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HARDWARE REFERENCE MANUAL

Accessory 11P

24/48 IN – 24/48 OUT OPTO I/O

xAx-603731-10x-xHxx

August 22, 2005

DELTA TAU
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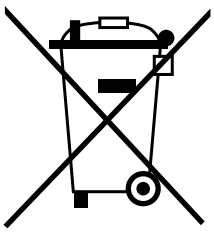
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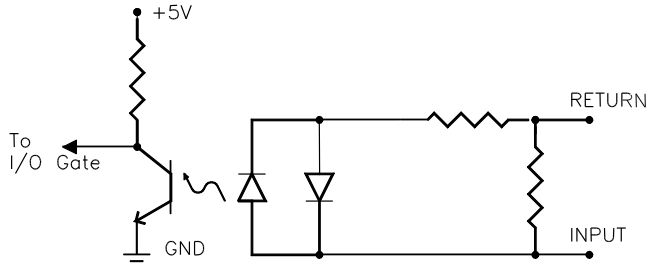
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INTRODUCTION

The PMAC Accessory 11P (ACC-11P) is a general-purpose input/output board for the Turbo PMAC and PMAC systems. It may be configured for a wide variety of different uses to serve many diverse applications. ACC-11P provides 24 lines of ***optically isolated*** inputs and 24 lines of ***optically isolated*** outputs. Option 1 provides 24 additional inputs and 24 additional outputs. This accessory provides PMAC with up to 96 bits of I/O which can be configured to the customer's needs. ACC-11P is a PCI bus-compatible accessory which is designed to transfer data through the 50-pin JEXP expansion port connector.

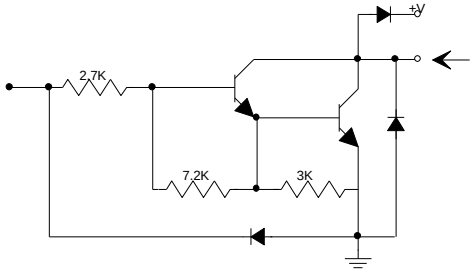
The inputs to the ACC-11P board have an activation range from 12V to 24V, and can either be sinking or sourcing depending on the reference to the opto circuitry. The opto-isolator IC used is a PS2705-4NEC-ND quad photo-transistor output type. This IC allows the current to flow from return to flag (sinking) or from flag to return (sourcing).



The output drivers are organized in a set of three 8-bit groups. Each byte may be ordered with either current sourcing drivers or with current sinking drivers. The default configuration of this accessory board uses UDN2981 current sourcing drivers for the three 8-bit output groups. With this configuration, the current drawn from each output line should be limited to 100mA at voltage levels between 12 and 24 volts. Custom configurations are available for current sinking applications. In current sinking configurations, one ULN2803 driver is used per 8-bit output group. Each open collector output line can sink up to 100mA when pulled up to a voltage level between 12 and 24 volts (external pull-up resistors are not supplied).

Sinking Outputs:

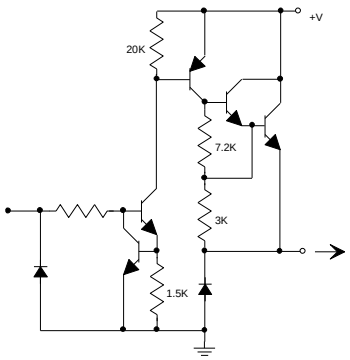
OUTPUT CHIP EQUIVALENT
CIRCUIT ULN2803 FOR SINKING



INVERTING, OPEN COLLECTOR, SINKING, 12-24V

Sourcing Outputs:

OUTPUT CHIP EQUIVALENT
CIRCUIT UDN2981 FOR SOURCING



NON-INVERTING, SOURCING, 12-24V

HARDWARE SETUP

ADDRESS SELECT DIP SWITCH S1

The DIP switch (S1) settings allow the user to select the starting address location for the first IO gate on the ACC-11P. The ACC-11P must have several jumpers configured to work properly with other JEXP cards.

DIP SWITCH SETTINGS

CHIP SELECT	PMAC Base Address	Turbo PMAC Base Address	DIP SWITCH SW1 POSITION					
			6	5	4	3	2	1
CS4(Default)	Y:$FFD0	Y:$78A00	**OPEN***	**OPEN***	CLOSE	CLOSE	**OPEN**	CLOSE
CS6	Y:$FFD8	Y:$78B00	**OPEN***	**OPEN***	CLOSE	CLOSE	**OPEN**	**OPEN**
CS10	Y:$FFE0	Y:$78A00	**OPEN***	**OPEN***	CLOSE	**OPEN**	CLOSE	CLOSE
CS12	Y:$FFE8	Y:$78D00	**OPEN***	**OPEN***	CLOSE	**OPEN**	CLOSE	**OPEN**
CS14	Y:$FFF0	Y:$78E00	**OPEN***	**OPEN***	CLOSE	**OPEN**	**OPEN**	CLOSE
CS16	Y:$FFF8	Y:$78F00	**OPEN***	**OPEN***	CLOSE	**OPEN**	**OPEN**	**OPEN**

* SW1-5&6 do not affect chip select settings on non-Turbo PMAC systems.

