

# 493.72 Digital I/O Transition Board

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This functional specification covers 493 Digital I/O Transition Board.

May, 2002 Rev E

## Revision History

10-20-98 Initial Creation

11-19-98 Rev B

- Changed Electrical Specifications for fused 12 volts to give maximum current at 50 deg. C rather than 20 deg. C.

12-7-98 Rev C

- Add jumper headers X2, X3, X4 and X5 to select debounce times for input banks 1-4, 5-8, 9-12 and 13-16 respectively.

2-23-99 Rev D

- Add model number to the spec. Add drawing numbers to the spec.

5-9-02 Rev E

- Added more detail to DIO electrical specifications

## 1.1 introduction

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The Digital I/O Transition Board contains 16 general purpose input and output channels. It is designed to interface with the multi-channel transition bus, residing in the rear card cage of the 493 chassis.

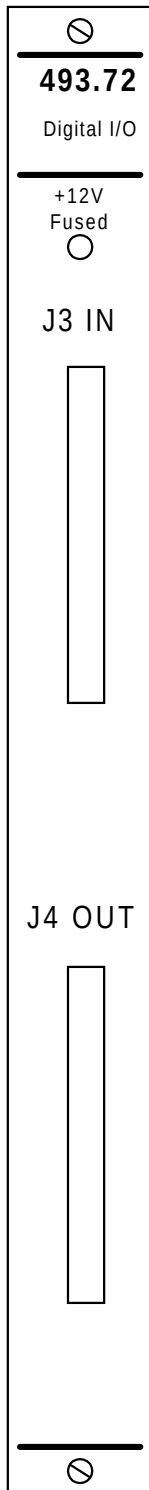
## 1.2 specifications

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| Parameter                   | Specification                                                                                                                                                                                                          |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating environment:      |                                                                                                                                                                                                                        |
| temperature                 | 5°C to 40°C ambient                                                                                                                                                                                                    |
| humidity                    | 0 to 85%, non-condensing                                                                                                                                                                                               |
| Altitude                    | 10,000 ft max                                                                                                                                                                                                          |
| air flow                    | 300 LFM                                                                                                                                                                                                                |
| Board size:                 |                                                                                                                                                                                                                        |
| height                      | 234 mm                                                                                                                                                                                                                 |
| depth                       | 80 mm                                                                                                                                                                                                                  |
| Weight                      | 5 oz.(.14 kg)                                                                                                                                                                                                          |
| Transition bus compliance   | A10: D16 Carrier Transition space                                                                                                                                                                                      |
| Input channel parameters    | 16 Optically Isolated;<br><br>Input on voltage = 2.7V – 26V (@ 0.5 mA min).<br><br>Input off voltage < 0.8 volts<br><br>Input Resistance = 2K<br><br>Jumper selectable debounce times: 20msec, 10msec, 1msec, 100usec. |
| Output channel parameters   | 16 Optically Isolated open collector, open emitter transistor outputs;<br><br>Vce max = 30V.<br><br>Vce(sat) <= 1V @ Ic <= 6 mA<br><br>Ic(max) = 20mA                                                                  |
| Fused +12 Volt Power Output | Self resetting upon fault clearing, 1 A max.                                                                                                                                                                           |

## 1.3 functional description

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- J3 connector provides connections to 16 channels of digital inputs and fused +12V power.
- J4 connector provides connections to 16 channels of digital outputs and fused +12V power
- +12V Fused LED indicates the state of the fuse for the fused +12V power output. If the LED is on, the fuse is intact.

## 1.4 registers / address map

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**register address map**

| REGISTER       | ADDRESS | READ/<br>WRITE | WIDTH<br>(BITS) | INITIAL<br>VALUE |
|----------------|---------|----------------|-----------------|------------------|
| Board ID       | 0       | ro             | 16              |                  |
| Digital Input  | 2       | ro             | 16              |                  |
| Digital Output | 4       | r/w            | 16              | 0's              |

**Board ID Register**

| BIT  | NAME     | FUNCTION                |
|------|----------|-------------------------|
| 0-15 | Board ID | Board ID = 0050 ( HEX ) |

**Digital Input Register**

| BIT  | NAME          | FUNCTION                                                                                          |
|------|---------------|---------------------------------------------------------------------------------------------------|
| 0-15 | Digital Input | Read Only. Bits 15 – 0 correspond to digital inputs 16 – 1 respectively.<br><br>1 = Input active. |

**Digital Output Register**

| BIT  | NAME           | FUNCTION                                                                                                                 |
|------|----------------|--------------------------------------------------------------------------------------------------------------------------|
| 0-15 | Digital Output | R/W. Bits 15 – 0 correspond to digital output 16 – 1 respectively. (Power up/reset state = 0 )<br><br>1 = Output active. |

## 1.5 connections

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**Digital Inputs D-37S (J3)**

| Pin | Signal     | Pin | Signal      |
|-----|------------|-----|-------------|
| 1   | Chan 1 Hi  | 20  | Chan 1 Low  |
| 2   | Chan 2 Hi  | 21  | Chan 2 Low  |
| 3   | Chan 3 Hi  | 22  | Chan 3 Low  |
| 4   | Chan 4 Hi  | 23  | Chan 4 Low  |
| 5   | Chan 5 Hi  | 24  | Chan 5 Low  |
| 6   | Chan 6 Hi  | 25  | Chan 6 Low  |
| 7   | Chan 7 Hi  | 26  | Chan 7 Low  |
| 8   | Chan 8 Hi  | 27  | Chan 8 Low  |
| 9   | Chan 9 Hi  | 28  | Chan 9 Low  |
| 10  | Chan 10 Hi | 29  | Chan 10 Low |
| 11  | Chan 11 Hi | 30  | Chan 11 Low |
| 12  | Chan 12 Hi | 31  | Chan 12 Low |
| 13  | Chan 13 Hi | 32  | Chan 13 Low |
| 14  | Chan 14 Hi | 33  | Chan 14 Low |
| 15  | Chan 15 Hi | 34  | Chan 15 Low |
| 16  | Chan 16 Hi | 35  | Chan 16 Low |
| 17  | No Connect | 36  | 12V GND     |
| 18  | +12VDC     | 37  | 12V GND     |
| 19  | +12VDC     |     |             |

