

Indigo² IMPACT[™] Dual Head Installation Guide and Notes for Developers

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CONTRIBUTORS

Written by Judy Muchowski, Jed Hartman, Charmaine Moyer

Illustrated by Dany Galgani, Cheri Brown

Production by Laura Cooper

Engineering Contributions by Michael Nagy, Jeff Quilici, and Richard Wright

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Introduction

This guide explains how to install the Dual Head graphics upgrade into your Indigo² IMPACT™ workstation. It also includes information on using the Dual Head system, troubleshooting, and programming notes for developers.

Read this guide once all the way through before you start to work. That way you'll be familiar with the Indigo² IMPACT system and the parts you'll be working with. Your owner's guide gives you complete information on the Indigo² IMPACT workstation. If you find a term you haven't seen before, refer to your workstation owner's guide. The glossary contains definitions of many of the terms used in this pamphlet.

It's always a good idea to back up your system. If you have not backed up your system recently, take this opportunity to do so. For instructions on backing up your system, see your *Personal System Administration Guide*.

Product Support

Silicon Graphics[®], Inc., 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 Solid IMPACT Graphics Board: Solid/Solid, Solid/High, and Solid/Maximum Configurations

This chapter tells you how to install the hardware for a dual head system in an Indigo² IMPACT workstation with an existing Solid IMPACT™, High IMPACT™, or Maximum IMPACT™ graphics board or boards installed. Indigo²™ XL, XZ, and Extreme™ graphics boards will not work with Indigo² IMPACT graphics boards in a dual head system.

Check any release notes for software information.

To install the hardware, you'll shut down the system, remove the cover, install the Solid IMPACT upgrade board above the existing graphics board or board set, and replace the cover of your Indigo² IMPACT workstation.

Shutting Down and Powering Off the System

Follow these steps to shut down the software and power off the system.

1. Remove the front cover.
 - Face the front of the Indigo² IMPACT chassis.

- Open the front cover by snapping it away from the top edge of the chassis and tipping it down, as shown in Figure 1-1.

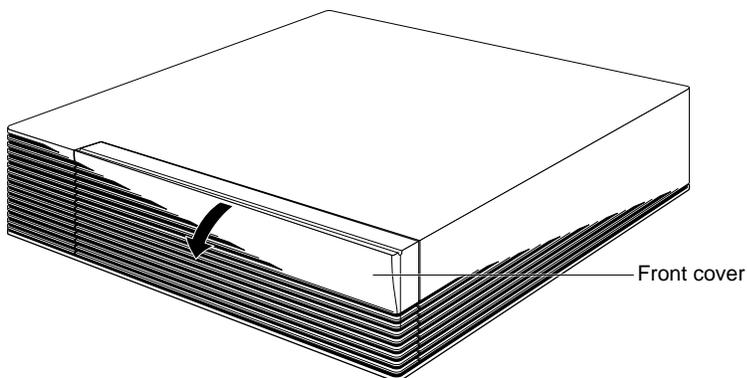


Figure 1-1 Removing the Front Cover

1. Press and release the power switch, as shown in Figure 1-2.

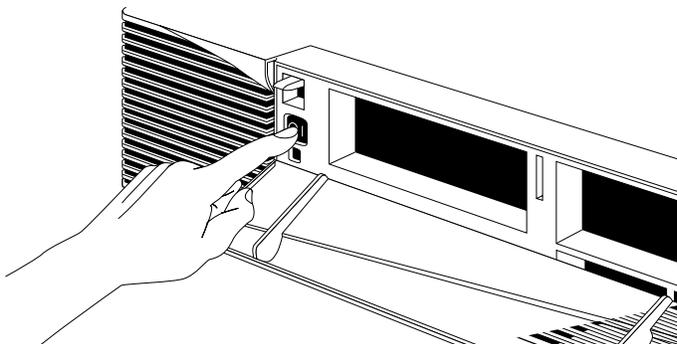


Figure 1-2 Turning off the System Power

The system will power off automatically within the next minute.

Removing the Cover

Follow these steps to disconnect the cables and remove the cover:

1. Disconnect any cables from the back of your Indigo² IMPACT workstation.
2. Remove the bezel.
 - Press down on the tabs on each side of the bezel, as shown in Figure 1-3.
 - If a lockbar is in place, unlock it at the back of the chassis and pull the lockbar out of the workstation.

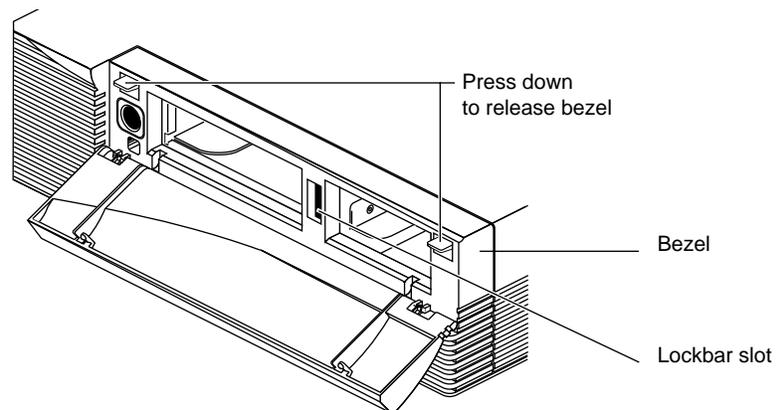


Figure 1-3 Releasing the Bezel

- Pull the bezel away from the chassis.

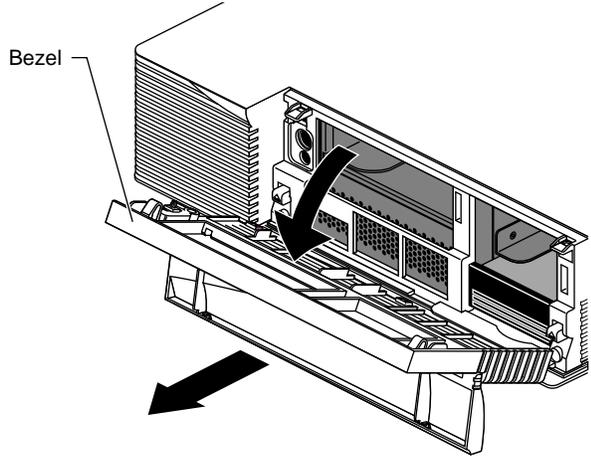


Figure 1-4 Removing the Bezel

3. Remove the top cover.
 - Press up on the tabs on each side of the drive openings as shown in Figure 1-5.

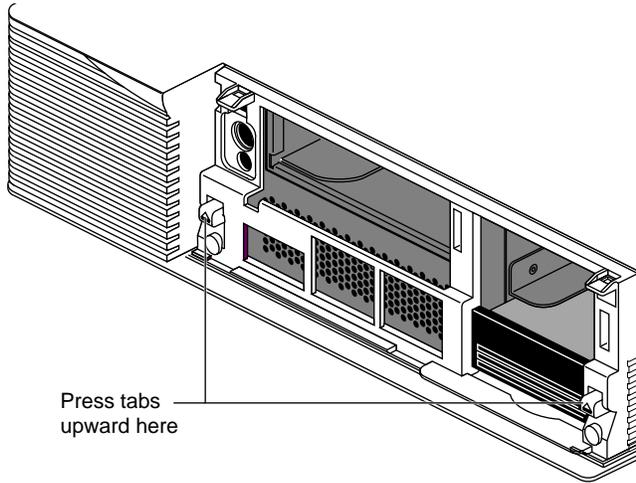


Figure 1-5 Releasing the Top Cover

- Pull up on the cover and rotate it back and away from the chassis, as shown in Figure 1-6.

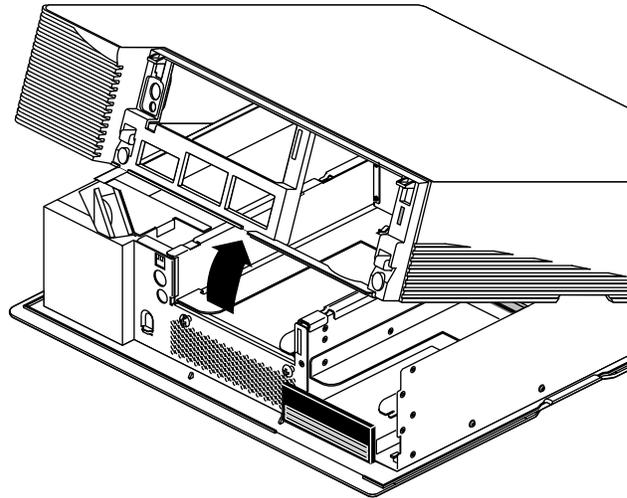


Figure 1-6 Removing the Top Cover

Attaching the Wrist Strap

Wear the wrist strap to prevent the flow of static electricity, which can damage the board.

Caution: The components inside the Indigo² IMPACT are extremely sensitive to static electricity. Handle all boards carefully, and wear the wrist strap shipped with the upgrade board 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 and exposed electrical ground, such as a metal part of the Indigo² IMPACT workstation.

You are now ready to install the board.

Installing the Board

To install the board, follow these steps:

1. Move the workstation or position yourself so that you are facing the expansion slots, as shown in Figure 1-7.
2. Open the metal panel in front of the expansion slots by pulling up on the panel and lowering it.

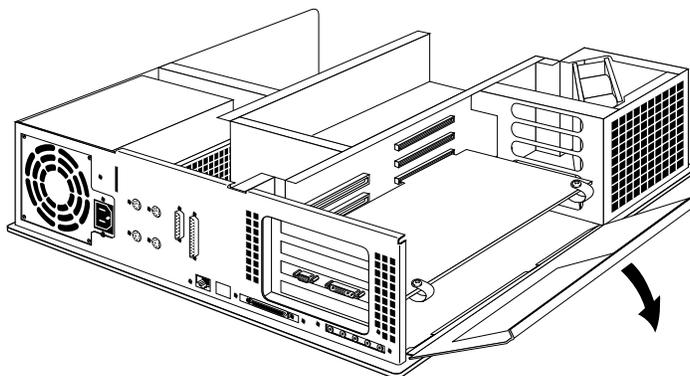


Figure 1-7 Opening the Metal Panel in Front of the Expansion Slots

3. Remove the retention pin from the workstation.
 - Grasp the retention pin on the right-front end of the board set and pull it up and off. See Figure 1-8.

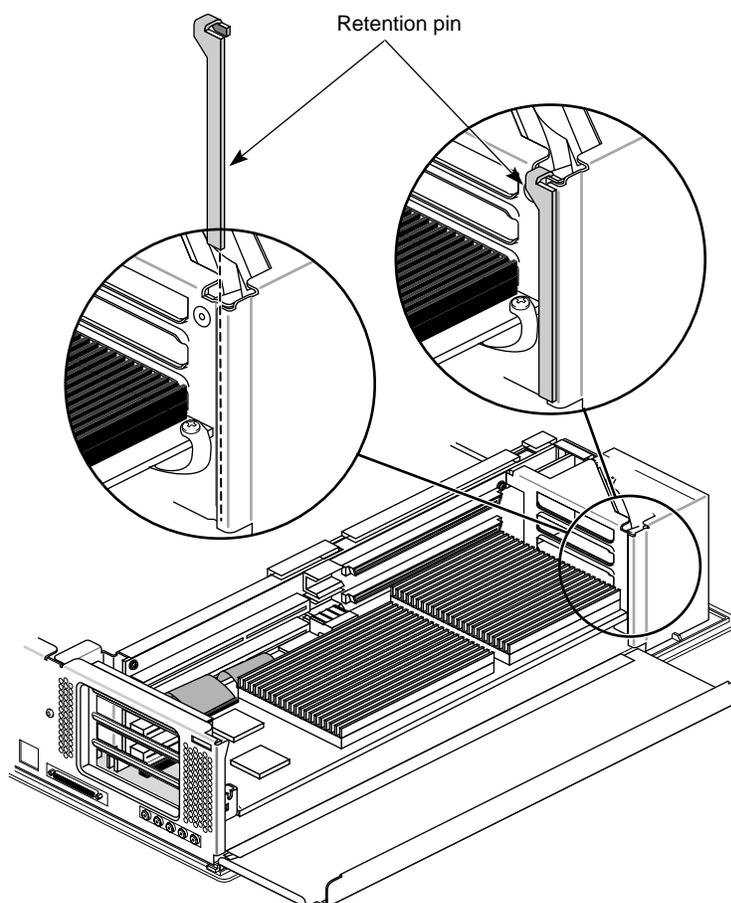


Figure 1-8 Removing the Retention Pin

Note: Check the placement of the retention pin. It hangs in front of the board, not beside it.

4. Install the new board in the slot above the existing Indigo² IMPACT board or board set. See Table 1-1 and Figure 1-9 for proper board placement.

Note: Indigo² XL, XZ, or Extreme graphics boards will not work with IMPACT graphics boards in a dual head system.

Table 1-1 Correct Placement of Graphics Boards

If You Have This Existing Graphics Board:	It Must Be in Slot:	Place Solid IMPACT (Dual Head) Graphics Board in Slot:
Solid IMPACT	B	D
High IMPACT	A and B	D
Maximum IMPACT	A, B, and C	D

Caution: The Dual Head system will not work and the graphics boards can be damaged if the boards are placed in the incorrect slot. Follow the above table to place the boards correctly.

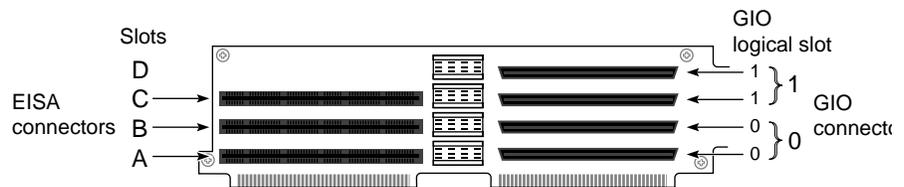


Figure 1-9 Identifying Board Slots

Note: The Dual Head system requires that each graphics board is placed in a different GIO logical slot. One board or board set uses one connector in Logical Slot 0/0 (Slots A/B), and one board or board set uses one connector in Logical Slot 1/1 (Slot C/D). Because both GIO logical slots are used in a Dual Head configuration, no other graphics board requiring a GIO connection will work in a Dual Head system.

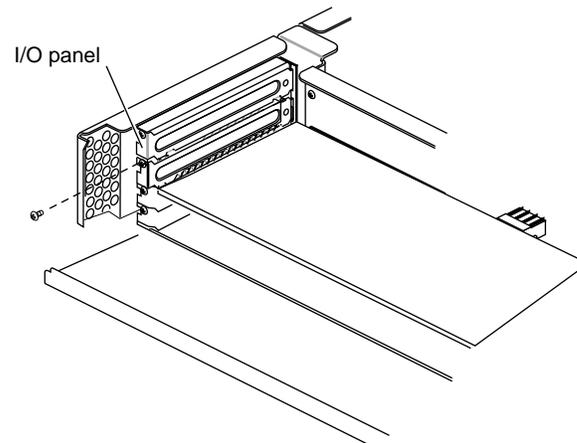


Figure 1-10 Removing the Metal I/O Panel

5. Remove the screw that attaches the I/O panel above the previously installed Indigo² IMPACT graphics board.
6. Remove the I/O panel.

Tip: If your site has multiple Indigo² IMPACT workstations, it's a good idea to save at least one set of I/O panels to reinstall in the workstation should you need to remove an option board.

7. Install the new Solid IMPACT graphics board
 - Insert the board carefully so that the board edge does not catch on the EMI lining along the inner left cutout area. Make sure the EMI lining is not damaged and remains between the chassis and the graphics board's metal extension.
 - Grasp the chassis with your fingers and push the board set into place with your thumbs. See Figure 1-11.

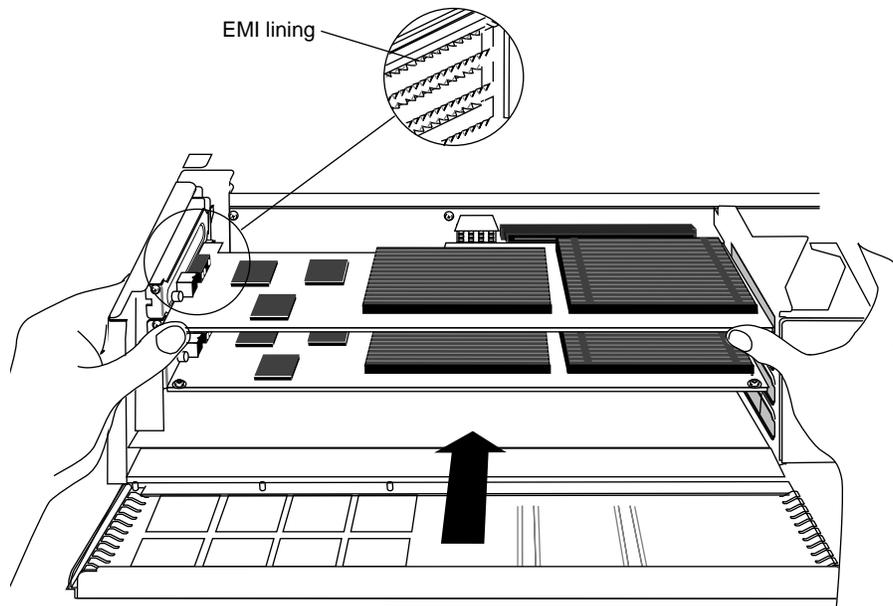


Figure 1-11 Installing the Solid IMPACT Graphics Board

- Push the board set into the slot until the connector on the back of the board is securely connected to the connector on the midplane.

