4EN-PC OPTION
MANUAL

P/N: EDO111 (V1.0)

AEROTECH®

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The 4EN- PC board is a product of Aerotech, Inc.

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CHAPTER 1:   EXPANSION CARD OVERVIEW

This chapter contains information about the installation and configuration of the encoder expansion cards used with UNIDEX 600 control system. Configuration of the board includes jumper settings and connector pinouts. Use of the board covers the expansion board test points.

1.1.   Expansion Card Jumper Settings

This section outlines the jumper configurations of the encoder expansion card. Descriptions are based on two functional groups of jumpers:

- Amplifier enable jumpers
- Board select jumpers

The expansion board jumper settings are configured at the factory according to the application specifications. If no specifications are available, the default jumper settings are used. The locations of the expansion board jumpers are shown in Figure 1-1.

Board Address Jumpers

JP1 JP2

JP1 JP2

P3

P7

TP1
TP2
TP3
TP4
TP5

TP1
TP2
TP3
TP4
TP5

TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16

TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16

R2—FS FS C7
R3—FS FS C8

P8

P4

TP17
TP18
TP19
TP20
TP21
TP22
TP23
TP24

TP17
TP18
TP19
TP20
TP21
TP22
TP23
TP24

P9

Amplifier Enable Jumpers

JP3 JP4 JP5 JP6

JP3 JP4 JP5 JP6

P10

JP7

TP34
TP35
TP36
TP37
TP38
TP39
TP40
TP41

TP34
TP35
TP36
TP37
TP38
TP39
TP40
TP41

P1

Figure 1-1.   Encoder Expansion Card

1.2. Amplifier Enable Jumpers (JP3, JP4, JP5, and JP6)

If an Aerotech DR500 drive rack has been purchased with the U600 system, the encoder expansion board is factory configured for the amplifiers. If an Aerotech drive rack is not being used, the amplifier enable jumpers may need to be reconfigured. It is vital for the user to verify these jumper settings. This safety measure is necessary to ensure that all amplifiers default to disabled (off) after the UNIDEX 600 is initially powered up or reset.

The encoder expansion board has four amplifier enable outputs, each corresponding to a particular axis of the system. Each axis (1-4) has an associated active polarity jumper (JP6-JP3, respectively) that is selectable. The encoder expansion board is shipped with the amplifier enable jumpers installed. In this configuration, the amplifier enable outputs are in the high impedance state during reset and pulled low when the drive is enabled. These outputs are also in the high impedance state when the axis is disabled by software. The axes are software disabled by default when the system is initialized or reset. Select a polarity for each axis so the associated amplifier is not active when the UNIDEX 600 is in a reset state.
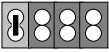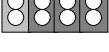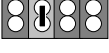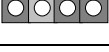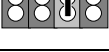
> Amplifier polarity should be set so the amplifiers are disabled after a system reset (when the UNIDEX 600's LED is ON). The amplifiers should remain disabled until the user has enabled them.

IMPORTANT
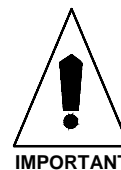
Amplifier enable jumpers JP6-JP3 are located near the P10 connector of the expansion board. The settings for these jumpers are listed in Table 1-1. This table shows each of the four jumpers (JP6-JP3), the corresponding axes (1-4), an illustration of both "In" and "Out" jumper settings, and the corresponding open collector amplifier output function (i.e., the impedance) during reset and when enabled.

Each axis has one 7406-type, open collector driver with absolute maximum ratings of 30 volts and 40 mA sink capability.

Table 1-1. Amplifier Enable Jumper Settings

Jumper	Axis	In/Out	Settings	Output Function (Impedance)
JP3	4	IN (default)	JP3	High (no connection) during reset, Low (pulled to ground) when enabled
		OUT	JP3	Low (pulled to ground) during reset, High (no connection) when enabled
JP4	3	IN (default)	JP3	High (no connection) during reset, Low (pulled to ground) when enabled
		OUT	JP3	Low (pulled to ground) during reset, High (no connection) when enabled
JP5	2	IN (default)	JP3	High (no connection) during reset, Low (pulled to ground) when enabled
		OUT	JP3	Low (pulled to ground) during reset, High (no connection) when enabled
JP6	1	IN (default)	JP3	High (no connection) during reset, Low (pulled to ground) when enabled
		OUT	JP3	Low (pulled to ground) during reset, High (no connection) when enabled

If an Aerotech drive rack is not being used, the user may need to reconfigure the amplifier enable jumpers for the amplifiers being used. To determine the appropriate amplifier enable jumper settings for each axis, the user must review the specifications of the amplifiers. Specifically, the user must determine the impedance (high or low) that is required to enable the amplifier. For amplifiers that require a low impedance to be enabled (and therefore a high impedance during reset), the user should keep the associated amplifier enable jumper installed. Conversely, for amplifiers that require a high impedance to be enabled (and therefore a low impedance during reset), the user should remove the associated amplifier enable jumper. Refer to the amplifier's documentation for the necessary information.

