

# Silicon Graphics 540™ Visual Workstation

Owner's Guide

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# About This Guide

The *Silicon Graphics 540 Visual Workstation Owner's Guide* is your complete guide to adding and replacing parts and diagnosing and repairing your Silicon Graphics 540 visual workstation. This guide tells you how to install and remove:

- DIMMs (memory)
- Internal drives
- Option cards
- Processors and voltage regulators
- Power supply, fans, and battery

Additionally, this guide provides the following:

- Setting up and troubleshooting information
- Regulatory information
- Customer support information
- Product warranty
- Technical specifications
- Port specifications

Technical specifications, safety and ergonomic information, hardware overview, and maintenance information are also found in the online document *Silicon Graphics 540 Hardware Overview*. This document is found by choosing Start > Silicon Graphics > *Hardware Overview*.

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## Where to Find Additional Information

Your Silicon Graphics 540 visual workstation ships with Windows NT installed. For software installation and configuration information, see the *Silicon Graphics 320 and Silicon Graphics 540 Visual Workstations Software Installation Guide* that came with your CDs.

For information on using Windows NT, see the documentation that ships with your workstation.

You can access additional information about your Silicon Graphics 540 visual workstation by choosing one of the following items from the Start > Silicon Graphics menu in the Windows NT task bar:

- **Online Books** gives you access to the online books that ship with your visual workstation.
- **Hardware Overview** displays an overview of the internal parts and exterior ports, technical specifications, and ergonomic and maintenance information.
- **Support** displays information about how to get technical support from Silicon Graphics.
- **Visual Demos** allows you to try out third-party software from the visual workstation CD-ROMs or demonstration software installed on your system disk.
- **Release Notes** displays the release notes that apply to your visual workstation hardware or software.

On the Web, you can access the Silicon Graphics Technical Publications Library. This Web site provides documentation that ships with your Silicon Graphics 540 visual workstation (as well as addenda and updates to this manual) and documentation for other Silicon Graphics products. Access the Technical Publications Library at <http://www.techpubs.sgi.com>.



## *Chapter 1*

# **Getting Started**

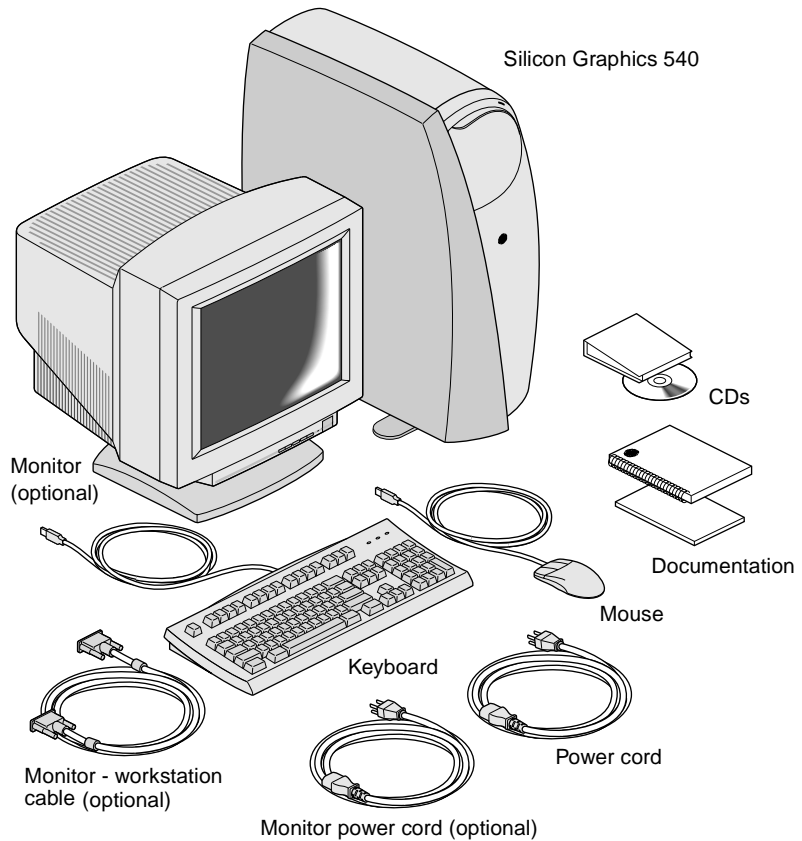
This chapter provides setup and getting started information, and contains the following sections:

- “Checking Your Shipment” on page 2
- “Placing the Workstation in Your Work Area” on page 4
- “Setting Up the System” on page 5
- “Opening and Closing the Sliding Front Panel” on page 11
- “Turning On the System” on page 12
- “Shutting Down the System” on page 14
- “Resetting the System” on page 15
- “Ergonomic Information” on page 15
- “Configuring Your System Firmware” on page 16

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## Checking Your Shipment



**Figure 1-1** Checking Your Shipment

It is always a good idea to check your shipment against your order. Except for the optional monitor, your shipment contains all the items shown above.

If you plan to install PCI cards or internal drives before you place the workstation in your work area, go to these chapters for instructions:

- To install drives, see Chapter 4, "Internal Drives."
- To install PCI cards, see Chapter 5, "Option Cards."

**Warning:** Because of its weight, lifting the Silicon Graphics 540 visual workstation is a two-person task.

Before you lift the Silicon Graphics 540 visual workstation, determine where you want to place it.

1. To lift the Silicon Graphics 540 visual workstation, face the wide side of the system
2. Rotate all of its four feet so that they are beneath the workstation before you lift it.
3. Place your fingers under the bottom edge, on the metal framework. Do not place your fingers only under the plastic edge.
4. Use your leg muscles to lift and place the workstation.
5. Rotate all four feet of the workstation outward after it is placed in its new location.



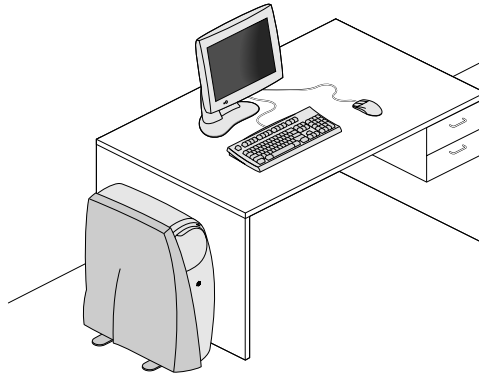
**Figure 1-2** Lifting a Silicon Graphics 540 Visual Workstation

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## Placing the Workstation in Your Work Area

The Silicon Graphics 540 visual workstation is a deskside system. Before setting it up, determine its location in relation to the other furniture in your work area. Keep in mind that the blue side cover removes for accessing the internal parts, so you might want to keep that side clear of any furniture. Before placing the workstation in its permanent location, connect the exterior cables. The instructions are found in the next section, “Setting Up the System.”



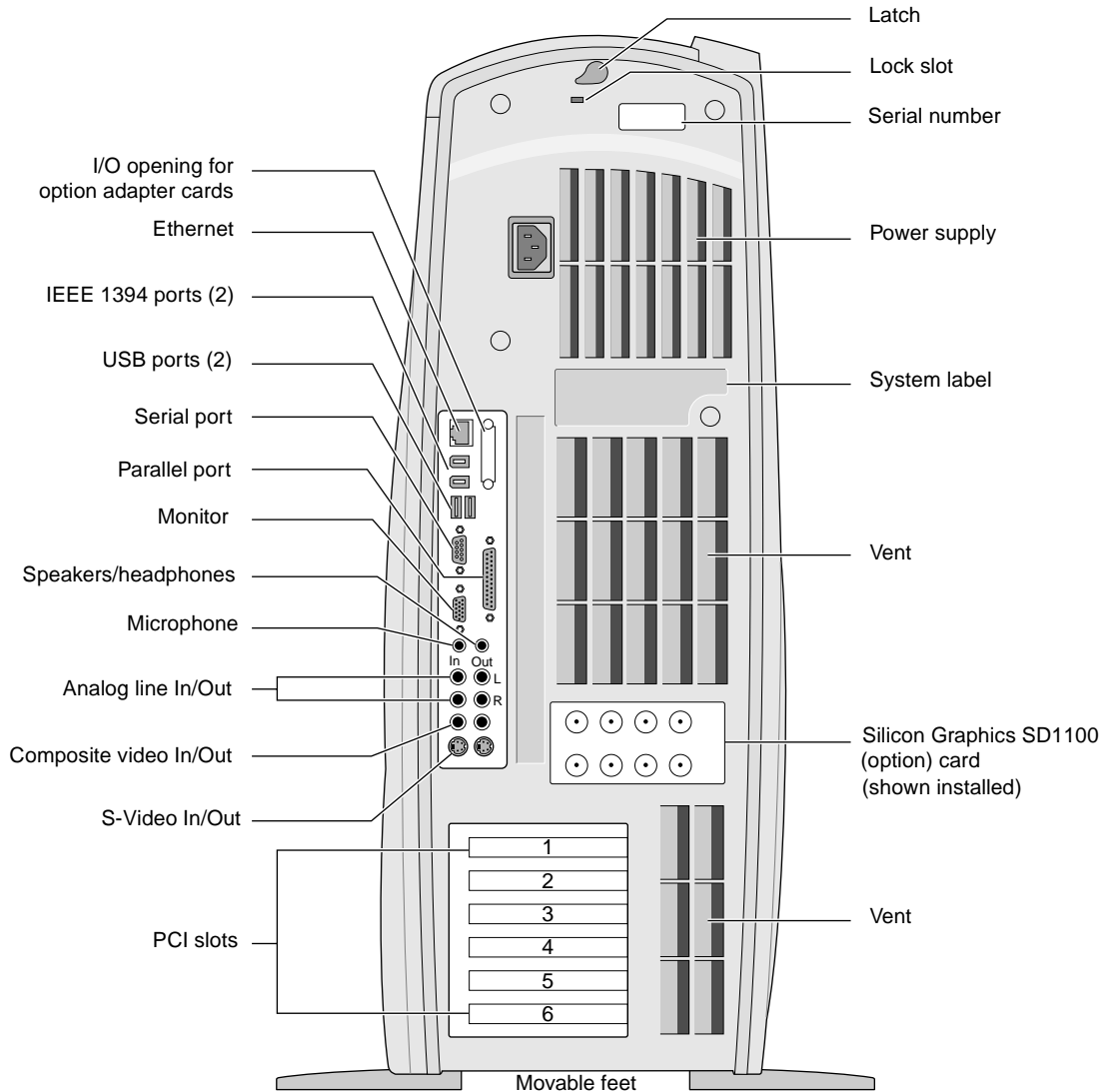
**Figure 1-3** Placing the Workstation

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## Setting Up the System

Use Figure 1-4 on page 5 to familiarize yourself with the ports on the rear of the workstation.

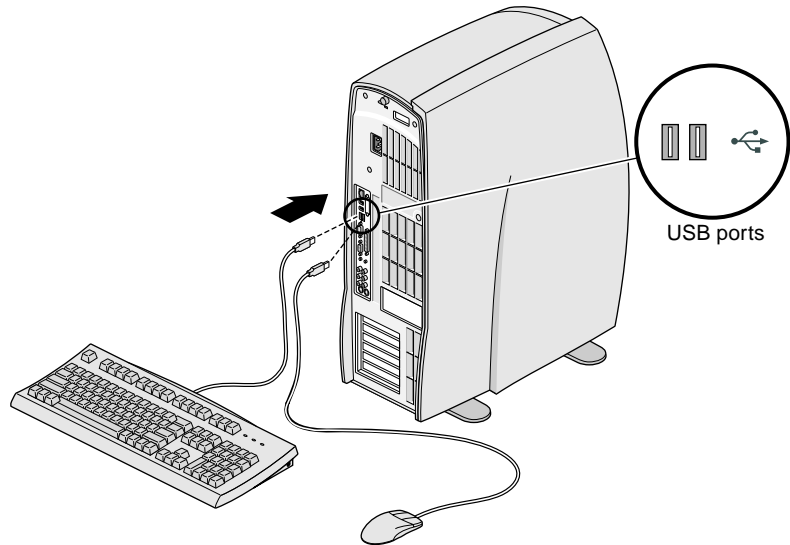


**Figure 1-4** Back View of the Silicon Graphics 540 Workstation

1. Place the workstation in a convenient, well-ventilated position. If you have not already done so, rotate the four feet outward for stability.
2. Attach the keyboard to one of the USB ports on the workstation.
3. Attach the mouse to the other USB port.

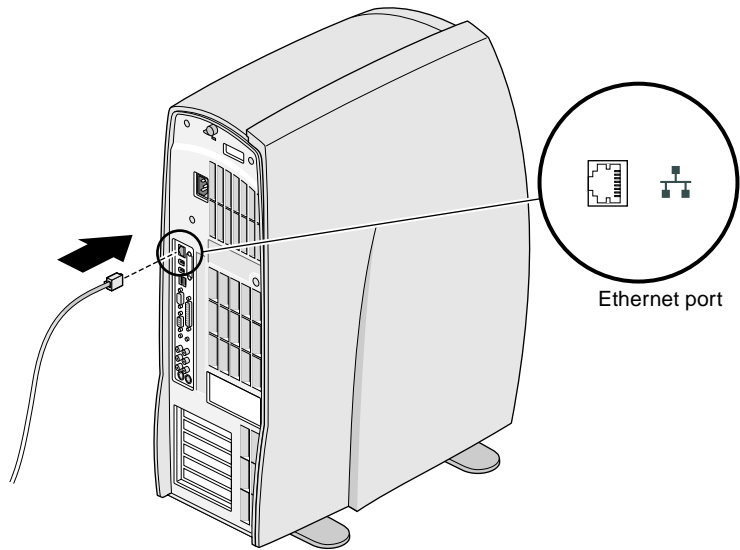
**Note:** The keyboard and mouse are the only USB devices supported by the current release of Windows NT 4.0. Future releases of Windows NT may support additional USB devices.

For more information on USB, see “USB Port Pinouts” and related information on page 164.



**Figure 1-5** Attaching the Keyboard and Mouse

4. If you are connecting your system to a network, install your Ethernet cable in the Ethernet port.



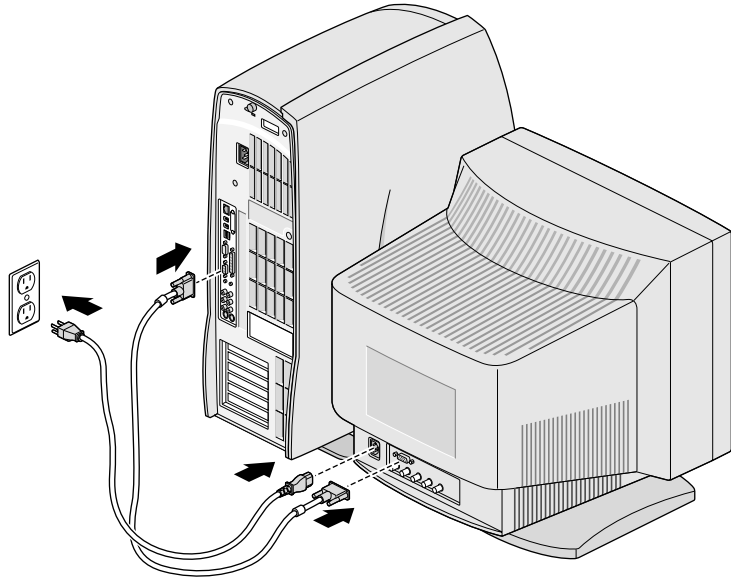
**Figure 1-6** Attaching an Ethernet Cable

5. Place your monitor on your desktop.

(See “Installing the Flat Panel Option Card” on page 80 for information on installing the option card and the flat panel monitor. Also see your flat panel monitor owner’s guide if you are installing that option.)

**Note:** A monitor and flat panel cannot be connected to the workstation simultaneously.

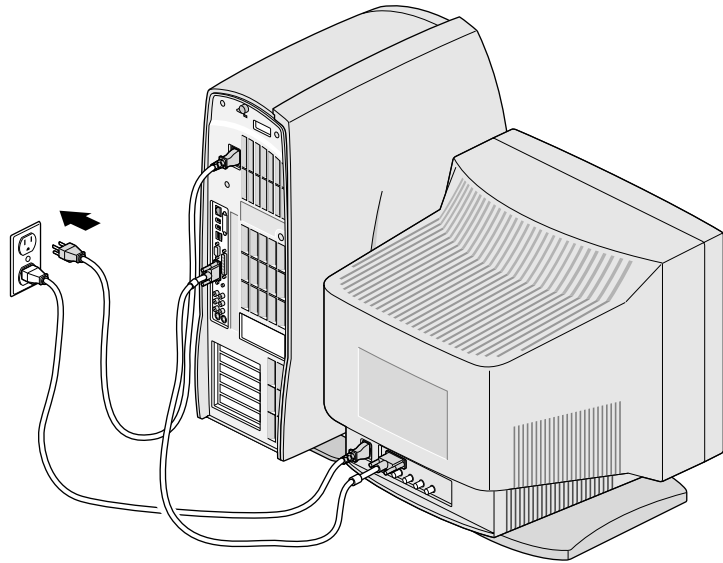
6. Attach the monitor-to-workstation cable to both the monitor and the workstation.
7. Connect the monitor power cable to the monitor and to an electrical outlet.



**Figure 1-7** Connecting the Monitor and the Workstation



8. Attach the workstation power cable to the workstation and to an electrical outlet.



**Figure 1-8** Plugging In Silicon the Workstation Power Cable

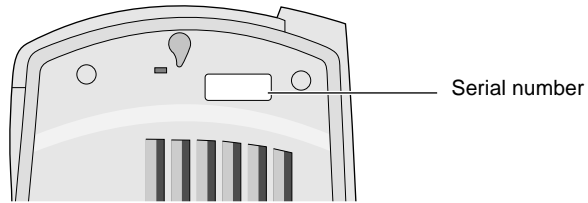
9. Attach any other external devices, such as printers or SCSI devices. See Appendix C for more information on SCSI devices.

**Note:** Microsoft Windows NT 4.0 does not support IEEE 1394 devices. Future releases of Windows NT may support IEEE 1394.

For more information on IEEE 1394, see “IEEE 1394 Port Pinouts” and related information on page 163.

**Note:** For instructions on locking the workstation, see “Locking the System” on page 26.

10. Find the serial number, located on the back of the system. Then go to “Individual System Information” on page 152 and record it in the table provided. The table is near Customer Support phone numbers and other information in case you ever need to make a service call.



**Figure 1-9** Locating the Serial Number

You are ready to power on the workstation.

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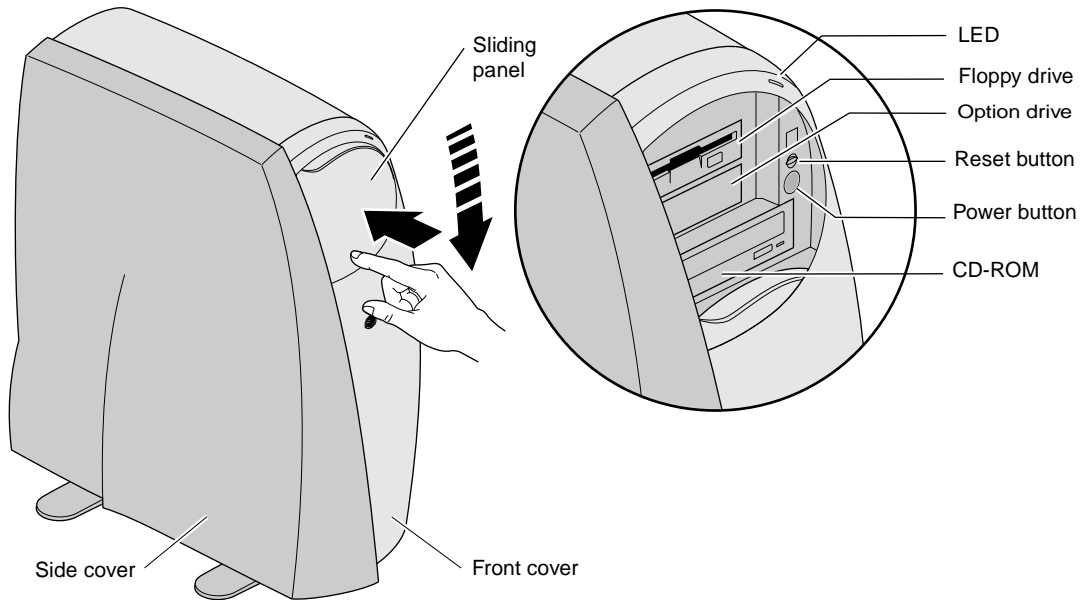
## Opening and Closing the Sliding Front Panel

The sliding panel in the front of the system gives you access to the removable media drives and the power and reset buttons.

1. To open the sliding panel, press lightly on its lower half, as shown in Figure 1-10.

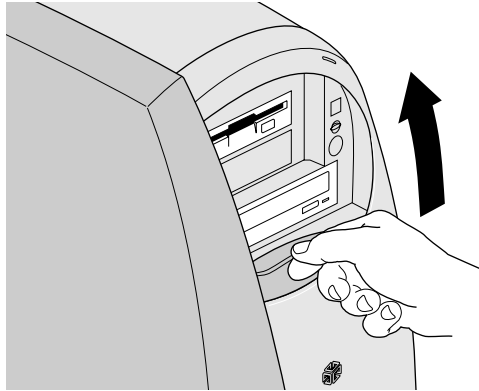
The panel automatically slides down into the front cover to expose the drives and power and reset buttons.

**Caution:** Do not force the panel down or you may damage it. Tap lightly in a slightly different location until the panel slides down.



**Figure 1-10** Opening the Front Panel

2. To close the sliding panel, lift up the tab at the top of the panel until the panel clicks into place.



**Figure 1-11** Closing the Sliding Panel

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## Turning On the System

After attaching all the cables and external devices, you are ready to turn on the system.

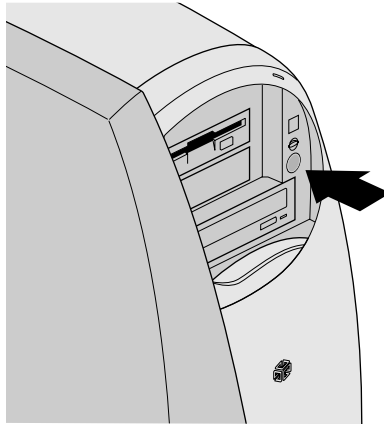
1. Turn on the monitor and any other external devices—such as external drives, printers, or modems—by pressing their power buttons.
2. Open the sliding front panel of the system by pressing lightly on the lower half of the panel, as shown in Figure 1-12.

The panel automatically slides down into the cover to expose the removable media drives and the power and reset buttons.

3. Press the power button, as shown in Figure 1-12.

The system powers on automatically.

**Note:** If you want the system to power on automatically when you plug it into an electrical outlet, or to power on automatically after being shut down due to a power failure, see the release notes that came with your system, or call your authorized service provider.



**Figure 1-12** Powering On the Workstation

For information on logging in, see your Windows NT documentation.

---

---

## Shutting Down the System

To shut down the system:

1. From the Start menu, choose System Shutdown. If you are not logged in, press Ctrl+Alt+Delete and click the *Shut Down...* button.

A dialog box appears.

2. Choose “Shutdown the computer?” and click *Yes*.

The software shuts down and a status window appears telling you that it is okay to power off.

**Caution:** To preserve data, always shut down your computer from the Start menu. The Silicon Graphics 540 visual workstation has a safety interlock that automatically powers off the system when the side cover is removed.

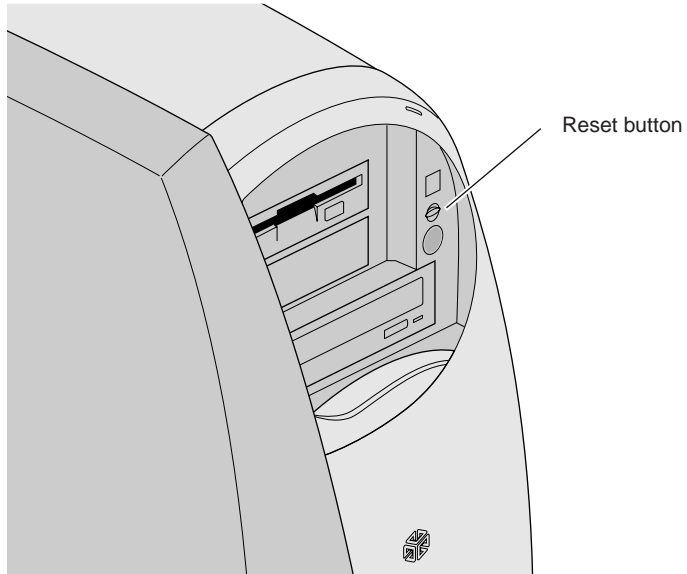
3. Open the sliding front panel by pressing on its lower portion. The panel automatically slides down into the cover to expose the removable media drives and power and reset buttons.
4. Press the power button on the front of the system. Your workstation is now powered off.
5. Press the power buttons on the front of the monitor and on any external devices to turn them off.

---

---

## Resetting the System

If the system hangs, and you cannot shut down from the Start menu, you can reset the system by pressing the reset button.



**Figure 1-13** Locating the Reset Button

---

---

## Ergonomic Information

After you have your system powered on, it is a good idea to make adjustments in the location of the monitor, keyboard, and other devices so that your working environment is ergonomically correct for you.

Ergonomic information is found online, accessed by choosing Start > SGI > *Hardware Overview* > *Ergonomics*.

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## Configuring Your System Firmware

For firmware configuration information, see the *Silicon Graphics 320 and Silicon Graphics 540 Visual Workstations Software Installation Guide* that came with your CDs. The firmware configuration screens allow you to access your system firmware settings, such as system startup settings, keyboard language settings, diagnostics, hardware inventory (hardware installed on your system), and more.



## *Chapter 2*

# **Opening the System**

This chapter contains the following sections:

- “Removing the Covers” on page 18
- “Identifying the Internal Parts” on page 23
- “Replacing the Covers” on page 24
- “Locking the System” on page 26

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## Removing the Covers

You need to remove the side and front covers when installing or replacing a removable media drive.

You need to remove the side cover when installing or replacing components in the system. See “Removing the Side Cover” on page 19.

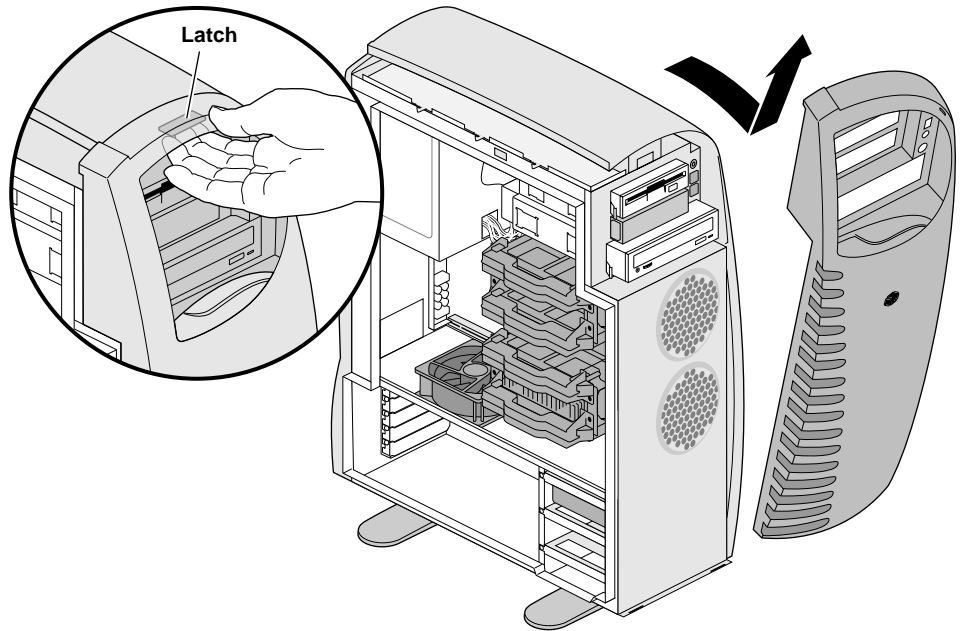
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## Removing the Front Cover

To access the drives or fans behind the front cover, follow these steps:

1. Open the sliding front panel if it is not already open. See “Opening and Closing the Sliding Front Panel” on page 11.
2. Facing the front of the system, release the front cover by pressing on the latch inside the top edge of the front cover and pulling it forward, as shown in Figure 2-1.
3. Pull up until the cover releases from the chassis.

Lay it, external side up, on a clean, dry surface. Go to the appropriate chapter to continue your task.



**Figure 2-1** Releasing the Front Cover

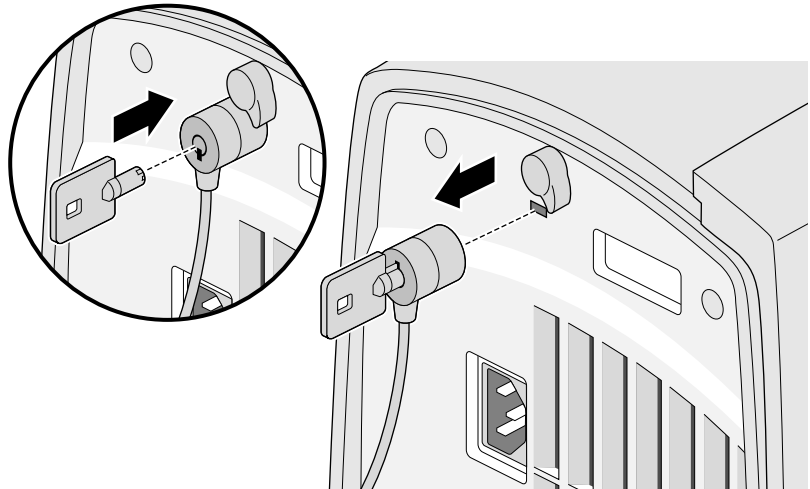
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## Removing the Side Cover

To access the interior of the Silicon Graphics 540 visual workstation, follow these steps:

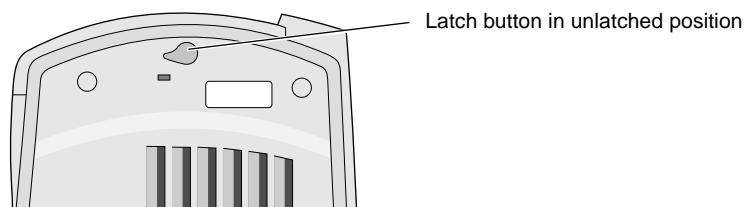
1. If the system is locked, insert the key and unlock the Kensington lock. The key and lock turn so that the lock can be removed from the chassis. If the system is not locked, skip to step 5.

