

N8VEM

S-100 BACKPLANE

VERSION 04

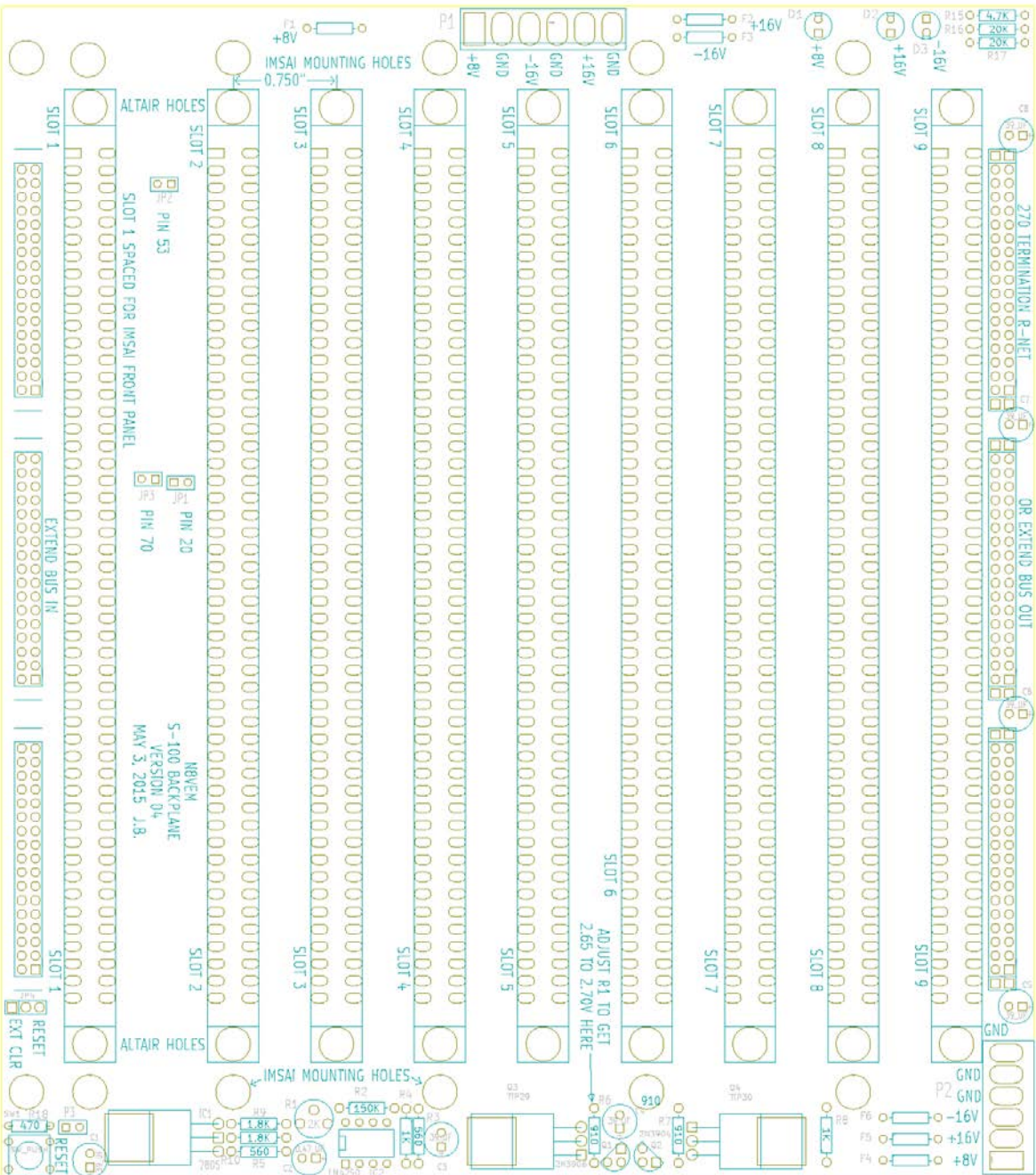
MAY 3, 2015 J.B.

Background.

