



**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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## **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

<u>Net Name</u>	<u>3M Pin Number</u>	<u>AMP Pin Number</u>	<u>Cable Conductor</u>
Cross	1	A18	2
/Cross	26	C17	1
GND	2	GND	4
CLK_A	27	B17	3
/CLK_A	3	B18	6
Sync_Gap	28	A17	5
1 <sup>st</sup> Crossing	4	A16	8
PRIORITY_IN_A	29	B16	7
CHANGE_MODE_A	5	A15	10
MODE1_A	30	C15	9
MODE0_A	6	B15	12
D7_A	31	B14	11
D6_A	7	A14	14
D5_A	32	C13	13
D4_A	8	A13	16
D3_A	33	B13	15
D2_A	9	A12	18
GND	34	GND	17
D1_A	10	B12	20
D0_A	35	C12	19
HDI_ENABLE_A	11	A11	22
DVALID_A	36	B11	21
PRIORITY_OUT_A	12	B10	24
DIR_A	37	C10	23
VCAL_A	13	A10	26
VCAL_B	38	B9	25
DIR_B	14	A9	28
PRIORITY_OUT_B	39	C9	27
DVALID_B	15	A8	30
HDI_ENABLE_B	40	B8	29
D0_B	16	B7	32
D1_B	41	C7	31
GND	17	GND	34
D2_B	42	B6	33
D3_B	18	A7	36
D4_B	43	C6	35
D5_B	19	A6	38
D6_B	44	A5	37
D7_B	20	B4	40
MODE0_B	45	B5	39
MODE1_B	21	A4	42
CHANGE_MODE_B	46	C4	41
PRIORITY_IN_B	22	A3	44
R_Preamplifier	47	B3	43
CFT_Reset	23	A2	46
/CLK_B	48	B2	45
CLK_B	24	B1	48
GND	49	GND	47
Spare	25	A1	50
L1_Accept	50	C2	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, 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.



