8/16 Hardware Installation

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SAFETY WARNINGS AND PRECAUTIONS

Safety Warnings

DO NOT REMOVE THE COVER FROM THE HORIZON UNTIL THE POWER IS OFF, THE FAN HAS STOPPED, AND THE RED INDICATOR ON THE FRONT PANEL HAS COMPLETELY DIMMED. DO NOT TURN THE POWER BACK ON UNTIL THE COVER HAS BEEN REPLACED.

DO NOT INSERT, REMOVE, CONNECT, DISCONNECT, OR TAMPER WITH ANY CIRCUIT BOARDS, THEIR COMPONENTS, OR DISK DRIVES WHILE THE POWER IS TURNED ON. TO AVOID THE POSSIBILITY OF A SEVERE SHOCK, DO NOT TOUCH THE HORIZON'S POWER SUPPLY SECTION WHENEVER THE POWER CORD IS PLUGGED INTO AN AC OUTLET.

Precautions

Make sure that the computer's power is off before installing or removing circuit boards. This includes TIO and MIO boards as well as S-100 boards. Removing a board while power is on could damage components.

To install a circuit board in a HORIZON, hold the board in one hand while touching the grounded metal chassis of the computer with the other hand. This will eliminate any difference in static potential between the board and the computer.

When removing a circuit board from the HORIZON, grasp the upper edge of the board so that you do not put excessive strain on the board's components or injure your hands on the pins on the back of the circuit board. If the circuit board has ejectors, use them to help remove the board from its slot.

Introduction

The HORIZON 8/16 multi-user system will accommodate up to eight users per HORIZON. One 8-bit HRZ-UP8 or 16-bit HRZ-UP16 board must be installed for each user.

HORIZON Boards

The HRZ-UP8 (User Processor) board has a 4MHz Z80A microprocessor with a 64K parity RAM and two serial I/O ports. It is provided with one HRZ-TIO serial drive board and has space for a second serial board.

The HRZ-TIO is an RS-232C terminal/printer driver board that connects either the HRZ-UP8 or the HRZ-UP16 board to a terminal or a printer.

The HRZ-UP16 board has an 8MHz 8088-2 microprocessor with 128K of parity RAM and two serial I/O ports. It is provided with one HRZ-TIO serial driver board and has room for a second serial board.

The HRZ-384K board is an optional memory board that can be used with the HRZ-UP16 to increase memory to 512K per 16 bit user.

The HRZ-MIO is an optional RS-232C modem driver board that connects either the HRZ-UP8 or the HRZ-UP16 to a modem.

The Background Batch Processor board is an optional UP8 board that is configured to serve as a background batch processor.

Upgrade Kit

An Upgrade Kit is available for earlier HORIZONS (those with serial numbers below 40,000). The kit contains all the components necessary to bring older HORIZONs up to the 40,000 series level, including a new transformer assembly and new rear panel.

Number of Boards

The maximum number of HRZ-UP8 or HRZ-UP16 boards that can be installed in a HORIZON 8/16 system is summarized below. Refer to the tables that follow the general guidelines for specific user and extended memory board allowances.

HORIZON	#HRZ-UP8 |or| #HRZ-UP16 (use lesser number if mix)	
HORIZONS with serial numbers greater than 40,000	8	8*
HORIZONS with serial numbers less than 40,000		
o Not upgraded	4	3
o Upgraded	8	8

* Reduce by one for each 384K board. A total of eight board slots are available.

Grounding Spring Requirement

In order to comply with FCC RFI regulations, North Star provides a spring (part #03840) as part of the Upgrade Kit that grounds the motherboard I/O connectors to the rear panel. HORIZON 8/16s will have the spring already installed. This spring is required only with HRZ-UP16 boards. Contact your North Star Dealer if you require a grounding spring.

Board Planning Table

This is a more detailed table. It shows the specific board combinations that can be configured in any HORIZON 8/16 system.

Maximum numbers are shown in the table. For example, "4" indicates that 4, 3, 2, 1 or 0 boards of that type could be used.

