged in
0 0 0 0 Taxi Tx card plugged in
0 0 0 1 Taxi Rx card plugged in
0 1 0 1 XFT Optical Rx

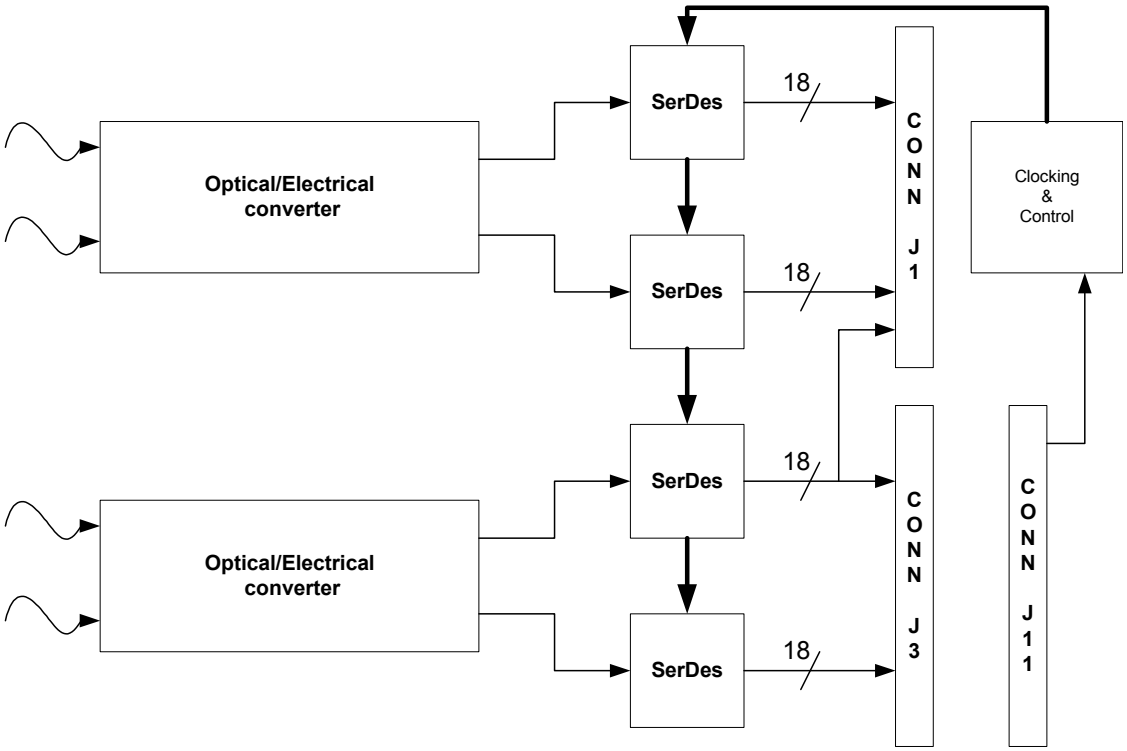

Figure 6. Block Diagram of the RX Mezzanine Board

FPGA Download

The two Altera EP2S60 FPGAs used in the implementation of the Finder chips will be capable of being downloaded independently and in parallel. Furthermore, there will be enough Flash memory on the download devices to hold at two copies of the firmware. The copy downloaded at power-up will always default to "firmware copy 1"; however, a software switch and command will make it possible to quickly download "firmware copy 2". Both copies of Flash RAM will be capable of being downloaded via the VMEbus.

Furthermore, the FPGAs will also be capable of being downloaded through a JTAG connection.

The FPGA which is used to implement the VMEbus slave interface and the FPGA used to drive L2 information to the Pulsar will be downloaded from a Flash based PROM at power up. These FPGAs and there download PROMs are both addressable and capable of being downloaded via JTAG as well.

JTAG- Boundary Scan

A JTAG-Boundary Scan chain is implemented on the Stereo Finder board to provide a method for testing the module for infrastructure and interconnect defects. There is the possibility of using the chain as a method for programming the FPGAs and Flash RAM devices. The JTAG chain connects to all FPGAs and download devices. All boundary scan signals are buffered and fanned out with the use of a CY74FCT162244 16 bit buffer. The TCK and TMS lines are fanned out through six outputs. The Corelis Inc. ScanPlus software will be used for testing, debugging and programming the Finder boards.

Power

The Stereo Finder board will derive all power required from the 13 pins of +5V on the backplane. The estimated power requirements for the plug-on mezzanine modules and the Stereo Finder Motherboard are shown on the following two pages. Power requirements are summarized in the table below. DC-DC converters will be used to generate the +3.3V, +2.5V and +1.2V power rails. The +3.3V rail is generated by a Datel UNR-3.3/20-D5 DC-DC converter which is capable of delivering up to 20Amps of 3.3V.

+2.5V and +1.2V are produced by Datel's LSM-2.5/10-D3 and LSM-1.2/10-D3 respectively. Each of these is capable of providing up to 10Amps is uses the +3.3V rail for conversion.

Power Rail	**Estimated Power (W)**
+5V	0.5
+3.3V	15.2
+2.5V	6.6
+1.2V	4.9

RX Mezzanine Power Estimation

item	qty	part number	part label	references	+3.3V (mw)		+2.5V (mw)	
1	3	AMP 120527-1	AMP 120527-1 60 Pin	J1,J3,J11	0		0	
2	4	CHICAGO LAMP 6200T1	6200T1 Red Led Right Angle	D1-D4	0		0	
3	1	CO4610-62.500-TR	62.500MHz co46	X1	148.5	148.5	0	
4	14	ERJ-3EKF36R5V	36.5ohms_1%_.0625W	R46-R59	0		0	
5	16	ERJ-6ENF49R9V	49.9ohms_1%_.1W	R27-R42	0		0	
6	1	ERJ-6ENF90R0V	90.9ohms_1%_.1W	R61	0		0	
7	6	ERJ-6ENF1001V	1.00Kohms_1%_.1W	R5-R10	0		0	
8	3	ERJ-6ENF1002V	10.0Kohms_1%_.1W	R43-R45	0		0	
9	4	ERJ-6ENF1003V	100Kohms_1%_.1W	R1-R4	0		0	
10	1	ERJ-6ENF1300V	130ohms_1%_.1W	R60	0		0	
11	8	ERJ-6ENF2000V	200ohms_1%_.1W	R15-R22	0		0	
12	4	ERJ-6ENF2210V	221ohms_1%_.1W	R11-R14	0		0	
13	4	ERJ-6ENF8060V	806ohms_1%_.1W	R23-R26	0		0	
14	1	ICS670-01	ICS670-01 so16	U5	405	405	0	
15	3	JUMPER BERG 2PINx2.54mm	JUMPER BERG 2PINx2.54mm	J14-J16	0		0	
16	4	KEMET C0805C102J5GACTU	1000pf C0805 5% 50wvdc	C1-C4	0		0	
17	1	MPC9446FA	MPC9446FA sqfp7x7-32	U8	0		0	
18	2	M2R-25-4-1-TL	M2T-25--4-1-TL m2r/t	J12-J13	825	1650	0	
19	7	PAN ECJ-2VB1H103K	.01uf C0805 10% 50wvdc	BP76-BP82	0		0	
20	75	PAN ECJ-2YB1H104K	.1uf C0805 10% 50wvdc	BP1-BP75	0		0	
21	29	PAN ECS-T1AZ335R	3.3uf C2012 20% 10wvdc	C5-C33	0		0	
22	20	Pan EXB-V8V470JV	47 ohms X 4, so8_mod_pan_v8v	RN1-RN20	0		0	
23	1	SIP6	SIP6	J17	0		0	
24	1	SN74LVC1G08DCKR	SN74LVC1G08DCKR sc88a	U6	231	231	0	
25	4	Steward-LI0603G221R-00	220ohm 700ma L0603	L1-L4	0		0	
26	14	Steward-MI0805J070R-00	7ohm 1000ma L0805	L5-L18	0		0	
27	21	TEST POINT SM	Test Point 18-25th Dia pin	TP1-TP21	0		0	
28	4	TLK1501IRCP	TLK1501IRCP sqfp10x10-64	U1-U4	0		350	1400
29	1	XC95144XL-5TQ100C	Xilinx CPLD	U7	200	200	0	
Total	Parts	Used: 257						
					Total +3.3V (mw)	**2634.5**	**Total +2.5V (mw)**	**1400**

