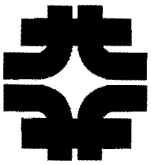

Fermi National Accelerator Laboratory

D0 Silicon Strip Detector Upgrade Project

SVX SEQUENCER CRATE
CUSTOM J1 BACKPLANE

D0 Engineering Note Number 3823.110-EN-478

10/29/97

M. Utes

1 GENERAL INFORMATION 1
1.1 Custom Bus System Used 1
1.2 Application 1
1.3 Configuration 1

2 INTERFACE SPECIFICATIONS 3
2.1 Connector Pin Configuration 3

3 ELECTRICAL & MECHANICAL SPECIFICATIONS 4
3.1 Packaging & Physical Size 4
3.2 PC Board Construction 4
3.3 Power Capacity 4

4 ELECTRICAL SAFETY 4

APPENDIX
A Geographic Addressing. 5

1 GENERAL INFORMATION

1.1 Custom Bus System Used

The Custom J1 Backplane is a full length (21 slot) user specified custom 3U backplane to be used in the J1 position. 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 J1 Backplane is to:

- Provide +5 volt power to slots 1 through 21.
- Provide -5.2 volt power to slots 1 through 21.
- Provide five bits of geographic addressing to slots 2 through 21. Slot 2 will have all five bits pulled low; slot 21 will have the value 10100. See Appendix A.
- Route a differential 1553 signal from a triaxial bulkhead connector to slots 2 through 11. This differential signal is bussed as a daisy chain. A 75 ohm resistor to ground shall be located near the last destination slot for each of these two signals.
- Route a second differential 1553 signal from a triaxial bulkhead connector to slots 12 through 21. This differential signal is bussed as a daisy chain. A 75 ohm resistor to ground shall be located near the last destination slot for each of these two signals.
- Route two NRZ signals and two Clock signals from slot 1 to each of slots 2 through 21. These are individual signals, not bussed.

1.3 Configuration

1.3.1 Slot definition

The leftmost slot corresponding to Slot 1 will be a distribution point for the NRZ and Clock differential signals; the other twenty slots will be able to accept identical cards. Slots will be numbered from 1 to 21.

1.3.2 Connectors

All connectors will be mounted to the front of the backplane to accept cards.

Slot 1 will have a normal DIN 96-pin receptacle mounted in exactly the same position as that in slot 1 of J1 of a standard 9U VME backplane.

Each of the slots 2 through 21 will have one 48-pin DIN connector which is equivalent to a "half-high" VME connector. The horizontal card positioning shall be the same as that for a

standard VME crate. Each connector shall be vertically positioned such that the connector occupies the same space as the top half of a normal J1 96-pin DIN connector in a VME crate.

The two triaxial bulkheads are Trompeter Electronics part # CBJ157 or equivalent, and should be attached so the 1553 cable plugs into the rear of the backplane in the vicinity of slots 2 and 21.

1.3.3 Traces

Each signal trace is to have 82 ohms characteristic impedance, except the differential traces from the 1553 connectors which are 75 ohms.

1.3.4 Planes

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

1.4 Power

Power for the crate comes from bus bars attached to the J1 backplane using "power bugs" located directly underneath the row of 48-pin DIN connectors. There are two power sources: +5 volt power and -5.2 volt power. For the +5 volt circuit, there should be enough power bugs to handle 260 Amperes. The -5.2 volt circuit should have enough power bugs to handle 60 Amperes. Power planes then carry the current to the designated pins in the connectors.