Jumpers

Please refer to the layout diagram of ACC-11E for the location of the jumpers on the board.

E-Point Jumpers

E1-E6*: Sinking or Sourcing Input Select

Jumpers	Descriptions
E1	1-2 Sinking inputs with the PS2705-4 IC for inputs 00 through 07 2-3 Sourcing outputs with the PS2705-4 IC for inputs 00 through 07
E2	1-2 Sinking inputs with the PS2705-4 IC for inputs 08 through 15 2-3 Sourcing outputs with the PS2705-4 IC for inputs 08 through 15
E3	1-2 Sinking inputs with the PS2705-4 IC for inputs 16 through 23 2-3 Sourcing outputs with the PS2705-4 IC for inputs 16 through 23
E4 (Opt. 1 only)	1-2 Sinking inputs with the PS2705-4 IC for inputs 24 through 31 2-3 Sourcing outputs with the PS2705-4 IC for inputs 24 through 31
E5 (Opt. 1 only)	1-2 Sinking inputs with the PS2705-4 IC for inputs 32 through 39 2-3 Sourcing outputs with the PS2705-4 IC for inputs 32 through 39
E6 (Opt. 1 only)	1-2 Sinking inputs with the PS2705-4 IC for inputs 40 through 47 2-3 Sourcing outputs with the PS2705-4 IC for inputs 40 through 47

* Set by factory

Jumper	Config	Description	Settings	Default
E7	1-2	Sample Clock Select	1-2 servo clock is SCLK 2-3 phase clock is SCLK	1-2

E7 Sample Clock Select

E9-E14*, E19-E24*: Sinking or Sourcing Output Select

Jumpers	Descriptions
E9 & E10	1-2 Sinking inputs with the ULN2803A IC for outputs 00 through 07 2-3 Sourcing outputs with the UDN2981A IC for outputs 00 through 07
E11 & E12	1-2 Sinking inputs with the ULN2803A IC for outputs 08 through 15 2-3 Sourcing outputs with the UDN2981A IC for outputs 08 through 15
E13 & E14	1-2 Sinking inputs with the ULN2803A IC for outputs 16 through 23 2-3 Sourcing outputs with the UDN2981A IC for outputs 16 through 23
E19 & E20 (Opt. 1 only)	1-2 Sinking inputs with the ULN2803A IC for outputs 24 through 31 2-3 Sourcing outputs with the UDN2981A IC for outputs 24 through 31
E21 & E22 (Opt. 1 only)	1-2 Sinking inputs with the ULN2803A IC for outputs 32 through 39 2-3 Sourcing outputs with the UDN2981A IC for outputs 32 through 39
E23 & E24 (Opt. 1 only)	1-2 Sinking inputs with the ULN2803A IC for outputs 40 through 47 2-3 Sourcing outputs with the UDN2981A IC for outputs 40 through 47
* Set by factory	

USING ACC-11P WITH PMAC AND TURBO PMAC

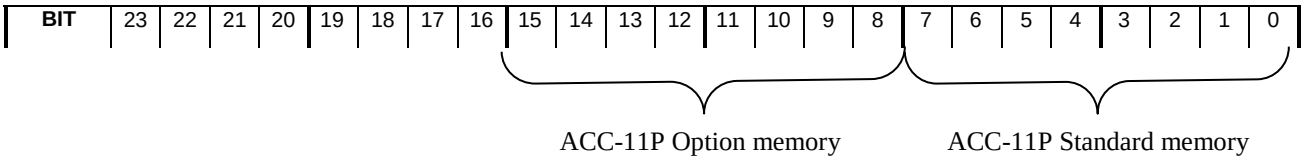
For the PMAC, the ACC-11P can be used for general purpose I/O. The ACC-11P's 48-bits of I/O are placed into six 8-bit registers. For example, if the base address set by the SW1 setting were set to Y:$FFD0, then the IO for the ACC-11P would be found at the following locations:

PMAC Memory Location	Turbo PMAC Memory Location	Description
Y:$FFD0,0,8	Y:$78A00,0,8	;bits 0-7 for input
Y:$FFD1,0,8	Y:$78A01,0,8	;bits 8-15 for input
Y:$FFD2,0,8	Y:$78A02,0,8	;bits 16-23 for input
Y:$FFD3,0,8	Y:$78A03,0,8	;bits 0-7 for output
Y:$FFD4,0,8	Y:$78A04,0,8	;bits 8-15 for output
Y:$FFD5,0,8	Y:$78A05,0,8	;bits 16-23 for output
Y:$FFD6,0,8	Y:$78A06,0,8	;register selected
Y:$FFD7,0,8	Y:$78A07,0,8	;control register

Using ACC-11P Option 1 (Extended I/O) with PMAC and Turbo PMAC

The ACC-11P Option 1 (Extended I/O) allows the user to add an additional 24 inputs and 24 outputs to the system. The memory addresses of the extended I/O are located at the same base address, but the data is now shifted 8 bits. For example, if the starting address of bits 0-7 were located at Y:$FFD0,0,8, then the starting address of the extended I/O (bits 24-31) would be located at Y:$FFD0,8,8.

