O2™ Workstation Hardware Reference Guide

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O2™ Workstation Hardware Reference Guide
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Introduction

Welcome to the O2™ workstation. The *O2 Workstation Owner's Guide* is your guide to installing, troubleshooting, and repairing your workstation. Specifically, it tells you how to

- set up the workstation, including an overview of the hardware (Chapter 1, "Getting Started").

- memory and option boards (Chapter 2, "Installing or Removing Memory and Option Boards")

- install and remove internal and external peripheral devices (Chapter 3, "Installing or Removing Peripherals: Internal and External Devices")

- diagnose hardware problems (Chapter 4, "Troubleshooting").

- order and replace faulty parts (Chapter 5, "Ordering, Removing, and Installing Replacement Parts").

- create a safe and comfortable environment for your workstation and maintain the system correctly (Chapter 6, "Safety and Regulatory Information").

- find technical specifications (Appendix A, "Technical Specifications.").

Getting Started

Welcome to the O2 workstation.

This chapter contains an overview of the exterior of the workstation and tells you how to connect the parts of your workstation. The following topics are covered:

- "Overview and Getting Started"
- "Checking Your Shipment"
- "Out of Box Experience"
- "Other Sources of Information"
- "Turning the Workstation On or Off"
- "Setting Up the O2Cam Digital Video Camera"
- "Securing the O2 Workstation"
- "Locating Your Workstation's Serial Number"

Overview and Getting Started

Take a minute to familiarize yourself with your workstation. Note that some models do not have video connectors on the side or rear panel.

To see an overview of the workstation, technical specifications, ergonomic information in a web browser, click Hardware Central. Or, if you're viewing this on a remote server, see Appendix A, "Technical Specifications.")

The following are inline images:

- Figure 1-1 shows the controls on the front of the workstation
- Figure 1-2 shows the rear view of the R5000 workstation
- Figure 1-3 shows the rear view of the R10000 workstation