	NUMBER OF BOARDS		
	HRZ-UP8	HRZ-UP16	HRZ-348K
HORIZON BELOW SN 40,000-- NOT UPGRADED	4	0	0
	2	1	0
	1	2	0
	1	2	0
	1	1	1
	0	3	0
	0	2	1
HORIZON WITH SN 40,000 AND UP; OR HORIZON WITH SN BELOW 40,000 --UPGRADED	Any combination up to 8 boards total.		

Introduction When connecting any peripheral device to your HORIZON, be sure to consult its installation manual for configuration instructions.

Modems Modems are connected via MIO boards, which in turn are connected to the user processor board (HRZ-UP8 or HRZ-UP8). The North Star factory-configured MIO is compatible with typical asynchronous modems such as the Bell 212. See the HORIZON 8/16 Technical Manual for jumper description requirements.

User Terminals

Any standard asynchronous type terminal will work with the HORIZON 8/16 multi-user system. The standard settings for user terminals are:

- o 9600 baud
- o 8 bits
- o No parity
- o 1 stop bit
- o Full duplex

Customization of terminal characteristics such as cursor positioning is done in applications software. For this reason, the system will be easier to manage if all the terminals are the same type. However, this is not a hardware requirement of the 8/16 system.

Server Terminal

The ZPB board in the HORIZON is called the **server** for the system. The server handles the system-level I/O and memory usage.

No dedicated terminal is needed on this system to function as a server in the standard configuration. Any user terminal becomes the server by entering the SERVER command. Since no dedicated terminal is used, both motherboard serial ports are available for printers.

Note: If you customize the system from the original distribution copy, you may need a dedicated server. If the system is reconfigured to use a separate server, the server terminal must be connected to the left serial port on the HORIZON motherboard. The server terminal is configured the same way as shown above for user terminals.

Printers

To connect a printer, you must know:

- Whether it is a parallel or serial printer.
- If you have a parallel printer, it must be connected to the motherboard parallel port. North Star has cables available for parallel printers. These cables use the most significant bit (bit 7) for the strobe line.

  NOTE: HD-18 hard disk systems cannot use a parallel printer under TurboDOS.

- If you have a serial printer,

  - What is its baud rate?

    If connected to the motherboard, the baud rate is fixed by the motherboard header. The headers shown in the "Configuring the HORIZON Motherboard" procedure set the left serial port (port 0) for 9600 baud and the right serial port (port 1) for 1200 baud. (Port 0 is intended for typical data word processing requirements and will generally work with serial dot matrix printers. Port 1 is intended for typical daisy wheel or letter quality printers.)

  - What is its protocol?

    If the printer has hardware handshaking, on which RS-232 line does it handshake? (The standard is DTR, pin 20.)

    If the printer has software handshaking, is it ETX/ACK or XON/XOFF?

Refer to the chart on the next page to see if you have to change anything in the system in installing your printer or printers.

See Also

HORIZON Computer System Manual for wiring the motherboard for other printer configurations.

Printer Installation Guide

Following is a chart for planning printer installation.

<table>
<tr><th colspan="5">PRINTER INSTALLATION GUIDE</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">PARALLEL</td><td colspan="3">SERIAL</td></tr>
<tr><td rowspan="2">HARDWARE HANDSHAKE</td><td colspan="2">SOFTWARE PROTOCOL</td></tr>
<tr><td>XON-XOFF</td><td>ETX-ACK</td></tr>
<tr><td rowspan="2">MOTHER-BOARD</td><td rowspan="2">Motherboard only. Requires special cable. Cannot be used with HD-18.</td><td>Standard serial header selects DTR -- change if required.</td><td colspan="2">Standard serial header okay.</td></tr>
<tr><td colspan="3">Baud rates set in hardware, by baud rate header.</td></tr>
<tr><td>FACTORY STD. MBD. CONFIG.</td><td>*</td><td>Left port (0) 9600 baud DTR</td><td>*</td><td>Right port(1) 1200 baud</td></tr>
<tr><td>USER PROCESSOR BOARD (UP)</td><td>None -- Motherboard only</td><td>Standard TIO jumper selects DTR -- change if required.</td><td colspan="2">Standard TIO jumpers okay.</td></tr>
<tr><td>FACTORY STD. UP CONFIG.</td><td>--</td><td>9600 baud DTR</td><td>*</td><td>*</td></tr>
</table>

* These printers are compatible with the standard hardware configuration but must be installed in the software. Run the CONFIG program to specify the type of printer (CTS/DTR, ETX/ACK, XON/XOFF) for each port.