2. Remove the lock from the chassis, as shown in Figure 2-2.



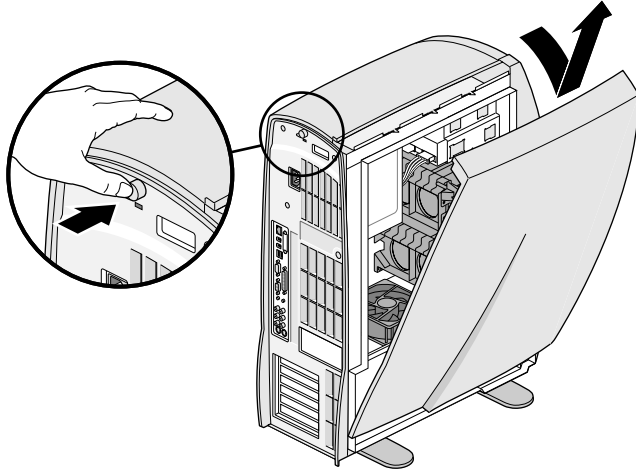
**Figure 2-2** Unlocking the System

3. Turn the latch button; it moves clockwise to the unlocked mode, as shown in Figure 2-3. (The curve on the latch button points to the left in the unlocked mode.)



**Figure 2-3** Rotating the Latch Button to the Open Position

4. Press the latch button until it is fully recessed; the side cover releases about 1/2 an inch.
5. Remove the side cover by pulling it away from the chassis and lifting it up and off. See Figure 2-4.



**Figure 2-4** Opening the System

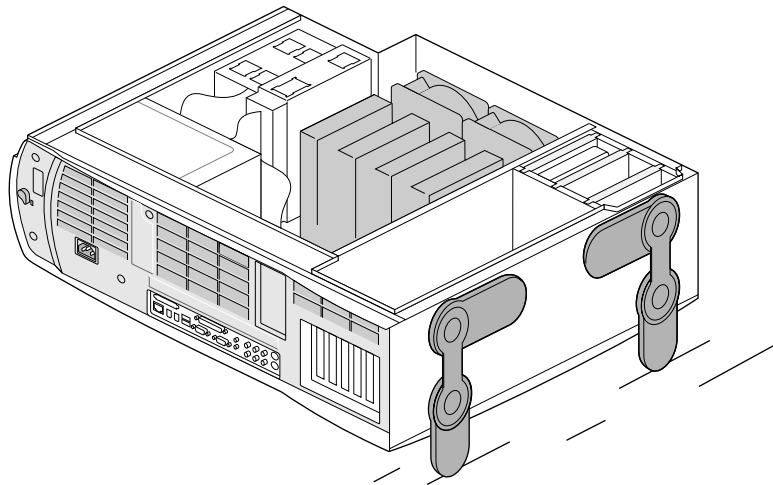
6. Lay the side cover, face up, on a clean, dry surface.

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## Laying the System on Its Side

Laying the system on its side is recommended for installing processors and voltage regulators, memory, and the power supply. You may also want to lay the system on its side for better visibility and cable clearance. (See Figure 2-5.) Follow these steps:

1. Place fabric or paper padding on the floor to protect the plastic from being scratched.
2. Rotate all four feet under the workstation.
3. Because of the weight involved, have someone help you lay the workstation on its side.
4. After the workstation is on its side, rotate the two feet closest to the floor toward the floor to stabilize the system while you perform your task. See Figure 2-5.



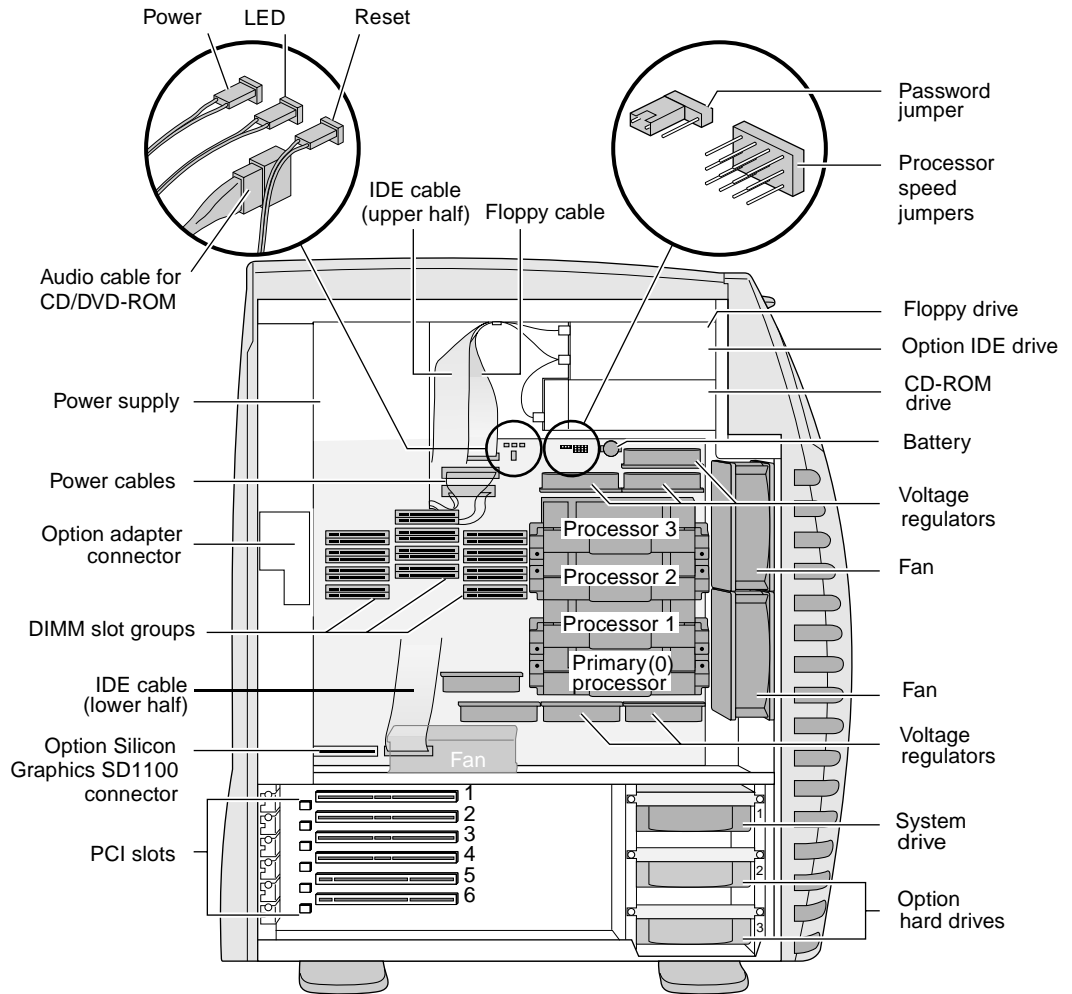
**Figure 2-5** Laying the System on Its Side

Figure 2-6 on page 23 provides a labeled, interior view of the system, which you might find helpful before beginning your task.

Go to the appropriate chapter for instructions on performing your task.

## Identifying the Internal Parts

The following illustrations of the interior of the system help you become acquainted with the Silicon Graphics 540 visual workstation hardware.



**Figure 2-6** Interior View of the Silicon Graphics 540 Workstation

The inside of the side cover contains a similar illustration.

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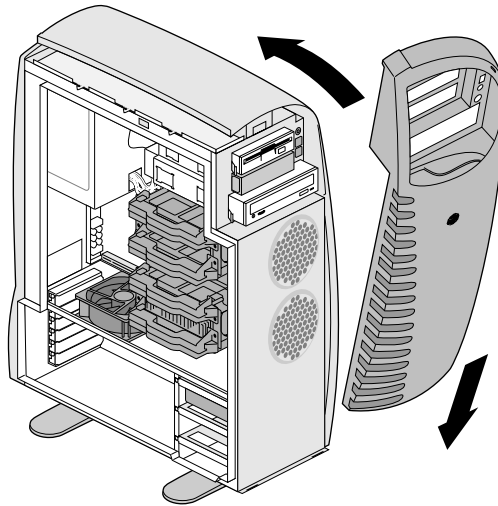
## Replacing the Covers

To replace the front cover, go to “Replacing the Front Cover” on page 24. To lift the system and replace the side cover go to “Lifting the System to an Upright Position” on page 25, and to replace the side cover go to “Replacing the Side Cover” on page 25.

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### Replacing the Front Cover

1. Replace the front cover by placing the front cover tabs in the slots in the groove at the bottom of the chassis, as shown in Figure 2-7.
2. Tilt the front cover toward the chassis until it locks into place.



**Figure 2-7** Replacing the Front Cover



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## Lifting the System to an Upright Position

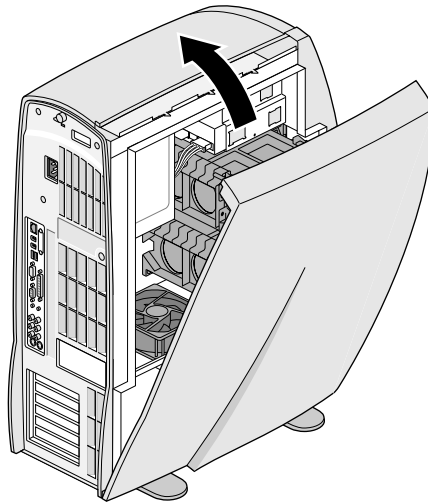
If your system is on its side, lift it before you replace the side cover.

1. Rotate the feet under the chassis.
2. Have someone help you lift the system to an upright position.
3. Rotate the four feet outward to stabilize the system.

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## Replacing the Side Cover

1. Place the bottom of the side cover in the groove at the bottom of the chassis. See Figure 2-8.
2. Tilt the top of the side cover toward the chassis.



**Figure 2-8** Replacing the Side Cover

3. Slide your free hand behind the system to support it before you close the side cover.
4. Press firmly in the center of the side cover's top edge until it snaps into place.
5. Plug in the workstation power cable to an electrical outlet.

6. Plug in any external device power cables to an electrical outlet.
7. You are ready to power on.

**Note:** Power on external devices before powering on the workstation to allow the workstation to recognize them.

For instructions on locking the system, see “Locking the System” on page 26.

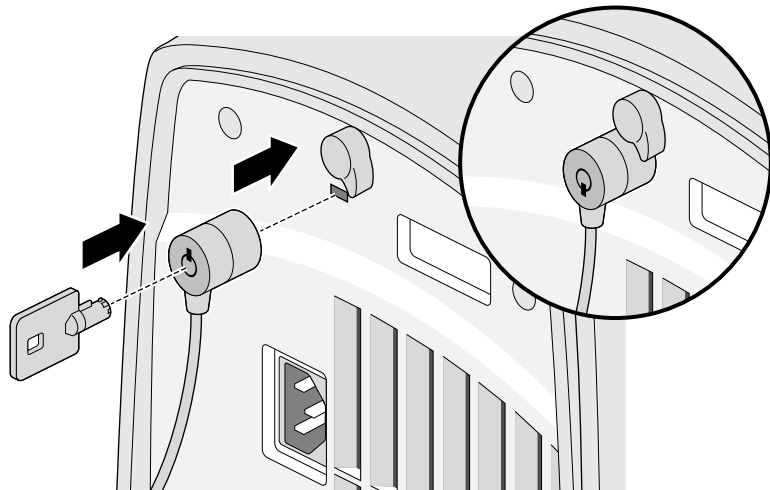
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## Locking the System

If you want to lock your Silicon Graphics 540 visual workstation, buy a Kensington lock from a computer retail store. Then follow these instructions for locking the workstation:

1. Turn the latch button counterclockwise to the locked position; the curved portion of the latch button points downward when it is latched. If you are not locking the system, you are ready to power on.
2. Insert the Kensington lock and key into the lock hole beneath the latch and turn the key. Remove the key, as shown in Figure 2-9.



**Figure 2-9** Locking the System

## *Chapter 3*

# **Memory**

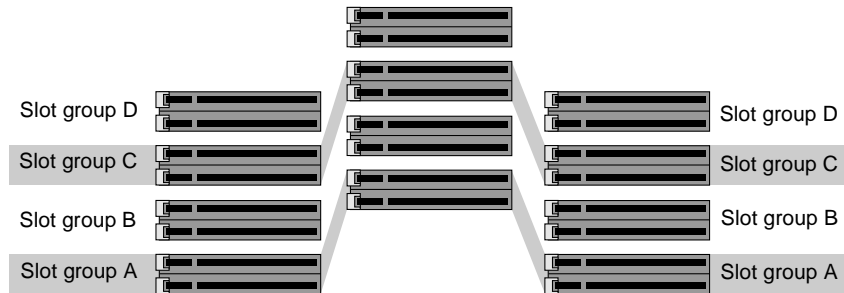
This chapter tells you how to install and remove DIMMs.

- “About Memory” on page 28
- “Installing DIMMs” on page 32
- “Verifying and Troubleshooting the DIMM Installation” on page 38
- “Removing DIMMs” on page 40

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## About Memory



**Figure 3-1** Map of DIMM Slot Groups

Before you install or remove DIMMs in your Silicon Graphics 540 visual workstation, read this information:

- The Silicon Graphics 540 visual workstation has four DIMM, or memory, slot groups: A, B, C, and D. See Figure 3-1.
- Each slot group is either empty, or contains six DIMMs of the same type and capacity. See Figure 3-1.
- Slot group A must always be populated.
- Slot groups are filled sequentially; when slot group A is filled, fill slot group B, and so on.
  - Type refers to the construction of the DIMM. Because DIMM construction cannot be determined visually, it is important to know that six DIMMs are the same type before you begin installation. (DIMMs are packaged in groups of six.) For example, if you insert six DIMMs of not all the same type in one slot group, the system may not work. Double-sided DIMMs and double-sided stacked DIMMs are two examples different types of memory.
  - Capacity refers to the number of megabytes in a DIMM or slot group.

- Each slot group contains DIMMs of the same capacity, but different slot groups may contain different capacity DIMMs. For example, slot group A may contain 256 MB DIMMs and slot group B may contain 128 MB DIMMs.
- When upgrading RAM, you need not put the largest DIMMs in the lower slot groups; place DIMMs of whatever capacity in the next available slot group.
- Minimum memory configuration is 128 MB in slot group A.
- Maximum memory configuration is 2 GB.
- DIMM slot groups are labeled on the system board.

The following table provides information on the memory combinations are possible in your workstation.

**Note:** The highest capacity memory does not have to be in slot group A. Move memory from slot group to slot group only when necessary.

- Only the following Silicon Graphics specialized DIMMs can be used in the Silicon Graphics 540 visual workstation:
  - Single-sided (high density) — 128 MB per slot group
  - Double-sided (high density) — 256 MB per slot group
  - Double-sided stacked (high density) — 512 MB per slot group

**Table 3-1** Examples of Memory Configuration

Total Memory	128 MB Single-sided	256 MB Double-sided	512 MB Double-sided stacked
128 MB	A <sup>a</sup>	-	-
256 MB	A,B	-	-
256 MB	-	A	-
384 MB	A, B, C	-	-
384 MB	A	B	-
384 MB	B	A	-

**Table 3-1** Examples of Memory Configuration (continued)

<b>Total Memory</b>	<b>128 MB Single-sided</b>	<b>256 MB Double-sided</b>	<b>512 MB Double-sided stacked</b>
512 MB	A, B, C, D	-	-
512 MB	A, B	C	-
512 MB	B, C	A	-
512 MB	A, C	B	-
512 MB	-	-	A
640 MB	A	B, C	-
640 MB	C	A, B	-
640 MB	B	A, C	-
768 MB	A, B	C, D	-
768 MB	B, C	A, D	-
768 MB	C, D	A, B	-
768 MB	-	A, B, C	-
768 MB	-	A	B
768 MB	-	B	A
896 MB	C	B	A
896 MB	C	A	B
896 MB	A	B	C
896 MB	B	A	C
896 MB	B	C	A
896 MB	D	A,B,C	-
896 MB	C	A,B,D	-
896 MB	B	A,C,D	-
896 MB	A	B,C,D	-
1 GB	-	A,B,C,D	-

**Table 3-1** Examples of Memory Configuration (continued)

<b>Total Memory</b>	<b>128 MB Single-sided</b>	<b>256 MB Double-sided</b>	<b>512 MB Double-sided stacked</b>
1 GB	-	-	A,B
1 GB	-	A,B	C
1 GB	-	B,C	A
1 GB, 128 MB	A	B,C	D
1 GB, 128 MB	B	A,C	D
1 GB, 128 MB	C	A,B	D
1 GB, 128 MB	D	A,B	C
1 GB, 128 MB	A	-	B,C
1 GB, 128 MB	B	-	A,C
1 GB, 128 MB	C	-	A,B
1 GB, 256 MB	A,B	-	C,D
1 GB, 256 MB	B,C	-	A,D
1 GB, 256 MB	C,D	-	A,B
1 GB, 256 MB	A,D	-	B,C
1 GB, 256 MB	A,C	-	B,D
1 GB, 256 MB	B,D	-	A,C
1 GB, 256 MB	-	A	B,C
1 GB, 256 MB	-	B	A,C
1 GB, 256 MB	-	C	A,B
1 GB, 512 MB	-	A,B	C,D
1 GB, 512 MB	-	B,C	A,D
1 GB, 512 MB	-	C,D	A,B
1 GB, 512MB	-	-	A,B,C
1 GB, 640MB	A	-	B,C,D

**Table 3-1** Examples of Memory Configuration (continued)

Total Memory	128 MB Single-sided	256 MB Double-sided	512 MB Double-sided stacked
1 GB, 640 MB	B	-	A,C,D
1 GB, 640 MB	C	-	A,B,D
1 GB, 640 MB	D	-	A,B,C
1 GB, 768 MB	-	A	B,C,D
1 GB, 768 MB	-	B	A,C,D
1 GB, 768 MB	-	C	A,B,D
1 GB, 768 MB	-	D	A,B,C
2 GB	-	-	A,B,C,D

a. Letters A, B, C, D refer to slot groups.

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## Installing DIMMs

Read “About Memory” on page 28 before installing DIMMs.

1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

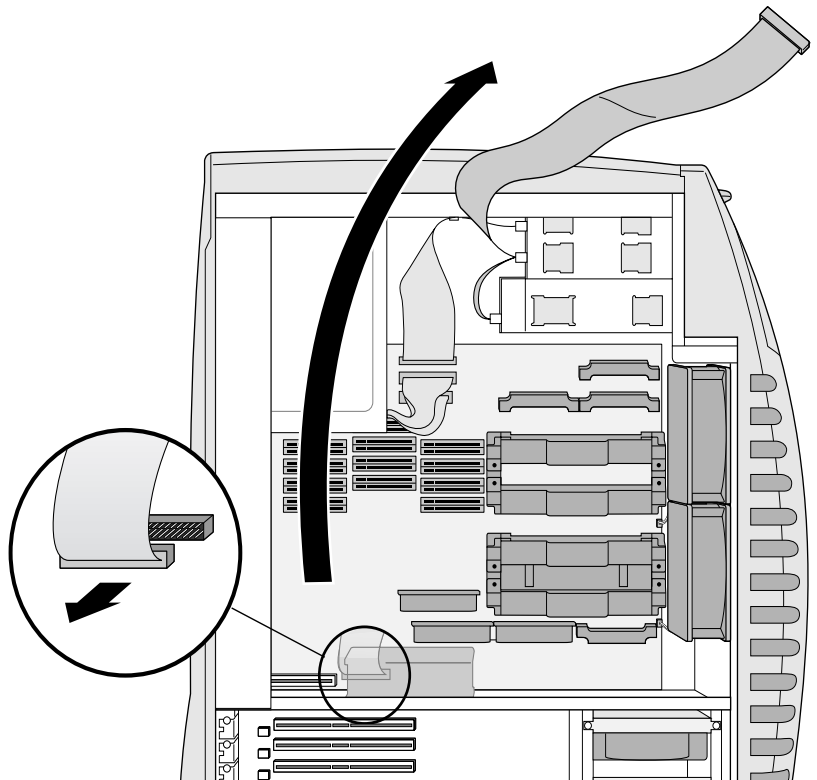
**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in this step prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.



4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.
5. Laying the system on its side is recommended for installing memory. For detailed instructions, see “Laying the System on Its Side” on page 22.

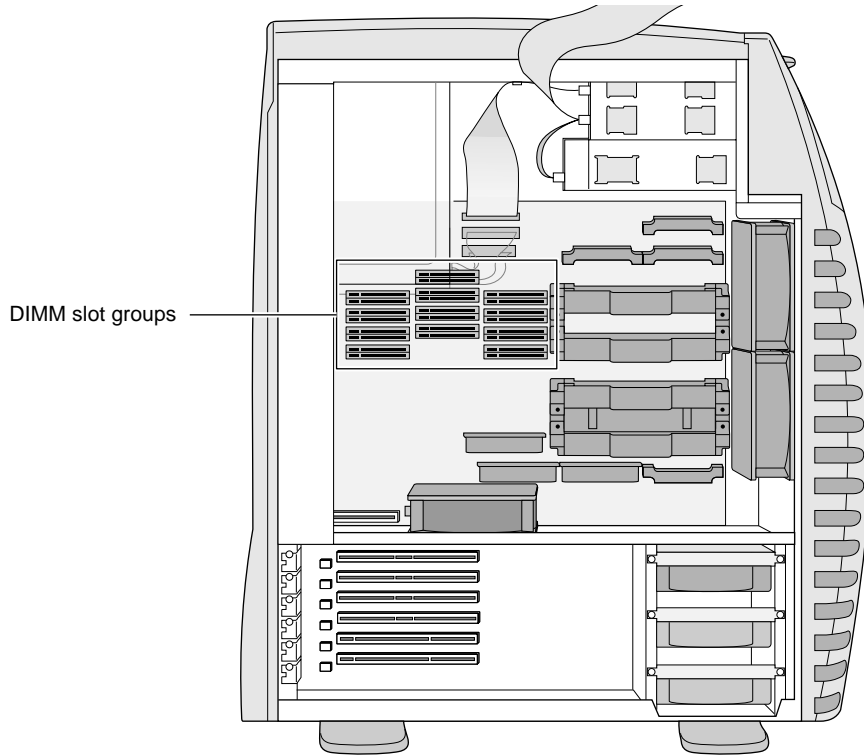
Note the orientation of the IDE cable in relation to the system board. The cable must be replaced in the same orientation to ensure proper airflow.

6. Remove the IDE cable from its connector on the system board, being careful not to pull out the horizontal fan cable and drape it over the top of the workstation. See Figure 3-2.



**Figure 3-2** Removing the IDE Cable

7. Locate the DIMM slot groups in the center of the system board, as shown in Figure 3-3.



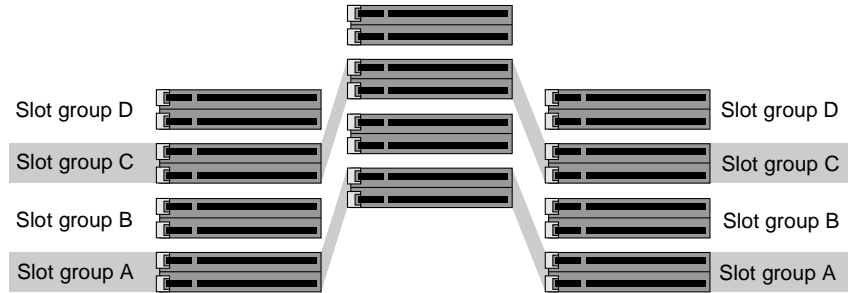
**Figure 3-3** Locating DIMM Slot Groups

**Note:** Slot group A must always be populated.

- Plan to insert six DIMMs into an empty slot group adjacent to a filled slot group.

Example: If DIMMs are in slot group A, install the next set of DIMMs in slot group B. See Figure 3-4.

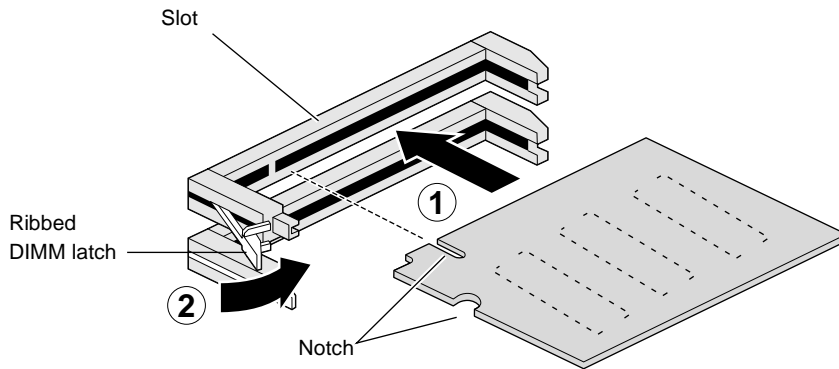
Begin your task with the right row of the DIMM slot group. The location of other system parts makes the installation easier if you work from right to left.



**Figure 3-4** Populating DIMM Slot Groups

**Note:** DIMMs and slots are easily damaged. Take care to align the DIMM with the slot before applying pressure to insert it.

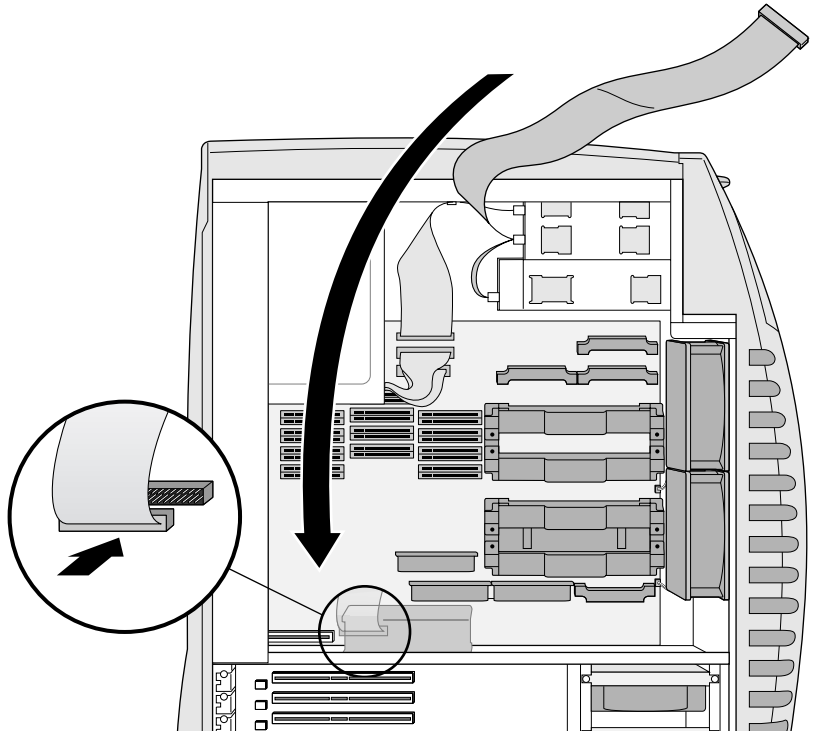
- Carefully place the DIMM in the slot before applying any pressure to seat it. The DIMM is notched for correct insertion, as shown in Figure 3-5. The DIMM fits snugly in the slot when it is correctly inserted.



**Figure 3-5** Inserting the DIMM in the Slot

- The ribbed DIMM latch should be parallel with the side of the slot when the DIMM is completely inserted. If it is not in a completely parallel position, move the latch toward the DIMM until it is completely upright. No force is needed. If the latch does not move, the DIMM is not properly seated.
- Fill the remaining slots of the DIMM slot group.

12. Reconnect the IDE cable to the system board. The cable connector is keyed so that it inserts only one way. The red stripe (pin 1) on the edge of the cable faces to the left. See Figure 3-6. Place it in the same orientation in the system as you found it to ensure proper airflow.



**Figure 3-6** Connecting the IDE Cable

13. Lift the system to an upright position. For detailed instructions, see “Lifting the System to an Upright Position” on page 25.
14. Replace the side cover. See “Replacing the Side Cover” on page 25.
15. Plug the system power cord into the electrical outlet.
16. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.

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## Verifying and Troubleshooting the DIMM Installation

You can determine the amount of recognized memory that you installed or removed by reading the Diagnostics screen that appears when the system is rebooting.

To determine the amount of memory you have installed or removed by accessing the Diagnostics screen, follow these steps:

1. After you have installed or removed memory, power on the system. As the system is booting, the Diagnostics screen appears.

**Note:** A message appears whenever memory is installed or removed and the system reboots the first time. The error message does not appear on subsequent reboots. The message is:

```
[53] Configuration - ** FAILED: Configuration changes:
error code 0x0002000
```

Near the bottom of the screen is another message indicating that the memory change is recognized:

```
Configuration Changes:
```

```
Memory configuration changed 0x00020000
```

2. Near the bottom of the Diagnostics screen is the following instruction: Press ESC to continue booting, or any other key for RAM information.

Press any other key. Information similar to the following example appears to confirm that the memory installation was successful and the memory is recognized by the system:

```
RAM Information
```

```
Slot group A 128 M Bytes
Slot group B 128 M Bytes
Slot group C 0 M Bytes
Slot group D 0 M Bytes
Total RAM 256 M Bytes
```

3. If after memory has been installed, a DIMM or DIMMs is not properly seated, or if it or the slot is damaged, an error message like this may be displayed on the Diagnostics screen:

```
[06] ECC RAM Bus - ** FAILED : error code  
0x00000010  
[0a] Test valid RAM Banks - ** FAILED : error code  
0x000104b4
```

Press a keyboard key (other than ESC) for more information.  
Information similar to the following example appears:

```
RAM Information  
  
Slot group A 128 M Bytes  
Slot group B 128 M Bytes - Bad  
Slot group C 0 M Bytes  
Slot group D 0 M Bytes  
Total RAM 256
```

If the above error message appears, reread “About Memory” on page 28 to be sure you have the same type of memory installed in the same slot group, the correct slot group is populated, and so on. If necessary, repeat the installation procedure.

If after repeating the installation process, the memory is not recognized, call your authorized service representative. See Chapter 9, “Customer Support Services” on page 150 for customer support phone numbers.