**Digital Outputs D-37S (J4)**

| Pin | Signal     | Pin | Signal      |
|-----|------------|-----|-------------|
| 1   | Chan 1 Hi  | 20  | Chan 1 Low  |
| 2   | Chan 2 Hi  | 21  | Chan 2 Low  |
| 3   | Chan 3 Hi  | 22  | Chan 3 Low  |
| 4   | Chan 4 Hi  | 23  | Chan 4 Low  |
| 5   | Chan 5 Hi  | 24  | Chan 5 Low  |
| 6   | Chan 6 Hi  | 25  | Chan 6 Low  |
| 7   | Chan 7 Hi  | 26  | Chan 7 Low  |
| 8   | Chan 8 Hi  | 27  | Chan 8 Low  |
| 9   | Chan 9 Hi  | 28  | Chan 9 Low  |
| 10  | Chan 10 Hi | 29  | Chan 10 Low |
| 11  | Chan 11 Hi | 30  | Chan 11 Low |
| 12  | Chan 12 Hi | 31  | Chan 12 Low |
| 13  | Chan 13 Hi | 32  | Chan 13 Low |
| 14  | Chan 14 Hi | 33  | Chan 14 Low |
| 15  | Chan 15 Hi | 34  | Chan 15 Low |
| 16  | Chan 16 Hi | 35  | Chan 16 Low |
| 17  | No Connect | 36  | 12V GND     |
| 18  | +12VDC     | 37  | 12V GND     |
| 19  | +12VDC     |     |             |

## 1.6 Transition Bus Definition

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J1 Pin Assignments

| Pin # | Row A          | Row B           | Row C          |
|-------|----------------|-----------------|----------------|
| 1     | /INTERLOCK 1   | <b>+3.3V</b>    | /INTERLOCK 2   |
| 2     | /INTERLOCK 3   | <b>+3.3V</b>    | /INTERLOCK 4   |
| 3     | /INTERLOCK 5   | <b>3.3V GND</b> | /INTERLOCK 6   |
| 4     | /INTERLOCK 7   | <b>3.3V GND</b> | /INTERLOCK 8   |
| 5     | A1             | RESERVED        | A2             |
| 6     | A3             | RESERVED        | A4             |
| 7     | A5             | RESERVED        | A6             |
| 8     | A7             | RESERVED        | A8             |
| 9     | A9             | RESERVED        | A10            |
| 10    | D0             | RESERVED        | D1             |
| 11    | D2             | RESERVED        | D3             |
| 12    | D4             | RESERVED        | D5             |
| 13    | D6             | <b>DIG GND</b>  | D7             |
| 14    | D8             | <b>DIG GND</b>  | D9             |
| 15    | D10            | <b>DIG GND</b>  | D11            |
| 16    | D12            | <b>DIG GND</b>  | D13            |
| 17    | D14            | <b>+5V</b>      | D15            |
| 18    | R/W            | <b>+5V</b>      | /RESET         |
| 19    | /DS            | <b>+5V</b>      | /DTACK         |
| 20    | /SLOTSEL       | <b>+5V</b>      | /FAIL          |
| 21    | /E-STOPIN      | SUPER CLOCK     | HI CLOCK       |
| 22    | /E-STOPOUT     | /PWRFAIL        | LOW CLOCK      |
| 23    | <b>+15 V</b>   | <b>ANLG GND</b> | <b>+15 V</b>   |
| 24    | RESERVED       | RESERVED        | RESERVED       |
| 25    | <b>-15 V</b>   | <b>ANLG GND</b> | <b>-15 V</b>   |
| 26    | <b>+12V</b>    | <b>12V GND</b>  | <b>+12V</b>    |
| 27    | RESERVED       | RESERVED        | RESERVED       |
| 28    | <b>-12V</b>    | <b>12V GND</b>  | <b>-12V</b>    |
| 29    | <b>24 VGND</b> | <b>24 VGND</b>  | <b>24 VGND</b> |
| 30    | <b>24 VGND</b> | <b>24 VGND</b>  | <b>24 VGND</b> |
| 31    | <b>+24</b>     | <b>+24</b>      | <b>+24</b>     |
| 32    | <b>+24</b>     | <b>+24</b>      | <b>+24</b>     |

# 1.7 Jumpers

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Jumper blocks X2, X3, X4 and X5 are used to select debounce times for digital input channels 1-4, 5-8, 9-12 and 13-16 respectively. Each jumper block can be configured to select one of four debounce times for the 4 input channels associated with that jumper block ( i.e. all four channels have the same debounce time as assigned by their corresponding jumper block). The figure below shows the jumper settings for the four supported debounce times for jumper blocks X2, X3, X4 and X5.



# 1.8 list of related drawings

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|---------------------|-------------|
| 1. Module Assembly: | 100-003-853 |
| 2. PWA:             | 558396-01   |
| 3. PWB:             | 558395-01   |
| 4. Schematic:       | 558394-01   |