UNIDEX 100

THM

REFERENCE
DOCUMENT

OPTION MANUAL

PN:EDU130

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CHAPTER 1: INTRODUCTION

The THM option for the UNIDEX 100 includes:

- Six-digit Thumbwheel Board
- Six-digit Interface Board
- Thumbwheel Interface Cable

The UNIDEX 100 Six-digit Thumbhweel Board, referred to as the Thumbwheel Board, is a six-digit (plus sign) thumbwheel assembly. The Six-digit Interface Board, referred to as the Interface Board, reads the thumbwheels and provides this information to the UNIDEX 100 upon request. The Thumbwheel Interface Cable connects the Thumbwheel Board to the Interface Board. The THM permits the user to enter data such as distance, speed, or number of cycles into parts program variables. The interface card plugs onto the expansion bus and is housed in a 6.25" W x 3.75" H x 2.25" D box that can be removed for panel mounting. The THM derives its power from the UNIDEX 100.

Before continuing, it is best that the user reviews the *Unidex 100 Operation & Technical Manual* or has some understanding of how the UNIDEX 100 works.

CHAPTER 2: GETTING STARTED

This chapter includes information pertaining to the initial setup for the THM option. Included is information describing the interface connections, THM parameter setup, and the initial THM power up. For information on safety considerations, preliminary troubleshooting, and customer assistance, please refer to Chapter 5 (Hardware) of the *Unidex 100 Operation & Technical Manual.*

2.1: THM Interface Connections

After mounting the thumbwheel option boards (see Chapter 4 on Hardware) it is necessary to make the required connections to the thumbwheel option boards.

The THM uses a 50-pin ribbon cable (maximum recommended cable length of 10 feet) with a connector at each end. One end of the ribbon cable connects to a locking header "P2 or P3" that protrudes from the front of the UNIDEX 100 while the other end connects to P1 of the Thumbwheel Board. To establish the power connection, P1 of the THM Interface Board connects to the Extension Bus Connector P5 of the UNIDEX 100 Control Board (refer to Chapter 4 for additional information).

2.2: Display Extension Bus Address

The six-digit display is a write only device that gets programmed with port variables (PV:). The default display extension bus beginning address is 0xE000. The user may change this address using the DIP switch, SW1 (located on the THM Interface Board).

Base Address	SW1-1	SW1-2	SW1-3	SW1-4
0xE000	on	on	on	on
0xE010	off	on	on	on
0xE020	on	off	on	on
0xE030	off	off	on	on
0xE040	on	on	off	on
0xE050	off	on	off	on
0xE060	on	off	off	on
0xE070	off	off	off	on
0xE080	on	on	on	off
0xE090	off	on	on	off
0xE0A0	on	off	on	off
0xE0B0	off	off	on	off
0xE0C0	on	on	off	off
0xE0D0	off	on	off	off
0xE0E0	on	off	off	off
0xE0F0	off	off	off	off

2.3: Initial THM Power Up

By now, the user should have completely connected the THM option. Turn on power (allowing approximately 10 seconds for the UNIDEX 100 to initialize). The THM option does not provide any status indication after being powered up. The user must verify that the THM option is operational. To do this it is necessary to read the thumbwheel data using the proper PV address (see Chapter 3 on programming the THM).

CHAPTER 3: PROGRAMMING THE THM

There are four THM locations that the user can program. These are as follows:

0xE0*0 - THM 1 Data (P2 of Thumbwheel Interface Board)

0xE0*1 - THM 1 Sign and Execute (P2 of Thumbwheel Interface Board)

0xE0*2 - THM 2 Data (P3 of Thumbwheel Interface Board)

0xE0*3 - THM 2 Sign and Execute (P3 of Thumbwheel Interface Board)

NOTE: The asterisk denotes a base address number. See the THM Extension Bus Address in Chapter 2.

3.1: Reading Thumbwheel Data

The UNIDEX 100 reads the Thumbwheel Data with a PV variable addressed to the Thumbwheel data port. There are two thumbwheel data ports available. The Thumbwheel #1 data port reads thumbwheels connected to P2 of the Thumbwheel Interface Board and uses an address of 0xE0*0 (* is dependent on base address, see Section 2.2). The Thumbwheel #2 data port reads thumbwheels connected to P3 of 0xE0*2 (* is dependent on base address, see Section 2.2).