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## Removing DIMMs

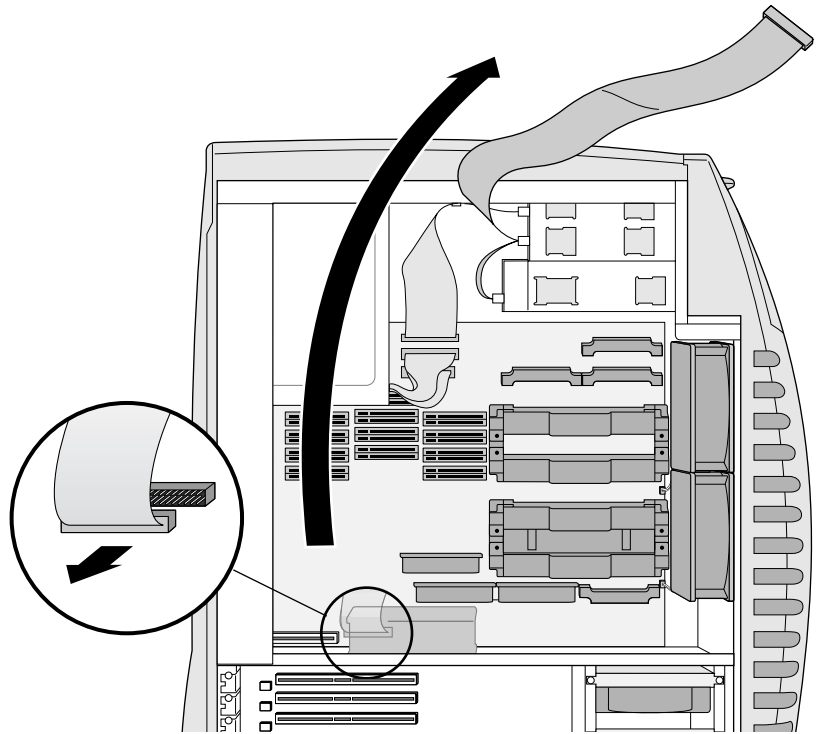
1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.
5. Laying the system on its side is recommended for removing memory. For detailed instructions, see “Laying the System on Its Side” on page 22.



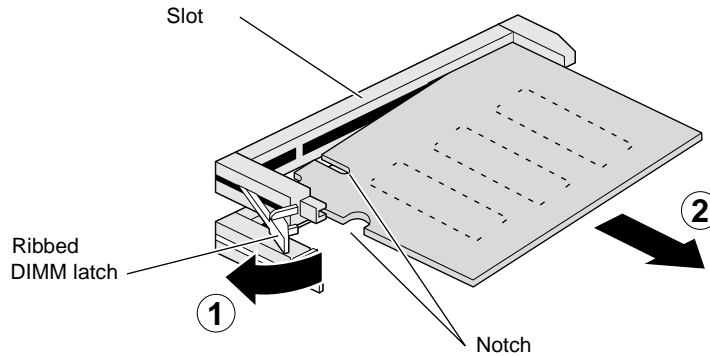
6. Remove the IDE cable from the system board and drape it over the top of the workstation.



**Figure 3-7** Disconnecting the IDE Cable

7. Locate the DIMM slot groups in the center of the system board.
8. To remove a DIMM, press on the ribbed DIMM latch at the left of the slot. The bottom of the latch pushes one edge of the DIMM out of the slot. See Figure 3-8.
9. Carefully pull the DIMM straight out of the slot to avoid damaging the pins; do not pull it out at an angle.

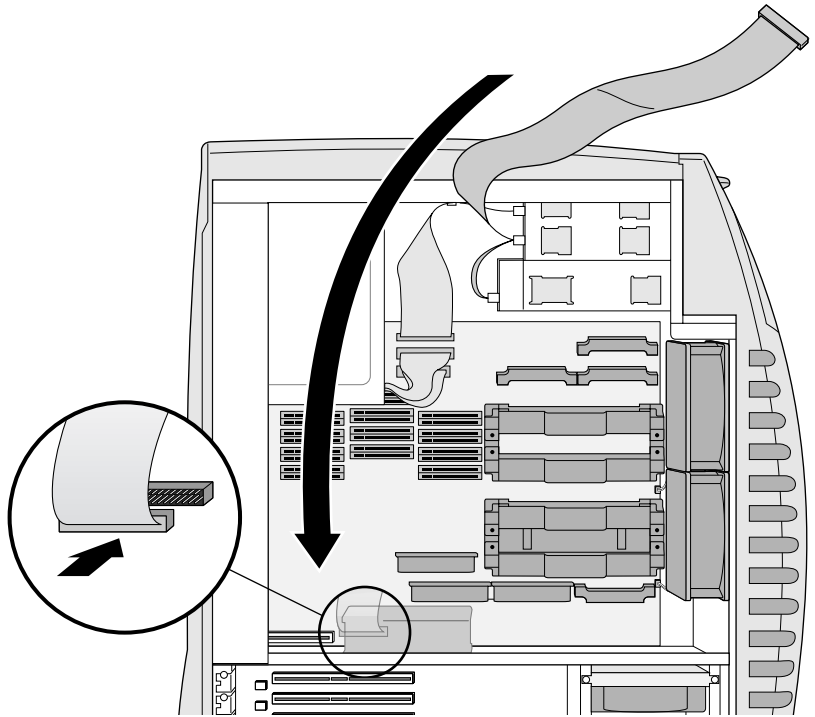
**Caution:** Six DIMMs make up a slot group. For any DIMM removed and not immediately replaced, you must also remove the remaining DIMMs in the slot group or the system may not work.



**Figure 3-8** Removing a DIMM

10. If you are installing DIMMs, go to step 5 of “Installing DIMMs” on page 32 for instructions on how to install the replacement DIMMs or to step 11 in this section to replace the IDE cable and the side cover, and to power on.

11. Replace the IDE cable to the system board. Turn the connector so that the red stripe is on the left.



**Figure 3-9** Replacing the IDE Cable

12. Lift the system to an upright position. For detailed instructions, see “Lifting the System to an Upright Position” on page 25.
13. Replace the side cover. See “Replacing the Side Cover” on page 25.
14. Plug the system power cord into the electrical socket.
15. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.



## *Chapter 4*

# **Internal Drives**

This chapter contains the following sections:

- “About Removable Media Drives” on page 46
- “Installing a Removable Media Drive” on page 47
- “Verifying and Troubleshooting Removable Media Drive Installation” on page 55
- “Removing a Removable Media Drive” on page 55
- “About Internal Hard Drives” on page 61
- “Installing Internal Hard Drives” on page 61
- “Verifying and Troubleshooting Internal Hard Drive Installation” on page 66
- “Removing an Internal Hard Drive” on page 66

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## About Removable Media Drives

Removable media drives in the Silicon Graphics 540 visual workstation run on either a Floppy Disk Interface (FDI) or Integrated Device Electronics (IDE) bus.

- The top 3.5 in. x 1 in. bay is for a floppy drive (FDI bus).
- The middle 3.5 in. x 1 in. removable media bay is for an option drive (IDE bus).
- The bottom 5.25 in. x 1.6 in. bay is for an IDE CD-ROM or Digital Video Disc-ROM (DVD-ROM) drive (IDE bus).
- A single drive on the IDE cable must be attached to the end connector, or the system may not boot or will not function properly.
- An IDE drive is either a Master or a Slave on the IDE bus.
- A single IDE drive that is preinstalled is set as Master. A single IDE drive set as Slave is not recognized by the system.
- All single IDE drives must be set as Master.
- The second device on the IDE bus is set as Slave.
- Consult the label on the drive or the drive's documentation to determine how to set the jumpers, or to determine the current setting.

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## Installing a Removable Media Drive

Read this procedure if you are:

- Installing a new drive in an empty slot.
- Replacing a drive already installed in a slot.

The differences are minimal and are called out in the procedure. For general drive information and information about which drives to use in the available bays, read “About Removable Media Drives” on page 46.

1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in this step prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

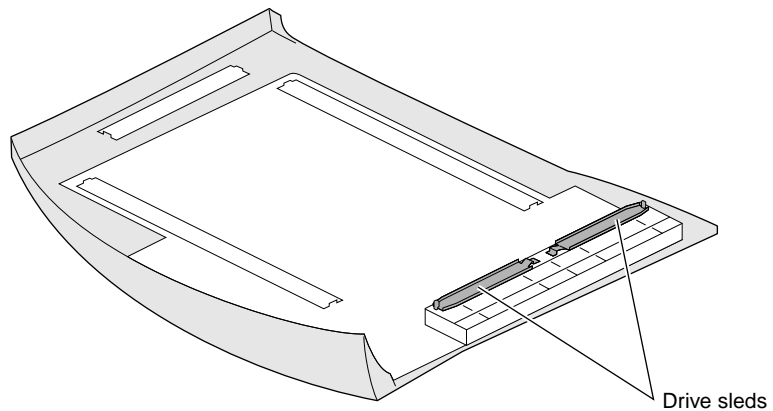
4. Remove the side and front covers. For detailed instructions, see “Removing the Side Cover” on page 19 and “Removing the Front Cover” on page 18.
5. If you are installing a new IDE drive, set the jumpers on the back of the drive. If it is the only IDE drive in the system, set it as Master. If it is the second IDE drive, set it as Slave. See the manufacturer’s sticker or documentation to determine the jumper setting and how to change it.

6. Locate the drive sleds.

If you are replacing a removable media drive, use the sleds from the installed drive after you remove that drive. See “Removing a Removable Media Drive” on page 55 for more information.

If you are installing a new drive, find the drive sleds and screws inside the side cover. The screw packets are located beneath the drive sleds. See Figure 4-1.

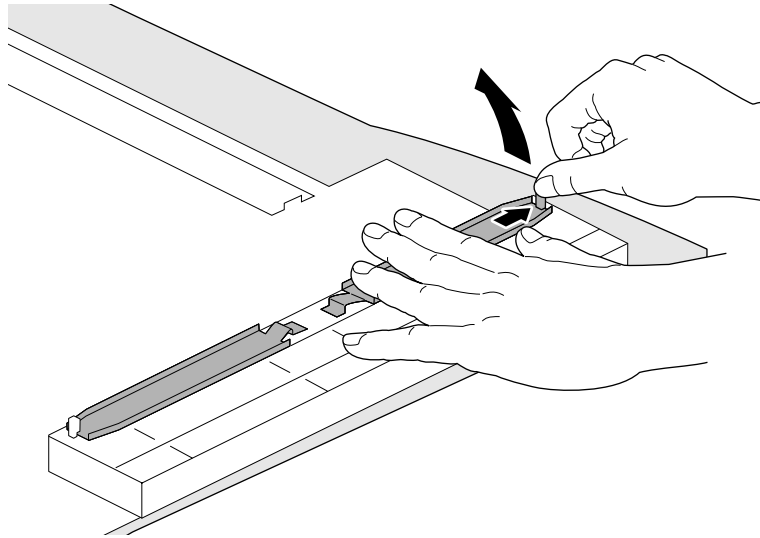
**Note:** The two screw packets contain two different types of screws, one more finely threaded than the other. Generally speaking, the (bag of four) M3 x 6 screws are used for removable media drives. The (bag of 12) 6/32 x 1/4 screws are used for hard drives.



**Figure 4-1** Locating the Drive Sleds

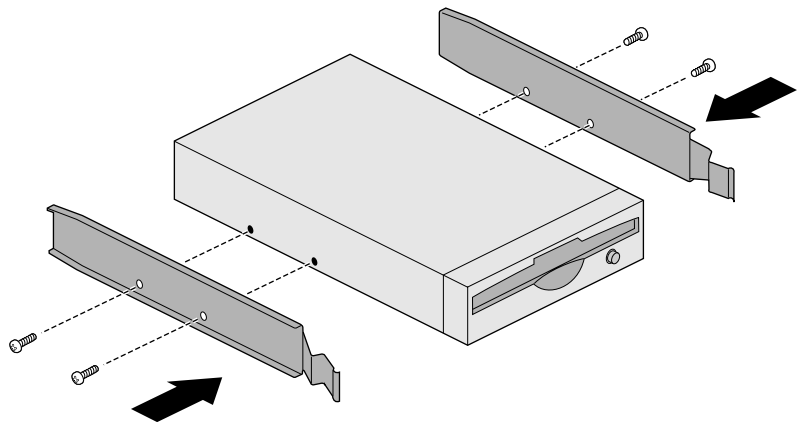
**Warning:** Take care when removing the drive sleds from the side cover. Place one hand over the middle of the sled to prevent it from flying up when it is released, as shown in Figure 4-2. Release the sled by pushing outward on the tab holding the sled in place. The sled releases. Release the other sled in the same manner.





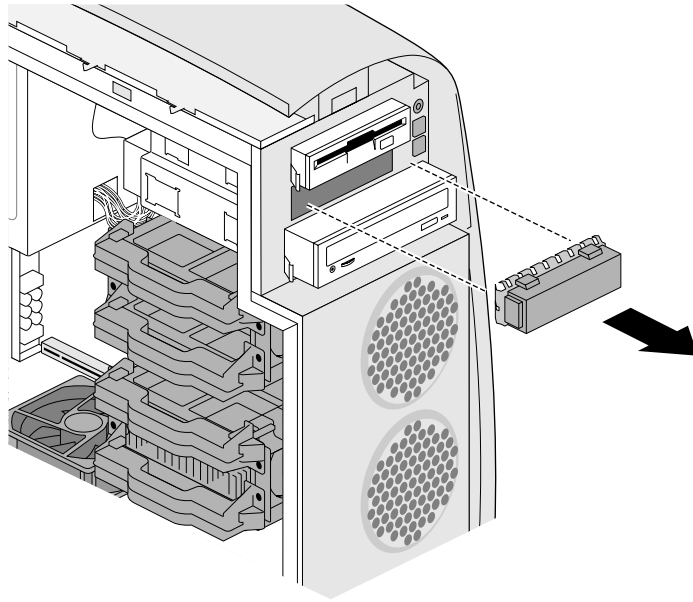
**Figure 4-2** Removing the Drive Sleds

7. Attach the drive sleds to the sides of the drive with the appropriate screws, as shown in Figure 4-3. The sleds allow the drive to be held firmly in place in the drive bay. A variety of holes on the drive sled allow you to attach the sled to different drives.



**Figure 4-3** Attaching the Drive Sleds

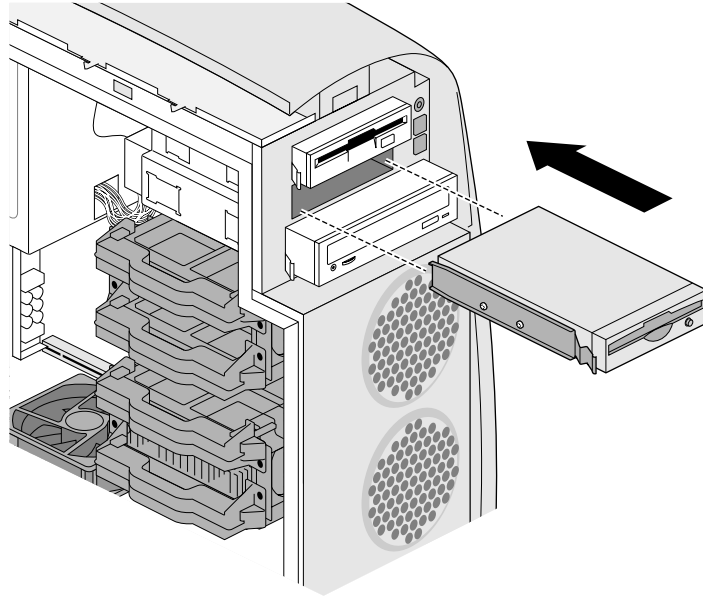
8. Locate the blank panel in the drive bay into which you will place the drive, grab the edge, and pull the panel out of the drive bay. See Figure 4-4.



**Figure 4-4** Removing the Blank Panel

Keep the blank panel. You must replace it if you ever remove a drive and do not replace it immediately.

- Slide the drive into the drive bay. The front of each sled locks it to the drive bay. See Figure 4-5.



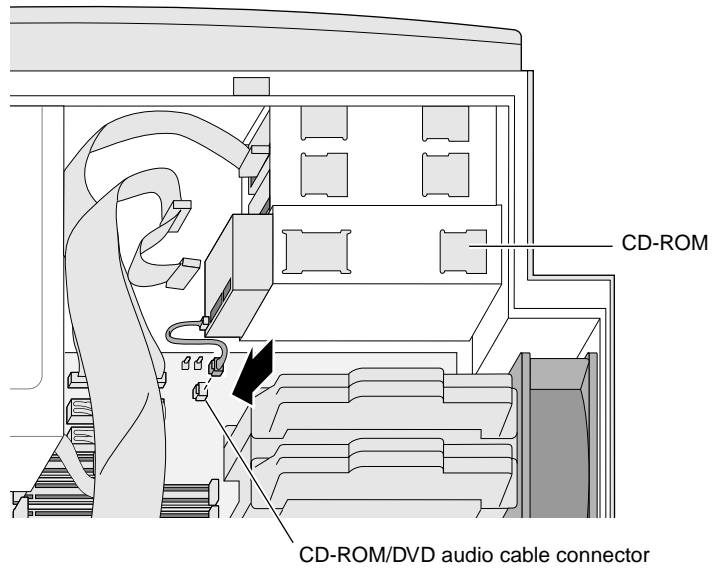
**Figure 4-5** Placing the Drive in the Drive Bay

- Attach the drive and power cables.

Because of the placement of cable connectors, you must follow the order presented here for cable connections. The order depends on how many drives you are installing and into which bays.

**Caution:** Memory (DIMMs) is very sensitive to static electricity and jarring. Be careful not to bump the DIMMs as you install the cables.

- Option IDE drive
  - If you are installing a CD-ROM or DVD-ROM drive, install the audio cable to the connector on the system board. The cable is keyed so that you cannot insert it incorrectly. See Figure 4-6.

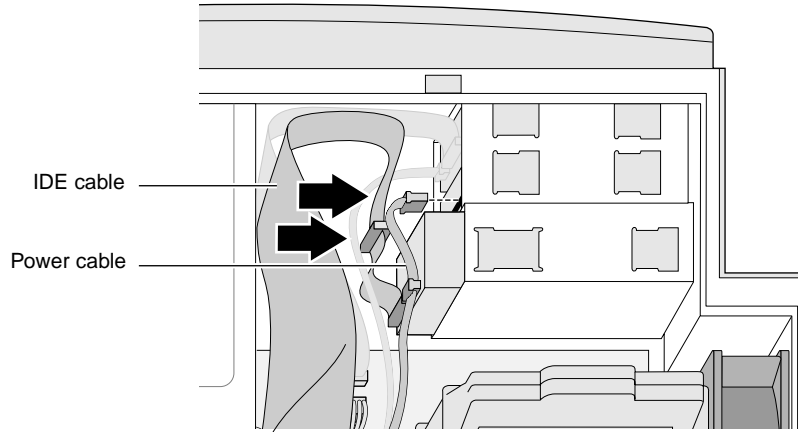


**Figure 4-6** Connecting the Audio Cable

The IDE cable is already attached to the system board. The IDE and power cables are keyed so that you cannot insert them improperly.

- If you are installing one option drive in either the middle or bottom drive bay, attach the end connector on the IDE cable to the back of the IDE drive. See Figure 4-7.

**Caution:** When only one IDE drive is installed, the connector on the end of the IDE cable must be attached to the single drive. Your system may not boot, or may or may not function properly if the wrong cable connector is used.

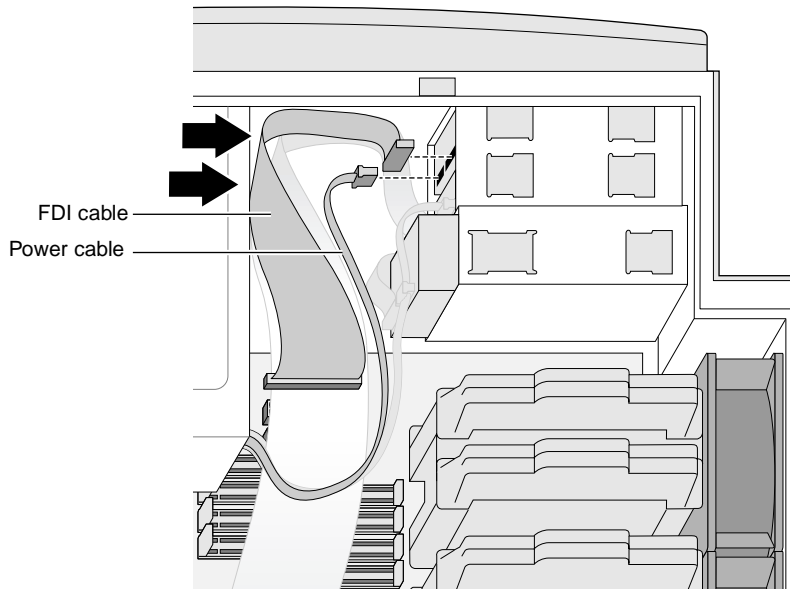


**Figure 4-7** Attaching the IDE and Power Cables

- If you are installing two option drives (in the middle and bottom bays), attach both connectors on the IDE cable to the back of the IDE drives—the middle connector to the drive in the middle bay, and the end connector to the drive in the bottom bay. See Figure 4-7.
- Attach the power cable from the power supply to the IDE drive. The power cable connectors are different sizes for different drive types and keyed so they can be inserted only one way. See Figure 4-7.

- Floppy Drive

- Attach the power cable to the back of the floppy drive. The cable is keyed so that you can insert it only one way. See Figure 4-5 to install the cables to the floppy drive.
- Attach the FDI cable to the back of the floppy drive. The cable is keyed so that you can insert it only one way. (The FDI cable is already attached to the system board.)



**Figure 4-8** Attaching the FDI Cable

11. Replace the covers. For detailed instructions, see “Replacing the Covers” on page 24.
12. Plug the system power cord into an electrical outlet.
13. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.

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## Verifying and Troubleshooting Removable Media Drive Installation

Use the Windows NT Diagnostics panel to verify that the system recognizes that your drives are installed. To open the panel follow these steps:

1. Press the power button on the workstation.
2. When the system is powered on, from the Start menu choose Programs > Administrative Tools > Windows NT Diagnostics > Drives.
3. If the system does not recognize the drive, shut down and reopen the system as shown in “Shutting Down the System” on page 14 and “Removing the Covers” on page 18. Then:
  - Check to make sure the power and ribbon cables are correctly attached to the back of the drive.
  - Check the jumpers on the drives to verify they are set to Slave for a drive in the bottom 3.5-inch bay and to Master for a drive in the 5.25-inch bay.
4. Close and reboot the system. If the system still does not recognize the drive, either the drive or the cable may be faulty. Contact your authorized service representative. See Chapter 9, “Customer Support Services” on page 150.

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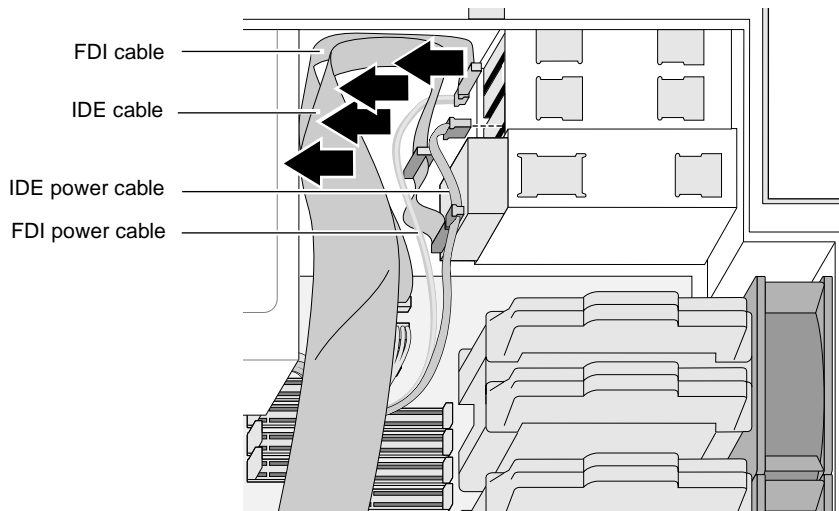
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## Removing a Removable Media Drive

1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in this step prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

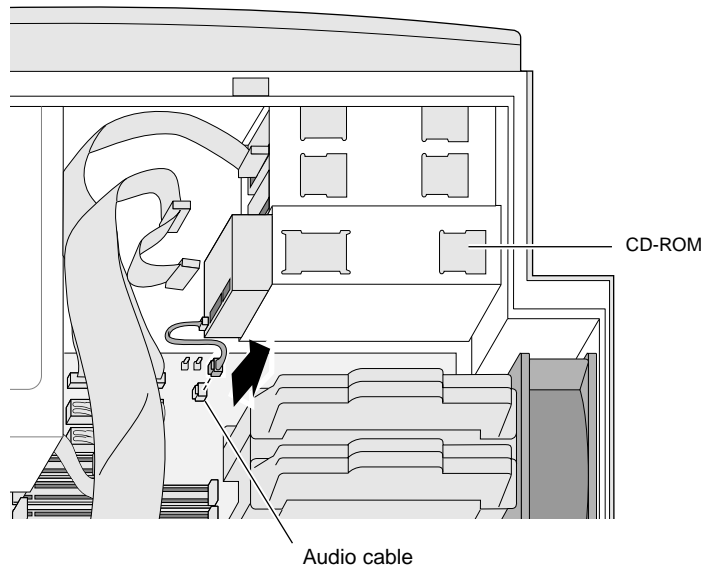
4. Remove the side and front covers. For detailed instructions, see “Removing the Side Cover” on page 19 and “Removing the Front Cover” on page 18.
5. Remove the cables from the back of the drive(s). See Figure 4-9.
  - For the floppy drive, remove the FDI cable, and then the FDI power cable. Press down on the locking tab on the power cable to release it.
  - For the IDE drives, remove the power cable, and then the IDE cable.



**Figure 4-9** Removing the Cables

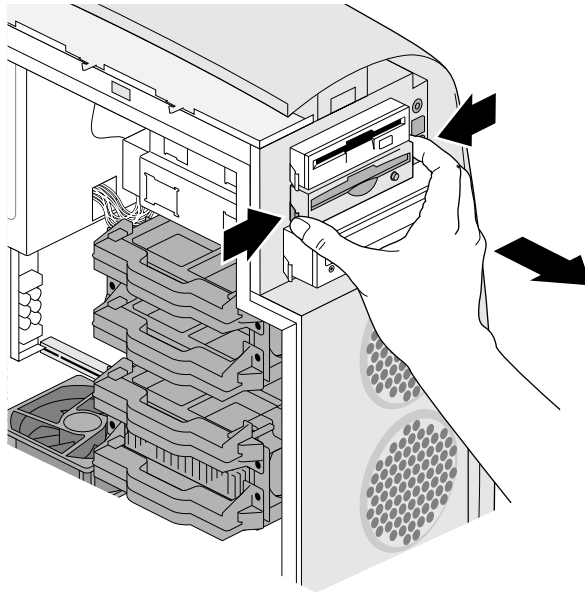


- When removing a CD-ROM or DVD-ROM drive, also unplug the audio cable from the system board. Press down on the locking tab to release the cable. See Figure 4-10.



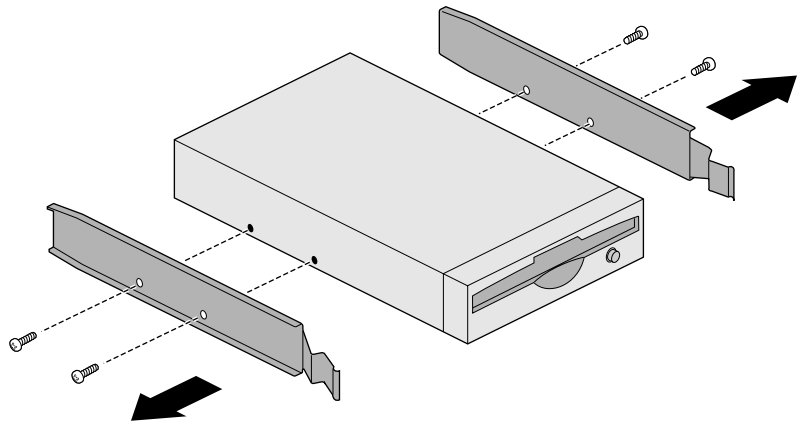
**Figure 4-10** Unplugging the Audio Cable

6. Facing the front of the system, pinch the edges of the drive sleds toward the drive to release it and slide the drive out of the drive bay. See Figure 4-11.



**Figure 4-11** Removing the Drive

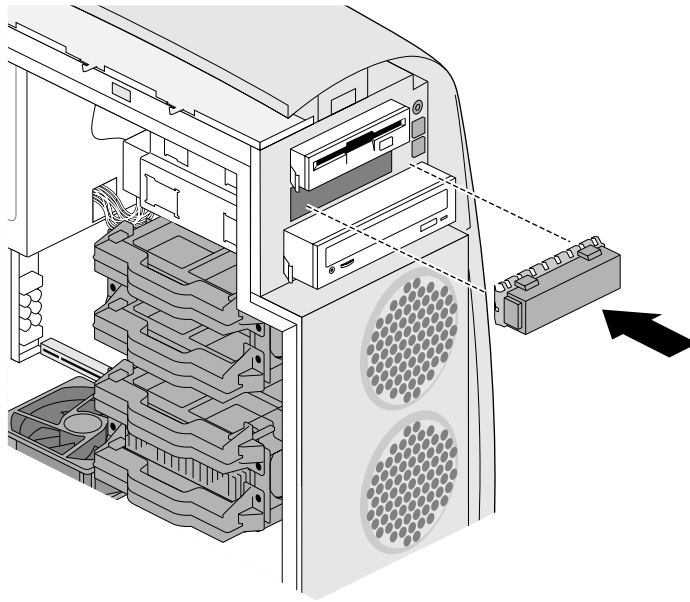
7. Remove the screws from the drive sleds. Keep the sleds and screws for future use. They can be stored beneath the drive sleds inside of the side cover.



**Figure 4-12** Removing the Drive Sleds for Future Use

8. If you are replacing a drive, go to “Installing a Removable Media Drive” on page 47. If you are not replacing an IDE drive:
  - If only one drive will remain in the system, check that the jumper on the drive is set to Master.

- Place a blank panel into the empty drive bay as shown in Figure 4-13.



**Figure 4-13** Placing the Blank Panel Over the Drive Bay

9. Replace the front and side covers. For detailed instructions, see “Replacing the Covers” on page 24.
10. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.

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## About Internal Hard Drives

Three internal SCSI hard drive bays are available on the Silicon Graphics 540 visual workstation.

- The three internal hard drives are on an Ultra2 SCSI bus using the integrated SCSI connector.
- The system drive occupies the top bay, bay 1. It must be installed in this location for the system to function.
- Two option bays (bays 2 and 3) for 3.5" x 1.6" hard drives, are beneath the system drive.
- The internal hard drives connect to the system board with an SCA (single connector attach) connector. To replace any internal Ultra2 SCSI hard drive, purchase a drive with this type of connector.

See Appendix C for more SCSI information.

