

# I/O Boards and Components



To protect both yourself and the equipment, make sure you follow precautions in Chapter 2, “Safety Precautions and Tools Requirements.”

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<i>Safety Precautions</i>	<i>page 2-1</i>
<i>Hot-Plug Feature</i>	<i>page 4-4</i>
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<i>SBus Cards</i>	<i>page 4-15</i>
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<i>Connectors</i>	<i>page G-5</i>

For your protection, also observe the following safety precautions when setting up your equipment:

- Follow all cautions, warnings, and instructions marked on the equipment.
- Never push objects of any kind through openings in the equipment as they may touch dangerous voltage points or short out components that could result in fire or electric shock.
- Refer servicing of equipment to qualified personnel.

## 4.1 Handling Boards and Assemblies



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**Caution** – The chassis AC power cord must remain connected to ensure a proper ground.

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**Caution** – The I/O boards, their modules, and cards have surface-mount components that can be broken by flexing the boards.

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To minimize the amount of board flexing, observe the following precautions:

- Hold the board only by the edges near the middle of the board, where the board stiffener is located. Do not hold the board *only* at the ends.
- When removing the board from an antistatic bag, keep the board vertical until you lay it on the Sun ESD mat.
- Do not place the board on a hard surface. Use a cushioned antistatic mat. The board connectors and components have very thin pins that bend easily.
- Do not use an oscilloscope probe on the components. The soldered pins are easily damaged or shorted by the probe point.
- Transport the board in an antistatic bag.
- Be careful of small parts located on the component side of the board.



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**Caution** – The heatsinks on the board can be damaged by incorrect handling. Do not touch the heatsinks while installing or removing the board. Hold the board only by the edges. If a heatsink is loose or broken, obtain a replacement board.

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**Caution** – The heatsinks on the board can be damaged by improper packaging. When storing or shipping the board, ensure that the heatsinks have sufficient protection.

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## 4.2 Filler Panels

All empty board slots in Enterprise 3000 systems must have a filler panel installed for cooling purposes. Filler panels are inserted into a board slot with the springfingers facing to the right. See Figure 4-1.

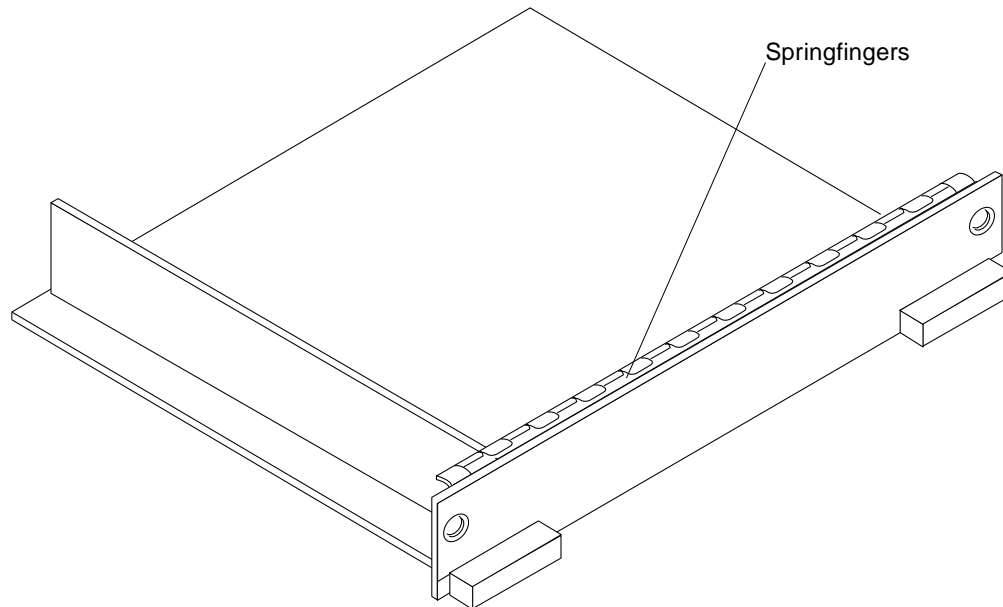


Figure 4-1 Filler Panel

### 4.3 SCSI Termination

The I/O board in slot 1 controls the internal SCSI tray devices. Therefore, the external SCSI connector on the I/O board in slot 1 of a system must be terminated with a SCSI terminator. See Figure 4-2.

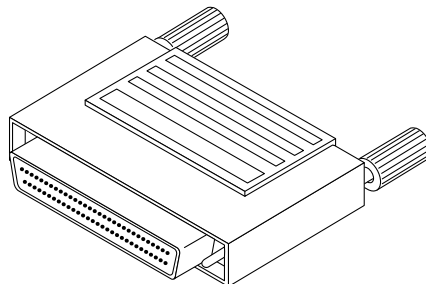


Figure 4-2 SCSI Terminator

## 4.4 Hot-Plug Feature

Enterprise 3000 systems have extensive error detection mechanisms, and an Automatic System Reconfiguration (ASR) feature that enables the system to be rebooted with failed components (such as CPUs, memory, or I/O) disabled. When an error is detected, the system can be reconfigured so that the board containing the failed components is placed in low power mode and is no longer accessible.



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**Caution** – If the message: NOTICE: Hot Plug not supported in this system is displayed during boot, do NOT attempt hot-plug in this system or damage to the hardware will occur.

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The hot-plug feature is the ability to insert a new board into a powered-on system, despite being “live,” or being supplied with electrical power. Once a working board is added to a powered-on system with the hot-plug feature, the system will not use the new board until the system is rebooted.

## 4.5 I/O Boards

Enterprise 3000 systems support two types of I/O boards: SBus and Graphics. See Figure 4-3 through Figure 4-6.

The SBus I/O board includes two SYSIO ASICs that provide two SBuses:

- One for two plug-in SBus cards and two fiber interfaces
- One for one plug-in SBus card and the on-board devices (10/100Mbyte TPE and Single-ended Fast/Wide SCSI)

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**Note** – SBus connector slots 1 and 2 on the SBus I/O board can accommodate a double-wide SBus card.

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The Graphics I/O board includes one SYSIO ASIC that provides a single SBus for two plug-in SBus cards, two fiber interfaces, and the on-board devices (10/100Mbyte TPE and Single-ended Fast/Wide SCSI). See Figure 4-5 and Figure 4-6 for simplified block diagrams of each board.

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### 4.5.1 `tpe-link-test?` *Variable*

If the system cannot communicate with a network, the `tpe-link-test?` settings for the on-board Ethernet ports may be incompatible with the setting at the network hub. The `tpe-link-test?` variable is set separately for the on-board Ethernet port on each I/O board. The variable is also set for any SBus Ethernet cards in the system.

If you have problems verifying connection between Sun equipment and your hub, verify that your hub also has the link test function enabled.

See Section 8.5.3.2, “`printenv` Command,” for information about displaying configuration variables and Section 8.6.1, “Failure of Network Communications,” for additional `tpe-link-test?` information. Also, refer to the manual provided with your hub.