8. Insert and tighten the screw that holds the board to the chassis.

The screw opening is located on the metal extension on the left side of the board. See Figure 1-12.

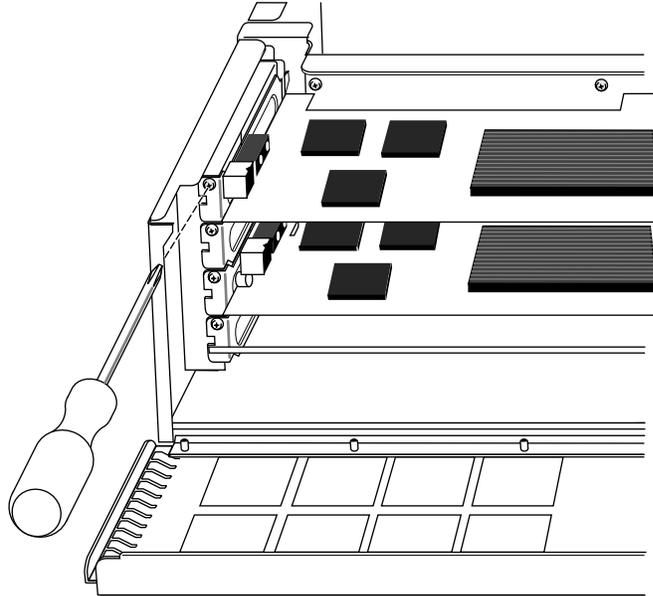


Figure 1-12 Attaching the Solid IMPACT Board to the Chassis

9. Hang the retention pin so that it sits in front of the board set, between the board set and the metal panel. See Figure 1-13

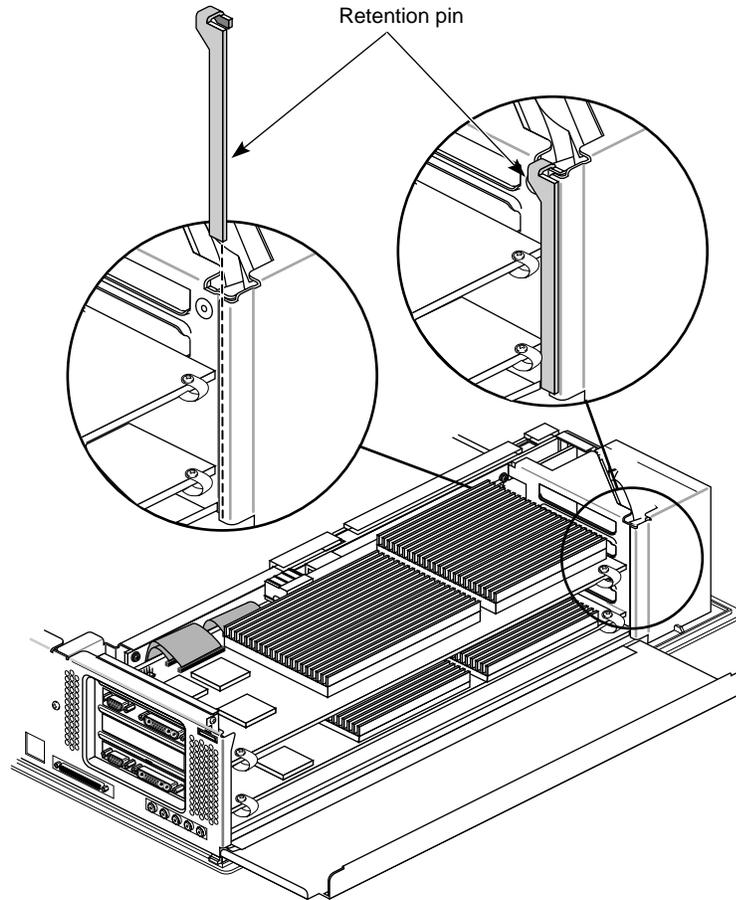


Figure 1-13 Replacing the Retention Pin

Tip: Use the retention pin as a plumb line to determine if the board set is properly seated. If the pin is tilted, push on the board or board set until it is properly connected.

10. Tip the metal panel up in front of the boards you just installed until it snaps into place.
11. Detach the wrist strap from the workstation and your wrist.
12. Go to the table below for your next installation instruction.

Table 1-2 Installation Direction

If you received a power supply	Go to Chapter 2, "Installing the Power Supply."
If you did not receive a power supply	Go to "Replacing the Cover" on page 14

Replacing the Cover

To replace the top cover, follow these steps:

1. Locate the tabs on the inside and back of the top cover and the holes on the back of the workstation. See Figure 1-14.
2. Face the front of the workstation.
 - Look through the holes as you lower the cover and move the tabs into place.

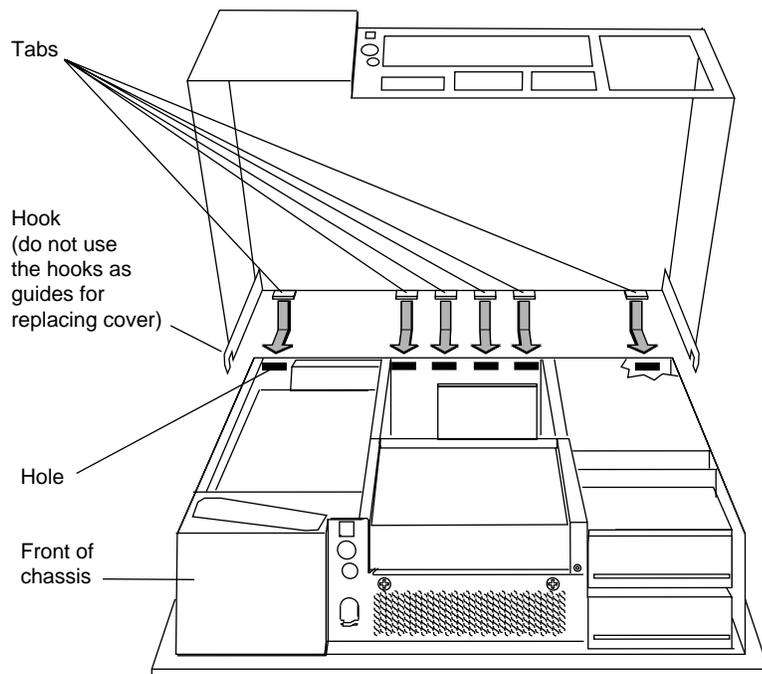


Figure 1-14 Replacing the Cover

- Slide the tabs into the holes and pull the cover down until it snaps into place. The cover fits tightly over the workstation.

3. Replace the bezel.
 - Place the tabs on the bottom of the bezel in the grooves in the front of the chassis, as shown in Figure 1-15.
 - Tilt the bezel up until it snaps into place.

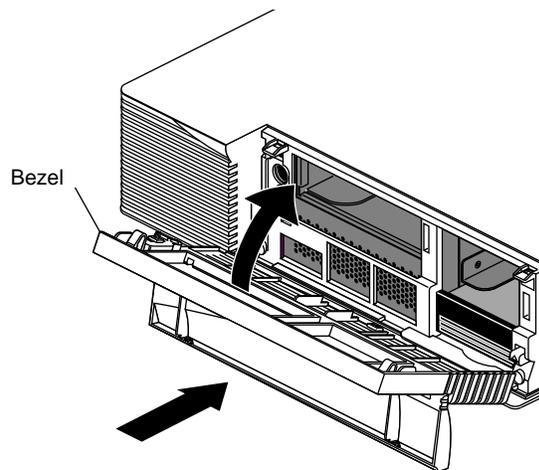


Figure 1-15 Replacing the Bezel

4. Replace the lockbar if you removed it.
5. Close the front cover of the bezel.
6. Reconnect the power cable to the back of the workstation.

You are now finished installing the Solid IMPACT graphics board. Go to Chapter 3, "Connecting the Monitors".

Installing the Power Supply

This chapter tells you how to install the power supply for a dual head system in an Indigo² IMPACT workstation.

Install the power supply after you have installed the Solid IMPACT graphics board. See Chapter 1, “Installing the Solid IMPACT Graphics Board: Solid/Solid, Solid/High, and Solid/Maximum Configurations,” to install the Solid IMPACT graphics board.

To install the power supply, you will shut down the system, remove the cover, remove the installed power supply, install the new power supply, and replace the cover of your Indigo² IMPACT workstation.

Shutting Down and Powering Off the System

Follow these steps to shut down the software and power off the system.

1. Remove the front cover.
 - Face the front of the Indigo² IMPACT chassis.
 - Open the front cover by snapping it away from the top edge of the chassis and tipping it down, as shown in Figure 2-1.

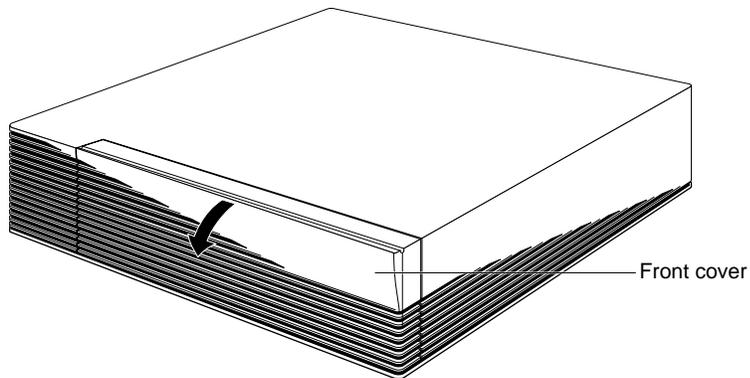


Figure 2-1 Removing the Front Cover

2. Press and release the power switch, as shown in Figure 2-2. The system will power off systematically within the next minute.

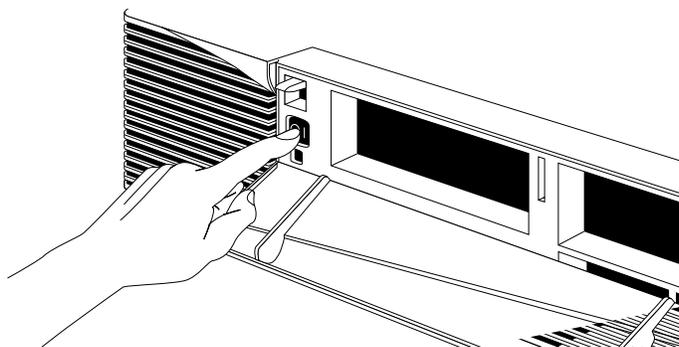


Figure 2-2 Turning off the System Power

Removing the Cover

Follow these steps to disconnect the cables and remove the cover:

1. Disconnect any cables from the back of your Indigo² IMPACT workstation.
2. Remove the bezel.
 - Press down on the tabs on each side of the bezel, as shown in Figure 2-3.
 - If a lockbar is in place, unlock it at the back of the chassis and pull the lockbar out of the workstation.

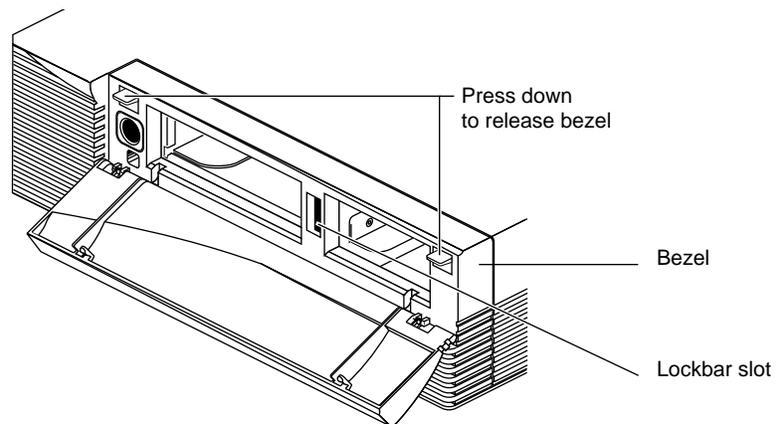


Figure 2-3 Releasing the Bezel

- Pull the bezel away from the chassis.

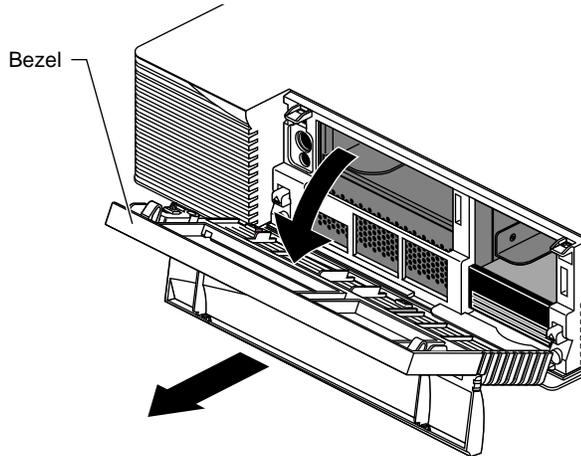


Figure 2-4 Removing the Bezel

3. Remove the top cover.
 - Press up on the tabs on each side of the drive openings as shown in Figure 2-5.

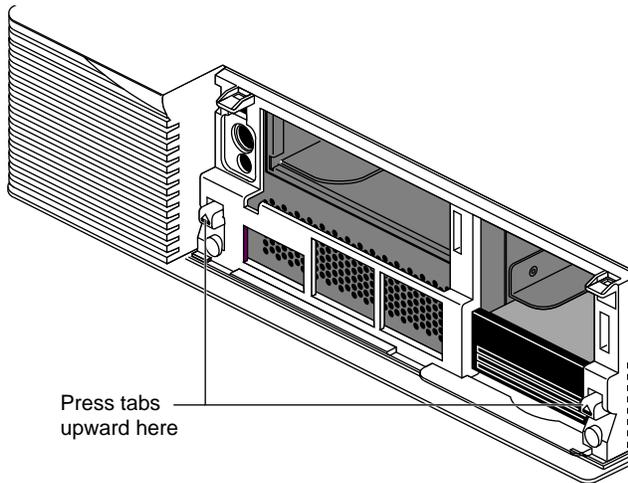


Figure 2-5 Releasing the Top Cover

- Pull up on the cover and rotate it back and away from the chassis, as shown in Figure 2-6.

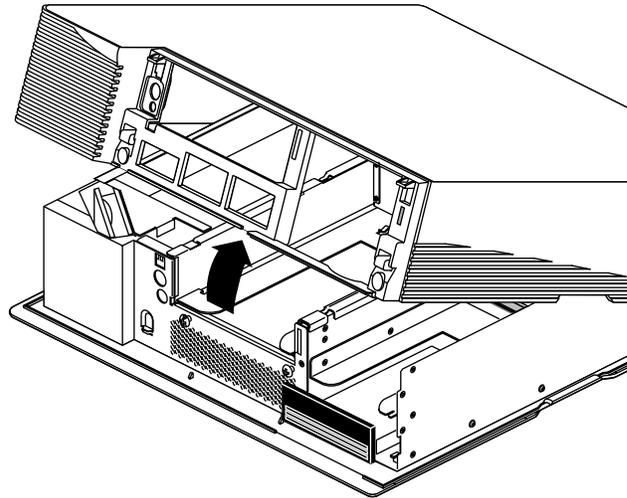


Figure 2-6 Removing the Top Cover

Attaching the Wrist Strap

Wear the wrist strap to prevent the flow of static electricity, which can damage the graphics and option boards.

Caution: The components inside the Indigo² IMPACT workstation are extremely sensitive to static electricity. Handle all boards carefully, and wear the wrist strap shipped with the upgrade board 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 and exposed electrical ground, such as a metal part of the Indigo² IMPACT workstation.

You are now ready to install the power supply.

Removing and Replacing the Indigo² IMPACT Power Supply

To remove the power supply, follow these steps:

1. If you have not already shut down the system, removed the cover, and attached the wrist strap, go to “Shutting Down and Powering Off the System” on page 18 for instructions.
2. Move the workstation, or position yourself so that you are facing the front of the workstation.
3. Disconnect the SCSI cable from the connector on the back of the 5-1/4" drive tray. See Figure 2-7.
 - Slip the wire clips on the SCSI cable off the edges of the connector.
 - Grasp the SCSI cable connector and disconnect it from the back of the drive tray. Move the cable with your fingers if you need to reposition it.

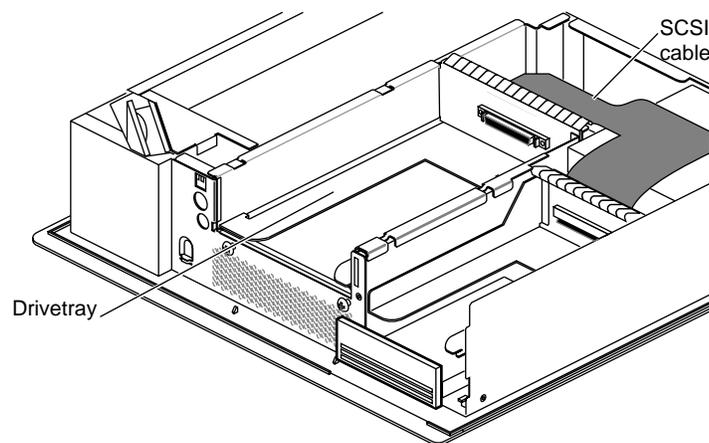


Figure 2-7 Locating the SCSI Cable

4. Remove the 5-1/4" drive tray. Removing the drive tray makes it easier to remove the power supply and install the new one. If there is a drive installed, there is no need to remove the drive from the tray.
 - Loosen the two captive screws that hold the 5-1/4" drive tray to the chassis. The screws are located below the drive tray on the center front of the chassis.
 - Push the drive tray toward the back of the workstation, and pull up on the tabs on the top of the drive tray to remove it, as shown in Figure 2-8.