Before it is possible to read the thumbwheel data it is necessary to latch it using the thumbwheel execute function (see Section 3.3). The system returns thumbwheel data in a BCD format. However the user may convert this data to an integer format by using the CBI command. For example: FV:1=CBI(PV=0xE010) that reads the Thumbwheel data port #1, converts the data to an integer format, and places the value in variable FV:1 in the above example.

Note that the base address is equal to 0xE010.

3.2: Thumbwheel Sign

A separate data address reads the Thumbwheel Sign. Like the data there are two sign addresses: Thumbwheel #1 and Thumbwheel #2. To obtain Thumbwheel #1 (P2 of the Interface Board) it is necessary to read the address 0xE0*1 (* determined by the base address, see Section 2-2) where Thumbwheel #2 (P3 of the Interface Board) requires that address 0xE0*3 be read to obtain its sign.

Bit #23 holds the sign status and changes its setting to a one if the sign is negative. When the user requires a negative data value they can determine the sign and negate the data by testing this bit. For example: BV:1=PV:0xE001 and 0x800000, IF(BV:1 EQ 0x800000) which reads the Thumbwheel #1 sign and tests the sign for a negative. The status of the sign gets sent to the BV:1 variable.

Note, in the above example, that the base address is equal to 0xE000.

3.3: Execute

The execute latches the data and sign into the Thumbwheel Interface Board upon pressing the execute. The execute status is bit #16 and uses the same address as the sign. Bit #16 is high upon pressing the execute. For example IF(PV=0xE001 AND 0x010000) which checks for a Thumbwheel #1 execute switch closure.

Note, in the above example, that the base address is equal to 0xE001.

3.4: Program Example

In some cases the user may wish to enter the length necessary for cut-to-length applications. To do this, the length must be an input variable. The variable value can come from a host controller, a set of thumbwheels, or an operator keypad/display unit. The optional THM is a six-digit thumbwheel addressable on the UNIDEX 100 Expansion Bus. The location for this thumbwheel is at E010 hex. The user units are machine steps. For an example of how this works refer to the following program.

```
BEGIN                              ; Start the program.
BV:1=PV:0xE011 AND 0x10000         ; BV:1 will equal 0x10000 when depressed.
WHL(BV:1 NE 0x10000)               ; Wait until the button is depressed.
  BV:1=PV:0xE011 AND 0x10000       ; BV:1 will equal 0x10000 when depressed.
ENDWHL                             ; End the while loop.
FV:1=CBI(PV:0xE010)                ; Set FV:1 equal to the CBI of variable
                                   ; PV:0xE010
IF(PV:0xE011 AND 0x800000)         ; If sign is negative, FV:1 will be negated.
  FV:1=-1*FV:1                     ; Set the variable FV:1 to negative.
ENDIF                              ; End the IF statement.
D(FV:1)                            ; Set the distance equal to the value of the FV:1
                                   ; variable.
V(6000)                            ; Set the velocity equal to 6000.
GO                                 ; Start the move.
END                                ; End the program.
```

CHAPTER 4: HARDWARE

In this Chapter you will find information concerning the THM boards and related hardware. It will provide information on both electrical and mechanical features.

4.1: UNIDEX 100 THM Option Location

There are two boards supplied with UNIDEX 100's THM option: Interface Board and Thumbwheel Board. The UNIDEX 100 THM Interface Board mounts to the UNIDEX 100 Control Board with four #4-40 x 3/4" standoffs. These standoffs get screwed into the female studs located behind the mounting holes on the control board. There are two #4-40 x 1/4" screws that go through the mounting holes at the front of the THM Interface Board. Two #4-40 x 1/2" screws get screwed into the remaining two standoffs through the holes in the DIN connector. For an example on how to mount the THM Interface Board to the UNIDEX 100 Control Board, see ***Figure 4-1*** on the following page.

As for the UNIDEX 100 THM Six-digit Thumbwheel Board, the user can mount it in one of two ways: remotely or housed in the standard plastic enclosure.