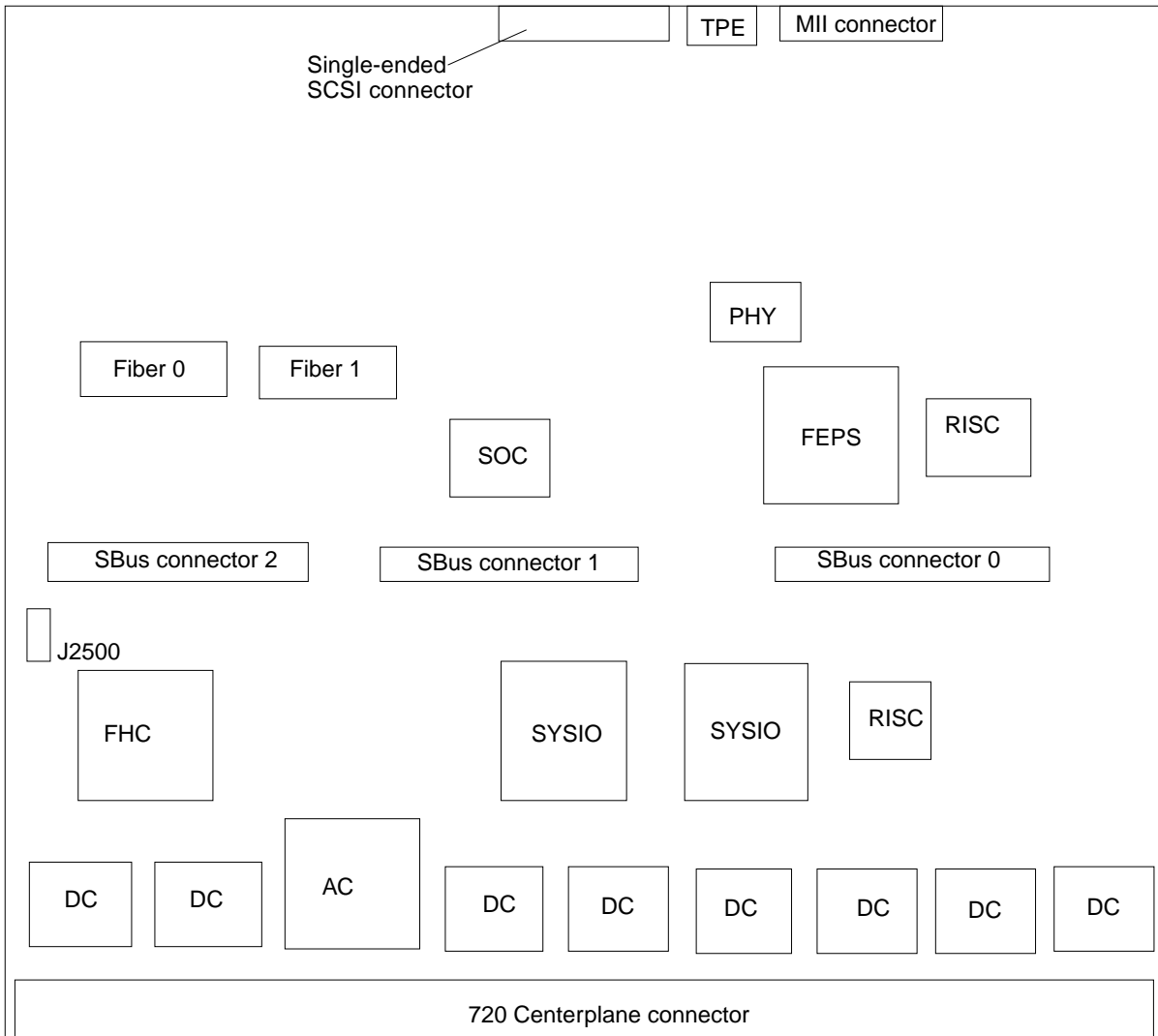


Figure 4-3 SBus I/O Board Components Locations

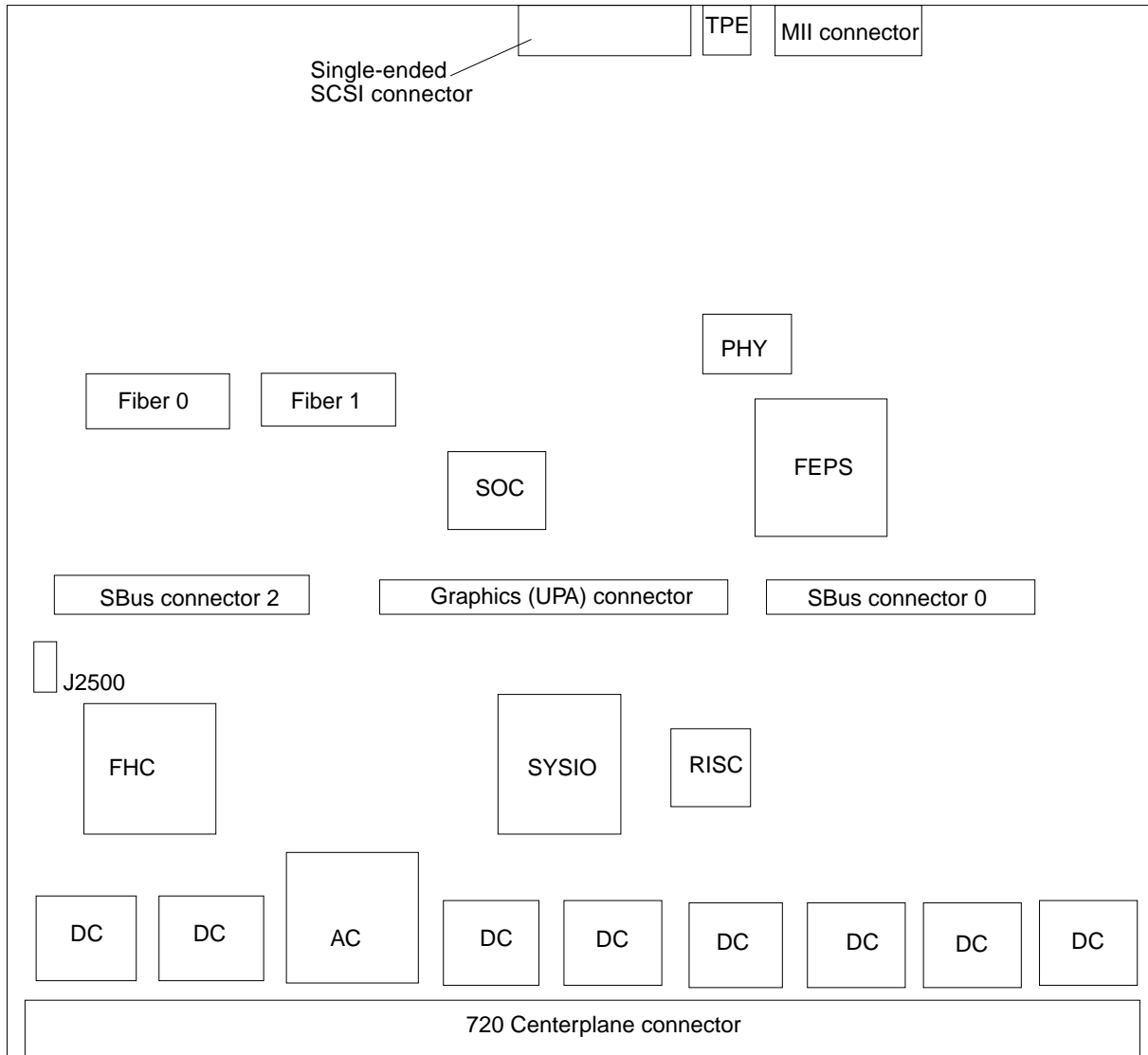


Figure 4-4 Graphics I/O Board Components Locations

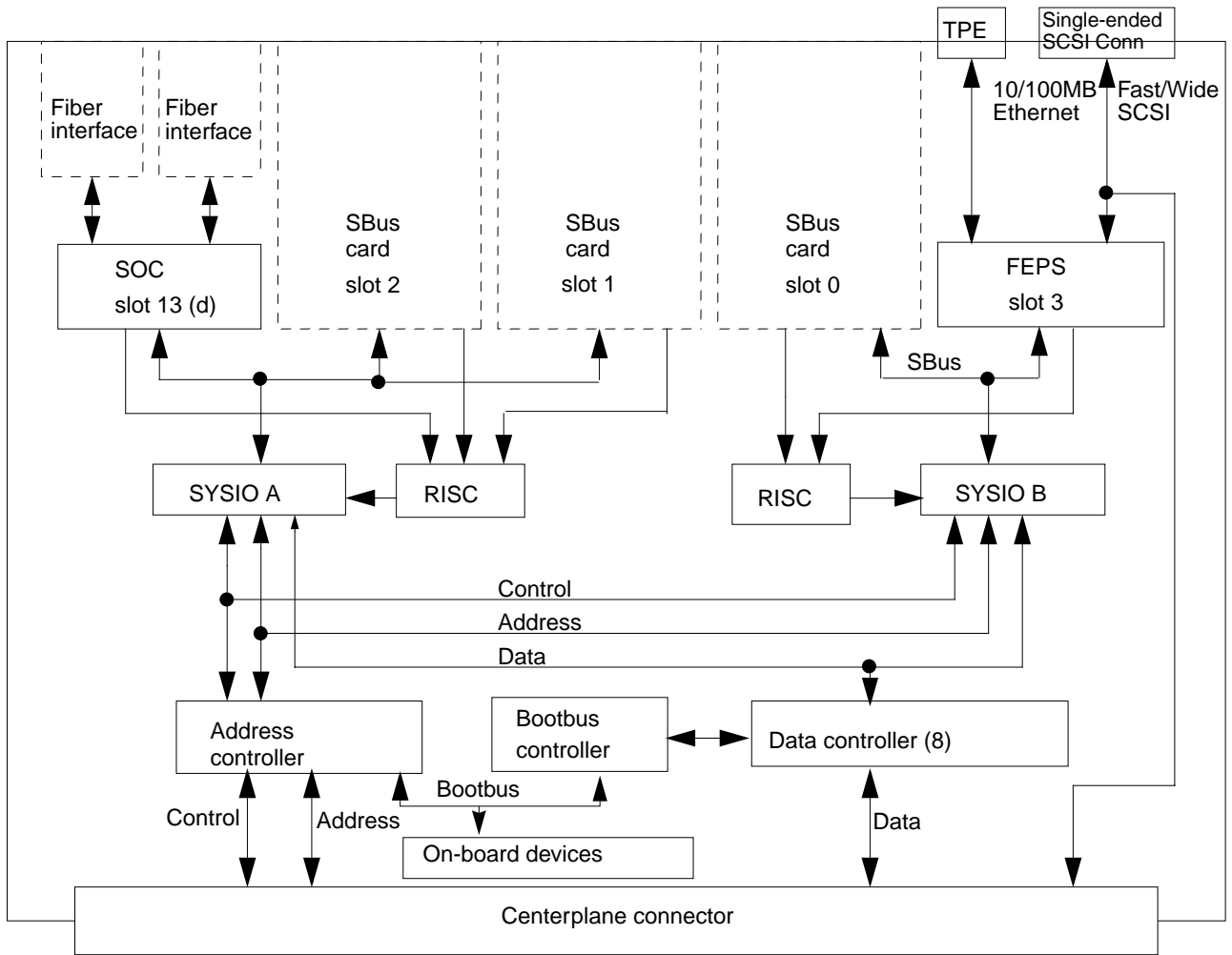


Figure 4-5 SBus I/O Board Simplified Block Diagram

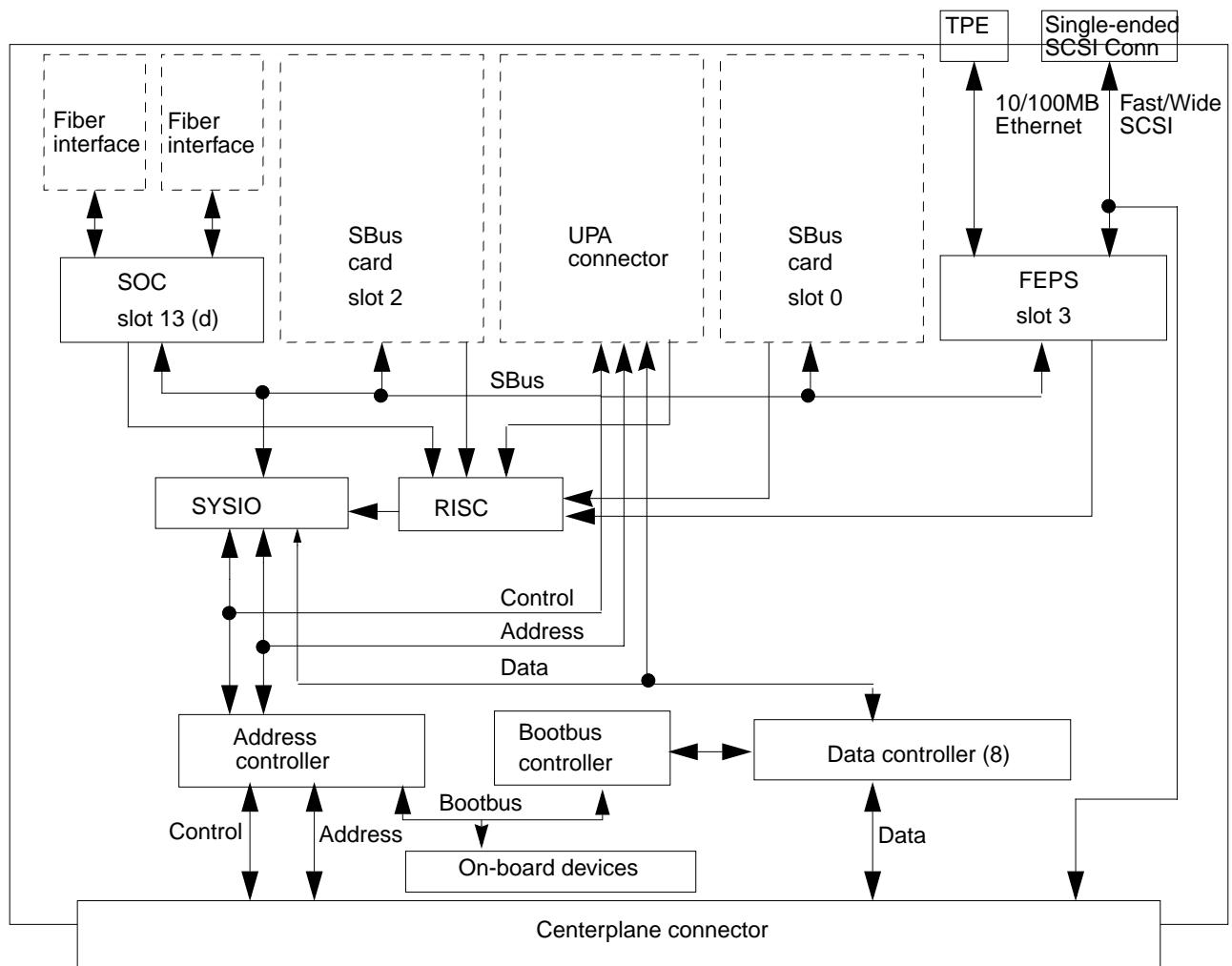


Figure 4-6 Graphics I/O Board Simplified Block Diagram

## 4.5.2 Removing a Board

### 4.5.2.1 Removing a Board from a Powered-On System



**Caution** – A board should be removed from a powered-on system only after the ASR software has disabled that board, otherwise, the operating system should be halted and the system powered off prior to board removal. See Chapter 11, “Powering Off and On” and then Section 4.5.2.2, “Removing a Board from a Nonpowered-On System.”

**1. Ensure that the board has been disabled by the ASR software. See Section 4.4, “Hot-Plug Feature.”**

Once disabled by ASR, one of two results occurs:

- The three LEDs on the board are not lit (board has no power).
- The outer two green LEDs are not lit and the middle yellow LED is lit (board in low power mode).

**2. Unfasten any cable connectors from the front panel and set them aside. Label cables to identify them for reconnection later.**

**3. Mechanically release the board from the system cabinet by inserting a Phillips #1 screwdriver into each quarter-turn access slot and then turning to the unlocked position.**

See Figure 4-7.

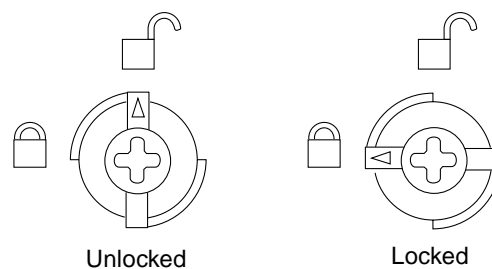


Figure 4-7 Unlocking and Locking Quarter-Turn Access Slots

- 4. Pull the ends of both extraction levers outward simultaneously to unseat the board centerplane connector from the centerplane receptacles.**  
See Figure 4-8.