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## Installing Internal Hard Drives

To install an internal hard drive, follow these instructions:

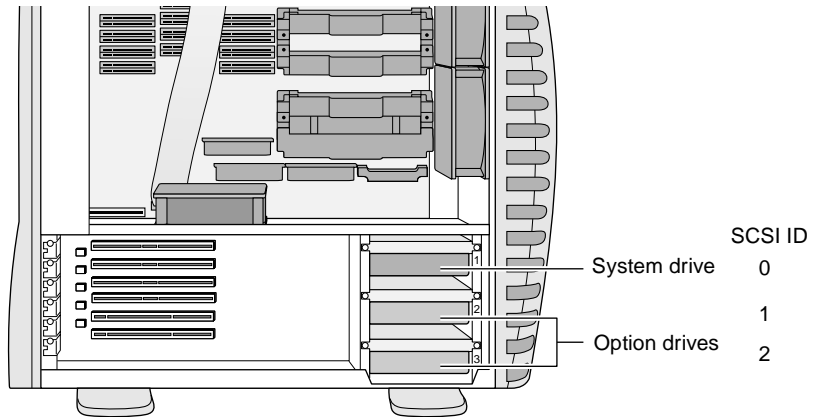
1. Shut down the system. For detailed instructions, see "Shutting Down the System" on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in this step prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.

When you are facing the system with the side cover off, the system and option hard drives are located in the lower right corner of the workstation.

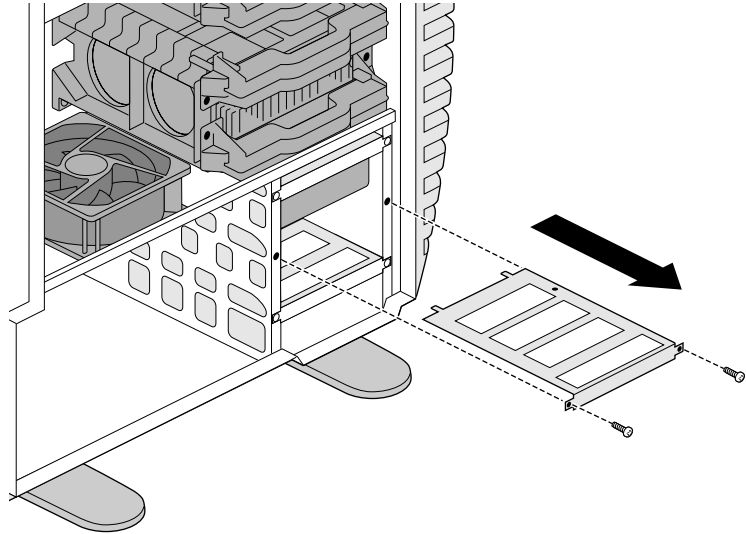
See Figure 4-14 to locate the drive bay in which you want to install a drive. The drives are numbered on the chassis to the right of the drive bays.



**Figure 4-14** Locating the System and Option Drives

5. From an unoccupied drive bay, with a Phillips screwdriver, remove the two screws holding the drive bracket to the chassis and slide out the drive bracket. See Figure 4-15.

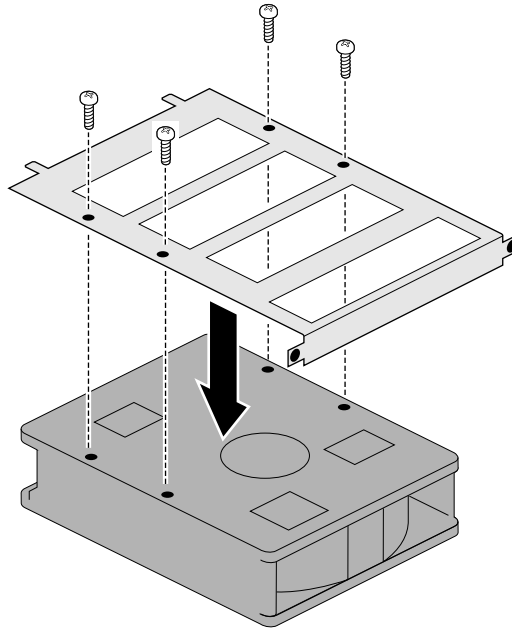
Save the screws to reattach the bracket in a later step.



**Figure 4-15** Removing a Drive Bracket

6. Turn the drive upside down on a clean, dry surface. Your desktop works well. See Figure 4-16.
7. Place the drive bracket on top of the drive, and attach the bracket to the drive. If screws did not come with the drive, use the extra screws beneath the drive sleds on the side cover.

**Note:** The two screw packets contain two different types of screws, one more finely threaded than the other. Generally speaking, the (bag of four) M3 x 6 screws are used for removable media drives. The (bag of 12) 6/32 x 1/4 screws are used for hard drives.



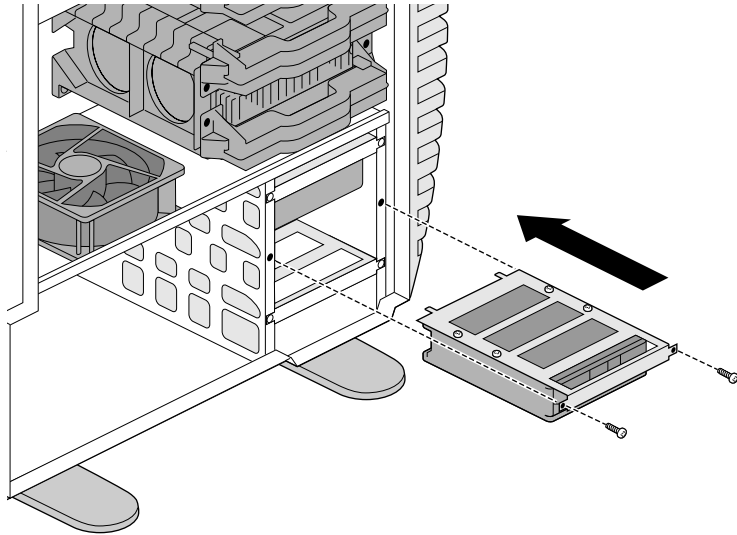
**Figure 4-16** Attaching the Drive Bracket

8. Keeping the drive upside down, slide the drive and bracket into the unoccupied drive bay, as shown in Figure 4-17.
9. Attach the bracket and hard drive to the chassis with two screws you removed from the bracket.

The SCA connector on the back of the drive (that attaches to the system board) provides both power and the Ultra2 SCSI bus connection.



SCSI information is found in Appendix C.



**Figure 4-17** Attaching the Drive to the Chassis

10. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
11. Plug the system power cord into an electrical outlet.
12. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.

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## Verifying and Troubleshooting Internal Hard Drive Installation

Use the Windows NT Diagnostics panel to verify that the system recognizes that your drives are installed. To open the panel follow these steps:

1. Press the power button on the workstation.
2. When the system is powered on, from the Start menu choose Programs > Administrative Tools > Windows NT Diagnostics > Drives.
3. If the system does not recognize the drive, shut down and reopen the system (as shown in “Installing Internal Hard Drives” on page 61), and check to make sure the drive is fully seated.
4. Close and reboot the system. If the system still does not recognize the drive, it may be faulty. Contact your authorized service representative. See Chapter 9, “Customer Support Services” on page 150.

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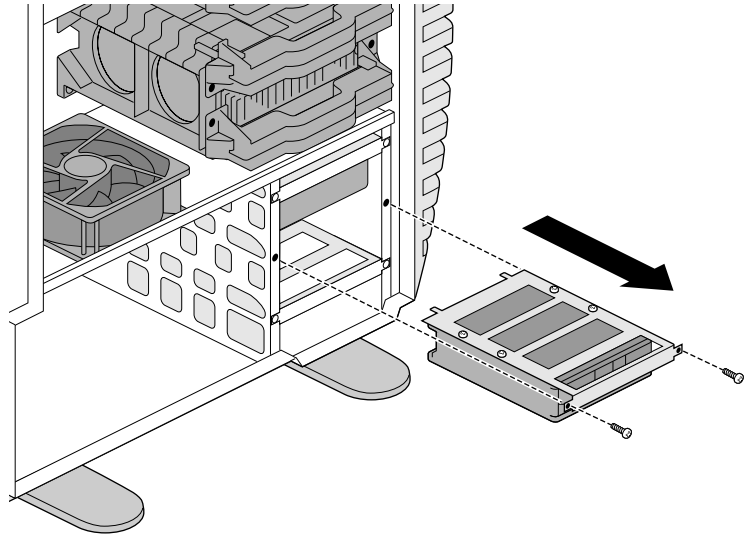
## Removing an Internal Hard Drive

1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in this step prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

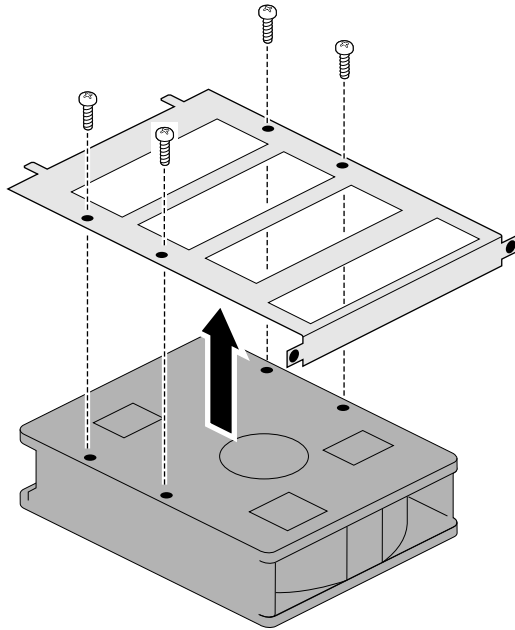
4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.
5. With a Phillips screwdriver, remove the two screws holding the drive bracket to the chassis, and remove the bracket and the attached drive from the bay. See Figure 4-18.

Save the screws to reattach the bracket in a later step.



**Figure 4-18** Removing the Internal Drive and Bracket

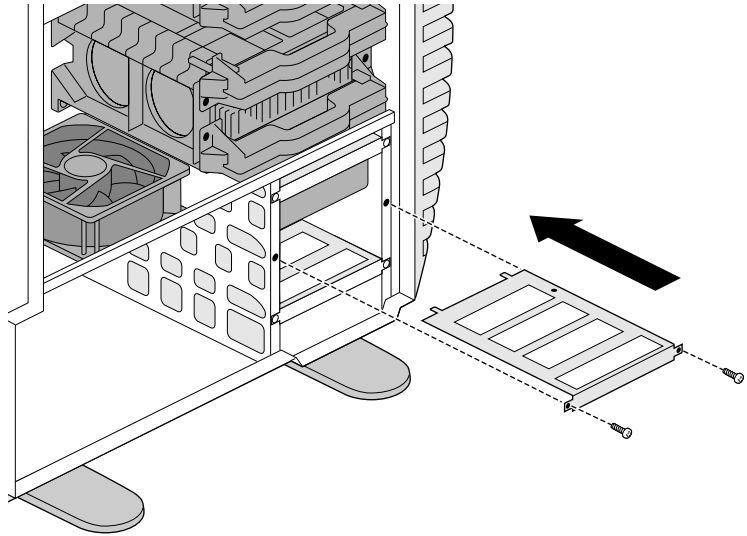
6. Detach the bracket from the drive by unscrewing the four screws that connect the top of the bracket and the drive. See Figure 4-19.



**Figure 4-19** Detaching the Drive Bracket

7. Install a new hard drive or simply replace the bracket.
  - To install a new hard drive, go to Step 6 of “Installing Internal Hard Drives” on page 61 and follow the steps to complete the task.
  - To replace the drive bracket with no attached drive, insert the drive bracket in to the empty drive bay, as shown in Figure 4-20.

8. Tighten the two screws to hold the drive bracket to the chassis.



**Figure 4-20** Inserting the Drive Bracket

9. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
10. Plug the power cord into an electrical outlet.
11. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.



## *Chapter 5*

# **Option Cards**

This chapter provides information about installing and removing option cards. Option cards include PCI cards as well as the Silicon Graphics SD1100 option card and the digital interface to the flat panel monitor. The following topics are covered in this chapter:

- “About PCI Cards” on page 72
- “Installing PCI Cards” on page 72
- “Removing PCI Cards” on page 77
- “Installing the Flat Panel Option Card” on page 80
- “Removing the Flat Panel Option Card” on page 84
- “Installing the Silicon Graphics SD1100 Option Card” on page 89
- “Removing the Silicon Graphics SD1100 Option Card” on page 96

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## About PCI Cards

Before installing PCI cards, read this section.

- PCI cards may or may not require configuration in the Silicon Graphics 540 visual workstation. Check any documentation included with your card.
- The Silicon Graphics 540 visual workstation has 6 PCI slots.
  - Slots 1-4 support 5 V and universal PCI cards.
  - Slots 5-6 support 3.3 V and universal PCI cards.
- If you are installing SCSI PCI cards, also see Appendix C, “SCSI Information.”

Before you can install a PCI card, you must remove the I/O blank panel. This panel covers the opening to the exterior when a card is not in place, ensures proper cooling of the workstation, and provides electromagnetic emissions (EMI) shielding.

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## Installing PCI Cards

Read “About PCI Cards” on page 72 first before installing PCI cards.

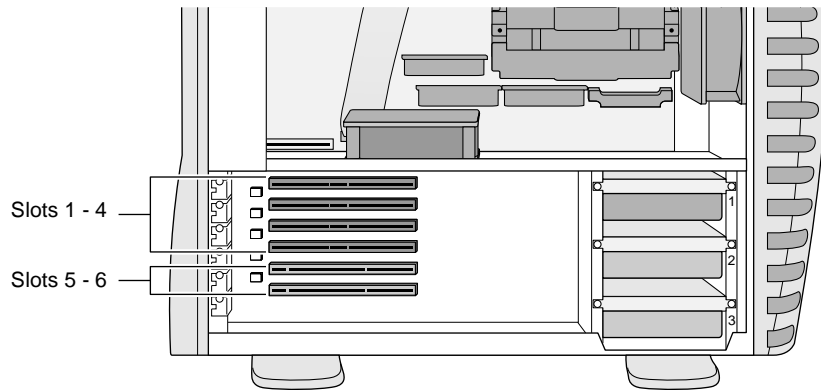
1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.



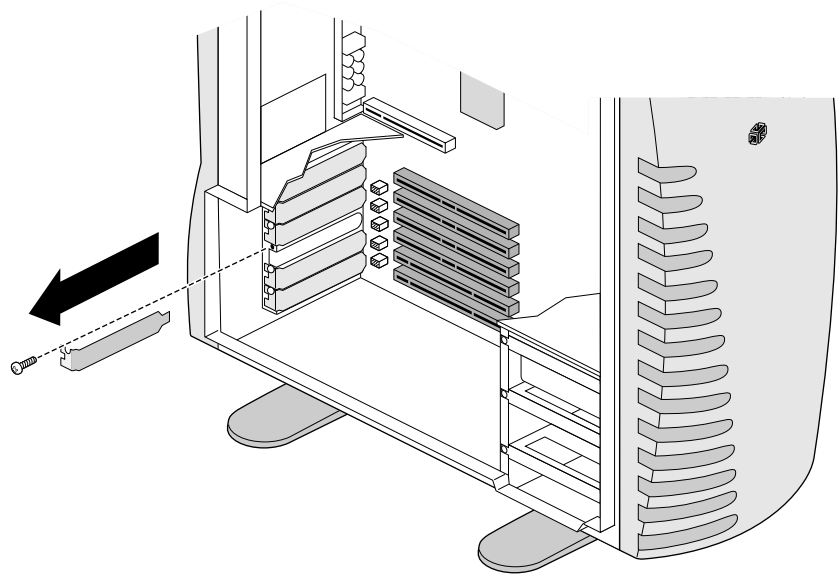
4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.
5. Laying the system on its side can be useful for seeing into the system. For detailed instructions, see “Laying the System on Its Side” on page 22.
6. Depending on the voltage of your PCI card, decide if it is to be inserted in slots 1 through 4 (5 V and universal cards) or slots 5 and 6 (3.3 V and universal cards).

**Note:** The cards and connectors are notched so that you cannot insert a card into an incorrect slot.



**Figure 5-1** Identifying the PCI Slots

7. Using a Phillips screwdriver, remove the screw from the I/O blank panel that is in the slot in which you wish to install a PCI card. See Figure 5-2.
8. Carefully remove the I/O blank panel so you do not bend or otherwise damage the metal fingers (EMI shielding) at the I/O opening in the chassis.



**Figure 5-2** Removing the I/O Blank panel

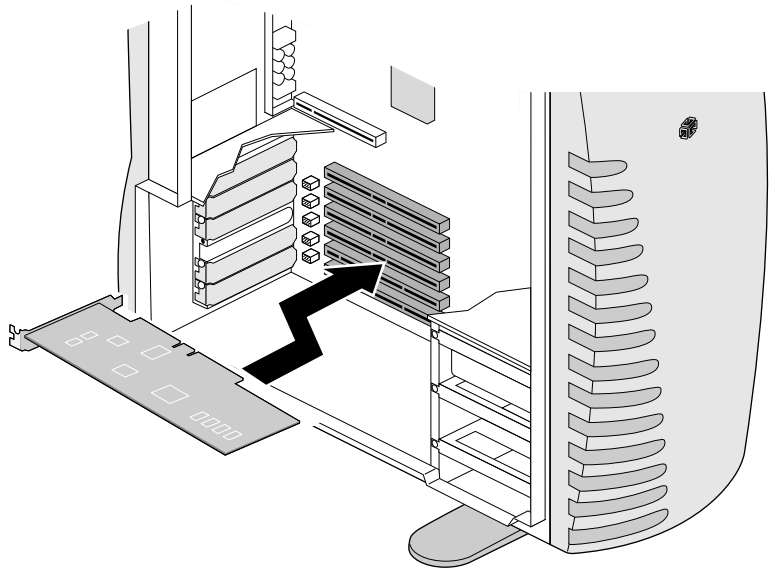
9. Turn the PCI board upside down, so that the connector is to the left. See Figure 5-3.

**Caution:** As you insert the PCI card, be careful not to bend the metal fingers (EMI shielding) at the edge of the I/O opening.

10. Tilt the card slightly, so that the left side of the card enters the chassis first.
11. Straighten the card. Insert it so the connector is flush with the I/O panel, and the card is lined up with the connector on the system board and the card support on the right.

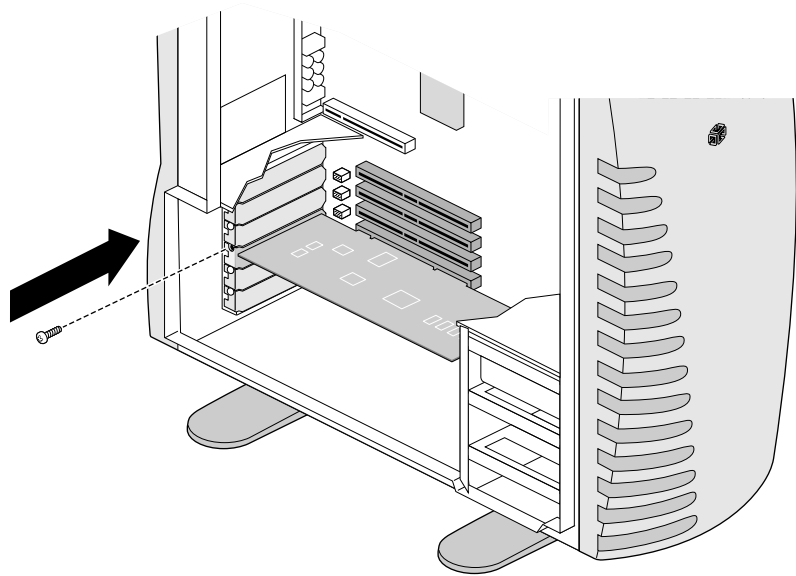
Be sure to insert the tip of the I/O connector in the metal slot on the I/O panel (near the system board).

12. Gently but firmly push the card so that the connector on the edge of the card is completely seated in the connector on the system board.



**Figure 5-3** Inserting a PCI Card

13. Insert the screw you removed with the I/O blank panel and tighten it until the PCI card is securely fastened to the chassis. See Figure 5-4.



**Figure 5-4** Inserting the PCI Card Screw

14. Attach the peripheral device cable to the PCI card connector on the exterior of the workstation.
15. Save the I/O blank panel to use again. If you remove a PCI card and do not replace it, you must replace the I/O blank panel.
16. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
17. Plug the system power cord into an electrical outlet.
18. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.

See the documentation that came with your option card for information on checking to see that the system recognizes the option card.

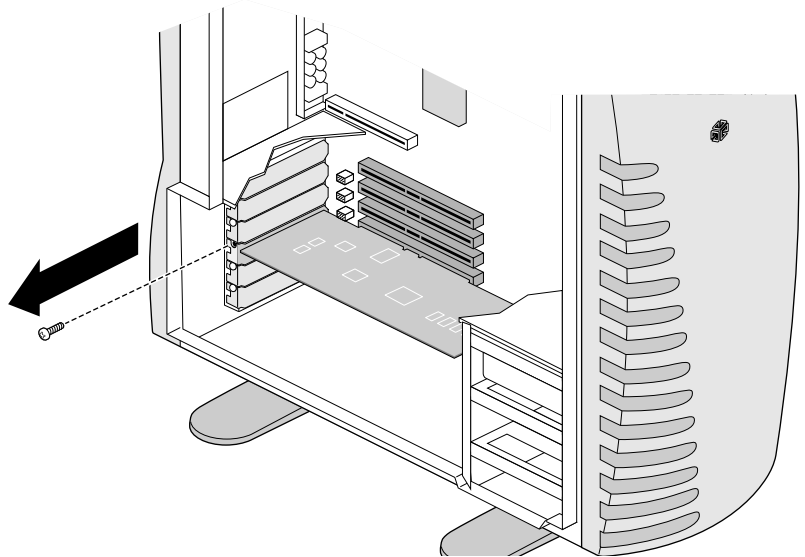
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## Removing PCI Cards

1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

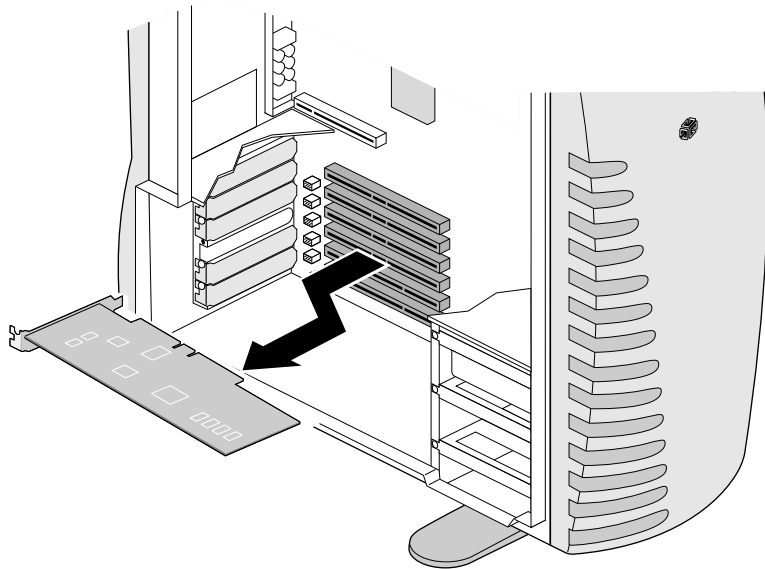
4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.
5. Use a Phillips screwdriver to remove the screw holding the PCI card. See Figure 5-5.



**Figure 5-5** Removing the PCI Screw

**Caution:** As you remove the PCI card, be careful not to bend the metal fingers (EMI shielding) at the edge of the I/O opening.

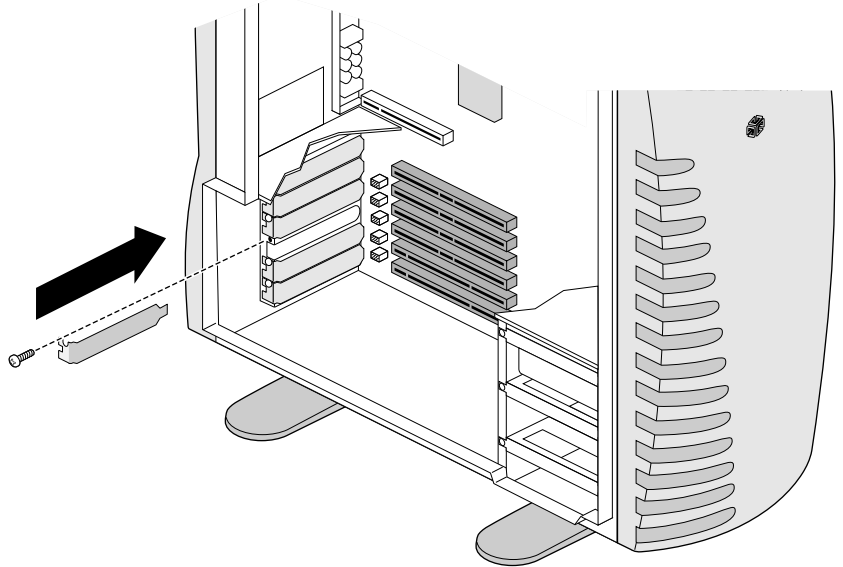
6. Pull the PCI card toward you until the PCI card connector releases and the card can be removed from the chassis. See Figure 5-6.
7. Tilt the card slightly, so that the right side of the card exits first. This allows you to remove the card without the PCI card connector hitting the edge of the chassis.



**Figure 5-6** Removing the PCI Card

**Caution:** As you insert the PCI I/O blank panel, be careful not to bend the metal fingers (EMI shielding) at the edge of the I/O opening.

1. If you are not replacing the PCI card, insert an I/O blank panel in the I/O slot from which you removed the card (Figure 5-7). Be sure to insert the tip of the I/O blank panel in the metal slot on the I/O panel (close to the system board). For instructions on inserting another PCI card, see “Installing PCI Cards” on page 72.
2. Insert the screw in the I/O panel, and tighten until the I/O blank panel is securely fastened to the chassis.



**Figure 5-7** Inserting the I/O Blank Panel in the I/O Slot

3. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
4. Plug the system power cord into an electrical outlet.
5. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.

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## Installing the Flat Panel Option Card

The flat panel monitor option card is the required interface for the Silicon Graphics flat panel monitor. The flat panel monitor cannot be connected to a typical analog VGA connector. If the flat panel monitor is connected, the monitor must be disconnected from the monitor port.

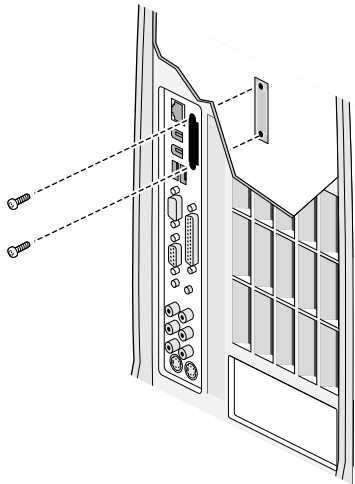
1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.



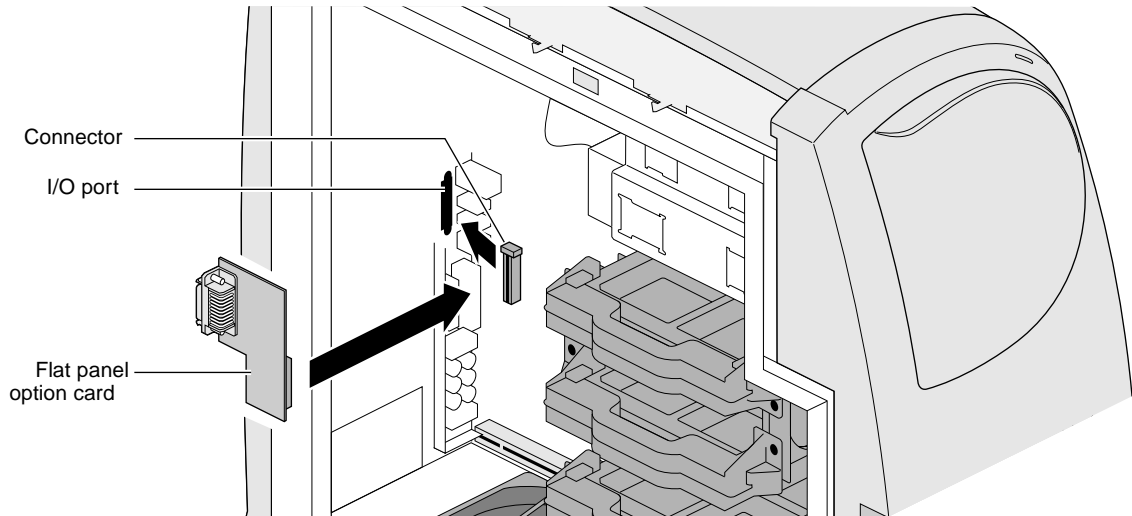
5. Locate the flat panel digital interface option card's I/O blank panel on the back of the workstation. See Figure 5-8.
6. Place one hand inside the workstation to prevent the I/O blank panel from falling when you unscrew the screws.
7. Using a Phillips screwdriver, unscrew the screws holding the I/O blank panel to the system. Save the I/O blank panel. If you ever remove the option card, you must replace the I/O blank panel.



**Figure 5-8** Removing the I/O blank panel

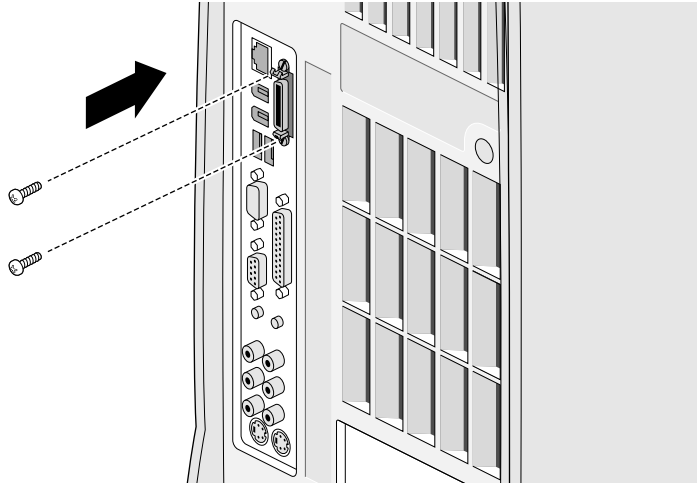
8. On the inside of the chassis, locate the flat panel option card connector beneath the power supply. See Figure 5-9.
9. Tilt the card to place the port connector through the I/O port.
10. Insert the flat panel digital interface option card into the connector on the system board.

**Caution:** DIMMs are very delicate. Be careful not to bump them as you insert the flat panel option card.



**Figure 5-9** Inserting the Flat Panel Option Card

11. Replace the screws, tightening the option card to the chassis, as shown in Figure 5-10.
12. You are finished installing the flat panel option card, and are ready to replace the side cover and power on.



**Figure 5-10** Replacing the Flat Panel Option Card Screws

13. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
14. Plug the system power cord into an electrical outlet.
15. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.

See the documentation that came with your option card for information on system recognition of the option card.

See the your flat panel owner’s guide for instructions for attaching the flat panel monitor and ColorLock Sensor.