- Figure 1-4 shows the audio and video ports on the side panel

* Not all models

Figure 1-1   Front View of the O2 Workstation

System
module

SCSI ◇

Parallel \\

Display
adapter
option

PCI option

Monitor ▢

Ethernet
10/100Base-T

Serial 1 ①

Serial 2 ②

Power connector

Camera/digital
video I/O*

Stereo audio out

Keyboard

Mouse

System disk

Optional drive
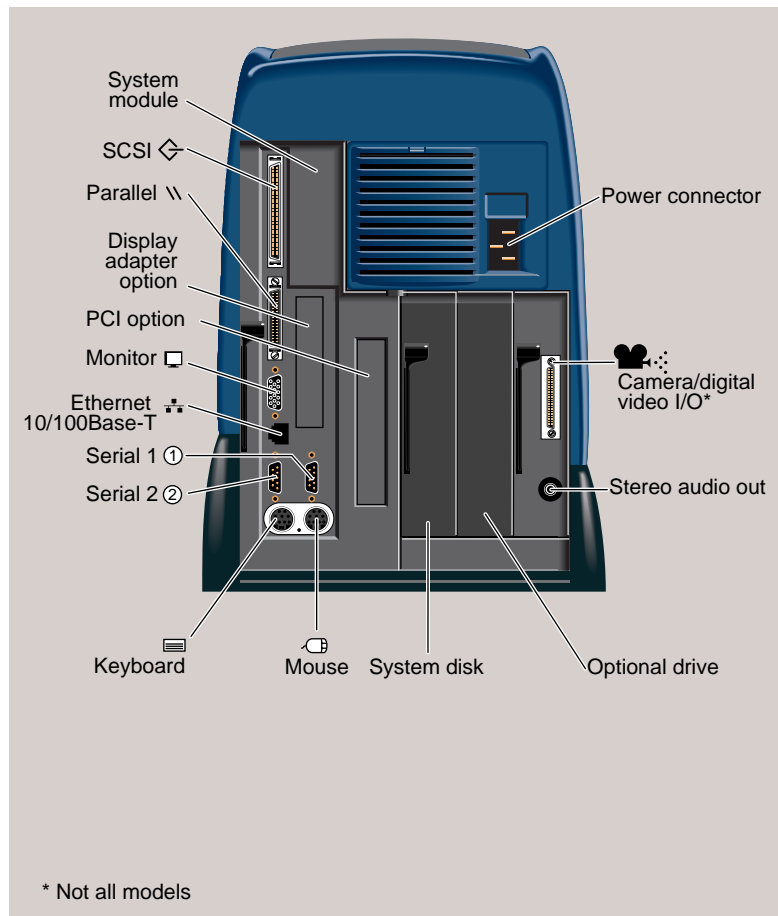
* Not all models

Figure 1-2   Rear View of the O2 R5000 Workstation

SCSI

Parallel

Display adapter option

PCI option

Monitor

Ethernet 10/100Base-T

Serial 1 ①

Serial 2 ②

Power connector

Camera/digital video I/O*

Stereo audio out

Keyboard

Mouse

System module

System disk
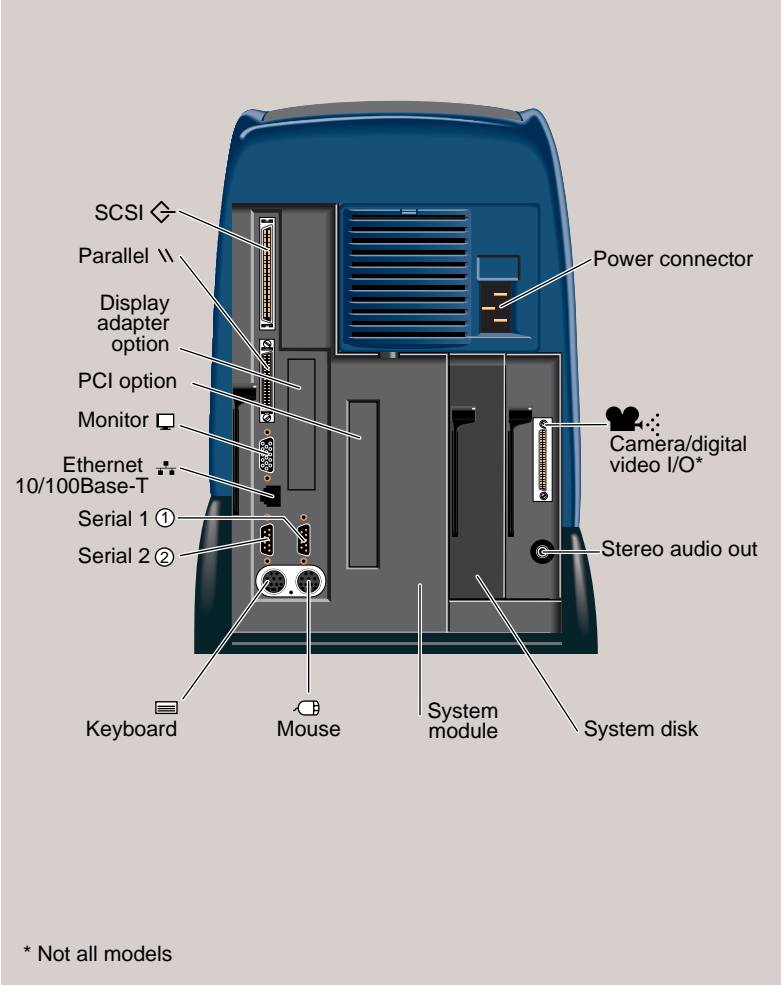
* Not all models

Figure 1-3   Rear View of the O2 R10000 Workstation
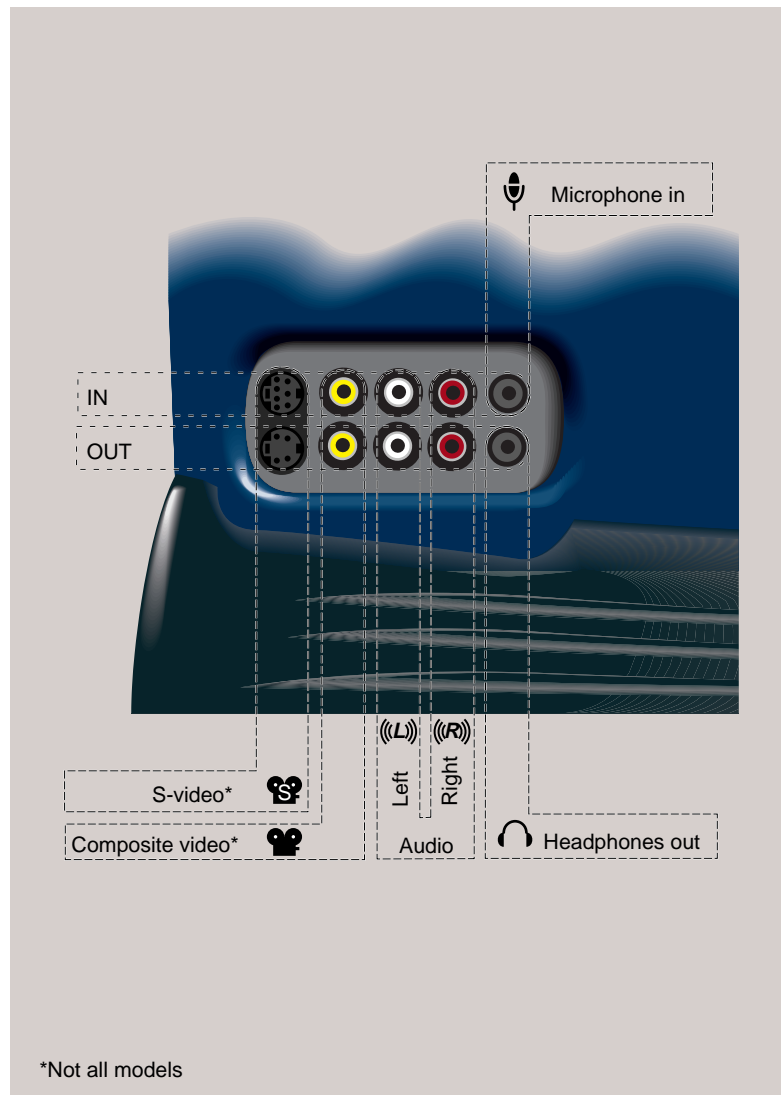
Figure 1-4   Side Panel Audio and Video Ports