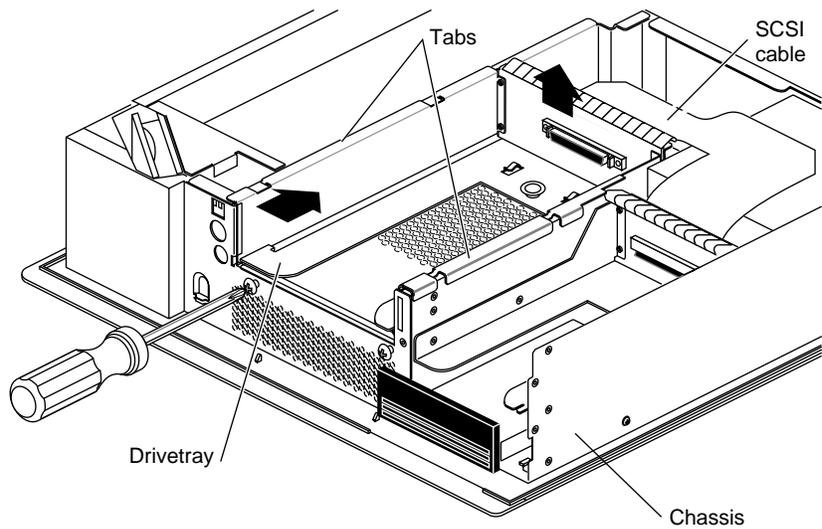


Figure 2-8 Removing the Drive Tray

Removing the Power Supply

1. Remove the power supply.
 - Move the workstation, or position yourself so that you are facing the back of the workstation. The power supply is located on the left, as shown in Figure 2-9.
 - Remove the two screws from the back of the chassis. The two screws on the back of the chassis are offset. See Figure 2-9.

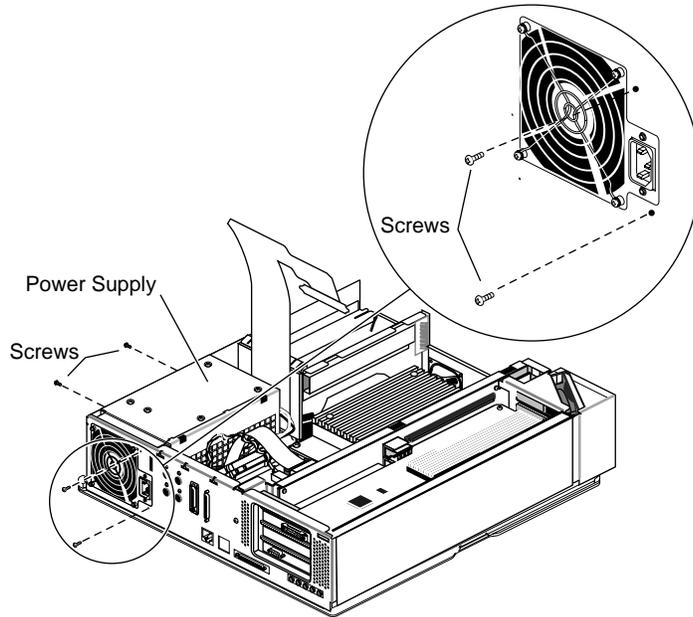


Figure 2-9 Removing the Power Supply Screws

- Remove the two screws from the side of the chassis. See Figure 2-9.

To remove the power supply, five power supply cables must first be disconnected from the chassis; one to the disk drives, two to the midplane, and two to the baseboard.

2. Disconnect the power cable to the system drives.

- Disconnect the connector to the disk drives by grasping it and pulling it straight back, away from the disk drives.

Note: The power supply will be in place when you disconnect the drive cable. Figure 2-10 shows the power supply out of place for illustration purposes.

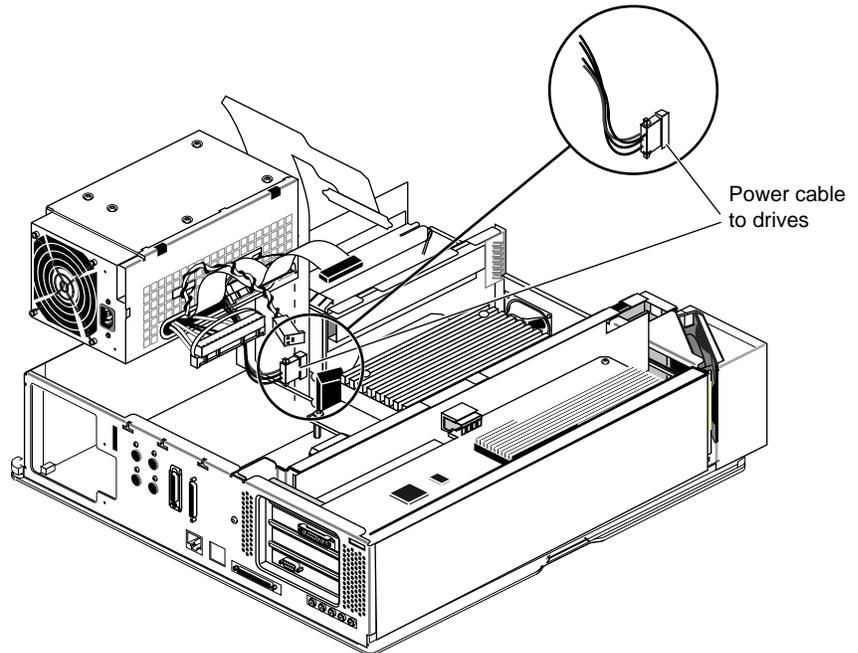


Figure 2-10 Disconnecting the Power Cable to the Drives

3. Disconnect the midplane power cables (ribbon cable and twisted-pair cable) from the midplane, as shown in Figure 2-11.
 - Pinch together the corrugated edges on the ribbon cable connector, and disconnect it from the midplane. See Figure 2-11.
 - Pull gently on the twisted-pair connector to disconnect it from the midplane.

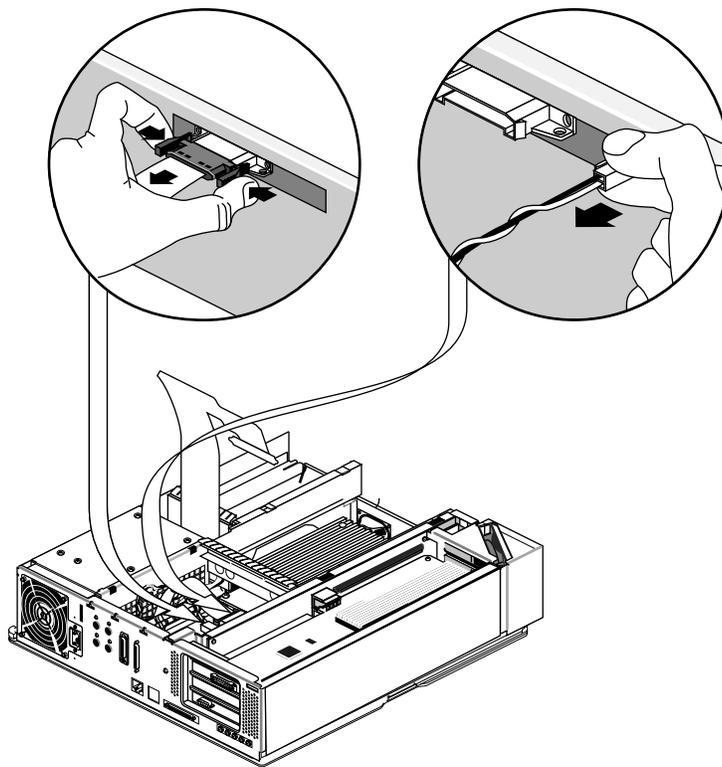


Figure 2-11 Removing the Midplane Power Cables

4. Disconnect the two power cables from the baseboard.
 - Disconnect the two cables located on the side of the power supply near the memory banks by grasping the strap on each connector and pulling it straight up.
 - Hang each connector by its strap on the two wide hooks that are above the connectors and attached to the side of the power supply. See Figure 2-12.

Caution: Do not bump the SIMMs located adjacent to the baseboard power cables. The SIMMs can become loose if bumped.

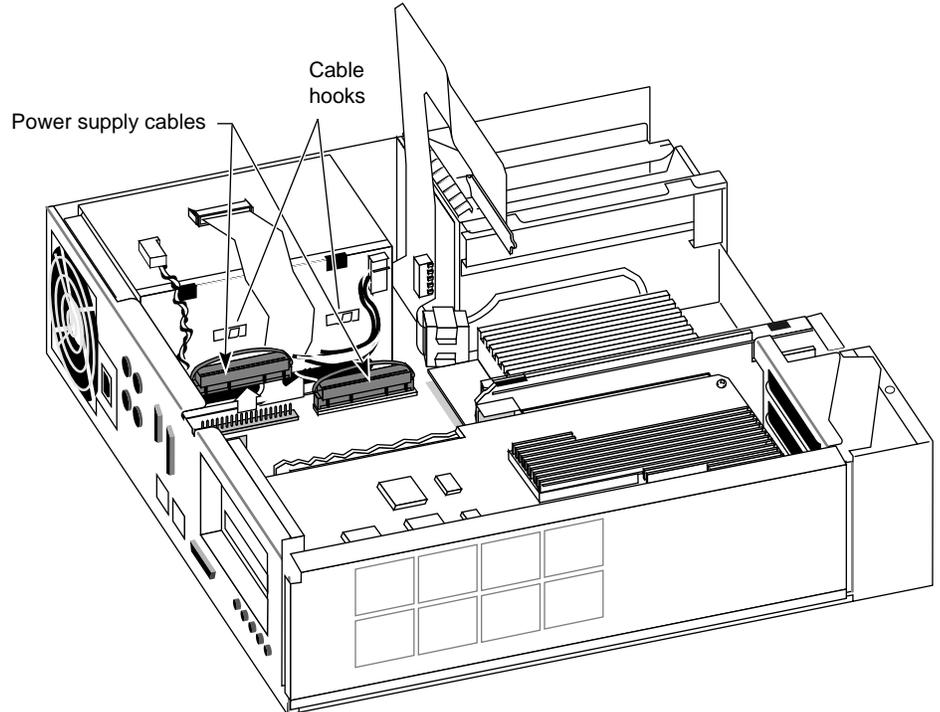


Figure 2-12 Removing the Baseboard Power Cables

5. Remove the power supply.
 - Move the power supply toward the front of the workstation about 1/4", as shown in Figure 2-13, by pushing on the flat surfaces around the fan.

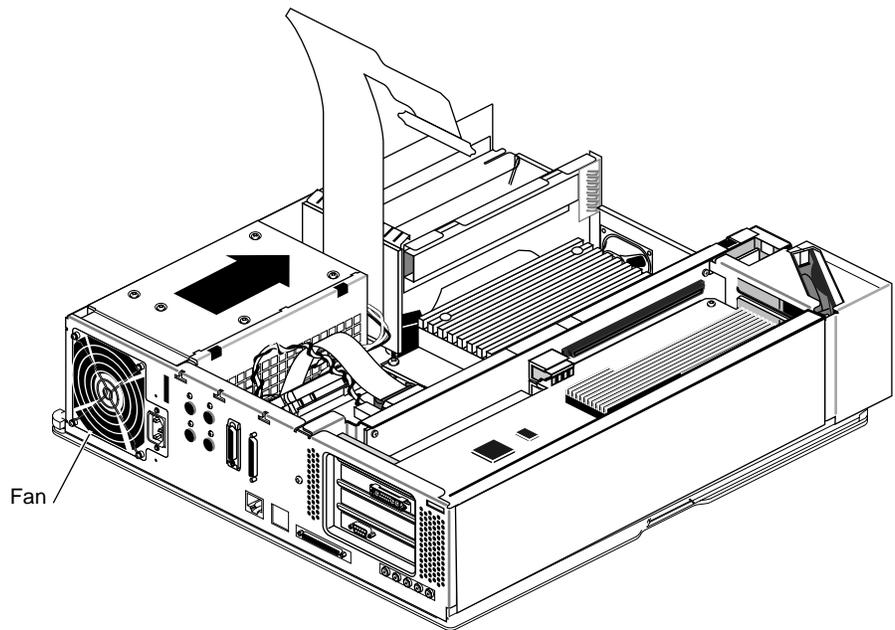


Figure 2-13 Sliding the Power Supply Forward

- Lift the power supply up and out of the chassis, as shown in Figure 2-14.

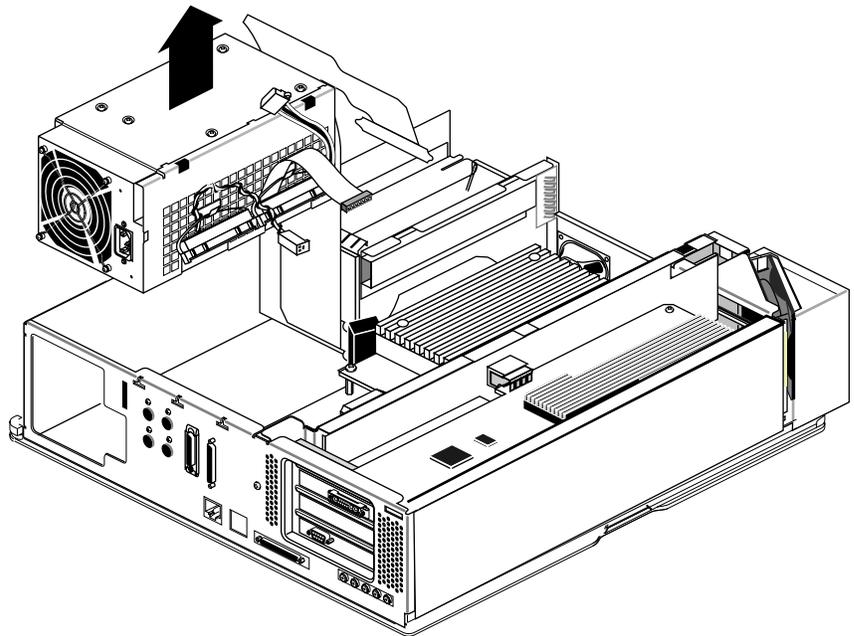


Figure 2-14 Lifting the Power Supply From the Chassis

Replacing the Power Supply

1. The new power supply has two midplane power supply cables terminated to the side of the power supply, a ribbon cable and a twisted-pair cable.
 - Pinch together the corrugated edges on the ribbon cable connector, and disconnect it from the terminating bracket. See Figure 2-15.
 - Pull gently on the twisted-pair connector to disconnect it from the terminating bracket.

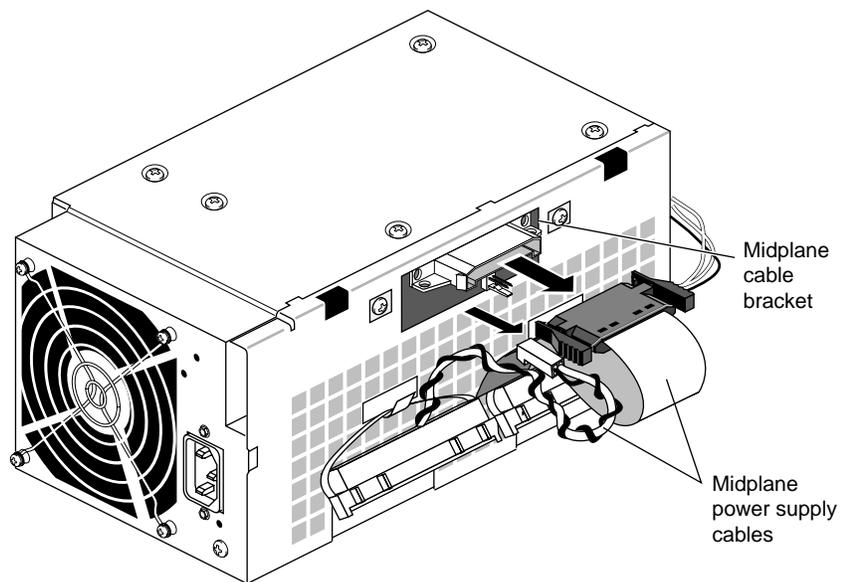


Figure 2-15 Disconnecting the Terminated Midplane Power Supply Cables

2. Before installing the new power supply, connect the power cable located close to the disk drives.
 - Hold the power supply with one hand so that the fan faces the back of the chassis and the power connectors are on the bottom. With your other hand, connect the free end of the power cable (shown in Figure 2-16) to the connector located close to the disk drives.

The connector is keyed so that you can connect it only one way if you don't force it.

- Press the connector firmly until seated. Check that it is seated all the way in the socket.