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## Removing the Flat Panel Option Card

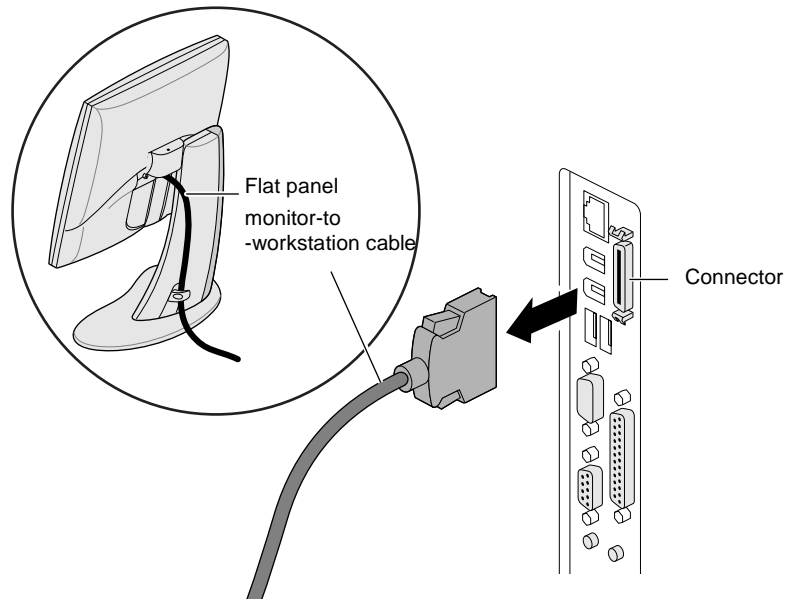
Before removing the flat panel monitor option card, you must power off the flat panel monitor, shut down and power off the system, and remove the side panel.

1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

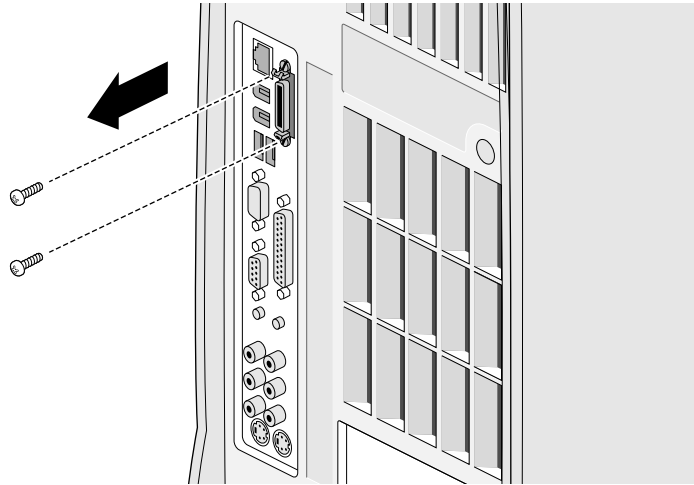
4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.

5. Remove the flat panel power cable from the electrical socket.
6. Remove the flat panel cable from the back of the Silicon Graphics 540 visual workstation. See Figure 5-11.



**Figure 5-11** Removing the Flat Panel-to-Workstation Cable

7. Using a Phillips screwdriver, unscrew the screws holding the option card connector to the system. See Figure 5-12.

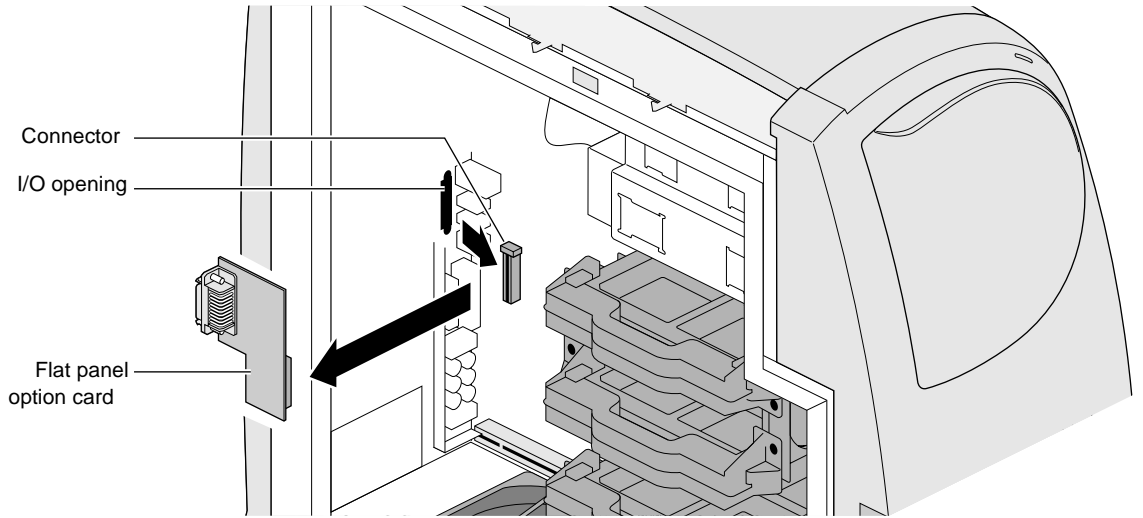


**Figure 5-12** Removing the Connector Screws

8. Locate the flat panel option card beneath the power supply and near the I/O panel.

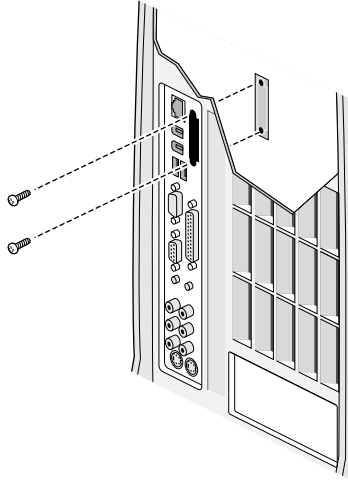
**Caution:** DIMMs are delicate. Be careful not to bump them when you remove the flat panel option card.

9. Remove the flat panel option card by pulling the card toward you to disconnect it from the system board, as shown in Figure 5-13.
10. Tilt the card and slide the connector out of the I/O panel opening.



**Figure 5-13** Removing the Flat Panel Option Card

11. If you are not replacing the card, reach inside the chassis holding the blank panel, and place it against the I/O opening. See Figure 5-14. To insert another card, refer to “Installing the Flat Panel Option Card” on page 80.
12. With your other hand, replace the screws, then use a Phillips screwdriver to tighten the I/O blank panel to the chassis.



**Figure 5-14** Replacing the Blank Panel

13. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
14. Plug the system power cord into an electrical outlet.
15. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.



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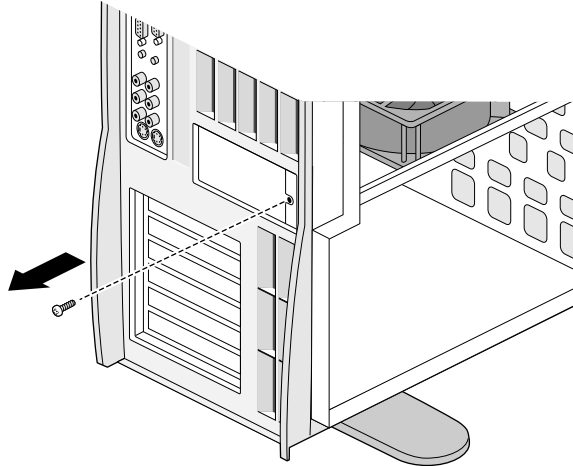
## Installing the Silicon Graphics SD1100 Option Card

The Silicon Graphics SD1100 option card supports the industry standard Serial Digital Interface (SDI) for digital video. SDI is used for professional quality video distribution and transfer. This card provides a total of four 10-bit serial D1 channels (two in and two out), as well as a genlock circuit suitable for locking to a reference video input signal. It also supports GPI and GPO for interoperability with external video devices.

1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

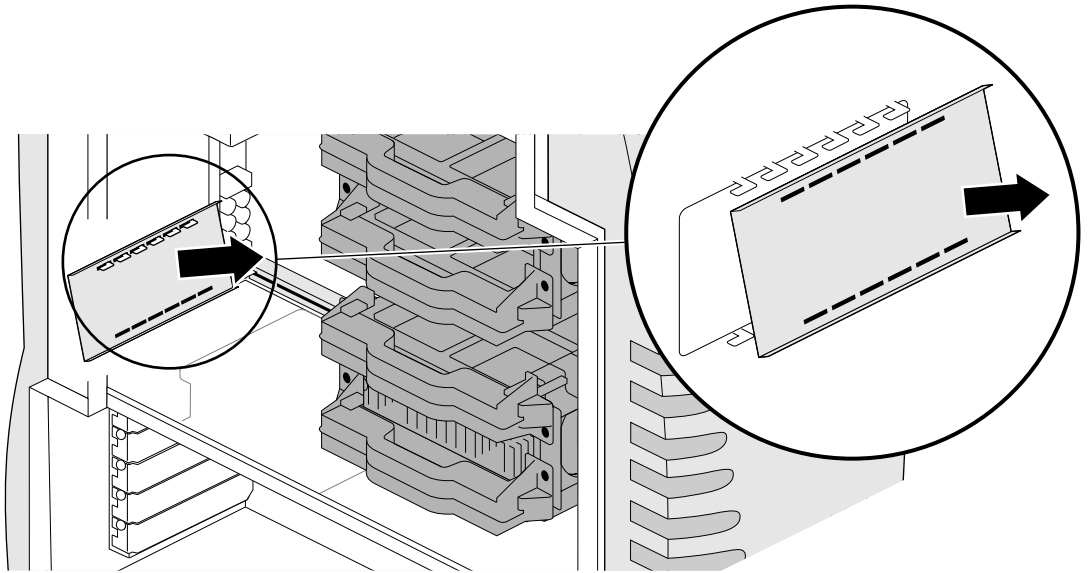
4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.
5. Facing the back of the system, locate the SD1100 I/O blank panel, as shown in Figure 5-15.
6. Using a Phillips screwdriver, remove the screw. Keep the screw to secure the Silicon Graphics SD1100 card to the chassis.



**Figure 5-15** Locating the Silicon Graphics SD1100 Card Blank Panel

7. Facing the side of the workstation, slide the I/O blank panel toward yourself and then lift it off the hooks above the I/O opening. See Figure 5-16.

Keep the I/O blank panel. If you ever remove the Silicon Graphics SD1100 board and do not replace it, you will need to reinstall the I/O blank panel.

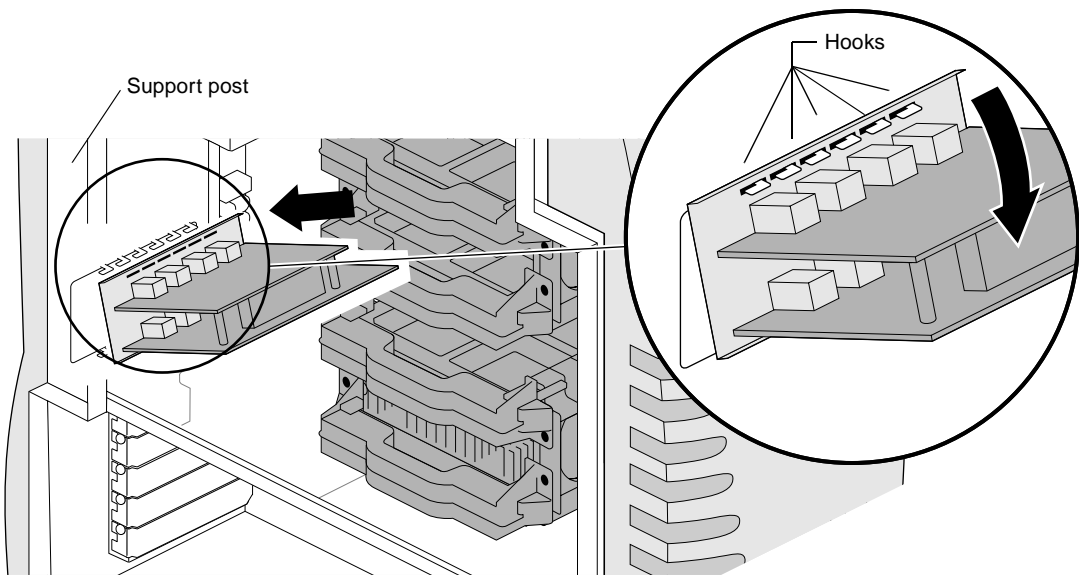


**Figure 5-16** Removing the Silicon Graphics SD1100 I/O Blank Panel

8. Locate the slots above the connectors on the Silicon Graphics SD1100 card. These slots go over hooks on the chassis to help hold the card in place. See Figure 5-17.

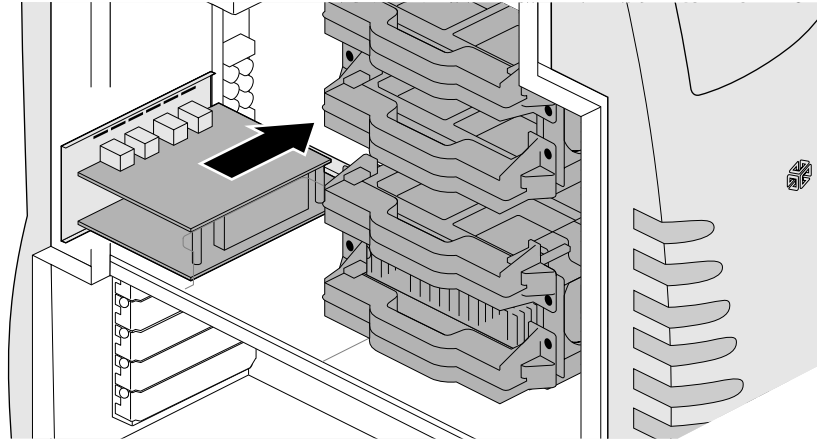
**Note:** If necessary, remove the IDE cable from its connector on the system board, being careful not to pull out the horizontal fan cable. Drape it over the top of the workstation while you complete your task.

9. Angle the Silicon Graphics SD1100 card to go behind the support post and over the fan.
10. Place the Silicon Graphics SD1100 ports in the I/O opening.
11. Slide the slots on the card over the hooks.



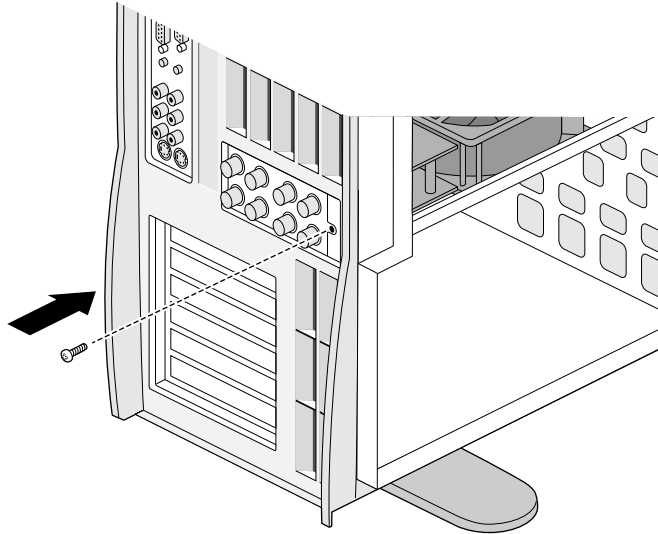
**Figure 5-17** Installing the Silicon Graphics SD1100 Option Card

12. Holding the card flush with the I/O panel, push the Silicon Graphics SD1100 card gently but firmly into the connector on the system board. Be sure the edge of the board closest to the system board connector slides into any slots or tabs that hold it firmly to the chassis. See Figure 5-18.



**Figure 5-18** Sliding the Silicon Graphics SD1100 Card to Connect to the System Board

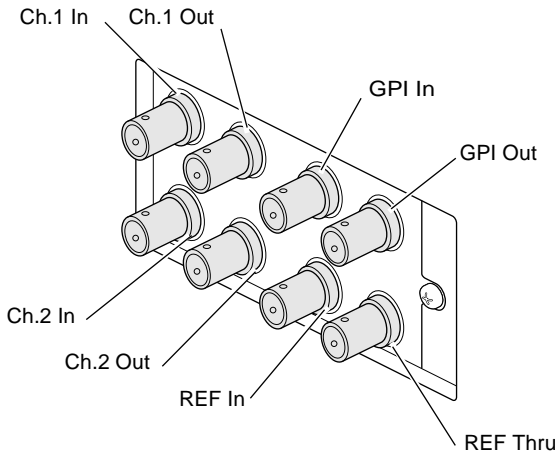
13. From the back of the system, insert and tighten the screw that holds the Silicon Graphics SD1100 card to the chassis. Use the same screw that you removed from the I/O blank panel. See Figure 5-19.



**Figure 5-19** Inserting the Silicon Graphics SD1100 Screw

14. Replace the IDE cable; the red stripe on the cable faces left.
15. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.

16. Use Figure 5-20 to identify the ports for cabling purposes.
17. Attach the appropriate cables from the video equipment.



**Figure 5-20** Attaching the Silicon Graphics SD1100 Cables

18. Plug the system power cord into an electrical outlet.
19. Turn on the system. For detailed instructions, see “Turning On the System” on page 12

See the online *Audio/Video User's Guide* for information on accessing the control panel for this card. If the control panel is active, the Silicon Graphics SD1100 card is recognized.

If the Silicon Graphics SD1100 card is not recognized, or does not appear to work, repeat the installation instructions found in this section. If the Silicon Graphics SD1100 card still does not work, call your authorized service representative. See Chapter 9, “Customer Support Services” on page 150.

For user information, see the online *Audio/Video User's Guide* found by choosing Start > Programs > Silicon Graphics > *Audio/Video User's Guide*.

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## Removing the Silicon Graphics SD1100 Option Card

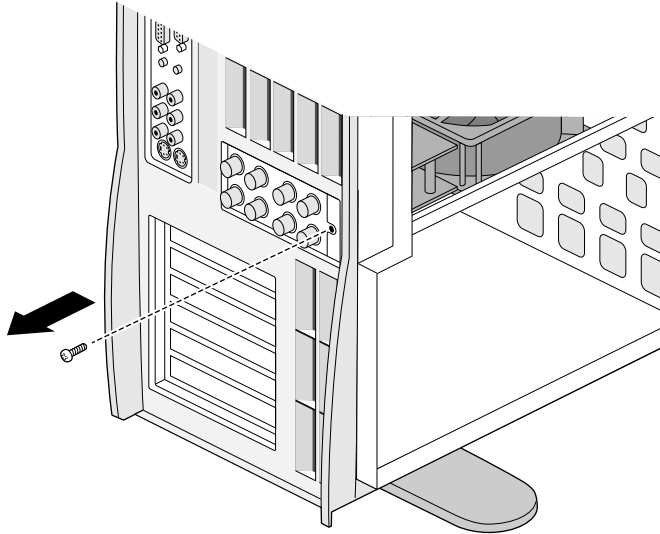
1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.



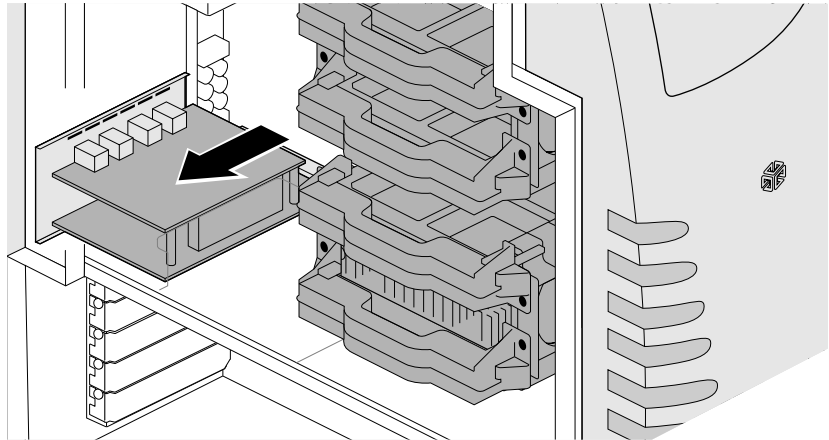
5. Facing the back of the system, locate the Silicon Graphics SD1100 I/O panel. See Figure 5-21.
6. Remove any cables attached to the Silicon Graphics SD1100 card.
7. Using a Phillips screwdriver, remove the screw that holds the Silicon Graphics SD1100 card to the chassis.



**Figure 5-21** Removing the Silicon Graphics SD1100 Card Screw

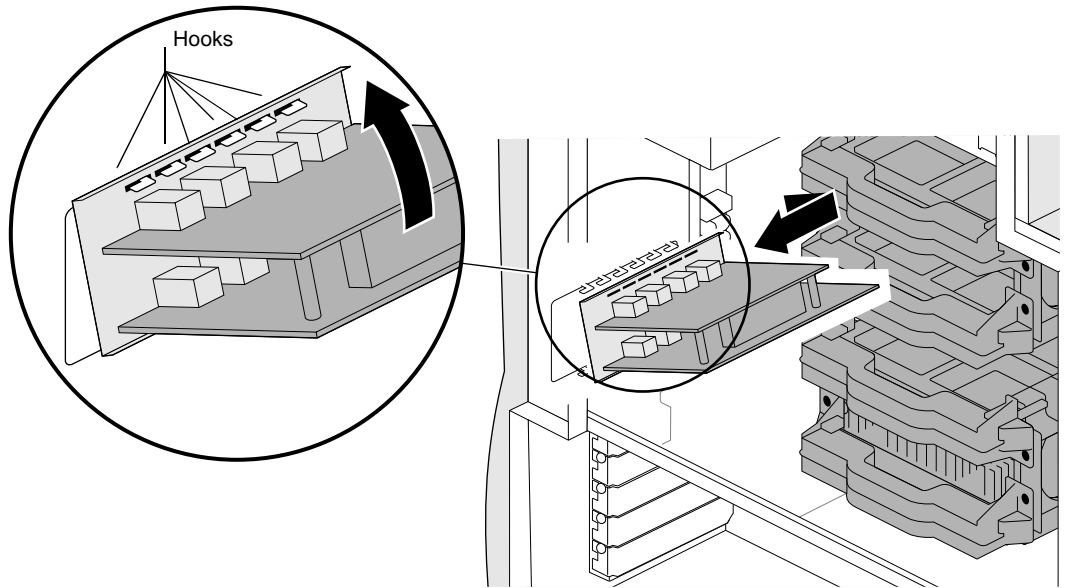
**Note:** If necessary, remove the IDE cable from its connector on the system board, being careful not to pull out the horizontal fan cable. Drape it over the top of the workstation while you complete your task.

8. Facing the side of the workstation, release the Silicon Graphics SD1100 card from the connector on the system board, pulling the card toward you, while keeping the I/O panel flush with the chassis. See Figure 5-22.



**Figure 5-22** Detaching the Silicon Graphics SD1100 Card

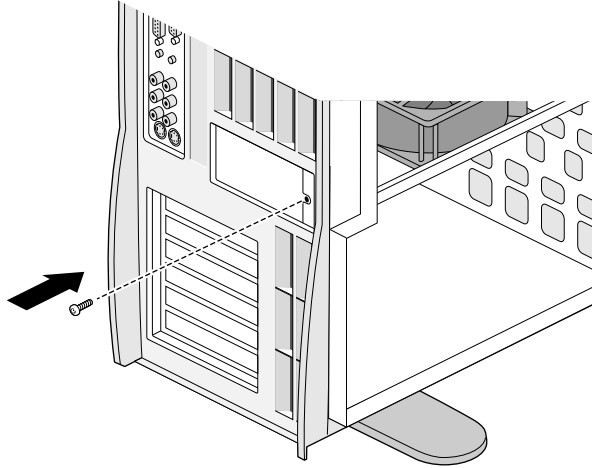
9. Slide the Silicon Graphics SD1100 card toward yourself and lift it off the hooks on the I/O panel, as shown in Figure 5-23.
10. Tilt the card upward and lift it out.



**Figure 5-23** Removing the Silicon Graphics SD1100 Card

11. Insert the I/O blank panel on the inside of the chassis covering the opening made by removing the Silicon Graphics SD1100 card.

12. Holding the I/O blank panel in place with one hand, insert the screw into the screw hole on the outside of the system with the other hand. See Figure 5-24.
13. Tighten the screw using a Phillips screwdriver.



**Figure 5-24** Inserting the Screw Holding the Silicon Graphics SD1100 Card Blank Panel

14. Replace the IDE cable, the red stripe on the cable faces left.
15. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
16. Plug the system power cord into an electrical outlet.
17. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.

## *Chapter 6*

# **Processors and Voltage Regulators**

This chapter contains the following sections:

- “About Processors and Voltage Regulators” on page 102
- “Installing Processors and Voltage Regulators” on page 104
- “Changing Processor Speed Jumpers” on page 110
- “Removing Processors and Voltage Regulators” on page 112
- “Installing the Windows NT Software” on page 116
- “Finding the Stepping Value of a Processor” on page 117
- “Verifying and Troubleshooting the Processor Installation” on page 118

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## About Processors and Voltage Regulators

Your Silicon Graphics 540 visual workstation is designed to use as many as four processors. The processors work in conjunction with voltage regulators. Here is some information to keep in mind:

- Processors must be installed sequentially, with no terminator cards in slots between them.
- Each processor slot must have a processor or terminator card.
- Never leave voltage regulators installed in slots when the processor is not installed. The workstation may not function or may crash if it boots.
- All processors must be identical. Never install two processors with different frequency capabilities.
- Jumpers must be changed whenever a processor is added or upgraded.
- As you add or remove processors, you must also add or remove voltage regulators. The graphics voltage regulator is never removed. It is not associated with processors.
- Current software or upgrade software must be installed after each processor replacement or addition.

Figure 6-1 shows the locations of processors and voltage regulators and their relationship to each other.

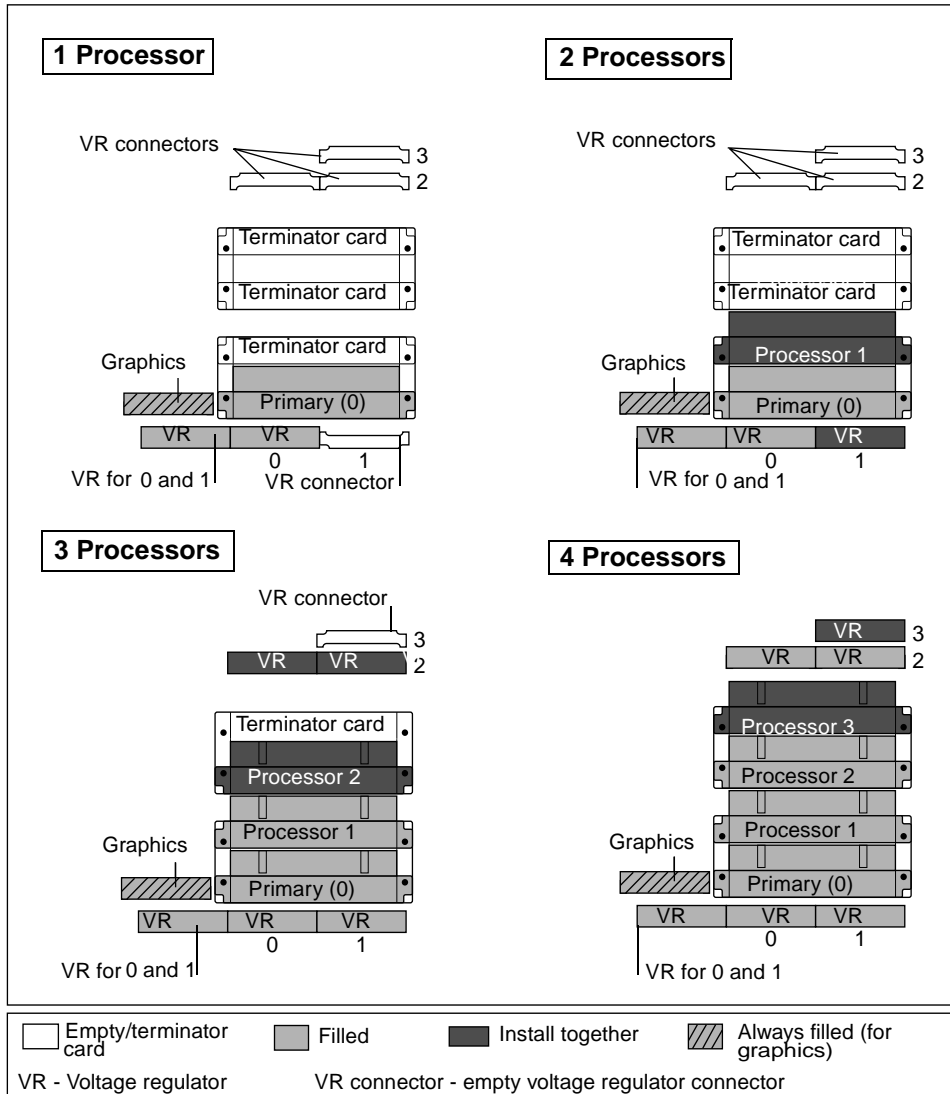


Figure 6-1 Pairing the Processors and Voltage Regulators

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## Installing Processors and Voltage Regulators

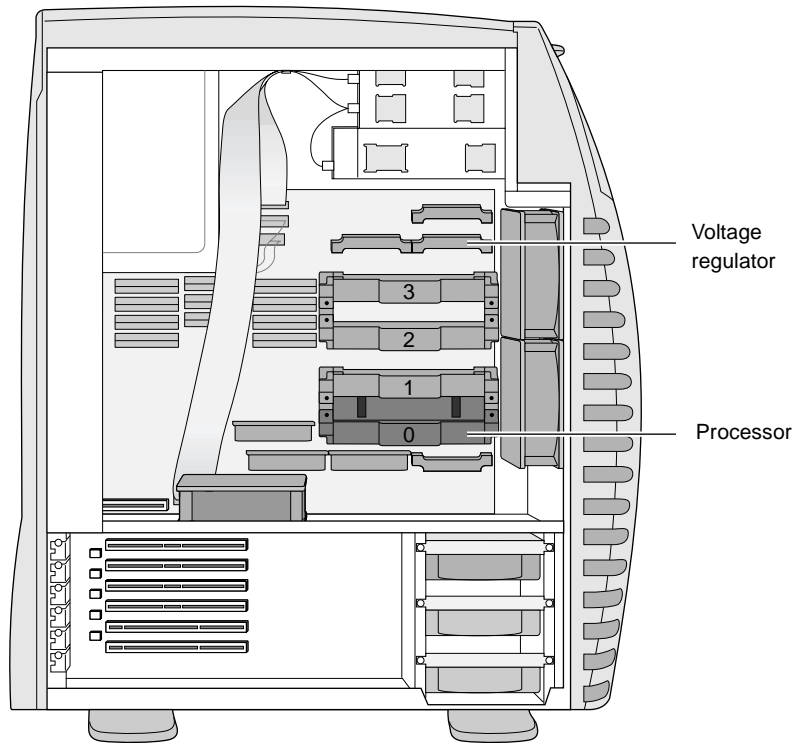
1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.
5. Laying the system on its side is recommended for installing processors and voltage regulators. For detailed instructions, see “Laying the System on Its Side” on page 22.