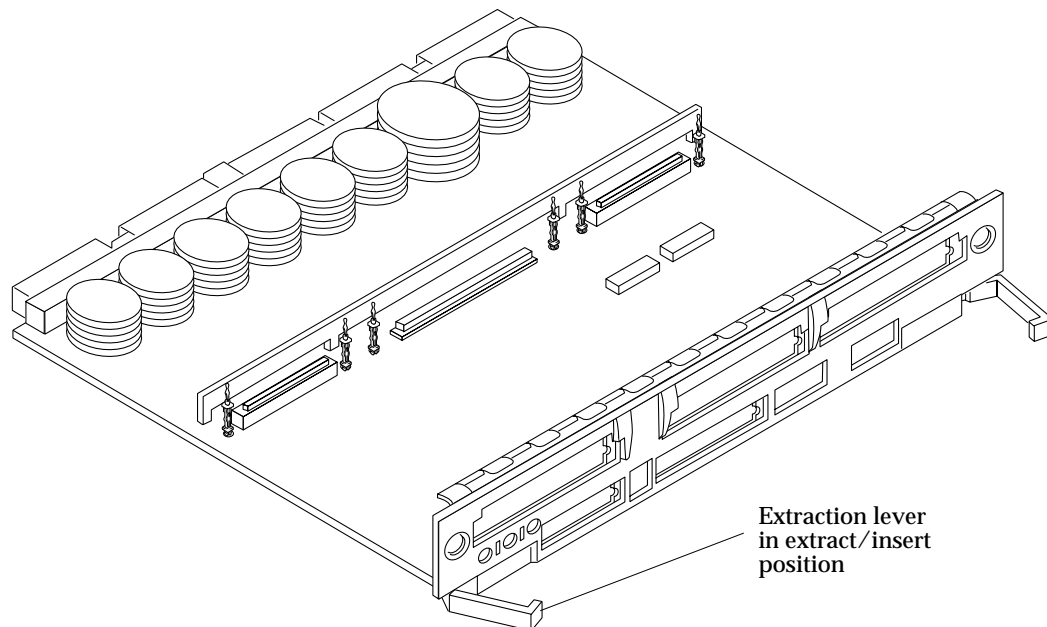


Figure 4-8 I/O Board (Graphics)

- 5. If a board is not immediately replaced, a filler panel must be installed in its place.**  
See Section 4.2, “Filler Panels.”

#### 4.5.2.2 Removing a Board from a Nonpowered-On System

- 1. Mechanically release the board from the system chassis by inserting a Phillips # 1 screwdriver into each quarter-turn access slot and then turning to the unlocked position.**  
See Figure 4-7 on page 4-10.

2. **Unfasten any cable connectors from the front panel and set them aside.**  
Label cables to identify them for reconnection later.
3. **Pull the ends of both extraction levers outward simultaneously to unseat the board from the centerplane receptacles.**  
See Figure 4-8 on page 4-11.
4. **If a board is not immediately replaced, a filler panel must be installed in its place.**  
See Section 4.2, “Filler Panels.”

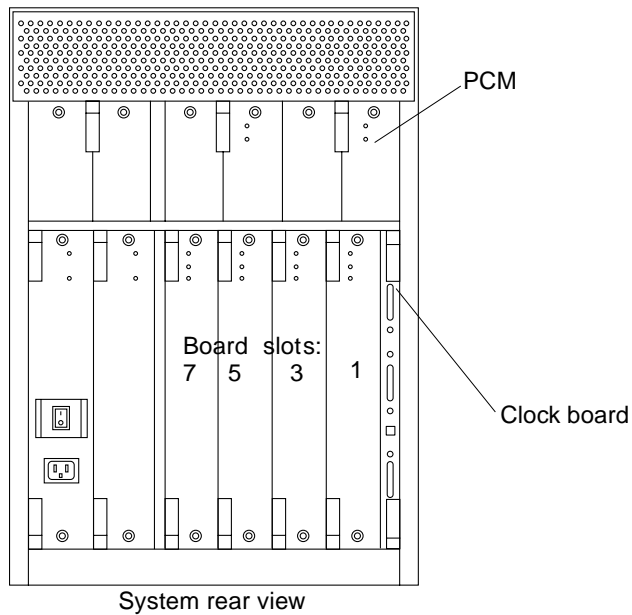


Figure 4-9 Board Removal and Replacement

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## 4.5.3 Installing a Board

### 4.5.3.1 Board Slot Selection

Logically there is no difference between the board slots, and each slot can accept any board type. However, since the lowest numbered board slot (slot 1) is the only slot connected to the onboard SCSI devices, this slot is usually reserved for the first I/O board. Board slot numbers are marked on the chassis. See Figure 4-9.

### 4.5.3.2 Cooling and Power Issues

There should be one power/cooling module (PCM) for every two boards to adhere to cooling and power requirements. The PCMs must be installed adjacent to populated board slots to ensure the fan in the PCM can cool the respective boards.

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**Note** – All empty slots must have a filler panel installed to ensure proper cooling.

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### 4.5.3.3 Powered-On or Nonpowered-On System

1. **Carefully insert the board (component side to the right) in the proper slot in the card cage, ensuring that the board does not slip out of the top and bottom card guides.**

All empty slots must have a filler panel installed.

2. **Ensure that both extraction levers are in the outward position as you slide the board toward the centerplane receptacles.**

The board will not seat fully unless the levers are in this starting position. See Figure 4-8 on page 4-11 for lever positioning.



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**Caution** – DO NOT FORCE any board into a slot; this can cause damage to the board and system. The board should insert and seat smoothly. If it binds, remove the board and inspect the card cage slot for any obvious obstructions. Also inspect both the board and the centerplane for bent pins or other damage.

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**3. Push the board into the card cage, then simultaneously press both extraction levers to seat the board on the centerplane.**

Pushing both levers simultaneously avoids twisting the board and bending the connector pins, and mates the board centerplane connector to the matching receptacle on the centerplane. Do not press on board front panel to seat it—doing so will damage the connector pins.

**4. Mechanically lock the board to the system chassis by inserting a Phillips #1 screwdriver into each quarter-turn access slot and then turning to the locked position.**

See Figure 4-7 on page 4-10.

**5. Replace or connect all necessary cables to the front of the board.**

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**Note** – The I/O board in slot 1 controls the internal SCSI tray devices. Therefore, the external SCSI connector on the I/O board in slot 1 of a system must be terminated with a SCSI terminator. See Figure 4-2 on page 4-3.

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**6. Terminate the board SCSI out connector if required. See “Note” above.**

**7. Once the board is installed, when the system is powered on, a message similar to the following will be displayed on the monitor:**

Example depicts screen output when a new I/O board has been hot-plugged into slot 3 of an operating Enterprise 3000 system:

```
NOTICE: I/O Board Hotplugged into Slot 3
NOTICE: Board 3 is ready to remove
```

Additionally, any subsequent `prtdiag(1M)` output would include information for board slot 3. Again, note that the system will not use the new board until the system is rebooted.

**8. Reboot the system now or schedule a later time to reboot when system disruption will be minimized.**

### 4.5.4 SBus Cards

There are three SBus card locations on the SBus I/O board; the Graphics I/O board has two.

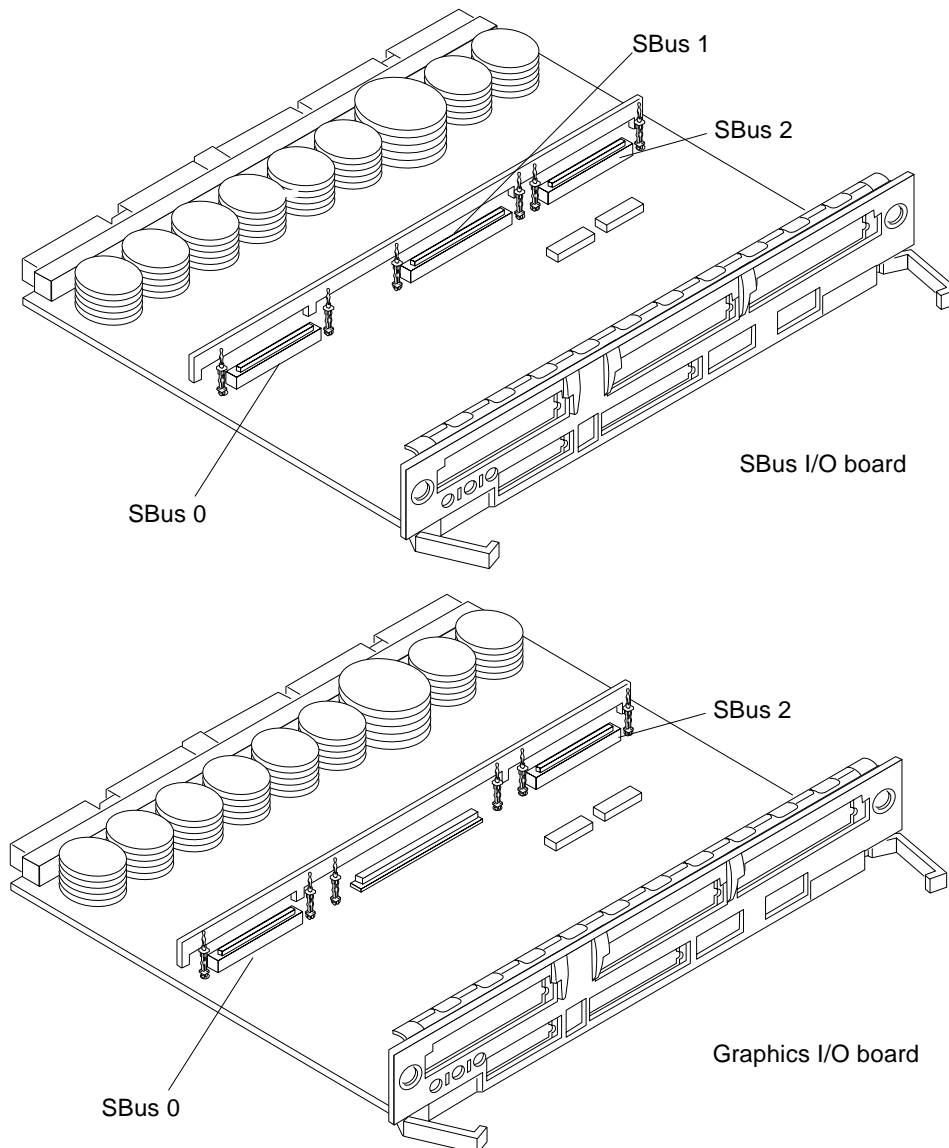


Figure 4-10 I/O Board SBus Card Locations

#### 4.5.4.1 Plastic Standoffs

Plastic standoffs lock the SBus cards to the I/O boards. See Figure 4-11.

