

R5000™ CPU Upgrade Installation Guide
for the Indy™ Workstation and
CHALLENGE® S Server

Document Number 007-3241-001

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Introduction

Congratulations on purchasing the R5000™ CPU upgrade for your workstation.

This guide is divided into two chapters:

- Chapter 1 describes how to install the R5000 CPU in an Indy™ workstation.
- Chapter 2 describes how to install the R5000 CPU in a CHALLENGE® S server.

Read through this guide first before starting the upgrade. If you find a term you haven't seen before, see your workstation or server's *Owner's Guide*. The glossary in the *Owner's Guide* contains definitions of many of the terms used in this guide.

When installing a CPU upgrade, it's a good idea to make a full backup of your system before powering down and installing the upgrade:

- Indy workstation owners can choose "Online Books" from the Help toolchest. Then select the *Personal System Administration Guide* and search for "Backing Up and Restoring Files."
- CHALLENGE S owners running IRIX 5.3 can consult the *IRIX Advanced Site and Server Administration Guide*, which is available in InSight format, and (optionally) in hardcopy. For IRIX 6.2 and later, consult *IRIX Admin: Backup, Security, and Accounting*.

Installing the CPU Upgrade in an Indy Workstation

This chapter explains how to install the CPU upgrade in an Indy workstation.

Installing the hardware consists of

- checking your system's PROM version
- shutting down the system
- removing the cover
- removing any GIO option boards and the graphics board (if necessary)
- removing and replacing the PROM chip on the system board (if necessary)
- reinstalling the graphics board or board set and any GIO option boards
- removing and replacing the CPU module
- replacing the cover and restarting your system

The Upgrade Package

Your upgrade package includes all of the following items. If anything is missing, contact your sales representative.

- PROM chip in an antistatic bag
- CPU module in an antistatic bag
- open-ended wrench to remove standoffs and hexnuts
- Phillips screwdriver
- chip removal tool to remove the PROM chip
- anti-static wrist strap
- *R5000™ CPU Upgrade Installation Guide for the Indy™ Workstation and CHALLENGE® S Server* (this manual)
- CD

Installing the Software

Install the software *before* installing the hardware. Read the release notes on the CD for further instructions.

Identifying Your Indy Workstation's Graphics Board

It's important that you know which graphics board is installed in your Indy workstation. This determines which instructions you follow in this manual.

To determine your Indy's graphics board, follow these steps.

1. Log in to your account.
2. From the Desktop toolchest, select "Unix Shell."

- At the shell prompt, type:

```
hinv
```

If you see:	Then:
"Graphics board: Indy 24-bit" or "Graphics board: Indy 8-bit"	Your system has Indy graphics.
"Graphics board: GR3-XZ"	Your system has Indy XZ graphics.

You may want to write down your graphics board type. Later in the installation, you'll follow a different path in the manual, depending which graphics board is installed in your Indy. Now go to the next section to check the date of the PROM chip.

Checking Your System's PROM Version

Before installing the CPU upgrade, you need to check what version of the PROM chip your workstation has. You do this from the Command Monitor while powering down your system.

Follow these steps to check your system's PROM version:

- Shut down the system.
 - From the System toolchest in the upper left corner of your screen, choose "System Shutdown."

If you have a root password set, you are prompted to enter it.

You then see a cautionary message asking you to confirm the shutdown of the system.
 - Click "OK" to shut down without powering off the system.
- After a few seconds, you see the message shown in Figure 1-1.

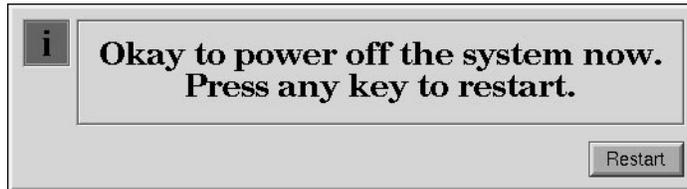


Figure 1-1 Okay to Power Off Notifier

- Click the “Restart” button.

You then see the message shown in Figure 1-2.

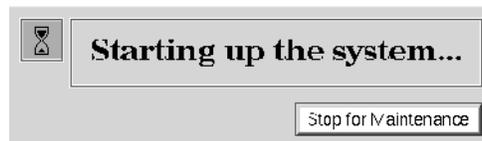


Figure 1-2 Starting Up the System Notifier

- Click on the “Stop for Maintenance” button. The System Maintenance menu appears.
2. Press **5** on the keyboard, or click on the “Enter Command Monitor” icon on the System Maintenance menu.
 3. See what version of the PROM you have. At the >> prompt, type:

version

Then press <Enter>. You see a line similar to this:

```
PROM Monitor SGI Version 5.3 Rev B10 R4X00 IP24 Feb 12, 1996 (BE)
```

The date, "Feb. 12, 1996" tells you the version of the PROM.

If the PROM date is:	Then:
Before February 12, 1996	You must replace the PROM chip. Continue with these instructions, and complete all the hardware installation tasks in the manual.
February 12, 1996 or later	You do not need to replace the PROM chip. Complete all the installation tasks in the manual <i>except for</i> "Replacing the PROM Chip" on page 8.

4. Type **exit** to exit the PROM monitor.
You see the System Maintenance menu again. It is safe to turn off your Indy workstation.
5. Press and release the power button on the front of the workstation, as shown in Figure 1-3, to power off the system.

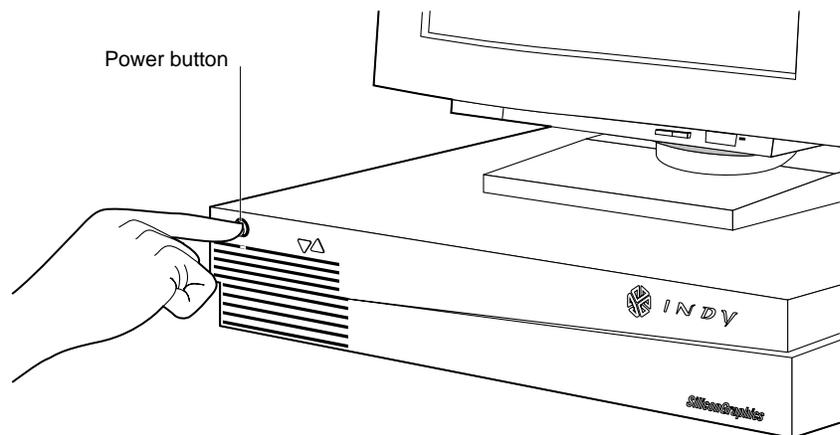


Figure 1-3 Turning Off the Indy Workstation

Removing the Top Cover and Disconnecting the Cables

Follow these steps to remove the top cover of your Indy workstation:

1. If the monitor is on top of the workstation, move it to one side.
Caution: Monitors are very heavy. Have someone help you move it.
2. Disconnect the following cables from the back of the Indy workstation:
 - power cable
 - monitor cable
 - Indy Cam™ cable (if connected)
 - Ethernet AUI cable (if connected). (Push the sliding bracket on the Ethernet port to the left and remove the cable.)

Disconnecting the Indy Cam and Ethernet AUI cables is optional. Removing them gives you more room.

3. Facing the front of the Indy workstation, place your right thumb on the small channel at the back of the cover, and your second and third fingers under the finger ledge, as shown in Figure 1-4.
4. Snap the cover loose by bracing your thumb against the lip and pushing up the finger ledge with the second and third fingers, followed by a small push toward the front.
5. Slide the cover forward about one inch and tilt it up to remove it.
Tip: It may be difficult to release the cover, and you may have to use some force.

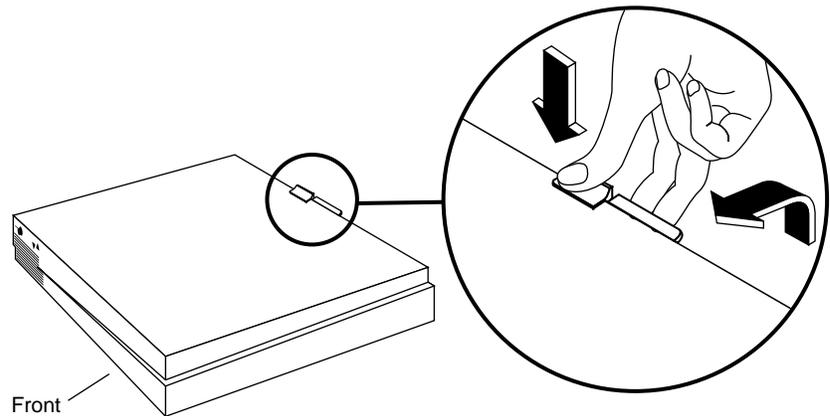


Figure 1-4 Removing the Top Cover From the Indy Workstation

Attaching the Wrist Strap

Wear the wrist strap to prevent the flow of static electricity, which can damage the components in the Indy workstation.

Caution: The components inside the Indy are extremely sensitive to static electricity. Handle all chips and modules carefully, and wear the wrist strap shipped with the upgrade package while replacing parts inside the system.

To attach the wrist strap, follow these steps:

1. Unwrap the first two folds of the band and wrap the exposed adhesive side firmly around your wrist.
2. Unroll the rest of the band and peel the liner from the copper foil at the opposite end.
3. Attach the copper foil to a convenient location on the metal part of the Indy chassis.

Replacing the PROM Chip

If your PROM chip is dated before February 12, 1996, follow the steps below. If the PROM is dated February 12 or later, skip this section and go to “Replacing the CPU Module” on page 36. (You should have already checked the version of your PROM chip before shutting down and opening up the system. See “Checking Your System’s PROM Version” on page 3.)

If your Indy workstation has:	Then:
Indy graphics	Continue with these instructions.
Indy XZ graphics	Go to “Removing the Indy XZ Graphics Board Set” on page 13.

Removing the Indy Graphics Board

To reach the PROM chip, you must first remove any GIO option boards that are installed and then remove the graphics board.

GIO option boards are installed on top of the graphics board. A single-width GIO option board covers half of the graphics board; a double-width covers the entire graphics board. Figure 1-5 shows a single-width board.

To determine if your workstation has a GIO option board installed, look at your workstation and at Figure 1-5. If there is a GIO option board installed, follow these steps to remove it. If there is no GIO option board installed, skip to step 6.

These instructions are for a single-width GIO option board. Use the same steps to remove a double-width GIO option board. The only difference is that there are more screws to remove on a double-width board.

1. Locate the GIO option board, as shown in Figure 1-5.

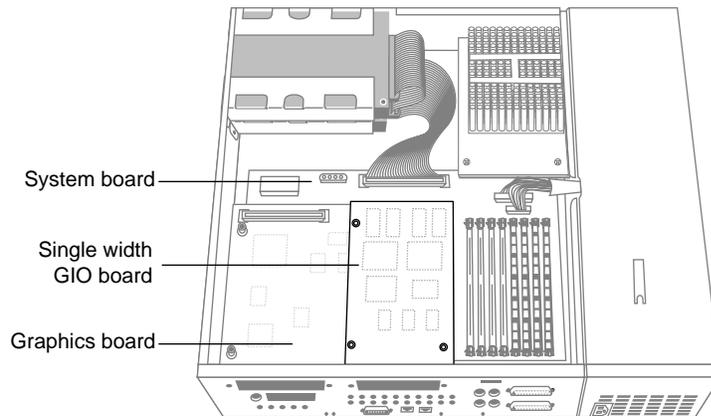


Figure 1-5 Locating the GIO Option Board

2. If there are external cables connected to the GIO option board connector on the rear of the workstation, disconnect them.
3. Using the Phillips screwdriver provided with this upgrade kit, remove the two screws from the GIO board connector on the rear of the workstation, as shown in Figure 1-6.

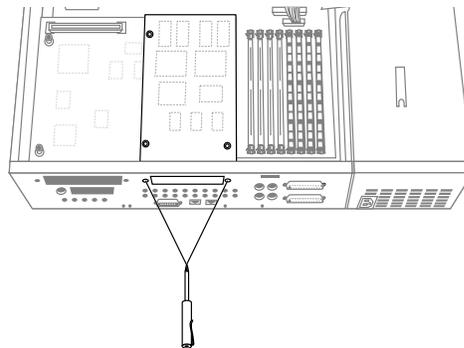


Figure 1-6 Removing the Screws From the Rear of the Workstation

4. Using a Phillips screwdriver, remove the three screws that connect the GIO option board to the graphics board, as shown in Figure 1-7.

Note: A double-width GIO option board has more than three screws to remove.