Stereo Finder Power Estimation

item	qty	part number	part label	+5V (mw)		+3.3V (mw)		+2.5V (mw)		+1.2V (mw)	
1	1	ALCO TSPDSTD11CGRA0	SPST Push Button Right Angle		0		0		0		0
2	12	AMP 120521-1	AMP 120521-1 60 Pin		0		0		0		0
3	1	AMP 435704-8	AMP 435704-8		0		0		0		0
4	1	AT27LV256A-55JC	AT27LV256A-55JC plcc_r32	30	30		0		0		0
5	8	CML 5682F1;1	5682F1;1 Dual Red Led RA		0	33	264		0		0
6	7	CML 5682F7;7	5682F7;7 Dual Yellow Led RA		0	33	231		0		0
7	1	CO4610-62.500-TR	62.500MHz co46		0	148.5	148.5		0		0
8	3	CTS 770-61-R10K	10K ohms X 5, sip6		0		0		0		0
9	15	EPC16UC88	EPC16UC88 ubga88		0	100	1500		0		0
10	8	EP2S60F484C3ES	EP2S60F484C3ES bga484		0	95	760	95	760	610	4880
11	335	ERJ-3EKF36R5V	36.5ohms_1%_.0625W		0		0		0		0
12	10	ERJ-3EKF82R5V	82.5ohms_1%_.0625W		0		0		0		0
13	79	ERJ-3EKF1001V	1.00Kohms_1%_.0625W		0		0		0		0
14	4	ERJ-3EKF1210V	121ohms_1%_.0625W		0		0		0		0
15	10	ERJ-3EKF1240V	124ohms_1%_.0625W		0		0		0		0
16	1	ERJ-3EKF2204V	2.20Mohms_1%_.0625W		0		0		0		0
17	32	ERJ-3EKF2320V	232ohms_1%_.0625W		0		0		0		0
18	16	ERJ-3EKF4751V	4.75Kohms_1%_.0625W		0		0		0		0
19	1	ERJ-3GEYJ5R6V	5.6ohms_1%_.0625W		0		0		0		0
20	4	ERJ-6ENF1004V	1.00Mohms_1%_.1W		0		0		0		0
21	1	ERNI 064784	hm_raf_type_b_19pos_w_shield		0		0		0		0
22	3	HARTING 02 01 160 2101	5x32DIN RA 39thH Harting		0		0		0		0
23	76	JUMPER BERG 2PINx2.54mm	JUMPER BERG 2PINx2.54mm		0		0		0		0
24	1	KEMET T491X336M035AS	33uf C7343_Mod 20% 35wvdc		0		0		0		0
25	4	LITTLEFUSE 154.010	FUSE_BLOK 10Amp 125V		0		0		0		0
26	1	LSM-1.2/10-D3	LSM-1.2/10-D3 datel case c45		0		0		0		0
27	1	LSM-2.5/10-D3	LSM-2.5/10-D3 datel case c45		0		0		0		0
28	1	MC100EL11D	MC100EL11D soic8	150	150		0		0		0
29	1	MC100LVELT23D_PG	MC100LVELT23D_PG soic8		0	100	100		0		0
30	1	MC100LVEL92DW	MC100LVEL92DW so20w	60	60	66	66		0		0
31	2	MPC9446FA	MPC9446FA sqfp7x7-32		0	280	560		0		0
32	328	PAN ECJ-1VB1A224K	.22uf C0603 10% 50wvdc		0		0		0		0
33	19	PAN ECJ-2YB1H104K	.1uf C0805 10% 50wvdc		0		0		0		0
34	32	PAN ECS-T1AC476R	47uf C6032 20% 10wvdc		0		0		0		0
35	34	PAN ECS-T1CX106R	10uf C3528 20% 16wvdc		0		0		0		0
36	21	PI5A100W	PI5A100W so16		0		0		0		0
37	16	SN74ALVTH16827GR	SN74ALVTH16827GR tssop56		0		0	12.5	200		0
38	1	SN74LS14D	SN74LS14D so14	100	100		0		0		0
39	1	SN74LVC2G04DBVR	SN74LVC2G04DCKR ssop6_95mmsp		0	5	5		0		0
40	1	SN74LVC16244ADGGR	SN74LVC16244ADGGR tssop48		0	27	27		0		0
41	10	SN74VMEH22501DGVR	SN74VMEH22501DGVR tvsop48		0	99	990		0		0
42	1	UNR-3.3/20-D5	UNR-3.3/20-D5 datel case c21		0		0		0		0
43	7	VISHAY 94SA227X0010FBP	220uf 10x10.5mm 20% 10wvdc		0		0		0		0
44	1	VME_400_Bottom_Discharge_Strip	VME 400 Bottom Discharge Strip		0		0		0		0
45	1	VME_400_Top_Discharge_Strip	VME 400 Top Discharge Strip		0		0		0		0
46	1	1N5817	1N5817 diode.107x.205b_.45sp		0		0		0		0
47	10	3m2510-6003UB	10 Pin Hdr_25th Sq pin_100x100		0		0		0		0
48	1	5KP5.0A	5KP5.0A diode.360x.360b_.65sp		0		0		0		0
49	1	74F38SC	74F38SC so14	150	150		0		0		0
50	4	Mezzanine			0	2635	10540	1400	5600		0
Total	Parts	Used: 1127									
				Total +5V (mw)		**Total +3.3V (mw)**		**Total +2.5V (mw)**		**Total +1.2V (mw)**	
					490		**15191.5**		**6560**		**4880**

Memory Map

YY00 0000 Diagnostic Register (32 bits) **(R/W)**

YY00 0004 Control/Status **(R/W)**

Bit	Function
31	Software Reset **(R/W)** ?undefined right now
30	Force Program of Finder A FPGA **(R/W)**
29	Force Program of Finder B FPGA **(R/W)**
28	Force Program of Pulsar Driver FPGA **(R/W)**
27	Force Program of VME Interface FPGA **(R/W)**
26	Disable download to Finder A from Configuration device **(R/W)**
25	Disable download to Finder B from Configuration device **(R/W)**
24	Select Flash Download Option **(R/W)** **0 - Select Flash - Configuration device 1** **1 – Select Flash - Configuration device 2**
23	Finders – Operate Mode **(R/W)** **1 – initiates Finder functions** **0 – Finder/Pixel Driver in idle state**
22	Finders – Software Reset **(R/W)**
21	Finders - Diagnostic Loop Mode **(R/W)** **1 - initiates looping pump out of data** **0 - allows VMEbus Read/Write of Diagnostic RAM**
20	Pulsar (L2) Opererate Mode **(R/W)** **1 – initiates Pulsar (L2 data) Driver Functions** **0 – Pulsar Driver in idle state**
19	Pulsar Driver – Software Reset **(R/W)**
18	Pulsar Driver - Diagnostic Loop Mode **(R/W)** **1 - initiates looping pump out of data** **0 - allows VMEbus Read/Write of Diagnostic RAM**
17	Enable Oscillator for Fiber Link to SLAM **(R/W)**
16	Reset PLL used for Fiber Link to SLAM **(R/W)**
15	undefined **(R/W)**
14	undefined **(R/W)**
13	undefined **(R/W)**
12	Mask Error **(R/W)**
11	VME Slave Interface - Download Complete **(R)**
10	Finder A - Download Complete **(R)**
9	Finder B - Download Complete **(R)**
8	Pulsar (L2) Driver - Download Complete **(R)**
7	undefined **(R/W)**
6	undefined **(R/W)**
6	undefined **(R/W)**
4	undefined **(R/W)**
3	undefined **(R/W)**
2	undefined **(R/W)**

1	Ready **(R)**
0	Error **(R)**

Note: The front panel reset button will cause all of the FPGA's on the board to be reconfigured with the contents of the appropriate Flash RAM or serial EPROM. The Control register bits are not self-clearing, the user needs to set the bit and then clear the bit. i.e. in order to force a download or reset a chip the user should set the bit and then clear it. In the case of loop modes the user should set the bit during a loop test and then clear it after the loop test.

YY00 0008 Level 2 Header Word - Pipeline Length in 132ns time slices**(R/W)**

Description: Depth of pipeline will be 42 minus the number of stages in pre-Finder FPGA circuitry.

Bit	**Function**
24-31	Programmable pipeline depth

YY00 000C Level 2 Header Word - Pipeline Offset in 132ns time slices**(R/W)**

Description: Offset will equal number of stages in pre-Finder FPGA circuitry. This is the value that is subtracted from 42 to determine the Pipeline length above.

Bit	**Function**
24-31	Programmable pipeline depth offset

YY00 0010 Flash RAM(Configuration Device) Bank Select Register **(R/W)**

Bit	**Function**
31-14	Undefined
13	Finder A Firmware Copy1
12	Finder A Firmware Copy2
11	Finder B Firmware Copy1
10	Finder B Firmware Copy2
9-0	Undefined

Note: Only one Flash Bank should be selected at a time!

YY00 00014 Flash RAM(Configuration Device) Write Status Bit **(R)**

Bit	**Function**
31-14	Undefined
13	Finder A Copy1 – Write Status Bit RY/*BY
12	Finder A Copy2 – Write Status Bit RY/*BY
11	Finder B Copy1 – Write Status Bit RY/*BY
10	Finder B Copy2 – Write Status Bit RY/*BY
9-0	Undefined

YY00 0018 RX Mezzanine Control Bits **(R/W)**

Bit	**Function**

31-12	Undefined
11	RX Mezzanine 3 - ENABLE
10	RX Mezzanine 2 – ENABLE
9	RX Mezzanine 1 - ENABLE
8	RX Mezzanine 3 - ACTIVE
7	RX Mezzanine 2 – ACTIVE
6	RX Mezzanine 1 - ACTIVE
5	RX Mezzanine 3 – OSC_ON
4	RX Mezzanine 2 – OSC_ON
3	RX Mezzanine 1 - OSC_ON
2	RX Mezzanine 3 – RESET
1	RX Mezzanine 2 – RESET
0	RX Mezzanine 1 - RESET

YY00 001C RX Channel Enable Bits **(R/W)**

Bit	**Function**
31-12	Undefined
11	RX Channel 12 - ENABLE
10	RX Channel 11 – ENABLE
9	RX Channel 10 - ENABLE
8	RX Channel 9 - ENABLE
7	RX Channel 8 – ENABLE
6	RX Channel 7 - ENABLE
5	RX Channel 6 - ENABLE
4	RX Channel 5 – ENABLE
3	RX Channel 4 - ENABLE
2	RX Channel 3 - ENABLE
1	RX Channel 2 – ENABLE
0	RX Channel 1 - ENABLE

YY00 0020 RX Channel LOOPEN Bits **(R/W)**

Bit	**Function**
31-12	Undefined
11	RX Channel 12 - LOOPEN
10	RX Channel 11 – LOOPEN
9	RX Channel 10 - LOOPEN
8	RX Channel 9 - LOOPEN
7	RX Channel 8 – LOOPEN
6	RX Channel 7 - LOOPEN
5	RX Channel 6 - LOOPEN
4	RX Channel 5 – LOOPEN
3	RX Channel 4 - LOOPEN
2	RX Channel 3 - LOOPEN
1	RX Channel 2 – LOOPEN
0	RX Channel 1 - LOOPEN

YY00 0024 RX Channel PRBSEN Bits **(R/W)**

Bit	**Function**
31-12	Undefined
11	RX Channel 12 - PRBSEN
10	RX Channel 11 – PRBSEN
9	RX Channel 10 - PRBSEN
8	RX Channel 9 - PRBSEN
7	RX Channel 8 – PRBSEN
6	RX Channel 7 - PRBSEN
5	RX Channel 6 - PRBSEN
4	RX Channel 5 – PRBSEN
3	RX Channel 4 - PRBSEN
2	RX Channel 3 - PRBSEN
1	RX Channel 2 – PRBSEN
0	RX Channel 1 - PRBSEN

YY00 0028 TDC Input Data Status **(R)**

Bit	**Function**
31-7	Undefined
6	Finder B – Beam Zero Error
5	Finder A – Beam Zero Error
4	Undefined
3	Undefined
2	Undefined
1	Finder B – First Word Error
0	Finder A – First Word Error

YY10 0000 - YY10 007F ID PROM (upper 8 bits) **(R)**

Finder A – Internal Status and Control

YY20 0000 Firmware ID Register **(R)**

Read only register which contains unique Firmware Identifier

Bit	Function
28-31	Month Compiled 1-12 (R)
23-27	Day Compiled 1-31 (R)
19-22	Year Compiled digit MSB 0-9 (R)
15-18	Year Compiled digit LSB 0-9 (R)
12-14	Version number 0 to 7 (R)
9-11	Revision number 0 to 7 (R)
5-8	Month Downloaded 1-12 (R/W) ?
0-4	Day Downloaded 1-31 (R/W) ?