1.3. Board Select Jumpers (JP1, JP2)

The UNIDEX 600 supports up to three encoder expansion boards on its expansion bus. Each board must have a unique address that is determined by the configuration of the board select jumpers JP1 and JP2. This board also determines the mapping of its user I/O points within the U600's virtual I/O.

The address of an expansion board is set from jumpers JP1-JP2. These jumpers are located near connector P3 on the board. Each jumper has two pins. For each jumper, a plastic cap jumper is connected to create a unique base address. The combinations of board address jumper settings are shown in Table 1-2. The locations of the expansion board jumpers are shown in Figure 1-1 on page 1-2.

> Each Encoder Expansion board must have a distinct address in the same PC.

Table 1-2. Encoder Board Address Jumper Settings

Board Address	JP1	JP2	Encoder/DAC Channel Numbers
Board 1 (default)			5 through 8
Board 2			9 through 12
Board 3			13 through 16

1.3.1. Differential Encoders

The UNIDEX 600 accepts differential RS-422 type square wave encoder signals. A "times 4" multiplication is always performed on the encoder fundamental line count. For example, if the encoder line count is 1,000 lines, the effective machine resolution is 4,000 machine steps (or counts) per revolution.

The marker and quadrature signal inputs are 26LS32 type RS-422 receivers. The sine and cosine signals are pulled to +5 volts through 10K ohm resistors (see Figure 1-2).
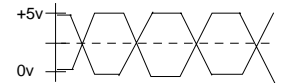
1.3.2.   Single Ended Encoders

Single ended encoders may be used with the UNIDEX 600 by connecting a 4.7K ohm 1/4 watt resistor from the unused differential input to signal common, removing the 180 ohm termination resistor and disabling the encoder feedback fault in the Faultmask axis parameters as illustrated below in Figure 1-2. In this configuration, only a single-ended active high (or active low) signal is provided.   Table 1-3, Table 1-4, Table 1-5, and Table 1-6 that indicate which resistor networks (RNs) to remove.
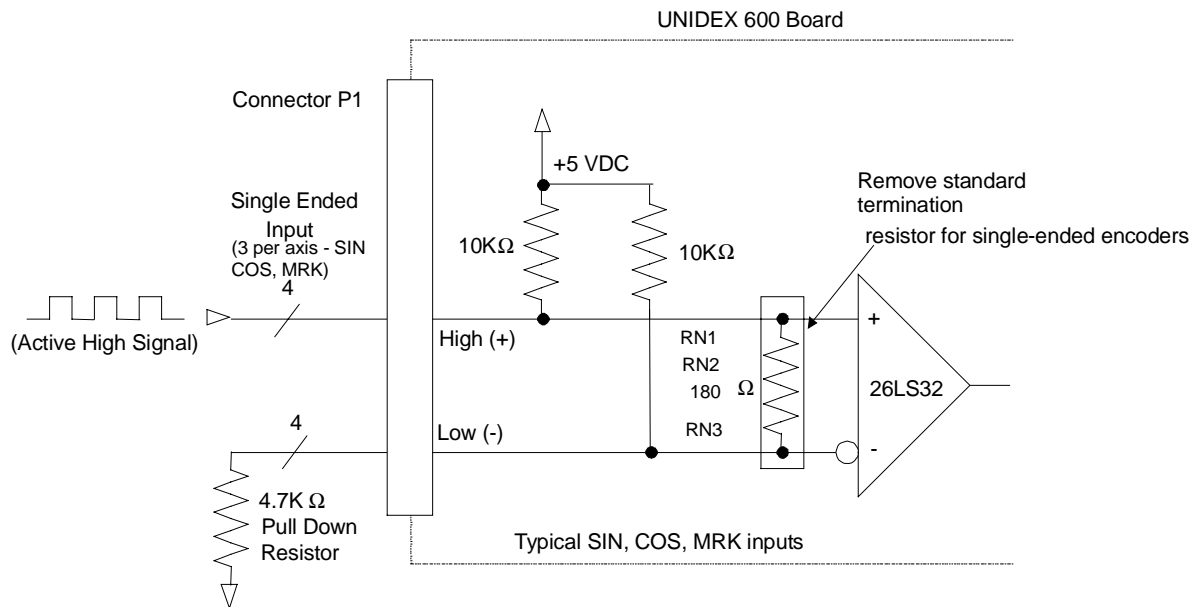
Figure 1-2.   **Electrical Characteristics of an Encoder Interface (Showing the Configuration of an Optional Single-ended Encoder)**

The removable termination resistors for axes 1-4 are grouped into three in-line resistor networks (RN1, RN2 and RN3). If your application mixes differential and single-ended encoders, you must provide separate 180 ohm resistors to replace the termination resistors that have been removed as part of the resistor network(s).