- To unlock a standoff, pull up the tip insert.
- To lock a standoff, first ensure that the module or card rests on the standoff flange, then press down the tip insert.

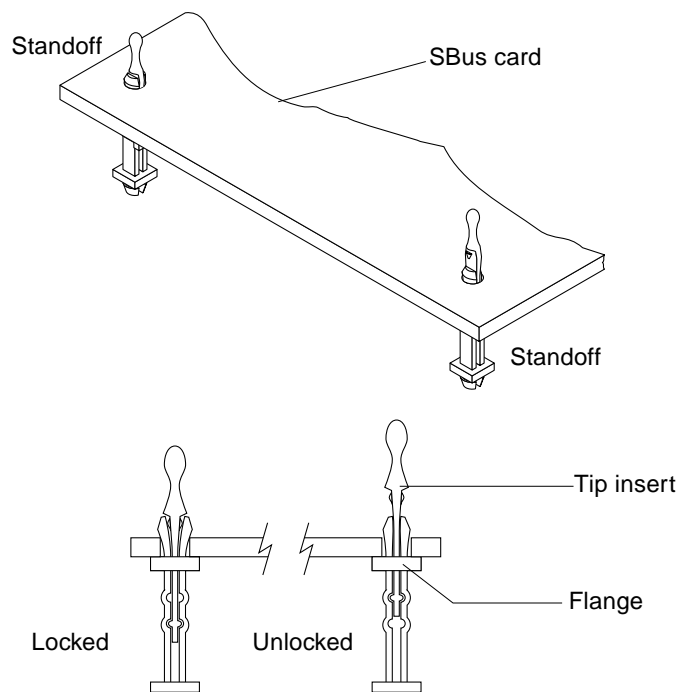


Figure 4-11 Locking and Unlocking Standoffs

#### 4.5.4.2 Removing an SBus Card

1. Use the procedures in Section 4.5.2, “Removing a Board,” to remove the applicable I/O board.
2. Locate the card to be removed.  
See Figure 4-10 on page 4-15.

- 3. Remove the two screws that secure the SBus card to the I/O board front panel.**  
Save the screws for installation of a replacement SBus card or a filler panel.
- 4. Unlock the SBus card by pulling up the tips of the two standoffs.**  
See Figure 4-11 on page 4-16.
- 5. Hold the card by the edges near the connector and gently rock the card back and forth to loosen it from the socket.**  
You may have to remove the SBus cards or the graphics (UPA) card next to this card in order to have enough room to hold onto the SBus card being removed.



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**Caution** – The connector housing may break if the SBus card is tilted too far.

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- 6. Lift the SBus card from the socket at an angle while guiding the face plate out from the back panel opening.**  
See Figure 4-12.

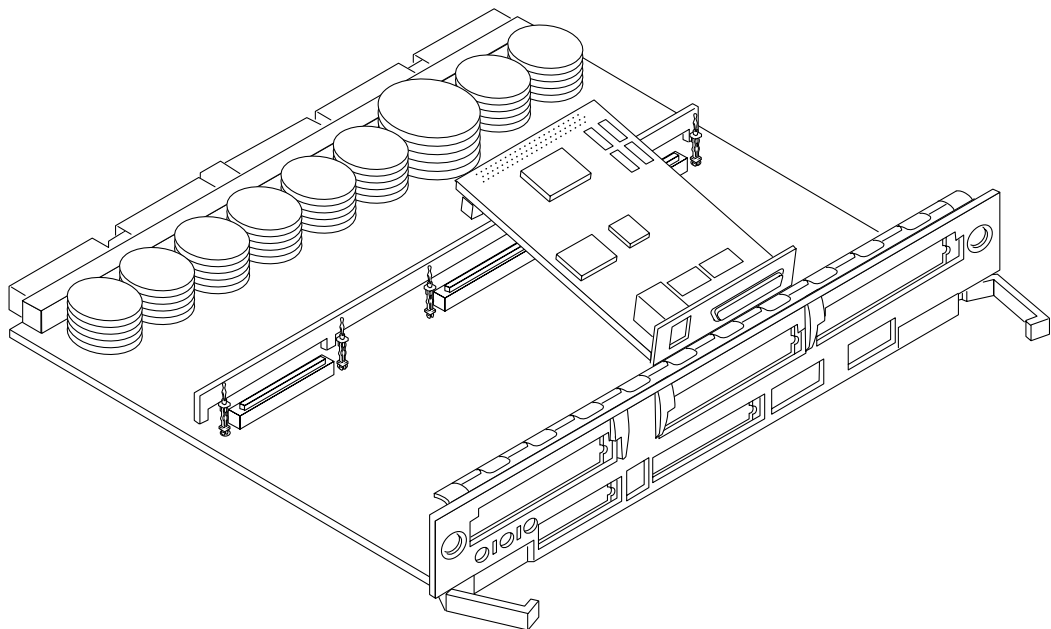


Figure 4-12 Removing or Installing an SBus Card

7. Place the SBus card in an antistatic bag.
8. If the SBus card is not immediately replaced, install a filler panel (part number 340-2305) on the I/O board back panel opening. To secure the filler panel, use the screws that were removed in Step 3.



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**Caution** – Be sure to install the filler panel right-side up. Installing it upside down creates a gap at the top edge of the SBus slot opening that can impair system cooling and regulatory compliance.

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9. Replace the I/O board. Use the procedures in Section 4.5.3, “Installing a Board.”

#### 4.5.4.3 *Installing an SBus Card*

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**Note** – If the new SBus card does not have an adapter plate or the Link Integrity Test feature, proceed to “Installing an SBus Card” on page 4-21.

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##### *Preparing to Install*

1. **Attach a wrist strap and take the SBus card out of the protective packaging. Place the SBus card on an antistatic mat.**
2. **Remove the adapter bracket from the SBus card rear panel.**  
See Figure 4-13. Remove the two screws securing the adapter to the card rear panel (the adapter bracket and the screws are not needed for this installation).

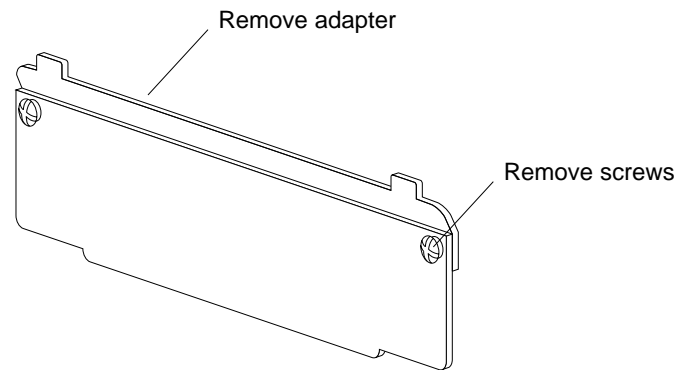


Figure 4-13 SBus Card Rear Panel with Adapter

**3. Remove the black plastic card retainer shipped with the card.**

See Figure 4-14. Spread the ends of the retainer apart to remove it from the card (the retainer is not needed for this installation).