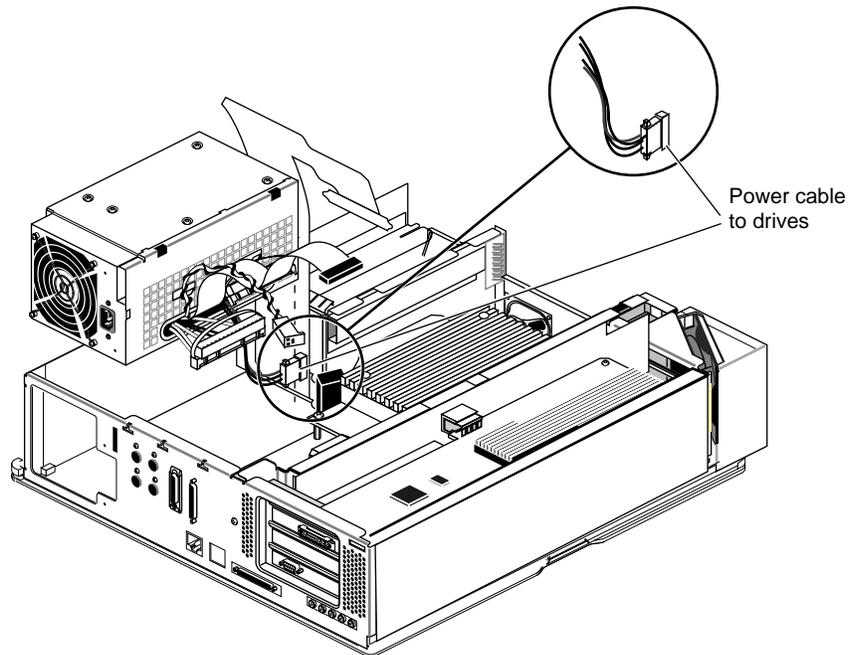


Figure 2-16 Connecting the Power Cable to the Drives

3. Install the new power supply, as shown in Figure 2-17.
 - Look at the metal tabs on the bottom of the power supply. The metal tabs will slide into the holes on the bottom of the chassis.
 - Lower the power supply into the Indigo² IMPACT chassis as close to the disk drives and side of the chassis as possible. Make sure that the power supply is flat against the bottom of the chassis.
 - Shove the power supply toward the back of the Indigo² IMPACT chassis, as far as it will go, making sure the metal tabs on the bottom of the power supply engage in the holes in the floor of the chassis.

If the tabs do not engage in the slot, raise the power supply and lower it again, making sure it is flat against the bottom of the chassis.

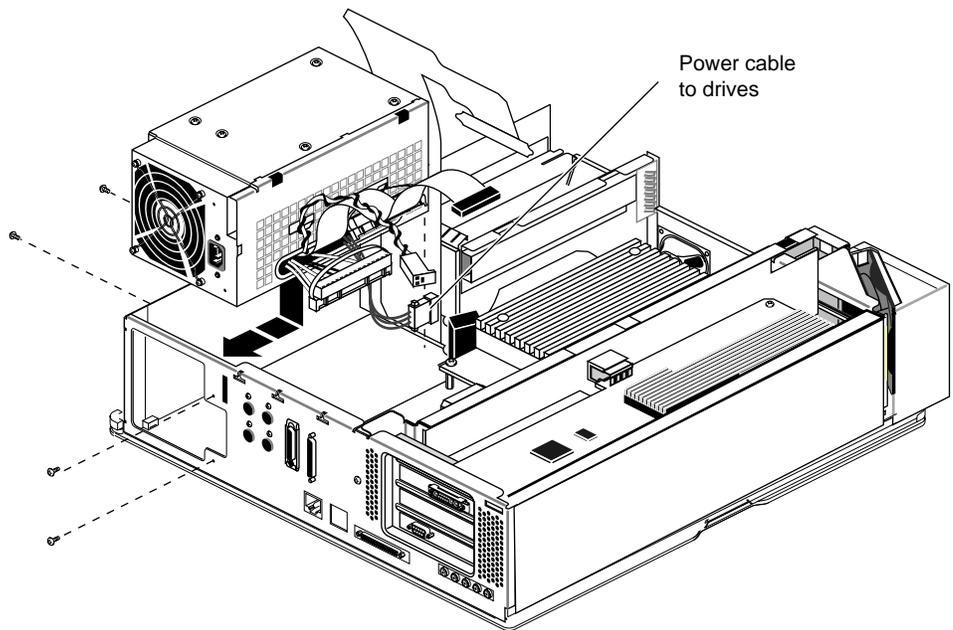


Figure 2-17 Installing the Power Supply

Tip: A good test is to lift up the power supply. If the chassis comes up with it, the metal tabs are engaged.

If the screw holes do not line up, verify that the power supply is completely seated, and is pushed against the back of the chassis.

4. Replace the four screws that hold the power supply, as shown in Figure 2-18.

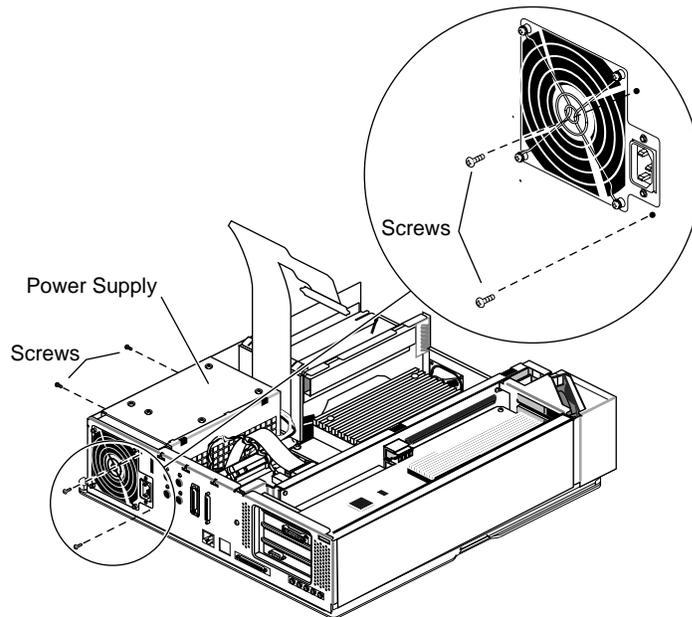


Figure 2-18 Replacing the Screws

5. Connect the two power cables that attach to the baseboard.
 - Remove the two power supply connectors (located close to the memory banks) from their hooks on the side of the power supply.
 - Connect the two power supply connectors as shown in Figure 2-19. These connectors are not keyed, so make sure you align them correctly before pressing firmly with your thumbs to seat them.

Caution: The pins the connectors slide onto can easily bend and break. Place the connectors carefully.

 - Check that the two power supply connectors are seated all the way in the sockets.

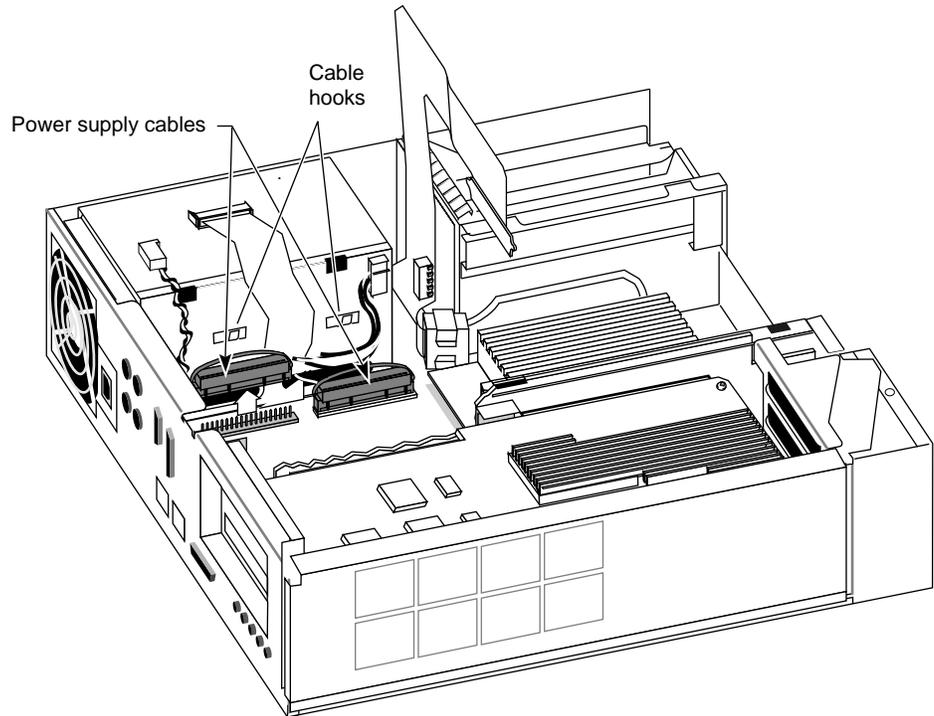


Figure 2-19 Connecting the Power Cables to the Baseboard

6. Connect the midplane power cables (ribbon and twisted-pair) to the gold-colored midplane.
 - Pinch together the corrugated edges on the ribbon cable connector, and connect it to the midplane. See Figure 2-20.
 - Push gently on the twisted-pair connector to connect it to the midplane.

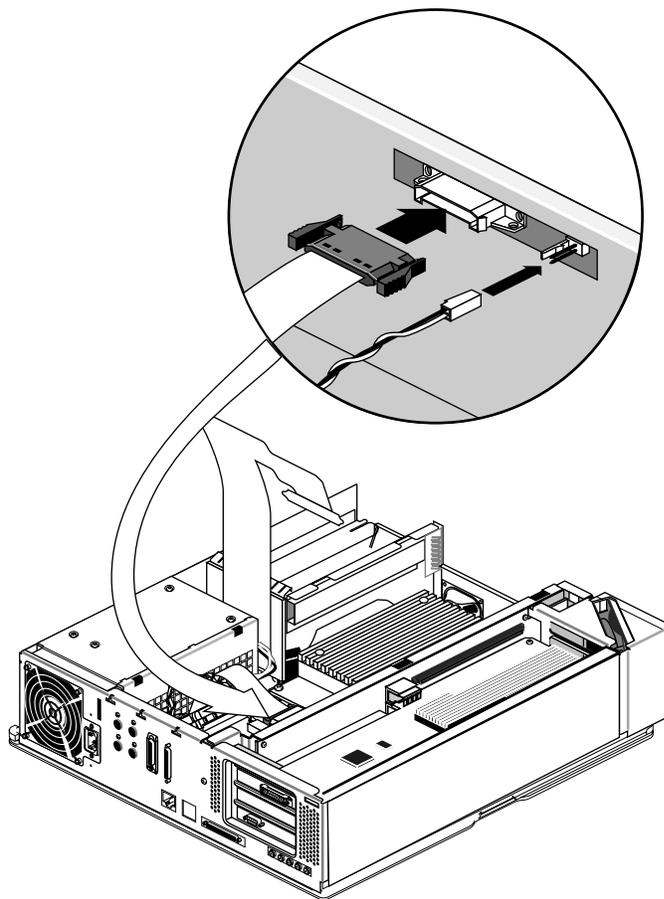


Figure 2-20 Connecting the Midplane Power Cables

7. Move the workstation, or position yourself so that you are facing the front of the workstation.
8. Replace the 5-1/4" drive and drive tray, as shown in Figure 2-21.
 - Position the drive tray so that the tabs on the sides of the tray fit inside the slot openings in the chassis and the open side of the tray faces the front of the chassis.
 - Pull the tray toward the front of the workstation about 1/2" to lock it in place.
 - Tighten the two captive screws.
9. Reattach the SCSI cable to the connector on the back of the drive tray.
 - Push the SCSI cable into the connector on the back of the drive tray.
 - Slip the wire clips on the SCSI cable over the edges of the connector.

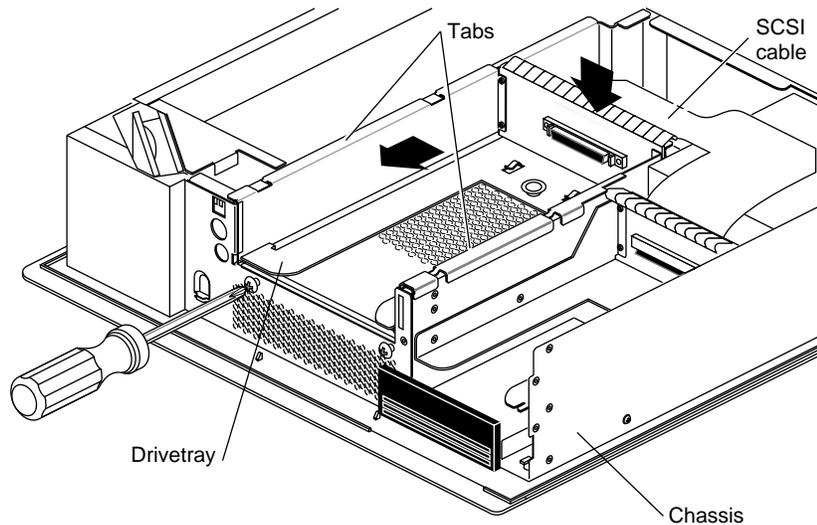


Figure 2-21 Replacing the 5-1/4" Drive Tray

10. Detach the wrist strap.

You are finished replacing the power supply. Turn to "Replacing the Cover" on page 37 to replace the top cover.

Replacing the Cover

To replace the top cover, follow these steps:

1. Locate the tabs on the inside and back of the top cover and the holes on the back of the workstation. See Figure 2-22.
2. Face the front of the workstation.
 - Look through the holes as you lower the cover to move the tabs into place.

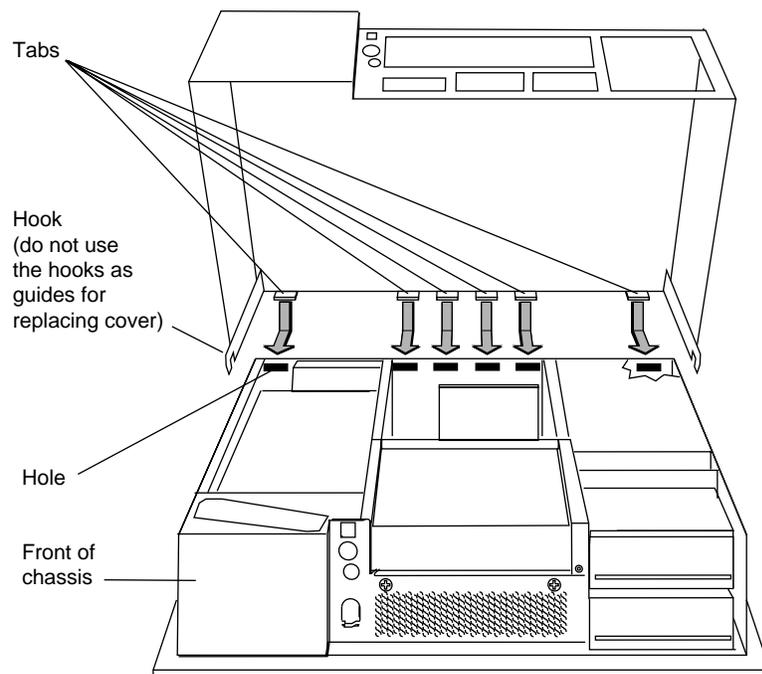


Figure 2-22 Replacing the Cover

- Slide the tabs into the holes and pull the cover down until it snaps into place. The cover fits tightly over the workstation.

3. Replace the bezel.
 - Place the tabs on the bottom of the bezel in the grooves in the front of the chassis, as shown in Figure 2-23.
 - Tilt the bezel up until it snaps into place.

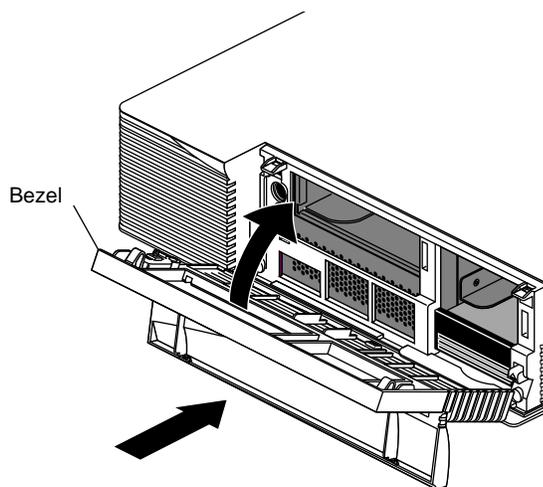


Figure 2-23 Replacing the Bezel

4. If you removed the lockbar, replace it.
5. Close the front cover of the bezel.
6. Reconnect the power cable to the back of the workstation.

You are now finished installing the power supply and are ready to connect the monitors. Go to Chapter 3, "Connecting the Monitors."

Connecting the Monitors

You can place your monitors side by side, or you can set them up in a stacked configuration. Follow the appropriate instructions for your configuration.

Unpacking the Secondary Monitor

Unpack the secondary monitor from its box.

Caution: The monitor is very heavy. Have someone help you lift it out of the box.

The monitor is shipped with two cables: a monitor chassis cable and a monitor power cable, as shown in Figure 3-1.