YY20 0004 Status/Control Register **(R/W)**

Bit	Function
31-28	Undefined
27	TX data in XTC format - Diagnostic mode
26	RX data in SLAM format - Diagnostic mode
25	Pixel Driver Input Fifo Empty
24	Pixel Driver Input Fifo Full
23-16	Pixel Driver Input Error Counter
15	SLAM 1 RX error (R)
14	SLAM-A TX_DIS (R/W)
13	SLAM-A PRBSEN (R/W)
12	SLAM-A LOOP Enable (R/W)
11	SLAM-A ENABLE (R/W)
10	Error Links(R)
9	Inputs aligned(R)
8	Pixel Driver Error Counter Reset (R/W)
7	Driver Loop Reset (R/W)
6	Wire Error Counter Reset (R/W)
5	Capture Loop Reset (R/W)
4	Pixel Driver Loop Enabled (R/W)
3	Pixel Capture Loop Enabled (R/W)
2	Wire Driver Loop Enabled (R/W)
1	Wire Capture Loop Enabled (R/W)
0	Operate FPGA (R)

YY20 0008 Input A – Status & Link Error Count **(R)**

Bit	Function
31-19	Undefined
18-3	Fiber A Error Counter
2	Signal Detect from Link
1	Data valid from Link
0	Error from Link

YY20 000C Input B – Status & Link Error Count **(R)**

YY20 0010 Input C – Status & Link Error Count **(R)**

YY20 0014 Input D – Status & Link Error Count **(R)**

YY20 0018 Input E – Status & Link Error Count **(R)**

YY20 001C Input F – Status & Link Error Count **(R)**

Dead Wire Registers

YY20 0020 Dead Wire Register 1 **(R/W)**

Bit	**Function**
31-24	Cell C Dead wire 7-0
23-12	Cell B Dead wire 11-0
11-0	Cell A Dead wire 11-0

YY20 0024 Dead Wire Register 2 **(R/W)**

Bit	**Function**
31-28	Cell F Dead wire 3-0
27-16	Cell E Dead wire 11-0
15-4	Cell D Dead wire 11-0
3-0	Cell C Dead wire 11-8

YY20 0028 Dead Wire Register 3 **(R/W)**

Bit	**Function**
31-20	Cell H Dead wire 11-0
19-8	Cell G Dead wire 11-0
7-0	Cell F Dead wire 11-4

YY20 002C Dead Wire Register 4 **(R/W)**

Bit	**Function**
31-24	Cell K Dead wire 7-0
23-12	Cell J Dead wire 11-0
11-0	Cell I Dead wire 11-0

YY20 0030 Dead Wire Register 5 **(R/W)**

Bit	**Function**
31-28	Cell N Dead wire 3-0
27-16	Cell M Dead wire 11-0
15-4	Cell L Dead wire 11-0
3-0	Cell K Dead wire 11-8

YY20 0034 Dead Wire Register 6 **(R/W)**

Bit	**Function**

31-20	Cell P Dead wire 11-0
19-8	Cell O Dead wire 11-0
7-0	Cell N Dead wire 11-4

YY20 0038 Dead Wire Register 7 **(R/W)**

Bit	Function
31-24	Cell S Dead wire 7-0
23-12	Cell R Dead wire 11-0
11-0	Cell Q Dead wire 11-0

YY20 003C Dead Wire Register 8 **(R/W)**

Bit	Function
31-28	Cell V Dead wire 3-0
27-16	Cell U Dead wire 11-0
15-4	Cell T Dead wire 11-0
3-0	Cell S Dead wire 11-8

YY20 0040 Dead Wire Register 9 **(R/W)**

Bit	Function
31-8	Unused
7-0	Cell V Dead wire 11-4

YY20 0044 Pipeline Depth Register **(R/W)**

……

Diagnostic Wire Capture

YY20 09FC - YY20 0800 Input A FIFO Data (input buffer/diagnostic) **(R)**

Bit	Function as XTC data	Function as SLAM data
31-19	unused	unused
18	SIG_DET_A	SIG_DET_A
17	ER_A	ER_A
16	DV_A	DV_A
15	Beam Zero A	Start Event marker
14	Cell Zero A	End Event marker
13	Group Identifier MSB	Error Event
12	Group Identifier LSB	Beam Zero
11-0	Wire Data A	Pixel Data A

YY20 0BFC - YY20 0A00 Input B FIFO Data (input buffer/diagnostic) **(R)**

YY20 0DFC - YY20 0C00 Input C FIFO Data (input buffer/diagnostic) **(R)**

YY20 0FFC - YY20 0E00 Input D FIFO Data (input buffer/diagnostic) **(R)**

YY20 11FC - YY20 1000 Input E FIFO Data (input buffer/diagnostic) **(R)**

YY20 13FC - YY20 1200 Input F FIFO Data (input buffer/diagnostic) **(R)**

Diagnostic Pixel Capture FIFO

YY20 15FC - YY20 1400 Input Pixel P FIFO Data (input buffer/diagnostic) **(R)**

Bit	Function
31-16	unused
15	Data Valid A
14	Cell Zero A
13	Error Flag
12	Beam Zero A
11-0	Pixel Data A

Diagnostic Wire RAM

YY20 17FC - YY20 1600 Output A RAM Data (diagnostic) **(R/W)**

Bit	Function
31-16	unused
15	Beam Zero A
14	Cell Zero A
13-12	Group Identifier A
11-0	Wire Data A

YY20 19FC - YY20 1800 Output B RAM Data (diagnostic) **(R/W)**

YY20 1BFC - YY20 1A00 Output C RAM Data (diagnostic) **(R/W)**

YY20 1DFC - YY20 1C00 Output D RAM Data (diagnostic) **(R/W)**

YY20 1FFC - YY20 1E00 Output E RAM Data (diagnostic) **(R/W)**

YY20 21FC - YY20 2000 Output F RAM Data (diagnostic) **(R/W)**

Diagnostic Pixel Output RAM

YY20 23FC - YY20 2200 Output Pixel P Data (diagnostic) **(R/W)**

Bit	Function as XTC data	Function as SLAM data
31-16	unused	unused
15	Beam Zero A	Start Event marker A
14	Cell Zero A	End Event marker A
13	Group Identifier MSB	Error Event A
12	Group Identifier LSB	Beam Zero A
11-0	Wire Data A	Pixel Data A

Finder B – Internal Status and Control

YY30 0000 Firmware ID Register **(R)**

Read only register which contains unique Firmware Identifier

Bit	**Function**
28-31	Month Compiled 1-12 (R)
23-27	Day Compiled 1-31 (R)
19-22	Year Compiled digit MSB 0-9 (R)
15-18	Year Compiled digit LSB 0-9 (R)
12-14	Version number 0 to 7 (R)
9-11	Revision number 0 to 7 (R)
5-8	Month Downloaded 1-12 (R/W) ?
0-4	Day Downloaded 1-31 (R/W) ?

YY30 0004 Status/Control Register **(R/W)**

Bit	**Function**
31-28	Undefined
27	TX data in XTC format - Diagnostic mode
26	RX data in SLAM format - Diagnostic mode
25	Pixel Driver Input Fifo Empty
24	Pixel Driver Input Fifo Full
23-16	Pixel Driver Input B Error Counter
15	SLAM 2 RX error (R)
14	SLAM-B TX_DIS (R/W)
13	SLAM-B PRBSEN (R/W)
12	SLAM-B LOOP Enable (R/W)
11	SLAM-B ENABLE (R/W)
10	Error Links(R)
9	Inputs aligned(R)
8	Pixel Driver Error Counter Reset (R/W)
7	Driver Loop Reset (R/W)
6	Wire Error Counter Reset (R/W)
5	Capture Loop Reset (R/W)
4	Pixel Driver Loop Enabled (R/W)
3	Pixel Capture Loop Enabled (R/W)
2	Wire Driver Loop Enabled (R/W)
1	Wire Capture Loop Enabled (R/W)
0	Operate FPGA (R)

YY30 0008 Input A – Status & Link Error Count **(R)**

Bit	**Function**
31-19	Undefined
18-3	Fiber A Error Counter
2	Signal Detect from Link
1	Data valid from Link
0	Error from Link

YY30 000C Input B – Status & Link Error Count **(R)**

YY30 0010 Input C – Status & Link Error Count **(R)**

YY30 0014 Input D – Status & Link Error Count **(R)**

YY30 0018 Input E – Status & Link Error Count **(R)**

YY30 001C Input F – Status & Link Error Count **(R)**

Dead Wire Registers

YY30 0020 Dead Wire Register 1 **(R/W)**

Bit	**Function**
31-24	Cell C Dead wire 7-0
23-12	Cell B Dead wire 11-0
11-0	Cell A Dead wire 11-0

YY30 0024 Dead Wire Register 2 **(R/W)**

Bit	**Function**
31-28	Cell F Dead wire 3-0
27-16	Cell E Dead wire 11-0
15-4	Cell D Dead wire 11-0
3-0	Cell C Dead wire 11-8

YY30 0028 Dead Wire Register 3 **(R/W)**

Bit	**Function**
31-20	Cell H Dead wire 11-0
19-8	Cell G Dead wire 11-0
7-0	Cell F Dead wire 11-4

YY30 002C Dead Wire Register 4 **(R/W)**

Bit	**Function**
31-24	Cell K Dead wire 7-0
23-12	Cell J Dead wire 11-0
11-0	Cell I Dead wire 11-0

YY30 0030 Dead Wire Register 5 **(R/W)**

Bit	**Function**
31-28	Cell N Dead wire 3-0
27-16	Cell M Dead wire 11-0
15-4	Cell L Dead wire 11-0
3-0	Cell K Dead wire 11-8