Checking Your Shipment

1. Check that you received all the parts shown in Figure 1-5.

Note: Not all models include the O2Cam.
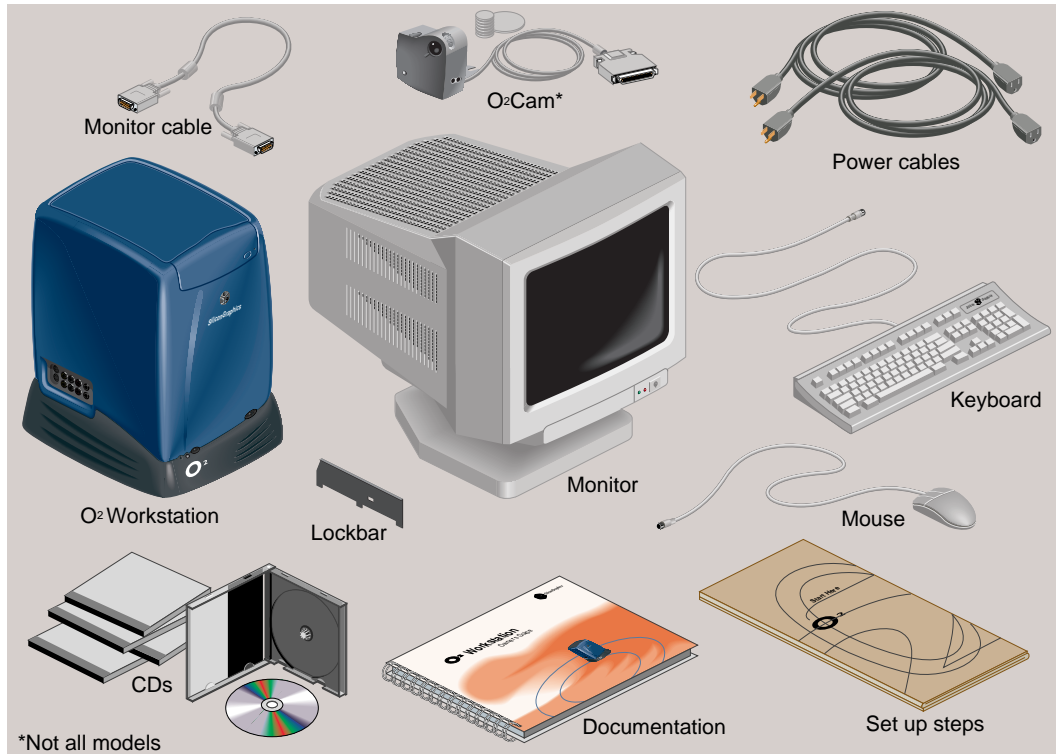
Figure 1-5 O2 Workstation Parts

Setting Up the O2 Workstation

Follow these steps to set up your workstation. The setup card that comes with the workstation also contains this information.

1. Connect the keyboard and the mouse to the workstation (Figure 1-6).
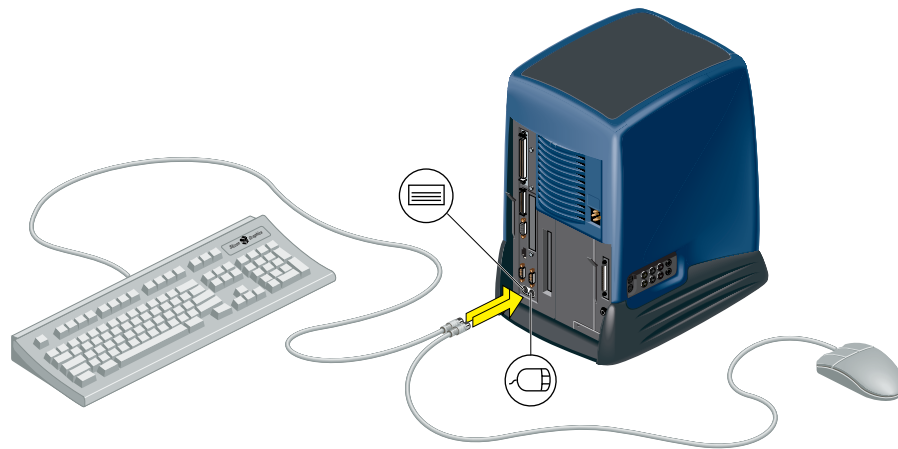
Figure 1-6   Connecting the Keyboard and Mouse to the Workstation

2. Connect the Ethernet 10-BASE T or 100-BASE T network cable to the Ethernet RJ45 connector on the rear of the workstation (Figure 1-7). If you do not have an Ethernet connection in your office, check with your system administrator.

   The O2 workstation supports Ethernet 10-BASE T and 100-BASE T. For optional networking PCI solutions supported on your workstation, see your Silicon Graphics service provider.