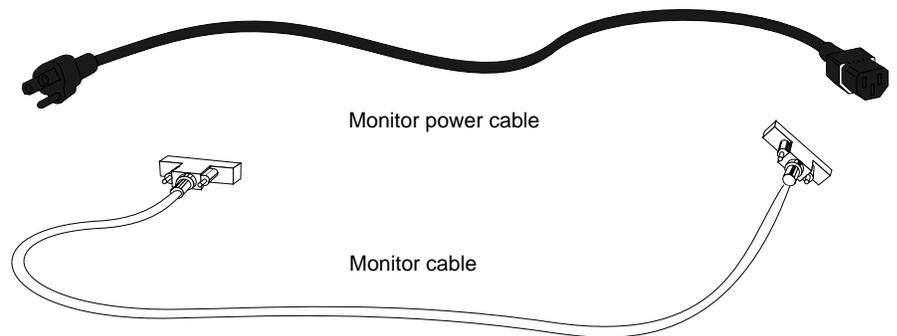


Figure 3-1 Secondary Monitor Chassis Cable and Monitor Power Cable

Connecting the Monitors in a Side by Side Configuration

Depending on whether you have a Solid /Solid, Solid/High, or Solid/Maximum IMPACT configuration, connect the monitor cables to different connectors on the chassis.

1. Facing the front, place the primary monitor on the left and the secondary monitor on the right. The secondary monitor is the monitor that is part of the dual head shipment. See Figure 3-2.

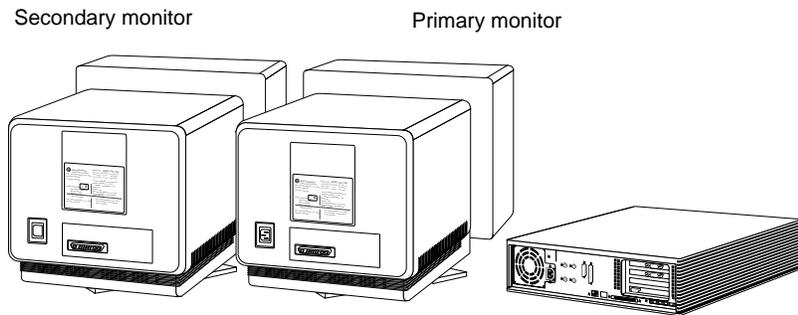


Figure 3-2 Arranging the Monitors in a Side by Side Configuration

2. Connect one end of each monitor cable to the monitor connector on the back of each monitor, as shown in Figure 3-3. Connect and tighten the thumbscrews on both sides of the connector.

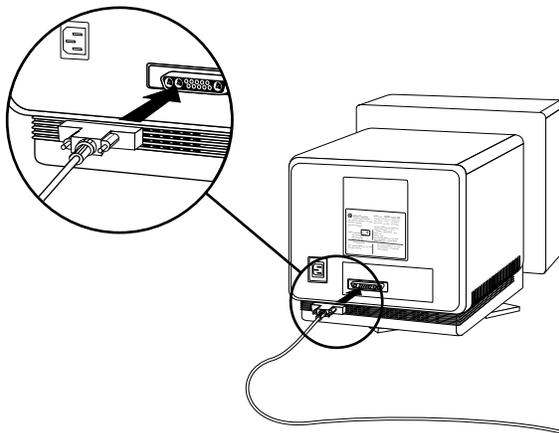


Figure 3-3 Connecting Monitor Cables to the Monitors

3. Connect the other end of the primary and secondary monitor cables to the appropriate connector on the back of the Indigo² IMPACT chassis. See Figure 3-4 for an overview of this task.

Note: It's important that you connect the primary monitor cable to the correct monitor connector on the Indigo² IMPACT chassis. If the monitor cables are not connected correctly, your mouse movements will be incorrect.

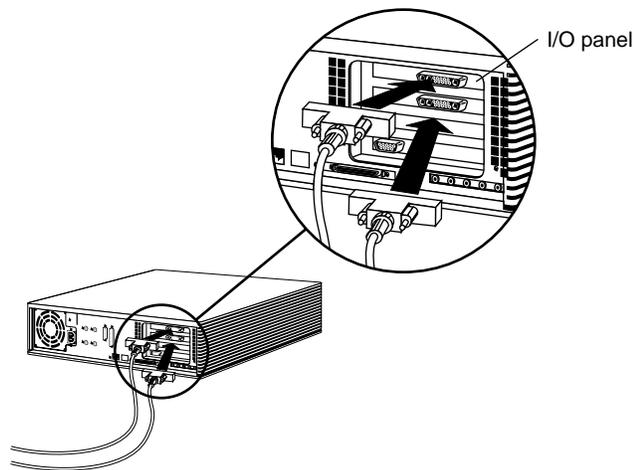


Figure 3-4 Identifying the I/O Panel Connectors

To connect your monitors to the correct monitor connector on the Indigo² IMPACT chassis (I/O panel), see the following illustrations:

Connecting the Monitors in a Solid/Solid Configuration

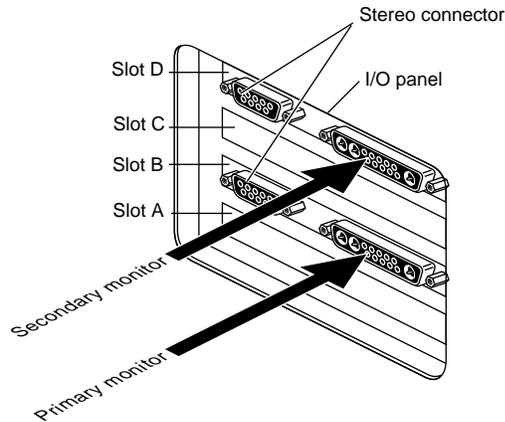


Figure 3-5 Connecting the Monitor Cables to the Chassis in a Solid/Solid Configuration

Connecting the Monitors in a Solid/High Configuration

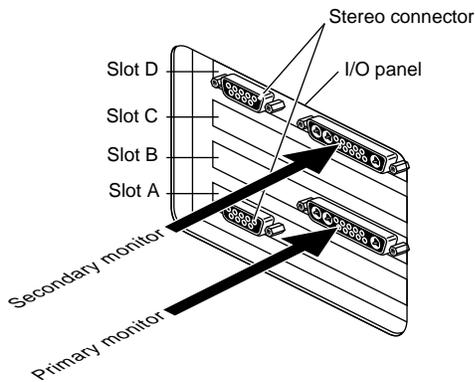


Figure 3-6 Connecting the Monitor Cables to the Chassis in a Solid/High Configuration

Connecting the Monitors in a Solid/Maximum Configuration

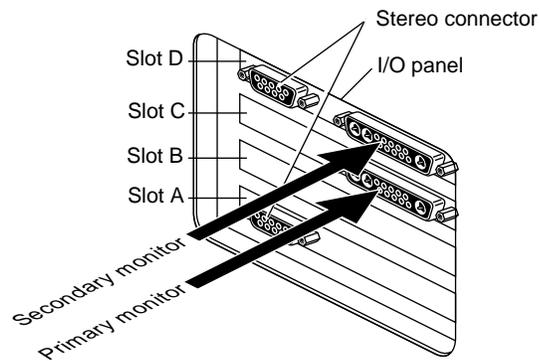


Figure 3-7 Connecting the Monitor Cables to the Chassis in the Solid/Maximum Configuration

Connect and tighten the thumbscrews on both sides of the connector.

You are finished connecting the monitor cables. Go to “Connecting the Power Cables” on page 49.

Connecting the Monitors in a Stacked Configuration

You will connect the monitor cables to different connectors on the chassis, depending on whether you have an Solid/Solid, Solid/High, or Solid/Maximum configuration.

Note: If you use the stacked configuration, you must reconfigure the software, as described in “Reconfiguring the Software for Stacked Monitors” on page 54.

Follow these steps to connect the monitor cables to the monitors and the Indigo² IMPACT chassis.

1. Facing the front, place the secondary monitor on a surface above the primary monitor. The secondary monitor is the monitor that is part of the dual head shipment.

Caution: Do not rest the secondary monitor on the primary monitor. Place it instead on a bookshelf or similar type structure above the primary monitor.

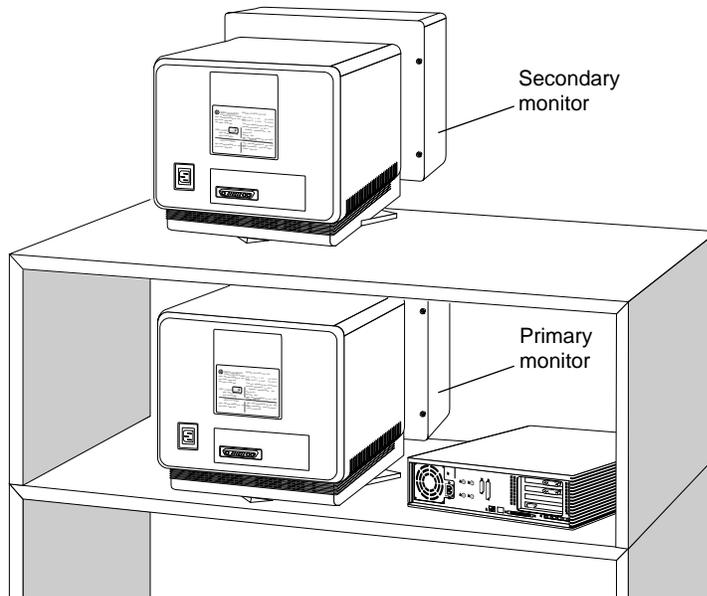


Figure 3-8 Arranging the Monitors in a Stacked Configuration

2. Connect the cables as follows:
 - Connect one end of the each monitor cable to the connector on the back of each monitor, as shown in Figure 3-9. Screw in the thumbscrews on both sides of the connector.

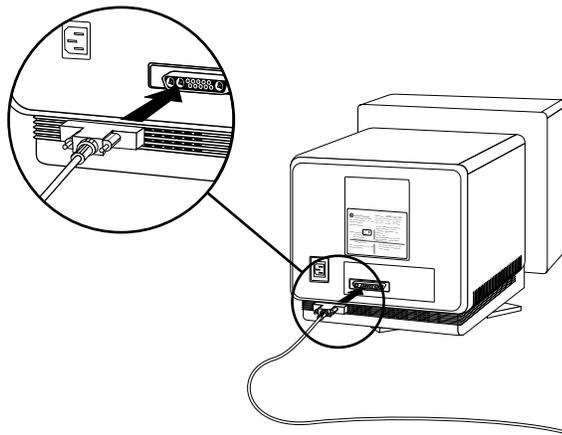


Figure 3-9 Connecting the Stacked Monitor's Cables to the Monitors

3. Connect the other end of the cable monitor connector on the back of the Indigo² chassis, as shown in Figure 3-10. Use the following tables to determine the correct connector on the I/O panel.

Note: It's important that you connect the primary monitor cable to the correct monitor connector on the Indigo² IMPACT chassis. If the monitor cables are not connected correctly, your mouse movements will be incorrect.

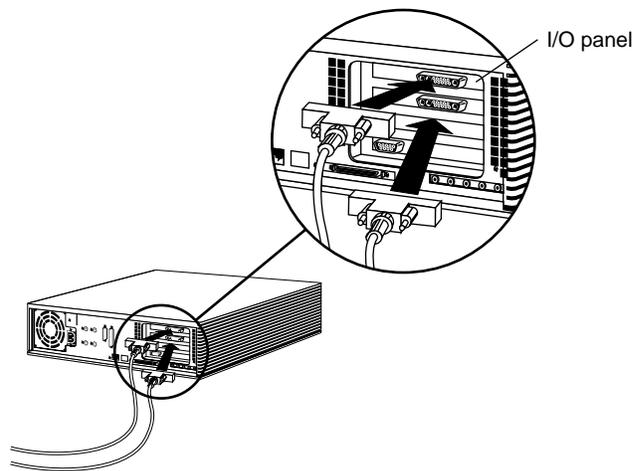


Figure 3-10 Identifying the I/O Panel on the Chassis

To connect your monitors to the correct monitor connector on the Indigo² IMPACT chassis (I/O panel), see the following illustrations.

Connecting the Monitors in a Solid/Solid Stacked Configuration

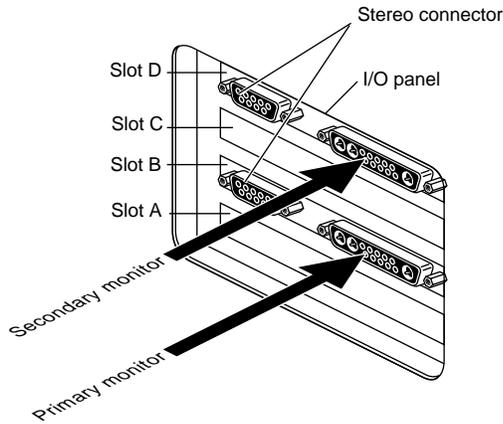


Figure 3-11 Connecting the Monitor Cables to the Chassis in a Solid/Solid Stacked Configuration

Connecting the Monitors in a Solid/High Stacked Configuration

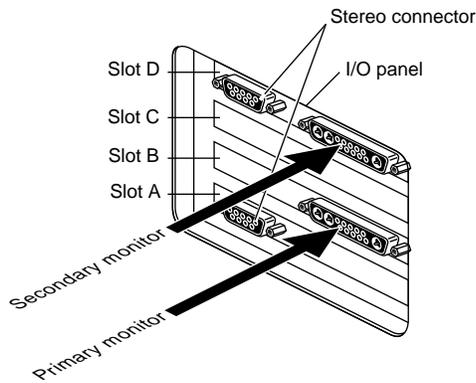


Figure 3-12 Connecting the Monitor Cables to the Chassis in a Solid/High Stacked Configuration

Connecting the Monitors in a Solid/Maximum Stacked Configuration

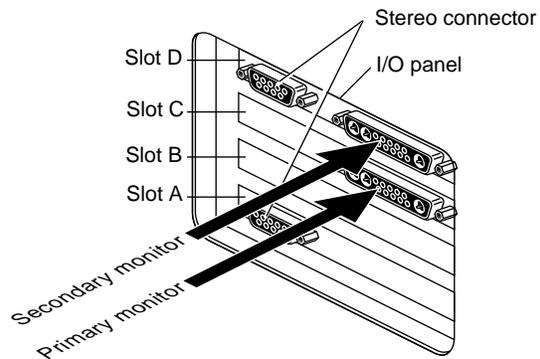


Figure 3-13 Connecting the Monitor Cables to the Chassis in a Solid/Maximum Stacked Configuration

4. Screw in the thumbscrews on both sides of the primary monitor connector and the secondary monitor connector,

You are finished connecting the monitor cables. Go to “Connecting the Power Cables” on page 50.

Connecting the Power Cables

Connect the power cable for each monitor as follows:

1. Connect the female end of the power cable to the power connector on the back of the monitor, as shown in Figure 3-14.
2. Plug the male end into a three-prong grounded electrical outlet.

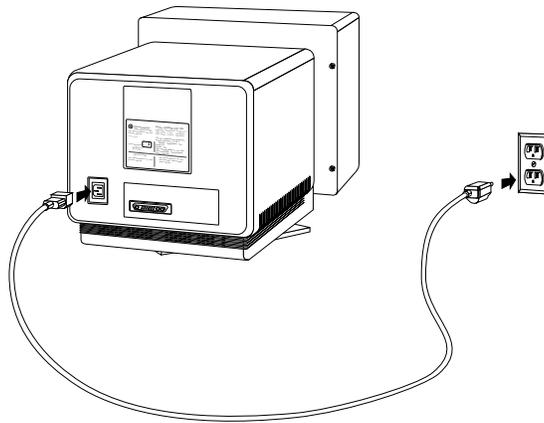


Figure 3-14 Connecting the Secondary Monitor's Power Cable

3. Turn on the primary monitor and the secondary monitor. The power switch is on the front of the monitor in the lower right corner. The LED on the switch lights up.

Note: Be sure to turn both monitors on *before* turning on your Indigo² IMPACT workstation.

You are finished installing the secondary monitor and are ready to install the software.

If you have a problem with your system, see Chapter 5, "Troubleshooting."

Installing the Software and Using the Dual Head System

This chapter explains how to use a dual head configuration.

Installing the Software

If you received a CD with your shipment, read any software release notes on the CD before proceeding.

Note: If you stacked the monitors, be sure to reconfigure the software, as described in “Reconfiguring the Software for Stacked Monitors” on page 54.

Moving the Cursor From One Monitor to the Other

To move the cursor from one monitor to the other, move the cursor off the screen you are on toward the other monitor. The cursor jumps to the other monitor.

The default is for the primary monitor to be located on the left and the secondary monitor on the right. By default, the cursor will move from the primary to the secondary monitor, left to right, and back.

To switch cursor crossover locations, see the following instructions and table.

1. Move your monitors to the chosen position.
2. If your machine is powered off, follow the steps in your system *Indigo² IMPACT Owner's Guide* to plug in the system and power it on.
3. Log in to the system.
4. Open a shell window.
5. Place the cursor inside the shell window.
6. In a shell window, become a super user by typing: `su`
7. Change the directory to access the Xservers file. Enter:
`cd /usr/lib/X11/xdm`
8. Change the permissions on this file (to be able to write to it) before you begin entering the command: `chmod +rw Xservers`
9. Open a text editor on Xservers.
10. Add the appropriate command from Table 4-1 to the command line.

Note: The contents of the file should be on one line. Do not insert carriage returns.

Table 4-1 Changing Cursor Crossover Locations

Primary Head is 0, Secondary Head is 1	
If you want:	Add this:
Secondary (1) on the left, Primary (0) on the right	<code>-hw board=0,left=1 -hw board=1,right=0</code>
Primary (0) on the left, Secondary (1) on the right (default)	delete any command found in this table from the Xservers file command line
Primary (0) below, Secondary (1) above	<code>-hw board=0,above=1 -hw board=1,below=0</code>
Secondary (1) below, Primary (0) above	<code>-hw board=0,below=1 -hw board=1,above=0</code>

11. Save, and exit the text editor.

Caution: Close any open applications before you follow the next step. The following command will close any running applications and any unsaved work will be lost.