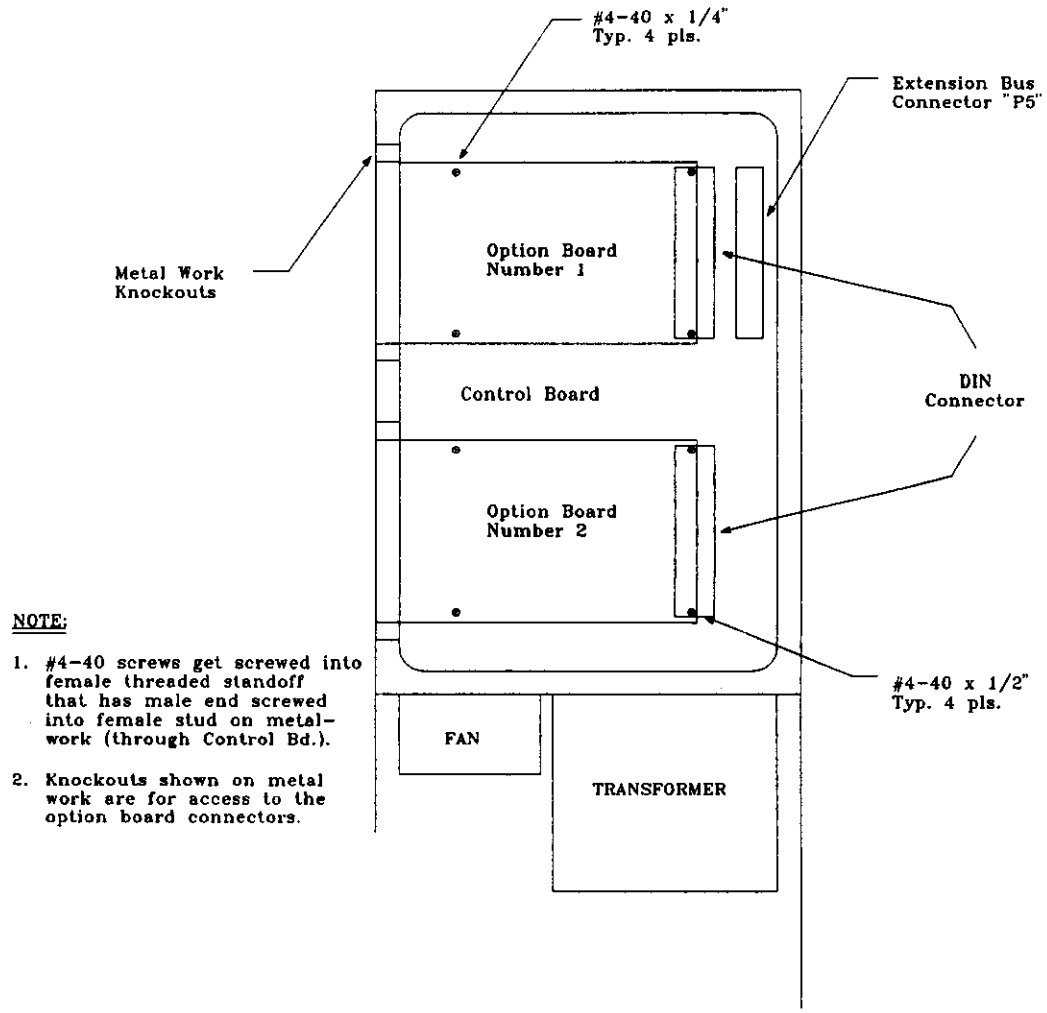


Figure 4-1: Mounting of THM Interface Board to UNIDEX 100 Control Board

NOTE: This option can be field installed, however it requires option wiring (consult factory). The UNIDEX 100 Control Board can mount 2 option boards.

4.2: THM Board Descriptions

The THM option consists of two boards: Interface Board and Thumbwheel Board. The following sections describe each one in detail.

4.2.1: THM Interface Board

The THM Interface Board is a 3U size board that provides the UNIDEX 100 with the capability of reading up to two thumbwheel boards or simulated thumbwheel interfaces (user may simulate the Thumbwheel Board using their own interface). Thumbwheel #1 uses P2 as its interface port while Thumbwheel #2 uses P3 for its port.