2 INTERFACE SPECIFICATIONS

2.1 Connector Pin Configurations

TABLE 1
J1 Backplane Pin Assignments, Slot 1

Row	Column A	Column B	Column C
1	GND	+NRZ1	-NRZ1
2	+CLK2	+CLK1	-CLK1
3	GND	+NRZ2	--NRZ2
4	-CLK2	+NRZ3	-NRZ3
5	GND	+CLK3	-CLK3
6	+CLK4	+NRZ4	-NRZ4
7	GND	+NRZ5	-NRZ5
8	-CLK4	+CLK5	-CLK5
9	GND	+NRZ6	-NRZ6
10	+CLK7	+CLK6	-CLK6
11	GND	+NRZ7	-NRZ7
12	-CLK7	+NRZ8	-NRZ8
13	+5V	+CLK8	-CLK8
14	+CLK9	+NRZ9	-NRZ9
15	+5V	+NRZ10	--NRZ10
16	-CLK9	+CLK10	-CLK10
17	-5.2V	+NRZ11	-NRZ11
18	+CLK12	+CLK11	-CLK11
19	-5.2V	+NRZ12	--NRZ12
20	-CLK12	+NRZ13	-NRZ13
21	GND	+CLK13	-CLK13
22	+CLK14	+NRZ14	-NRZ14
23	GND	+NRZ15	-NRZ15
24	-CLK14	+CLK15	-CLK15
25	GND	+NRZ16	-NRZ16
26	+CLK17	+CLK16	-CLK16
27	GND	+NRZ17	-NRZ17
28	-CLK17	+NRZ18	-NRZ18
29	GND	+CLK18	-CLK18
30	+CLK19	+NRZ19	-NRZ19
31	GND	+NRZ20	--NRZ20
32	-CLK19	+CLK20	-CLK20

TABLE 2
J1 Backplane Pin Assignments, Slots 2-21

Row	Column A	Column B	Column C
1	GND	GND	GND
2	GA0	GND	+NRZ
3	GA1	GND	-NRZ
4	GA2	+5V	GND
5	GA3	+5V	+CLK
6	GA4	+5V	-CLK
7	GND	+5V	GND
8	+5V	GND	+5V
9	+5V	GND	+5V
10	+5V	GND	GND
11	+5V	GND	+5V
12	GND	GND	+5V
13	-5.2V	-5.2V	GND
14	-5.2V	-5.2V	+1553
15	-5.2V	-5.2V	-1553
16	GND	GND	GND

3 ELECTRICAL AND MECHANICAL SPECIFICATIONS

3.1 Packaging & Physical Size

The board is to fit into the J1 position of a standard 21-slot VME crate.

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 the correct characteristic impedances.

3.3 Power Capacity

Power for the crate comes from bus bars attached to the J1 backplane using "power bugs" located directly underneath the row of 48-pin DIN connectors. There are two power sources: +5 volt power and -5.2 volt power. For the +5 volt circuit, there should be enough power bugs to handle 260 Amperes. The -5.2 volt circuit should have enough power bugs to handle 60 Amperes. Power planes then carry the current to the designated pins in the connectors.

4 ELECTRICAL SAFETY

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

APPENDIX A
Geographic Addressing

Slot	GA4	GA3	GA2	GA1	GA0
2	Gnd	Gnd	Gnd	Gnd	+5V
3	Gnd	Gnd	Gnd	+5V	Gnd
4	Gnd	Gnd	Gnd	+5V	+5V
5	Gnd	Gnd	+5V	Gnd	Gnd
6	Gnd	Gnd	+5V	Gnd	+5V
7	Gnd	Gnd	+5V	+5V	Gnd
8	Gnd	Gnd	+5V	+5V	+5V
9	Gnd	+5V	Gnd	Gnd	Gnd
10	Gnd	+5V	Gnd	Gnd	+5V
11	Gnd	+5V	Gnd	+5V	Gnd
12	Gnd	+5V	Gnd	+5V	+5V
13	Gnd	+5V	+5V	Gnd	Gnd
14	Gnd	+5V	+5V	Gnd	+5V
15	Gnd	+5V	+5V	+5V	Gnd
16	Gnd	+5V	+5V	+5V	+5V
17	+5V	Gnd	Gnd	Gnd	Gnd
18	+5V	Gnd	Gnd	Gnd	+5V
29	+5V	Gnd	Gnd	+5V	Gnd
20	+5V	Gnd	Gnd	+5V	+5V
21	+5V	Gnd	+5V	Gnd	Gnd