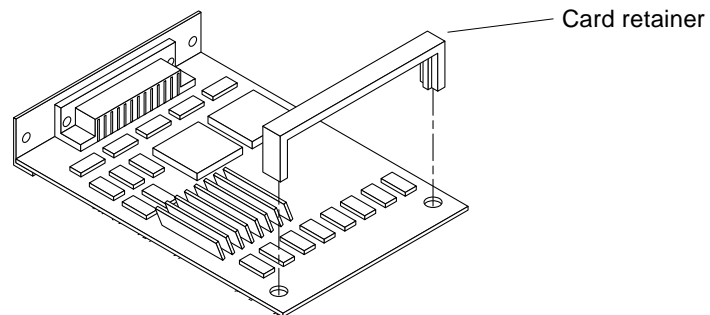


Figure 4-14 Card Retainer

*Link Integrity Test*

1. Ensure that the SBus card is on an antistatic mat.
2. For DSBE/S and FSBE/S cards: remove the two outer retaining screws (see Figure 4-15), but do NOT remove the middle screw or the springfinger. Use a Phillips #0 screwdriver and a 3/16 nut driver or socket wrench.

**3. For DSBE/S and FSBE/S cards, configure jumper J0302 for Link Integrity Test functionality.**

See Figure 4-15 (DSBE/S) or Figure 4-16 (FSBE/S).

- a. Put the shunt over both pins to *disable* the Link Integrity Test. See Figure 4-17 “Disabled.”**
- b. Put the shunt in one pin to *enable* the Link Integrity Test. See Figure 4-17 “Enabled.”**



**Caution** – If you choose to disable the test, it must be disabled both at the hub and at the SBus card. In the event of “loss of carrier” or “not responding” problems, check the status of the link enable on both the SBus card and the hub.

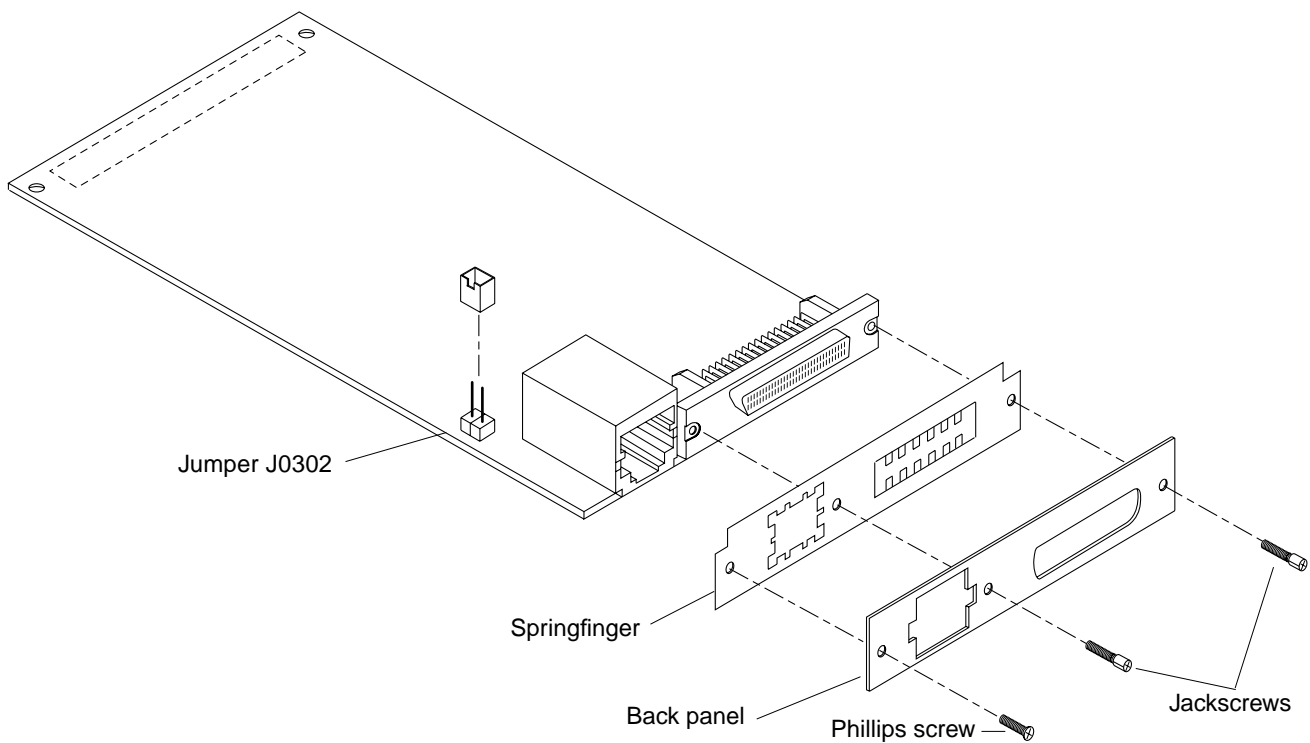


Figure 4-15 DSBE/S SBus Card

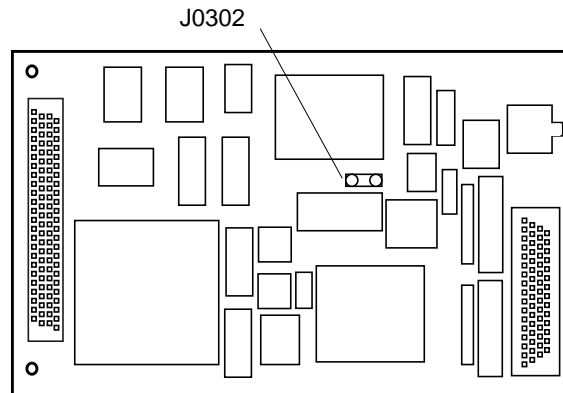


Figure 4-16 FSBE/S SBus Card



Figure 4-17 Disabling and Enabling the Link Integrity Test

### *Installing an SBus Card*

1. Use the procedures in Section 4.5.2, “Removing a Board,” to remove the applicable SBus I/O or Graphics I/O board.
2. Locate the SBus connector that the card is to be installed in. See Figure 4-10 on page 4-15.
3. If a filler panel covers the front panel SBus slot, remove the two screws and detach the filler panel.  
Retain the screws to attach the SBus card to the back panel, unless the card has a wide connector, or set of connectors.
4. Unlock the tip inserts of the two standoffs for the SBus slot. See Figure 4-11 on page 4-16.

5. **Attach a wrist strap and take the SBus card out of the protective packaging. Inspect the pins in the connector to make sure they are not bent.**
6. **Guide the SBus card face plate under the springfinger and against the rear face of the I/O board front panel.**  
The I/O connectors of the SBus card should be visible through the opening in the I/O board front panel.
7. **Hold the card by the edges nearest the SBus connector and place the card over the two standoffs.**
8. **Hold the SBus card by the edges near the connector and firmly but gently press the card down until the connector is fully seated.**  
To align the connector and socket, push the card toward the I/O board front panel.



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**Caution** – Do not rock the card onto the socket; the plastic connector housing may break.

---

9. **Press each corner of the SBus card to ensure that it rests on the collar of the standoff.**
10. **Press down on the tip insert of each standoff to lock the card in place.**
11. **Replace and tighten the back panel screws to secure the SBus card to the I/O board front panel.**
12. **Replace the I/O board using the procedures described in Section 4.5.3, “Installing a Board.”**

#### ***4.5.5 Graphics (UPA) Cards***

The Graphics I/O board contains a single connector that accommodates graphics (UPA) cards. See Figure 4-18.