All the thumbwheel interface ports (P2 and P3) signal inputs use logic levels of +5V and 0 volts; however, it is possible to drive these inputs using open collector devices due to the 10K pull-up resistors. By using the execute input the user can latch the six-digit BCD coded inputs.

The UNIDEX 100 obtains data from the Interface Board through the Extension Bus connection (P1). To access the board it is necessary to use the proper address. SW1 (Base Address, Section 2.2). This section partially determines what address to use. ***Figure 4-2*** shows the THM Interface Board and component functions.

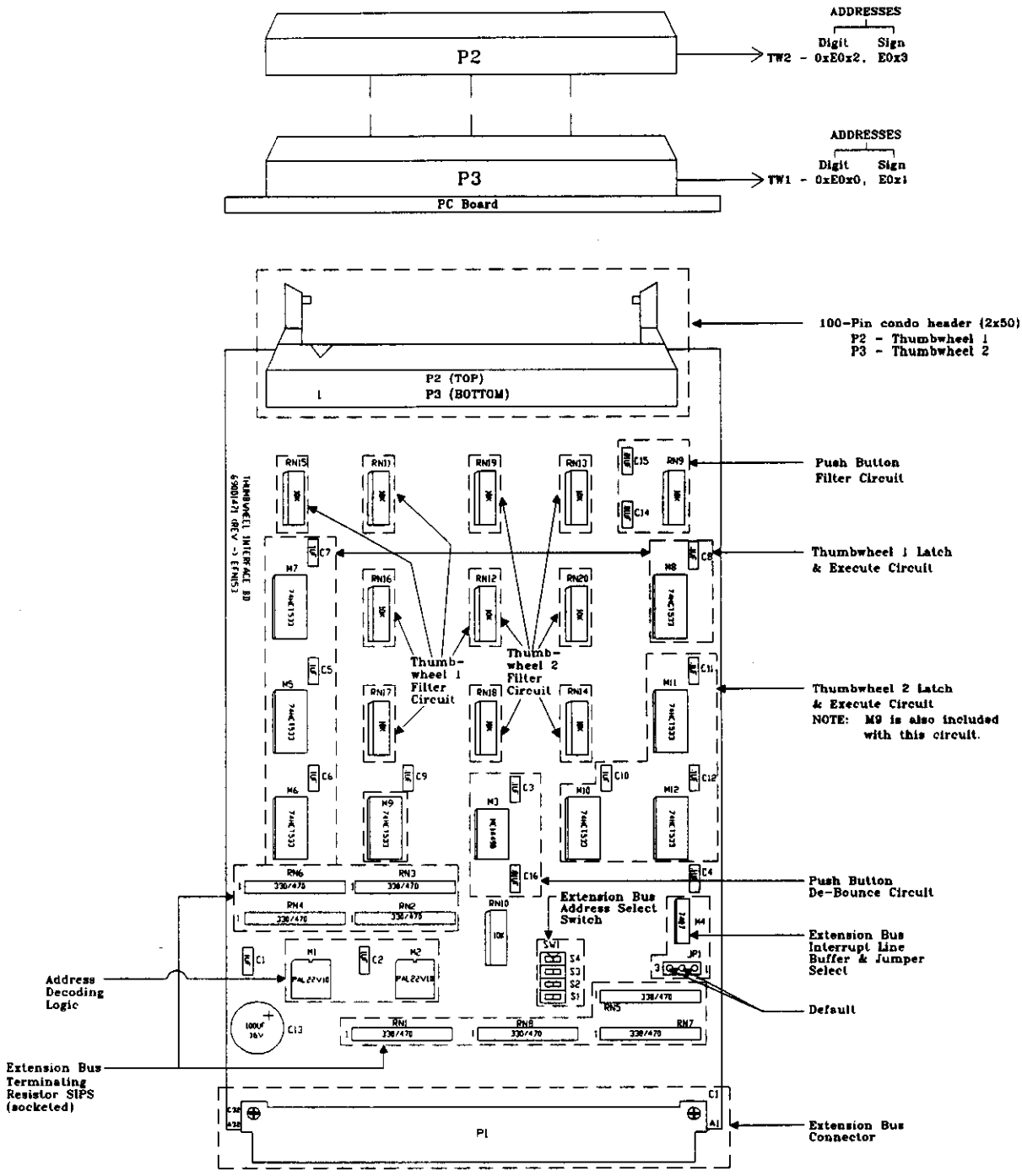


Figure 4-2: THM Interface Board

4.2.2: Thumbwheel Board

The THM Thumbwheel Board is a data entry board that connects to the UNIDEX 100 through the THM Interface Board. This board contains six-digit BCD