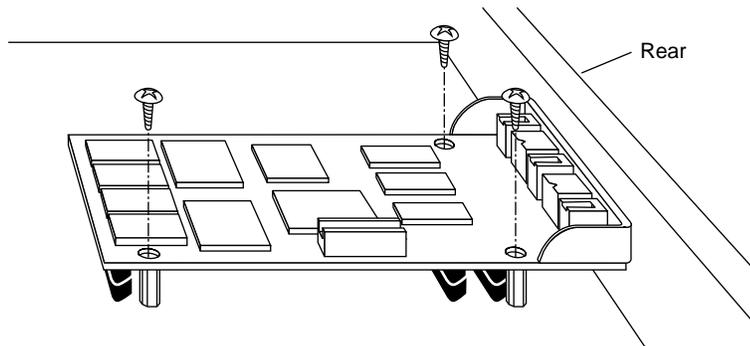


Figure 1-7 Removing the Screws From the GIO Option Board

5. Remove the GIO board from the system.
 - Grasp the board on the sides and pull it up, as shown in Figure 1-8. This separates the connector on the underside of the GIO board from the connector on the graphics board.

You may have to tilt the board slightly, raising the end of the board close to the system disk and farthest from the rear of the system.

- Place the board on a soft, anti-static surface, such as an anti-static bag or the anti-static foam used to package the CPU upgrade.

Caution: Do not handle the board carelessly, or set it down roughly on a hard surface such as a filing cabinet or desk-top. Rough handling can damage delicate components on the board.

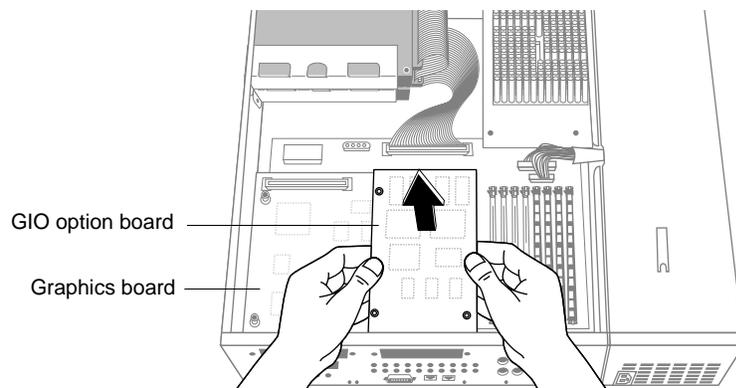


Figure 1-8 Removing the GIO Board

6. Facing the rear of the workstation, use the open-ended wrench to unscrew the two hexnuts on either side of the graphics board's I/O connector, as shown in Figure 1-9. The wrench is provided with this upgrade.

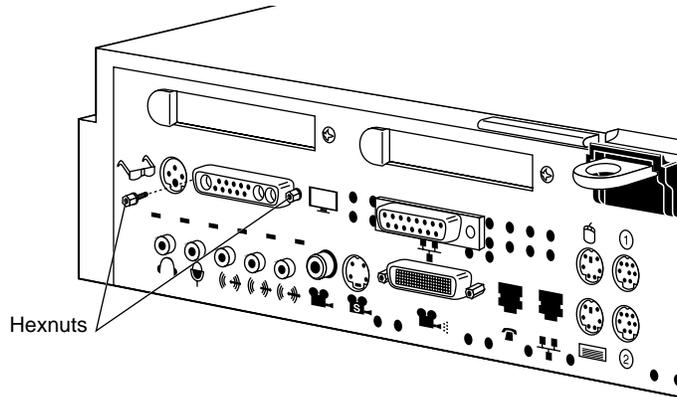


Figure 1-9 Removing the Screws From the Graphics Board's I/O Connector

7. Use the other end of the open-ended wrench to unscrew the two standoff screws (tall, hexagonal posts) from the graphics board, as shown in Figure 1-10.
8. Use a Phillips screwdriver to remove one screw from the graphics board.

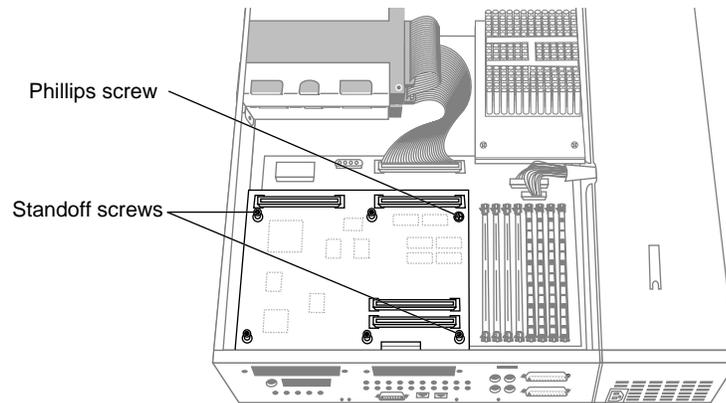


Figure 1-10 Removing the Screws From the Graphics Board

9. Disconnect the graphics board from the system board, as shown in Figure 1-11.
 - Grasp the board firmly on the side close to the system disk drive and pull up to disconnect the connectors under the graphics board from the connectors on the system board.
 - Lift the graphics board up and remove it.

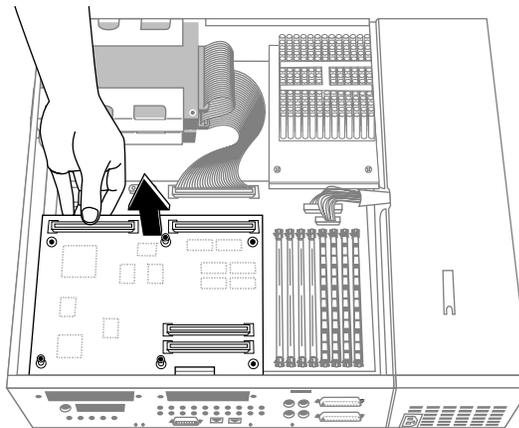


Figure 1-11 Disconnecting the Graphics Board From the System Board

You are finished removing the graphics board and are ready to replace the PROM. Go to “Removing and Replacing the PROM Chip” on page 17.

Removing the Indy XZ Graphics Board Set

Follow these steps to remove the XZ graphics board set.

Note: If you have a Presenter XZ board installed in your Indy, you must first remove it. Refer to the manual that came with the Presenter XZ board for instructions.

The XZ graphics board set consists of two boards, the X board and the Z board. The X board is installed on top of the Z board.

1. Use a Phillips screwdriver to remove the screws securing the X board to the Z board, as shown in Figure 1-12.

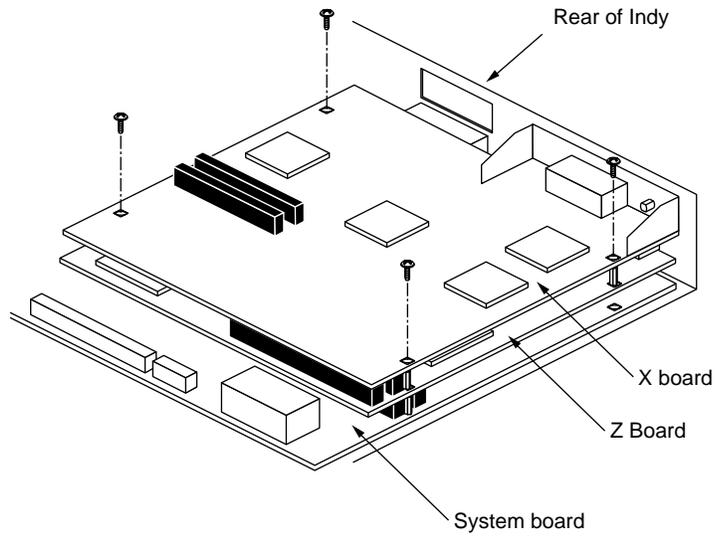


Figure 1-12 Removing the Screws From the X Board

2. On the rear of the workstation, remove the two Phillips screws in the locations shown in Figure 1-13.

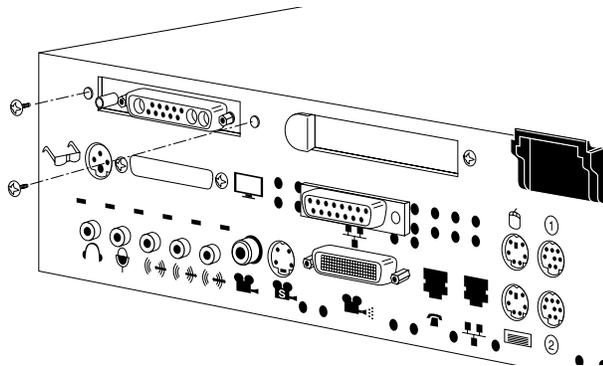


Figure 1-13 Removing the Exterior Screws for the X Board

3. Disconnect the X board from the Z board, by grasping the board firmly on the side close to the system disk drive and pulling up to disconnect the two connectors underneath the board. See Figure 1-14.

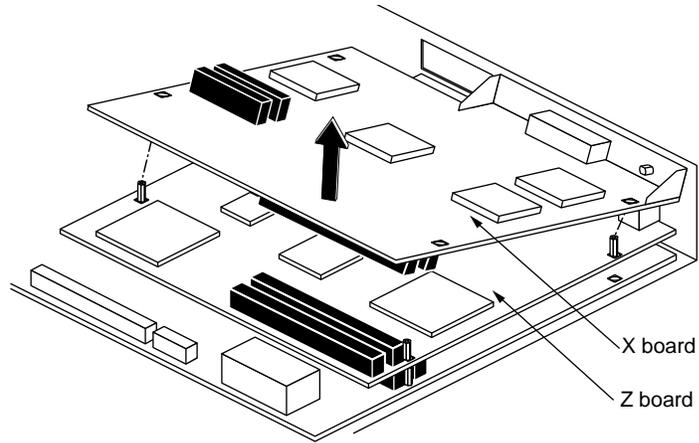


Figure 1-14 Disconnecting the X Board from the Z Board

4. Using an open-ended wrench, remove the three standoff screws from the Z board, as shown in Figure 1-15.

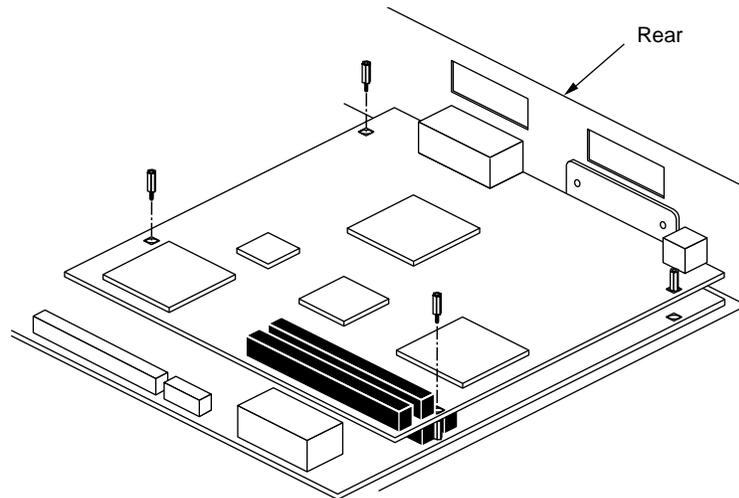


Figure 1-15 Removing the Standoff Screws From the Z Board

5. On the rear of the workstation, remove the two Phillips screws, as shown in Figure 1-16.

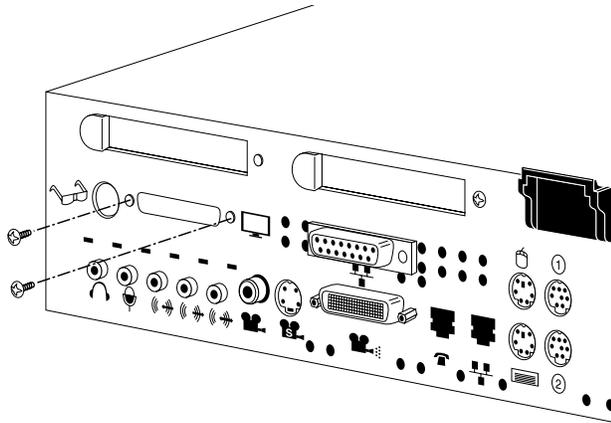


Figure 1-16 Removing the Exterior Screws For the Z Board

6. Disconnect the Z board from the system board, by grasping the board firmly on the side close to the system disk drive and pulling up to disconnect the two connectors underneath the board. See Figure 1-17.