YY30 0034 Dead Wire Register 6 **(R/W)**

Bit	**Function**

31-20	Cell P Dead wire 11-0
19-8	Cell O Dead wire 11-0
7-0	Cell N Dead wire 11-4

YY30 0038 Dead Wire Register 7 **(R/W)**

Bit	**Function**
31-24	Cell S Dead wire 7-0
23-12	Cell R Dead wire 11-0
11-0	Cell Q Dead wire 11-0

YY30 003C Dead Wire Register 8 **(R/W)**

Bit	**Function**
31-28	Cell V Dead wire 3-0
27-16	Cell U Dead wire 11-0
15-4	Cell T Dead wire 11-0
3-0	Cell S Dead wire 11-8

YY30 0040 Dead Wire Register 9 **(R/W)**

Bit	**Function**
31-8	Unused
7-0	Cell V Dead wire 11-4

YY30 0044 Pipeline Depth Register **(R/W)**

……

Diagnostic Wire Capture

YY30 09FC - YY30 0800 Input A FIFO Data (input buffer/diagnostic) **(R)**

Bit	**Function as XTC data**	**Function as SLAM data**
31-19	unused	unused
18	SIG_DET_A	SIG_DET_A
17	ER_A	ER_A
16	DV_A	DV_A
15	Beam Zero A	Start Event marker
14	Cell Zero A	End Event marker
13	Group Identifier MSB	Error Event
12	Group Identifier LSB	Beam Zero
11-0	Wire Data A	Pixel Data A

YY30 0BFC - YY30 0A00 Input B FIFO Data (input buffer/diagnostic) **(R)**

YY30 0DFC - YY30 0C00 Input C FIFO Data (input buffer/diagnostic) **(R)**

YY30 0FFC - YY30 0E00 Input D FIFO Data (input buffer/diagnostic) **(R)**

YY30 11FC - YY30 1000 Input E FIFO Data (input buffer/diagnostic) **(R)**

YY30 13FC - YY30 1200 Input F FIFO Data (input buffer/diagnostic) **(R)**

Diagnostic Pixel Capture FIFO

YY30 15FC - YY30 1400 Input Pixel B FIFO Data (input buffer/diagnostic) **(R)**

Bit	Function
31-16	unused
15	Data Valid B
14	Cell Zero B
13	Error Flag B
12	Beam Zero B
11-0	Pixel Data B

Diagnostic Wire RAM

YY30 17FC - YY30 1600 Output A RAM Data (diagnostic) **(R/W)**

Bit	Function
31-16	unused
15	Beam Zero A
14	Cell Zero A
13-12	Group Identifier A
11-0	Wire Data A

YY30 19FC - YY30 1800 Output B RAM Data (diagnostic) **(R/W)**

YY30 1BFC - YY30 1A00 Output C RAM Data (diagnostic) **(R/W)**

YY30 1DFC - YY30 1C00 Output D RAM Data (diagnostic) **(R/W)**

YY30 1FFC - YY30 1E00 Output E RAM Data (diagnostic) **(R/W)**

YY30 21FC - YY30 2000 Output F RAM Data (diagnostic) **(R/W)**

Diagnostic Pixel Output RAM

YY30 23FC - YY30 2200 Output Pixel Data B(diagnostic) **(R/W)**

Bit	Function as XTC data	Function as SLAM data
31-16	unused	unused
15	Beam Zero B	Start Event marker B
14	Cell Zero B	End Event marker B
13	Group Identifier MSB	Error Event B
12	Group Identifier LSB	Beam Zero B
11-0	Wire Data B	Pixel Data B

L2-PULSAR Driver – Internal Status and Control

YY70 0000 Firmware ID Register (R)

Read only register which contains unique Firmware Identifier

Bit	Function
28-31	Month Compiled 1-12 (R)
23-27	Day Compiled 1-31 (R)
19-22	Year Compiled digit MSB 0-9 (R)
15-18	Year Compiled digit LSB 0-9 (R)
12-14	Version number 0 to 7 (R)
9-11	Revision number 0 to 7 (R)
5-8	Month Downloaded 1-12 (R/W) ?
0-4	Day Downloaded 1-31 (R/W) ?

YY70 0004 Status/Control Register(R/W)

Bit	Function
31-8	Undefined
7	Diagnostic Transmit Data as XTC Data (R/W)
6	Diagnostic Transmit Data as SLAM Data (R/W)
5	Error Counter Reset (R/W)
4	Diagnostic Reset (R/W)
3	Loop Mode (R)
2	Driver Loop Enabled (R/W)
1	Capture Loop Enabled (R/W)
0	Operate Board (R)

YY70 0008 Input A – Status & Error Count(R)

Bit	Function
31-10	Undefined
9	Input FIFO A - EMPTY
8	Input FIFO A - Full
7-0	Error Counter

YY70 000C Input B – Status & Error Count(R)

Bit	Function
31-10	Undefined
9	Input FIFO A - EMPTY
8	Input FIFO A - Full
7-0	Error Counter

YY70 0010 Pipeline Depth Register (R/W)

Bit	Function
10-0	Pipeline depth

……

YY70 0014 TX – Mezzanine Register(R/W)

Bit	Function
31-4	Undefined
3	L2 TX Mezzanine - TX_DIS
2	L2 TX Mezzanine - PRBSEN
1	L2 TX Mezzanine - LOOPEN
0	L2 TX Mezzanine - ENABLE

……

Diagnostic Capture FIFO A

YY70 0400 – YY70 07FC Input A Pixel FIFO Data (input buffer/diagnostic) **(R)**

Bit	Function
31-0	Pixel Data A

Diagnostic Capture FIFO B

YY70 0800 – YY70 0BFC Input B Pixel FIFO Data (input buffer/diagnostic) **(R)**

Bit	Function
31-0	Pixel Data B

Diagnostic Output RAM

YY70 0C00 – YY70 0FFC Output Pixel Data (diagnostic) **(R/W)**

Bit	Function
31-16	Pulsar Path B
15-0	Pulsar Path A

Bit	Function as XTC data	Function as SLAM data
31 or 15	Beam Zero	Start Event marker
30 or 14	Cell Zero	End Event marker
29 or 13	Group Identifier MSB	Error Event
28 or 12	Group Identifier LSB	Beam Zero
27-16 or 11-0	Wire Data	Pixel Data

L2 Buffer Space (NOTE: All L2 Buffers are Read Only)

YY80 0000 L2 Buffer 0 Header Word

Bit	Function
0-7	Bunch ID: 8 bit counter from Bunch Zero
8-12	Geographical Address
13-22	Module Serial Number
23-31	Module Type

YY80 0004 Finder A - Cell 0,1 Segment Information (segment info passed on bits 30:0)

Bit	Function
0-11	Cell 0 - Pixel (11:0)
12	Cell 0 - B0 Marker
13	Cell 0 - W0 Marker
14	Cell 0 - Error Marker
15	Undefined
16-27	Cell 1 - Pixel (11:0)
28	Cell 1 - B0 Marker
29	Cell 1 - W0 Marker
30	Cell 1 - Error Marker
31	Undefined

YY80 0008 Finder A - Cell 2,3 Segment Information
YY80 000C Finder A - Cell 4,5 Segment Information
YY80 0010 Finder A - Cell 6,7 Segment Information
YY80 0014 Finder A - Cell 8,9 Segment Information
YY80 0018 Finder A - Cell 10,11 Segment Information
YY80 001C Finder A - Cell 12,13 Segment Information
YY80 0020 Finder A - Cell 14,15 Segment Information
YY80 0024 Finder A - Cell 16,17 Segment Information

YY80 0028 Finder B - Cell 0,1 Segment Information
YY80 002C Finder B - Cell 2,3 Segment Information
YY80 0030 Finder B - Cell 4,5 Segment Information
YY80 0034 Finder B - Cell 6,7 Segment Information
YY80 0038 Finder B - Cell 8,9 Segment Information
YY80 003C Finder B - Cell 10,11 Segment Information
YY80 0040 Finder B - Cell 12,13 Segment Information
YY80 0044 Finder B - Cell 14,15 Segment Information
YY80 0048 Finder B - Cell 16,17 Segment Information

YY80 004C Finder A - Wire Cell 0 Time Slice 0&1 Information

Bit	Function
0-11	Wire Data time slice 0 (11:0)
12-23	Wire Data time slice 1 (11:0)
24	B0 Marker
25	W0 Marker
26	Error Marker

YY80 0050 Finder A - Wire Cell 0 Time Slice 2&3 Information
YY80 0054 Finder A - Wire Cell 0 Time Slice 4&5 Information
YY80 0058 Finder A - Wire Cell 1 Time Slice 0&1 Information
YY80 005C Finder A - Wire Cell 1 Time Slice 2&3 Information
YY80 0060 Finder A - Wire Cell 1 Time Slice 4&5 Information
YY80 0064 Finder A - Wire Cell 2 Time Slice 0&1 Information
YY80 0068 Finder A - Wire Cell 2 Time Slice 2&3 Information
YY80 006C Finder A - Wire Cell 2 Time Slice 4&5 Information
YY80 0070 Finder A - Wire Cell 3 Time Slice 0&1 Information
YY80 0074 Finder A - Wire Cell 3 Time Slice 2&3 Information
YY80 0078 Finder A - Wire Cell 3 Time Slice 4&5 Information
YY80 007C Finder A - Wire Cell 4 Time Slice 0&1 Information
YY80 0080 Finder A - Wire Cell 4 Time Slice 2&3 Information
YY80 0084 Finder A - Wire Cell 4 Time Slice 4&5 Information
YY80 0088 Finder A - Wire Cell 5 Time Slice 0&1 Information
YY80 008C Finder A - Wire Cell 5 Time Slice 2&3 Information
YY80 0090 Finder A - Wire Cell 5 Time Slice 4&5 Information
YY80 0094 Finder A - Wire Cell 6 Time Slice 0&1 Information
YY80 0098 Finder A - Wire Cell 6 Time Slice 2&3 Information
YY80 009C Finder A - Wire Cell 6 Time Slice 4&5 Information
YY80 00A0 Finder A - Wire Cell 7 Time Slice 0&1 Information
YY80 00A4 Finder A - Wire Cell 7 Time Slice 2&3 Information
YY80 00A8 Finder A - Wire Cell 7 Time Slice 4&5 Information
YY80 00AC Finder A - Wire Cell 8 Time Slice 0&1 Information
YY80 00B0 Finder A - Wire Cell 8 Time Slice 2&3 Information
YY80 00B4 Finder A - Wire Cell 8 Time Slice 4&5 Information
YY80 00B8 Finder A - Wire Cell 9 Time Slice 0&1 Information
YY80 00BC Finder A - Wire Cell 9 Time Slice 2&3 Information
YY80 00C0 Finder A - Wire Cell 9 Time Slice 4&5 Information
YY80 00C4 Finder A - Wire Cell 10 Time Slice 0&1 Information
YY80 00C8 Finder A - Wire Cell 10 Time Slice 2&3 Information
YY80 00CC Finder A - Wire Cell 10 Time Slice 4&5 Information
YY80 00D0 Finder A - Wire Cell 11 Time Slice 0&1 Information
YY80 00D4 Finder A - Wire Cell 11 Time Slice 2&3 Information
YY80 00D8 Finder A - Wire Cell 11 Time Slice 4&5 Information
YY80 00DC Finder A - Wire Cell 12 Time Slice 0&1 Information
YY80 00E0 Finder A - Wire Cell 12 Time Slice 2&3 Information
YY80 00E4 Finder A - Wire Cell 12 Time Slice 4&5 Information
YY80 00E8 Finder A - Wire Cell 13 Time Slice 0&1 Information