How to Use this Guide

To perform any installation required for the HORIZON 8/16, first consult the "Safety Warnings and Precautions" at the front of this manual. Then,

- If this is the first 8/16 upgrade installation, consult Chapter 2, "Configuring the HORIZON Motherboard" procedure.
- To install HRZ-UP8, HRZ-UP16, or HRZ-384K boards, consult Chapter 3, "Configure the HRZ-UP Boards."
- To install either the HRZ-TIO or the HRZ-MIO boards, consult Chapter 3, "Connect the HRZ-UP Boards."
- To install a Background Batch UP-8, consult Chapter 4.

Tools Required

You will need the tools listed below to complete the installation procedures:

- A medium-sized flat blade screwdriver
- A #1 Phillips' head screwdriver
- A 3/16" nut driver
- A small pointed tool such as a small screwdriver for setting DIP switches
- If jumpering a Background Batch Processor, you will also need a soldering iron and solder.

HORIZON 8/16 Parts

Following is a general parts list for system installation.

HORIZON Computer

The basic board population should be as follows:

- o ZPB CPU card
- o HRAM with 64K bytes of memory
- o Floppy disk controller
- o Hard disk controller if an HD-5 or HD-15 is present.

All other boards should be removed from the S-100 bus. (You may optionally leave the tape backup controller installed.)

Additional Parts for 8/16 System

- o One or more CRT terminals, each with standard connecting cable and screws for connecting to TIO board outlet.
- o HRZ-UP boards -- one of either per CRT terminal:
  - HRZ-UP8 board(s)
  - HRZ-UP16 board(s)
- o HRZ-TIO board(s) -- one for each UP board, with connecting cable to UP-board and screws for connecting to back panel.
- o Miscellaneous parts (supplied):
  - Headers for configuring motherboard
  - Mini-jumpers for configuring boards
- o System printer (if used) with standard connecting cable to HORIZON motherboard.

HORIZON 8/16 Parts (cont.)

If using:

- Optional 384K board(s) with cable connector
- Optional HRZ-MIO board(s) with connecting cable to UP-board and screws.
- Dedicated printer(s), each with one additional HRZ-TIO board as above, and printer cable and screws to TIO board outlet.
- One additional UP8 board, and optionally one TIO board, for use as the Background Batch processor option.

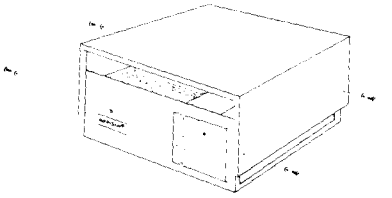
CONFIGURING THE HORIZON MOTHERBOARD

Introduction The purpose of this procedure is to configure motherboard headers and HRAM switches and jumpers for the 8/16 system being installed.

Procedure: Configuring the HORIZON Motherboard

1. Turn off and unplug the HORIZON.

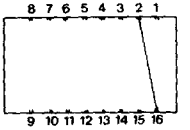
2. Use a medium-sized flat blade screwdriver to remove the HORIZON's four cabinet screws.



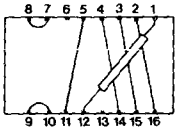
3. The headers on the HORIZON motherboard should be configured as shown.

   The baud rate and real time clock headers for TurboDOS are different from the factory HORIZON. If your headers are not the same as those shown at the right, remove them and install the headers supplied with TurboDOS.