This board is a copy of Andrew Lynch's Version 03 board (with 8 slots) but with added features.

Added features:

- 9 SLOT
- Active Termination (copied from v 03)
- 1st SLOT is spaced 1" from other slots to accommodate IMSAI Style chassis. All other slots are spaced the usual 0.75"
- Mounting holes for ALTAIR and IMSAI chassis. Hole size 0.138" (6-32 screws).
- Two power connectors with different pin outs.
 - P1 with 0.2" (5.08mm) spacing. Hole Size 0.060"
 - P2 with 0.156" spacing. Hole Size 0.065"
- Expansion Connectors with multiple function
 - Expansion IN/OUT
 - Test point
 - Active Termination
- Jumpers to ground some S-100 pins as needed by IEEE-696.
 - Pins 20, 53 & 70. (Pin 53 on ALTAIR and IMSAI computers is needed for Front Panel operations and should not be grounded when using these front panels).
- Thick board, approximately 0.100".
- S-100 connectors require 0.25" row spacing. Hole sized 0.040".
- Fused power.



Construction

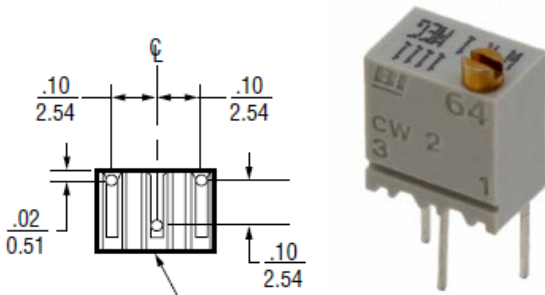
The exact bill of materials will vary based on your desired build. You may choose to install less than all nine of the S-100 connectors. Active Termination is also optional with slower speed systems (4MHz or less), but a must have for high speed. Which power connector you choose is also optional and based upon your ultimate chassis design. Perhaps you already have one size or another of the connector and want to use that. With all the variations, the parts given in the BOM are only a single possibility, your build will vary.

Capacitors.

The voltage rating on capacitors can be higher than shown; this will not affect the performance in any way. If you are ordering all the capacitors, then it is likely to be cheaper to order all the same voltage (say 16V), further, it will eliminate errors when building. Sometimes a capacitor rated at a higher voltage is actually cheaper than a lower rated one of the same capacitance. This can happen when it is more popular to order that higher voltage, hence production increases and cost per unit decreases.

Resistors.

All resistors are 1/4Watt. Trimmer pot has 3 leads, 0.200" spacing between ends and a middle pin that is 0.100" row offset. Eg. Digikey part number: 987-1065-ND



Fuses.

These are fast acting Micro Fuses (eg. Digikey Part number: F5580TR-ND). They are optional, you may simply install a jumper wire here if you choose not to use them, or if your power supply already has fused outputs. The exact values of the fuses depend on your S-100 build. Their purpose is to protect the power supply and circuit traces. As a general rule, they should not be higher than the maximum rated current output of your power supply. Here are some reasonable values, but the current demands of the boards you install in your S-100 will ultimately be your best guide. You may also choose to substitute these fuses with PTC type fuses.

Fuse	Voltage Supply	Rating
F1, F4	+8V	3 to 10 Amps
F3, F5	+16V	1 Amp
F2, F6	-16V	1 Amp



BILL OF MATERIALS

Base Build

Part	Description	
Slot1-9	S-100 Connector. 0.25" row spacing	
P1	6 Position Connector. 0.200" (5.08mm)	
P2	6 Position Connector. 0.156"	
F1-F3	Micro fuses for P1 Connector. See text	Eg. Digikey p/n: F5580TR-ND
F4-F6	Micro fuses for P2 Connector. See Text	
D1-D3	LED's. Your favorite type.	
R15	4.7K Resistor	
R16, 17	20K Resistor	
JP1-3	2 Pin 0.100" Pin Header	
JP1-3	Mini-Jumpers	

