



**Fermi National Accelerator Laboratory**

**D0 Silicon Strip Detector Upgrade Project**

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

**D0 Engineering Note Number 3823.110-EN-479**

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M. Utes

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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 Connector Pin Configurations

TABLE 1  
J2/J3 Backplane Pin Assignments

<i>Net Name</i>	<i>3M Pin Number</i>	<i>AMP Pin Number</i>
53MHzA	1	A18
153MHzA	26	C17
GND	2	GND
CLK_A	27	B17
/CLK_A	3	B18
CROSSINGA	28	A17
RESETA	4	A16
PRIORITY_IN_A	29	B16
CHANGE_MODE_A	5	A15
MODE1_A	30	C15
MODE0_A	6	B15
D7_A	31	B14
D6_A	7	A14
D5_A	32	C13
D4_A	8	A13
D3_A	33	B13
D2_A	9	A12
GND	34	GND
D1_A	10	B12
D0_A	35	C12
HDI_ENABLE_A	11	A11
DVALID_A	36	B11
PRIORITY_OUT_A	12	B10
DIR_A	37	C10
VCAL_A	13	A10
VCAL_B	38	B9
DIR_B	14	A9
PRIORITY_OUT_B	39	C9
DVALID_B	15	A8
HDI_ENABLE_B	40	B8
D0_B	16	B7
D1_B	41	C7
GND	17	GND
D2_B	42	B6
D3_B	18	A7
D4_B	43	C6
D5_B	19	A6
D6_B	44	A5
D7_B	20	B4
MODE0_B	45	B5
MODE1_B	21	A4
CHANGE_MODE_B	46	C4
PRIORITY_IN_B	22	A3
RESETB	47	B3
CROSSINGB	23	A2
/CLK_B	48	B2
CLK_B	24	B1
GND	49	GND
153MHzB	25	A1
53MHzB	50	C2

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.

## **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