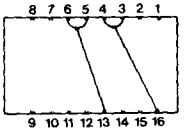
INTERRUPT HEADER



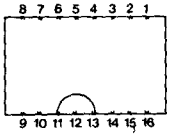
LEFT AND RIGHT SERIAL HEADERS



BAUD RATE HEADER



REAL TIME CLOCK HEADER



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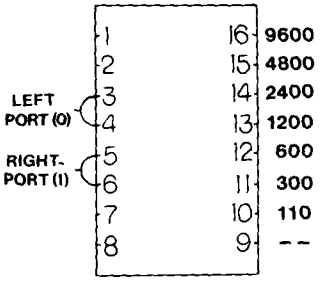
Procedure: Configuring the HORIZON Motherboard

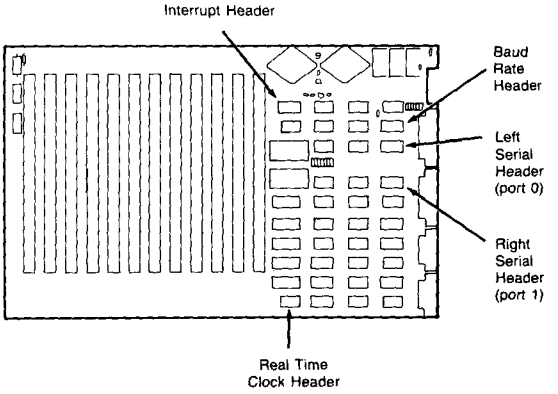
Note: The illustration at right shows the possible baud rate settings.

BAUD RATE SETTINGS
2D



4. Install the headers at the motherboard locations illustrated at the right. The motherboard lies flat above the floor of the HORIZON on the left side.

   Note: Make sure that the headers are properly oriented so that the number one on the header corresponds to the number one on the motherboard.



5. If the HRAM board is installed, remove the board from its board slot in the HORIZON.

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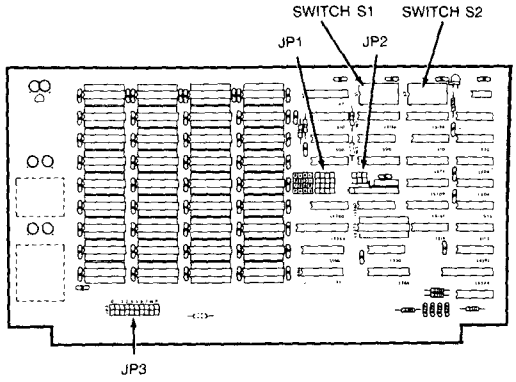
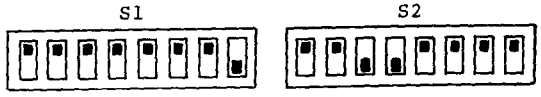
Procedure: Configuring the HORIZON Motherboard

6. Use the illustrations at the right to locate and correctly set the switches and jumper plugs.

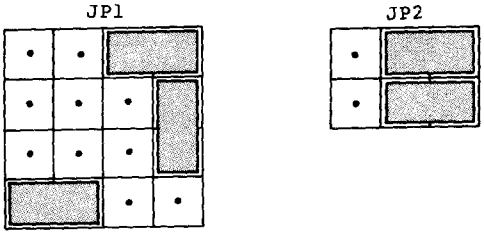
HRAM



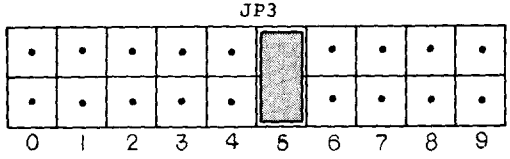
- S1/S2 select 64K RAM with E800-EBFF (hex) de-selected for the Boot PROM and floppy drive controller.



- JP1/JP2 cause the HRAM board memory to always be selected on system reset.



- JP3 causes memory parity to be vectored to Vector Interrupt 5.



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Procedure: Configuring the HORIZON Motherboard

7. Install (or reinstall) the HRAM board in any available board slot.

INSTALLING THE HRZ-UP BOARDS

Introduction This chapter describes the step-by-step procedure for installing the 8/16 HRZ-UP boards. To install the boards you:

1. Configure the HRZ-UP boards to set correct addresses and install each board. The board address is composed of two hexadecimal digits:

   - The upper digit (switches 1-4) represents the board type: 2 = UP8 board
     4 = UP16 board
     7 = UP8 board used as Background Batch (see Chapter 4).

   - The lower digit (switches 5-7) identifies a particular board: first, second, etc.

   - The lowest-order digit (switch 8) is always set open ("1") for normal operation (the switch is set closed to invoke a special service diagnostic). This gives the low-order address digit odd numbering: 1, 3, 5, etc.