3. If you received the O2Cam, connect it to the workstation (Figure 1-7).
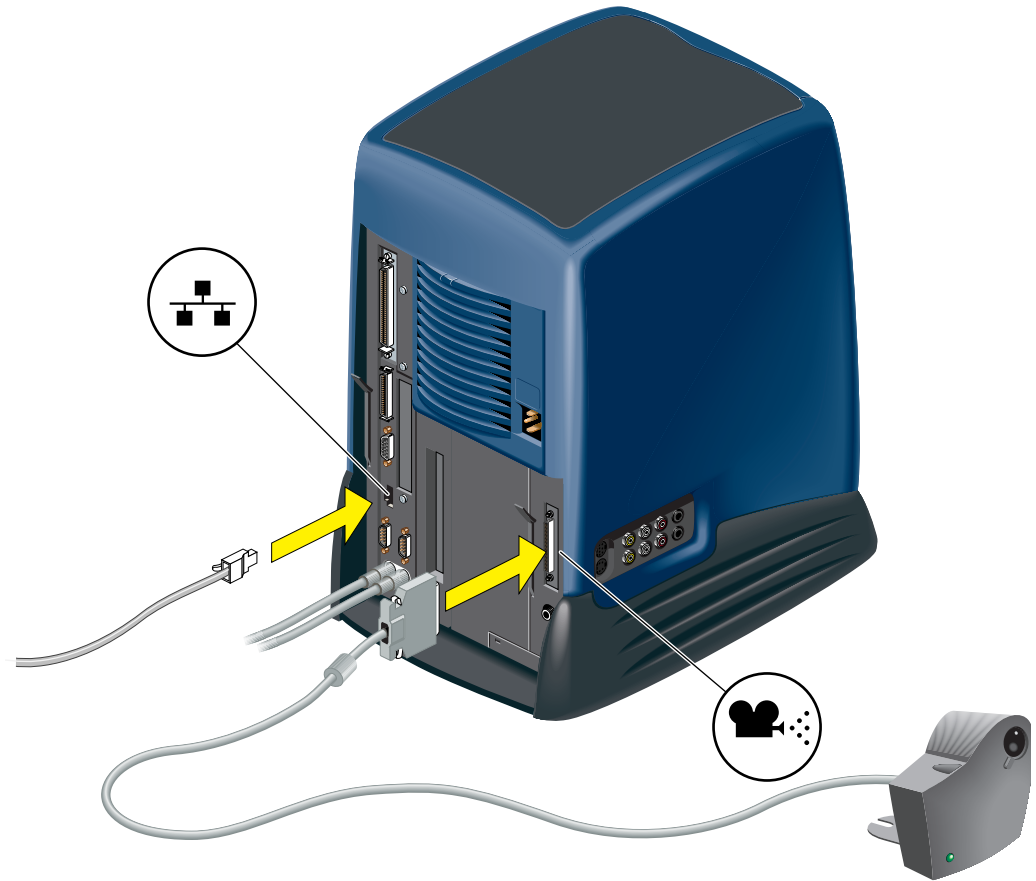
Figure 1-7   Connecting the Network Cable and the Camera to the Workstation

4.   Connect the monitor cable to the workstation and to the monitor (Figure 1-8).
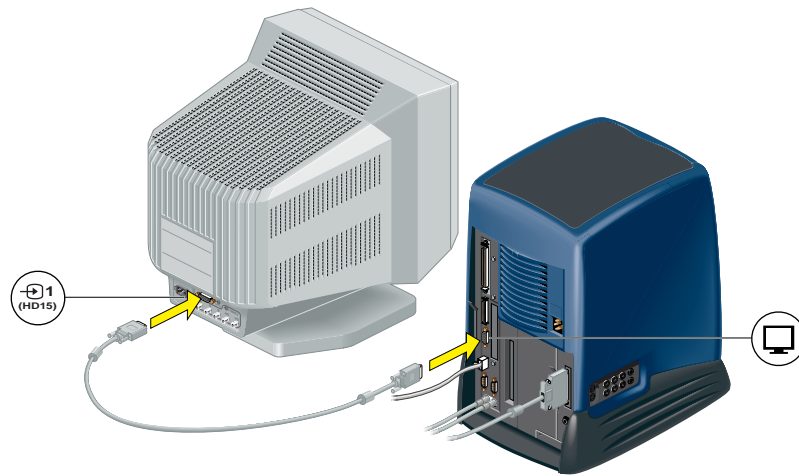
Figure 1-8   Connecting the Monitor to the Workstation

5. Connect the power cables as follows (Figure 1-9).

   •   Connect one power cable to the monitor and to a working wall outlet.

   •   Connect the other power cable to the workstation and to a working wall outlet.
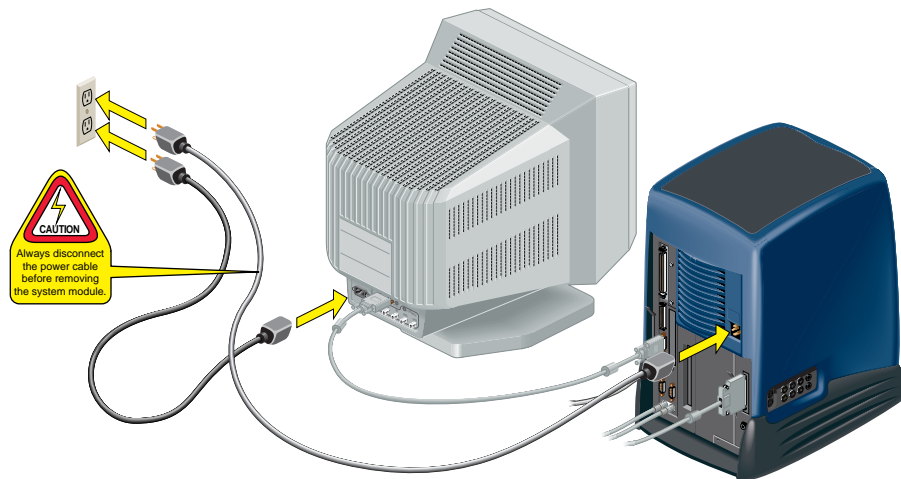
Figure 1-9   Connecting the Power Cables to the Monitor and to the Workstation