thumbwheels, a sign thumbwheel, an execute connector (P2), and the interface connector (P1). The six-digit thumbwheels are active low, which means that the associated BCD line connects to COM to activate that line. The Sign Thumbwheel also makes connection to common when there is a closed contact. The execute button, connected to P2, causes the execute line to connect to common upon pressing the button.

The P1 connection is a 50-pin connector used to connect the THM Thumbwheel Board to the THM Interface Board (see Section 4.5.2).

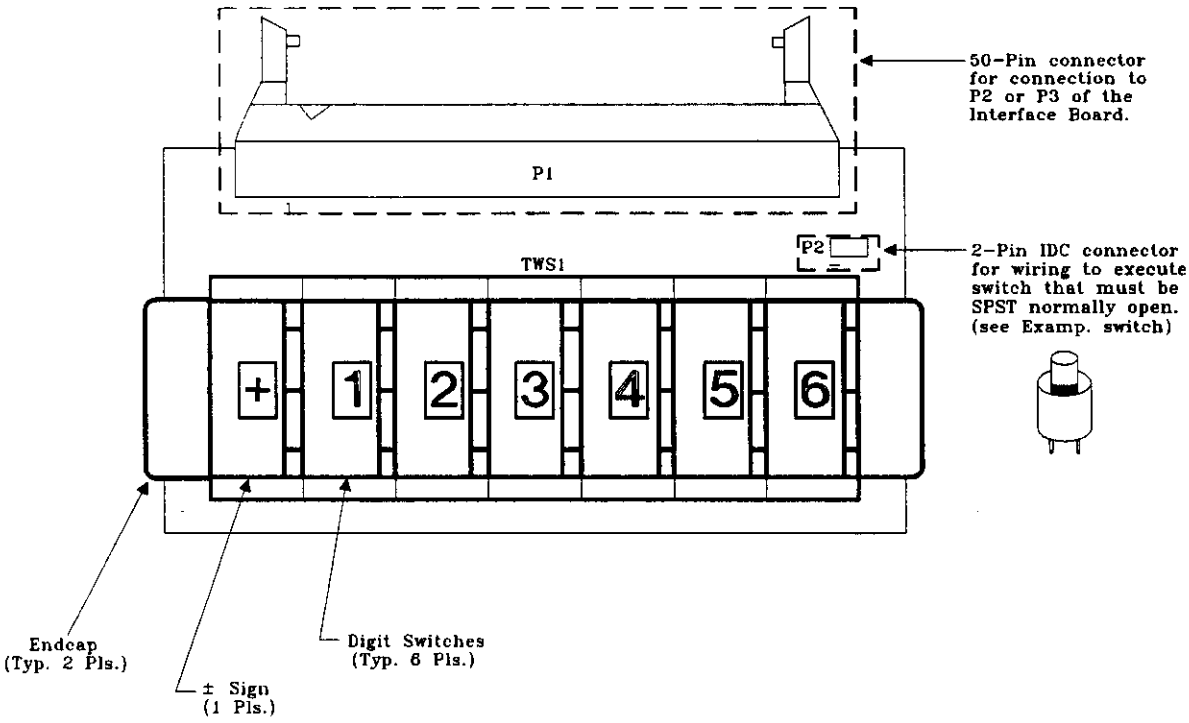


Figure 4-3: THM Thumbwheel Board

4.3: THM Interface Connections

To connect the UNIDEX 100's THM Interface Board and the Thumbwheel Board it is necessary to connect the 50-pin ribbon cable assembly between the Interface and Thumbwheel boards. See ***Figure 4-4*** below.