Resistor networks **RN1, RN2** and **RN3** provide termination resistors for axes 1, 2, 3 and 4. The following tables show the important configuration information for each individual axis. Included are the resistor network number, main pinouts (connector P1), axis signals, and resistor network pin numbers.

Table 1-3.   Termination Resistor Configuration for Axis 1 Encoder

RN #	P1 Pinout	Axis Signal	RN Pin Number	180 Ω Resistor *
RN3	11 12	MRK1+ MRK1-	1 2	
RN2	7 8	SIN1+ SIN1-	1 2	
RN2	9 10	COS1+ COS1-	3 4	

*   Use a 180 Ω termination resistor for standard differential encoders.

Table 1-4.   Termination Resistor Configuration for Axis 2 Encoders

RN #	P1 Pinout	Axis Signal	RN Pin Number	180 Ω Resistor *
RN3	20 19	MRK2- MRK2+	4 3	
RN2	16 15	SIN2- SIN2+	6 5	
RN2	18 17	COS2- COS2+	8 7	

*   Use a 180 Ω termination resistor for standard differential encoders.

Table 1-5.   Termination Resistor Configuration for Axis 3 Encoders

RN #	P1 Pinout	Axis Signal	RN Pin Number	180 Ω Resistor *
RN3	28 27	MRK3- MRK3+	6 5	
RN1	24 23	SIN3- SIN3+	2 1	
RN1	26 25	COS3- COS3+	4 3	

*   Use a 180 Ω termination resistor for standard differential encoders.

Table 1-6.   Termination Resistor Configuration for Axis 4 Encoders

RN #	P1 Pinout	Axis Signal	RN Pin Number	180 Ω Resistor *
RN3	36 35	MRK4- MRK4+	8 7	
RN1	32 31	SIN4- SIN4+	6 5	
RN1	34 33	COS4- COS4+	8 7	

*   Use a 180 Ω termination resistor for standard differential encoders.

1.4. Encoder Card Test Points

Test points are located at various areas on the encoder expansion card. They are used as an aid in troubleshooting the encoder expansion card and to gain access to UNIDEX 600 signals.

Use of these test points is explained in Table 1-7.

Table 1-7.   Encoder Expansion Card Test Points

Test Point	Meaning
TP1	+ 5 Volts
TP2	+12 Volts
TP3	- 12 Volts
TP4	Common
TP5	- 5 Volts
TP20	Position latch input after RC filter
TP21	Axis 4 marker pulse
TP22	Axis 3 marker pulse
TP23	Axis 2 marker pulse
TP24	Axis 1 marker pulse
TP34	Axis 4 cosine
TP35	Axis 4 sine
TP36	Axis 3 cosine
TP37	Axis 3 sine
TP38	Axis 2 cosine
TP39	Axis 2 sine
TP40	Axis 1 cosine
TP41	Axis 1 sine

All other test points are for factory use only.

1.5. Encoder Card Connectors

1.5.1. Opto 22 Input Bus Connector (P8)

The pinouts for the opto 22 bus connector are listed in Table 1-8.

Table 1-8.   Opto 22 Bus Connector Pinouts (Encoder Expansion Card)

Pin #	Description	Pin #	Description
1	IN39	2	Common
3	IN38	4	Common
5	IN37	6	Common
7	IN36	8	Common
9	IN35	10	Common
11	IN34	12	Common
13	IN33	14	Common
15	IN32	16	Common
17	IN31	18	Common
19	IN30	20	Common
21	IN29	22	Common
23	IN28	24	Common
25	IN27	26	Common
27	IN26	28	Common
29	IN25	30	Common
31	IN24	32	Common
33	IN23	34	Common
35	IN22	36	Common
37	IN21	38	Common
39	IN20	40	Common
41	IN19	42	Common
43	IN18	44	Common
45	IN17	46	Common
47	IN16	48	Common
49	+ 5 Volts	50	Common

See Section 1.6. for mapping of these I/O points within the U600's virtual I/O space.