9

6. Turn on the monitor and the workstation (Figure 1-10).
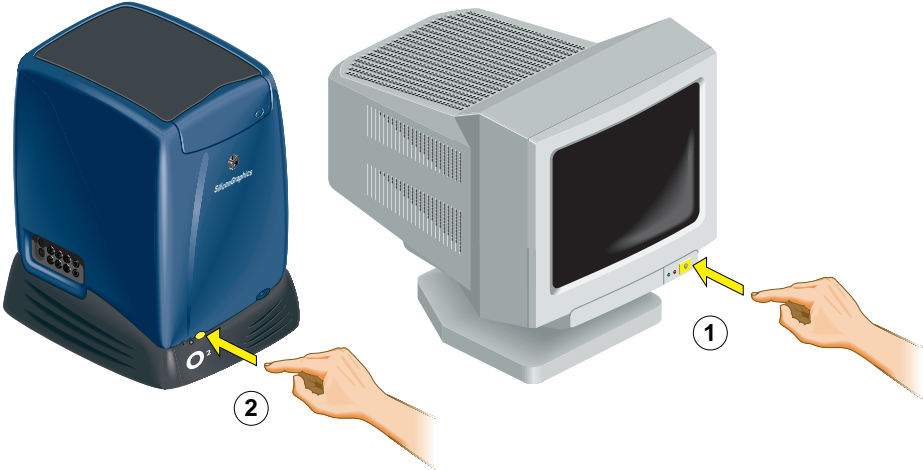
Figure 1-10   Turning On the Monitor and the Workstation

Out of Box Experience

The Out of Box Experience CD provides an exciting 3D environment to guide you through the process of getting up and running on your workstation.

- It helps you configure your *network*, language, time zone, and user account.
- The interactive *System Tour* guides you through your workstation's desktop environment.
- The *Innovations Gallery* demonstrates how other customers use our workstations to apply the latest technologies.
- *Jungle Island* provides some fun and games.

If your workstation does not have a CD-ROM drive, or if you prefer to set up your system without using the Out of Box Experience, you can access the system administration tools by clicking the EZsetup icon at the login screen.

Figure 1-11   The Out of Box Experience

Other Sources of Information

The printed *Owner's Guide* contains all the information you need when your workstation is turned off and you can't access online documentation. Additional information such as a hardware overview with 3D animation, technical specifications, cable pinout assignments, and regulatory statements is in this manual, the *O2 Hardware Reference Guide.*

IRIS InSight Document Library

Online books are located in the IRIS InSight Document Library. From the Toolchest choose Help > Online Books.

"How do I" and "InfoSearch"

From the Toolchest choose Help > How do I or Help > InfoSearch. "How Do I" tells you which application you need to accomplish a task, and also lets you launch the application from the help card. "InfoSearch" lets you search or browse through all online information on your desktop.

Technical Publications Library

If you have access to the Internet, you can view most manuals on the Technical Publications Library on the Silicon Graphics homepage at
`http://www.sgi.com/Technology/TechPubs/`

System Tour

The interactive *System Tour* guides you through your workstation's desktop environment. It is on the Out of Box Experience CD that comes with the workstation. You can also reach it by clicking its icon on the desktop.

Turning the Workstation On or Off

To turn your workstation on or off, press the power button on the front (Figure 1-12). It's not necessary to shut down the system software before turning it off.

You can also turn the workstation off from the Toolchest Menu on the desktop. See "Turning the Workstation Off From the Toolchest Menu."

Figure 1-12   Turning the Workstation On or Off

Turning the Workstation Off From the Toolchest Menu

From the Toolchest, choose System > System Shutdown. If you have a root password set, you are prompted to enter it.

As the system shuts down, you see the following:

- A cautionary message warning you that all running applications are stopped and remote users are logged off. Click *OK* to shut down the system.

- A notifier that the system is shutting down.

- A message telling you it is okay to power off. When you see this notifier, you can press and release the power button on the front of the workstation. Or, to shut down and restart the system without powering off, click *Restart*.

> **i** Okay to power off the system now.
> Press any key to restart.
>
> Restart
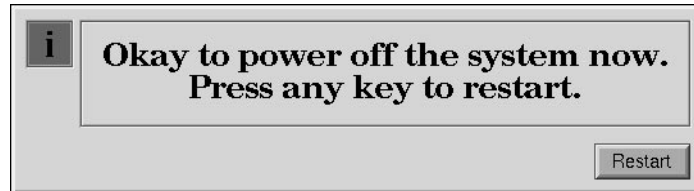
Setting Up the O2Cam Digital Video Camera

Note: The O2Cam is not a standard item with all O2 workstations.