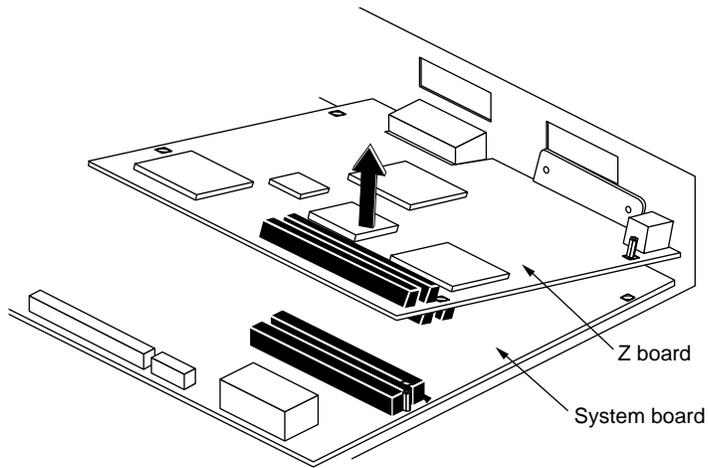


Figure 1-17 Disconnecting the Z Board From the System Board

You are finished removing the XZ graphics board set and ready to replace the PROM chip.

Removing and Replacing the PROM Chip

Follow these steps to replace the PROM chip:

1. Locate the PROM chip. Facing the workstation from the rear, the PROM chip is located on the left of the system board, as shown in Figure 1-18.

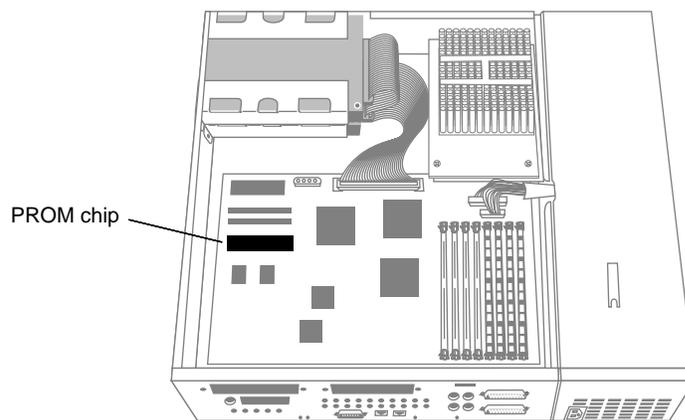


Figure 1-18 Locating the PROM Chip on the System Board

Before removing the PROM chip, familiarize yourself with it. Note that it has either a semi-circular notch or a small, indented circle at one end. You'll use this notch or circle to orient the upgrade PROM when you install it.

2. Remove the PROM chip from the system board.

The PROM chip is seated in a socket that is permanently attached to the system board. It's important when you use the tool to remove the chip that you insert the tool under the PROM chip itself, *and not under the socket*.

- You received a chip removal tool—it looks like a pair of huge tweezers. Insert the chip removal tool between the PROM chip and the socket on the board, as shown in Figure 1-19. Work the chip away from the socket in a rocking motion, pulling up on one side of the chip and then on the other side. It may be difficult to loosen it.
- Continue the rocking motion until the PROM chip is all the way out of the socket.

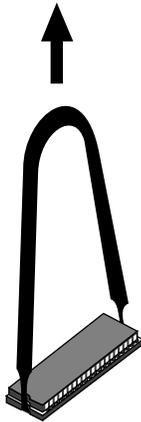


Figure 1-19 Removing the PROM Chip

3. Install the new PROM chip.
 - Grasp the new PROM chip. Orient the PROM above the socket on the system board so the end with the semi-circular notch or small, indented circle on the PROM chip lines up with the notch in the socket, as shown in Figure 1-20.

Caution: Make sure you line up the notch or the small circle on the PROM chip with the notch in the socket. If you install the PROM chip backwards, the system will not power on and you will damage the PROM chip.

- Line up all of the pins on the PROM with the corresponding holes in the socket.

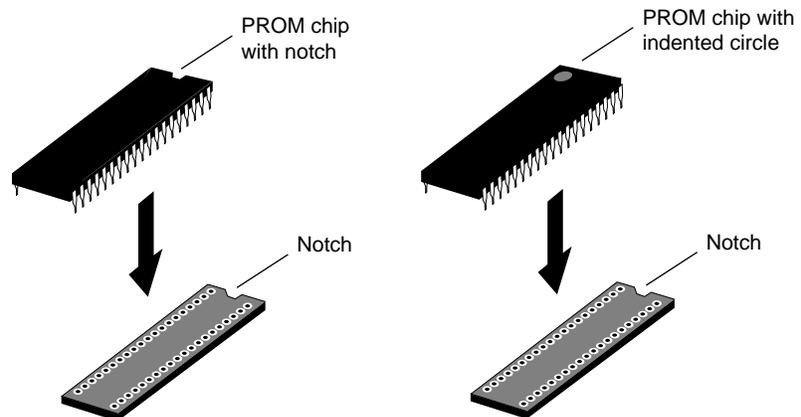


Figure 1-20 Lining Up the PROM Chip

4. Once the pins are lined up, press down firmly on the top of the PROM chip until it is seated in the socket, as shown in Figure 1-21.

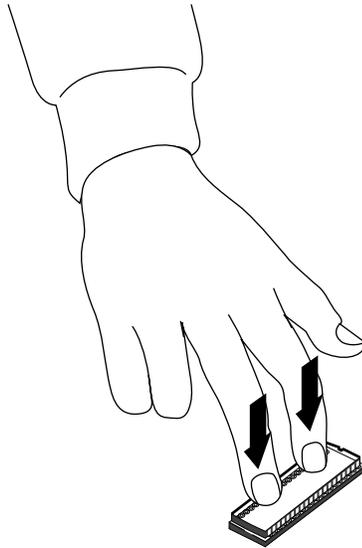


Figure 1-21 Pressing the PROM Chip Into the Socket

5. Visually check to make sure all the pins on the PROM are inserted correctly in the holes on the socket and the PROM is seated all the way.

Caution: If the PROM is not seated completely in the socket, it can work loose during normal system operation.

You are now finished installing the PROM chip and are ready to reinstall the graphics board or board set.

If your Indy workstation has	Then:
Indy graphics	Go to "Reinstalling the Indy Graphics Board" on page 21
Indy XZ graphics	Go to "Reinstalling the Indy XZ Graphics Board Set" on page 27

Reinstalling the Indy Graphics Board

Follow these steps to reinstall the Indy graphics board. If your workstation has Indy XZ graphics, go to “Reinstalling the Indy XZ Graphics Board Set” on page 27.

1. Lower the graphics board over the system board, tilting it to insert the graphics board’s I/O connector through the open I/O slot on the rear of the chassis.
2. Align the screw holes on the graphics board over the vacant standoff screws (tall, hexagonal posts) on the system board.
3. Connect the graphics board to the system board as follows. See Figure 1-22.
 - Align the connectors under the graphics board over the connectors on the system board. Make sure they are positioned correctly before going on to the next step.
 - The pins in the male connector are delicate. Gently wiggle or reposition the graphics board to fit the pins into their slots in the female connectors. Do not apply any pressure until the pins fit properly.

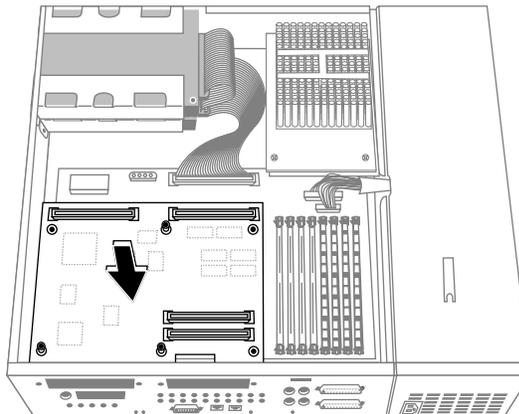


Figure 1-22 Positioning the Graphics Board Over the System Board

4. Place your fingers or thumbs on the board above where the connectors are located, and press firmly until the two connectors fit snugly. The connectors must be touching along the entire shared surface. See Figure 1-23. If the board is not seated all the way, the screws will not tighten correctly.

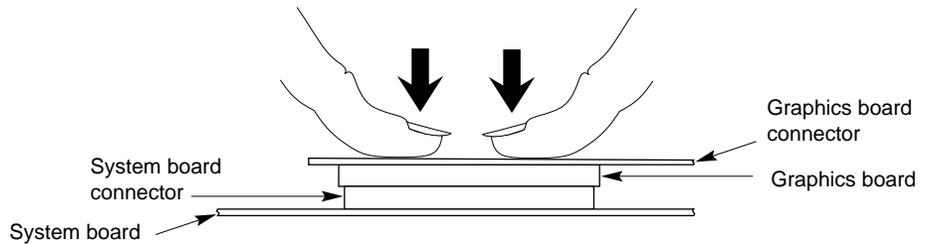


Figure 1-23 Seating the Connectors

5. Insert the two hexnut screws on either side of the graphics board's I/O connector on the rear of the chassis, as shown in Figure 1-24. Use the open-ended wrench provided with this upgrade to tighten the two hexnut screws.

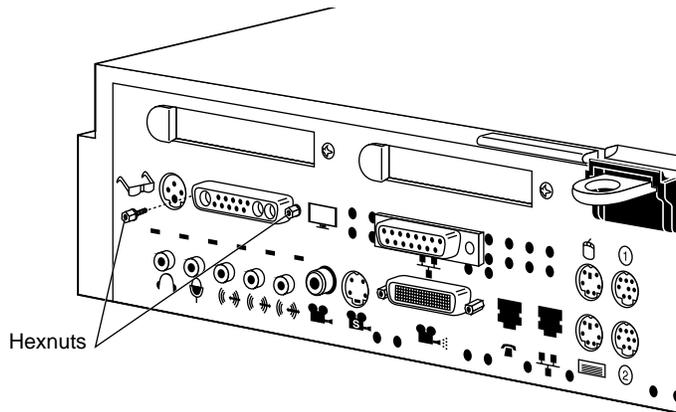


Figure 1-24 Replacing the Hexnut Screws on the Rear

6. Secure the graphics board with the following screws:
 - Using the open-ended wrench, insert and tighten the two standoff screws that you removed earlier, in the locations shown in Figure 1-25. As you tighten the screws, alternate among them so that the board is fastened evenly.
 - Using the Phillips screwdriver, insert and tighten the Phillips screw in the location shown in Figure 1-25.

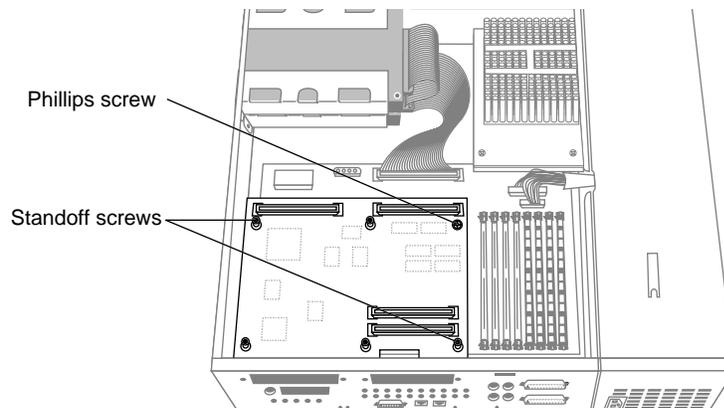


Figure 1-25 Inserting the Screws on the Graphics Board

You are finished reinstalling the graphics board and are ready to reinstall the GIO option board, if you removed one. If you are not reinstalling a GIO board, skip to “Replacing the CPU Module” on page 36.

Reinstalling a GIO Option Board

Follow these steps to replace the GIO option board, if one was installed.

1. Install the GIO board.
 - Lower the GIO option board over the graphics board, inserting the GIO board's I/O connector through the open slot on the rear of the workstation, as shown in Figure 1-26.
 - Align the three screw holes on the GIO option board over the vacant standoffs (tall, hexagonal posts) on the graphics board.
 - Align the connectors under the GIO board over the connectors on the graphics board. Make sure they are positioned correctly before going on to the next step.

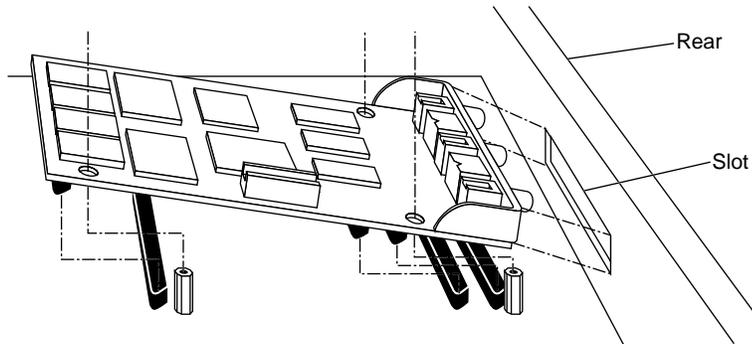


Figure 1-26 Inserting the GIO Board's I/O Connector Through the Backplane

2. Place your fingers or thumbs on the board above where the connectors are located, and press firmly until the two connectors fit snugly. The connectors must be touching along the entire shared surface. See Figure 1-27. If the board is not seated all the way, the screws will not tighten correctly.