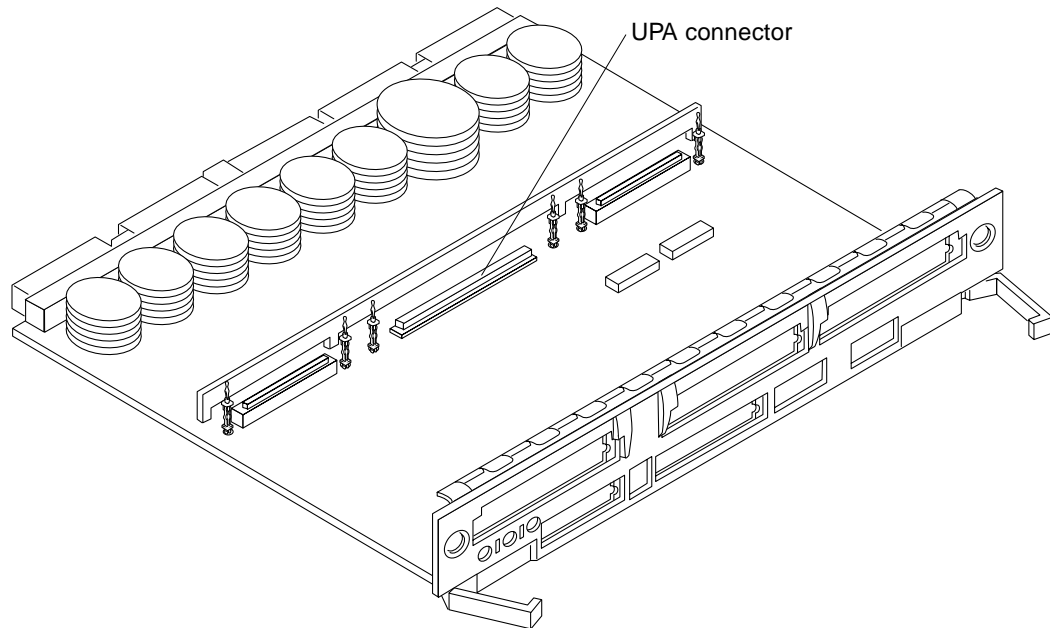


Figure 4-18 Graphics (UPA) Card Connector Location

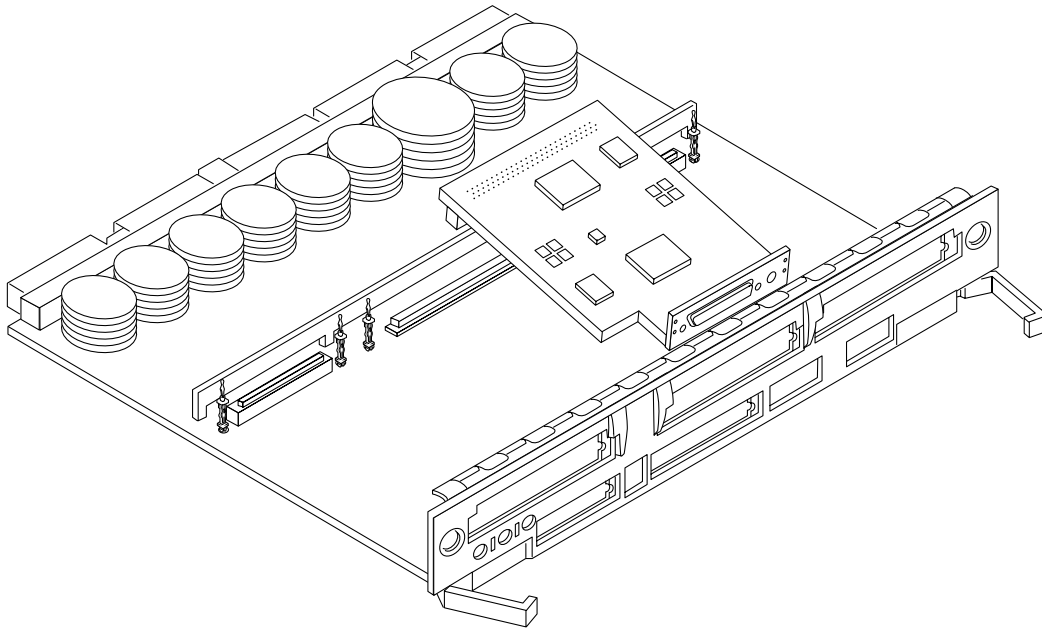
#### 4.5.5.1 Removing a Graphics (UPA) Card

1. Use the procedures in Section 4.5.2, “Removing a Board,” to remove the applicable Graphics I/O board.
2. Locate the card.  
See Figure 4-19.
3. Remove the two screws that secure the card to the I/O board front panel.  
Save the screws for installation of a replacement card or a filler panel.
4. Unlock the card by pulling up the tips of the two standoffs.  
See Figure 4-11 on page 4-16.
5. Hold the card by the edges near the connector and gently rock the card back and forth to loosen it from the socket.  
You may have to remove the SBus cards next to this card in order to have enough room to hold onto the graphics (UPA) card being removed.



**Caution** – The connector housing may break if the card is tilted too far.

- 6. Lift the card from the socket at an angle while guiding the face plate out from the front panel opening.**  
See Figure 4-19.



*Figure 4-19 Removing or Installing a Graphics (UPA Card)*

- 7. Place the card in an antistatic bag.**

- 8. If the graphics (UPA) card is not immediately replaced, install a filler panel (part number 340-2305) on the Graphics I/O board front panel opening.**

To secure the filler panel, use the screws that were removed in Step 3.



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**Caution** – Be sure to install the filler panel right-side up. Installing it upside down creates a gap at the top edge of the card slot opening that can impair system cooling and FCC regulatory compliance.

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- 9. Use the procedures in Section 4.5.3, “Installing a Board,” to replace the Graphics I/O board.**

#### *4.5.5.2 Installing a Graphics (UPA) Card*

- 1. Use the procedures described in Section 4.5.2, “Removing a Board,” to remove the applicable Graphics I/O board.**
- 2. Attach a wrist strap and take the graphics (UPA) card out of the protective packaging and place the card on an antistatic mat.**  
Inspect the pins in the connector to make sure they are not bent.
- 3. Remove the adapter bracket from the rear panel of the card.**  
See Figure 4-13 on page 4-19. Remove the two screws securing the adapter to the card rear panel (the adapter bracket and the screws are not needed for this installation).
- 4. Remove the black plastic card retainer shipped with the card.**  
See Figure 4-14 on page 4-19. Spread the ends of the retainer apart to remove it from the card (the retainer is not needed for this installation).
- 5. Locate the graphics (UPA) connector for the card.**  
See Figure 4-18 on page 4-23.
- 6. If a filler panel covers the I/O board front panel slot for the graphics (UPA) card, remove the two screws and detach the filler panel.**  
Retain the screws to attach the graphics (UPA) card to the front panel, unless the card has a wide connector, or set of connectors.
- 7. Unlock the tip inserts for the two standoffs for the graphics (UPA) connector slot.**  
See Figure 4-11 on page 4-16.

- 8. Hold the card at an angle as depicted in Figure 4-19 on page 4-24. Guide the card face plate under the springfingers and against the rear face of the I/O board front panel.**

The I/O connectors of the card should be visible through the opening in the I/O board front panel once the card is properly positioned.

- 9. Hold the card by the edges nearest the graphics (UPA) connector and place the card over the two standoffs.**
- 10. Hold the card by the edges near the connector and firmly but gently press the card down until the connector is fully seated.**  
To align the connector and socket, push the card toward the Graphics I/O board front panel.



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**Caution** – Do not rock the card onto the socket; the plastic connector housing may break.

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- 11. Press each corner of the card to ensure that it rests on the collar of the standoff.**
- 12. Press down on the tip insert of each standoff to lock the card in place.**
- 13. Replace and tighten the front panel screws to secure the card to the Graphics I/O board front panel.**  
See Figure 4-12 on page 4-17
- 14. Use the procedures in Section 4.5.3, “Installing a Board,” to replace the Graphics I/O board.**

## 4.5.6 Fibre Cards

### 4.5.6.1 Removing a Fibre Card

- 1. Use the procedures in Section 4.5.2, “Removing a Board,” to remove the applicable I/O board.**
- 2. Locate the card to be removed. See Figure 4-20.**  
You may have to remove the SBus cards over (or next to) this card in order to have enough room to hold onto the fibre card being removed. See Figure 4-21.