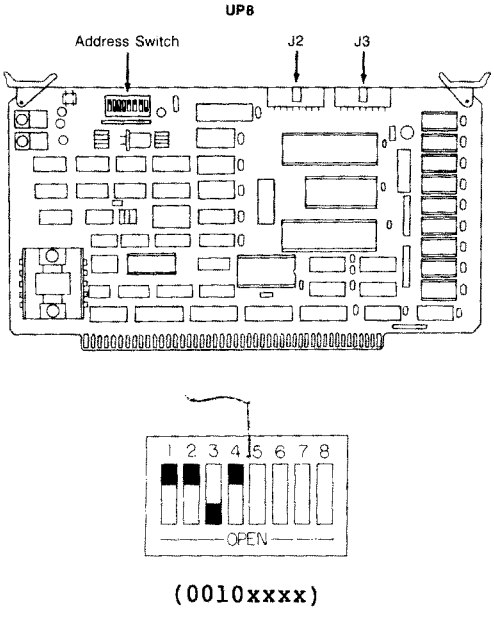
2. Install any 384K boards.

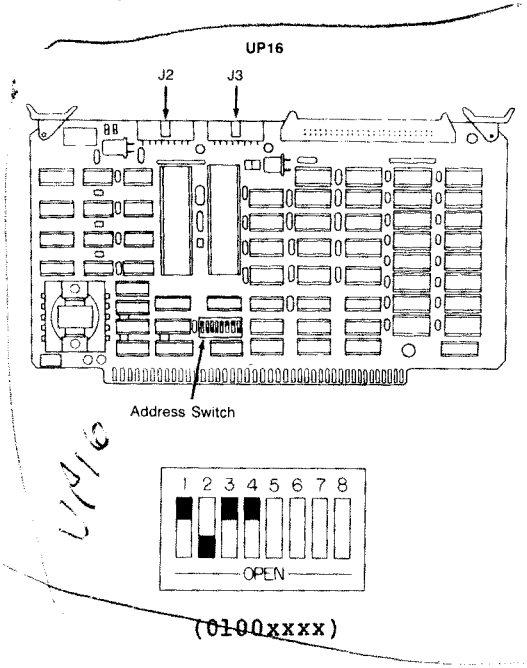
3. Connect the HRZ-UP boards by installing the associated TIO boards and cables.

4. Connect the CRT terminals.

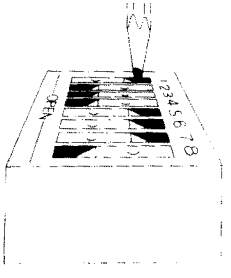
Procedure: Configure the HRZ-UP Boards

1. Remove each HRZ-UP board from its protective cover, locate the address switches, and use a small pointed tool to set the first four switches as shown below.





NOTE: The figure below shows a sample DIP switch setting, with dark areas (as in the figures above) pushed in.



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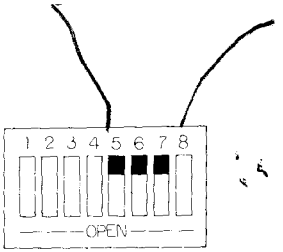
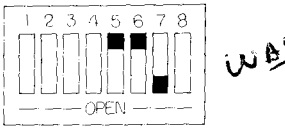
Procedure: Configure the HRZ-UP Boards

2. Set address switches 5, 6, and 7 on each HRZ-UP board as follows:

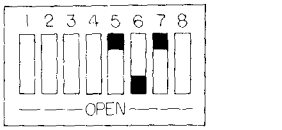
The first board (xxxx000x)



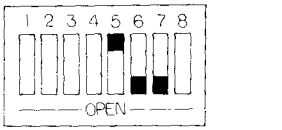
The second board (xxxx001x)



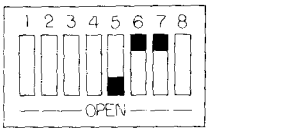
The third board (xxxx010x)



The fourth board (xxxx011x)



The fifth board (xxxx100x)

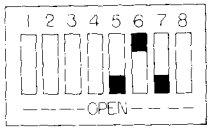


Page 3-3, step 2, add:

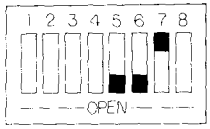
> **Note:** If you are installing UP8 and UP16 boards in the same system, install the UP8's first, following the instructions for "first board," "second board," et cetera. When you get to the UP16's, don't continue with the switch settings. Instead, go back to the beginning of step 2 and set up the first UP16 as "first board," the second UP16 as "second board," et cetera.