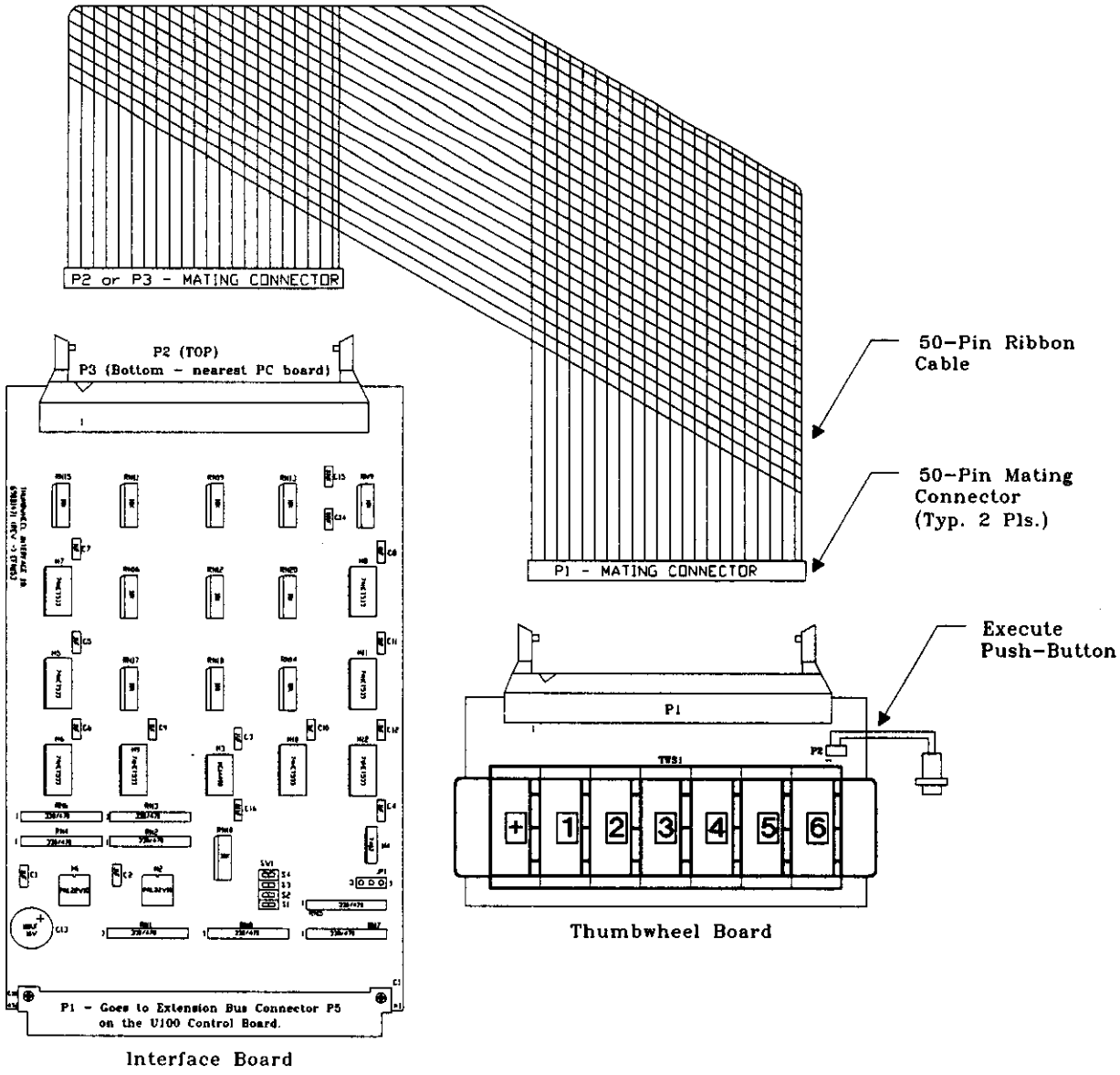


Figure 4-4: THM PC Board Connections

4.4: THM Interface Board Jumpers

There is one jumper on the THM Interface board. This jumper allows the user to interrupt the UNIDEX 100 upon pressing the Execute push-button. If JP1 is in the 1-2 position upon pressing the Execute push-button an interrupt occurs on the UNIDEX 100. When JP1 is in the 2-3 position, the UNIDEX 100 does not generate an interrupt.