6. Identify the processor, terminator card, and voltage regulators you are installing or replacing. (Figure 6-2) For information on voltage regulator and processor pairing, see Figure 6-1.

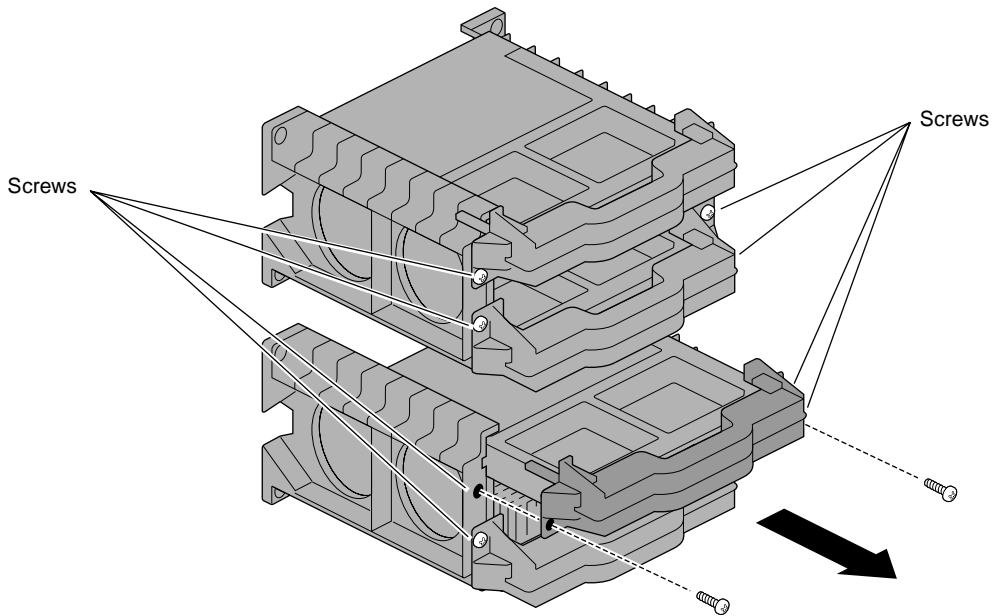


**Figure 6-2** Locating the Processors and Voltage Regulators

7. Unscrew the two screws that hold the processor or terminator card to the processor bracket.

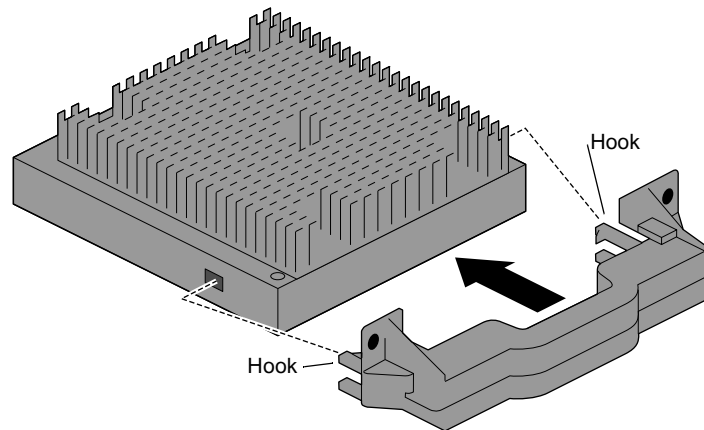
**Note:** Make a note of the orientation of the handles to make sure they are oriented the same way when they are installed. If you need to remove a handle from a terminator card (because you purchased a processor without a handle from a source other than Silicon Graphics) or processor (if it came from another slot), you need to replace the handle in the same orientation as the current handle.

8. Pull the terminator card toward you until it is out of the supporting bracket.



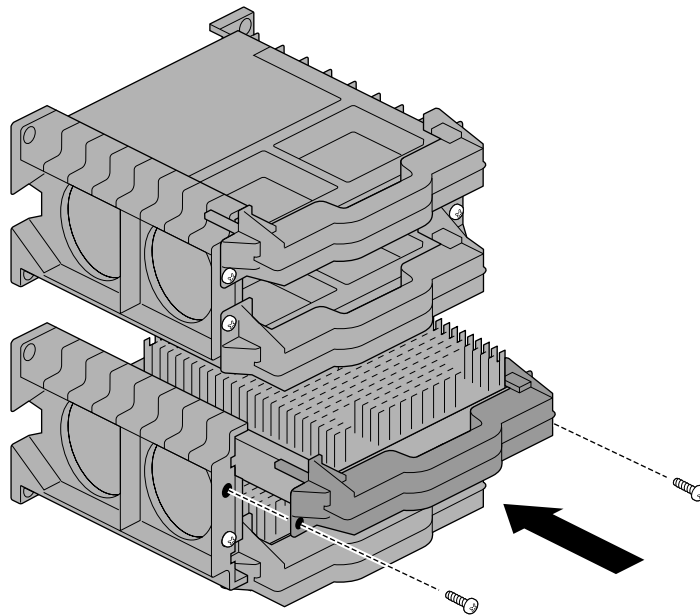
**Figure 6-3** Removing the Processor Terminator Card

9. Processors must have handles before they are installed. If the processor already has a handle, go to step 12.
10. Attach the handle to the processor in the same orientation as on the terminator card or processor you just removed.  
  
The orientation of the handles is determined by the processor bracket. The screw holes of the handle and bracket must align.
11. Put the flexible hooks into the holes on the sides of the processor. See Figure 6-4.



**Figure 6-4** Attaching the Processor Handle

12. Insert the processor into the bracket, making sure the screw holes line up with the holes in the bracket. See Figure 6-5. If the screws do not line up, remove the processor, reposition the handle, and replace the processor. If you need help to reposition the handle, see step 4.
13. Use some force to seat the processor. Press on the middle of the handle with the palm of your hand. You hear three sounds as the processor seats.
14. Insert the screws that hold the processor to the processor bracket and tighten.
15. Repeat these steps if you are installing more than one processor, taking care to populate a processor slot beside the last processor installed. Do not skip slots.



**Figure 6-5** Inserting the Processor Into the Bracket

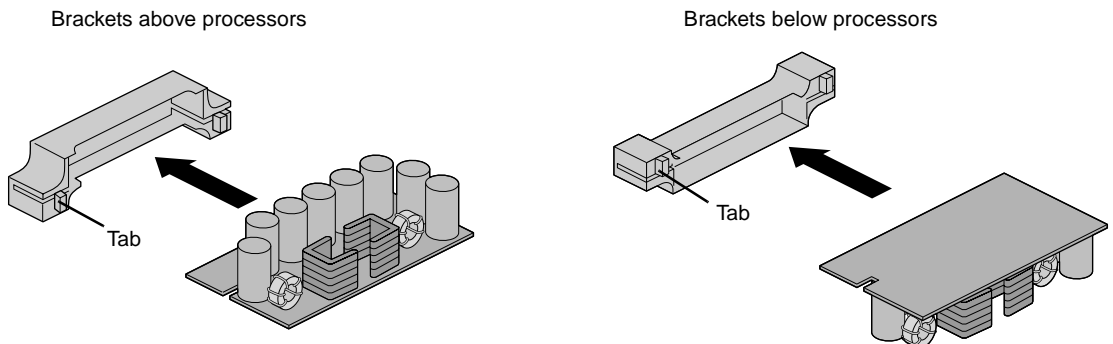
16. Insert the voltage regulators. See “Inserting Voltage Regulators” on page 109.

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## Inserting Voltage Regulators

1. Locate the appropriate voltage regulator slots. See Figure 6-1 to determine which voltage regulator slots to use.
2. Insert the voltage regulators into the voltage regulator brackets.
  - In the voltage regulator brackets above the top processor, insert the voltage regulator card with the components facing up.
  - In the voltage regulator brackets below the primary processor, insert the voltage regulator cards with the components facing down.

**Note:** When the voltage regulator is completely inserted and the tabs that holds the card to the bracket are locked, you should see an empty rectangular space beneath each tab.



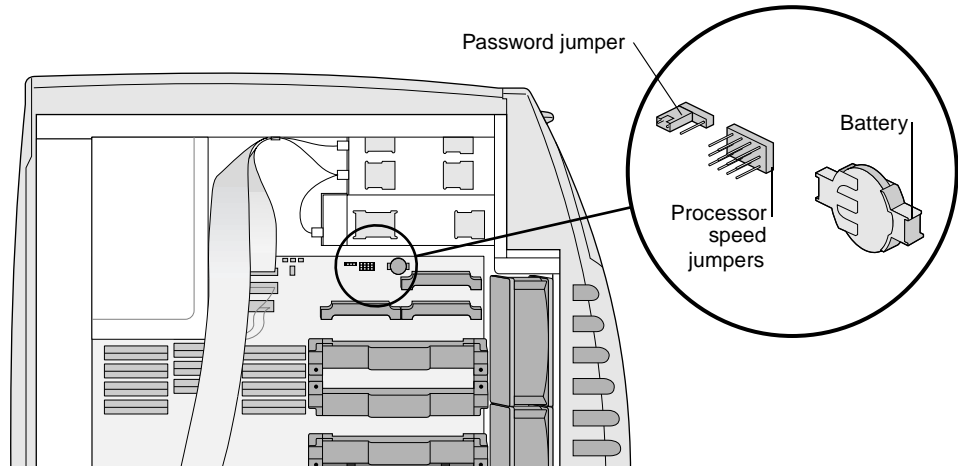
**Figure 6-6** Inserting a Voltage Regulator

You are finished installing the voltage regulators. Go to “Changing Processor Speed Jumpers” on page 110.

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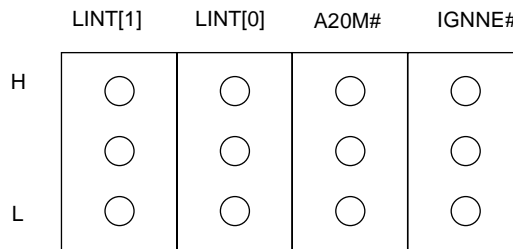
## Changing Processor Speed Jumpers

The processor speed jumpers are located at the top of the system board, above the voltage regulators, to the left of the battery. See Figure 6-7 for their location on the board.



**Figure 6-7** Locating the Processor Speed Jumpers

Use Figure 6-8 and Table 6-2 to determine the appropriate jumper configuration for your processor upgrade. Place the four jumpers over either the H and middle pin, or L and middle pin.



**Figure 6-8** Identifying the Processor Speed Jumpers.

**Table 6-1** Processor Speed Jumper Settings

Processor Speed	Ratio: [100] front side bus speed]/ processor speed	LINT[1]	LINT[0]	A20M#	1GNNE#
150 MHz	2/3	H	H	H	L
200 MHz <sup>a</sup>	1/2	L	L	L	L
200 MHz <sup>a</sup>	1/2	H	H	H	H
250 MHz	2/5	L	H	L	L
300 MHz	1/3	L	L	L	H
350 MHz	2/7	L	H	L	H
400 MHz	1/4	L	L	H	L
450 MHz	2/9	L	H	H	L
500 MHz	1/5	L	L	H	H
550 MHz	2/11	L	H	H	H
600 MHz	1/6	H	L	L	L
650 MHz	2/13	H	H	L	L
700 MHz	1/7	H	L	L	H

**Table 6-1** Processor Speed Jumper Settings (continued)

Processor Speed	Ratio: [100] front side bus speed]/ processor speed	LINT[1]	LINT[0]	A20M#	1GNNE#
750 MHz	2/15	H	H	L	H
800 MHz	1/8	H	L	H	L

a. Either set of 200 MHz jumper configurations can be used.

3. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
4. Plug in the system power cable.
5. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.

If you have added processors, you must reinstall software. See “Installing the Windows NT Software” on page 116.

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## Removing Processors and Voltage Regulators

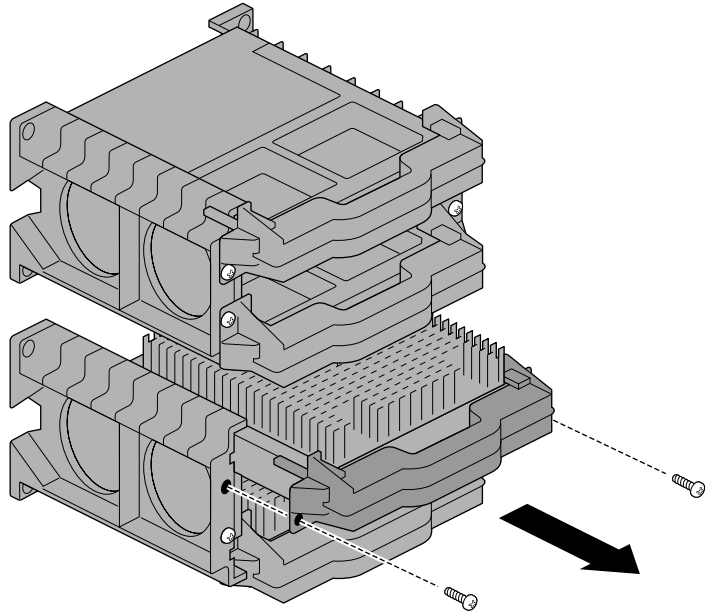
1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.



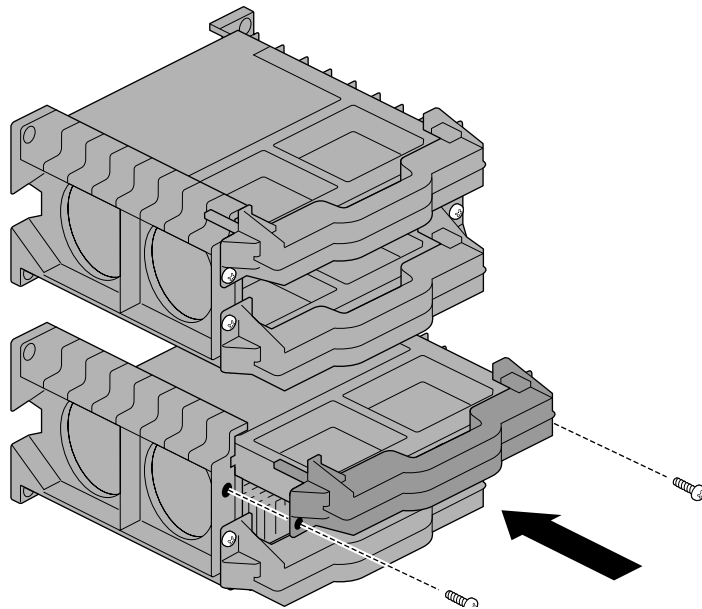
5. Laying the system on its side is recommended for removing processors and voltage regulators. For detailed instructions, see “Laying the System on Its Side” on page 22.
6. Using a Phillips screwdriver, remove the two screws holding the processor to the bracket, as shown in Figure 6-9.
7. Pull the processor from the bracket.



**Figure 6-9** Removing the Processor

**Caution:** It is a good idea to wear a wrist strap, if you have one, whenever you are performing tasks near the system board.

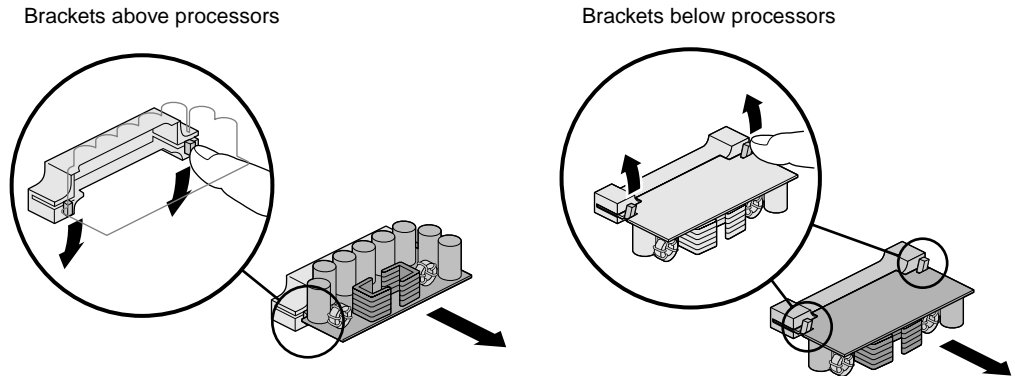
8. If you are not installing another processor, insert a terminator card into the processor slot, as shown in Figure 6-10.
9. Tighten the two screws to hold it in place.



**Figure 6-10** Inserting the Terminator Card

10. Remove the voltage regulator or regulators associated with the processor. See Figure 6-1 for information on which voltage regulators map to which processors.

11. Press simultaneously on the two ribbed tabs on the voltage regulator bracket. Press up or down depending on the orientation of the voltage regulator bracket. See Figure 6-11.
12. Pull each voltage regulator card out of its bracket.



**Figure 6-11** Removing the Voltage Regulators

13. To install a processor, go to “Installing Processors and Voltage Regulators” on page 104. If you are not installing the processor, go to “Changing Processor Speed Jumpers” on page 110.

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## Installing the Windows NT Software

If you have added processors, you must reinstall the Silicon Graphics and Microsoft Windows NT software so that the system can recognize and use the processors that are installed. You do not need to reinstall software if you are removing processors.

Use the following table to determine which software to install:

**Table 6-2** Processor Software Upgrade

<b>If You Now Have:</b>	<b>Install:</b>
2 processors	Your original software
3 processors	Upgrade software from the upgrade CD
4 processor	Upgrade software from the upgrade CD

See the *Silicon Graphics 320 and Silicon Graphics 540 Visual Workstations Software Installation Guide* for installation instructions. This guide is in the front of your software CD case.

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## Finding the Stepping Value of a Processor

The Silicon Graphics 540 visual workstation contains slots for four processors. The chip revision—called the stepping value—of the second, third, and fourth processor must match that of the primary processor. When ordering additional processors, you need to give the stepping value of the primary processor. To find the stepping value:

1. Select Start > Settings > Control Panels from the Windows NT task bar. Then double-click the System icon to open the System panel.
2. Click the General tab and look below the Computer label for the line that includes the stepping value. It should look similar to the following:
3. x86 Family 6 Model 3 Stepping 4

In this example, the stepping value for the processor is 4.

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## Verifying and Troubleshooting the Processor Installation

To verify that the processor and voltage regulators you installed are recognized by the system, check the Windows NT Diagnostics System panel.

1. From the Start menu, choose Programs > Administrative Tools > Windows NT Diagnostics > System panel. The processors the system recognizes (from Processor 0 through Processor 3) are listed in the window at the bottom of the panel.
2. If the processor you installed is not reported correctly, check to make sure you have the voltage regulators and processors in the correct connectors.
3. Then repeat the installation procedures to make sure the voltage regulators and processors are completely seated.
4. Check to make sure the correct software is installed.
5. If the correct number of processors are still not reported, call your authorized service representative. See “Customer Support Services” on page 150 for a listing of Customer Support phone numbers.

## *Chapter 7*

# **Power Supply, Battery, and Fans**

Occasionally power supplies, batteries, and fans need to be replaced. Follow the instructions in this chapter to replace them.

This chapter contains the following sections:

- “Replacing the Power Supply” on page 120
- “Replacing the Battery” on page 129
- “Replacing a Fan” on page 131

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## Replacing the Power Supply

To replace the power supply, follow these steps:

1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

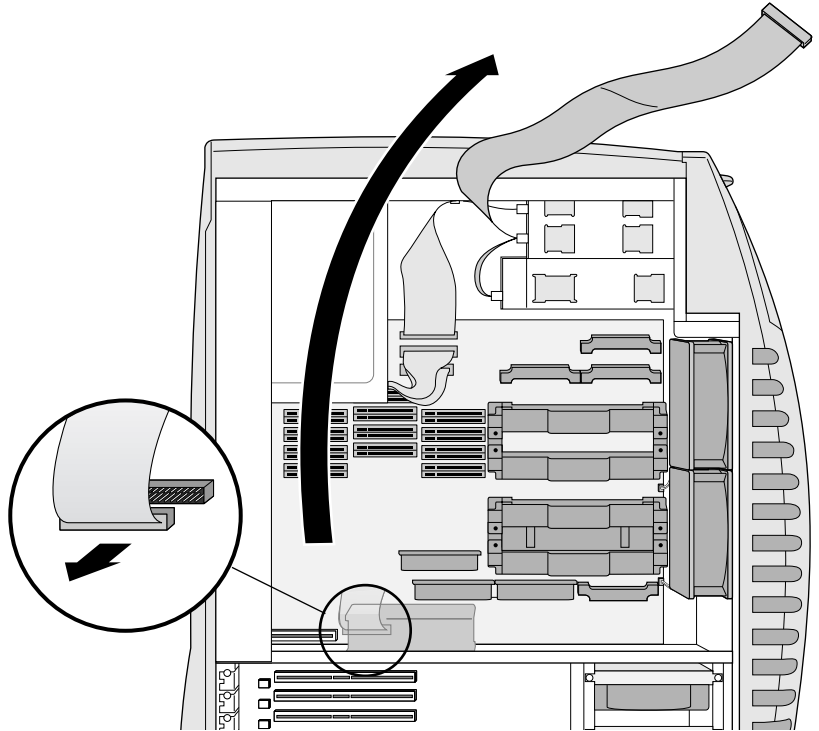
4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.
5. Laying the system on its side is recommended for replacing the power supply. For detailed instructions, see “Laying the System on Its Side” on page 22.



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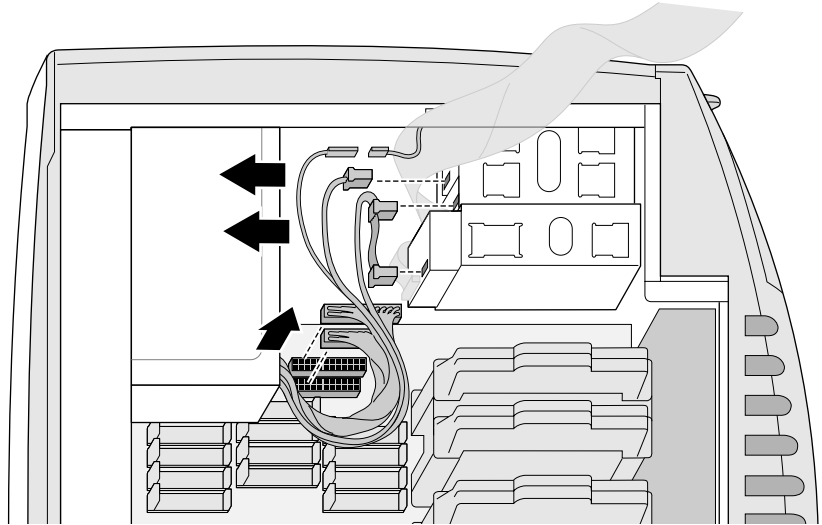
## Disconnecting the Cables

1. Disconnect the IDE cable from its connector behind the fan. Be careful not to pull loose the fan cable. Disconnecting the IDE cable allows you to access the power cables behind it.



**Figure 7-1** Disconnecting the IDE Cable

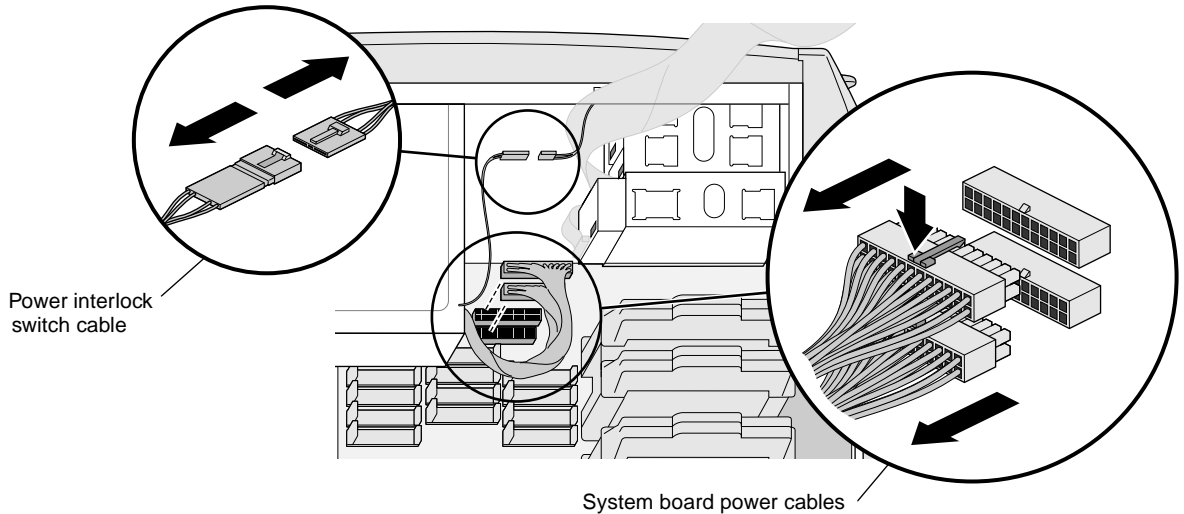
2. Unplug the power cables from the IDE drives. Press down on the locking tab to release the power cable from the drive. See Figure 7-2.
3. Drape the IDE cable over the top of the workstation.



**Figure 7-2** Unplugging the Power Cords From the Drives

4. Disconnect the power cable from the FDI drive.

5. Disconnect the two parts of the power interlock switch cable. See Figure 7-3.
6. Press down on the front of the tab on the top of each of the two cable connectors to the system board.
7. Pull and wiggle the connectors from side to side until they release. They fit snugly.



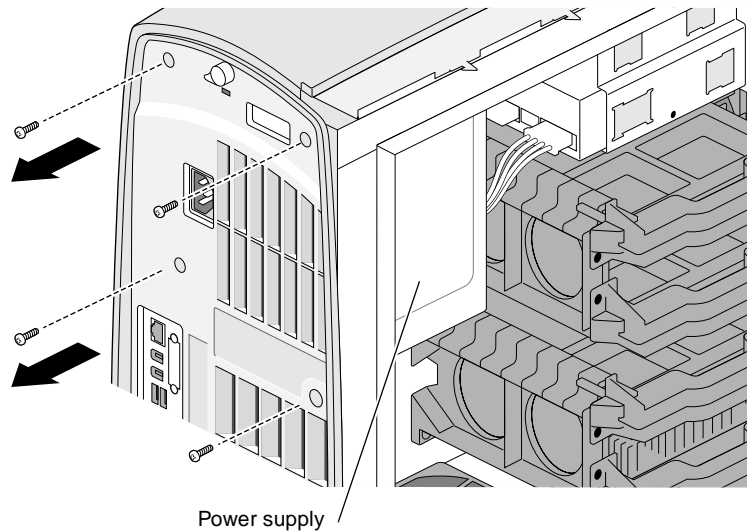
**Figure 7-3** Removing the System Board and Power Interlock Power Cords

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## Disconnecting the Power Supply

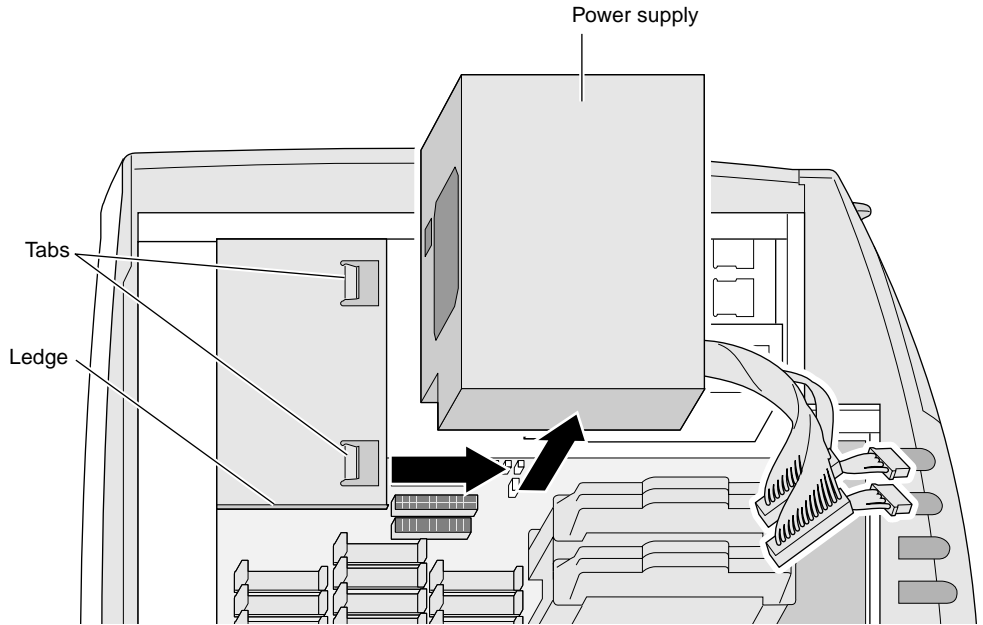
1. Use a Phillips screwdriver to remove four screws from the back of the workstation. See Figure 7-4.

**Note:** The power supply is supported by a ledge and metal tabs. If the system is in an upright position, it will not fall when the screws are removed.



**Figure 7-4** Removing the Power Supply Chassis Screws

2. If the workstation is in an upright position, support the power supply as you slide it toward the drives. The power supply sits on a ledge and is held to the chassis by two tabs.
3. Continue sliding the power supply until it is off the ledge and releases from the tabs. Remove it from the chassis. See Figure 7-5.



**Figure 7-5** Removing the Power Supply

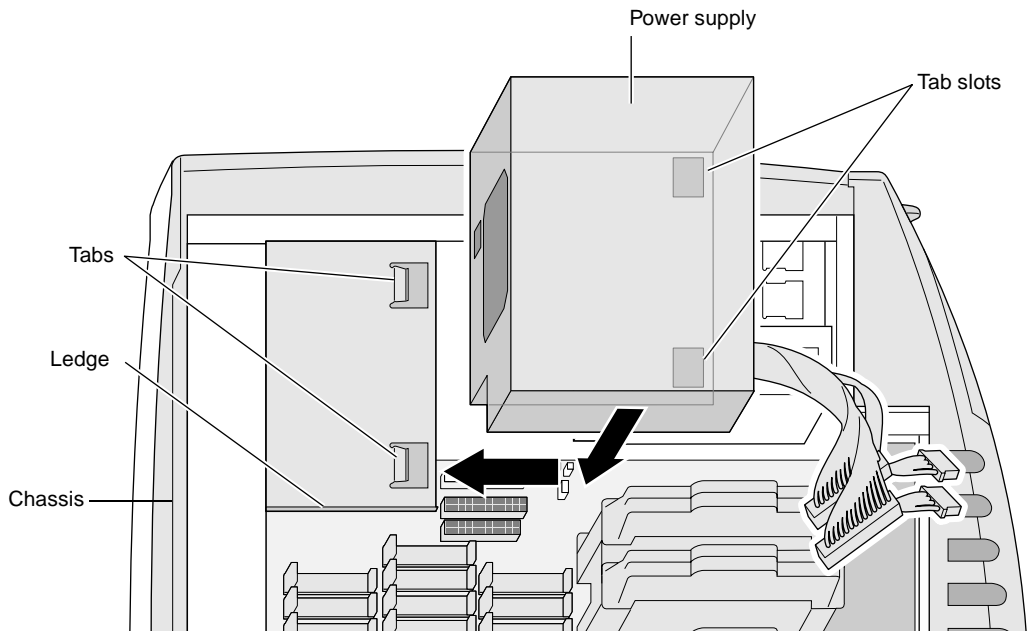
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## Inserting the Power Supply

1. To replace the power supply, position it as shown in Figure 7-6.  
**Caution:** Be careful not to bump the DIMMs.
2. Place the power supply along the ledge.
3. Slide the power supply to the left until it is flush with the left side of the chassis. Its weight should ensure that the tabs slide into the power supply slots.