Procedure: Configure the HRZ-UP Boards

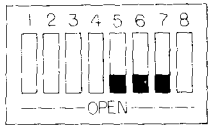
The sixth board (xxxx101x)



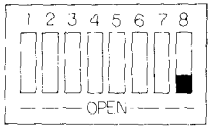
The seventh board (xxxx110x)



The eighth board (xxxx111x)



3. Set the 8th address switch to OPEN. This allows the HRZ-UP board to operate in its standard mode.



(xxxxxx1)

Note: This switch is set to CLOSED to invoke the special Diagnostics environment. For this mode, see the 8/16 Technical Manual.

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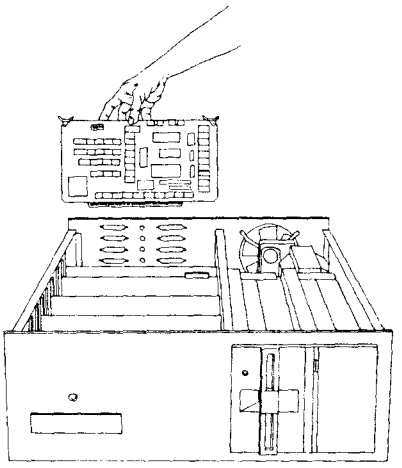
Procedure: Install the HRZ-UP Boards

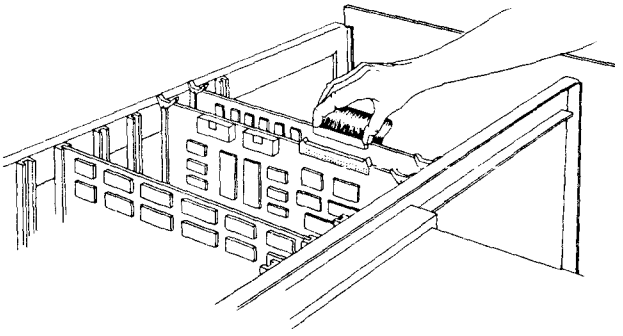
1. To install, hold a HRZ-UP board by both edges with its component side facing the front of the computer as shown. Firmly press the board down into an unoccupied slot. Repeat for all HRZ-UP boards.

   Note: For maximum cooling effect, space the boards out among the slots as much as possible.



2. If you have an HRZ-384K board, install it in a slot next to the HRZ-UP16 that will use the extra memory and attach its cable connector to the 50 pin connector on top of the HRZ-UP16 board.

   If you do not have an HRZ-384K board, go on to the next procedure.



Introduction This procedure describes how to connect the HRZ-UP8 and HRZ-UP16 boards for communication with peripherals. There are two parallel ports on each UP board:

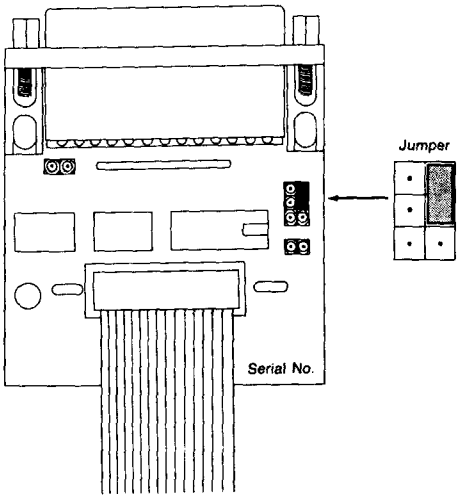
- o J2 (left port) goes to the terminal
- o J3 (right port) is either unconnected or goes to a dedicated printer or a modem.

Procedure: Connect the HRZ-UP Boards

1. The 16-pin keyed connector on the TIO cable should be plugged into the TIO board connector. If it is not, use the proper end of the cable to duplicate the illustration.