12. Restart your server.

- Stay in super user mode.
- Type on the command line: `killall xsgi`

13. After a few seconds the login window appears.

14. Log in to the system.

Selecting the Head on Which a Program Runs

During an interactive session with the Window Manager, you can use the `DISPLAY` environment variable to control the head on which newly-started graphics programs run. When `DISPLAY` is set to `":0.0,"` programs you start will run on head 0 (the primary head); when it is set to `":0.1,"` programs you start run on head 1 (the secondary head).

For convenience, the default start-up files (`.login`, `.profile`) for *root* and *guest* shells set `DISPLAY` to a reasonable initial value, if it is not already set. Each head has a toolchest that can be used to invoke graphics programs. Each toolchest has the `DISPLAY` variable in its environment set to the correct value for the head on which it appears, so any application you invoke from a toolchest will inherit this `DISPLAY` value, and thus appear on the same head as the toolchest from which it was invoked.

Similarly, programs started by clicking on an icon appear on the head from which you invoked them.

Once a program has been launched, it is impossible to move it from one head to another from the Window Manager.

See Appendix A for more information on choosing a graphics head.

Reconfiguring the Software for Stacked Monitors

The dual head software's default is for monitors positioned side-by-side. If your monitors are stacked on top of each other, you need to reconfigure the software.

Follow these steps to reconfigure the software:

1. If your machine is powered off, follow the steps in your system *Indigo² IMPACT Owner's Guide* to plug in the system and power it on.
2. Log in to the system.
3. Open a shell window by selecting "Unix Shell" from the desktop Toolchest.
4. Place the cursor inside the shell window.
5. Become super user by entering:

```
su
```

Then press <Return>.

6. Change the directory by typing the following:

```
cd /usr/lib/X11/xdm
```

Then press <Return>.

7. Change the permissions on this file (to be able to write to it) before you begin entering the command: `chmod +rw Xservers`
8. Use a text editor to edit the *Xservers* file. Once you are in the *Xservers* file, You see a line that reads:

```
:0 secure /usr/bin/X11/x -bs -c -pseudomap 4sight
```

9. Add `-stacked` to the end of the line, so that it now reads:

```
:0 secure /usr/bin/X11/x -bs -c -pseudomap 4sight -stacked
```

10. Save and exit the *Xservers* file.

Caution: Close any open applications before you follow the next step. The following command will close any running applications and any unsaved work will be lost.

11. Restart your server.
 - Stay in super user mode.
 - Type on the command line: `killall xsgi`
12. After a few seconds the login window appears.
13. Log in to the system.

You are finished reconfiguring the software for stacked monitors.

Troubleshooting

This chapter provides you with troubleshooting information and one diagnostic test. See Table 5-1 for information about specific symptoms and remedies.

Primary Head Default

If the board attached to the primary monitor is removed, the secondary board and monitor by default becomes the primary head.

Blank Screen or Screen with Faulty Images

Table 5-1 Troubleshooting

If you see:	Take this action:	Then:	Then:
Blank Screen or Screen with Faulty Images: Solid/Solid or Solid/High Configuration.	<ol style="list-style-type: none"> 1. Access the gfxinfo file, instructions given below. 2. Read the info in the file. 3. Both graphics boards appear in the inventory. 	Call your service representative.	
Blank Screen or Screen with Faulty Images: Solid/Solid or Solid/High Configuration.	<ol style="list-style-type: none"> 1. Access the gfxinfo file, instructions given below. 2. Read the info in the file. 3. One graphics board appears in the inventory. 	Perform the diagnostic test in this chapter.	<ol style="list-style-type: none"> 1. Call your service representative to report software problems or to order a new graphics board. 2. Order a new graphics board.
Anything wrong, and you have a Solid/Maximum configuration.	Call your service representative.		

Accessing the gfxinfo File

If one of your monitor screens is blank or has faulty images, you can make some determination of the problem by accessing the `gfxinfo` file. On a correctly functioning system, two lines of this file tell you “Graphics board 0 is ‘IMPACT’ graphics,” and “Graphics board 1 is ‘IMPACT’ graphics.” Board 0 is connected to the Primary Head, and board 1 is the board connected to the Secondary Head.

Follow these steps to determine which graphics boards the system is identifying.

1. Go to the Toolchest in the upper left corner of your screen.
2. Click on Desktop, and then click on Unix Shell to open a shell.
3. On the command line, enter: `/usr/gfx/gfxinfo`

On a system with a blank screen or a screen with faulty images, you may have one of two types of information reported.

1. If you see “Graphics board 0 is ‘IMPACT’ graphics,” and “Graphics board 1 is ‘IMPACT’ graphics,” call your service representative.
2. If you see only one board reported, complete the diagnostic test in this chapter to determine if the problem is software or hardware based.
 - Complete the diagnostic test only if you have a Solid/Solid or Solid/High configuration.
 - If you have a Solid/Maximum configuration, call your service representative for help. The diagnostic test requires you to swap boards. If you have a Solid/Maximum configuration, you cannot swap boards because they will not fit in the workstation in a swapped mode.

Performing the Diagnostic Test

To determine if the hardware or software is faulty, you will need to shut down the system, disconnect the monitors, remove the cover, attach the wrist strap, remove the graphics boards and place each in the other’s original slot, replace the cover, reconnect the monitors, and power on the system.

Shutting Down and Powering Off the System

Follow these steps to shut down the software and power off the system.

1. Remove the front cover.
 - Face the front of the Indigo² IMPACT chassis.
 - Open the front cover by snapping it away from the top edge of the chassis and tipping it down, as shown in Figure 5-1.

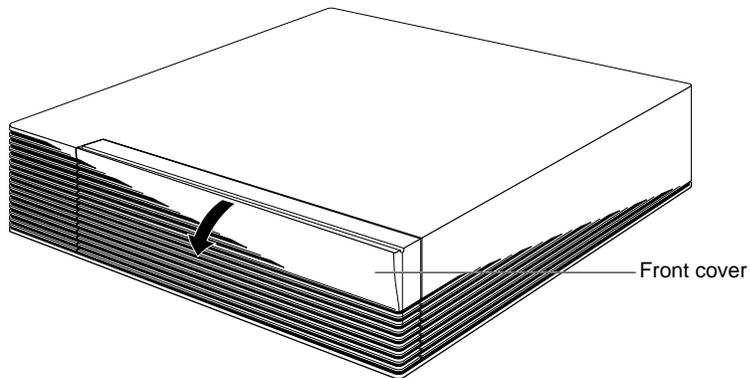


Figure 5-1 Removing the Front Cover

2. Press and release the power switch, as shown in Figure 5-2. The system will power off systematically within the next minute.

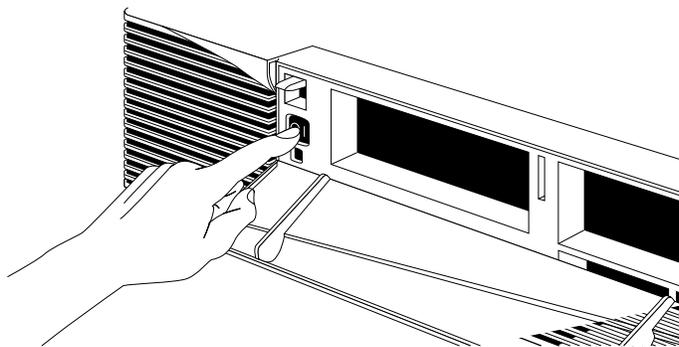


Figure 5-2 Turning off the System Power

Removing the Cover

Follow these steps to disconnect the cables and remove the cover:

1. Disconnect any cables from the back of your Indigo² IMPACT workstation.
2. Remove the bezel.
 - Press down on the tabs on each side of the bezel, as shown in Figure 5-3.
 - If a lockbar is in place, unlock it at the back of the chassis and pull the lockbar out of the workstation.

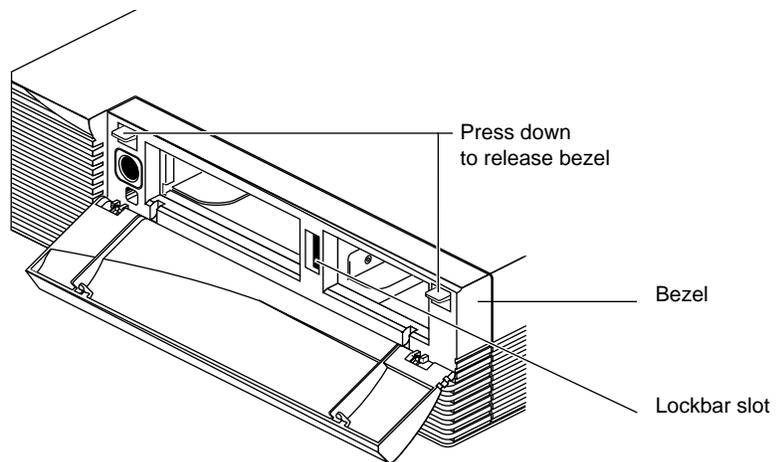


Figure 5-3 Releasing the Bezel

- Pull the bezel away from the chassis.

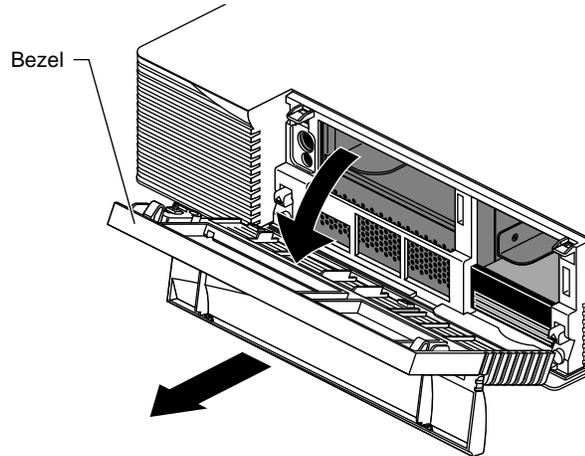


Figure 5-4 Removing the Bezel

3. Remove the top cover.
 - Press up on the tabs on each side of the drive openings as shown in Figure 5-5.

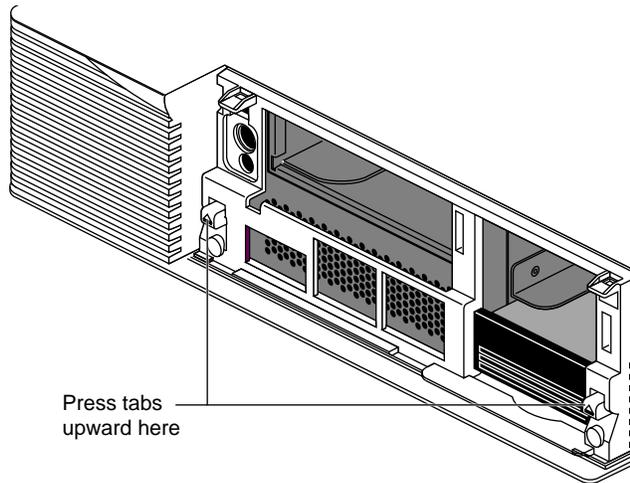


Figure 5-5 Releasing the Top Cover

- Pull up on the cover and rotate it back and away from the chassis, as shown in Figure 5-6.

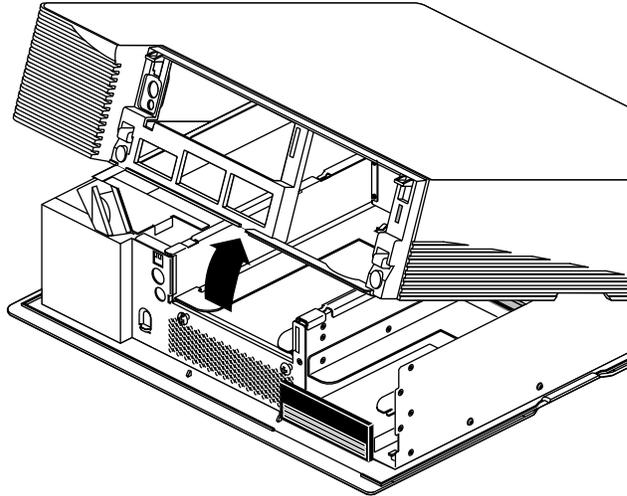


Figure 5-6 Removing the Top Cover

Attaching the Wrist Strap

Wear the wrist strap to prevent the flow of static electricity, which can damage the board.

Caution: The components inside the Indigo² IMPACT are extremely sensitive to static electricity. Handle all boards carefully, and wear the wrist strap shipped with the upgrade board 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 and exposed electrical ground, such as a metal part of the Indigo² IMPACT workstation.

You are now ready to remove the board.

Removing the Boards

To remove the boards, follow these steps:

1. Move the workstation or position yourself so that you are facing the expansion slots, as shown in Figure 5-7.
2. Open the metal panel in front of the expansion slots by pulling up on the panel and lowering it.

Caution: The heat sinks in your Indigo² IMPACT workstation become hot when the workstation is running. Take a coffee break for a few minutes while the graphics boards cool before you begin working with them.

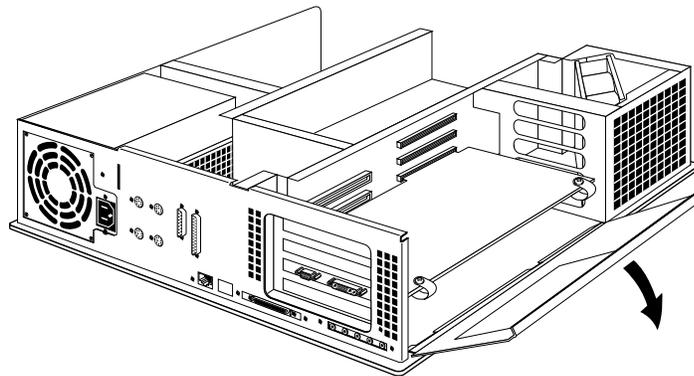


Figure 5-7 Opening the Metal Panel in Front of the Expansion Slots

3. Remove the retention pin from the workstation.
 - Grasp the retention pin on the right front end of the board set and pull it up and off. See Figure 5-8.

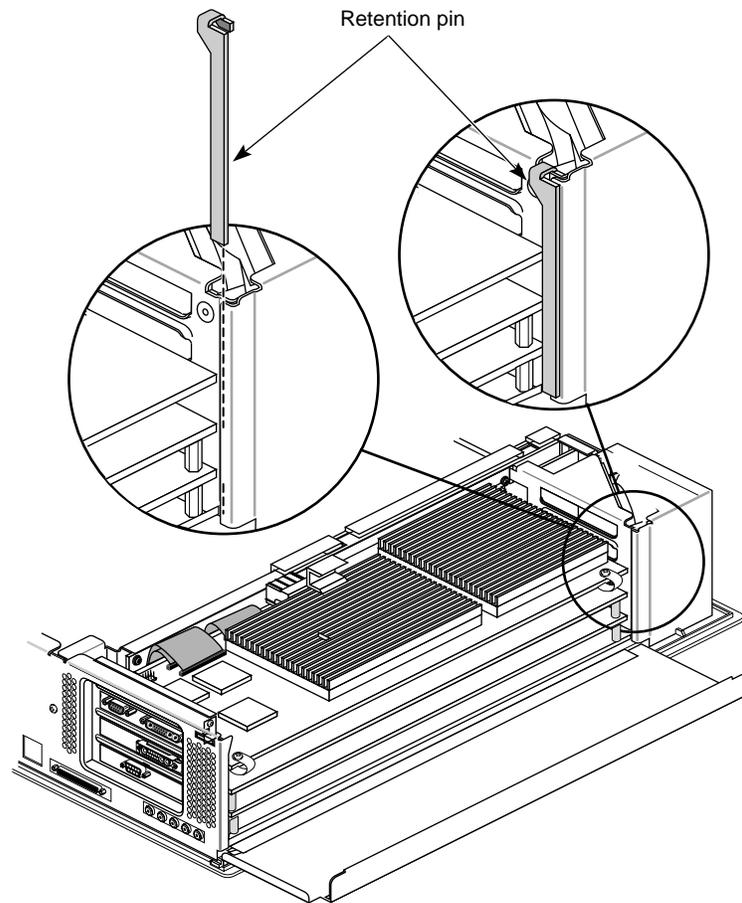


Figure 5-8 Releasing the Retention Pin

Note: Check the placement of the retention pin. It hangs in front of the board, not beside it.

Note: After you have finished the test and are reconfiguring your system, place any option boards and both your Indigo² Solid IMPACT or Indigo² High IMPACT board sets in their original slots.

4. Remove the screws attaching the board set to the workstation slots as shown in Figure 5-9. The number of screws to be removed equals the number of boards you are removing.

The screws are located on the metal extension on the left side of each board.

- Loosen each screw with the Phillips screwdriver.
- Unscrew and remove the screws with your hand.

The screws are very small. If you drop a screw into the chassis, retrieve it after you have removed the boards, to prevent shorting the system.