The O2Cam color digital video camera captures images and video recordings. It has a built-in microphone that points in the same direction as the lens. You speak toward the front of the camera.

Note: If you wish to place the camera face down for snapshots of documents or objects on the desktop, a desktop camera stand is available. To order one, contact your local Silicon Graphics service provider.

- Figure 1-13 shows how to connect the O2Cam to the workstation. Connect the camera before turning on workstation so that the system recognizes the device.

- Figure 1-14 show the features of the O2Cam.

- Figure 1-15 shows how to use the microphone on the camera.

- Figure 1-16 shows how to set up the O2Cam on your monitor.

- Figure 1-17 shows how to set up the O2Cam on the Presenter 1280 flat panel display.

For information on software media tools that you can use with the camera, see "About The Digital Media Tools Guide."

For the camera's technical specifications, see Hardware Central. (If your web browser is not loaded, it takes a few seconds to load.) Or, if you're viewing this on a remote server, see "O2 Camera Technical Specifications."
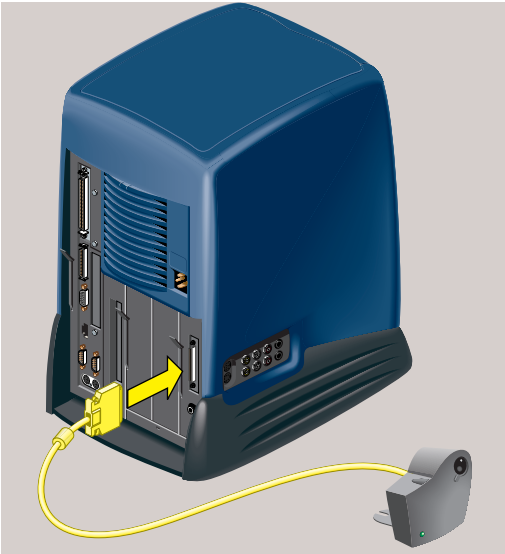
Figure 1-13   Connecting the O2Cam to the Workstation
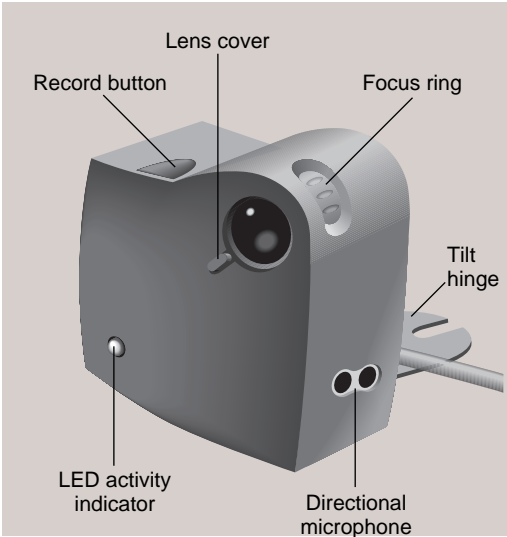
Figure 1-14   Front View of the O2Cam

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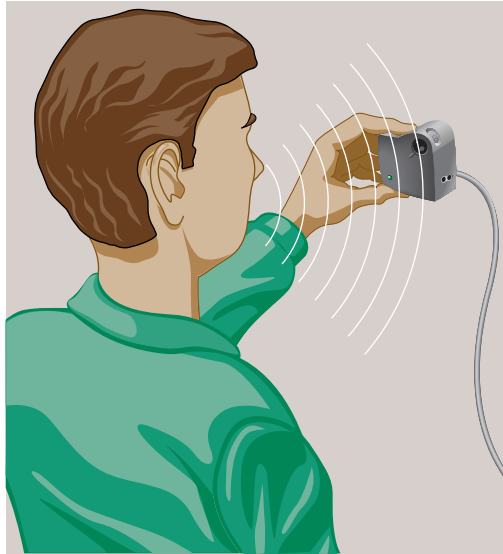
Figure 1-15   Using the O2Cam's Built In Microphone
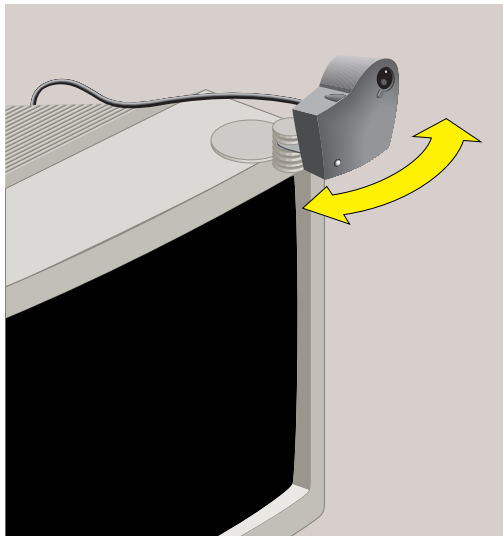
Figure 1-16   Setting Up the O2Cam on Your Monitor

Figure 1-17   Setting Up the Camera on Presenter 1280

Securing the O2 Workstation

Your workstation comes with a separate lockbar and a built-in slot for the Kensington™ lock and cable. You purchase the lock and cable separately from Silicon Graphics. To secure the workstation, follow these steps:

To secure the workstation, follow these steps:

1.   Place the lockbar on the rear of the workstation, as shown in Figure 1-18.

2.   Insert the Kensington lock through the lockbar into the built-in security slot on the workstation.

3.   Insert the key into the lock and turn it.
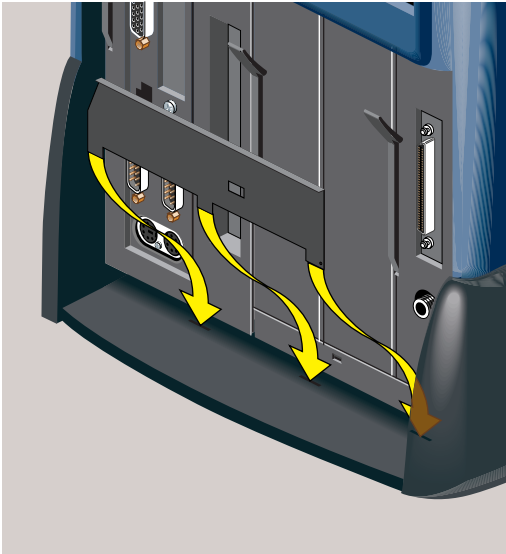
Figure 1-18 Attaching the Lockbar to the Workstation
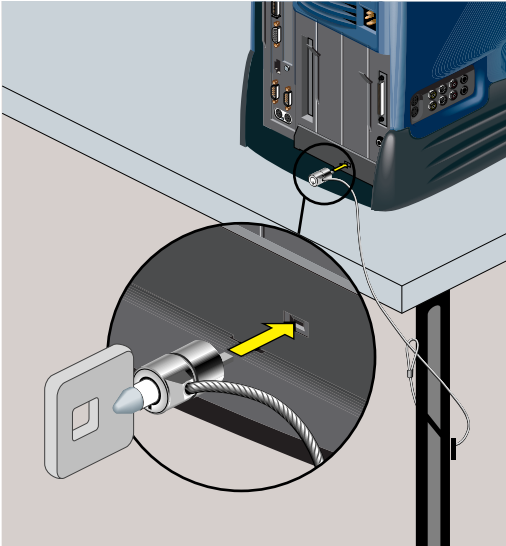
Figure 1-19 Locking the O2 Workstation

Locating Your Workstation's Serial Number

From time to time you may need to know your workstation's serial number. There are several ways you can find it. The serial number is the one beginning with the numbers 08.

Note: The illustrations show an R5000 workstation. The serial number is in the same locations on an R10000 workstation.

- On the rear of the workstation, it is located on the bottom right beneath the audio visual module (Figure 1-20).

- Inside the workstation, it's on the connector of the PCI tray, which is attached to the system module (Figure 1-21). (To remove the system module, see "Removing the System Module.")

  Caution: The small, printed circuit board beneath the *PCI* tray contains a host chip with important system information such as the serial number. Do not mix PCI trays between workstations. To check if your workstation has its original PCI tray, compare the serial number on the rear of the workstation with the serial number on the PCI tray connector. The serial numbers should be the same.

- If your system is running, from a shell window, type:

  ```
  netstat -ia
  ```

- From the Toolchest choose System > System Manager > About This System.
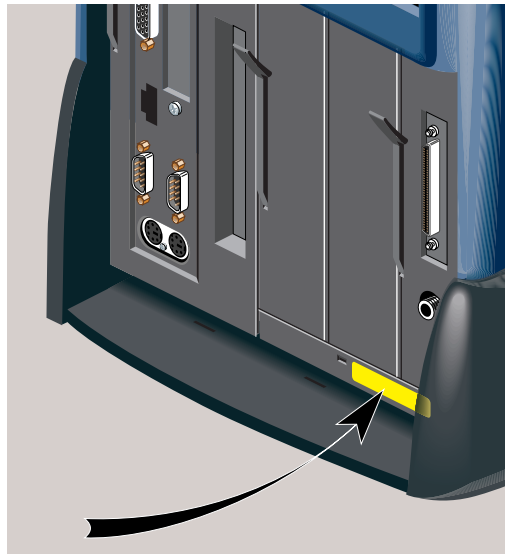
Figure 1-20   Locating the Serial Number On the Rear
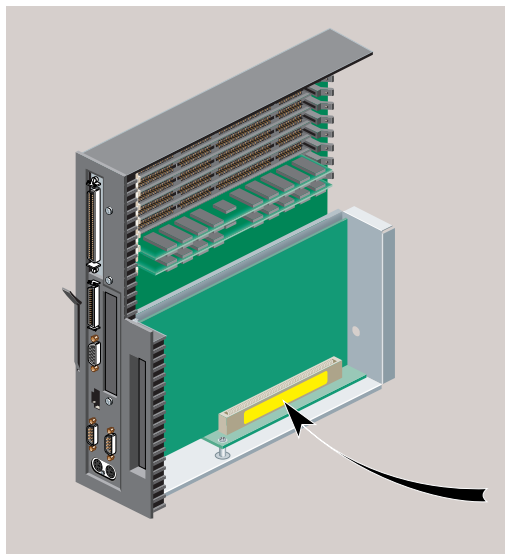
Figure 1-21   Locating the Serial Number Inside the Workstation