YY80 00EC Finder A - Wire Cell 13 Time Slice 2&3 Information
YY80 00F0 Finder A - Wire Cell 13 Time Slice 4&5 Information
YY80 00F4 Finder A - Wire Cell 14 Time Slice 0&1 Information
YY80 00F8 Finder A - Wire Cell 14 Time Slice 2&3 Information
YY80 00FC Finder A - Wire Cell 14 Time Slice 4&5 Information
YY80 0100 Finder A - Wire Cell 15 Time Slice 0&1 Information
YY80 0104 Finder A - Wire Cell 15 Time Slice 2&3 Information
YY80 0108 Finder A - Wire Cell 15 Time Slice 4&5 Information
YY80 010C Finder A - Wire Cell 16 Time Slice 0&1 Information
YY80 0110 Finder A - Wire Cell 16 Time Slice 2&3 Information
YY80 0114 Finder A - Wire Cell 16 Time Slice 4&5 Information
YY80 0118 Finder A - Wire Cell 17 Time Slice 0&1 Information
YY80 011C Finder A - Wire Cell 17 Time Slice 2&3 Information
YY80 0120 Finder A - Wire Cell 17 Time Slice 4&5 Information

YY80 0124 Finder B - Wire Cell 0 Time Slice 0&1 Information
YY80 0128 Finder B - Wire Cell 0 Time Slice 2&3 Information
YY80 012C Finder B - Wire Cell 0 Time Slice 4&5 Information
YY80 0130 Finder B - Wire Cell 1 Time Slice 0&1 Information
YY80 0134 Finder B - Wire Cell 1 Time Slice 2&3 Information
YY80 0138 Finder B - Wire Cell 1 Time Slice 4&5 Information
YY80 013C Finder B - Wire Cell 2 Time Slice 0&1 Information
YY80 0140 Finder B - Wire Cell 2 Time Slice 2&3 Information
YY80 0144 Finder B - Wire Cell 2 Time Slice 4&5 Information
YY80 0148 Finder B - Wire Cell 3 Time Slice 0&1 Information
YY80 014C Finder B - Wire Cell 3 Time Slice 2&3 Information
YY80 0150 Finder B - Wire Cell 3 Time Slice 4&5 Information
YY80 0154 Finder B - Wire Cell 4 Time Slice 0&1 Information
YY80 0158 Finder B - Wire Cell 4 Time Slice 2&3 Information
YY80 015C Finder B - Wire Cell 4 Time Slice 4&5 Information
YY80 0160 Finder B - Wire Cell 5 Time Slice 0&1 Information
YY80 0164 Finder B - Wire Cell 5 Time Slice 2&3 Information
YY80 0168 Finder B - Wire Cell 5 Time Slice 4&5 Information
YY80 016C Finder B - Wire Cell 6 Time Slice 0&1 Information
YY80 0170 Finder B - Wire Cell 6 Time Slice 2&3 Information
YY80 0174 Finder B - Wire Cell 6 Time Slice 4&5 Information
YY80 0178 Finder B - Wire Cell 7 Time Slice 0&1 Information
YY80 017C Finder B - Wire Cell 7 Time Slice 2&3 Information
YY80 0180 Finder B - Wire Cell 7 Time Slice 4&5 Information
YY80 0184 Finder B - Wire Cell 8 Time Slice 0&1 Information
YY80 0188 Finder B - Wire Cell 8 Time Slice 2&3 Information
YY80 018C Finder B - Wire Cell 8 Time Slice 4&5 Information
YY80 0190 Finder B - Wire Cell 9 Time Slice 0&1 Information
YY80 0194 Finder B - Wire Cell 9 Time Slice 2&3 Information
YY80 0198 Finder B - Wire Cell 9 Time Slice 4&5 Information
YY80 019C Finder B - Wire Cell 10 Time Slice 0&1 Information

YY80 01A0	Finder B - Wire Cell 10 Time Slice 2&3 Information
YY80 01A4	Finder B - Wire Cell 10 Time Slice 4&5 Information
YY80 01A8	Finder B - Wire Cell 11 Time Slice 0&1 Information
YY80 01AC	Finder B - Wire Cell 11 Time Slice 2&3 Information
YY80 01B0	Finder B - Wire Cell 11 Time Slice 4&5 Information
YY80 01B4	Finder B - Wire Cell 12 Time Slice 0&1 Information
YY80 01B8	Finder B - Wire Cell 12 Time Slice 2&3 Information
YY80 01BC	Finder B - Wire Cell 12 Time Slice 4&5 Information
YY80 01C0	Finder B - Wire Cell 13 Time Slice 0&1 Information
YY80 01C4	Finder B - Wire Cell 13 Time Slice 2&3 Information
YY80 01C8	Finder B - Wire Cell 13 Time Slice 4&5 Information
YY80 01CC	Finder B - Wire Cell 14 Time Slice 0&1 Information
YY80 01D0	Finder B - Wire Cell 14 Time Slice 2&3 Information
YY80 01D4	Finder B - Wire Cell 14 Time Slice 4&5 Information
YY80 01D8	Finder B - Wire Cell 15 Time Slice 0&1 Information
YY80 01DC	Finder B - Wire Cell 15 Time Slice 2&3 Information
YY80 01E0	Finder B - Wire Cell 15 Time Slice 4&5 Information
YY80 01E4	Finder B - Wire Cell 16 Time Slice 0&1 Information
YY80 01E8	Finder B - Wire Cell 16 Time Slice 2&3 Information
YY80 01EC	Finder B - Wire Cell 16 Time Slice 4&5 Information
YY80 01F0	Finder B - Wire Cell 17 Time Slice 0&1 Information
YY80 01F4	Finder B - Wire Cell 17 Time Slice 2&3 Information
YY80 01F8	Finder B - Wire Cell 17 Time Slice 4&5 Information

L2 Buffer Space (NOTE: All L2 Buffers are Read Only)

YY90 0000 L2 Buffer 0 Header Word

Bit	Function
0-7	Bunch ID: 8 bit counter from Bunch Zero
8-12	Geographical Address
13-22	Module Serial Number
23-31	Module Type

YY90 0004 Finder A - Cell 0,1 Segment Information (segment info passed on bits 30:0)

Bit	Function
0-11	Cell 0 - Pixel (11:0)
12	Cell 0 - B0 Marker
13	Cell 0 - W0 Marker
14	Cell 0 - Error Marker
15	Undefined
16-27	Cell 1 - Pixel (11:0)
28	Cell 1 - B0 Marker
29	Cell 1 - W0 Marker
30	Cell 1 - Error Marker
31	Undefined

YY90 0008 Finder A - Cell 2,3 Segment Information
YY90 000C Finder A - Cell 4,5 Segment Information
YY90 0010 Finder A - Cell 6,7 Segment Information
YY90 0014 Finder A - Cell 8,9 Segment Information
YY90 0018 Finder A - Cell 10,11 Segment Information
YY90 001C Finder A - Cell 12,13 Segment Information
YY90 0020 Finder A - Cell 14,15 Segment Information
YY90 0024 Finder A - Cell 16,17 Segment Information

YY90 0028 Finder B - Cell 0,1 Segment Information
YY90 002C Finder B - Cell 2,3 Segment Information
YY90 0030 Finder B - Cell 4,5 Segment Information
YY90 0034 Finder B - Cell 6,7 Segment Information
YY90 0038 Finder B - Cell 8,9 Segment Information
YY90 003C Finder B - Cell 10,11 Segment Information
YY90 0040 Finder B - Cell 12,13 Segment Information
YY90 0044 Finder B - Cell 14,15 Segment Information
YY90 0048 Finder B - Cell 16,17 Segment Information

YY90 004C Finder A - Wire Cell 0 Time Slice 0&1 Information

Bit	Function
0-11	Wire Data time slice 0 (11:0)
12-23	Wire Data time slice 1 (11:0)
24	B0 Marker
25	W0 Marker
26	Error Marker

