



Fermi National Accelerator Laboratory

D0 Silicon Strip Detector Upgrade Project

**SVX SEQUENCER CRATE
CUSTOM J2/J3 BACKPLANE**

D0 Engineering Note Number 3823.110-EN-479B

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1 GENERAL INFORMATION

1.1 Custom Bus System Used

The Custom J2/J3 Backplane is a full length (21 slot) user specified custom 3U backplane to be used in both the J2 and J3 positions. Slot spacing is identical to that used for VME (0.8"), and each backplane shall fit into a standard Eurocard VME style crate.

1.2 Application

The purpose of the Custom J2/J3 Backplane is to send and receive control and clock signals from the SVX chips via 3M pleated foil cables (Slots 2-21), and in slot 1, accept a cable connector and route its signal through to a signal distribution board.

1.3 Configuration

1.3.1 Slot definition

The leftmost slot corresponding to Slot 1 will be unique; the other twenty slots will be identical. Slots will be numbered from 1 to 21.

1.3.2 Connectors

Slot one will have provisions for accepting a cable connector and feeding its signals through to the LSL Fanout Board plugged into slot one. The connector will be a 48-pin DIN female mounted exactly in the same position as the top half of a standard VME connector. In the rear of the backplane, Row C will be cut, leaving the tails of rows A and B to protrude and mate with the female connector on a cable. These 32 pins will have a common shroud, and penetration into the cable connector should be between 0.3" and 0.4". The tails should be .025" square.

Each of slots two through twenty will have two 72-pin AMP (or equivalent) metric connectors with P/N 1-536504-2 on the front side of the backplane to accept cards. The horizontal card positioning shall be the same as that for a standard VME crate. On the rear of the backplane, each slot will have two 50-pin 3M Mini D ribbon bulkheads P/N 10250-6212VC, to accept the connectors on the pleated-foil cable. When viewed from the front of the backplane, the 3M Mini D connector will be to the left of its corresponding AMP connector, but will protrude out the rear.

1.3.3 Traces

There are 46 signals on the pleated-foil cable, and there are four grounds. Each of these signals is received by the 3M connector and routed approximately 1/2" to its corresponding pin on the AMP connector. This leaves 26 ground pins on the AMP connector that are used for ground.

Each signal trace is to have 82 ohms characteristic impedance. Each pair of 3M/AMP connectors is to be routed identically. There is no common bussing on this backplane.

There are no traces emanating from the connector in slot 1 in the J2/J3 backplane.

1.3.4 Planes

There will be two ground planes and two signal planes. Spacing will be governed by the 82 ohm impedance requirement. The thickness of the backplane should be at least .125" to provide rigidity.

2 INTERFACE SPECIFICATIONS

2.1.1 Connector Pin Configurations – Original Table

TABLE 1
J2/J3 Backplane Pin Assignments

<i>Net Name</i>	<i>AMP Pin Number</i>	<i>3M Pin Number</i>	<i>Cable Conductor</i>
<i>Cross</i>	A18	1	2
<i>/Cross</i>	C17	26	1
<i>GND</i>	GND	2	4
<i>CLK_A</i>	B17	27	3
<i>/CLK_A</i>	B18	3	6
<i>Sync_Gap</i>	A17	28	5
<i>1st Crossing</i>	A16	4	8
<i>PRIORITY_IN_A</i>	B16	29	7
<i>CHANGE_MODE_A</i>	A15	5	10
<i>MODE1_A</i>	C15	30	9
<i>MODE0_A</i>	B15	6	12
<i>D7_A</i>	B14	31	11
<i>D6_A</i>	A14	7	14
<i>D5_A</i>	C13	32	13
<i>D4_A</i>	A13	8	16
<i>D3_A</i>	B13	33	15
<i>D2_A</i>	A12	9	18
<i>GND</i>	GND	34	17
<i>D1_A</i>	B12	10	20
<i>D0_A</i>	C12	35	19
<i>HDI_ENABLE_A</i>	A11	11	22
<i>DVALID_A</i>	B11	36	21
<i>PRIORITY_OUT_A</i>	B10	12	24
<i>DIR_A</i>	C10	37	23
<i>VCAL_A</i>	A10	13	26
<i>VCAL_B</i>	B9	38	25
<i>DIR_B</i>	A9	14	28
<i>PRIORITY_OUT_B</i>	C9	39	27
<i>DVALID_B</i>	A8	15	30
<i>HDI_ENABLE_B</i>	B8	40	29
<i>D0_B</i>	B7	16	32
<i>D1_B</i>	C7	41	31
<i>GND</i>	GND	17	34
<i>D2_B</i>	B6	42	33
<i>D3_B</i>	A7	18	36
<i>D4_B</i>	C6	43	35
<i>D5_B</i>	A6	19	38
<i>D6_B</i>	A5	44	37
<i>D7_B</i>	B4	20	40
<i>MODE0_B</i>	B5	45	39
<i>MODE1_B</i>	A4	21	42
<i>CHANGE_MODE_B</i>	C4	46	41
<i>PRIORITY_IN_B</i>	A3	22	44
<i>R_Preamplifier</i>	B3	47	43
<i>CFT_Reset</i>	A2	23	46
<i>/CLK_B</i>	B2	48	45
<i>CLK_B</i>	B1	24	48
<i>GND</i>	GND	49	47
<i>Spare</i>	A1	25	50
<i>LI_Accept</i>	C2	50	49

Note: We have defined the four columns of the AMP connector as A, B, C, and D. When viewed from the front of the backplane, row A is on the left. The 3M connector, when viewed from the front, has pin 1 on the lower left. Non-capitalized signals are CFT system only.