Base Address of ACC-11P and Option 1 (Y:$FFD0 used in this example)



PMAC Memory Location	Turbo PMAC Memory Location	Description
Y:$FFD0,8,8	Y:$78A00,8,8	;bits 24-31 for input
Y:$FFD1,8,8	Y:$78A01,8,8	;bits 32-39 for input
Y:$FFD2,8,8	Y:$78A02,8,8	;bits 40-47 for input
Y:$FFD3,8,8	Y:$78A03,8,8	;bits 24-31 for output
Y:$FFD4,8,8	Y:$78A04,8,8	;bits 32-39 for output
Y:$FFD5,8,8	Y:$78A05,8,8	;bits 40-47 for output
Y:$FFD6,8,8	Y:$78A06,8,8	;register selected
Y:$FFD7,8,8	Y:$78A07,8,8	;control register

Control Register

The control register at address {Base + 7} permits the configuration of the IOGATE IC to a variety of applications. The control register consists of 8 write/read-back bits – Bits 0 - 7. The control register consists of two sections; Direction Control and Register Select.

The direction control allows setting input bytes to be read only. One of the advantages of the IOGATE IC is the ability to define the bits as inputs or outputs. This "control" mechanism allows you to ensure the inputs will always be read properly. Our traditional I/O accessories always defined the inputs and outputs through hardware.

The ACC-11P is different from Delta Tau's other I/O boards in that the hardware layout of the board designates the direction of the signal. However, it is still necessary to set up the software logic to accommodate the hardware. This will be done in a power up PLC that will be described later.

Direction Control Bits

Bits 0 to 5 of the control register control the direction of the I/O for the matching numbered data register. That is, Bit *n* controls the direction of the I/O at {Base + *n*}. A value of 0 in the control bit (the default) permits a write operation to the data register, enabling the output function for each line in the register. Enabling the output function does not prevent the use of any or all of the lines as inputs, as long as the outputs are off (non-conducting). A value of 1 in the control bit prohibits a write operation to the data register, disabling the output, reserving the register for inputs.

Example: A value of 1 in Bit 3 disables the write function into the data register at address {Base + 3}, ensuring that lines IO24 - IO31 can always be used as inputs.

Register Select Control Bits

Bits 6 and 7 of the control register together select which of 4 possible registers can be accessed at each of the addresses {Base + 0} through {Base + 5}. They also select which of 2 possible registers can be selected at {Base + 6}.

The following table explains how these bits select registers:

Bit 7	Bit 6	Combined Value	{Base + 0} to {Base + 5} Register Selected	{Base + 6} Register Selected
0	0	0	Data Register	Data Register
0	1	1	Setup Register 1	Setup Register
1	0	2	Setup Register 2	n. a.
1	1	3	Setup Register 3	n. a.

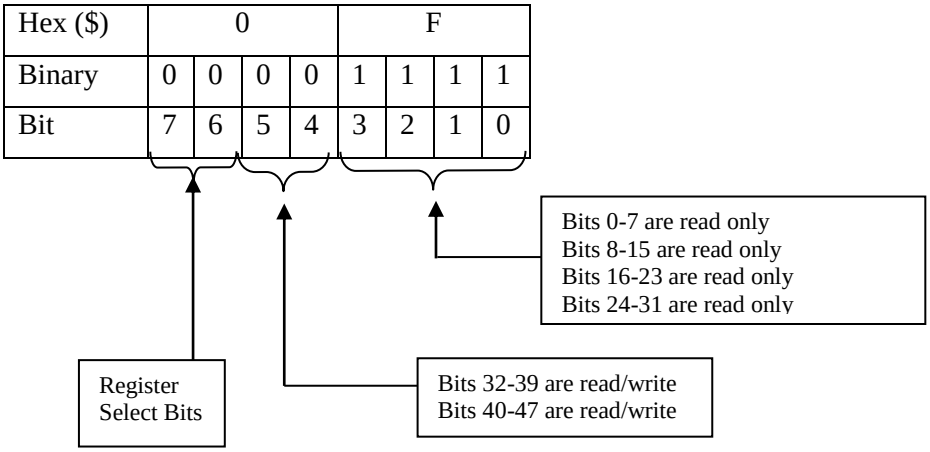
In a typical application, non-zero combined values of Bits 6 and 7 are used only for initial configuration of the IC. These values are used to access the setup registers at the other addresses. After the configuration is finished, zeros are written to both Bits 6 and 7, so the data registers at the other regions can be accessed.