YY90 0050 Finder A - Wire Cell 0 Time Slice 2&3 Information
YY90 0054 Finder A - Wire Cell 0 Time Slice 4&5 Information
YY90 0058 Finder A - Wire Cell 1 Time Slice 0&1 Information
YY90 005C Finder A - Wire Cell 1 Time Slice 2&3 Information
YY90 0060 Finder A - Wire Cell 1 Time Slice 4&5 Information
YY90 0064 Finder A - Wire Cell 2 Time Slice 0&1 Information
YY90 0068 Finder A - Wire Cell 2 Time Slice 2&3 Information
YY90 006C Finder A - Wire Cell 2 Time Slice 4&5 Information
YY90 0070 Finder A - Wire Cell 3 Time Slice 0&1 Information
YY90 0074 Finder A - Wire Cell 3 Time Slice 2&3 Information
YY90 0078 Finder A - Wire Cell 3 Time Slice 4&5 Information
YY90 007C Finder A - Wire Cell 4 Time Slice 0&1 Information
YY90 0080 Finder A - Wire Cell 4 Time Slice 2&3 Information
YY90 0084 Finder A - Wire Cell 4 Time Slice 4&5 Information
YY90 0088 Finder A - Wire Cell 5 Time Slice 0&1 Information
YY90 008C Finder A - Wire Cell 5 Time Slice 2&3 Information
YY90 0090 Finder A - Wire Cell 5 Time Slice 4&5 Information
YY90 0094 Finder A - Wire Cell 6 Time Slice 0&1 Information
YY90 0098 Finder A - Wire Cell 6 Time Slice 2&3 Information
YY90 009C Finder A - Wire Cell 6 Time Slice 4&5 Information
YY90 00A0 Finder A - Wire Cell 7 Time Slice 0&1 Information
YY90 00A4 Finder A - Wire Cell 7 Time Slice 2&3 Information
YY90 00A8 Finder A - Wire Cell 7 Time Slice 4&5 Information
YY90 00AC Finder A - Wire Cell 8 Time Slice 0&1 Information
YY90 00B0 Finder A - Wire Cell 8 Time Slice 2&3 Information
YY90 00B4 Finder A - Wire Cell 8 Time Slice 4&5 Information
YY90 00B8 Finder A - Wire Cell 9 Time Slice 0&1 Information
YY90 00BC Finder A - Wire Cell 9 Time Slice 2&3 Information
YY90 00C0 Finder A - Wire Cell 9 Time Slice 4&5 Information
YY90 00C4 Finder A - Wire Cell 10 Time Slice 0&1 Information
YY90 00C8 Finder A - Wire Cell 10 Time Slice 2&3 Information
YY90 00CC Finder A - Wire Cell 10 Time Slice 4&5 Information
YY90 00D0 Finder A - Wire Cell 11 Time Slice 0&1 Information
YY90 00D4 Finder A - Wire Cell 11 Time Slice 2&3 Information
YY90 00D8 Finder A - Wire Cell 11 Time Slice 4&5 Information
YY90 00DC Finder A - Wire Cell 12 Time Slice 0&1 Information
YY90 00E0 Finder A - Wire Cell 12 Time Slice 2&3 Information
YY90 00E4 Finder A - Wire Cell 12 Time Slice 4&5 Information
YY90 00E8 Finder A - Wire Cell 13 Time Slice 0&1 Information

YY90 00EC Finder A - Wire Cell 13 Time Slice 2&3 Information
YY90 00F0 Finder A - Wire Cell 13 Time Slice 4&5 Information
YY90 00F4 Finder A - Wire Cell 14 Time Slice 0&1 Information
YY90 00F8 Finder A - Wire Cell 14 Time Slice 2&3 Information
YY90 00FC Finder A - Wire Cell 14 Time Slice 4&5 Information
YY90 0100 Finder A - Wire Cell 15 Time Slice 0&1 Information
YY90 0104 Finder A - Wire Cell 15 Time Slice 2&3 Information
YY90 0108 Finder A - Wire Cell 15 Time Slice 4&5 Information
YY90 010C Finder A - Wire Cell 16 Time Slice 0&1 Information
YY90 0110 Finder A - Wire Cell 16 Time Slice 2&3 Information
YY90 0114 Finder A - Wire Cell 16 Time Slice 4&5 Information
YY90 0118 Finder A - Wire Cell 17 Time Slice 0&1 Information
YY90 011C Finder A - Wire Cell 17 Time Slice 2&3 Information
YY90 0120 Finder A - Wire Cell 17 Time Slice 4&5 Information

YY90 0124 Finder B - Wire Cell 0 Time Slice 0&1 Information
YY90 0128 Finder B - Wire Cell 0 Time Slice 2&3 Information
YY90 012C Finder B - Wire Cell 0 Time Slice 4&5 Information
YY90 0130 Finder B - Wire Cell 1 Time Slice 0&1 Information
YY90 0134 Finder B - Wire Cell 1 Time Slice 2&3 Information
YY90 0138 Finder B - Wire Cell 1 Time Slice 4&5 Information
YY90 013C Finder B - Wire Cell 2 Time Slice 0&1 Information
YY90 0140 Finder B - Wire Cell 2 Time Slice 2&3 Information
YY90 0144 Finder B - Wire Cell 2 Time Slice 4&5 Information
YY90 0148 Finder B - Wire Cell 3 Time Slice 0&1 Information
YY90 014C Finder B - Wire Cell 3 Time Slice 2&3 Information
YY90 0150 Finder B - Wire Cell 3 Time Slice 4&5 Information
YY90 0154 Finder B - Wire Cell 4 Time Slice 0&1 Information
YY90 0158 Finder B - Wire Cell 4 Time Slice 2&3 Information
YY90 015C Finder B - Wire Cell 4 Time Slice 4&5 Information
YY90 0160 Finder B - Wire Cell 5 Time Slice 0&1 Information
YY90 0164 Finder B - Wire Cell 5 Time Slice 2&3 Information
YY90 0168 Finder B - Wire Cell 5 Time Slice 4&5 Information
YY90 016C Finder B - Wire Cell 6 Time Slice 0&1 Information
YY90 0170 Finder B - Wire Cell 6 Time Slice 2&3 Information
YY90 0174 Finder B - Wire Cell 6 Time Slice 4&5 Information
YY90 0178 Finder B - Wire Cell 7 Time Slice 0&1 Information
YY90 017C Finder B - Wire Cell 7 Time Slice 2&3 Information
YY90 0180 Finder B - Wire Cell 7 Time Slice 4&5 Information
YY90 0184 Finder B - Wire Cell 8 Time Slice 0&1 Information
YY90 0188 Finder B - Wire Cell 8 Time Slice 2&3 Information
YY90 018C Finder B - Wire Cell 8 Time Slice 4&5 Information
YY90 0190 Finder B - Wire Cell 9 Time Slice 0&1 Information
YY90 0194 Finder B - Wire Cell 9 Time Slice 2&3 Information
YY90 0198 Finder B - Wire Cell 9 Time Slice 4&5 Information
YY90 019C Finder B - Wire Cell 10 Time Slice 0&1 Information

YY90 01A0	Finder B - Wire Cell 10 Time Slice 2&3 Information
YY90 01A4	Finder B - Wire Cell 10 Time Slice 4&5 Information
YY90 01A8	Finder B - Wire Cell 11 Time Slice 0&1 Information
YY90 01AC	Finder B - Wire Cell 11 Time Slice 2&3 Information
YY90 01B0	Finder B - Wire Cell 11 Time Slice 4&5 Information
YY90 01B4	Finder B - Wire Cell 12 Time Slice 0&1 Information
YY90 01B8	Finder B - Wire Cell 12 Time Slice 2&3 Information
YY90 01BC	Finder B - Wire Cell 12 Time Slice 4&5 Information
YY90 01C0	Finder B - Wire Cell 13 Time Slice 0&1 Information
YY90 01C4	Finder B - Wire Cell 13 Time Slice 2&3 Information
YY90 01C8	Finder B - Wire Cell 13 Time Slice 4&5 Information
YY90 01CC	Finder B - Wire Cell 14 Time Slice 0&1 Information
YY90 01D0	Finder B - Wire Cell 14 Time Slice 2&3 Information
YY90 01D4	Finder B - Wire Cell 14 Time Slice 4&5 Information
YY90 01D8	Finder B - Wire Cell 15 Time Slice 0&1 Information
YY90 01DC	Finder B - Wire Cell 15 Time Slice 2&3 Information
YY90 01E0	Finder B - Wire Cell 15 Time Slice 4&5 Information
YY90 01E4	Finder B - Wire Cell 16 Time Slice 0&1 Information
YY90 01E8	Finder B - Wire Cell 16 Time Slice 2&3 Information
YY90 01EC	Finder B - Wire Cell 16 Time Slice 4&5 Information
YY90 01F0	Finder B - Wire Cell 17 Time Slice 0&1 Information
YY90 01F4	Finder B - Wire Cell 17 Time Slice 2&3 Information
YY90 01F8	Finder B - Wire Cell 17 Time Slice 4&5 Information

L2 Buffer Space (NOTE: All L2 Buffers are Read Only)

YYA0 0000 L2 Buffer 0 Header Word

Bit	Function
0-7	Bunch ID: 8 bit counter from Bunch Zero
8-12	Geographical Address
13-22	Module Serial Number
23-31	Module Type

YYA0 0004 Finder A - Cell 0,1 Segment Information (segment info passed on bits 30:0)

Bit	Function
0-11	Cell 0 - Pixel (11:0)
12	Cell 0 - B0 Marker
13	Cell 0 - W0 Marker
14	Cell 0 - Error Marker
15	Undefined
16-27	Cell 1 - Pixel (11:0)
28	Cell 1 - B0 Marker
29	Cell 1 - W0 Marker
30	Cell 1 - Error Marker
31	Undefined

YYA0 0008 Finder A - Cell 2,3 Segment Information
YYA0 000C Finder A - Cell 4,5 Segment Information
YYA0 0010 Finder A - Cell 6,7 Segment Information
YYA0 0014 Finder A - Cell 8,9 Segment Information
YYA0 0018 Finder A - Cell 10,11 Segment Information
YYA0 001C Finder A - Cell 12,13 Segment Information
YYA0 0020 Finder A - Cell 14,15 Segment Information
YYA0 0024 Finder A - Cell 16,17 Segment Information

YYA0 0028 Finder B - Cell 0,1 Segment Information
YYA0 002C Finder B - Cell 2,3 Segment Information
YYA0 0030 Finder B - Cell 4,5 Segment Information
YYA0 0034 Finder B - Cell 6,7 Segment Information
YYA0 0038 Finder B - Cell 8,9 Segment Information
YYA0 003C Finder B - Cell 10,11 Segment Information
YYA0 0040 Finder B - Cell 12,13 Segment Information
YYA0 0044 Finder B - Cell 14,15 Segment Information
YYA0 0048 Finder B - Cell 16,17 Segment Information

YYA0 004C Finder A - Wire Cell 0 Time Slice 0&1 Information

Bit	Function
0-11	Wire Data time slice 0 (11:0)
12-23	Wire Data time slice 1 (11:0)
24	B0 Marker
25	W0 Marker
26	Error Marker