1.5.2. Opto 22 Outputs and Hall Sensor Inputs (P10) Pinouts

Table 1-9 lists the pinouts for the OPTO 22 outputs and Hall sensor inputs (P10).

Table 1-9.   Pinouts for Opto 22 Outputs and Hall Sensor Inputs (Expansion Card)

Pin	Description	Pin	Description
1	HALL 4C	2	Common
3	HALL 4A	4	Common
5	HALL 4B	6	Common
7	HALL 3C	8	Common
9	HALL 3A	10	Common
11	HALL 3B	12	Common
13	HALL 2C	14	Common
15	HALL 2A	16	Common
17	HALL 2B	18	Common
19	HALL 1C	20	Common
21	HALL 1A	22	Common
23	HALL 1B	24	Common
25	Reserved	26	Common
27	Position Latch Input	28	Common
29	Reserved	30	Common
31	Reserved	32	Common
33	OUT15	34	Common
35	OUT14	36	Common
37	OUT13	38	Common
39	OUT12	40	Common
41	OUT11	42	Common
43	OUT10	44	Common
45	OUT9	46	Common
47	OUT8	48	Common
49	+5	50	Common

See Section 1.6. for mapping of these I/O points within the U600's virtual I/O space.

1.5.3. Opto 22 Output Bus Connector (P7)

The pinouts for the opto output bus connector are listed in Table 1-10.

Table 1-10. Opto 22 Output Bus Connector Pinouts (Encoder Expansion Card)

Pin #	Description	Pin #	Description
1	OUT39	2	Common
3	OUT 38	4	Common
5	OUT 37	6	Common
7	OUT 36	8	Common
9	OUT 35	10	Common
11	OUT 34	12	Common
13	OUT 33	14	Common
15	OUT 32	16	Common
17	OUT 31	18	Common
19	OUT 30	20	Common
21	OUT 29	22	Common
23	OUT 28	24	Common
25	OUT 27	26	Common
27	OUT 26	28	Common
29	OUT 25	30	Common
31	OUT 24	32	Common
33	OUT 23	34	Common
35	OUT 22	36	Common
37	OUT 21	38	Common
39	OUT 20	40	Common
41	OUT 19	42	Common
43	OUT 18	44	Common
45	OUT 17	46	Common
47	OUT 16	48	Common
49	+ 5 Volts	50	Common

See Section 1.6. for mapping of these I/O points within the U600's virtual I/O space.

1.5.4. Main Connector Pinout of the Encoder Expansion Card

The encoder expansion card's main interface connector (P1) is accessible from the rear of the PC. The connector is a 100-pin "AMPLIMITE" high density female connector. The mating connector is an "AMPLIMITE" series connector, part number 759879-9. This connector connects to a BB500, BB501, or DR500 via an OP500 cable.

Refer to Table 1-11 for the main connector pinouts.