Control Word Setup Example

You need to set up the control words for the IO card at power up. To accomplish this task, a simple PLC could be written to set up the control word properly. For this example, we will be setting up an ACC-11P with Option 1.

Control Word for ACC-11P

(TURBO: M2007->Y:$078A07,0,8) (NON TURBO: M207->Y:$FFD7,0,8)



;**** ACC-11P Base Card Definitions **for PMAC** ****
M200->Y:$FFD0,0,8 ;I/O bits 0-7 ACC-11P base card
M201->Y:$FFD1,0,8 ;I/O bits 8-15 ACC-11P base card
M202->Y:$FFD2,0,8 ;I/O bits 16-23 ACC-11P base card
M203->Y:$FFD3,0,8 ;I/O bits 24-31 ACC-11P base card
M204->Y:$FFD4,0,8 ;I/O bits 32-39 ACC-11P base card
M205->Y:$FFD5,0,8 ;I/O bits 40-47 ACC-11P base card
M206->Y:$FFD6,0,8 ;register selected
M207->Y:$FFD7,0,8 ;control register

;**** ACC-11P Option 1 Definitions **for PMAC** ****
M2008->Y:$FFD0,8,8 ;I/O bits 0-7 ACC-11P Option 1
M2009->Y:$FFD1,8,8 ;I/O bits 8-15 ACC-11P Option 1
M2010->Y:$FFD2,8,8 ;I/O bits 16-23 ACC-11P Option 1
M2011->Y:$FFD3,8,8 ;I/O bits 24-31 ACC-11P Option 1
M2012->Y:$FFD4,8,8 ;I/O bits 32-39 ACC-11P Option 1
M2013->Y:$FFD5,8,8 ;I/O bits 40-47 ACC-11P Option 1
M2014->Y:$FFD6,8,8 ;register selected
M2015->Y:$FFD7,8,8 ;control register

IMPORTANT The ACC11P must be setup as specified.
;**** PLC to initialize read/write I/O bits **for PMAC** ****
OPEN PLC 1 CLEAR
M207=$0F ;define bits 0-31 as inputs and bits 32-47 as outputs (ACC-11P)
M215=$0F ;define bits 0-31 as inputs and bits 32-47 as outputs (ACC-11P Opt. 1)
DIS PLC1
CLOSE

```
;**** ACC-11P Base Card Definitions for TURBO PMAC ****
M2000->Y:$078A00,0,8          ;I/O bits 0-7 ACC-11P base card
M2001->Y:$078A01,0,8          ;I/O bits 8-15 ACC-11P base card
M2002->Y:$078A02,0,8          ;I/O bits 16-23 ACC-11P base card
M2003->Y:$078A03,0,8          ;I/O bits 24-31 ACC-11P base card
M2004->Y:$078A04,0,8          ;I/O bits 32-39 ACC-11P base card
M2005->Y:$078A05,0,8          ;I/O bits 40-47 ACC-11P base card
M2006->Y:$078A06,0,8          ;register selected
M2007->Y:$078A07,0,8          ;control register

;**** ACC-11P Option 1  Definitions for TURBO PMAC ****
M2008->Y:$078A00,8,8          ;I/O bits 0-7 ACC-11P Option 1
M2009->Y:$078A01,8,8          ;I/O bits 8-15 ACC-11P Option 1
M2010->Y:$078A02,8,8          ;I/O bits 16-23 ACC-11P Option 1
M2011->Y:$078A03,8,8          ;I/O bits 24-31 ACC-11P Option 1
M2012->Y:$078A04,8,8          ;I/O bits 32-39 ACC-11P Option 1
M2013->Y:$078A05,8,8          ;I/O bits 40-47 ACC-11P Option 1
M2014->Y:$078A06,8,8          ;register selected
M2015->Y:$078A07,8,8          ;control register

**IMPORTANT**  The ACC11P must be setup as specified.
;**** PLC to initialize read/write I/O bits for TURBO PMAC ****
OPEN PLC 1 CLEAR
M2007=$0F                     ;define bits 0-31 as inputs and bits 32-47 as outputs (ACC-11P)
M2015=$0F                     ;define bits 0-31 as inputs and bits 32-47 as outputs (ACC-11P Opt)
DIS PLC1
CLOSE
```