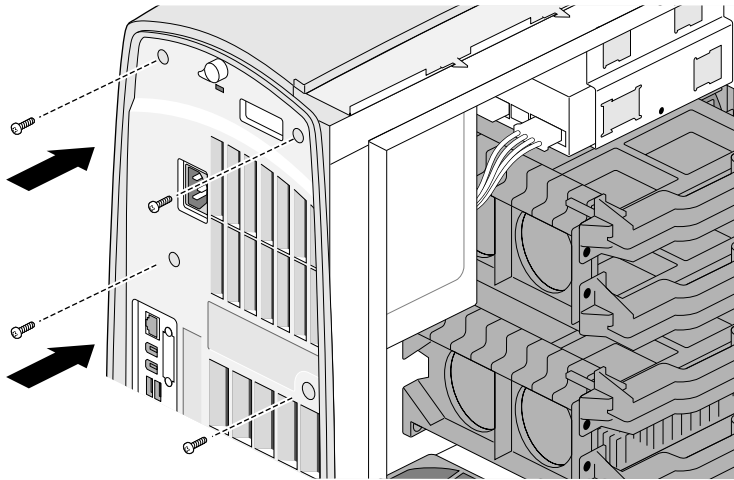
If you are doing this task with the system in an upright position, press the power supply toward the system board as you slide it to the left.

4. Face the rear of the Silicon Graphics 540 visual workstation.



**Figure 7-6** Installing the Power Supply

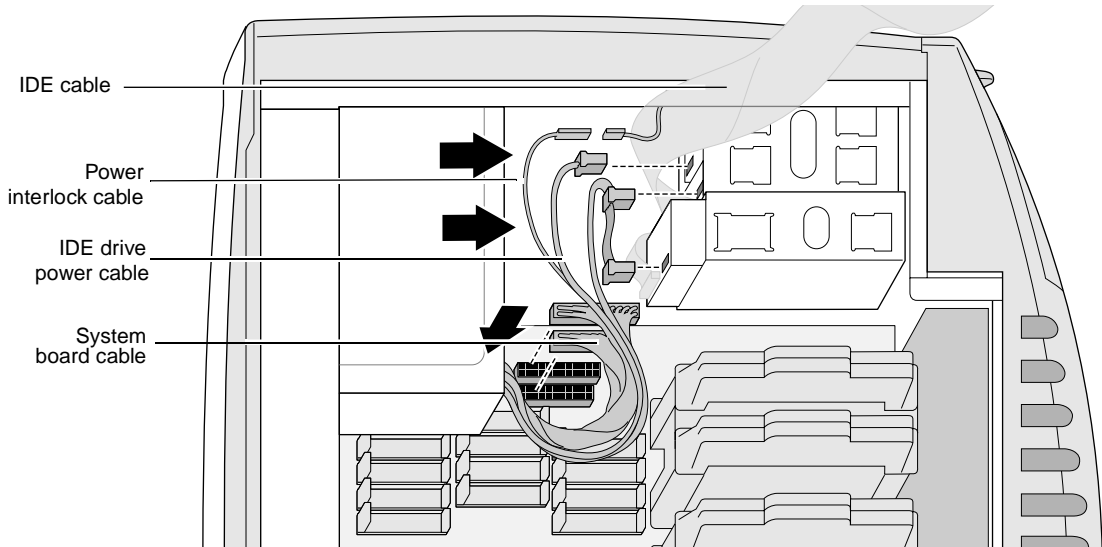
5. Replace the four screws you removed from the back of the system. See Figure 7-7.



**Figure 7-7** Replacing the Power Supply Screws

6. Reconnect all cables.
  - Reconnect the power cables to the system board with the connector tabs facing up. These connectors are different sizes and cannot be incorrectly inserted. See Figure 7-8.
  - Reconnect the power cable to the FDI drive. The cable connectors are different sizes for the different drives.
  - Reconnect the FDI cable to the FDI drive. Place the red stripe on the side of the cable close to the power connector on the drive.
  - Reconnect the IDE cable to the system board. Place the cable in the same orientation as you found it. The cable connector is keyed so that you cannot attach it incorrectly. The red stripe on the cable faces to the left.

- Reconnect the IDE power cables.
- Reconnect the power interlock cable.



**Figure 7-8** Reconnecting the Power Cables

7. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
8. Plug the system power cord into an electrical outlet.
9. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.



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## Replacing the Battery

To replace the battery, follow these steps:

1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

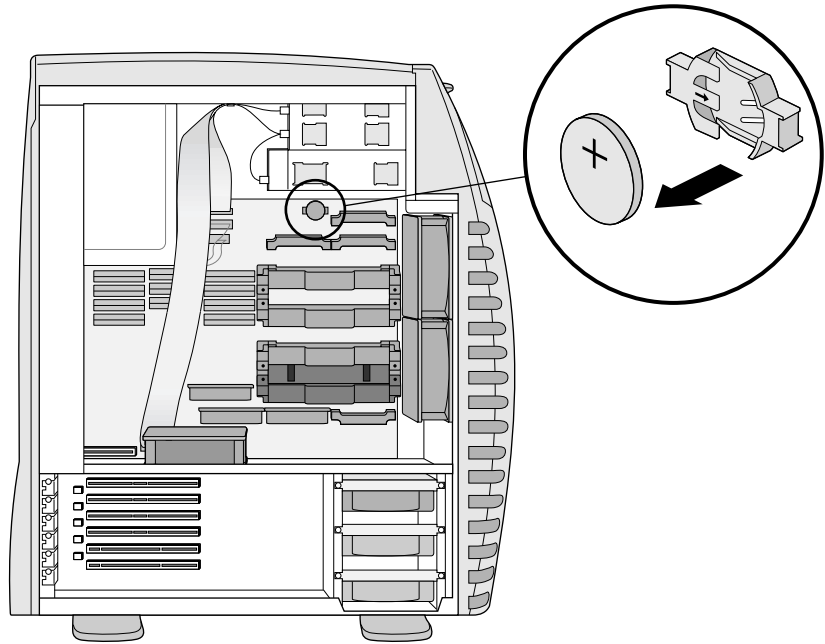
4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.

The battery is located just above the voltage regulators at the top right of the system board. If you notice the dates on your files are incorrect, even after being reset, check the battery. It may need to be replaced.

**Caution:** Danger of explosion if battery is incorrectly placed.

Replace only with the Renata (part number) CR2032 or equivalent type recommended by the manufacturer. Dispose of used batteries according to the local regulations.

1. Place your thumbnail behind the battery and pull toward yourself. The battery releases. See Figure 7-9.
2. Insert a new Renata CR2032 (or equivalent) battery, print side up. It snaps into place.



**Figure 7-9** Locating the Battery

**Note:** System configuration data and real time clock settings are maintained by the battery. When the battery is replaced, these settings might be cleared. You may need to set your system clock using the PROM GUI (graphical user interface) or Windows NT control panel. You may see false POST failures the first time you boot after replacing the battery.

3. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
4. Reattach the power cord.
5. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.

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## Replacing a Fan

To replace a fan, follow these steps:

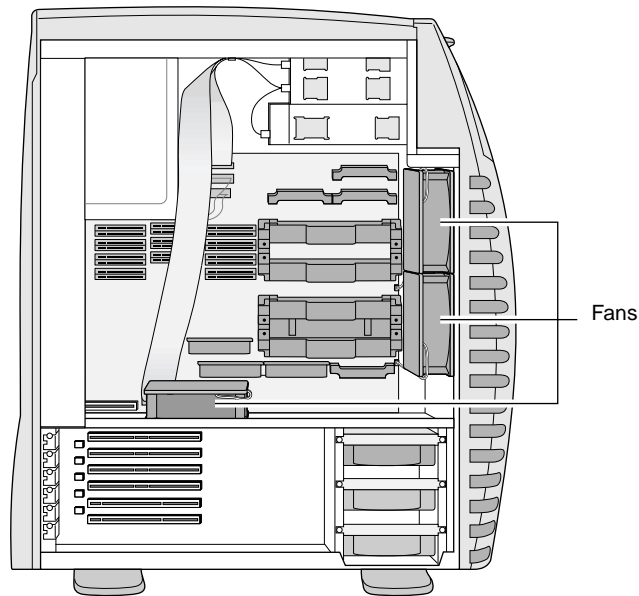
1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

4. Depending on which fan you are replacing, remove the side or side and front covers. For detailed instructions, see “Removing the Covers” on page 18.
5. You may choose to lay the system on its side for ease in replacing a fan. For detailed instructions, see “Laying the System on Its Side” on page 22.

Three fans cool the Silicon Graphics 540 visual workstation.

6. Locate the fan you wish to replace. See Figure 7-10.



**Figure 7-10** Locating the Fans

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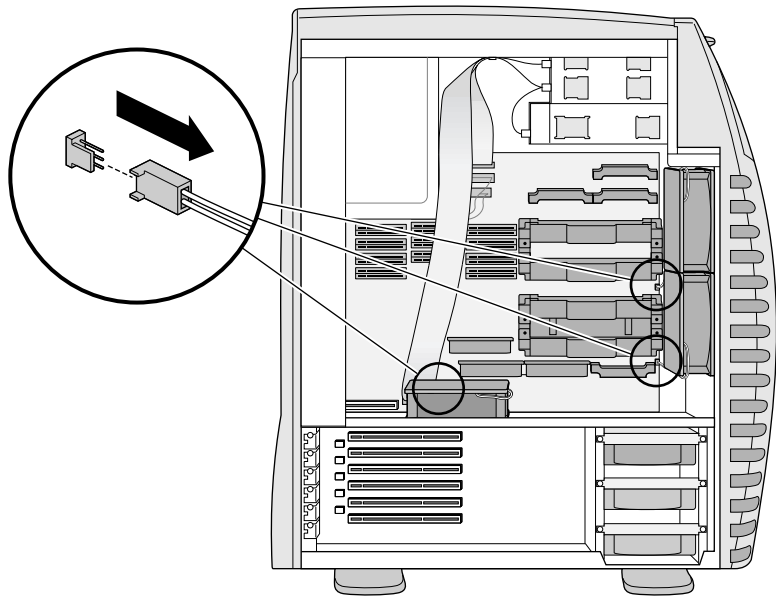
## Removing the Fan

**Note:** Note the location of the fan connector on the system board before you remove the fan cable.

**Caution:** Touch a metal part of the chassis to ground yourself before you begin your task. Components inside the system are susceptible to static electricity. It's a good idea to wear a wrist strap, if you have one, whenever you are performing tasks near the system board.

1. To remove either of the vertical fans, you remove a processor or two to gain access to the fan cable connector on the system board. The horizontal fan requires no removal of any other part.
  - To remove the lower fan, remove the primary processor. See “Removing Processors and Voltage Regulators” on page 112 for instructions.
  - To remove the upper fan, remove processors or terminator cards 1 and 2 (the second and third processors or terminator cards). See “Removing Processors and Voltage Regulators” on page 112 for instructions. Then return here.

**Note:** You may find a needle-nose pliers and a pencil with an eraser handy for either removing or replacing the fan cable connector.
2. Grasp the cable connector and pull it toward you to release it from the system board. See Figure 7-11.

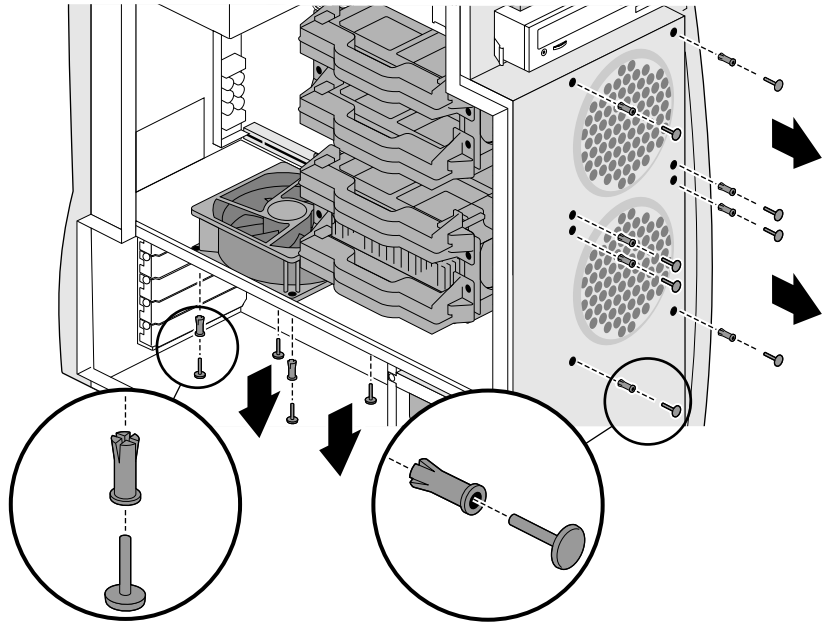


**Figure 7-11** Unplugging the Fan Cable

3. Pry out the four push pins that hold the fan to the chassis. See Figure 7-12. Your fingernail or the edge of a small straight blade screwdriver works well.

Instead of prying, you can push some of the pins out because they are easily accessible. Locate them on the rear of the fan and push.

4. Remove the fan from the chassis.



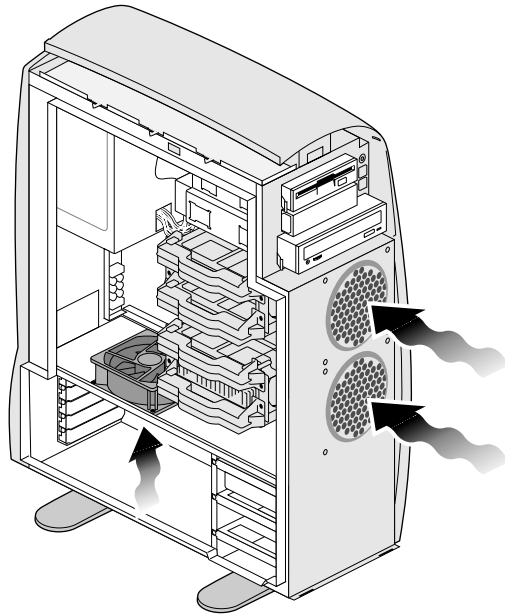
**Figure 7-12** Removing the Fan Push Pins

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## Inserting the Fan

1. On the replacement fan, locate the arrow printed on it. The arrow indicates the direction of the airflow. Position the fan so that air blows into the upper chamber of the workstation. See Figure 7-13.

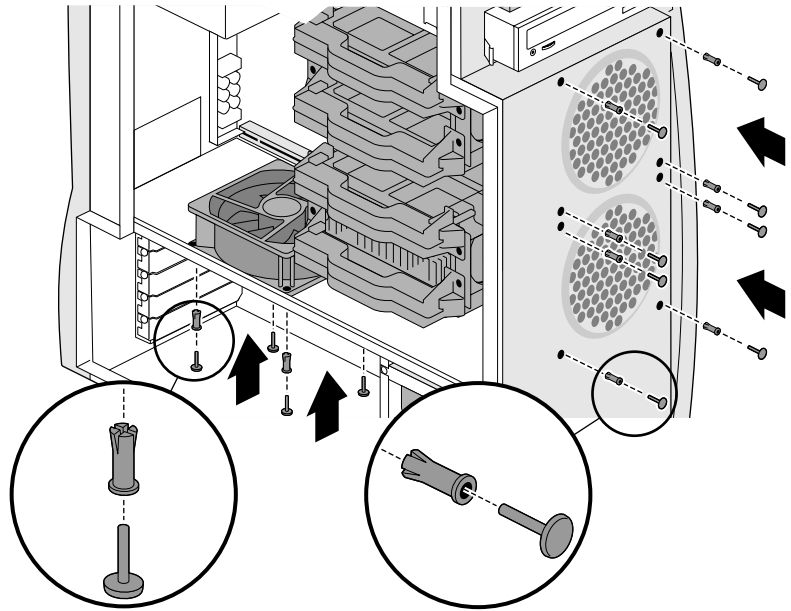
Air exits through the power supply.



**Figure 7-13** Checking the Direction of the Airflow

2. Position the new fan over the push pin holes. Turn it so that the cable exits the fan on the side farthest from the system board.
3. Make sure you align the fans so that the arrow printed on the fan (indicating the airflow direction) is facing in or up. If the fan is installed incorrectly, the system can overheat and be damaged.

4. Using the push pins that came with the new fan, insert each hollow push pin casing into the fan. See Figure 7-14.
5. Insert the push pins into the casings in the fan. Make sure they are completely seated so that the fan is not loose.



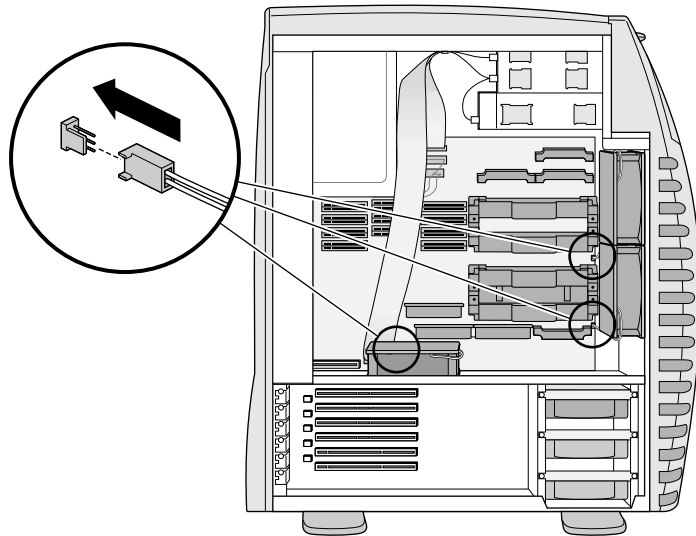
**Figure 7-14** Installing the Fan and Push Pins



6. Connect the fan cable to the system board as shown in Figure 7-15. The connector is designed so that you can insert it only one way.

**Note:** Placing the cable connector on the system board three-pin connector is difficult when inserting either vertical fan. A needle-nose pliers and a pencil may be helpful for this task. After positioning the connector on the pins, and carefully push it into place using the eraser end of a pencil.

7. Tuck the fan cable around the middle of the fan. This prevents the cable from hanging loose and being accidentally disconnected.
8. If you removed a processor or terminator card, replace it. See “Installing Processors and Voltage Regulators” on page 104 for instructions. Then return here.



**Figure 7-15** Installing the Fan Cable

9. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
10. Plug the power cord into an electrical outlet.
11. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.



## *Chapter 8*

# **Maintenance and Troubleshooting**

This chapter provides maintenance and troubleshooting information for the Silicon Graphics 540 visual workstation. The following topics are included in this chapter:

- “Maintenance Tips” on page 140
- “Troubleshooting” on page 140
- “Interpreting LED Blink Codes” on page 145
- “Disabling and Enabling the Setup Password” on page 146
- “Reconnecting the Power Button, LED, and Reset Button Cables” on page 148
- “Reinstalling the Operating System or Service Pack” on page 148

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## Maintenance Tips

- Shut down, power off, and unplug the workstation from an electrical outlet before performing any hardware task.
- Periodically vacuum dust and lint from the vents to maintain optimal airflow through the system. Vacuum frequently if you are in an environment that does not filter air.
- Place your Silicon Graphics 540 visual workstation in a location to allow air to be pulled into the vents for cooling.
- Do not block the vents by placing objects around or over the workstation.
- Always discharge any static electricity by powering off the system, unplugging the power cord, and touching the metal chassis, before beginning work on the system board or DIMMs. Wear a wrist strap (attached to the metal chassis) if you have one.
- Do not plug in any cables to the workstation while the workstation is running except audio, IEEE 1394, and USB cables.
- Keep liquids away from the keyboard and workstation.

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## Troubleshooting

Table 8-1 lists system problems, possible causes, and recommended solutions.

- To verify that the system recognizes a part, go to Start > Programs > Administrative Tools > Windows NT Diagnostics.
- If after attempting to diagnose the problem, you need assistance from Customer Support, see Chapter 9, “Customer Support Services” on page 150 for a listing of Customer Support phone numbers.

**Table 8-1** Troubleshooting

<b>Symptom</b>	<b>Possible Cause</b>	<b>Solution</b>
System does not power on.	System power cord is loose or unplugged; electrical outlet is dead.	Plug the system power cord into the workstation power connector and electrical outlet, or into a different outlet.
	Power supply cables are not attached to system board.	Connect both power supply cables to the system board. See Chapter 7.  Check to see if the internal fans are working and if the LED on the front of the system is lit. If the fans are working and the LED is lit, the system board is receiving power. See Chapter 7.
	Power supply is dead.	Replace the power supply. See Chapter 7.
	Primary processor is not recognized.	Reinstall the processor. See Chapter 6.
	Primary processor failure.	Replace the processor. See Chapter 6.
	A voltage regulator is dead.	Replace the voltage regulator. See Chapter 6.
	A required voltage regulator is not installed, or is installed in an incorrect slot.	Make sure the proper number of voltage regulators are in place. See Chapter 6.
	Power button and LED cables are not attached to the system board.	Attach power button and LED cables to the system board. See the illustration on the interior of the side cover.
	Power supply failure.	Replace the power supply. See Chapter 7.
	System board failure.	Replace the system board. Call Customer Support.

**Table 8-1** Troubleshooting (continued)

Symptom	Possible Cause	Solution
System powers on, LED and monitor are black.	Processor terminator cards are not installed in unused processor slots.	Install processor terminator cards in all unused processor slots. See Chapter 6.
The system powers on, green LED blinks continuously, nothing appears on the monitor.	Memory error.	Make sure that all DIMMs installed in slot group A are the same capacity. See Chapter 3.  Make sure that the DIMMs are securely seated in the DIMM sockets.
	A voltage regulator is installed with a processor terminator card in the associated processor slot.	Remove the voltage regulator associated with the processor slot that has the terminator card in it. See Chapter 6.
	Memory failure.	Replace the appropriate DIMMs. See Chapter 3.
	System board failure.	Replace the system board. Call Customer Support. See “Customer Support Services” on page 150.
The system powers on, the green LED blinks a repeating pattern, and nothing appears on the monitor.	Memory failure.	Locate and replace the faulty DIMM by interpreting the LED blink code. For information, see “Interpreting LED Blink Codes” on page 145.
The system boots to PROM level, does not boot Windows NT.	Memory error or failure.	Make sure all DIMMs installed in slot group A are the same capacity.
		Make sure DIMMs are securely seated in the slots.
		Set Power On Diagnostics to Extensive Mode and reboot the system. (See the <i>Silicon Graphics 320 and Silicon Graphics 540 Software Installation Guide</i> for instructions.) Check for memory error in diagnostics display to identify faulty DIMMs.

**Table 8-1** Troubleshooting (continued)

Symptom	Possible Cause	Solution
	System drive not recognized.	If the boot drive was changed in type or location, then the PROM must be configured correctly. See the <i>Silicon Graphics 320 and Silicon Graphics 540 Software Installation Guide</i> for instructions.
	Software does not recognize new processor.	Reinstall Windows NT. See the <i>Silicon Graphics 320 and Silicon Graphics 540 Software Installation Guide</i> for instructions.
Mouse does not work.	Mouse unplugged.	Plug mouse into the USB connector.
	Mouse not recognized.	Press the Reset button to reboot the system.
	Faulty or incompatible mouse.	Replace the mouse.
Keyboard does not work.	Keyboard not plugged in or not recognized.	Plug keyboard into USB port. Reboot the system.
	Faulty or incompatible keyboard.	Replace the keyboard.
No power to monitor.	Power cable unattached or monitor not turned on.	Attach the power cable. Press the power button on the front of the monitor.
	Monitor is dead.	Replace the monitor.
Monitor powers on, no display, system LED on but does not blink continuously.	Monitor brightness controls too dark.	Increase brightness.
	Monitor cable unattached.	Check monitor cable connection to system and monitor.

**Table 8-1** Troubleshooting (continued)

Symptom	Possible Cause	Solution
Removable media drive not recognized.	Cables connected incorrectly or disconnected.	Verify correct IDE or FDI cabling.  Connect any disconnected IDE, FDI, or power cables.
Removable media drive not recognized.	IDs set incorrectly.	Verify Master and Slave settings for IDE drives.
Internal hard SCSI drive not recognized.	IDs set incorrectly	Verify drive IDs are not duplicated and system drive is set to ID 0. Some drives have jumpers on the back that could be set (in error) to duplicate an ID set by the system.
PCI card not recognized.	Card not correctly installed in slot.	Reinstall the card.
	Card not supported.	Remove the card.
	Card missing the driver.	Install the driver.
Second, third, or fourth processor slot not recognized.	Processor not correctly installed in slot.	Reinstall the processor.
	A voltage regulator is not installed, is installed in the wrong slot, or is bad.	Install or replace the appropriate voltage regulator.
LED does not work	LED cable to system board was removed and replaced upside down.	Replace the LED cable with the label facing up.

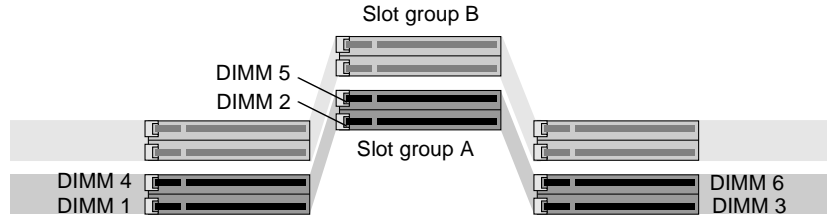


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## Interpreting LED Blink Codes

The LED on the front of the system blinks while the system powers up and runs power-on diagnostics. If the system boot is successful, the NT login screen appears on your monitor. If the boot is unsuccessful, the LED blink codes may help you determine the error.



**Figure 8-1** Identifying DIMMs in Slot Group A

The LED code (blink-pause-blink) communicates the number of the failed DIMM in slot group A. It also indicates that a RAM failure is detected but the specific location is unknown. See Table 8-2.

**Table 8-2** LED Blink Code — Failed DIMM

Blink Code	Failed DIMM
1 blink, pause (repeat)	Slot group A, DIMM 1
2 blinks, pause (repeat)	Slot group A, DIMM 2
3 blinks, pause (repeat)	Slot group A, DIMM 3
4 blinks, pause (repeat)	Slot group A, DIMM 4
5 blinks, pause (repeat)	Slot group A, DIMM 5
6 blinks, pause (repeat)	Slot group A, DIMM 6
7 or 8 blinks, pause (repeat)	Unspecific RAM failure.

- The LED flashes slowly as the system boots, turning solid green when it is fully up and running.

- The LED shows a steady light on when the system is powered on.
- The LED flashes quickly when the system cannot boot.
- The LED is off when the system is powered off.

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## Disabling and Enabling the Setup Password

If you do not know your setup password, you can disable it by moving a jumper (a small cap that connects to two pins) on the system board. To move the jumper you must shut down and power off the system, and unlock and remove the side panel.

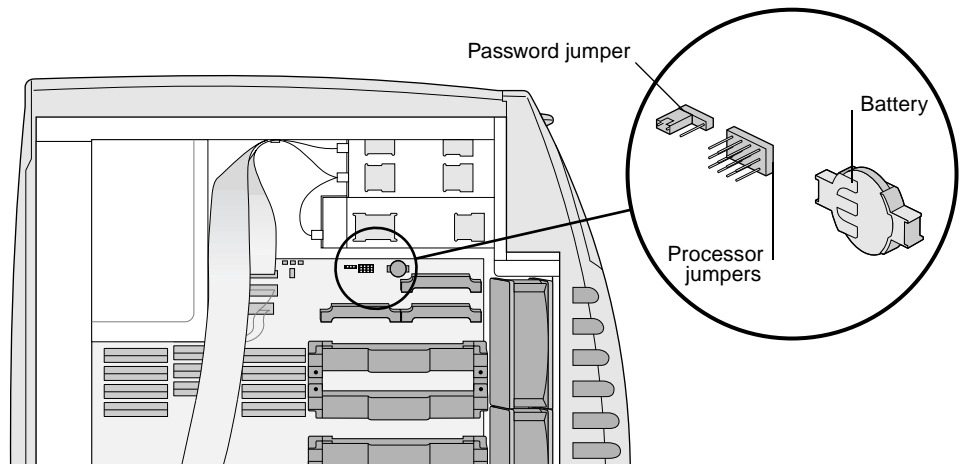
**Caution:** If you have a PROM image floppy disk in your floppy drive, a new PROM will be installed when you power on your system in the disable-the-password mode.

1. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14.
2. Unplug the workstation power cable from the electrical outlet.
3. On the back of the system, touch a metal part, such as the metal frame surrounding the PCI slots to equalize the electrostatic charges between you and the system.

**Caution:** System parts are sensitive to electrostatic discharge and can be damaged if the static charge you carry is greater than that of the system. Following the instructions in step 3 prevents damage. It is also always a good idea to wear a grounded wrist strap, if you have one, while working inside a system.

4. Remove the side cover. For detailed instructions, see “Removing the Side Cover” on page 19.
5. Laying the system on its side is recommended for accessing and moving and moving jumpers. For detailed instructions, see “Laying the System on Its Side” on page 22.

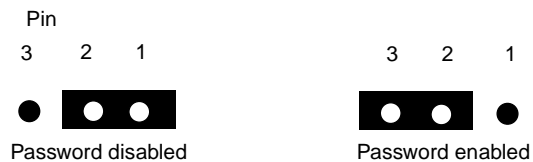
6. Locate the password jumper on the system board. It is near the upper voltage regulators. It is to the immediate left of the processor jumpers. See Figure 8-2.



**Figure 8-2** Locating the Password Jumper

The password is disabled when the jumper is on the right two pins.