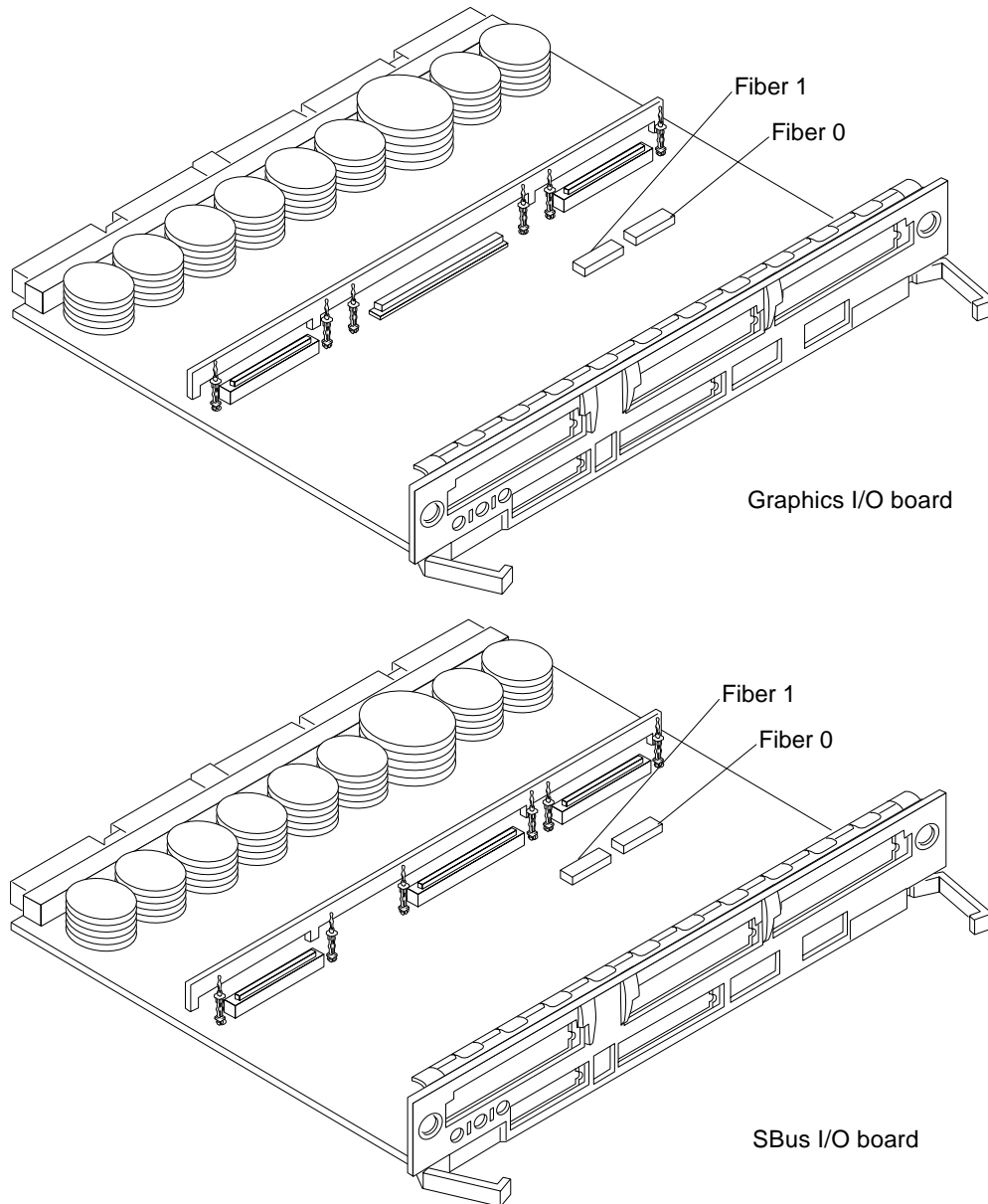


Figure 4-20 I/O Board Fibre Card Connector Locations

**Note** – There are four plastic standoffs located on the bottom of each card, two on each end. These secure the card once they are inserted into corresponding openings on the I/O board. See detail in Figure 4-21.

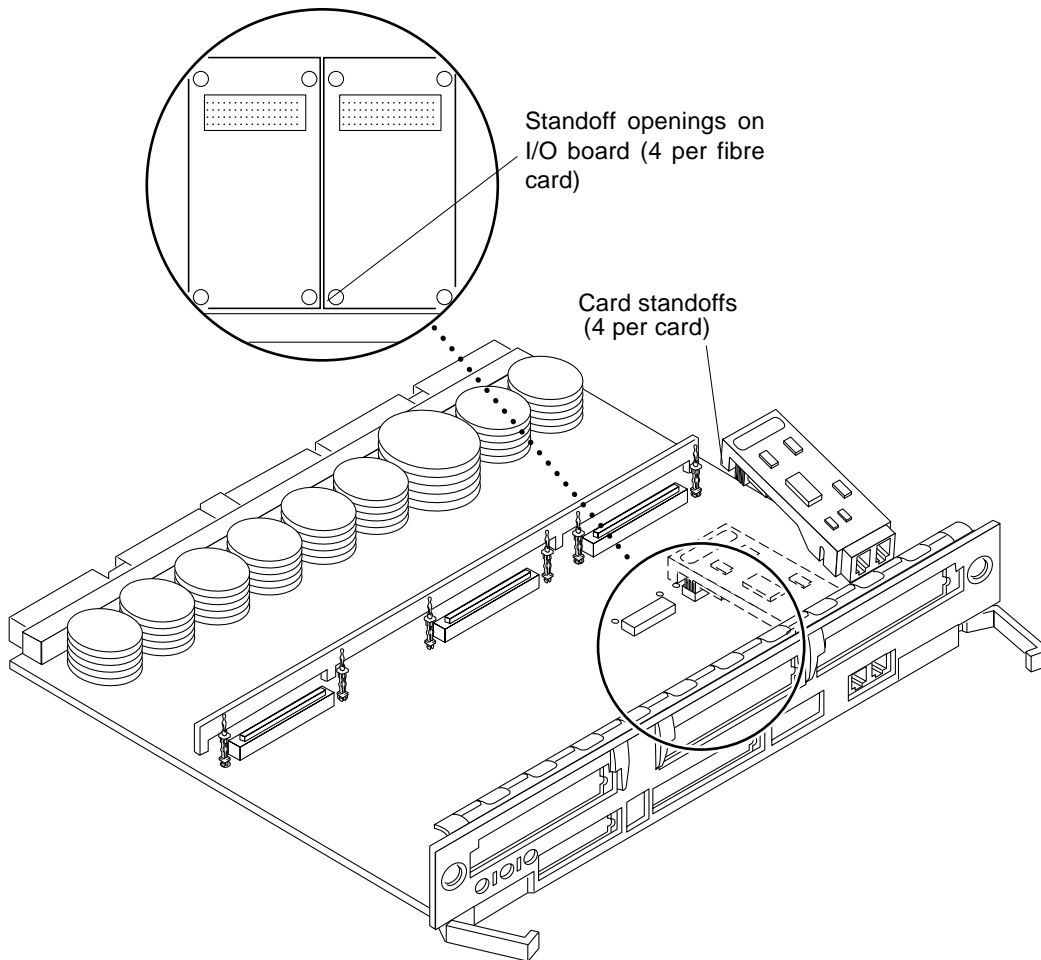


Figure 4-21 Removing or Installing A Fibre Card

3. Unseat the card from the I/O board:
  - a. Grasp the card underneath each corner on the end of the card that connects to the I/O board receptacle (opposite the I/O board front panel end), then firmly unseat the two standoffs and the card connector.
  - b. Grasp the card underneath each corner near the I/O board front panel, and then firmly unseat the remaining two standoffs from the I/O board.
4. Once the card standoffs and connector are unseated, hold the card at a slight angle as shown in Figure 4-21 on page 4-28. Guide the card fiber connector end from the front panel opening on the I/O board.
5. If the fibre card is not immediately replaced, install an OLC plug on the I/O board front panel opening.
6. Use the procedures in Section 4.5.3, “Installing a Board,” to replace the I/O board.

#### 4.5.6.2 *Installing a Fibre Card*

1. Use the procedures in Section 4.5.2, “Removing a Board,” to remove the applicable I/O board.

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**Note** – If required, remove the OLC plug that protects the fiber optic connector opening on the front panel of the I/O board. These OLC plugs are installed in factory shipped systems without fibre cards installed.

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2. **Locate the card slot for installation.**

See Figure 4-20 on page 4-27. You may need to remove the SBus cards over (or next to) this card to have enough room to hold onto the fibre card being installed.

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**Note** – There are four plastic standoffs located on the bottom of each card, two on each end of the card. These secure the card once they are inserted into corresponding openings on the I/O board. See detail in Figure 4-21 on page 4-28.

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- 3. Hold the card at a slight angle and position it so the fiber connector end is loosely inserted into the I/O board front panel opening.**
- 4. Align the card over the I/O board fiber connector receptacle and over the four standoff holes on the I/O board.**  
See Figure 4-21 on page 4-28.
- 5. Seat the card:**
  - a. Grasp the card underneath each corner near where the card connects to the I/O board fiber connector receptacle. Firmly seat the card on the connector and on the two adjacent standoffs.**
  - b. On the end of the card near the I/O board front panel, grasp the card underneath each side and firmly seat the remaining two standoffs.**
- 6. Use the procedures in Section 4.5.3, “Installing a Board,” to replace the I/O board.**