Accessory 11P I/O M-Variables for PMAC

The following is a list of suggested M-variables for the default switch setting is provided. You may assign any M-variables to these addresses. You may make these M-variable definitions and use them as general purpose I/O for their PLCs or motion programs.

```
M700->Y:$FFD0,0,1      Input 0       M724->Y:$FFD3,0,1      Input 24
M701->Y:$FFD0,1,1      Input 1       M725->Y:$FFD3,1,1      Input 25
M702->Y:$FFD0,2,1      Input 2       M726->Y:$FFD3,2,1      Input 26
M703->Y:$FFD0,3,1      Input 3       M727->Y:$FFD3,3,1      Input 27
M704->Y:$FFD0,4,1      Input 4       M728->Y:$FFD3,4,1      Input 28
M705->Y:$FFD0,5,1      Input 5       M729->Y:$FFD3,5,1      Input 29
M706->Y:$FFD0,6,1      Input 6       M730->Y:$FFD3,6,1      Input 30
M707->Y:$FFD0,7,1      Input 7       M731->Y:$FFD3,7,1      Input 31
M708->Y:$FFD1,0,1      Input 8       M732->Y:$FFD4,0,1      Input 32
M709->Y:$FFD1,1,1      Input 9       M733->Y:$FFD4,1,1      Input 33
M710->Y:$FFD1,2,1      Input 10      M734->Y:$FFD4,2,1      Input 34
M711->Y:$FFD1,3,1      Input 11      M735->Y:$FFD4,3,1      Input 35
M712->Y:$FFD1,4,1      Input 12      M736->Y:$FFD4,4,1      Input 36
M713->Y:$FFD1,5,1      Input 13      M737->Y:$FFD4,5,1      Input 37
M714->Y:$FFD1,6,1      Input 14      M738->Y:$FFD4,6,1      Input 38
```

```
M715->Y:$FFD1,7,1      Input 15      M739->Y:$FFD4,7,1      Input 39
M716->Y:$FFD2,0,1      Input 16      M740->Y:$FFD5,0,1      Input 40
M717->Y:$FFD2,1,1      Input 17      M741->Y:$FFD5,1,1      Input 41
M718->Y:$FFD2,2,1      Input 18      M742->Y:$FFD5,2,1      Input 42
M719->Y:$FFD2,3,1      Input 19      M743->Y:$FFD5,3,1      Input 43
M720->Y:$FFD2,4,1      Input 20      M744->Y:$FFD5,4,1      Input 44
M721->Y:$FFD2,5,1      Input 21      M745->Y:$FFD5,5,1      Input 45
M722->Y:$FFD2,6,1      Input 22      M746->Y:$FFD5,6,1      Input 46
M723->Y:$FFD2,7,1      Input 23      M747->Y:$FFD5,7,1      Input 47
```

```
;****** Sample E-Stop PLC *****
; This PLC will abort all motion programs and kill the bus voltage to
; the motors when E-stop is depressed.  When E-Stop button in pulled out
; the motors will servo to actual position (<ctrl> A command) after
; allowing 5 seconds for proper bus voltage.
;       P700 used as a Latch variable
;       M700 used Emergency Stop Input
;       M800 used as Main Contact for main AC for Bus Voltage
;       M400 used as count down timer(M400->X:$700,0,24,S)

OPEN PLC 5 CLEAR
IF (M700=1 and P700=0)                  ;emergency stop condition
   CMD^A                                ;global motion program abort
   M400=500*8388608/I10                 ;500 msec delay for deceleration
   WHILE (M400>0) ENDWHILE
   CMD^K                                ;kill all axes
   M800=0                               ;turn off BUS voltage
   P700=1                               ;latch input
Endif
IF (M700=0 and P700=1)
   M800=1                               ;enable BUS voltage
   M400=5000*8388608/I10                ;5000 msec delay for bus voltage
   WHILE (M400>0) ENDWHILE
   CMD^A                                ;close loop for all servos
   P700=0                               ;latch input
Endif
```