2.1.2 Connector Pin Configurations - -Table reordered to show actual signal order

TABLE 2
J2/J3 Backplane Pin Assignments

<u>Net Name</u>	<u>AMP Pin Number</u>	<u>3M Pin Number</u>	<u>Cable Conductor</u>
/Cross	C17	26	1
Cross	A18	1	2
CLK_A	B17	27	3
GND	GND	2	4
Sync_Gap	A17	28	5
/CLK_A	B18	3	6
PRIORITY_IN_A	B16	29	7
1 st Crossing	A16	4	8
MODE1_A	C15	30	9
CHANGE_MODE_A	A15	5	10
D7_A	B14	31	11
MODE0_A	B15	6	12
D5_A	C13	32	13
D6_A	A14	7	14
D3_A	B13	33	15
D4_A	A13	8	16
GND	GND	34	17
D2_A	A12	9	18
D0_A	C12	35	19
D1_A	B12	10	20
DVALID_A	B11	36	21
HDI_ENABLE_A	A11	11	22
DIR_A	C10	37	23
PRIORITY_OUT_A	B10	12	24
VCAL_B	B9	38	25
VCAL_A	A10	13	26
PRIORITY_OUT_B	C9	39	27
DIR_B	A9	14	28
HDI_ENABLE_B	B8	40	29
DVALID_B	A8	15	30
D1_B	C7	41	31
D0_B	B7	16	32
D2_B	B6	42	33
GND	GND	17	34
D4_B	C6	43	35
D3_B	A7	18	36
D6_B	A5	44	37
D5_B	A6	19	38
MODE0_B	B5	45	39
D7_B	B4	20	40
CHANGE_MODE_B	C4	46	41
MODE1_B	A4	21	42
R_Preamp	B3	47	43
PRIORITY_IN_B	A3	22	44
/CLK_B	B2	48	45
CFT_Reset	A2	23	46
GND	GND	49	47
CLK_B	B1	24	48
LI_Accept	C2	50	49
Spare	A1	25	50

Note: We have defined the four columns of the AMP connector as A, B, C, and D. When viewed from the front of the backplane, rowA is on the left. The 3M connector, when viewed from the front, has pin 1 on the lower left. Non-capitalized signals are CFT system only.

2.1.3 New Backplane Pin Configurations – Proposed Signal Order – minimal changes
 Asterisks indicate changes

TABLE 3
J2/J3 Backplane Pin Assignments

<u>Net Name</u>	<u>AMP Pin Number</u>		<u>3M Pin Number</u>	<u>Cable Conductor</u>
/Cross	C17		26	1
Cross	A18		1	2
CLK_A	B17		27	3
GND	GND		2	4
Sync_Gap	A17		28	5
/CLK_A	B18		3	6
PRIORITY_IN_A	B16		29	7
1 st Crossing	A16		4	8
MODE1_A	C15		30	9
CHANGE_MODE_A	A15		5	10
DVALID_A	B11	*	31	11
MODE0_A	B15		6	12
D5_A	C13		32	13
D6_A	A14		7	14
D3_A	B13		33	15
D4_A	A13		8	16
GND	GND		34	17
D2_A	A12		9	18
D0_A	C12		35	19
D1_A	B12		10	20
D7_A	B14	*	36	21
HDI_ENABLE_A	A11		11	22
DIR_A	C10		37	23
PRIORITY_OUT_A	B10		12	24
VCAL_B	B9		38	25
VCAL_A	A10		13	26
PRIORITY_OUT_B	C9		39	27
DIR_B	A9		14	28
HDI_ENABLE_B	B8		40	29
D7_B	B4	*	15	30
D1_B	C7		41	31
D0_B	B7		16	32
D2_B	B6		42	33
GND	GND		17	34
D4_B	C6		43	35
D3_B	A7		18	36
D6_B	A5		44	37
D5_B	A6		19	38
MODE0_B	B5		45	39
DVALID_B	A8	*	20	40
CHANGE_MODE_B	C4		46	41
MODE1_B	A4		21	42
R_Preamplifier	B3		47	43
PRIORITY_IN_B	A3		22	44
/CLK_B	B2		48	45
CFT_Reset	A2		23	46
GND	GND		49	47
CLK_B	B1		24	48
LI_Accept	C2		50	49
Spare	A1		25	50

Note: We have defined the four columns of the AMP connector as A, B, C, and D. When viewed from the front of the backplane, rowA is on the left. The 3M connector, when viewed from the front, has pin 1 on the lower left. Non-capitalized signals are CFT system only.

2.2 AMP Connector Grounds

All AMP Connector pins not mentioned in Table 1 are connected to the backplane ground. This includes all of Row D.

2.3 3M Connector Grounds

In addition to the four pins defined as ground, the connector housing serves as a ground connection between the pleated foil shield and the backplane ground. The region underneath the 3M connectors' mounting holes shall be free of solder mask and tinned to effect good ground connections.

3 ELECTRICAL AND MECHANICAL SPECIFICATIONS

3.1 Packaging & Physical Size

This backplane is the width of a standard 21-slot VME backplane, and must be able to be used as either the J2 or the J3 backplane.

3.2 PC Board Construction

The printed circuit board is a 4 layer board. The high speed signal traces (defined in section 2.1) are implemented as microstrip above ground plane, with geometry chosen to produce a characteristic impedance of 82 ohms.

3.3 Power Capacity

No power supply currents are carried through the signal traces.

4 ELECTRICAL SAFETY

Materials required for an Electrical Safety Review, such as artwork, data sheets, and Engineering Notes, are available from the author.

APPENDIX
Design Drawing