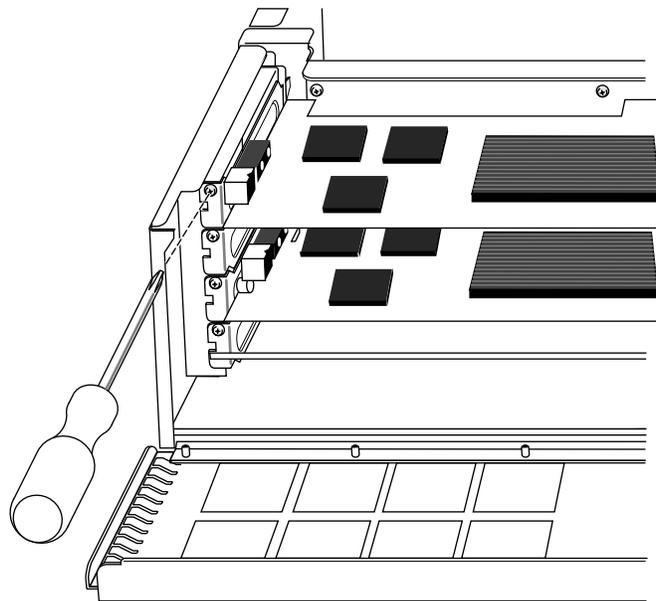


Figure 5-9 Removing the Screws From the Metal Extension

Note: You will have to remove one screw from a Solid IMPACT graphics board.

5. Remove the graphics board sets.
 - Place your index fingers behind the plastic loops on each side of each board set as shown in Figure 5-10.
 - Brace your knuckles and thumbs on the chassis frame and pull each board set out of its slots. You may need to use some force.
 - Place the board set down on a flat, antistatic surface so the side with the chips faces up. An empty antistatic bag or a clean, dry desktop works well.

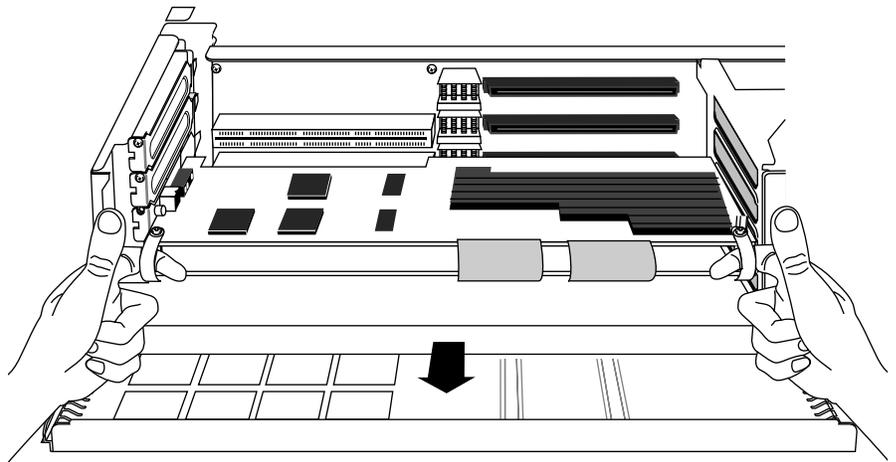


Figure 5-10 Removing the Board Set From the Chassis

- Note:** If you received a Solid IMPACT graphics boards without pull straps,
- Grasp the edges of the graphics board with your thumb and fingers and pull the board from the chassis.
 - Place the board set down on a flat, antistatic surface so the side with the chips faces up. An empty antistatic bag or a clean, dry desktop works well.
6. Remove any option board attached to the graphics boards. See the option board manual if you need help.
 7. Remove any other GIO or EISA boards from the workstation.

Tip: Make a written note of the location of the option boards and graphics boards. If the problem is hardware related and you need to obtain a replacement board, some time may elapse before you reinstall the boards in the original configuration.

Swapping the Board Sets in a Solid/Solid Configuration

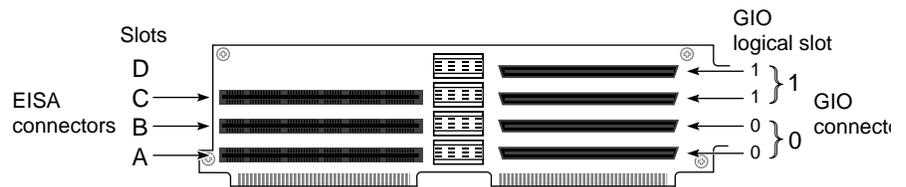


Figure 5-11 Identifying Board Slots

1. Place your Solid IMPACT board (that was in Slot D) in Slot B.
2. Place your Solid IMPACT board (that was in Slot B) in Slot D. See Figure 5-12.

Note: Do not replace the option boards for this test. Do replace the option boards when you are returning to your original configuration.

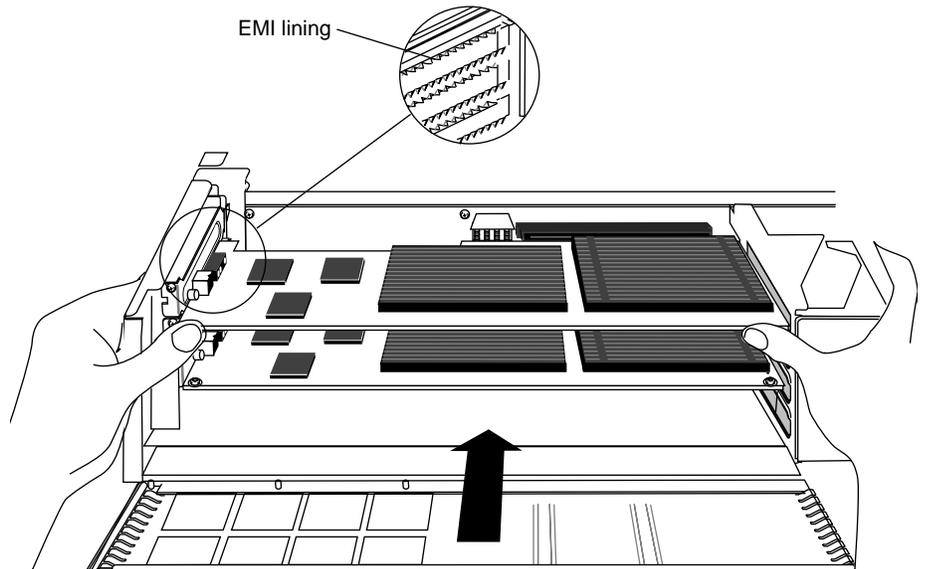


Figure 5-12 Inserting the Solid IMPACT Graphics Board

- Insert the board carefully so that the board edge does not catch on the EMI lining along the inner left cutout area. Make sure the EMI lining is not damaged and remains between the chassis and the graphics board's metal extension.
- Grasp the chassis with your fingers and push the board set into place with your thumbs. See Figure 5-13.
- Push the board set into the slot until the connector on the back of the board is securely connected to the connector on the midplane.

Swapping the Board Sets in a Solid/High Configuration

1. Place your Solid IMPACT board (that was in Slot D) in Slot B. See Figure 5-11 and Figure 5-12.
2. Place your High IMPACT board (that was in Slots A and B) in Slot C. See Figure 5-13.

Note: Do not replace the option boards for this test. Do replace the option boards when you are returning to your original configuration.

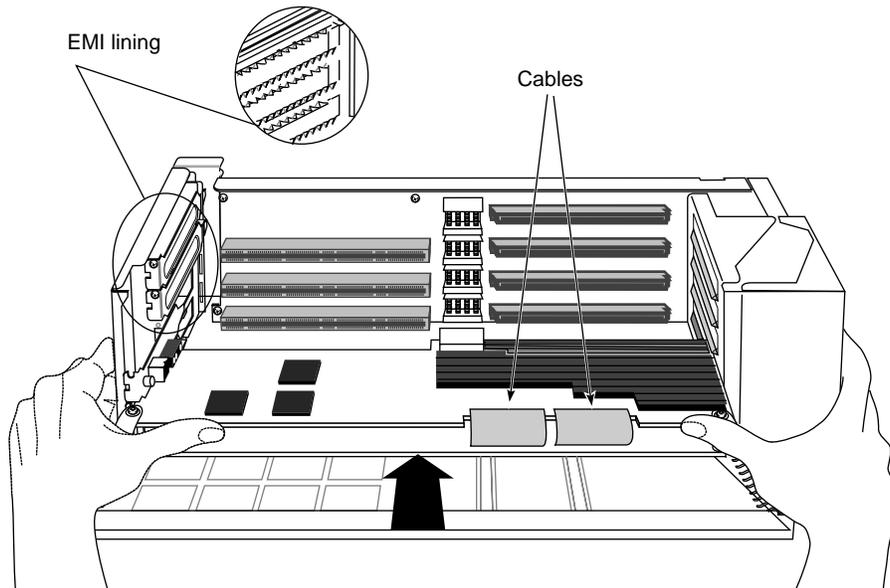


Figure 5-13 Inserting the High IMPACT Graphics Board Set

Caution: As you replace the board set, do not press on the flexible cables that vertically connect your Indigo² High IMPACT boards.

- Insert the board carefully so that the board edge does not catch on the EMI lining along the inner left cutout area. Make sure the EMI lining is not damaged and remains between the chassis and the graphics board's metal extension.
- Grasp the chassis with your fingers and push the board set into place with your thumbs. See Figure 5-13.
- Push the board set into the slot until the connector on the back of the board is securely connected to the connector on the midplane.

Note: Place pressure on the recommended board edge or standoff near the top of any board stack when reinserting the board stack into the workstation. You must use some force to seat the board stack properly.

3. Visually check to be sure the boards are completely seated in their connectors. The board set should not look tilted when viewed from above. See Figure 5-14.

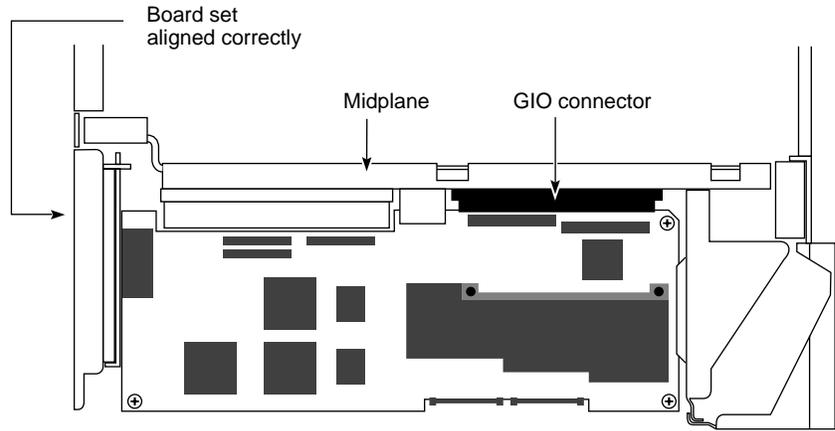


Figure 5-14 Correctly Aligned Board Set, Viewed From Above

4. Replace the retention pin on the side of the chassis. See Figure 5-15.

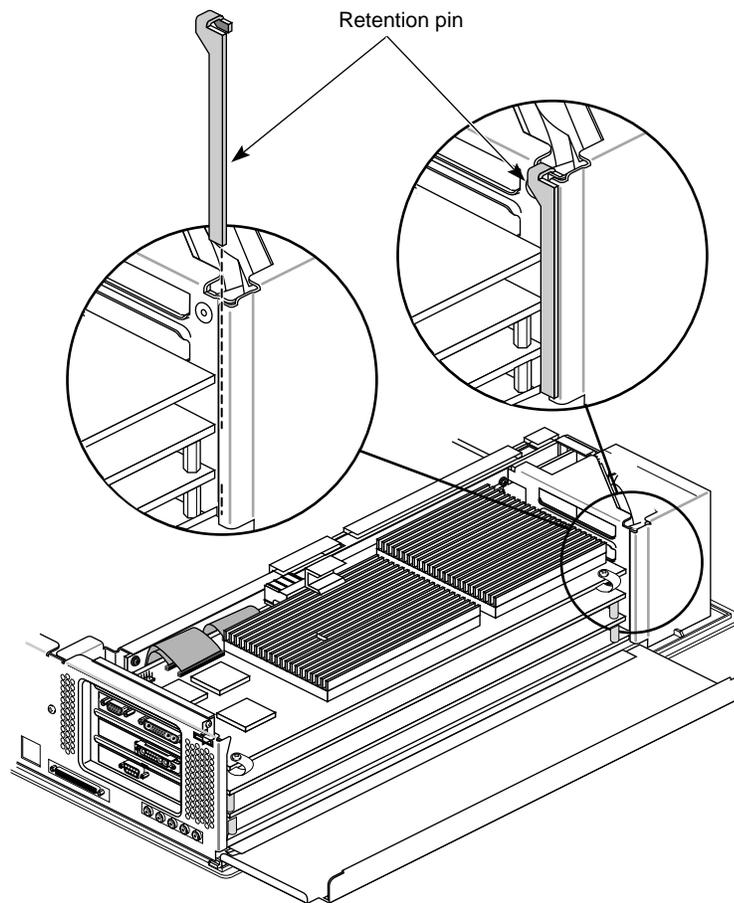


Figure 5-15 Replacing the Retention Pin

5. Tip the metal panel up in front of the boards you just installed until it snaps into place.
6. Detach the wrist strap from the workstation and from your wrist.

Replacing the Cover

To replace the top cover, follow these steps:

1. Locate the tabs on the inside and back of the top cover and the holes on the back of the workstation. See Figure 5-16.
2. Face the front of the workstation.
 - Look through the holes as you lower the cover and move the tabs into place.

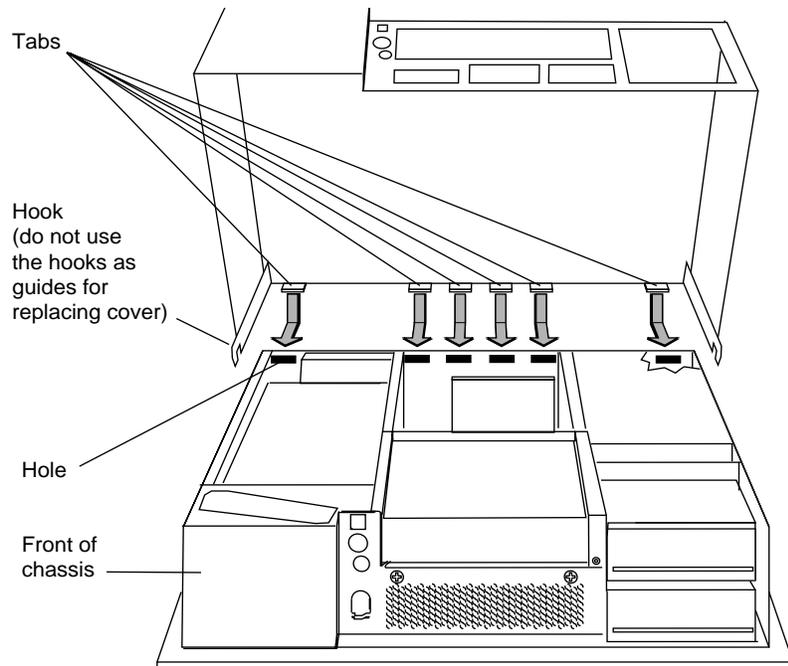


Figure 5-16 Replacing the Cover

- Slide the tabs into the holes and pull the cover down until it snaps into place. The cover fits tightly over the workstation.
3. Replace the bezel.
 - Place the tabs on the bottom of the bezel in the grooves in the front of the chassis, as shown in Figure 5-17.
 - Tilt the bezel up until it snaps into place.

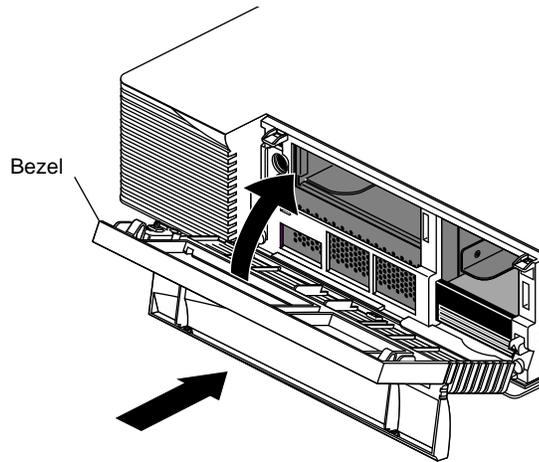


Figure 5-17 Replacing the Bezel

4. Replace the lockbar if you removed it.
5. Close the front cover of the bezel.
6. Reconnect the power cable and monitor cables to the back of the workstation. See Chapter 3, “Connecting the Monitors” if you need help reconnecting the monitors.

Checking the Configuration

1. Go to the Toolchest in the upper left corner of your screen.
2. Click on desktop, and then click on Unix Shell to open a shell.
3. On the command line, type `/usr/gfx/gfxinfo`

If in the original configuration, Board 0 is not recognized, and in the test (swapped board) configuration Board 0 is not recognized then Board 0 is faulty. However, if Board 0 is not recognized in the original configuration and is recognized in the test (swapped board) configuration, the software is faulty.

If you need software or hardware support, see the “Product Support” section of this chapter.

Returning to the Original Configuration

After you have determined the problem, at some point you will need to return the boards to their original configuration along with any option boards you have removed.

To return to your original graphics board configuration, follow the steps in this chapter beginning with “Shutting Down and Powering Off the System” on page 60.

Product Support

Silicon Graphics[®], Inc., 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.

For information on ordering a replacement graphics board, see your *Indigo² IMPACT Workstation Owner's Guide*.

Regulatory Information

Manufacturer's Regulatory Declarations for the Indigo² IMPACT Graphics Boards

Caution: Your workstation has several governmental and third-party approvals, licenses, permits. Do not modify this product in any way that is not expressly approved by Silicon Graphics. If you do, you may lose these approvals and your governmental agency authority to operate this device.