Table 1-11. Main Connector Pinouts for the Encoder Expansion Card

Pin	Function	Descr.	Pin	Function	Descr.
1	Common	ILOCKS	2	*Reserved*	*Reserved*
3	+5 Volts	+5	4	+5 Volts	+5
5	Encoder Common	COM	6	Encoder Common	COM
7	Encoder Sine Positive, Axis 1	SIN1+	8	Encoder Sine Ground, Axis 1	SIN1-
9	Encoder Cosine Positive, Axis 1	COS1+	10	Encoder Cosine Ground, Axis 1	COS1-
11	Marker Pulse, Axis 1	MRK1+	12	Marker Pulse, Axis 1	MRK1-
13	Encoder Common	COM	14	Encoder Common	COM
15	Encoder Sine Positive, Axis 2	SIN2+	16	Encoder Sine Ground, Axis 2	SIN2-
17	Encoder Cosine Positive, Axis 2	COS2+	18	Encoder Cosine Ground, Axis 2	COS2-
19	Marker Pulse, Axis 2	MRK2+	20	Marker Pulse, Axis 2	MRK2-
21	Encoder Common	COM	22	Encoder Common	COM
23	Encoder Sine Positive, Axis 3	SIN3+	24	Encoder Sine Ground, Axis 3	SIN3-
25	Encoder Cosine Positive, Axis 3	COS3+	26	Encoder Cosine Ground, Axis 3	COS3-
27	Marker Pulse, Axis 3	MRK3+	28	Marker Pulse, Axis 3	MRK3-
29	Encoder Common	COM	30	Encoder Common	COM
31	Encoder Sine Positive, Axis 4	SIN4+	32	Encoder Sine Ground, Axis 4	SIN4-
33	Encoder Cosine Positive, Axis 4	COS4+	34	Encoder Cosine Ground, Axis 4	COS4-
35	Marker Pulse, Axis 4	MRK4+	36	Marker Pulse, Axis 4	MRK4-
37	Encoder Common	COM	38	Encoder Common	COM
39	Clockwise Limit, Axis 1	CW1	40	Counter clockwise Limit, Axis 1	CCW1
41	Clockwise Limit, Axis 2	CW2	42	Counter clockwise Limit, Axis 2	CCW2
43	Clockwise Limit, Axis 3	CW3	44	Counter clockwise Limit, Axis 3	CCW3
45	Clockwise Limit, Axis 4	CW4	46	Counter clockwise Limit, Axis 4	CCW4
47	Home Limit, Axis 1	HOME1	48	Home Limit, Axis 2	HOME2
49	Home Limit, Axis 3	HOME3	50	Home Limit, Axis 4	HOME4
51	Reserved	Reserved	52	Limits Common	COM
53	+12 Volts	+12	54	+12 Volts	+12
55	-12 Volts	-12	56	-12 Volts	-12
57	Mode Axis 1	MODE1	58	Mode Axis 2	MODE2
59	Input 0	IN0	60	Input 1	IN1
61	Input 2	IN2	62	Input 3	IN3
63	Output 0	OUT0	64	Output 1	OUT1
65	Output 2	OUT2	66	Output 3	OUT3
67	Mode Axis 3	MODE3	68	Mode Axis 4	MODE4
69	Amplifier Enable 1	AEN1	70	Amplifier Enable 2	AEN2
71	Amplifier Enable 3	AEN3	72	Amplifier Enable 4	AEN4
73	Amplifier Fault 1	AFLT1	74	Amplifier Fault 2	AFLT2
75	Amplifier Fault 3	AFLT3	76	Amplifier Fault 4	AFLT4

Table 1-11.   **Main Connector Pinouts for the Encoder Expansion Card (Cont'd)**

Pin	Function	Descr.	Pin	Function	Descr.
77	Limits Common	COM	78	Limits Common	COM
79	Axis 1 Primary Current Cmd	ICMD1B	80	Axis 1 Secondary Current Cmd	ICMD1A
81	Axis 2 Primary Current Cmd	ICMD2B	82	Axis 2 Secondary Current Cmd	ICMD2A
83	Axis 3 Primary Current Cmd	ICMD3B	84	Axis 3 Secondary Current Cmd	ICMD3A
85	Axis 4 Primary Current Cmd	ICMD4B	86	Axis 4 Secondary Current Cmd	ICMD4A
87	Common	COM	88	Common	COM
89	Joystick Potentiometer 1 Input	JSW1	90	Joystick Potentiometer 2 Input	JSW2
91	Joystick Button A Input	JSA	92	Joystick Button B Input	JSB
93	Joystick Interlock	JSC	94	Brake Output	BRAKE
95	Analog Input 0	AIN0	96	Analog Input 1	AIN1
97	NC		98	NC	
99	NC		100	Interlock Receive	ILOCKR

1.5.5.   Encoder Expansion Bus Pin Description (P3)

The pinouts for the encoder expansion bus connector are listed in Table 1-12.

Table 1-12.   **Encoder Expansion Bus Pinouts**

Pin #	Description	Pin #	Description
1	+12v	2	-12v
3	GND	4	+5v
5	RESET	6	MCLK
7	MA2	8	MPST
9	MA1	10	*reserved*
11	MA0	12	MINTR1
13	IOWRT	14	MINTR0
15	IORD	16	MWAIT
17	GND	18	+5v
19	MD7	20	MSC1
21	MD6	22	MCS0
23	MD5	24	*reserved*
25	MD4	26	TDMA
27	MD3	28	OPT1
29	MD2	30	OPT0
31	MD1	32	MDACK
33	MD0	34	MDRQT
35	GND	36	+5v

Table 1-12.   **Encoder Expansion Bus Pinouts (Cont'd)**

Pin #	Description	Pin #	Description
37	MDE	38	MDF
39	MDC	40	MDD
41	MDA	42	MDB
43	MD8	44	MD9

1.5.6. Auxiliary Signals Connector (P4)

The pinouts in this connector are reserved outputs for future use. The pin descriptions is shown in Table 1-13.

Table 1-13. Auxiliary Output Pinouts Connector (P4)

Pin #	Description
1	Aux 1
2	Aux 2
3	Aux 3
4	Aux 4
5	Aux 5
6	Aux 6
7	Aux 7
8	Aux 8

1.5.7. Digital Inputs and Outputs Bus Pinouts (P9)

The pinouts for the digital inputs and outputs bus connector are listed in Table 1-14.