Accessory 11P I/O M-Variables for Turbo PMAC

The following is a list of suggested M-variables for the default switch setting is provided. You may assign any M-variables to these addresses. You may make these M-variable definitions and use them as general purpose I/O for their PLCs or motion programs.

```
M7000->Y:$078A00,0,1   Input 0       M7024->Y:$078A03,0,1   Input 24
M7001->Y:$078A00,1,1   Input 1       M7025->Y:$078A03,1,1   Input 25
M7002->Y:$078A00,2,1   Input 2       M7026->Y:$078A03,2,1   Input 26
M7003->Y:$078A00,3,1   Input 3       M7027->Y:$078A03,3,1   Input 27
M7004->Y:$078A00,4,1   Input 4       M7028->Y:$078A03,4,1   Input 28
```

```
M7005->Y:$078A00,5,1   Input 5       M7029->Y:$078A03,5,1   Input 29
M7006->Y:$078A00,6,1   Input 6       M7030->Y:$078A03,6,1   Input 30
M7007->Y:$078A00,7,1   Input 7       M7031->Y:$078A03,7,1   Input 31
M7008->Y:$078A01,0,1   Input 8       M7032->Y:$078A04,0,1   Input 32
M7009->Y:$078A01,1,1   Input 9       M7033->Y:$078A04,1,1   Input 33
M7010->Y:$078A01,2,1   Input 10      M7034->Y:$078A04,2,1   Input 34
M7011->Y:$078A01,3,1   Input 11      M7035->Y:$078A04,3,1   Input 35
M7012->Y:$078A01,4,1   Input 12      M7036->Y:$078A04,4,1   Input 36
M7013->Y:$078A01,5,1   Input 13      M7037->Y:$078A04,5,1   Input 37
M7014->Y:$078A01,6,1   Input 14      M7038->Y:$078A04,6,1   Input 38
M7015->Y:$078A01,7,1   Input 15      M7039->Y:$078A04,7,1   Input 39
M7016->Y:$078A02,0,1   Input 16      M7040->Y:$078A05,0,1   Input 40
M7017->Y:$078A02,1,1   Input 17      M7041->Y:$078A05,1,1   Input 41
M7018->Y:$078A02,2,1   Input 18      M7042->Y:$078A05,2,1   Input 42
M7019->Y:$078A02,3,1   Input 19      M7043->Y:$078A05,3,1   Input 43
M7020->Y:$078A02,4,1   Input 20      M7044->Y:$078A05,4,1   Input 44
M7021->Y:$078A02,5,1   Input 21      M7045->Y:$078A05,5,1   Input 45
M7022->Y:$078A02,6,1   Input 22      M7046->Y:$078A05,6,1   Input 46
M7023->Y:$078A02,7,1   Input 23      M7047->Y:$078A05,7,1   Input 47
```

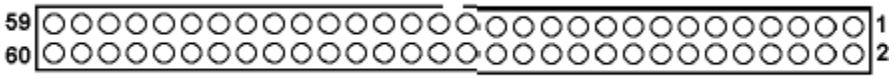
```
;****** Sample E-Stop PLC *****
; This PLC will abort all motion programs and kill the bus voltage to
; the motors when E-stop is depressed.  When E-Stop button in pulled out
; the motors will servo to actual position (<ctrl> A command) after
; allowing 5 seconds for proper bus voltage.
;       P7000 used as a Latch variable
;       M7000 used Emergency Stop Input
;       M8000 used as Main Contact for main AC for Bus Voltage
;       I5111 used as count down timer
OPEN PLC 5 CLEAR
IF (M7000=1 and P7000=0)                ;emergency stop condition
  CMD^A                                 ;global motion program abort
  I5111=500*8388608/I10                 ;500 msec delay for deceleration
  WHILE (I5111>0) ENDWHILE
  CMD^K                                 ;kill all axes
  M8000=0                               ;turn off BUS voltage
  P7000=1                               ;latch input
Endif
IF (M7000=0 and P7000=1)
  M8000=1                               ;enable BUS voltage
  I5111=5000*8388608/I10                ;5000 msec delay for bus voltage
  WHILE (I5111>0) ENDWHILE
  CMD^A                                 ;close loop for all servos
  P7000=0                               ;latch input
Endif
```

J1 CONNECTOR (50 PIN HEADER) - JEXP PIN-OUTS

Pin	Symbol	Function	Description	Note
1	BD00	BIDIRECT	BUFFERED DATA BUS	
2	BD01	BIDIRECT	BUFFERED DATA BUS	
3	BD02	BIDIRECT	BUFFERED DATA BUS	
4	BD03	BIDIRECT	BUFFERED DATA BUS	
5	BD04	BIDIRECT	BUFFERED DATA BUS	
6	BD05	BIDIRECT	BUFFERED DATA BUS	
7	BD06	BIDIRECT	BUFFERED DATA BUS	
8	BD07	BIDIRECT	BUFFERED DATA BUS	
9	BD08	BIDIRECT	BUFFERED DATA BUS	
10	BD09	BIDIRECT	BUFFERED DATA BUS	
11	BD10	BIDIRECT	BUFFERED DATA BUS	
12	BD11	BIDIRECT	BUFFERED DATA BUS	
13	BD12	BIDIRECT	BUFFERED DATA BUS	
14	BD13	BIDIRECT	BUFFERED DATA BUS	
15	BD14	BIDIRECT	BUFFERED DATA BUS	
16	BD15	BIDIRECT	BUFFERED DATA BUS	
17	BD16	BIDIRECT	BUFFERED DATA BUS	
18	BD17	BIDIRECT	BUFFERED DATA BUS	
19	BD18	BIDIRECT	BUFFERED DATA BUS	
20	BD19	BIDIRECT	BUFFERED DATA BUS	
21	BD20	BIDIRECT	BUFFERED DATA BUS	
22	BD21	BIDIRECT	BUFFERED DATA BUS	
23	BD22	BIDIRECT	BUFFERED DATA BUS	
24	BD23	BIDIRECT	BUFFERED DATA BUS	
25	GND	COMMON	PMAC COMMON	
26	GND	COMMON	PMAC COMMON	
27	BA00	OUTPUT	BUFFERED ADDR BUS. BIT 0	
28	BA01	OUTPUT	BUFFERED ADDR BUS. BIT 1	
29	BA02	OUTPUT	BUFFERED ADDR BUS. BIT 2	
30	BA03	OUTPUT	BUFFERED ADDR BUS. BIT 3	
31	BA04	OUTPUT	PMAC CHIP SEL.	