The Indigo² IMPACT graphics boards conform to several national and international specifications and European Directives listed on the "Manufacturer's Declaration of Conformity." The CE mark insignia displayed on each device is an indication of conformity to the aforementioned European requirements.

Manufacturer's Declaration of Conformity

A "Manufacturer's Declaration of Conformity" is available on the World Wide Web. Look on your system (regulatory) label on the rear of your workstation to determine your CMN (model) number which you will need to identify your Declaration of Conformity. See Figure 6-1 (Exterior of Workstation) at the end of this chapter for the location of your system label.

Enter "<http://www.sgi.com/Products/compliance/index.html>" in your browser location window. Locate and print or save your Declaration of Conformity. Make a note of your CMN number and the date on the Declaration of Conformity here for future reference.

Regulatory Label

If you received a regulatory label with a graphics board upgrade, place the label below the logos and over the lower portion of the regulatory label on the rear of your workstation. See Figure 6-1 for placement of the upgrade regulatory label.

Electromagnetic Emissions

This device complies with the Class A limits of Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

This device complies with Class A electromagnetic emissions limits of C.I.S.P.R. Publication 22, Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment, Germany's BZT Class A limits for Information Technology Equipment, and with Japan's VCCI Class 1 limits.

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取扱説明書に従って正しい取り扱いをして下さい。

Radio and Television Interference

The equipment described in this guide generates and uses radio frequency energy. If it is not installed and used in accordance with the instructions in this guide, it can cause radio and television interference.

This equipment has been tested and complies with the limits for a Class A computing device in accordance with the specifications in Part 15 of FCC rules. These specifications are designed to provide reasonable protection against such interference in an industrial or office installation. However, there is no guarantee that the interference will not occur in a particular installation. This system is not certified for home use.

You can determine whether your system is causing interference by turning it off. If the interference stops, it was probably caused by the workstation or one of the peripherals. To tell if the interference is caused by one of the peripherals, try disconnecting one peripheral at a time to see if the interference stops. If it does, that peripheral is the cause of the interference.

If your workstation does cause interference to radio or television reception, try to correct the interference by using one or more of the following suggestions:

- Turn the television or radio antenna until the interference stops.
- Move the workstation to one side or the other of the radio or television.

- Move the workstation farther away from the radio or television.
- Plug the workstation into an outlet that is on a different circuit from the radio or television. (That is, make certain the workstation and the radio or television are on circuits controlled by different circuit breakers or fuses.)

Shielded Cables

The Indigo² IMPACT workstation is FCC-compliant under test conditions that include the use of shielded cables between Indigo² IMPACT workstation and its peripherals. Your Indigo² IMPACT workstation and any peripherals you purchase from Silicon Graphics have shielded cables. Shielded cables reduce the possibility of interference with radio, television, and other devices. If you use any cables that are not from Silicon Graphics, make sure they are shielded. Telephone cables do not need to be shielded.

In Germany, a shielded cable must be used on the Ethernet 10-BASE T port.

The monitor cable supplied with your system uses additional filtering molded into the cable jacket to reduce radio frequency interference. Always use the cable supplied with your system. If your monitor cable becomes damaged, a replacement cable should be obtained from Silicon Graphics.

Electrostatic Discharge

Silicon Graphics designs and tests its products to be immune to effects of electrostatic discharge (ESD). ESD is a source of electromagnetic interference and can cause problems ranging from data errors and lockups to permanent component damage.

It is important that while you are operating your Indigo² you keep all the covers and doors, including the plastics, in place. The shielded cables that came with the workstation and its peripherals should be installed correctly, with all thumbscrews fastened securely.

An ESD wrist strap is included with some products, such as memory and graphics upgrades. The wrist strap is used when installing these upgrades

to prevent the flow of static electricity, and it should protect your system from ESD damage.

Exterior of Workstation

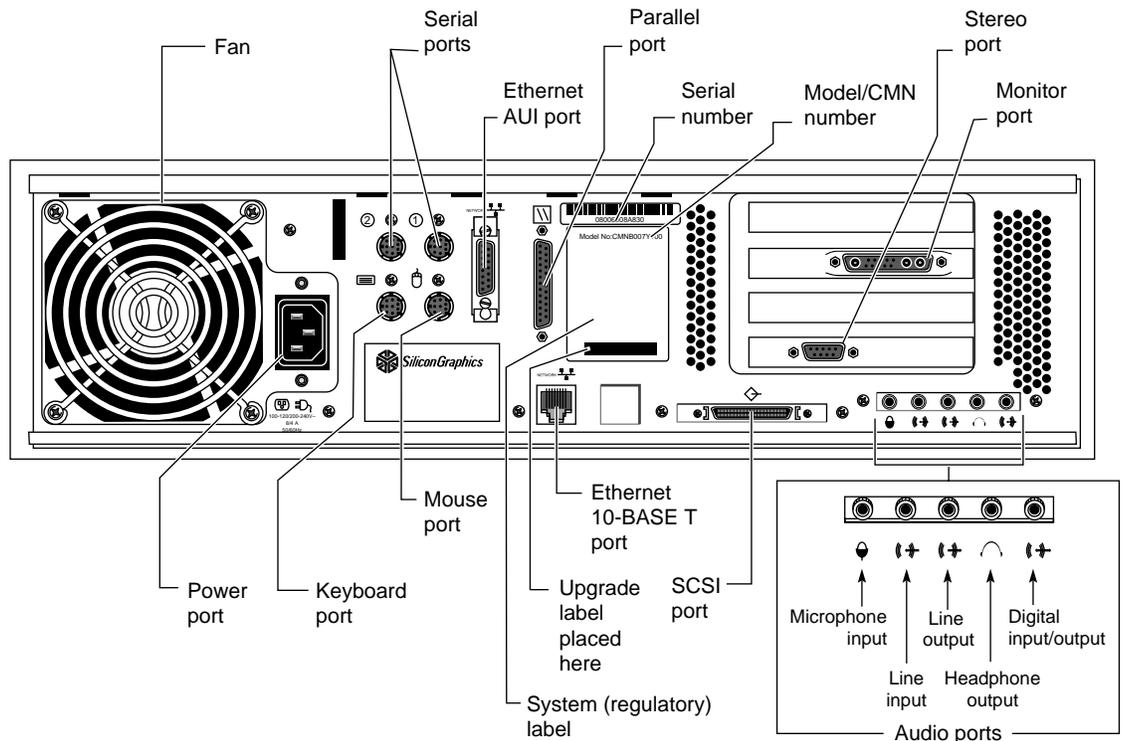


Figure 6-1 Exterior of Workstation

Choosing a Graphics Head (for Developers)

This chapter provides a brief overview of library routines that developers may need in order to make applications work on a dual-head system. For more information about the routines mentioned, see the appropriate reference pages.

Note that once you open a window on a given head, the user can't move it to the other head via the window manager; if you want users to be able to move windows from one head to another, your program will have to explicitly close the old window and open a new one on the other head.

Using Multiple Graphics Heads Under OpenGL, X, or Mixed-Model GL

X, mixed-model IRIS GL™, and OpenGL™ all use X calls to choose on which screen to display: just pass the name of the desired display as the argument to **XOpenDisplay(3X11)**. (Pass NULL as the display name if you want to default to the value of the DISPLAY environment variable.) You can then call **RootWindow(3X11)** with the newly-opened display, specifying whichever screen you want; then call **XCreateWindow(3X11)** to create a window on the specified screen. After that, use the usual OpenGL or X calls, as appropriate, to draw or display in the window.

Here's the syntax for **XOpenDisplay()**:

```
Display *XOpenDisplay(display_name)
      char *display_name;
```

For example, to open a window on each head of a dual-head system:

```
#include <X11/Xlib.h>
#include <X11/Xutil.h>
#include <stdio.h>

void main(argc, argv)
int argc;
char **argv;
{
    Display *display;
    Window root0, root1, win0, win1;

    /* Open the display specified in the DISPLAY variable. */
    if ( (display = XOpenDisplay("")) == NULL )
        fprintf(stderr, "%s: cannot connect to X server.\n",
                argv[0]);

    /* Set up a root window for each screen. */
    root0 = RootWindow(display, 0);
    root1 = RootWindow(display, 1);

    /* Now create a window on each screen. */
    win0 = XCreateSimpleWindow(display, root0, 0, 0, 100,
                               100, 0, 0, 0);
    win1 = XCreateSimpleWindow(display, root1, 0, 0, 100,
                               100, 0, 0, 0);

    /* Display the windows and flush the output buffer. */
    XMapWindow(display, win0);
    XMapWindow(display, win1);
    XFlush(display);

    /* Leave them up for ten seconds before exiting. */
    sleep(10);
}
```

Note that if you are using the heterogeneous (Solid/High or Solid/Maximum) dual-head configuration, the High or Maximum head is always screen zero, while the Solid head is always screen one. It may be worthwhile being careful about which head you choose, if you don't decide to default to the value of DISPLAY. 3D graphics will run faster on a Maximum IMPACT board set than on a Solid IMPACT board. Both

Maximum IMPACT and High IMPACT graphics boards run texture mapping much faster than a Solid IMPACT board.

Using Multiple Heads Under IRIS GL

Under IRIS GL, select a head on which to run a window by using the **scrnselect(3G)** function. If you don't call **scrnselect()** before opening a window with **winopen(3G)**, the window will open on whichever screen the user has specified in the DISPLAY environment variable.

This is the syntax for **scrnselect()**:

```
long scrnselect(gsnr)
    long gsnr;
```

where *gsnr* is the screen number relative to the current server—that is, zero for screen :0.0, or one for :0.1.

Specifying Screen Adjacency

If you include system configuration files such as */usr/lib/X11/xdm/Xservers* with your application, you may want to configure the layout of the heads, specifying which is on the left and which on the right. For information on how to specify adjacency, see the Xsgi reference page, under the *-hw* option.

Identifying Graphics Boards Sets

The information s in this section provides annotated illustrations to help you identify option boards and graphics board sets in your workstation.

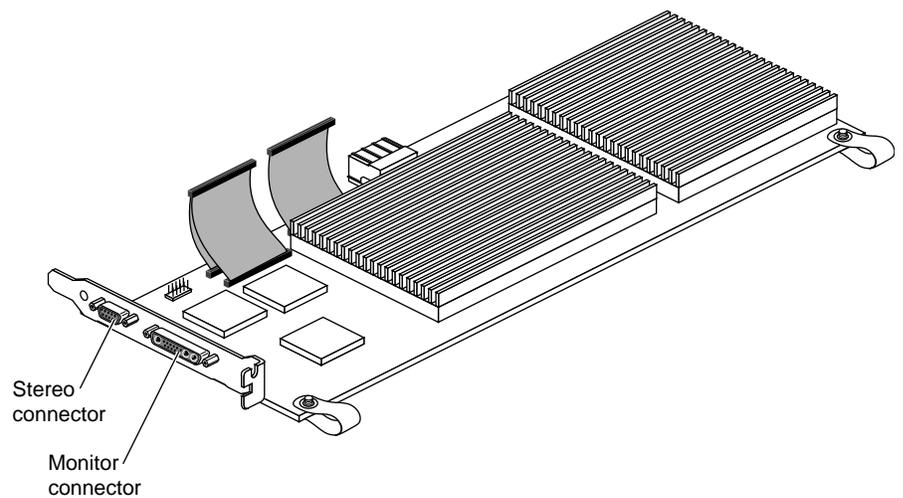


Figure B-1 Solid IMPACT Graphics Board

Your Solid IMPACT graphics board is a single board. If the Indigo² video option board is installed, it is attached by standoffs and cables above the Solid IMPACT board.

The Solid IMPACT board has a “3 board pull strap.”

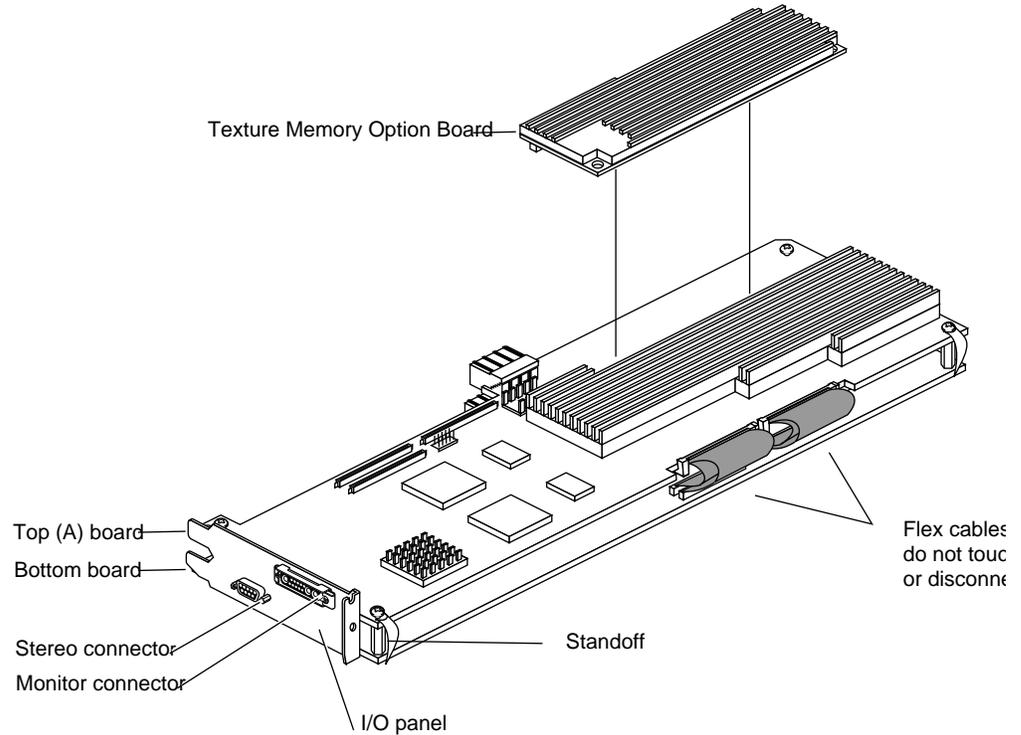


Figure B-2 High IMPACT Graphics Board Set With Texture Memory Option Board

Your High IMPACT graphics board set is always the bottom two boards connected by a solid I/O panel.

Tip: Pull straps are labeled “2 board pull strap” for the High IMPACT graphics board set, Board sets with Indigo² Video attached with option boards have 3 board straps.

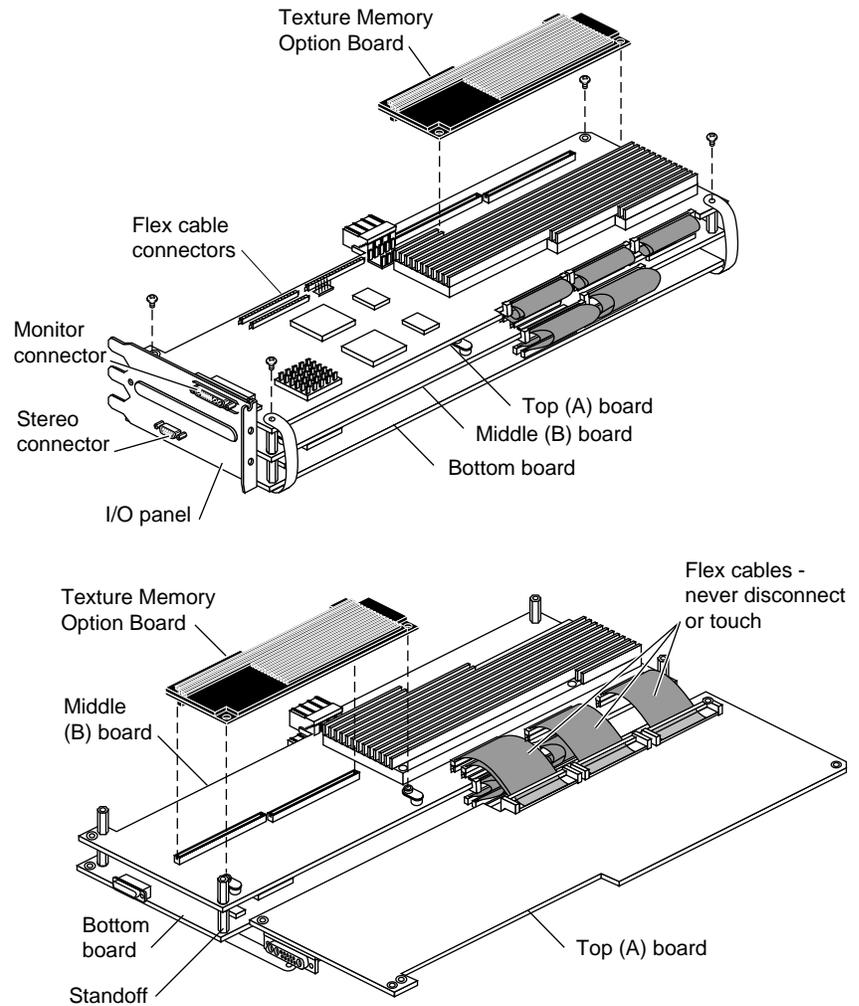


Figure B-3 Maximum IMPACT Graphics Board Set With Texture Memory Option Boards

Maximum IMPACT board set are three boards connected by a solid I/O panel.

Tip: Pull straps are labeled "3 board pull strap" for the Maximum IMPACT graphics board set;

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