Table 1-14. Digital Inputs and Outputs Pinouts (P9)

Description	Pin#	Description	Pin#	Description	Pin#	Description	Pin#
IN0	31	IN 5	21	IN 10	11	IN 15	1
IN 1	29	IN 6	19	IN 11	9	COM	2-50 (even)
IN 2	27	IN 7	17	IN 12	7	+5 volts	49
IN 3	25	IN 8	15	IN 13	5		
IN 4	23	IN 9	13	IN 14	3		
OUT0	47	OUT 2	43	OUT 4	39	OUT 6	35
OUT 1	45	OUT 3	41	OUT 5	37	OUT 7	33

1.6.   Virtual I/O Mapping

Each expansion board has forty user outputs and forty user inputs, numbered 0 to 39. All of these I/O points are accessed through the U600's programming commands based upon their virtual I/O point number. This virtual I/O point number is dependent on the expansion board number shown in Table 1-15. For example, if a program utilized input "16" on expansion board #3, its referenced virtual I/O point is "112," located in connector P8 pin 47. If another program utilized output "8" on expansion board #2, its referenced virtual I/O point is "64," located in connector P10 pin 47.

Table 1-15. Virtual Binary I/O Inputs and Outputs

INPUTS			
Board	**Label**	**Virtual Binary Input #**	**Connector and Pin Numbers on the Respective Board**
U600	IN0-15	0 through 15	P9 pins 31 - 1 (odd pins)
Expansion Board 1	IN0-15	16 through 31	P9 pins 31 - 1 (odd pins)
Expansion Board 1	IN16-39	32 through 55	P8 pins 47 - 1 (odd pins)
Expansion Board 2	IN0-15	56 through 71	P9 pins 31 -1 (odd pins)
Expansion Board 2	IN16-39	72 through 95	P8 pins 47 - 1 (odd pins)
Expansion Board 3	IN0-15	96 through 111	P9 pins 31 -1 (odd pins)
Expansion Board 3	IN16-39	112 through 135	P8 pins 47 - 1 (odd pins)
OUTPUTS			
U600	OUT0-7	0 through 7	P9 pins 47 - 33 (odd pins)
U600	OUT8-15	8 through 15	P10 pins 47 - 33 (odd pins)
Expansion Board 1	OUT0-7	16 through 23	P9 pins 47 - 33 (odd pins)
Expansion Board 1	OUT8-15	24 through 31	P10 pins 47 - 33 (odd pins)
Expansion Board 1	OUT16-39	32 through 55	P7 pins 47 -1 (odd pins)
Expansion Board 2	OUT-7	56 through 63	P9 pins 47 - 33 (odd pins)
Expansion Board 2	OUT8-15	64 through 71	P10 pins 47 - 33 (odd pins)
Expansion Board 2	OUT16-39	72 through 95	P7 pins 47 -1 (odd pins)
Expansion Board 3	OUT0-7	96 through 103	P9 pins 47 - 33 (odd pins)
Expansion Board 3	OUT8-15	104 through 111	P10 pins 47 - 33 (odd pins)
Expansion Board 3	OUT16-39	112 through 135	P7 pins 47 -1 (odd pins)

1.7.   Installing the Encoder Expansion Card

The encoder expansion board is a full-sized AT card that is installed into any of the PC's unused 16-bit expansion slots.

> The encoder expansion board may not fit in some smaller models of PC's.

The procedure for installation of the encoder expansion board is outlined in the steps that follow.

1. Turn OFF the power to the computer system unit and unplug the unit's power cord from the power source.

DANGER

> The possibility of electrical shock exists. Make certain that the computer system's power switch is in the OFF position and the power cord is disconnected before opening the computer's cabinet.

2. Open the computer cabinet. See the sample in Figure 1-3 (Refer to the PC's User Manual for directions for opening the cabinet.)
3. Select an unused 16-bit (full-sized) expansion slot on the computer motherboard.
4. Locate the bracket of the selected expansion slot. Remove the screw and pull the bracket out of the expansion slot.
5. Take ribbon cable supplied with the encoder expansion card and connect it to P3 of the UNIDEX 600 control board while observing anti-static safeguards.
6. Connect the other end of the ribbon cable to P3 of the encoder expansion card.
7. Observing anti-static safeguards, line up the encoder expansion board with the expansion slot and guide rails. Lower the board into the slot until each of it's edge connectors rests on an expansion slot receptacle. Using evenly distributed pressure, push the board straight down until it is fully inserted into the expansion slot.
8. Secure the board to the chassis by reinstalling the bracket screw that was removed in step 4.
9. Tuck the ribbon cable away from any obstructions inside the PC.
7. Close and secure the PC's cover.
8. Reconnect the PC's power cord to the power source.
9. Move the PC's power switch to the ON position and note the status of the UNIDEX 600 board's LED.