32	BX/Y	OUTPUT	BUF. X/Y SEL.	
33	CS02-	OUTPUT	PMAC CHIP SEL.	
34	CS03-	OUTPUT	PMAC CHIP SEL.	
35	CS04-	OUTPUT	PMAC CHIP SEL.	
36	CS06-	OUTPUT	PMAC CHIP SEL.	
37	CS10-	OUTPUT	PMAC CHIP SEL.	
38	CS12-	OUTPUT	PMAC CHIP SEL.	
39	CS14-	OUTPUT	PMAC CHIP SEL.	
40	CS16-	OUTPUT	PMAC CHIP SEL.	
41	BA12	OUTPUT	BUFFERED ADDR. BUS BIT 12	
42	BA13	OUTPUT	BUFFERED ADDR. BUS BIT 13	
43	BWR-	BUF. WRITE STROBE		
44	BRD-	BUF. READ STROBE		
45	GND	COMMON	PMAC COMMON	
46	GND	COMMON	PMAC COMMON	
47	BRST	OUTPUT	BUFFERED RESET	
48	WT2-	INPUT	CPU WAIT	
49	SER	OUTPUT	CPU SERVO CLOCK	
50	PHA	OUTPUT	CPU PHASE CLOCK	

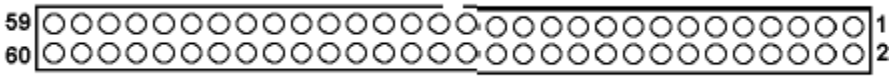
J2 CONNECTOR (60 PIN HEADER) - PIN-OUTS



Pin	Symbol	Function	Description	Note
1	IN00	INPUT	INPUT#1	
2	IN01	INPUT	INPUT#2	
3	IN02	INPUT	INPUT#3	
4	IN03	INPUT	INPUT#4	
5	IN04	INPUT	INPUT#5	
6	IN05	INPUT	INPUT#6	
7	IN06	INPUT	INPUT#7	
8	IN07	INPUT	INPUT#8	
9	O+V01	REFERENCE	Reference Voltage for Inputs 1-8	12-24V
10	OGND01	REFERENCE	Reference GND for Inputs 1-8	
11	IN08	INPUT	INPUT#9	
12	IN09	INPUT	INPUT#10	
13	IN10	INPUT	INPUT#11	
14	IN11	INPUT	INPUT#12	
15	IN12	INPUT	INPUT#13	
16	IN13	INPUT	INPUT#14	
17	IN14	INPUT	INPUT#15	
18	IN15	INPUT	INPUT#16	
19	O+V02	REFERENCE	Reference Voltage for Inputs 9-16	12-24V
20	OGND02	REFERENCE	Reference GND for Inputs 9-16	
21	IN16	INPUT	INPUT#17	
22	IN17	INPUT	INPUT#18	
23	IN18	INPUT	INPUT#19	
24	IN19	INPUT	INPUT#20	
25	IN20	INPUT	INPUT#21	
26	IN21	INPUT	INPUT#22	
27	IN22	INPUT	INPUT#23	
28	IN23	INPUT	INPUT#24	
29	O+V03	REFERENCE	Reference Voltage for Inputs 17-24	12-24V