Active Termination

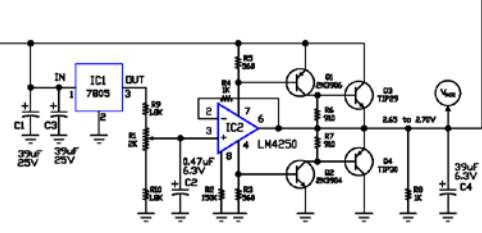
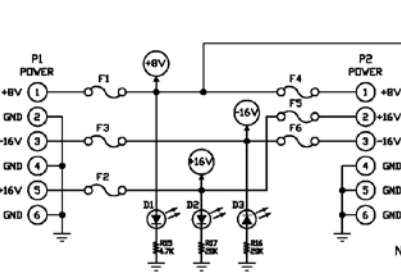
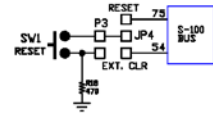
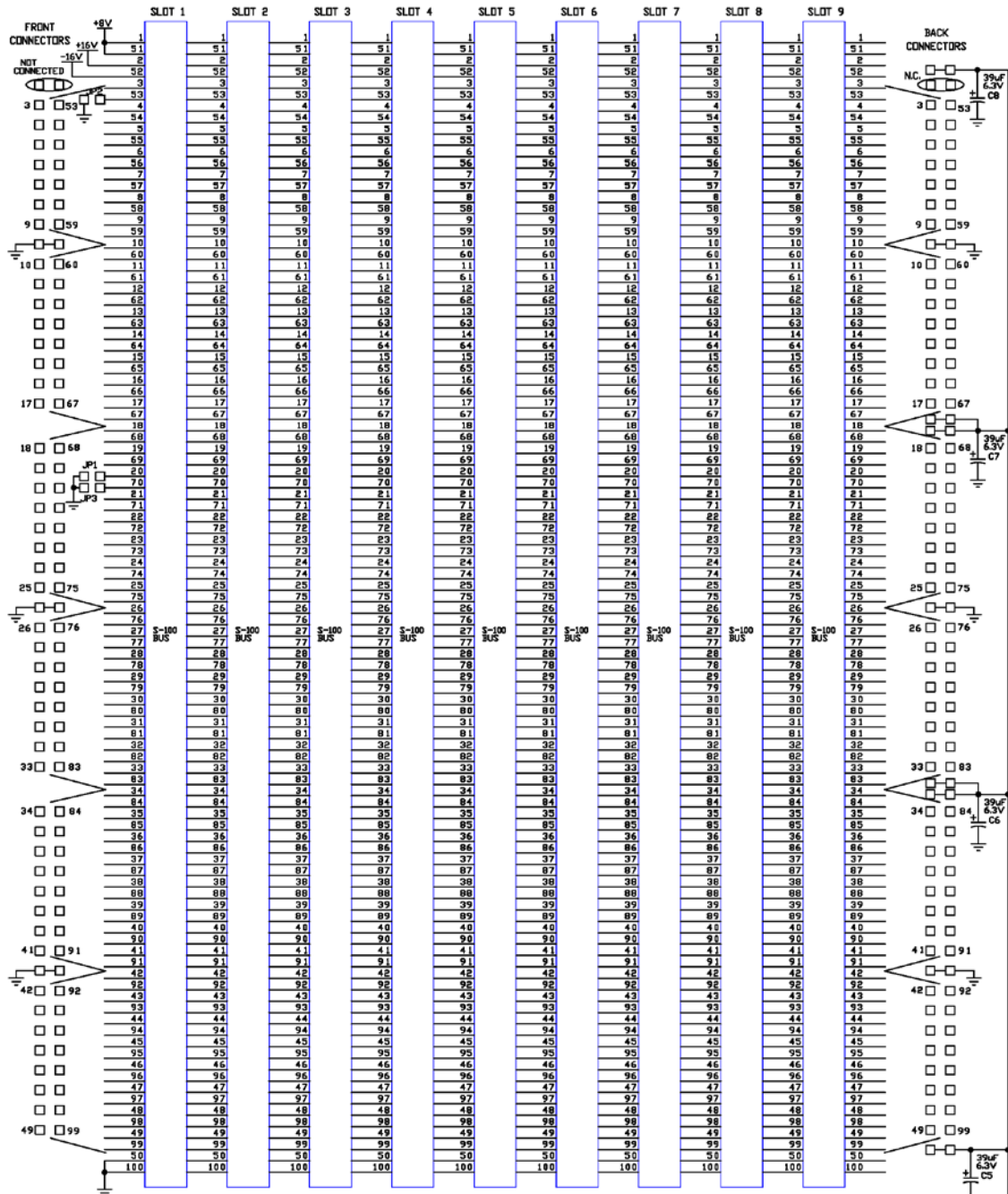
Part	Description	
C1,C3	39uF / 25V Tantalum Capacitor	
C2	0.47uF / 6.3V Tantalum Capacitor	
C4-C8	39uF / 6.3V Tantalum Capacitor (see text)	
IC1	LM7805 Voltage Regulator. Positive 5 Volts. TO-220	
IC2	LM4250 Op Amp	
Q1	2N3906 PNP Transistor TO-92	
Q2	2N3904 NPN Transistor TO-92	
Q3	TIP29 NPN Power Transistor TO-220	
Q4	TIP30 PNP Power Transistor TO-220	
R1	2K Trimmer POT. 0.100" spacing, 0.100" row offset	Eg Digikey p/n: 987-1065-ND
R2	150K Resistor	
R3,R5	560 Ohm Resistor	
R4, R8	1K Resistor	
R6, R7	910 Ohm Resistor	
R9, R10	1.8K Resistor	
RN1-12	270 Ohm Resistor Network. 9 pin (8 Resistors Bussed)	