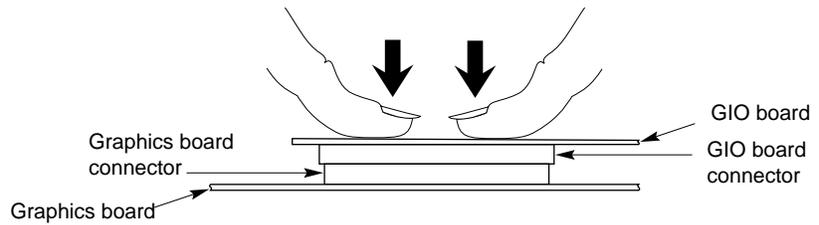


Figure 1-27 Seating the Connectors

3. Insert and tighten the two screws through the rear of the workstation, as shown in Figure 1-28. If the screw holes do not line up, the board may not be seated all the way, or one of the screws may be screwed down too tightly.
 - Look under the board to make sure the connector or connectors are seated evenly and are inserted all the way into the sockets.
 - Press the four corners of the board to make sure the connectors are inserted all the way into the sockets on the graphics board.

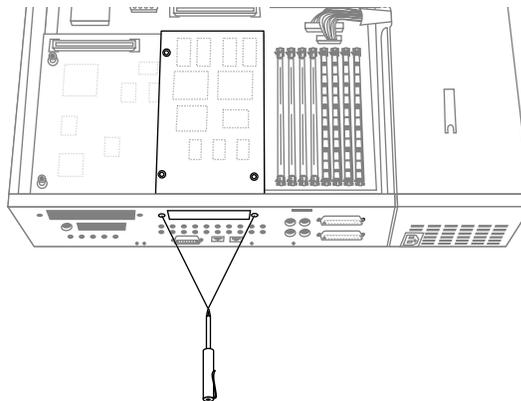


Figure 1-28 Inserting the Screws Through the Rear of the Workstation

4. Connect the GIO option board to the graphics board.
 - Using a Phillips screwdriver, insert and tighten the screws you removed earlier to connect the GIO option board to the graphics board, as shown in Figure 1-29. As you tighten the screws, alternate among them so that the board is connected evenly.

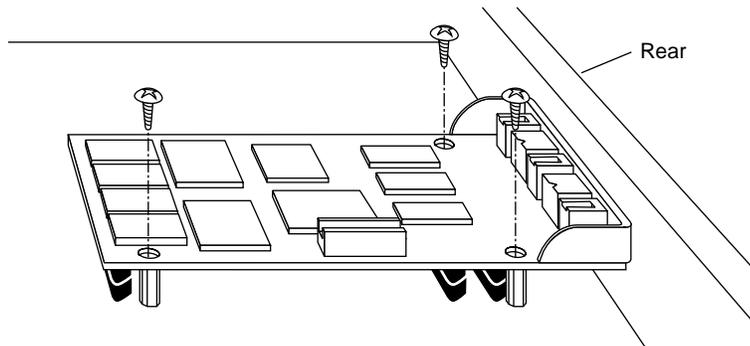


Figure 1-29 Reinstalling the GIO Option Board

5. If the GIO option board has one or more external cables, reconnect them to the board's I/O connector.

You are finished reinstalling the GIO option board and are ready to replace the CPU module. Go to "Replacing the CPU Module" on page 36.

Reinstalling the Indy XZ Graphics Board Set

You replace the boards in the same order in which you removed them. You install the Z board on the Indy system board first, and then you install the X board on top of the Z board. Follow the instructions below.

1. Identify the Z board, as shown in Figure 1-30. It is the one with a small, round I/O connector on the back panel, and a rectangular cutout at the rear of the board.

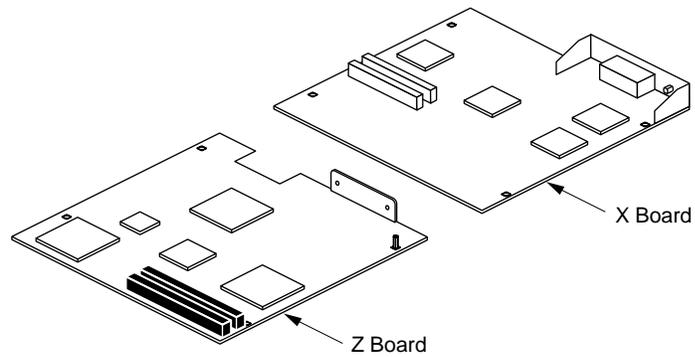


Figure 1-30 The Z Board and the X Board

2. Install the Z board on the system board.
 - Grasp the Z board by the sides, with the two 96-pin male connectors on the underside, as shown in Figure 1-31.
 - Loosely place the Z board on top of the system board so that the two male connectors on the underside of the Z board align with the two female connectors on the system board, as shown in Figure 1-31.

Caution: The pins in the male connectors are delicate. Gently wiggle or reposition the Z board to fit the pins of the male connectors into their slots in the female connectors. Do not apply any pressure until the pins fit properly.

 - Check that each screw hole on the Z board is sitting above a matching standoff (tall, hexagonal post) on the system board.

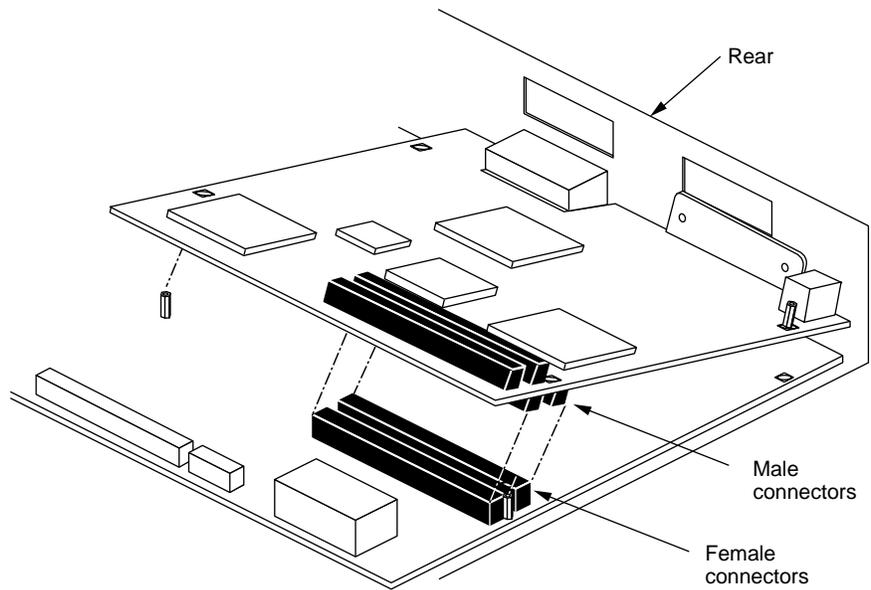


Figure 1-31 Positioning the Z Board Over the System Board

3. Press to seat the Z board's connectors into the system board's connectors, as shown in Figure 1-32.
 - Place your fingers or thumbs on the Z board above where the connectors are located.
 - Press down gently but firmly until the two connectors fit snugly.

Caution: Do not press hard enough to bend the system board.

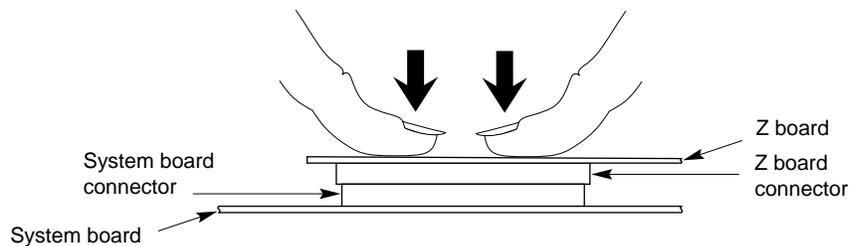


Figure 1-32 Seating the Z Board's Connectors

4. Verify that the Z board is properly seated.
 - Look underneath the Z board to see the two 96-pin connectors. Due to the other components on the board, it may be difficult to see the connectors. The male and female connectors must be touching along the entire shared surface, as shown in Figure 1-32. Be sure to check each end of the connector.

5. Insert and tighten two Phillips screws through the rear of the workstation, as shown in Figure 1-33.

If the screw holes are not aligned, press the board lightly until the screw holes are aligned.

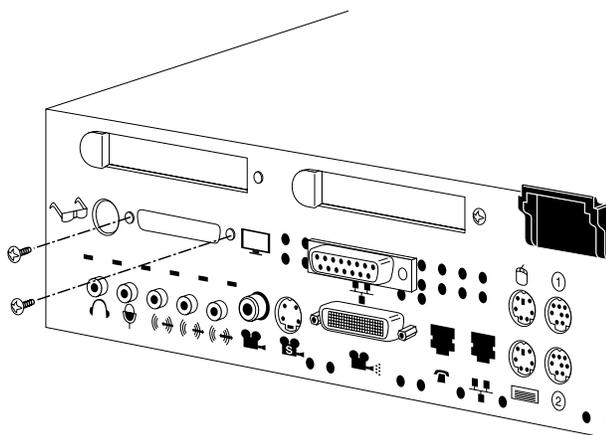


Figure 1-33 Securing the Z Board to the Rear of the Workstation

6. Secure the Z board with three standoff screws, in the locations shown in Figure 1-34.
 - Use the open-ended wrench to tighten the three standoff screws. As you tighten the screws, alternate among them so that the board is fastened evenly.

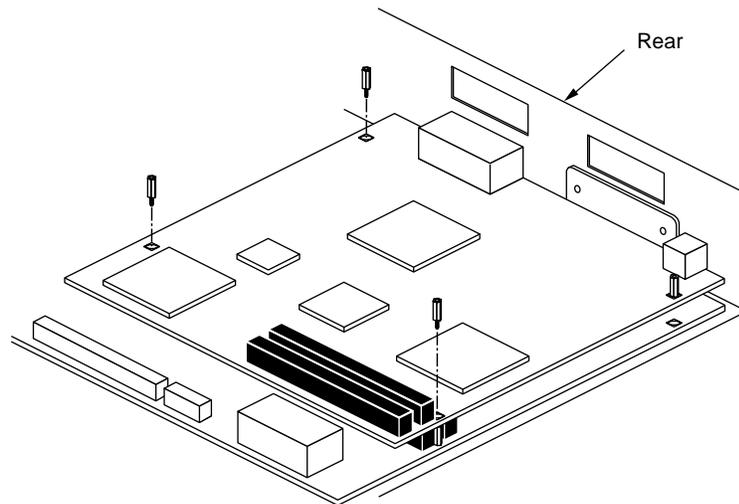


Figure 1-34 Inserting the Standoff Screws on the Z Board

7. Install the X board on the Z board.
 - Grasp the X board by the sides, with the two 96-pin male connectors on the underside, as shown in Figure 1-35.
 - Lower the X board over the Z board, inserting the board's external I/O connector through the open slot on the rear of the workstation.
 - Loosely place the X board on top of the Z board so that the two male connectors on the underside of the X board align with the two female connectors on the Z board, as shown in Figure 1-35.

Caution: The pins in the male connectors are delicate. Gently wiggle or reposition the X board to fit the pins of the male connectors into their slots in the female connectors. Do not apply any pressure until the pins fit properly.

 - Check that each screw hole on the X board is sitting above a matching standoff (tall, hexagonal post) on the Z board.

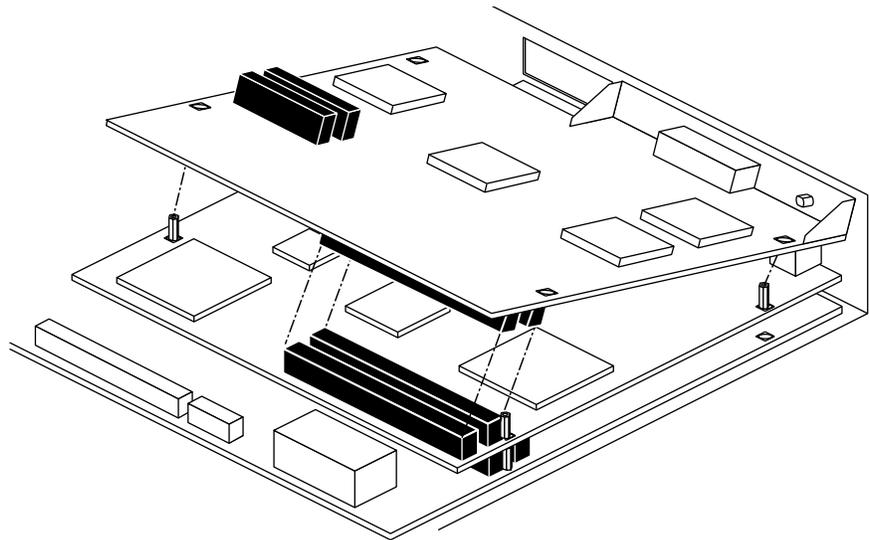


Figure 1-35 Positioning the X Board Over the Z Board

8. Press to seat the X board's connectors into the Z board's connectors, as shown in Figure 1-36.

- Place your fingers or thumbs on the X board above where the connectors are located.
- Press down gently but firmly until the two connectors fit snugly.