30	OGND03	REFERENCE	Reference GND for Inputs 17-24	
31	OUT00	OUTPUT	OUTPUT#1	
32	OUT01	OUTPUT	OUTPUT#2	
33	OUT02	OUTPUT	OUTPUT#3	
34	OUT03	OUTPUT	OUTPUT#4	
35	OUT04	OUTPUT	OUTPUT#5	
36	OUT05	OUTPUT	OUTPUT#6	
37	OUT06	OUTPUT	OUTPUT#7	
38	OUT07	OUTPUT	OUTPUT#8	
39	O+V04	REFERENCE	Reference Voltage for Outputs 1-8	12-24V
40	OGND04	REFERENCE	Reference GND for Outputs 1-8	
41	OUT08	OUTPUT	OUTPUT#9	
42	OUT09	OUTPUT	OUTPUT#10	
43	OUT10	OUTPUT	OUTPUT#11	
44	OUT11	OUTPUT	OUTPUT#12	
45	OUT12	OUTPUT	OUTPUT#13	
46	OUT13	OUTPUT	OUTPUT#14	
47	OUT14	OUTPUT	OUTPUT#15	
48	OUT15	OUTPUT	OUTPUT#16	
49	O+V05	REFERENCE	Reference Voltage for Outputs 9-16	12-24V
50	OGND05	REFERENCE	Reference GND for Outputs 9-16	
51	OUT16	OUTPUT	OUTPUT#17	
52	OUT17	OUTPUT	OUTPUT#18	
53	OUT18	OUTPUT	OUTPUT#19	
54	OUT19	OUTPUT	OUTPUT#20	
55	OUT20	OUTPUT	OUTPUT#21	
56	OUT21	OUTPUT	OUTPUT#22	
57	OUT22	OUTPUT	OUTPUT#23	
58	OUT23	OUTPUT	OUTPUT#24	
59	O+V06	REFERENCE	Reference Voltage for Outputs 16-23	12-24V
60	OGND06	REFERENCE	Reference GND for Outputs 16-23	

J3 CONNECTOR (60 PIN HEADER) - PIN-OUTS



Pin	Symbol	Function	Description	Note
1	IN24	INPUT	INPUT#25	
2	IN25	INPUT	INPUT#26	
3	IN26	INPUT	INPUT#27	
4	IN27	INPUT	INPUT#28	
5	IN28	INPUT	INPUT#29	
6	IN29	INPUT	INPUT#30	
7	IN30	INPUT	INPUT#31	
8	IN31	INPUT	INPUT#32	
9	O+V07	REFERENCE	Reference Voltage for Inputs 25-32	12-24V
10	OGND07	REFERENCE	Reference GND for Inputs 25-32	
11	IN32	INPUT	INPUT#33	
12	IN33	INPUT	INPUT#34	
13	IN34	INPUT	INPUT#35	
14	IN35	INPUT	INPUT#36	
15	IN36	INPUT	INPUT#37	
16	IN37	INPUT	INPUT#38	
17	IN38	INPUT	INPUT#39	
18	IN39	INPUT	INPUT#40	
19	O+V08	REFERENCE	Reference Voltage for Inputs 33-40	12-24V
20	OGND08	REFERENCE	Reference GND for Inputs 33-40	
21	IN40	INPUT	INPUT#41	
22	IN41	INPUT	INPUT#42	
23	IN42	INPUT	INPUT#43	
24	IN43	INPUT	INPUT#44	
25	IN44	INPUT	INPUT#45	
26	IN45	INPUT	INPUT#46	
27	IN46	INPUT	INPUT#47	
28	IN47	INPUT	INPUT#48	
29	O+V09	REFERENCE	Reference Voltage for Inputs 41-48	12-24V

30	OGND09	REFERENCE	Reference GND for Inputs 41-48	
31	OUT24	OUTPUT	OUTPUT#25	
32	OUT25	OUTPUT	OUTPUT#26	
33	OUT26	OUTPUT	OUTPUT#27	
34	OUT27	OUTPUT	OUTPUT#28	
35	OUT28	OUTPUT	OUTPUT#29	
36	OUT29	OUTPUT	OUTPUT#30	
37	OUT30	OUTPUT	OUTPUT#31	
38	OUT31	OUTPUT	OUTPUT#32	
39	O+V10	REFERENCE	Reference Voltage for Outputs 25-32	12-24V
40	OGND10	REFERENCE	Reference GND for Outputs 25-32	
41	OUT32	OUTPUT	OUTPUT#33	
42	OUT33	OUTPUT	OUTPUT#34	
43	OUT34	OUTPUT	OUTPUT#35	
44	OUT35	OUTPUT	OUTPUT#36	
45	OUT36	OUTPUT	OUTPUT#37	
46	OUT37	OUTPUT	OUTPUT#38	
47	OUT38	OUTPUT	OUTPUT#39	
48	OUT39	OUTPUT	OUTPUT#40	
49	O+V11	REFERENCE	Reference Voltage for Outputs 33-40	12-24V
50	OGND11	REFERENCE	Reference GND for Outputs 33-40	
51	OUT40	OUTPUT	OUTPUT#41	
52	OUT41	OUTPUT	OUTPUT#42	
53	OUT42	OUTPUT	OUTPUT#43	
54	OUT43	OUTPUT	OUTPUT#44	
55	OUT44	OUTPUT	OUTPUT#45	
56	OUT45	OUTPUT	OUTPUT#46	
57	OUT46	OUTPUT	OUTPUT#47	
58	OUT47	OUTPUT	OUTPUT#48	
59	O+V12	REFERENCE	Reference Voltage for Outputs 41-48	12-24V
60	OGND12	REFERENCE	Reference GND for Outputs 41-48	

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