The LED (visible from the rear of the system) of the UNIDEX 600 board must come ON during system initialization and then go OFF and remain OFF. During subsequent system software resets, the LED should come ON for approximately 5 seconds, and then turn OFF.

The LED should remain ON following system power up. This should disable any amplifiers and set the output bus to the high impedance state.

If the LED does not come ON or if it stays ON following software initialization, refer to the Troubleshooting section of this manual for help.
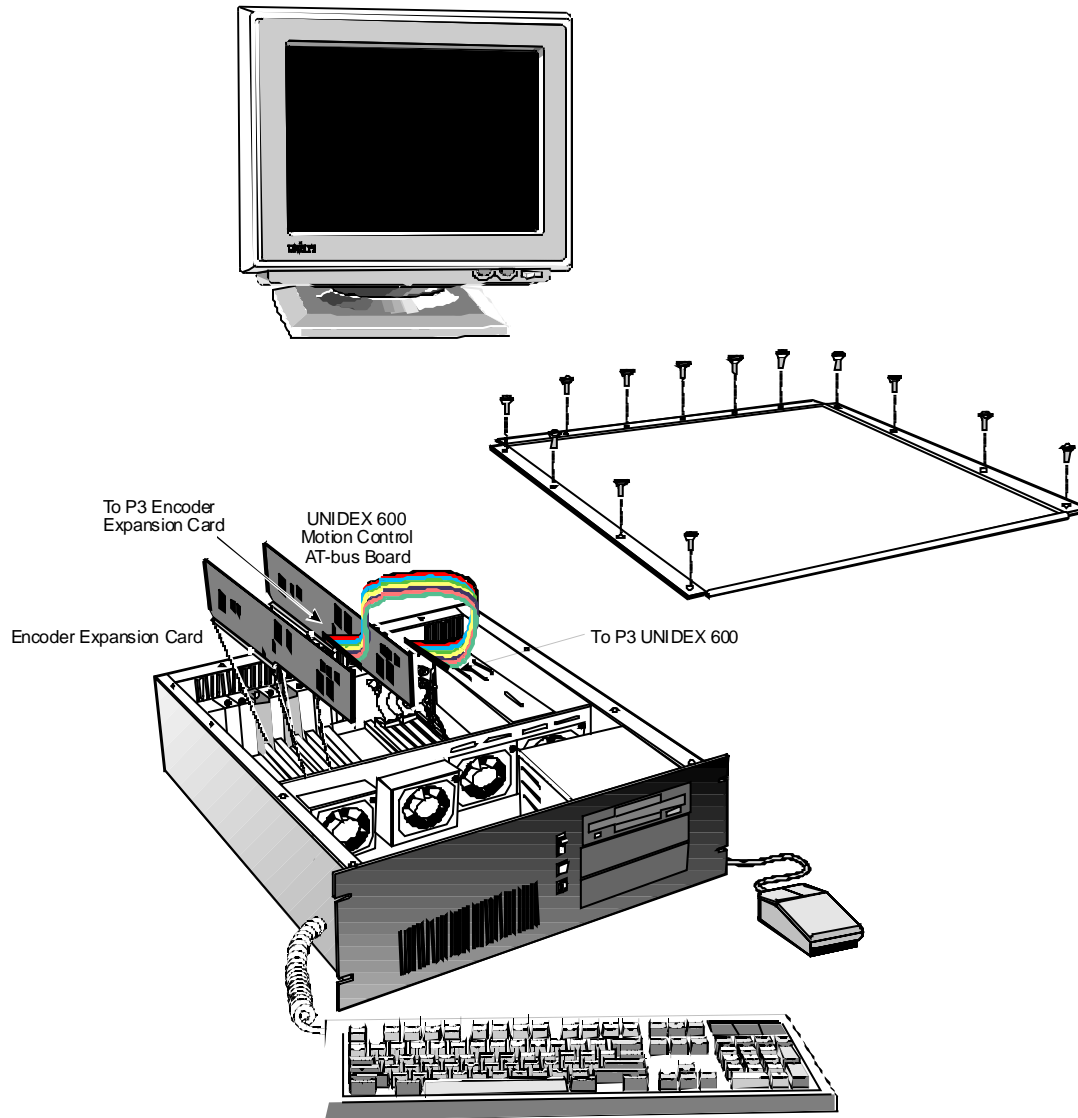
To P3 Encoder
Expansion Card