Caution: Do not press hard enough to bend the lower two boards.

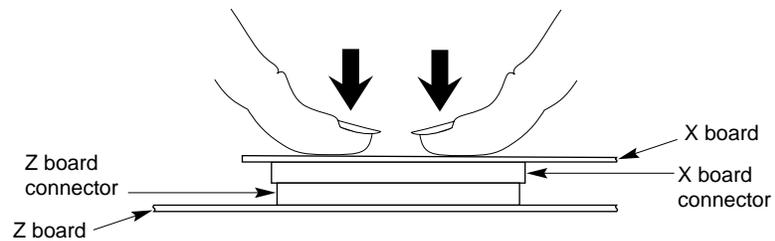


Figure 1-36 Seating the X Board's Connectors

9. Verify that the X board is properly seated.
 - Look underneath the X board to see the 96-pin connectors. Due to the other components on the board, it may be difficult to see the connectors. The male and female connectors must be touching along the entire shared surface, as shown in Figure 1-36. Be sure to check each end of the connector.

10. Insert and tighten two Phillips screws in the locations shown in.

If the screw holes are not aligned, the board may not be seated all the way. When you look down at the board, the screw holes on the board must be lined up above matching standoff screws on the board below. (See Figure 1-35 if necessary.)

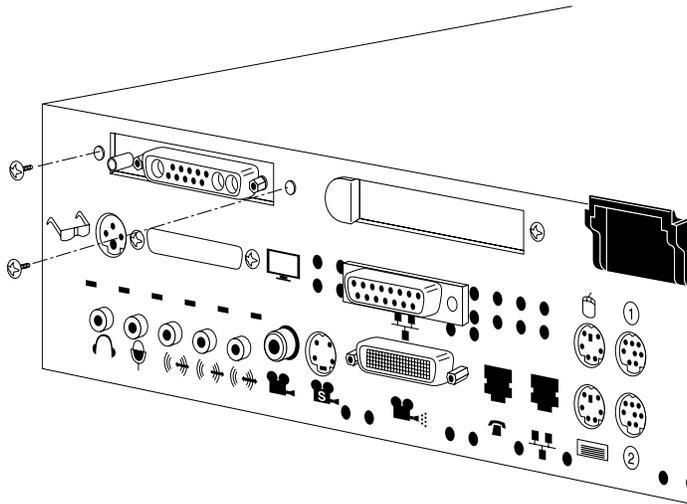


Figure 1-37 Securing the X Board to the Rear of the Workstation

11. Insert and tighten four Phillips screws in the locations shown in. As you tighten the screws, alternate among them so that the board is fastened evenly.

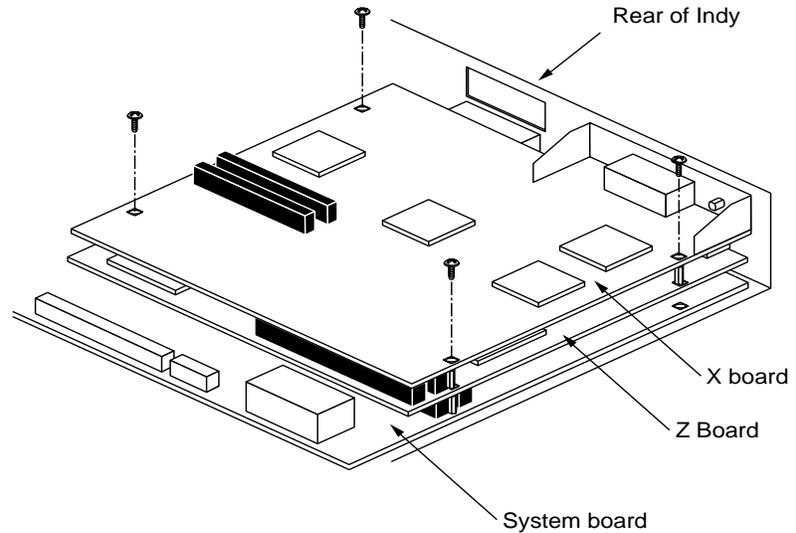


Figure 1-38 Inserting the Screws on the X Board

You are finished replacing the XZ graphics board set. If you removed a Presenter XZ adapter board, replace it following the instructions in the manual that came with the Presenter adapter board.

You have now reinstalled the XZ graphics board set and are ready to replace the CPU module.

Replacing the CPU Module

Follow the steps below to remove the CPU module and install the new CPU module.

1. Locate the CPU module, as shown in Figure 1-39.

The CPU module is elevated on the system board and is located at the front of the system between the power supply and the system disk drive. It is protected by a textured heat sink. *Do not remove the heat sink.*

Note: The Indy workstation supports several CPU module shapes. Your system may have a CPU module and heat sink that look different than the one shown below.

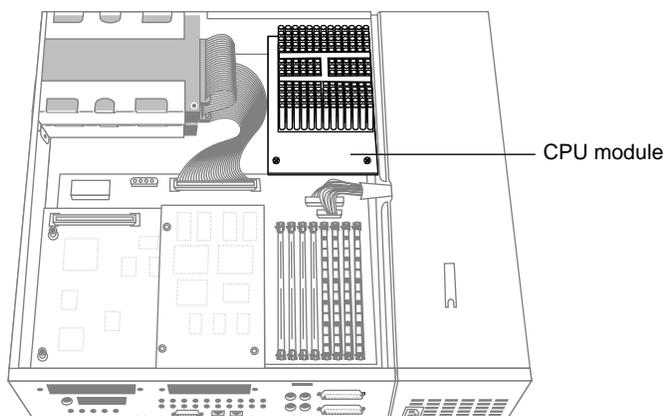


Figure 1-39 Locating the CPU Module

- Using the Phillips screwdriver provided, remove the two screws that connect the CPU module to the system board, as shown in Figure 1-40.

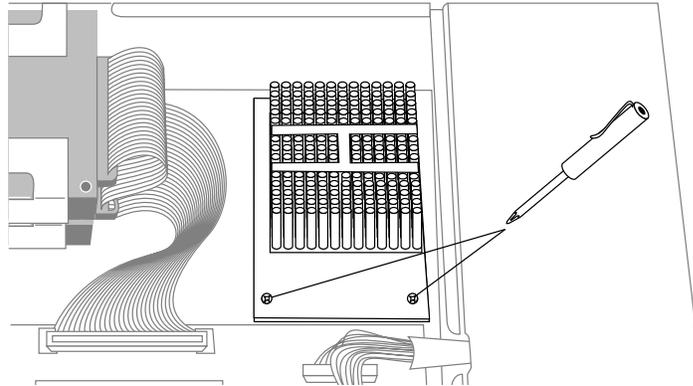


Figure 1-40 Removing the Screws From the CPU Module

- Lift the board by bracing your hands against the power supply and the chassis and pushing the board up with your thumbs, as shown in Figure 1-41.

Note: Note that when the board disconnects, it pops up quite quickly and may startle you.

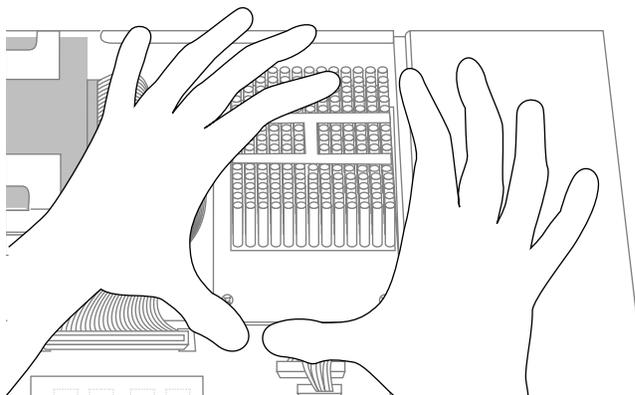


Figure 1-41 Disconnecting the CPU Module

4. Install the new CPU module, as shown in Figure 1-42.
 - Slide the feet on the bottom of the CPU module into the slippers on the base of the chassis.
 - Align the two screw holes on the CPU module over the screw holes on the system board.
 - Seat the connector under the CPU module over the connector on the system board. Make sure it is positioned correctly before going on to the next step.
 - Press down firmly on the CPU module until it is securely seated in the socket on the system board.

If the connector does not seem to fit into the socket, do not force it. Lift the end of the CPU module slightly and lower it again, making sure it's aligned correctly over the connector before pressing it all the way down. You may need to push the power cables gently aside to see the CPU's connectors.

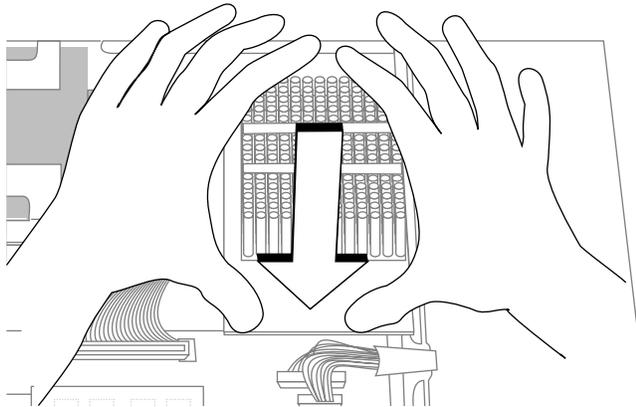


Figure 1-42 Installing the CPU Module

5. Insert and tighten the two screws you removed earlier to connect the CPU module to the system board. As you tighten the screws, alternate from one to the other so that the board is connected evenly.

You have now replaced the CPU module and are ready to replace the cover.

Replacing the Cover

To replace the cover of your Indy workstation, follow these steps:

1. Facing the front of the system, lower the cover a few inches from its fully closed position, as shown in Figure 1-43.
2. Tilt the cover and insert the tab through the hole in the rear of the chassis.
3. Slide the cover toward the back of the chassis until it snaps into place.

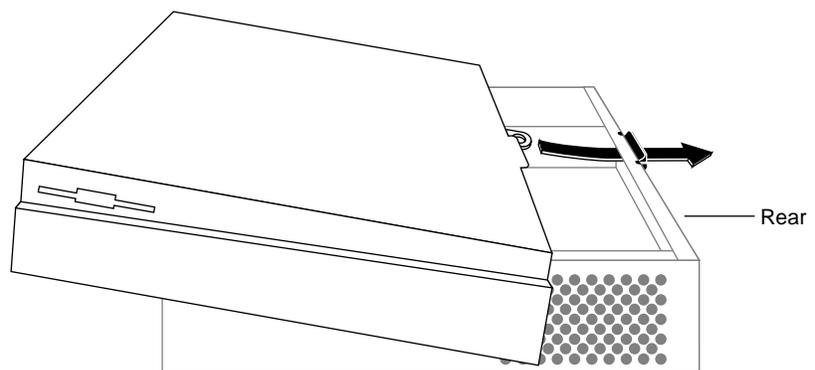


Figure 1-43 Replacing the top cover on the Indy workstation

4. Reconnect the external cables you removed earlier. Be sure to connect the power cable.
5. Replace the monitor on top of the Indy workstation.

Congratulations! You have completed the CPU upgrade and are ready to turn on your Indy workstation.

Turning on the Workstation

To turn on the system power, press and release the power button to turn on the system, as shown in Figure 1-44.

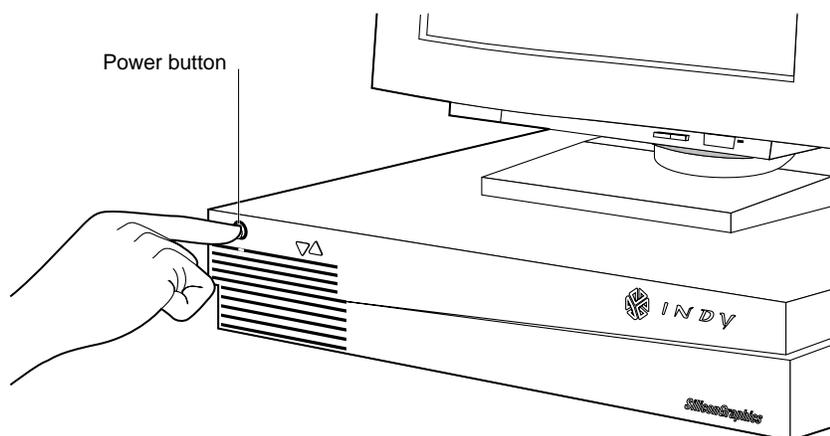


Figure 1-44 Turning on the Indy workstation

When you power on your system, the power indicator LED on the front of the machine is amber for a few seconds, and then the LED turns to green and you hear the boot “tune.”