YYA0 0050 Finder A - Wire Cell 0 Time Slice 2&3 Information
YYA0 0054 Finder A - Wire Cell 0 Time Slice 4&5 Information
YYA0 0058 Finder A - Wire Cell 1 Time Slice 0&1 Information
YYA0 005C Finder A - Wire Cell 1 Time Slice 2&3 Information
YYA0 0060 Finder A - Wire Cell 1 Time Slice 4&5 Information
YYA0 0064 Finder A - Wire Cell 2 Time Slice 0&1 Information
YYA0 0068 Finder A - Wire Cell 2 Time Slice 2&3 Information
YYA0 006C Finder A - Wire Cell 2 Time Slice 4&5 Information
YYA0 0070 Finder A - Wire Cell 3 Time Slice 0&1 Information
YYA0 0074 Finder A - Wire Cell 3 Time Slice 2&3 Information
YYA0 0078 Finder A - Wire Cell 3 Time Slice 4&5 Information
YYA0 007C Finder A - Wire Cell 4 Time Slice 0&1 Information
YYA0 0080 Finder A - Wire Cell 4 Time Slice 2&3 Information
YYA0 0084 Finder A - Wire Cell 4 Time Slice 4&5 Information
YYA0 0088 Finder A - Wire Cell 5 Time Slice 0&1 Information
YYA0 008C Finder A - Wire Cell 5 Time Slice 2&3 Information
YYA0 0090 Finder A - Wire Cell 5 Time Slice 4&5 Information
YYA0 0094 Finder A - Wire Cell 6 Time Slice 0&1 Information
YYA0 0098 Finder A - Wire Cell 6 Time Slice 2&3 Information
YYA0 009C Finder A - Wire Cell 6 Time Slice 4&5 Information
YYA0 00A0 Finder A - Wire Cell 7 Time Slice 0&1 Information
YYA0 00A4 Finder A - Wire Cell 7 Time Slice 2&3 Information
YYA0 00A8 Finder A - Wire Cell 7 Time Slice 4&5 Information
YYA0 00AC Finder A - Wire Cell 8 Time Slice 0&1 Information
YYA0 00B0 Finder A - Wire Cell 8 Time Slice 2&3 Information
YYA0 00B4 Finder A - Wire Cell 8 Time Slice 4&5 Information
YYA0 00B8 Finder A - Wire Cell 9 Time Slice 0&1 Information
YYA0 00BC Finder A - Wire Cell 9 Time Slice 2&3 Information
YYA0 00C0 Finder A - Wire Cell 9 Time Slice 4&5 Information
YYA0 00C4 Finder A - Wire Cell 10 Time Slice 0&1 Information
YYA0 00C8 Finder A - Wire Cell 10 Time Slice 2&3 Information
YYA0 00CC Finder A - Wire Cell 10 Time Slice 4&5 Information
YYA0 00D0 Finder A - Wire Cell 11 Time Slice 0&1 Information
YYA0 00D4 Finder A - Wire Cell 11 Time Slice 2&3 Information
YYA0 00D8 Finder A - Wire Cell 11 Time Slice 4&5 Information
YYA0 00DC Finder A - Wire Cell 12 Time Slice 0&1 Information
YYA0 00E0 Finder A - Wire Cell 12 Time Slice 2&3 Information
YYA0 00E4 Finder A - Wire Cell 12 Time Slice 4&5 Information
YYA0 00E8 Finder A - Wire Cell 13 Time Slice 0&1 Information

YYA0 00EC Finder A - Wire Cell 13 Time Slice 2&3 Information
YYA0 00F0 Finder A - Wire Cell 13 Time Slice 4&5 Information
YYA0 00F4 Finder A - Wire Cell 14 Time Slice 0&1 Information
YYA0 00F8 Finder A - Wire Cell 14 Time Slice 2&3 Information
YYA0 00FC Finder A - Wire Cell 14 Time Slice 4&5 Information
YYA0 0100 Finder A - Wire Cell 15 Time Slice 0&1 Information
YYA0 0104 Finder A - Wire Cell 15 Time Slice 2&3 Information
YYA0 0108 Finder A - Wire Cell 15 Time Slice 4&5 Information
YYA0 010C Finder A - Wire Cell 16 Time Slice 0&1 Information
YYA0 0110 Finder A - Wire Cell 16 Time Slice 2&3 Information
YYA0 0114 Finder A - Wire Cell 16 Time Slice 4&5 Information
YYA0 0118 Finder A - Wire Cell 17 Time Slice 0&1 Information
YYA0 011C Finder A - Wire Cell 17 Time Slice 2&3 Information
YYA0 0120 Finder A - Wire Cell 17 Time Slice 4&5 Information

YYA0 0124 Finder B - Wire Cell 0 Time Slice 0&1 Information
YYA0 0128 Finder B - Wire Cell 0 Time Slice 2&3 Information
YYA0 012C Finder B - Wire Cell 0 Time Slice 4&5 Information
YYA0 0130 Finder B - Wire Cell 1 Time Slice 0&1 Information
YYA0 0134 Finder B - Wire Cell 1 Time Slice 2&3 Information
YYA0 0138 Finder B - Wire Cell 1 Time Slice 4&5 Information
YYA0 013C Finder B - Wire Cell 2 Time Slice 0&1 Information
YYA0 0140 Finder B - Wire Cell 2 Time Slice 2&3 Information
YYA0 0144 Finder B - Wire Cell 2 Time Slice 4&5 Information
YYA0 0148 Finder B - Wire Cell 3 Time Slice 0&1 Information
YYA0 014C Finder B - Wire Cell 3 Time Slice 2&3 Information
YYA0 0150 Finder B - Wire Cell 3 Time Slice 4&5 Information
YYA0 0154 Finder B - Wire Cell 4 Time Slice 0&1 Information
YYA0 0158 Finder B - Wire Cell 4 Time Slice 2&3 Information
YYA0 015C Finder B - Wire Cell 4 Time Slice 4&5 Information
YYA0 0160 Finder B - Wire Cell 5 Time Slice 0&1 Information
YYA0 0164 Finder B - Wire Cell 5 Time Slice 2&3 Information
YYA0 0168 Finder B - Wire Cell 5 Time Slice 4&5 Information
YYA0 016C Finder B - Wire Cell 6 Time Slice 0&1 Information
YYA0 0170 Finder B - Wire Cell 6 Time Slice 2&3 Information
YYA0 0174 Finder B - Wire Cell 6 Time Slice 4&5 Information
YYA0 0178 Finder B - Wire Cell 7 Time Slice 0&1 Information
YYA0 017C Finder B - Wire Cell 7 Time Slice 2&3 Information
YYA0 0180 Finder B - Wire Cell 7 Time Slice 4&5 Information
YYA0 0184 Finder B - Wire Cell 8 Time Slice 0&1 Information
YYA0 0188 Finder B - Wire Cell 8 Time Slice 2&3 Information
YYA0 018C Finder B - Wire Cell 8 Time Slice 4&5 Information
YYA0 0190 Finder B - Wire Cell 9 Time Slice 0&1 Information
YYA0 0194 Finder B - Wire Cell 9 Time Slice 2&3 Information
YYA0 0198 Finder B - Wire Cell 9 Time Slice 4&5 Information
YYA0 019C Finder B - Wire Cell 10 Time Slice 0&1 Information

YYA0 01A0	Finder B - Wire Cell 10 Time Slice 2&3 Information
YYA0 01A4	Finder B - Wire Cell 10 Time Slice 4&5 Information
YYA0 01A8	Finder B - Wire Cell 11 Time Slice 0&1 Information
YYA0 01AC	Finder B - Wire Cell 11 Time Slice 2&3 Information
YYA0 01B0	Finder B - Wire Cell 11 Time Slice 4&5 Information
YYA0 01B4	Finder B - Wire Cell 12 Time Slice 0&1 Information
YYA0 01B8	Finder B - Wire Cell 12 Time Slice 2&3 Information
YYA0 01BC	Finder B - Wire Cell 12 Time Slice 4&5 Information
YYA0 01C0	Finder B - Wire Cell 13 Time Slice 0&1 Information
YYA0 01C4	Finder B - Wire Cell 13 Time Slice 2&3 Information
YYA0 01C8	Finder B - Wire Cell 13 Time Slice 4&5 Information
YYA0 01CC	Finder B - Wire Cell 14 Time Slice 0&1 Information
YYA0 01D0	Finder B - Wire Cell 14 Time Slice 2&3 Information
YYA0 01D4	Finder B - Wire Cell 14 Time Slice 4&5 Information
YYA0 01D8	Finder B - Wire Cell 15 Time Slice 0&1 Information
YYA0 01DC	Finder B - Wire Cell 15 Time Slice 2&3 Information
YYA0 01E0	Finder B - Wire Cell 15 Time Slice 4&5 Information
YYA0 01E4	Finder B - Wire Cell 16 Time Slice 0&1 Information
YYA0 01E8	Finder B - Wire Cell 16 Time Slice 2&3 Information
YYA0 01EC	Finder B - Wire Cell 16 Time Slice 4&5 Information
YYA0 01F0	Finder B - Wire Cell 17 Time Slice 0&1 Information
YYA0 01F4	Finder B - Wire Cell 17 Time Slice 2&3 Information
YYA0 01F8	Finder B - Wire Cell 17 Time Slice 4&5 Information

L2 Buffer Space (NOTE: All L2 Buffers are Read Only)

YYB0 0000 L2 Buffer 0 Header Word

Bit	Function
0-7	Bunch ID: 8 bit counter from Bunch Zero
8-12	Geographical Address
13-22	Module Serial Number
23-31	Module Type

YYB0 0004 Finder A - Cell 0,1 Segment Information (segment info passed on bits 30:0)

Bit	Function
0-11	Cell 0 - Pixel (11:0)
12	Cell 0 - B0 Marker
13	Cell 0 - W0 Marker
14	Cell 0 - Error Marker
15	Undefined
16-27	Cell 1 - Pixel (11:0)
28	Cell 1 - B0 Marker
29	Cell 1 - W0 Marker
30	Cell 1 - Error Marker
31	Undefined

YYB0 0008 Finder A - Cell 2,3 Segment Information
YYB0 000C Finder A - Cell 4,5 Segment Information
YYB0 0010 Finder A - Cell 6,7 Segment Information
YYB0 0014 Finder A - Cell 8,9 Segment Information
YYB0 0018 Finder A - Cell 10,11 Segment Information
YYB0 001C Finder A - Cell 12,13 Segment Information
YYB0 0020 Finder A - Cell 14,15 Segment Information
YYB0 0024 Finder A - Cell 16,17 Segment Information