7. To disable the password, move the jumper from the two left pins to the two right pins. See Figure 8-3.



**Figure 8-3** Determining the Password Jumper Positions

8. Replace the side panel. For specific instructions see “Replacing the Side Cover” on page 25. Then return here.
9. Plug in the power cord, and power on the system.
10. With the system powered on, enter a new password when prompted to do so.

11. Shut down and power off the system, and remove the power cord and side panel.
12. Move the jumper one pin, back to its original location. Your new password is now enforced.
13. Replace the side cover. For detailed instructions, see “Replacing the Side Cover” on page 25.
14. Plug the system power cord into an electrical outlet.
15. Turn on the system. For detailed instructions, see “Turning On the System” on page 12.

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## **Reconnecting the Power Button, LED, and Reset Button Cables**

If you ever need to remove the power button, LED, or reset button cables, located at the top and middle of the system board, replace the cables so the labels on the connectors face up. If the LED cable is replaced upside down, the LED does not work.

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## **Reinstalling the Operating System or Service Pack**

If you need to reinstall your operating system, see the *Silicon Graphics 320 and Silicon Graphics 540 Visual Workstations Software Installation Guide* which shipped with your CDs.

To receive the correct service pack, contact your authorized customer service representative. See “Customer Support Services” on page 150 for some phone numbers of authorized service providers.

## *Chapter 9*

# **Customer Support and Warranty**

This chapter provides customer support and warranty information for the Silicon Graphics 540 visual workstation. The following topics are included in this chapter:

- “Customer Support Services” on page 150
- “Individual System Information” on page 152
- “Limited Product Warranty” on page 153

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## Customer Support Services

Silicon Graphics offers a wide range of support services. Warranty upgrades and support contract services include operating system support packages, onsite maintenance, and Supportfolio for Visual Workstation, an online tool for finding answers to frequently asked questions and other technical support information. You can also enroll in education classes or purchase consulting services for more complete service needs.

A detailed description of these services is available online at:

<http://www.sgi.com/visual/support>

Supportfolio for Visual Workstation, which provides technical assistance through the Web, is available at:

<http://support.sgi.com/nt> (note that there is no www in the URL).

To contact Silicon Graphics customer support in your area by telephone, use the following numbers:

<b>Country</b>	<b>Phone Number</b>
Argentina	0800-5-1002 at tone enter 650-933-1980-4744 then 992-0021 or dial 31 3465-97221 TOLL for NT/Flatpanel
Australia	1800-818-549
Austria	0800-201705
Belgium	02-6790052
Brazil	0008140-550-3510
Canada	800-800-4744
Chile	1230-020-2327
China	10-800-120-0117
Colombia	980-15-4537
Denmark	04327-0427
Finland	096-13-32-445
France	01-3488 8888
Germany	0130 112 550

<b>Country</b>	<b>Phone Number (continued)</b>
Greece	00800-12-5137
Hong Kong	852-27843136
India	000-127 at tone enter 650-933-1980-4744 then 993-0024 or dial 61 02 6221 6524 TOLL for NT/Flatpanel
Indonesia	001-803-011-2502
Ireland	0870-60744744
Israel	9-970-6677
Italy	1678-23183
Japan	0120 458 901
Korea	080-333-7373
Malaysia	1-800-80-3226
Mexico	52-5-267-1370
The Netherlands	030-669-6700
New Zealand	0800-4744-4357
Norway	6711-4601
Peru	0800-5-1002 at tone enter 650-933-1980-4744 then 992-0021 or dial 31 3465-97221 TOLL for NT/Flatpanel
Portugal	08008-12734
Singapore	65-776-0970
Spain	900-234432
Sweden	08-470-0090
Switzerland- French	0800-804021
Switzerland- German	0800-804022
Taiwan	0080-13-9709
Thailand	001-800-12-0662980
United Kingdom	0870-60744744
United States	800-800-4744
Venezuela	8001-2509
Local	<hr/>
Other	<hr/>

In all other countries, please contact your local Silicon Graphics representative.

Make sure your Individual System Information table (on page 152) is filled out before you make your service call. Your service representative needs information about your system to be able to help you. If you need to return a part, please call your local Silicon Graphics representative for instructions.

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## Individual System Information

Use the following table to record information about your system, which you need should you ever need to make a support call.

**Table 9-1** System Information

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### System Information

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Serial number

---

Date of purchase

---

Size and type of memory (DIMMs)

---

Number of processors

---

Processor type and speed

---

Type and number of PCI cards

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PCI slot 1

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PCI slot 2

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PCI slot 3

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PCI slot 4

---

PCI slot 5

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PCI slot 6

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Capacity of system Ultra2 SCSI hard drive

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Capacity of option Ultra2 SCSI hard drive (bay 2)

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Capacity of option Ultra2 SCSI hard drive (bay 3)

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**Table 9-1** System Information (continued)

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**System Information**

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Operating system version

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Service pak number

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**Limited Product Warranty**

Silicon Graphics (“SG”) warrants to the original purchaser of this SG hardware product (the “Product”) that it will be free from defects in material and workmanship for a period of three (3) years after the date of its original purchase (the “Warranty Period”). Product will be of new manufacture, but may include used parts and/or components that match or exceed the performance and reliability of new parts and/or components.

If you discover a defect in any Product during the Warranty Period, SG will repair, or at SG’s option replace, such Product at no charge to you, provided that you (i) promptly provide notice of the defect to an SG service center or authorized SG service provider in the country where you purchased the Product, (ii) include with such notice a copy of your bill of sale or packing list for the Product, bearing the applicable SG serial number as proof of the original date and location of your purchase, and (iii) return such defective Product freight pre-paid to SG or an authorized SG service provider, as applicable. Product or components thereof replaced by SG will become the property of SG.

This warranty applies only to Product that you purchased from SG or an authorized SG reseller, that SG or its authorized service provider

determines to be defective. This warranty does not apply to (a) software installed on or accompanying the Product, which is licensed to you under a separate agreement included with such software, (b) the Silicon Graphics 1600SW Flat Panel monitor or other flat panel monitors, which are provided under separate warranty, (c) Product that has been damaged by abuse, accident, act of God, misuse, misapplication, improper installation or shipment or the like, or (d) Product that has been modified or on which the serial number has been removed or altered. YOU ARE SOLELY RESPONSIBLE FOR BACKING UP YOUR SOFTWARE AND DATA ON AN ONGOING BASIS AND BEFORE THE PRODUCT IS REPLACED OR REPAIRED. SG, ITS RESELLERS AND AUTHORIZED SERVICE PROVIDERS WILL NOT BE LIABLE TO YOU FOR ANY LOSS OF OR DAMAGE TO SOFTWARE, DATA OR REMOVABLE STORAGE MEDIA.

THE FOREGOING WARRANTY IS YOUR EXCLUSIVE REMEDY FOR BREACH OF WARRANTY BY THE PRODUCT. THIS WARRANTY IS IN LIEU OF, AND SG DISCLAIMS, ALL OTHER WARRANTIES, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT. NO ORAL OR WRITTEN INFORMATION OR ADVICE GIVEN BY SG, OR ITS RESELLERS, DEALERS, DISTRIBUTORS, OR AUTHORIZED SERVICE PROVIDERS WILL CREATE A DIFFERENT WARRANTY OR CHANGE THE TERMS OF THIS WARRANTY.

SG SHALL NOT BE LIABLE FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL OR INDIRECT DAMAGES OF ANY KIND (INCLUDING WITHOUT LIMITATION LOSS OF PROFITS, USE, DATA, SOFTWARE, GOODWILL OR PROPERTY DAMAGE), WHETHER OR NOT SG HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH LOSS, HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, ARISING OUT OF THE USE OF THE PRODUCT, OR RESULTING FROM A BREACH OF THIS WARRANTY. THESE LIMITATIONS SHALL APPLY NOTWITHSTANDING THE FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY.

## Appendix A

# Technical Specifications

This appendix shows the technical specifications for the Silicon Graphics 540 visual workstation.

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### Physical Specifications

The Silicon Graphics 540 visual workstation has removable media drives at the front top of the enclosure for easy access. Slots for PCI options, disk drives, memory modules, and processor modules are accessible by removing the side cover. Cooling is achieved by three internal fans and a fan in the power supply.

**Table A-1** Dimensions and Weight

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Dimensions	9 in. W x 24 in. H x 18 in. D
Minimum weight	51 lb
Maximum weight	65 lb

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**Table A-2** Dimensions and Weight in Packaging

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Dimensions in Packaging	
- Width	21.50 in. (54.61 cm)
- Height	28.75 in. (73.03 cm)
- Depth	27.75 in. (70.49 cm)
Maximum weight in packaging	89 lb

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## Environmental Range Specifications

**Table A-3** Environmental Range Specifications

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<b>Condition</b>	<b>Range</b>
Temperature	+10° C to +35° C (operating) -40° C to + 85° C (non-operating)
Heat dissipation	2400 BTU/hour
Relative humidity	10% to 85% operating (no condensation) 5% to 95% non-operating (no condensation)
Altitude	Sea-level - 10,000 ft (operating) Sea-level - 40,000 ft (non-operating)
Vibration	0.02 in. displacement, 5-19 Hz: 0.35 G, 19 - 500 Hz.
3-Axis sine vibration	0.02 in. displacement, 5 to 19 Hz 0.2G, 20 to 200 Hz (operating) 0.1 in. displacement, 5 to 19 Hz, 0.5G, 20 to 200 Hz (non-operating)
Half sine shock	5 G, 15 mS Horizontal Plane 7.5 G, 10 mS Vertical Plane (operating) 20 G, 10 mS 3 Axis
Random vibration	3 to 10 Hz, 5 dB/Octave 10 to 200 Hz, 0.0005 G (Square)/Hz 200 to 500 Hz, -5 dB/Octave 0.41 G (RMS) Overall

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## AC Power

**Table A-4** Power Specifications

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Voltage minimum	100/200 V
Voltage maximum	120/240 V
Frequency	50/60 Hz
Current maximum	9 A
Power factor, minimum	0.98
Total harmonic dist., at 120 volts	5% maximum
Inrush current, peak	45 amps
Total power consumption/ Watts (from the Wall)	838 W

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## Acoustic Noise

The Silicon Graphics 540 visual workstation generates a maximum range of 42 dB(A) acoustic noise when configured with Silicon Graphics processor and storage components.

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## System Board Specifications

The following table contains information about the Silicon Graphics 540 visual workstation system board ports and buses.

**Table A-5** System Board Specifications

Port or Bus	Description
Processor bus	One to four Intel Pentium III Xeon processors.
Memory configuration	Minimum: 128 MB. Maximum: 2 GB.
Ultra DMA IDE	One Ultra DMA/33 IDE channel.
FDI	One Floppy Drive Interface bus.
USB ports	Two Universal Serial Bus (USB) ports.
Monitor port	VGA connector to CRT or analog-interface flat panel monitor. Supports monitor ID and control via DDC2B interface.
Flat panel monitor option	One optional digital interface flat panel monitor port.
IEEE 1394 ports	Two IEEE 1394 connectors at 400 Mbps.
Serial port	One RS-232 serial port with separate DMA channels for input and output. Each channel is capable of up to 115 Kbaud and is full duplex.
Parallel port	One IEEE 1284-compliant parallel port.
Ethernet port	One 10/100 Mb auto-sensing Ethernet interface.
Analog audio ports	The audio subsystem has two input channels that can be sourced from the microphone input: the stereo line-level inputs, and the internal CD-ROM drive analog outputs. The audio subsystem has two output channels that drive the stereo line-level outputs, and the stereo variable-level headphone/speaker output.

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**Table A-5** System Board Specifications (continued)

<b>Port or Bus</b>	<b>Description</b>
Analog video ports	The video subsystem has two channels and two signal formats. The input channel can take data from a composite input or a Y/C (S-Video) input, and the output channel can send data to a composite output and a Y/C (S-Video) output simultaneously.
PCI bus	The Silicon Graphics 540 visual workstation has two PCI buses, one with four slots, and one with two slots. All slots are 33 MHz/64 bit. Slots 1 through 4 accept 5 V and universal cards. Slots 5 and 6 accept 3.3V and universal cards.





## Appendix B

### Port Information

This chapter contains a description of the ports on the back of the Silicon Graphics 540 visual workstation and detailed pinout information for each port. There is also a section on serial port adapter cables.

**Table B-1** I/O Panel Port and Connector Type

Port	Connector Type
Ethernet	RJ45 10/100 Base TXt (8 Pin - male)
IEEE 1394	6-pin IEEE 1394 connector
USB	4-pin USB connector
Serial	DB9 (9 pin - male)
Parallel	DB25 (25 pin - female)
Monitor	DB15 (15 pin - female)
Microphone	3.5 mm mini jack (female)
Speaker/Headphone	3.5 mm mini jack (female) stereo variable-level output
Analog Line In/Out	4 X RCA (female) stereo line-level audio input/output
Composite Video	RCA (female) NTSC/PAL composite video input
S-Video In/Out	4-pin Mini-DIN (female)

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## Option Card Adapter Ports

**Table B-2** Adapter Card Port and Connector

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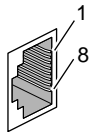
Adapter Card Port	Connector
Flat panel monitor	36 pin (female)
Silicon Graphics SD1100 Card	8 BNC connectors

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## Ethernet Port Pinouts



**Table B-3** Ethernet Port

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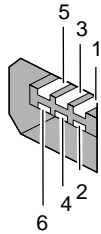
Pin	Assignment
1	Transmit+
2	Transmit-
3	Receive+
4	(Reserved)
5	(Reserved)
6	Receive-
7	(Reserved)
8	(Reserved)

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## IEEE 1394 Port Pinouts



**Table B-4** IEEE 1394 Ports

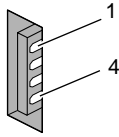
Pin	Assignment
1	Power
2	Ground
3	TPB-
4	TPB+
5	TPA-
6	TPA+

- There is no support in Windows/NT 4.0 for IEEE 1394. Full Silicon Graphics and Microsoft support for IEEE 1394 is expected with the release of Windows/NT 5.0.
- Maximum cable length is 4.5 meters between devices or to the system.
- Up to 63 devices can be attached per system or bus:
  - A node is a device with connectors allowing other devices to attach to it.
  - Up to 16 nodes can be daisy-chained together.
  - A node generally has three connectors, but can have more or less.

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## USB Port Pinouts



**Table B-5** USB Port

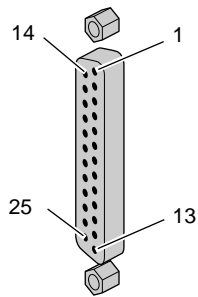
Pin	Assignment	Color	Comment
1	+5 V	Red	Cable power
2	-Data	White	
3	+Data	Green	
4	Ground	Black	Cable ground

- The keyboard and mouse are the only USB devices supported prior to the Windows/NT 5.0 release.
- Maximum cable length between USB devices or to the system is 3 meters for slow-speed devices, and 5 meters for high-speed devices.
- A maximum of 127 peripheral devices can theoretically be attached via hubs to the host.
- A peripheral device can be either a single device or a hub.
- A single device connects directly to the system.
- A hub (a peripheral or stand alone device) can have up to seven ports to which other peripherals connect.
- Some USB devices can receive power from the system or can contain their own power supply.
- Maximum power drawn from USB ports is 5 Watts of +5 V DC.

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## Parallel Port Pinouts



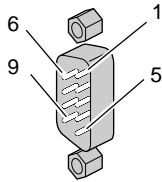
**Table B-6** Parallel Port

Pin	Assignment	Pin	Assignment
1	Strobe	14	AutoFd
2	Data (0)	15	Fault
3	Data (1)	16	InIt
4	Data (2)	17	SelIn
5	Data (3)	18	Gnd
6	Data (4)	19	Gnd
7	Data (5)	18	Gnd
8	Data (6)	19	Gnd
9	Data (7)	22	Gnd
10	Ack	23	Gnd
11	Busy	24	Gnd
12	Error	25	Gnd
13	Select		

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## Serial Port Pinouts



**Table B-7** Serial Port

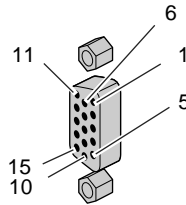
Pin	Assignment	Description
1	DCD	Data Carrier Detect
2	RD	Receive Data
3	TD	Transmit Data
4	DTR	Data Terminal Ready
5	SG	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear to Send
9	RI	Ring Indicator

For serial adapter cables, see Table B-15.

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## Monitor Port Pinouts



**Table B-8** Monitor Port

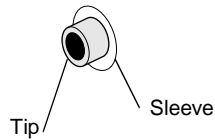
Pin	Assignment
1	Red
2	Green
3	Blue
4	Ground
5	Ground
6	Red Return
7	Green Return
8	Blue Return
9	No Connect
10	Ground
11	Ground
12	IIC Data
13	Horizontal Sync
14	Vertical Sync
15	IIC Clock

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## Microphone, Headphone/Speaker Port Pinouts



**Table B-9** Microphone Port

Microphone	Tip	Ring Sleeve
Line level mono microphone	Signal (+)	Open Ground (-)

**Table B-10** Microphone Specification

Microphone Jack	
Connector	3.5 mm stereo mini (mono signal on tip and ring)
Power	+5 phantom power on tip
Type	Unidirectional electret condenser

**Table B-11** Speaker/Headphone Port

Tip	Ring	Sleeve
Left	Right	Ground

**Table B-12** Speaker/Headphone Specification

Headphone/Speaker	
Connector, speaker	150 ohms
Connector, headphone	3.5 mm stereo mini
Recommended impedance	35 ohms

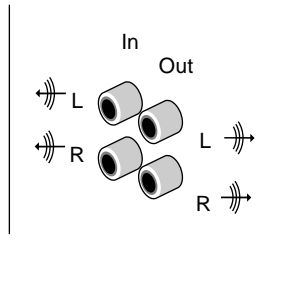


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## Analog Line Level Audio



**Table B-13** Analog Line Level Audio Port

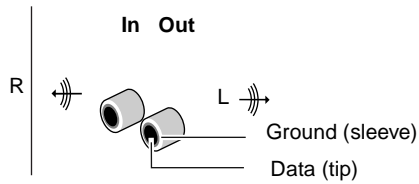
Specifications	Line In	Line Out
Line level	-10 dBV	-10 dBV
OdBFS Maximum	+10 dBV to -22 dBV	6.5 dBV 0.5 dBV

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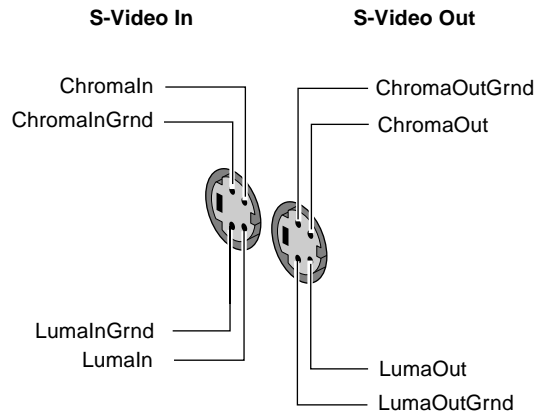
## Composite Video



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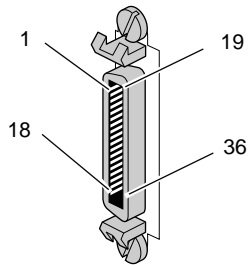
## S-Video Port Pinouts



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## Flat Panel Monitor Option Card Port Pinouts



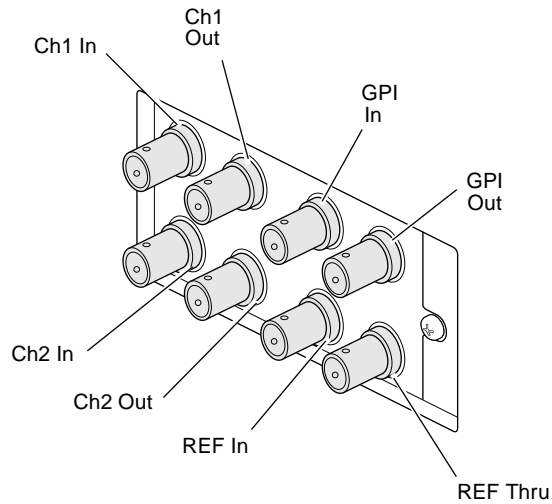
**Table B-14** Display Option Card (Flat Panel Monitor) Port Pinouts

Pin	Assignment	Pin	Assignment
1	ODDCH0_N	19	ODDCH3_N
2	ODDCH0_P	20	ODDCH3_P
3	ODDCH1_N	21	ODDCLK_N
4	ODDCH1_P	22	ODDCLK_P
5	ODDCH2_N	23	I2C_SCL
6	ODDCH2_P	24	I2C_VCC
7	RESERVED	25	I2C_SDA
8	RESERVED	26	I2C_DGND
9	LVDSGND	27	RESERVED
10	LVDSGND	28	RESERVED
11	RESERVED	29	RESERVED
12	RESERVED	30	RESERVED
13	EVNCH0_N	31	TXR_ENABLE_NOT
14	EVNCH0_P	32	DGND
15	EVNCH1_N	33	EVNCLK_N
16	EVNCH1_P	34	EVNCLK_P
17	EVNCH2_N	35	EVNCH3_N
18	EVNCH2_P	36	EVNCH3_P

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## Silicon Graphics SD1100 Option Card



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## Serial Adapter Cables

**Table B-15** Serial Adapter Cables

Cable Type	Connector on System	Connector on Peripheral
Printer/Dumb Terminal Cable	DB9 Connector (female)	DB25 (female)
PC Modem Serial Cable	DB9 Connector (female)	DB25 (female)
Serial Port Converter Cable	DB9 (female)	Mini-DIN8 (female)
Adapter Cable to support ANSI/SMPTE Standard 197M-1992	DB9 (female)	DB9 (female)

## SCSI Information

Your Silicon Graphics 540 visual workstation supports up to three internal Ultra2 SCSI drives.

If your Silicon Graphics 540 visual workstation has SCSI PCI cards installed, you can attach external SCSI devices to the system. Here are some tips to keep in mind when attaching SCSI devices:

- You can mix Ultra2, Ultra, and Fast devices on the same bus. You can also mix 16-bit and 8-bit devices on the same bus. The overall performance of a mixed bus can vary widely.
- To daisy-chain a mix of wide and narrow devices, place the wide devices (as a group) closest to the Silicon Graphics 540 visual workstation where the bus is wide, and place the narrow devices (as a group) at the end of the daisy chain.

**Note:** Be sure to use an adapter or other special cable that terminates the upper half of the SCSI bus when converting from the final wide device to the first narrow device. Silicon Graphics supplied cables have this integrated into the cable, but not all third-party cables have the terminator integrated into the cable.

- The length of combined SCSI cables determines how many devices can be daisy-chained. See Table C-1 in this appendix.
- Terminate the last device in the chain with an LVD/SE terminator.
- See your authorized Silicon Graphics service representative for a current list of supported devices and adapter cables.
- Purchase Ultra2 SCSI hard drives with SCA (single connector attachment) type connectors.

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## Attaching External SCSI Devices

You must shut down your system to install an external device, but before doing so you must assign an address to the device.

1. Assign a unique SCSI ID number to each device. Set an ID by moving the jumpers, switch, or dial on the device to the assigned number. You can assign any number from 1 to 15, excluding number 7, which is reserved for the SCSI controller.

If you already have external devices attached and want to add a device, you can check the SCSI ID numbers of the current devices by doing the following:

- Choose Start > Control Panels from the Windows NT task bar.
  - Double-click the SCSI Adapters icon to open the SCSI Adapters panel.
  - Click the + next to the PCI SCSI Card to see a list of the devices.
  - Click a device name, then click the *Properties* button to open the device Properties panel.
  - Click the Settings tab. The assigned SCSI ID number for the device appears next to the Target ID label.
2. Shut down the system. For detailed instructions, see “Shutting Down the System” on page 14. Press the power button to power off the system.
  3. Attach the device to the SCSI connector on the back of the system.
  4. If you are attaching multiple devices, chain them together using the cables that shipped with the devices, making sure not to exceed the maximum cable length of 3 meters. If all devices are Ultra2 SCSI, the maximum cable length is 12 meters.

**Caution:** Using a cable without controlled impedance may cause your device not to function. For any external device, it is extremely important that you use a cable of controlled impedance that meets Ultra SCSI cable specifications. Not all cables with the correct connector work. This is particularly important if you have more than one external device.

5. Terminate the last device in the chain with an LVD/SE terminator.
6. Power on the system by pressing the power button.

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## Verifying and Troubleshooting SCSI Device Installation

Use the SCSI Adapters panel to verify that the system recognizes the devices you installed.

1. Choose Start > Control Panels.
2. Double-click the SCSI Adapters icon.
3. Click the + next to PCI SCSI Card to see a list of installed SCSI devices.

If the system does not recognize one or more of the devices:

- Make sure each device is set to a unique SCSI ID number.
- Check all the cable connections and verify the last device is terminated. Shut down and reboot the system.
- If the system still does not recognize a device, shut down and open up the system. Check to make sure the SCSI PCI card is installed correctly (see “Installing PCI Cards” on page 5-72).

Close and reboot the system. If the system still does not recognize the device, there may be a problem with one of the devices, one of the cables, the terminator, or the PCI card. Contact your support representative.

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## Cables

You can attach one or more external devices to a SCSI PCI adapter card port. Connecting more than one device is called daisy-chaining. The devices are connected in a chain, with the first device attached to the SCSI adapter card port.

The combined length of SCSI cables determines the number of devices that can be daisy-chained. See Table C-1 for information on the types of devices and combined cable lengths you may use.

**Note:** Ultra2 SCSI uses a new technology, low voltage differential (LVD) that allows for longer cabling to Ultra2 SCSI devices. Ultra2 SCSI is backward compatible. However, when Ultra2 and other SCSI devices are combined, the cable length reverts to a shorter length. See Table C-1.

**Table C-1** Maximum Combined SCSI Cable Length

SCSI Type	Maximum Cable Length
Ultra2 SCSI	12 meters
Ultra2 SCSI and other SCSI devices	3 meters
Ultra SCSI	3 meters
Ultra SCSI and Fast SCSI	1.5 meters
Fast SCSI 2	6 meters

If you have a device that you want to attach to your system, but you do not have the appropriate cables, you can order them by contacting your authorized service provider.

**Note:** Ultra2 SCSI 68-pin connectors are Very High Density (VHD) type connectors, which are smaller than the 68-pin connectors used for Ultra SCSI.



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## Data Transfer Rates

Data transfer rates vary depending on the type of SCSI controller in the workstation, and the type of SCSI device attached. The Silicon Graphics 540 visual workstation has an Ultra2 SCSI controller.

Table C-2 compares Ultra and Fast, wide and narrow SCSI rates. Ultra SCSI is also referred to as Fast-20.

**Table C-2** Comparison of SCSI Rates

	Wide (16 bit) Bus	Narrow (8 bit) Bus
Ultra2 SCSI	80 MB/s	40 MB/s
Ultra SCSI (Fast-20)	40 MB/s (peak theoretical rate)	20 MB/s (peak theoretical rate)
Fast SCSI	20 MB/s (peak theoretical rate)	10 MB/s (peak theoretical rate)

The data transfer rate is also affected by the media speed of the SCSI peripheral. Fast-20 SCSI is not merely “fast SCSI.” The “-20” in the term signifies the maximum number of megatransfers (millions of 8-bit or 16-bit data transfers per second) that can occur during an I/O operation.

Data transfer rates are either slow or fast, and are measured in megabytes per second. An operation is either 8- or 16-bit in size; thus, data transfer rates are dependent on bus width.

By default the Ultra2 SCSI controller tries to negotiate for wide (16-bit) and for Ultra2 speed. Table C-3 provides data burst rate information.

**Table C-3** Bus Rate + Operating Mode = Data Burst Rate

Existing Bus	Operating Mode	Data Burst Rate
16-bit	Ultra2	80 MB/second
16-bit	Ultra	40 MB/second
16-bit	Fast	20 MB/second
8-bit	Ultra	20 MB/second
8-bit	Fast	10 MB/second

## Regulatory Information

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### Manufacturer's Regulatory Declarations

The Silicon Graphics 540 visual workstation conforms to several national and international specifications and European Directives listed on the "Manufacturer's Declaration of Conformity." The CE insignia displayed on each device is an indication of conformity to the European requirements.

**Caution:** Your Silicon Graphics 540 visual workstation has several governmental and third-party approvals, licenses, and 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.

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### CMN Number

The CMN (model) number, for the Silicon Graphics 540 visual workstation is on the system label on the back of the workstation. The system label is located at the top right on the back of the workstation. See Figure 1-4 on page 1-5 for the location of your system label.

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## **Series Number**

The series number is on the serial number label on the back of the workstation.

You need to know the series number and CMN number for downloading the Manufacturer's Declaration of Conformity from the World Wide Web.

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## **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 the system to determine your CMN (model) number, and on the serial number label to determine your series number. You need both to identify your Declaration of Conformity. See Figure 1-4 on page 1-5 for the location of your system label and serial number label.

To locate the information on the World Wide Web, enter the following in your Web browser location window:

<http://www.sgi.com/compliance>

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## **Upgrade Regulatory Label**

If you received a regulatory label with an upgrade, place it in the margin of this chapter, next to "Manufacturer's Declaration of Conformity" on page 180.

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## Class A

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**Caution:** The user is cautioned that changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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## **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.

Also, 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.

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## **Industry Canada Notice (Canada Only)**

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

Cet appareil numérique n'émet pas de perturbations radioélectriques dépassant les normes applicables aux appareils numériques de Classe A prescrites dans le Règlement sur les interférences radioélectriques établi par le Ministère des Communications du Canada.

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## **VCCI Notice (Japan Only)**

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

---

## Chinese Class A Regulatory Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

---

## Korean Class A Regulatory Notice

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

---

## NOM 024 Information (Mexico Only)

La información siguiente se proporciona en el dispositivo o en dispositivos descritos en este documento, en cumplimiento con los requisitos de la Norma Oficial Mexicana (NOM 024):

Exportador: Silicon Graphics, Inc.

Importador: Silicon Graphics, Inc.

Embarcar a: Av. Vasco de Quiroga  
No. 3000  
Col. Santa Fe  
C.P. 01210  
México, D.F. México

Tensión alimentación: 100/240 ~ VAC

Frecuencia: 50/60 Hz

Consumo de corriente: 9 A



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## CE Notice

Marking by the “CE” symbol indicates compliance of the device to directives of the European Community. A “Declaration of Conformity” in accordance with the above standards has been made and is available from Silicon Graphics upon request.

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## Shielded Cables

The Silicon Graphics 540 visual workstation is FCC-compliant under test conditions that include the use of shielded cables between Silicon Graphics 540 and its peripherals. Your Silicon Graphics 540 visual 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.

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.



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## Electrostatic Discharge

Silicon Graphics designs and tests its products to be immune to the 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 the Silicon Graphics 540 visual workstation 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 may be 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.



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