If you do not hear the boot tune or the LED is red and does not turn green, either the PROM chip or the CPU module may not be installed correctly.

Turn off the system, remove the top cover, and check that you’ve installed the components correctly, following the instructions in this manual.

You are now ready to log in.

Product Support

Silicon Graphics provides a comprehensive product support and maintenance program for its products. If you are in North America and would like support for your Silicon Graphics-supported products, contact the Technical Assistance Center at 1-800-800-4SGI, or your authorized service provider. If you are outside North America, contact the Silicon Graphics subsidiary or authorized distributor in your country.

Installing the CPU Upgrade in a Challenge S Server

This chapter explains how to install the CPU upgrade in a Challenge S server.

Installing the hardware consists of

- checking your system's PROM version
- shutting down the system
- removing the cover
- replacing the CPU module
- removing any GIO and IOPLUS boards in the system (if necessary)
- replacing the PROM chip on the system board (if necessary)
- replacing the IOPLUS and GIO boards
- replacing the cover
- restarting your system

The Upgrade Package

Your upgrade package includes all of the following items. If anything is missing, contact your sales representative.

- PROM chip in an antistatic bag
- CPU module in an antistatic bag
- open-ended wrench to remove standoffs and hexnuts
- Phillips screwdriver
- chip removal tool to remove the PROM chip
- anti-static wrist strap
- *R5000™ CPU Upgrade Installation Guide for the Indy™ Workstation and CHALLENGE® S Server* (this manual)
- CD

In addition, the upgrade package may include a system label to attach to the underside of the Challenge S server.

Installing the Software

Install the software *before* installing the hardware. Read the release notes on the CD for further instructions.

Checking Your System's PROM Version

Before installing the CPU upgrade, you need to check the version number of your system's PROM chip. You do this from the Command Monitor while powering down your system.

Follow these steps to check your system's PROM version:

1. Shut down the system.
 - Make sure nobody is performing critical work on the system. See the *IRIX Advanced Site and Server Administration Guide* (for IRIX 5.3 and IRIX 6.1 systems) and the *IRIX Admin: System Configuration and Operation* (for IRIX 6.2 systems, and later) for information on general system administration practices, including how to alert server users of an impending shutdown.
 - Log in as root on the system console.
 - Use the *shutdown* command to shut down the system:

```
# /etc/shutdown -i0
```

In the above command, "0" is a zero.
 - After a while you are prompted whether or not to continue with the shutdown process:

```
Do you want to continue with the shutdown (yes/no)[no] :
```

Enter **y** or **yes** to continue. You see several messages as the system shuts down. After a while, you see the following message, which indicates the system has shut down:

```
Okay to power off the system now.
Press any key to restart.
```

2. Bring the system up to the System Maintenance menu:

- Press any key on the keyboard (for example, **<Enter>**) to restart the system.

- Press **<Esc>** when you see the following message:

Starting up the system..

After you press **<Esc>** you see the System Maintenance menu:

System Maintenance Menu

- 1) Start System
- 2) Install System Software
- 3) Run Diagnostics
- 4) Recover System
- 5) Enter Command Monitor

Option?

3. At the System Maintenance menu, press **5** to enter the Command Monitor.

4. At the command monitor prompt (**>>**), use the *version* command to determine your system's PROM revision:

>> version

You should see a line similar to the following:

PROM Monitor SGI Version 5.3 Rev B10 R4X00 IP24 Feb 12, 1996 (BE)

The date, "February 12, 1996" tells you the version of the PROM.

- If your PROM is dated *before* February 12, 1996 you must replace the PROM chip.
- If your PROM is dated February 12, 1996 *or later*, you do not need to replace the PROM chip.

5. Type **exit** to exit the PROM monitor.
You see the System Maintenance menu again.
6. Turn off power to the server.
 - Press and release the power button on the front of the server, as shown in Figure 2-1.

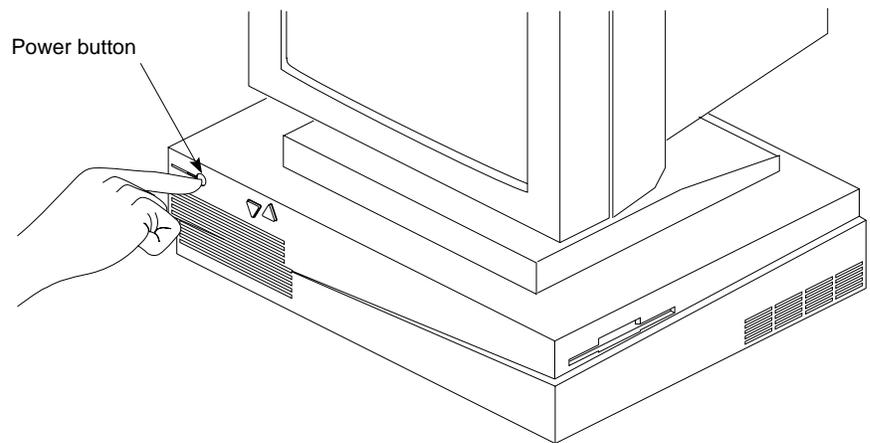


Figure 2-1 Turning Off the Challenge S Server

Removing the Top Cover and Disconnecting the Cables

Follow these steps to remove the top cover of your server:

1. If the system console (ASCII terminal) is on top of the server, move it to one side.
2. Disconnect the following cables from the back of the server:
 - power cable
 - external SCSI cables attached to the 68-pin connectors (SCSI channels 4 and 5)
 - Ethernet 10-BASE T connector (ec3)
 - Ethernet AUI cable (if connected). (Push the sliding bracket on the Ethernet port to the left and remove the cable.)
 - cables connected to any GIO option boards

Note: Disconnecting the Ethernet AUI and 50-pin SCSI cables is optional. Removing the Ethernet AUI cable gives you more room when removing the screws on either side of the IOPLUS connector. Removing the 50-pin SCSI cable (and any attached SCSI devices) makes it easier to move the system to gain access to internal components.

3. Facing the front of the server, place your right thumb on the small channel at the back of the cover, and your second and third fingers under the finger ledge, as shown in Figure 2-2.
4. Snap the cover loose by bracing your thumb against the lip and pushing up the finger ledge with the second and third fingers, followed by a small push toward the front.
5. Slide the cover forward about one inch and tilt it up to remove it.

Tip: It may be difficult to release the cover, and you may have to use some force.

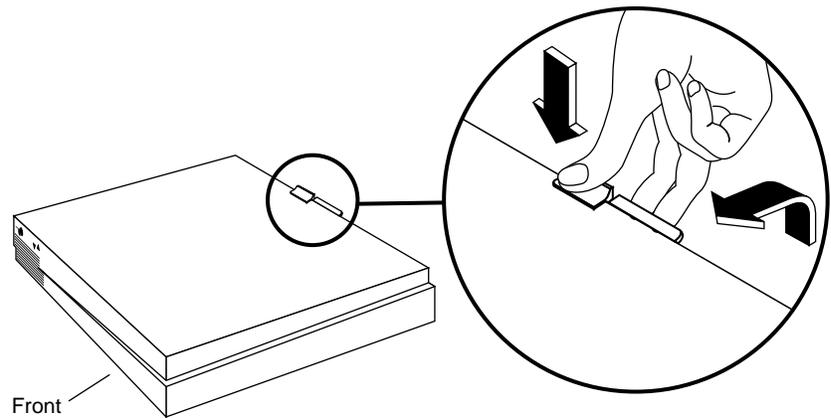


Figure 2-2 Removing the Top Cover of the Challenge S Server

Attaching the Wrist Strap

A wrist strap is included with every Silicon Graphics upgrade package. Wearing the wrist strap helps prevent the flow of static electricity, which can damage the components in the server.

Caution: The components inside the Challenge S server are extremely sensitive to static electricity. Handle all chips and modules carefully, and wear the wrist strap shipped with the upgrade package while replacing parts inside the system.

To attach the wrist strap, follow these steps:

1. Unwrap the first two folds of the band and wrap the exposed adhesive side firmly around your wrist.
2. Unroll the rest of the band and peel the liner from the copper foil at the opposite end.
3. Attach the copper foil to a convenient location on the metal part of the server chassis.

Caution: Do not attach the wrist strap to the +5VDC screw and standoff. Figure 2-10 shows the location of the screw and standoff.

Replacing the CPU Module

Follow the steps below to remove the old CPU module and install the new CPU module:

1. Locate the CPU module, as shown in Figure 2-3.

The CPU module is elevated on the system board and is located at the front of the system between the power supply and the system disk drive. It is protected by a textured heat sink. *Do not remove the heat sink.*

Note: The Challenge S server supports several CPU module shapes. Your system may have a CPU module and heat sink that look different than the one shown below.

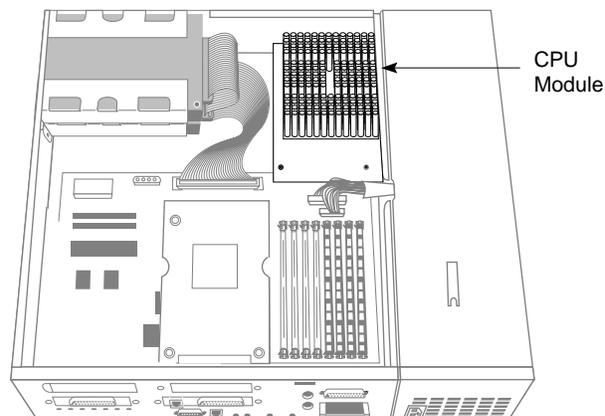


Figure 2-3 Locating the CPU Module

2. Using the Phillips screwdriver provided, remove the two screws that connect the CPU module to the system board, as shown in Figure 2-4.

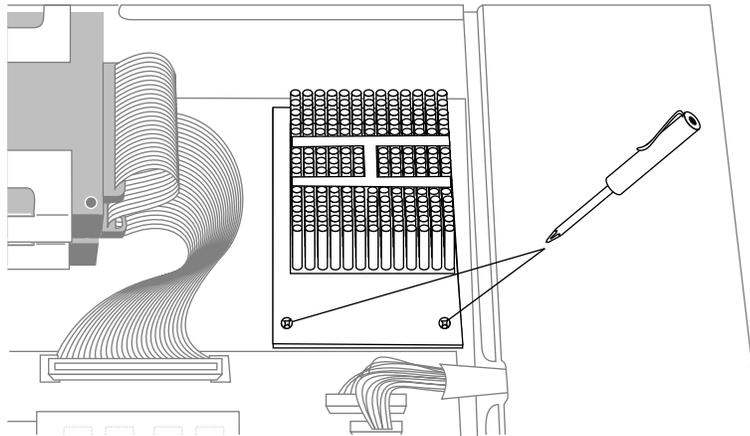


Figure 2-4 Removing the Two Screws From the CPU Module

3. Lift the board by bracing your hands against the power supply and the chassis and pushing the board up with your thumbs, as shown in Figure 2-5.

Note: When the board disconnects, it pops up quite quickly and may startle you.

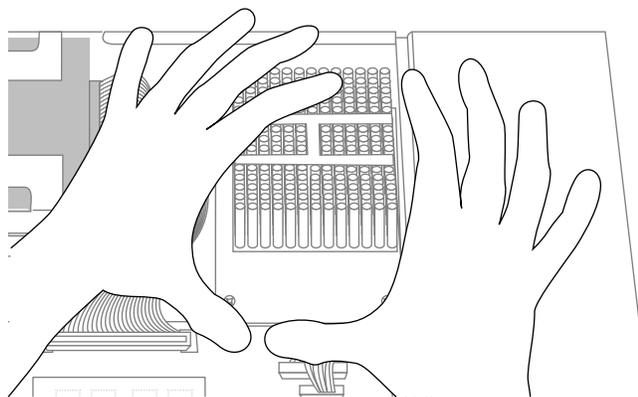


Figure 2-5 Disconnecting the CPU Module

4. Install the new CPU module, as shown in Figure 2-6.
 - Slide the feet on the bottom of the CPU module into the slippers on the base of the chassis.
 - Align the two screw holes on the CPU module over the screw holes on the system board.
 - Seat the connector under the CPU module over the connector on the system board. Make sure it is positioned correctly before going on to the next step.
 - Press down firmly on the CPU module until it is securely seated in the socket on the system board.

If the connector does not seem to fit into the socket, do not force it. Lift the end of the CPU module slightly and lower it again, making sure it's aligned correctly over the connector before pressing it all the way down. You may need to push the power cables gently aside to see the CPU's connectors.