Reset Switch

Part	Description	
SW1	Small tactile PCB Mounted Momentary Push Button Switch	
R18	470 Ohm Resistor	
P3	2 Pin 0.100" Pin Header	
JP4	3 Pin 0.100" Pin Header	

Expansion Connectors

Part	Description	
Front Connectors	34 pin (2x17) 0.100 Pin Headers (for Test Pins)	
Front Connectors	34 pin (2x17) 0.100 PCB Mounted Ribbon Cable	
Back Connectors	34 pin (2x17) 0.100 PCB Mounted Ribbon Cable	

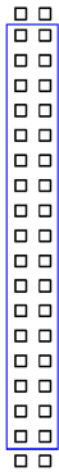


NBVM
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SCHEMATIC

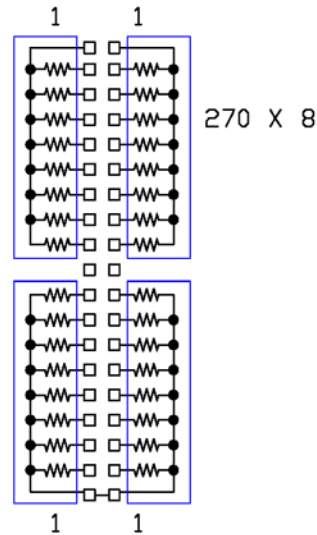
NOTE: THE FRONT AND BACK CONNECTORS INCLUDE ALL THE S-100 PINS EXCEPT FOR THE POWER PINS 1, 2, 51 AND 52.

The Front expansion connectors can be populated with pin headers as test points or used to extend another backplane board. The back expansion connector can be used to extend or terminate the bus as shown below.