   Make sure the jumper on the TIO board is positioned as shown.

   Note: If you are using a non-DTR printer (one that handshakes on some line other than 20) you will need to change this jumper. Consult the HORIZON 8/16 Technical Manual before changing any jumpers.



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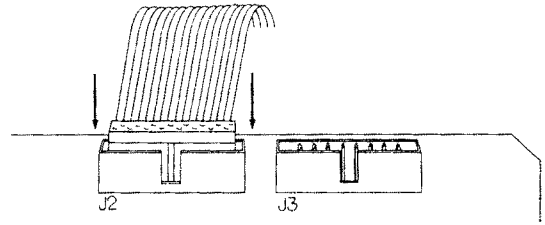
Procedure: Connect the HRZ-UP Boards

2. Plug the keyed connector on the other end of the TIO cable into the left terminal connector (J2) of the UP board.

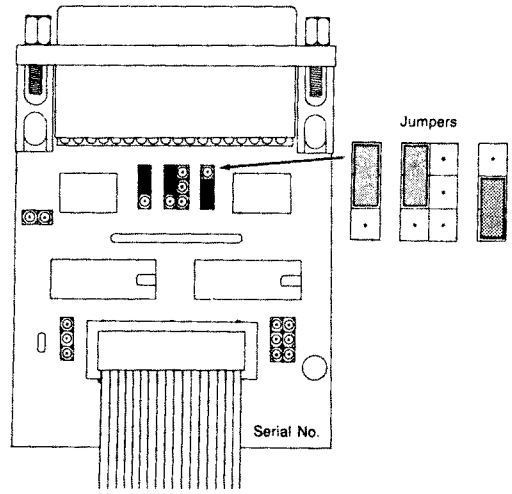


3. If your HORIZON 8/16 system has neither a dedicated printer nor a modem, go on to step 7.

4. If your HORIZON 8/16 system is to use a dedicated printer, connect the TIO cable to the TIO board and check the jumper as described in step 1.

5. If using a modem, the 16-pin keyed connector on the MIO cable should be plugged into the MIO board connector. If it is not, use the proper end of the cable to duplicate the illustration.

   Check the illustration at the right to make sure that the jumper on the MIO board is properly positioned.



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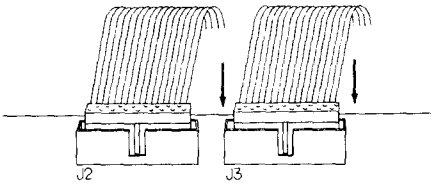
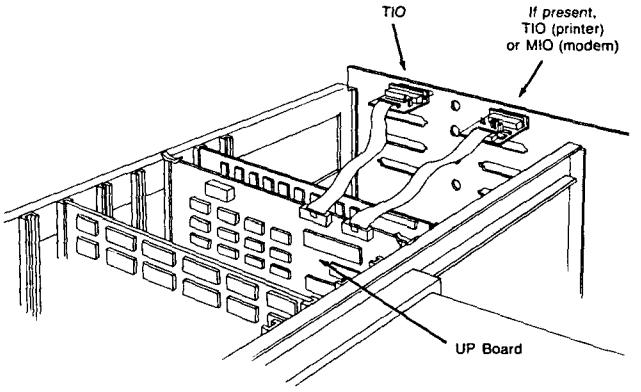
Procedure: Connect the HRZ-UP Boards

6. Attach the other end of the TIO or MIO cable to the right terminal connector (J3) on the UP board.



7. Attach each TIO/MIO board to the rear panel as follows:

   - Unfasten the jackscrews from the connector on the TIO or MIO.
   - Hold the TIO or MIO up to the rear panel so the connector faces through the appropriate I/O port.
   - Screw in the screws or jackscrews from the back so that they hold the TIO or MIO firmly in place.

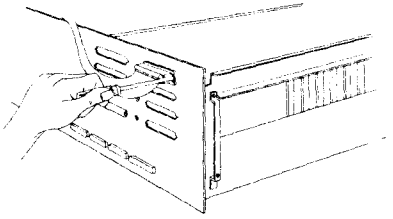


CAUTION
Be careful not to damage the power supply wires to the motherboard.