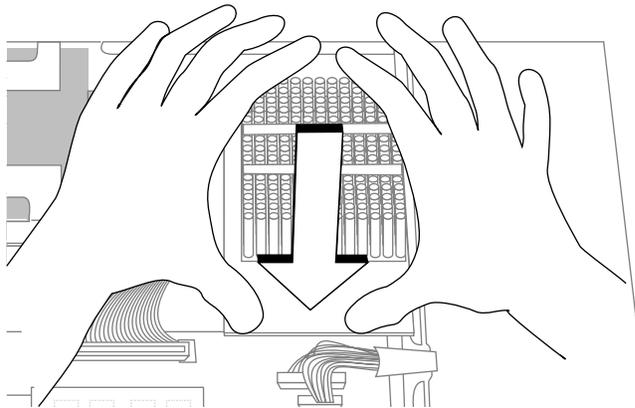


Figure 2-6 Installing the CPU Module

5. Insert and tighten the two screws you removed earlier to connect the CPU module to the system board. As you tighten the screws, alternate from one to the other so that the board is connected evenly.

You are finished replacing the CPU. If the PROM should be replaced, proceed to the next section. Otherwise, go to "Replacing the Cover."

Replacing the PROM Chip

If your PROM chip is dated before February 12, 1996, follow the steps below. If the PROM is dated February 12, 1996 or later, go to “Replacing the CPU Module” on page 51. (You should have already checked the version of your PROM chip before shutting down and opening up the system. See “Checking Your System’s PROM Version” on page 45.)

To reach the PROM chip, you must first remove any GIO option boards that are installed and then remove the IOPLUS board. Follow the steps below.

Removing the GIO Option Board

GIO option boards are installed on top of the IOPLUS board. A single-width GIO option board covers half of the IOPLUS; a double-width covers the entire IOPLUS. Figure 2-7 shows a single-width board.

If there is a GIO option board installed in your server, follow these steps to remove it. If there is no GIO option board installed, go to “Removing the IOPLUS Board.”

These instructions are for a single-width GIO option board. Use the same steps to remove a double-width GIO option board. The only difference is that there are more screws to remove on a double-width board.

1. Locate the GIO board, as shown in Figure 2-7.

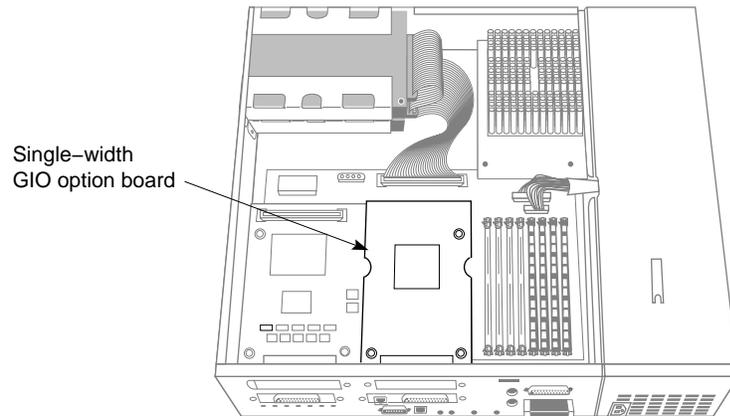


Figure 2-7 Locating the GIO Option Board

2. If there are external cables connected to the GIO option board connector on the rear of the server, disconnect them.

3. Using the Phillips screwdriver provided with this upgrade kit, remove the screws from the GIO board connector on the rear of the server, as shown in Figure 2-8.

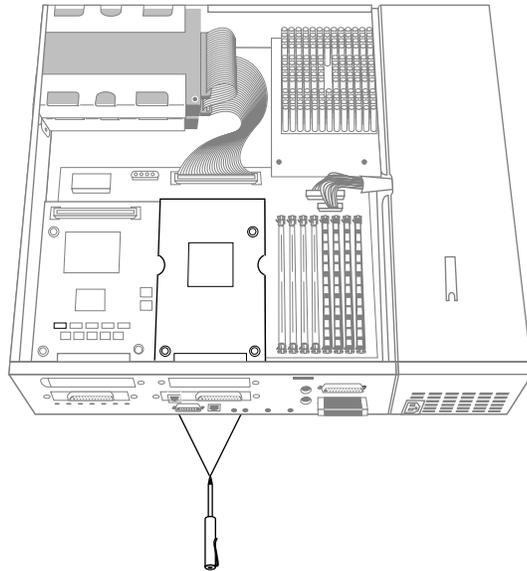


Figure 2-8 Removing GIO Board Screws at the Rear of the Server

4. Using a Phillips screwdriver, remove the screws that attach the GIO option board to the standoffs on the IOPLUS, as shown in Figure 2-9.

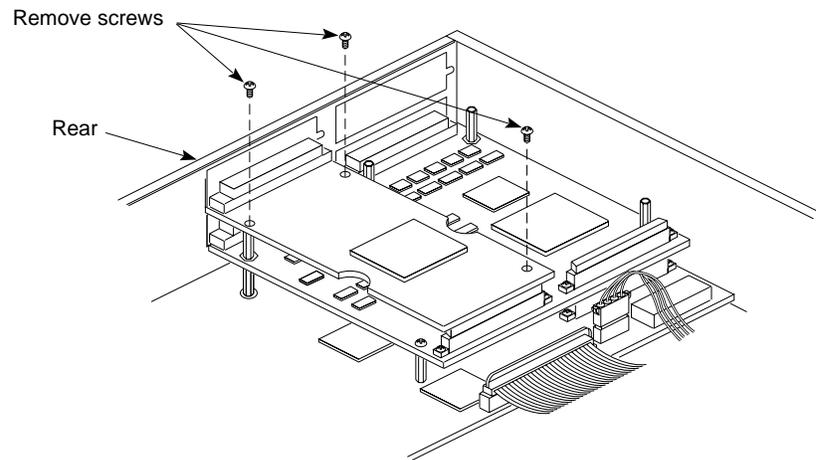


Figure 2-9 Removing the Screws From the GIO Option Board

5. Remove the GIO board from the system.
 - Pull up on the GIO board. This separates the connector on the underside of the GIO board from the mating connector on the IOPLUS board.
 - Remove the GIO board from the system. You may have to tilt it slightly, raising the end of the board closest to the system disk and farthest from the rear of the system.
 - Place the board on a soft, anti-static surface, such as an anti-static bag or the anti-static foam used to package the CPU upgrade.

Caution: Do not handle the board carelessly, or set it down roughly on a hard surface such as a filing cabinet or desk-top. Rough handling can damage delicate components on the board.

Removing the IOPLUS Board

Follow these steps to remove the IOPLUS board from the server:

1. Using the open-ended hex wrench provided in the upgrade kit, remove the standoffs from the IOPLUS board, as shown in Figure 2-10.
2. Use the Phillips screwdriver to remove the +5V screw, as shown in Figure 2-10.

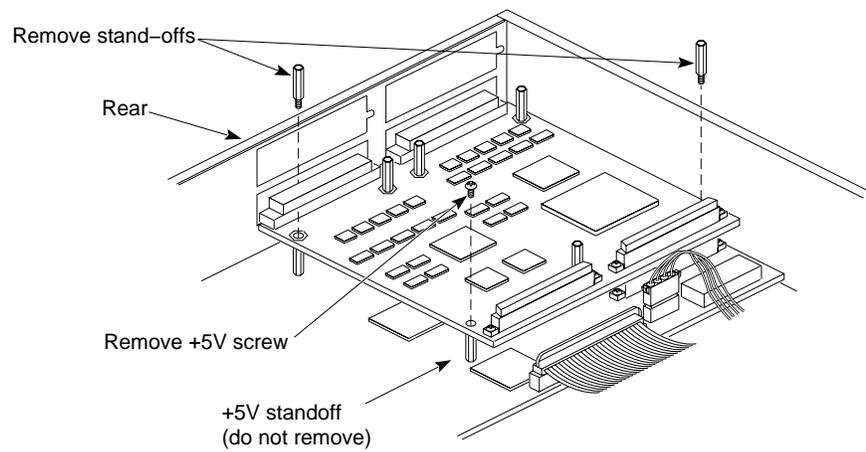


Figure 2-10 Removing the Screw and Standoffs From the IOPLUS Board

3. Use the Phillips screwdriver to remove the four screws from the IOPLUS board's I/O connectors on the rear of the server, as shown in Figure 2-11.

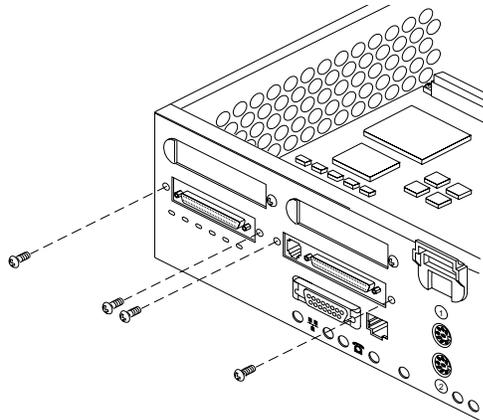


Figure 2-11 Removing the Screws From the IOPLUS Board's I/O Connectors

4. Remove the IOPLUS board from the system.
 - Grasp the board firmly with two hands on the side close to the system disk drive and pull up. This will separate the two connectors on the underside of the IOPLUS from the mating connectors on the system board.
 - Lift the board up and out of the system.
 - Place the board on a soft, anti-static surface, such as an anti-static bag or the anti-static foam used to package the CPU upgrade.
- Caution:** Do not handle the board carelessly, or set it down roughly on a hard surface such as a filing cabinet or desk-top. Rough handling can damage delicate components on the board.

Replacing the PROM Chip

Follow these steps to replace the PROM chip:

1. Locate the PROM chip. The PROM chip is located on the opposite side of the system board from the SIMM banks, as shown in Figure 2-12.

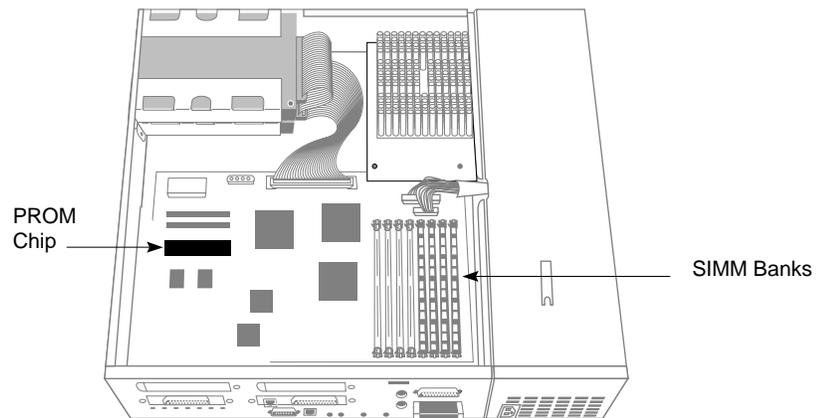


Figure 2-12 Locating the PROM Chip

Before removing the PROM chip, familiarize yourself with it. Note that it has either a semi-circular notch or a small, indented circle at one end. You'll use this notch or circle to orient the upgrade PROM when you install it.

2. Remove the PROM chip from the system board.

The PROM chip is seated in a socket that is permanently attached to the system board. It's important when you use the tool to remove the chip that you insert the tool under the PROM chip itself, *and not under the socket*.

- You received a chip removal tool—it looks like a pair of huge tweezers. Insert the chip removal tool between the PROM chip and the socket on the board, as shown in Figure 2-13. Work the chip away from the socket in a rocking motion, pulling up on one side of the chip and then on the other side. It may be difficult to loosen it.
- Continue the rocking motion until the PROM chip is all the way out of the socket.

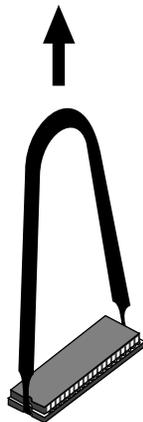


Figure 2-13 Removing the PROM Chip

3. Install the new PROM chip.
 - Grasp the new PROM chip. Orient the PROM above the socket on the system board so the end with the semi-circular notch or small, indented circle on the PROM chip lines up with the notch in the socket, as shown in Figure 2-14.

Caution: Make sure you line up the notch or the small circle on the PROM chip with the notch in the socket. If you install the PROM chip backwards, the system will not power on and you will damage the PROM chip.

- Line up all of the pins on the PROM with the corresponding holes in the socket.