UNIDEX 600
Motion Control
AT-bus Board

Encoder Expansion Card

To P3 UNIDEX 600

Figure 1-3.   Installation of the Encoder Expansion Card

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APPENDIX A: WARRANTY AND FIELD SERVICE

In This Section:
- Laser Product Warranty
- Return Products Procedure
- Returned Product Warranty Determination
- Returned Product Non-warranty Determination
- Rush Service
- On-site Warranty Repair
- On-site Non-warranty Repair

Aerotech, Inc. warrants its products to be free from defects caused by faulty materials or poor workmanship for a minimum period of one year from date of shipment from Aerotech. Aerotech's liability is limited to replacing, repairing or issuing credit, at its option, for any products which are returned by the original purchaser during the warranty period. Aerotech makes no warranty that its products are fit for the use or purpose to which they may be put by the buyer, whether or not such use or purpose has been disclosed to Aerotech in specifications or drawings previously or subsequently provided, or whether or not Aerotech's products are specifically designed and/or manufactured for buyer's use or purpose. Aerotech's liability or any claim for loss or damage arising out of the sale, resale or use of any of its products shall in no event exceed the selling price of the unit.

Aerotech, Inc. warrants its laser products to the original purchaser for a minimum period of one year from date of shipment. This warranty covers defects in workmanship and material and is voided for all laser power supplies, plasma tubes and laser systems subject to electrical or physical abuse, tampering (such as opening the housing or removal of the serial tag) or improper operation as determined by Aerotech. This warranty is also voided for failure to comply with Aerotech's return procedures.   *Laser Products*

Claims for shipment damage (evident or concealed) must be filed with the carrier by the buyer. Aerotech must be notified within (30) days of shipment of incorrect materials. No product may be returned, whether in warranty or out of warranty, without first obtaining approval from Aerotech. No credit will be given nor repairs made for products returned without such approval. Any returned product(s) must be accompanied by a return authorization number. The return authorization number may be obtained by calling an Aerotech service center. Products must be returned, prepaid, to an Aerotech service center (no C.O.D. or Collect Freight accepted). The status of any product returned later than (30) days after the issuance of a return authorization number will be subject to review.   *Return Procedure*

After Aerotech's examination, warranty or out-of-warranty status will be determined. If upon Aerotech's examination a warranted defect exists, then the product(s) will be repaired at no charge and shipped, prepaid, back to the buyer. If the buyer desires an air freight return, the product(s) will be shipped collect. Warranty repairs do not extend the original warranty period.   *Returned Product Warranty Determination*

Returned Product Non-warranty Determination

After Aerotech's examination, the buyer shall be notified of the repair cost. At such time the buyer must issue a valid purchase order to cover the cost of the repair and freight, or authorize the product(s) to be shipped back as is, at the buyer's expense. Failure to obtain a purchase order number or approval within (30) days of notification will result in the product(s) being returned as is, at the buyer's expense. Repair work is warranted for (90) days from date of shipment. Replacement components are warranted for one year from date of shipment.

Rush Service

At times, the buyer may desire to expedite a repair. Regardless of warranty or out-of-warranty status, the buyer must issue a valid purchase order to cover the added rush service cost. Rush service is subject to Aerotech's approval.

On-site Warranty Repair

If an Aerotech product cannot be made functional by telephone assistance or by sending and having the customer install replacement parts, and cannot be returned to the Aerotech service center for repair, and if Aerotech determines the problem could be warranty-related, then the following policy applies:

Aerotech will provide an on-site field service representative in a reasonable amount of time, provided that the customer issues a valid purchase order to Aerotech covering all transportation and subsistence costs. For warranty field repairs, the customer will not be charged for the cost of labor and material. If service is rendered at times other than normal work periods, then special service rates apply.

If during the on-site repair it is determined the problem is not warranty related, then the terms and conditions stated in the following "On-Site Non-Warranty Repair" section apply.

On-site Non-warranty Repair

If any Aerotech product cannot be made functional by telephone assistance or purchased replacement parts, and cannot be returned to the Aerotech service center for repair, then the following field service policy applies:

Aerotech will provide an on-site field service representative in a reasonable amount of time, provided that the customer issues a valid purchase order to Aerotech covering all transportation and subsistence costs and the prevailing labor cost, including travel time, necessary to complete the repair.

Company Address

Aerotech, Inc.
101 Zeta Drive
Pittsburgh, PA 15238-2897
USA

Phone: (412) 963-7470
Fax: (412) 963-7459
TWX: (710) 795-3125

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READER'S COMMENTS

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P/N EDO 111, February 2000

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