The following is the recommended and standard jumper position:

JP1 - 2-3 (Upon pressing the Execute button no interrupt occurs)

4.5: THM Interface and Thumbwheel Board Connections

The THM option requires several connections. These include:

P1 - Interface Board (64-pin)

P2 - Interface Board (50-pin)

P3 - Interface Board (50-pin)

P1 - Thumbwheel Board (50-pin)

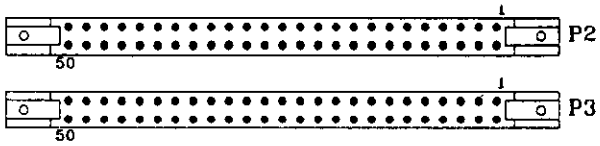
P2 - Thumbwheel Board (2-pin)

4.5.1: Interface Board (P1) to UNIDEX 100 Cable

Connecting a cable between P1 on the Interface Board and P5 on the UNIDEX 100 Control Board establishes the power connection between the THM Thumbwheel option and the UNIDEX 100. This cable is a 64-pin cable.

4.5.2: Interface (P2, P3) to THM (P1) Cables

P1 on the Thumbwheel Board and P2 or P3 on the Interface Board connect the thumbwheel boards to the Interface Board. A 50-pin ribbon cable, with the mate to connectors P1 and P2 or P3, establishes the link between the Thumbwheel Board and Interface Board. The total cable length should not exceed 10 feet. To determine the pin connections for these connectors refer to ***Figure 4-5***.



DIGIT 1-1	1	2	SIGNAL COMMON
DIGIT 1-2	3	4	SIGNAL COMMON
DIGIT 1-4	5	6	SIGNAL COMMON
DIGIT 1-8	7	8	SIGNAL COMMON
DIGIT 2-1	9	10	SIGNAL COMMON
DIGIT 2-2	11	12	SIGNAL COMMON
DIGIT 2-4	13	14	SIGNAL COMMON
DIGIT 2-8	15	16	SIGNAL COMMON
DIGIT 3-1	17	18	SIGNAL COMMON
DIGIT 3-2	19	20	SIGNAL COMMON
DIGIT 3-4	21	22	SIGNAL COMMON
DIGIT 3-8	23	24	SIGNAL COMMON
DIGIT 4-1	25	26	SIGNAL COMMON
DIGIT 4-2	27	28	SIGNAL COMMON
DIGIT 4-4	29	30	SIGNAL COMMON
DIGIT 4-8	31	32	SIGNAL COMMON
DIGIT 5-1	33	34	SIGNAL COMMON
DIGIT 5-2	35	36	SIGNAL COMMON
DIGIT 5-4	37	38	SIGNAL COMMON
DIGIT 5-8	39	40	SIGNAL COMMON
DIGIT 6-1	41	42	SIGNAL COMMON
DIGIT 6-2	43	44	SIGNAL COMMON
DIGIT 6-4	45	46	SIGNAL COMMON
DIGIT 6-8	47	48	SIGNAL COMMON
± SIGN	49	50	EXECUTE -N

Pin Number

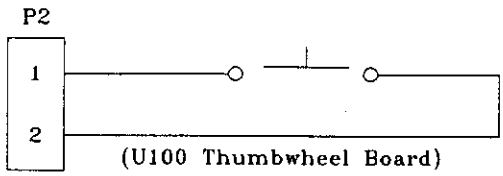
Digit Number & BCD Number

Digit/Sign

Figure 4-5: Pin Connections for P2 or P3 of Interface Board and P1 of Thumbwheel Board

4.5.3: Thumbwheel Board Execute Connection (P2)

The Thumbwheel Board contains a 2-pin connector (P2) used for an Execute push-button. These pins should be connected to a SPST normally open push-button switch (see ***Figure 4-6***).



Note: Pin P2-1 is pulled high with 10K Ohm resistor
Pin P2-2 is conected to common.

Figure 4-6: SPST Normally Open Switch

4.6: THM Interface Board Power Requirements

The THM Interface Board requires +5 volts, all of which P1 provides. By no means should this voltage be greater than 5.25 volts or less than 4.75 volts. Voltages not falling within the operating range may cause damage or operational failure.

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