YYB0 0028 Finder B - Cell 0,1 Segment Information
YYB0 002C Finder B - Cell 2,3 Segment Information
YYB0 0030 Finder B - Cell 4,5 Segment Information
YYB0 0034 Finder B - Cell 6,7 Segment Information
YYB0 0038 Finder B - Cell 8,9 Segment Information
YYB0 003C Finder B - Cell 10,11 Segment Information
YYB0 0040 Finder B - Cell 12,13 Segment Information
YYB0 0044 Finder B - Cell 14,15 Segment Information
YYB0 0048 Finder B - Cell 16,17 Segment Information

YYB0 004C Finder A - Wire Cell 0 Time Slice 0&1 Information

Bit	Function
0-11	Wire Data time slice 0 (11:0)
12-23	Wire Data time slice 1 (11:0)
24	B0 Marker
25	W0 Marker
26	Error Marker

YYB0 0050 Finder A - Wire Cell 0 Time Slice 2&3 Information
YYB0 0054 Finder A - Wire Cell 0 Time Slice 4&5 Information
YYB0 0058 Finder A - Wire Cell 1 Time Slice 0&1 Information
YYB0 005C Finder A - Wire Cell 1 Time Slice 2&3 Information
YYB0 0060 Finder A - Wire Cell 1 Time Slice 4&5 Information
YYB0 0064 Finder A - Wire Cell 2 Time Slice 0&1 Information
YYB0 0068 Finder A - Wire Cell 2 Time Slice 2&3 Information
YYB0 006C Finder A - Wire Cell 2 Time Slice 4&5 Information
YYB0 0070 Finder A - Wire Cell 3 Time Slice 0&1 Information
YYB0 0074 Finder A - Wire Cell 3 Time Slice 2&3 Information
YYB0 0078 Finder A - Wire Cell 3 Time Slice 4&5 Information
YYB0 007C Finder A - Wire Cell 4 Time Slice 0&1 Information
YYB0 0080 Finder A - Wire Cell 4 Time Slice 2&3 Information
YYB0 0084 Finder A - Wire Cell 4 Time Slice 4&5 Information
YYB0 0088 Finder A - Wire Cell 5 Time Slice 0&1 Information
YYB0 008C Finder A - Wire Cell 5 Time Slice 2&3 Information
YYB0 0090 Finder A - Wire Cell 5 Time Slice 4&5 Information
YYB0 0094 Finder A - Wire Cell 6 Time Slice 0&1 Information
YYB0 0098 Finder A - Wire Cell 6 Time Slice 2&3 Information
YYB0 009C Finder A - Wire Cell 6 Time Slice 4&5 Information
YYB0 00A0 Finder A - Wire Cell 7 Time Slice 0&1 Information
YYB0 00A4 Finder A - Wire Cell 7 Time Slice 2&3 Information
YYB0 00A8 Finder A - Wire Cell 7 Time Slice 4&5 Information
YYB0 00AC Finder A - Wire Cell 8 Time Slice 0&1 Information
YYB0 00B0 Finder A - Wire Cell 8 Time Slice 2&3 Information
YYB0 00B4 Finder A - Wire Cell 8 Time Slice 4&5 Information
YYB0 00B8 Finder A - Wire Cell 9 Time Slice 0&1 Information
YYB0 00BC Finder A - Wire Cell 9 Time Slice 2&3 Information
YYB0 00C0 Finder A - Wire Cell 9 Time Slice 4&5 Information
YYB0 00C4 Finder A - Wire Cell 10 Time Slice 0&1 Information
YYB0 00C8 Finder A - Wire Cell 10 Time Slice 2&3 Information
YYB0 00CC Finder A - Wire Cell 10 Time Slice 4&5 Information
YYB0 00D0 Finder A - Wire Cell 11 Time Slice 0&1 Information
YYB0 00D4 Finder A - Wire Cell 11 Time Slice 2&3 Information
YYB0 00D8 Finder A - Wire Cell 11 Time Slice 4&5 Information
YYB0 00DC Finder A - Wire Cell 12 Time Slice 0&1 Information
YYB0 00E0 Finder A - Wire Cell 12 Time Slice 2&3 Information
YYB0 00E4 Finder A - Wire Cell 12 Time Slice 4&5 Information
YYB0 00E8 Finder A - Wire Cell 13 Time Slice 0&1 Information

YYB0 00EC	Finder A - Wire Cell 13 Time Slice 2&3 Information
YYB0 00F0	Finder A - Wire Cell 13 Time Slice 4&5 Information
YYB0 00F4	Finder A - Wire Cell 14 Time Slice 0&1 Information
YYB0 00F8	Finder A - Wire Cell 14 Time Slice 2&3 Information
YYB0 00FC	Finder A - Wire Cell 14 Time Slice 4&5 Information
YYB0 0100	Finder A - Wire Cell 15 Time Slice 0&1 Information
YYB0 0104	Finder A - Wire Cell 15 Time Slice 2&3 Information
YYB0 0108	Finder A - Wire Cell 15 Time Slice 4&5 Information
YYB0 010C	Finder A - Wire Cell 16 Time Slice 0&1 Information
YYB0 0110	Finder A - Wire Cell 16 Time Slice 2&3 Information
YYB0 0114	Finder A - Wire Cell 16 Time Slice 4&5 Information
YYB0 0118	Finder A - Wire Cell 17 Time Slice 0&1 Information
YYB0 011C	Finder A - Wire Cell 17 Time Slice 2&3 Information
YYB0 0120	Finder A - Wire Cell 17 Time Slice 4&5 Information
YYB0 0124	Finder B - Wire Cell 0 Time Slice 0&1 Information
YYB0 0128	Finder B - Wire Cell 0 Time Slice 2&3 Information
YYB0 012C	Finder B - Wire Cell 0 Time Slice 4&5 Information
YYB0 0130	Finder B - Wire Cell 1 Time Slice 0&1 Information
YYB0 0134	Finder B - Wire Cell 1 Time Slice 2&3 Information
YYB0 0138	Finder B - Wire Cell 1 Time Slice 4&5 Information
YYB0 013C	Finder B - Wire Cell 2 Time Slice 0&1 Information
YYB0 0140	Finder B - Wire Cell 2 Time Slice 2&3 Information
YYB0 0144	Finder B - Wire Cell 2 Time Slice 4&5 Information
YYB0 0148	Finder B - Wire Cell 3 Time Slice 0&1 Information
YYB0 014C	Finder B - Wire Cell 3 Time Slice 2&3 Information
YYB0 0150	Finder B - Wire Cell 3 Time Slice 4&5 Information
YYB0 0154	Finder B - Wire Cell 4 Time Slice 0&1 Information
YYB0 0158	Finder B - Wire Cell 4 Time Slice 2&3 Information
YYB0 015C	Finder B - Wire Cell 4 Time Slice 4&5 Information
YYB0 0160	Finder B - Wire Cell 5 Time Slice 0&1 Information
YYB0 0164	Finder B - Wire Cell 5 Time Slice 2&3 Information
YYB0 0168	Finder B - Wire Cell 5 Time Slice 4&5 Information
YYB0 016C	Finder B - Wire Cell 6 Time Slice 0&1 Information
YYB0 0170	Finder B - Wire Cell 6 Time Slice 2&3 Information
YYB0 0174	Finder B - Wire Cell 6 Time Slice 4&5 Information
YYB0 0178	Finder B - Wire Cell 7 Time Slice 0&1 Information
YYB0 017C	Finder B - Wire Cell 7 Time Slice 2&3 Information
YYB0 0180	Finder B - Wire Cell 7 Time Slice 4&5 Information
YYB0 0184	Finder B - Wire Cell 8 Time Slice 0&1 Information
YYB0 0188	Finder B - Wire Cell 8 Time Slice 2&3 Information
YYB0 018C	Finder B - Wire Cell 8 Time Slice 4&5 Information
YYB0 0190	Finder B - Wire Cell 9 Time Slice 0&1 Information
YYB0 0194	Finder B - Wire Cell 9 Time Slice 2&3 Information
YYB0 0198	Finder B - Wire Cell 9 Time Slice 4&5 Information
YYB0 019C	Finder B - Wire Cell 10 Time Slice 0&1 Information

YYB0 01A0 Finder B - Wire Cell 10 Time Slice 2&3 Information
YYB0 01A4 Finder B - Wire Cell 10 Time Slice 4&5 Information
YYB0 01A8 Finder B - Wire Cell 11 Time Slice 0&1 Information
YYB0 01AC Finder B - Wire Cell 11 Time Slice 2&3 Information
YYB0 01B0 Finder B - Wire Cell 11 Time Slice 4&5 Information
YYB0 01B4 Finder B - Wire Cell 12 Time Slice 0&1 Information
YYB0 01B8 Finder B - Wire Cell 12 Time Slice 2&3 Information
YYB0 01BC Finder B - Wire Cell 12 Time Slice 4&5 Information
YYB0 01C0 Finder B - Wire Cell 13 Time Slice 0&1 Information
YYB0 01C4 Finder B - Wire Cell 13 Time Slice 2&3 Information
YYB0 01C8 Finder B - Wire Cell 13 Time Slice 4&5 Information
YYB0 01CC Finder B - Wire Cell 14 Time Slice 0&1 Information
YYB0 01D0 Finder B - Wire Cell 14 Time Slice 2&3 Information
YYB0 01D4 Finder B - Wire Cell 14 Time Slice 4&5 Information
YYB0 01D8 Finder B - Wire Cell 15 Time Slice 0&1 Information
YYB0 01DC Finder B - Wire Cell 15 Time Slice 2&3 Information
YYB0 01E0 Finder B - Wire Cell 15 Time Slice 4&5 Information
YYB0 01E4 Finder B - Wire Cell 16 Time Slice 0&1 Information
YYB0 01E8 Finder B - Wire Cell 16 Time Slice 2&3 Information
YYB0 01EC Finder B - Wire Cell 16 Time Slice 4&5 Information
YYB0 01F0 Finder B - Wire Cell 17 Time Slice 0&1 Information
YYB0 01F4 Finder B - Wire Cell 17 Time Slice 2&3 Information
YYB0 01F8 Finder B - Wire Cell 17 Time Slice 4&5 Information

YYC0 0000 - YYFF FFFC Flash RAM Data Register **(R/W)**
Upper 16 bits
(16-Megabit Flash Ram for download configuration for the Finder Module's PLDs{ Finder FPGA's only)

YY is the VME geographical address of the Finder board.