---->

Procedure: Connect the HRZ-UP Boards

8. From the back of the HORIZON press the external connector into the TIO or MIO board. If you have jackscrews, screw down the connector to insure that the connection is physically intact.



9. Repeat the procedure to install any additional UP boards.

10. If installing a Background Batch Processor board, continue on to Chapter 4. Otherwise proceed to step 11 below.

11. Installation is now complete. You can:

    - o Replace the HORIZON cover.
    - o Insert and tighten the four cover screws.
    - o Plug the computer into a grounded AC power outlet.
    - o Turn on the HORIZON.

INSTALLING A BACKGROUND BATCH PROCESSOR

Introduction

The purpose of this procedure is to configure a UP8 board as a Background Batch Processor (BBP) and install the board in the HORIZON.

The Background Batch Processor is a UP8 board that is configured to serve as a background batch processor. The board occupies one slot in the HORIZON 8/16 board set.

Installation Option

In installing the BBP, you have the option of connecting it via:

o The TIO board (one is supplied with each UP8)

or

o Jumpering at the J2 connector.

If you use the TIO board option, you do not need to do any soldering. By using the jumper, however, the TIO board (and its I/O slot on the back panel) is freed for other use.

See Also

The Background Batch Processor is accessed remotely by UP8 users via the BB command. See the Turbo-Plus User's Guide for further information on BB operation.

Procedure: Installing the Background Batch Processor

1. If you are installing the BBP separately and the HORIZON is not yet opened, first turn off the power to the HORIZON and open its cabinet as described on page 2-1, steps 1 and 2.

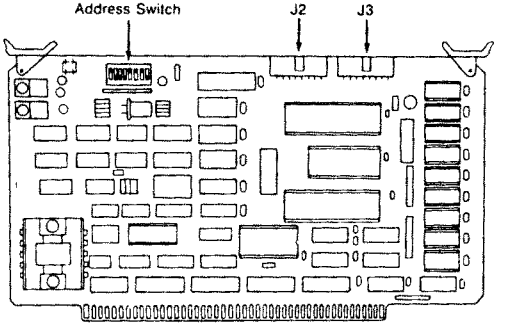
---->

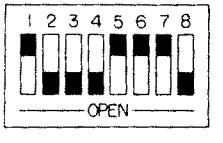
HORIZON 8/16 Hardware Installation 4-1

Procedure: Installing the Background Batch Processor

2. Remove the UP8 from its protective cover, locate the address switches, and use a small pointed tool to set the address switches as shown below.

BACKGROUND BATCH PROCESSOR





(01110001)

Comment: The BB address is set to 71 hex (TurboDOS will see it as 70).

---->

Procedure: Installing the Background Batch Processor

3. If installing the BBP with a TIO, perform the following steps:

   a. **Step 4, page 3-5.** Install the BBP board into any free slot in the HORIZON board cage.

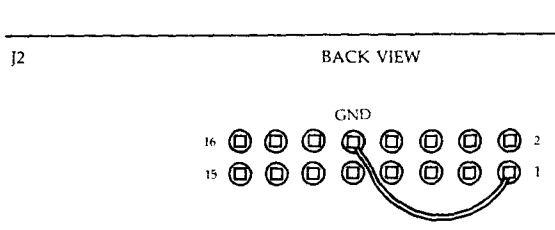
   b. **Step 1, page 3-6.** The 16-pin keyed connector on the TIO cable should be plugged into the TIO board connector. If it is not, connect the cable and check the jumper as described.

   c. **Step 2, page 3-7.** Connect the TIO to J2 of the BB board.

   d. **Step 7, page 3-8.** Attach the TIO to the rear panel.

   Comment: The BBP operates in this configuration with nothing attached to the external TIO connector. A terminal can be connected, in which case it displays an ongoing log of BBP activity. However, the Turbo-Plus LOG command is the normal way of logging BBP activity.

4. If installing the BBP via jumpering, jumper J2-1 to J2-10 as shown in the illustration below.



   Then install the BBP board into any free slot in the HORIZON board cage (for reference see step 4, page 3-5).

5. The HORIZON cabinet can then be closed as described in step 11, page 3-9.