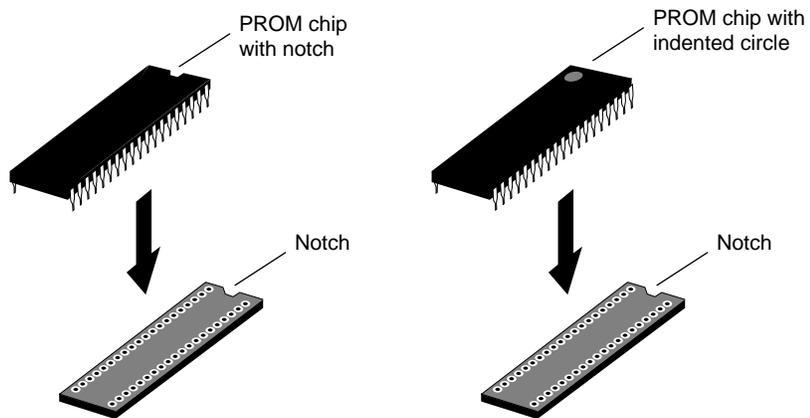


Figure 2-14 Lining Up the PROM Chip

4. Once the pins are lined up, press down firmly on the top of the PROM chip until it is seated in the socket, as shown in Figure 2-15.

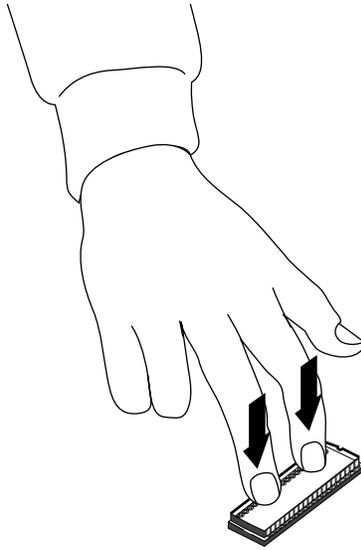


Figure 2-15 Pressing the PROM Chip Into the Socket

5. Visually check to make sure all the pins on the PROM are inserted correctly in the holes on the socket and the PROM is seated all the way.

Caution: If the PROM is not seated completely in the socket, it can work loose during normal system operation.

You are finished replacing the PROM. You are now ready to reinstall the IOPLUS and any GIO option boards.

Reinstalling the IOPLUS and GIO Option Boards

The procedures in this section describe how to reinstall the IOPLUS and any GIO boards you removed earlier.

Reinstalling the IOPLUS

Follow these steps to reinstall the IOPLUS board:

1. Lower the IOPLUS into the system, tilting it as necessary to insert the IOPLUS board's I/O connectors through the open I/O slot in the rear of the system chassis.
2. Align the standoffs on the system board with the corresponding holes in the IOPLUS board.
3. Connect the board to the system.
 - Seat the connectors on the underside of the IOPLUS board over the mating connectors on the system board.
 - Press firmly on all four corners of the IOPLUS board until it is securely seated in the sockets on the system board. If the board is not properly seated, the standoffs and various attachment screws will not tighten correctly.

4. Use the Phillips screwdriver to insert the four screws into the IOPLUS board's I/O connectors at the rear of the server, as shown in Figure 2-16.

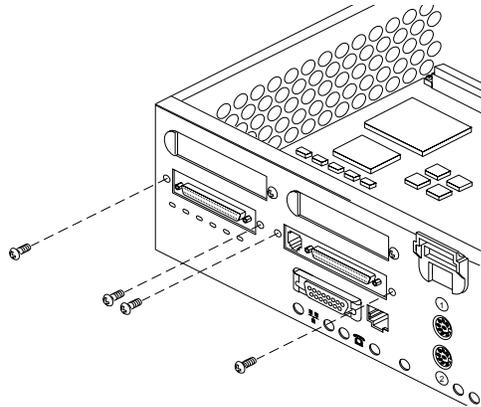


Figure 2-16 Installing the Screws In the IOPLUS Board's I/O Connectors

5. Attach the standoffs and +5V screw, as shown in Figure 2-17.
 - Finger tighten the standoffs.
 - Install the +5V screw with the Phillips screwdriver.
 - Tighten the standoffs and screw firmly. As you do so, alternate between them so that the torque on each is more or less even.

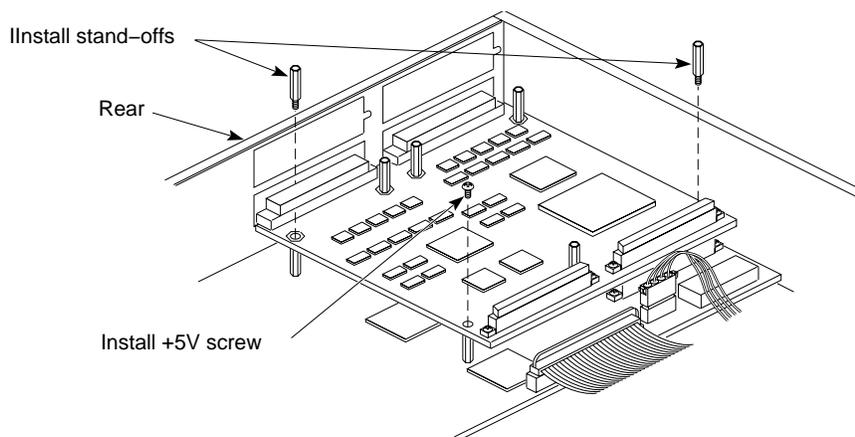


Figure 2-17 Installing the IOPLUS Board

You are finished reinstalling the IOPLUS board. You are ready to reinstall any GIO option boards that you removed from the server.

Reinstalling a GIO Board

Follow these steps to reinstall a GIO board:

1. Install the GIO board.
 - Lower the GIO option board over the IOPLUS board, inserting the GIO board's I/O connector through the open slot on the rear of the server, as shown in Figure 2-18.
 - Align the three screw holes on the GIO option board over the vacant standoffs (tall, hexagonal posts) on the IOPLUS board.
 - Seat the connector located under the GIO option board over the socket on the graphics board and press down firmly on all four corners of the board until the connector is securely seated on the IOPLUS board.

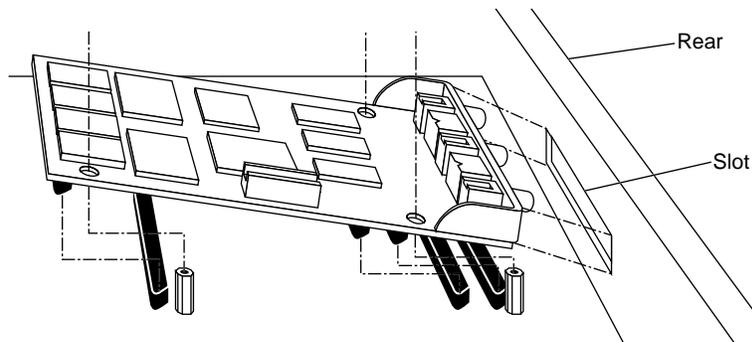


Figure 2-18 Inserting the GIO Board's I/O Connector Through the Backplane

2. Insert and tighten the two screws through the rear of the server, as shown in Figure 2-19. If the screw holes do not line up, the board may not be seated all the way, or one of the screws may be screwed down too tightly.
 - Look under the board to make sure the connector or connectors are seated evenly and are inserted all the way into the sockets.
 - Press the four corners of the board to make sure the connectors are inserted all the way into the sockets on the IOPLUS board.

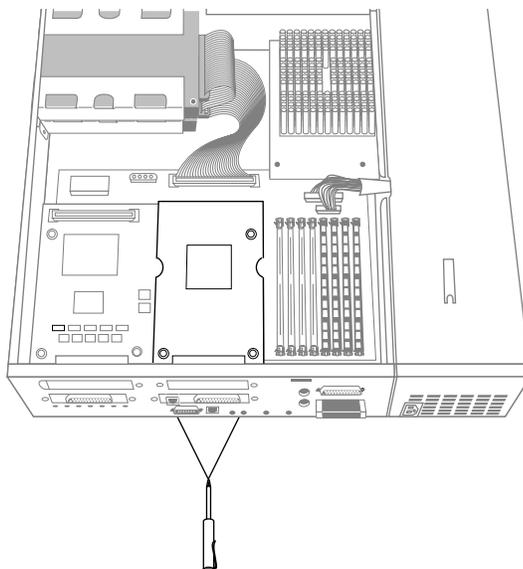


Figure 2-19 Inserting the GIO Screws From the Rear of the Server

3. Connect the GIO option board to the IOPLUS board.
 - Using a Phillips screwdriver, insert and tighten the screws you removed earlier to connect the GIO option board to the IOPLUS board, as shown in Figure 2-20. As you tighten the screws, alternate among them so that the torque on each is more or less even.

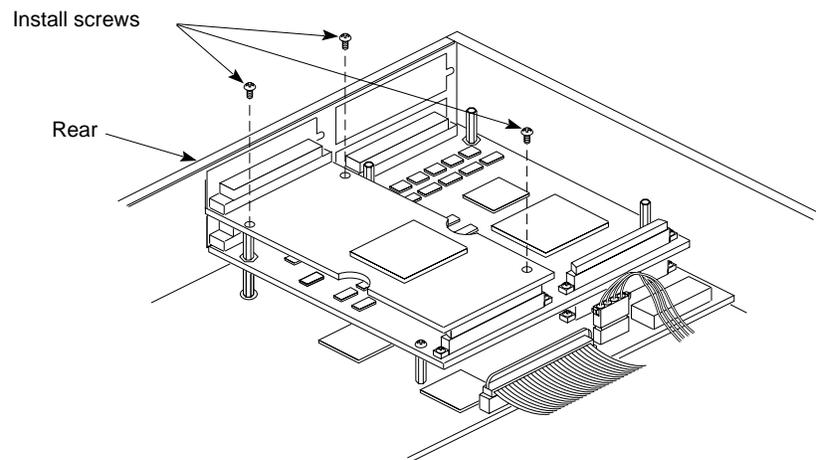


Figure 2-20 Installing the GIO Board

Replacing the Cover

To replace the cover of your Challenge S server, follow these steps:

1. Facing the front of the system, lower the cover a few inches from its fully closed position, as shown in Figure 2-21.
2. Tilt the cover and insert the tab through the hole in the rear of the chassis.
3. Slide the cover toward the back of the chassis until it snaps into place.

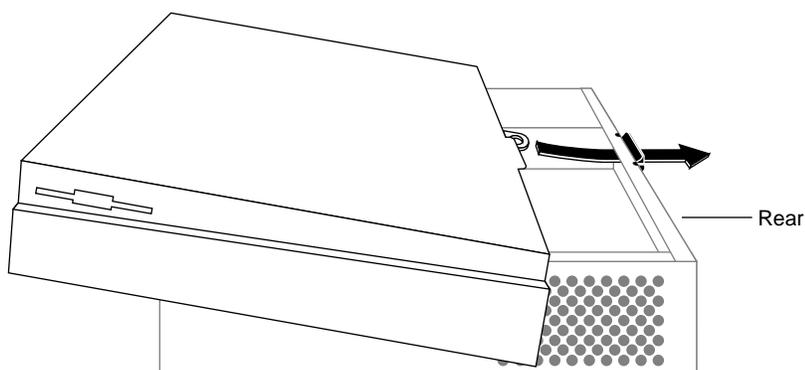


Figure 2-21 Replacing the Top Cover

4. If you received a system label in this package, place the label on top of the existing system label on the underside of the chassis.
5. Reconnect the external cables you removed earlier. Be sure to connect the power cable.

Congratulations! You have completed the CPU upgrade and are ready to turn on your Challenge S server.

Restarting the Server

To turn on system power and restart the server, press and release the power button, as shown in Figure 2-22.

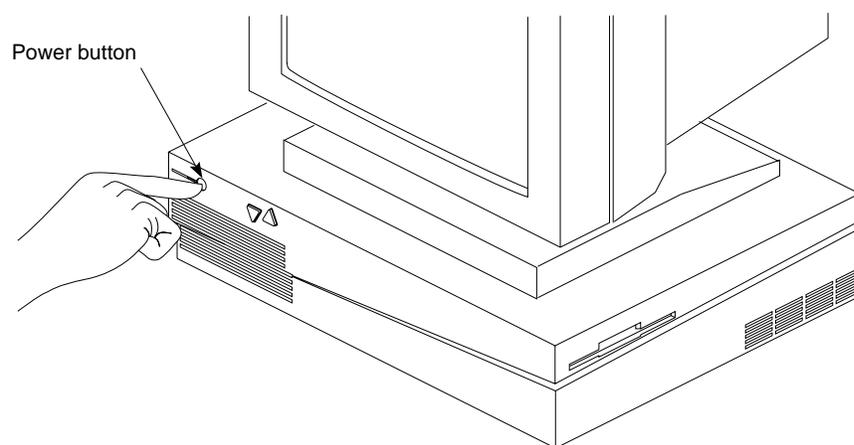


Figure 2-22 Restarting the Server

When you power on your system, the power indicator LED on the front of the machine is amber for a few seconds, and then the LED turns to green.

If the LED is red and does not turn green, either the PROM chip or the CPU module may not be installed correctly.

Turn off the system, remove the top cover, and check that you've installed the components correctly, following the instructions in this manual.

You are now ready to log in.

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