BACK CONNECTOR



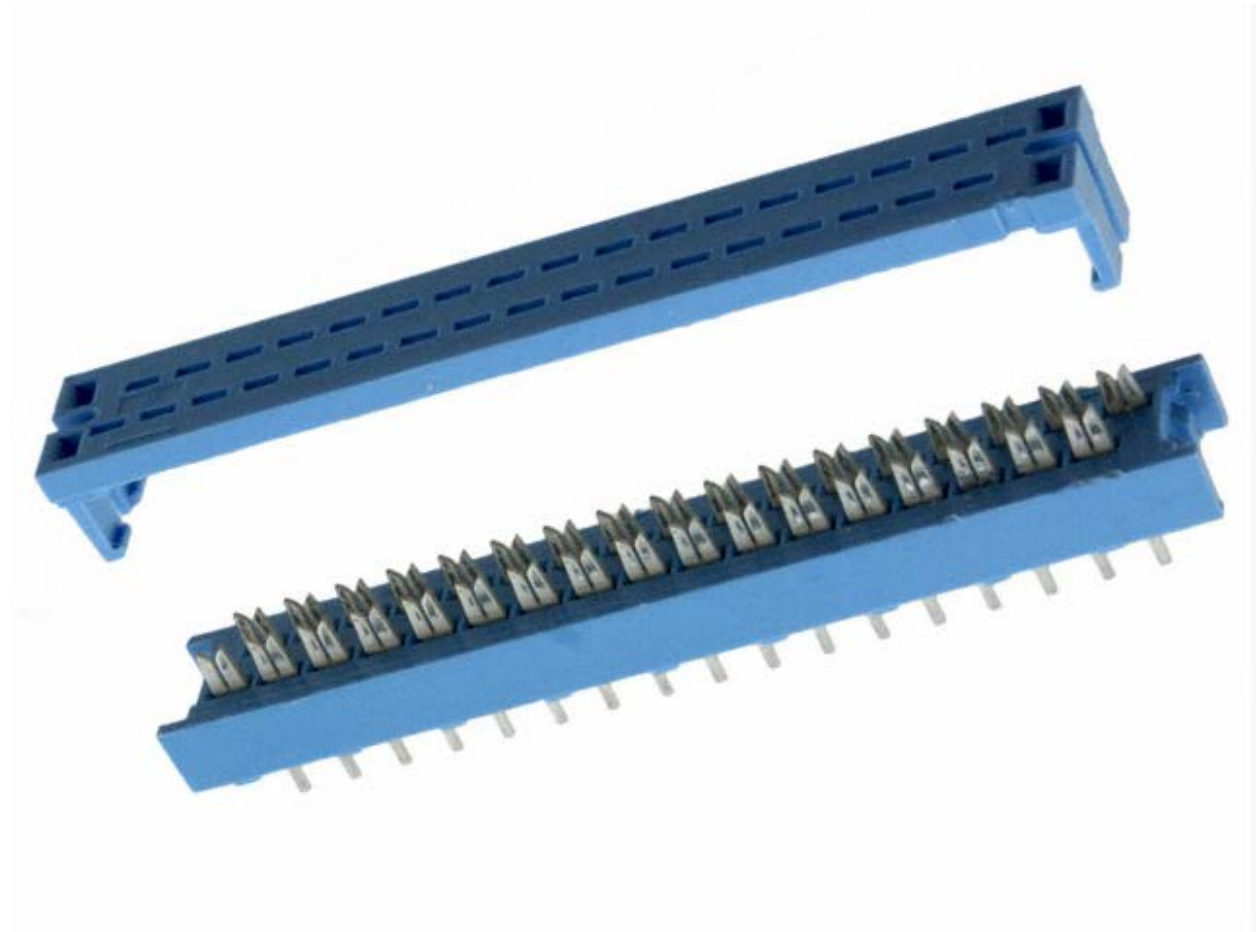
EXTEND BUS
TO NEXT
BACK PLANE
INSTALL 34 PIN
HEADER IN
CENTER POSITION
IGNORE LAST TWO
PINS ON EACH SIDE



TERMINATE BUS
INSTALL 4 RESISTOR
NETWORKS 270 X 8
IN OUTER POSITIONS
IGNORE MIDDLE TWO
PINS IN CENTER

Extending the bus on high speed systems (over 4Mhz) might present a problem as the connectors between two backplanes may cause undesired reflections. It has not been tested but the option is there for your choice to try. No guarantees of performance are given. Perhaps one way to minimize the medium transition is to use PCB mounted ribbon cables (eg. Digikey Part number 1658525-2-ND) instead of pin headers with connectors & ribbon cables.

Eg. Digikey Part Number: 1658525-2-ND



S-100 Connectors

These connectors may be found on Ebay or other Electronic Surplus stores. Ask on the S-100 computer forums for more advice on sourcing these parts.