Installing or Removing Memory and Option Boards

This chapter explains how to install or remove *DIMM*s (double in-line memory modules), PCI option boards, or the flat panel/stereo view option board. The following topics are covered:

- "Removing the System Module"
- "Installing Memory Modules"
- "Removing Memory Modules"
- "Installing a PCI Board: R5000 Workstation"
- "Removing a PCI Board: R5000 Workstation"
- "Installing a PCI Board: R10000 Workstation"
- "Removing a PCI Board: R10000 Workstation"
- "Installing a Digital Display Adapter Board"
- "Removing a Digital Display Adapter Board"
- "Reinstalling the System Module"
- "Verifying the Hardware Installation"

Caution: Boards and DIMMs are extremely sensitive to static electricity. Handle the boards carefully, and wear the wrist strap while installing the hardware.

Removing the System Module

Before installing memory or option boards, you must turn off the workstation, remove the power cable, and remove the system module from the chassis.

Note: The illustrations show an O2 R5000 workstation. Installing and removing the system module is the same for the O2 R10000 workstation.

1. Turn off the workstation by pressing the power button on the front (Figure 2-1).

Figure 2-1   Turning Off the O2 Workstation

2. Remove the power cable from the rear. (Figure 2-2).

   Caution: Always remove the power cable before removing the system module from the workstation.

   When you walk quickly across a room, or sit down or stand up, you build up a lot of static electricity. To perform any of the hardware tasks on the system module, it's a good idea to stand in one place until you've completed the task.
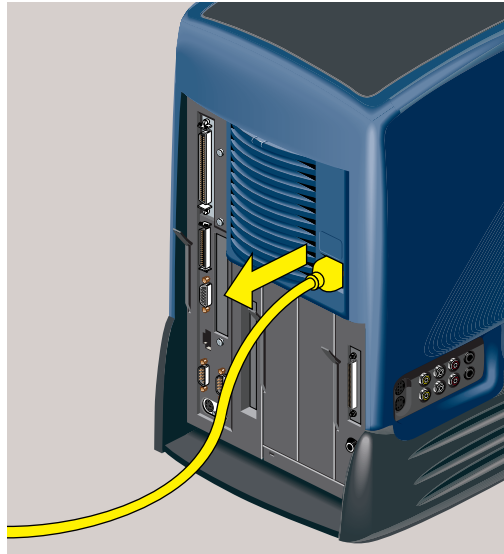
Figure 2-2   Disconnecting the Power Cables

3.   The system module is on the left as you face the rear. Pull down the lever on the left side of the module to release it (Figure 2-3).

     Note: There is no need to remove the cables from the system module, as long as you are careful when handling it.

Figure 2-3   Pulling Down the Lever on the System Module

4.   Slide the system module out of the chassis (Figure 2-4).
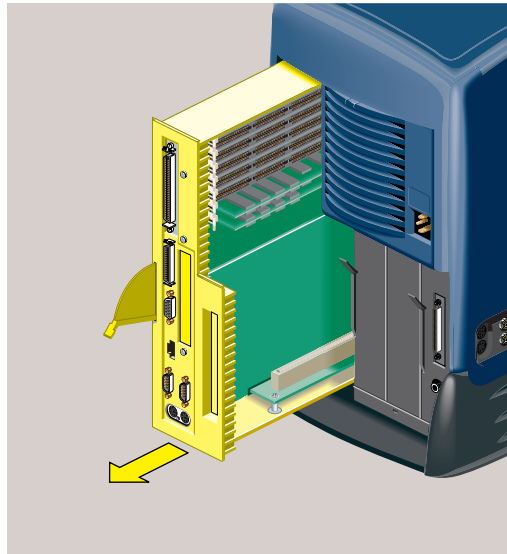
Figure 2-4   Remove the System Module From the Chassis

5. Lay the system module on a clean, flat surface, such as your desktop (Figure 2-5).
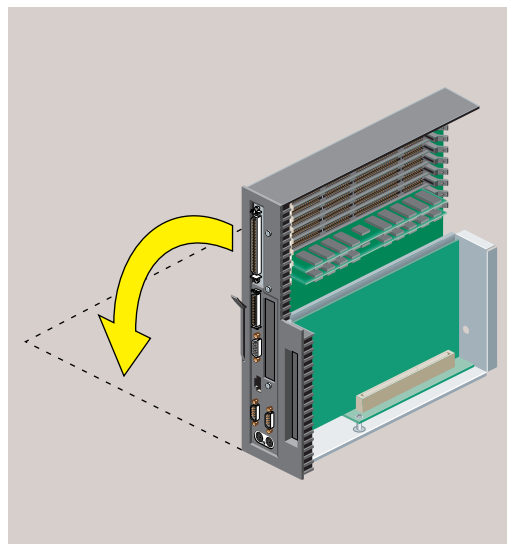
Figure 2-5   Laying the System Module on a Flat Surface

- To install memory, go to "Installing Memory Modules."

- To install a PCI option board on an R5000 workstation, go to

- To remove a PCI option board on an R5000 workstation, go to "Removing the PCI Tray: R5000 Workstation."

- To install a PCI option board on an R10000 workstation, go to "Installing a PCI Board: R10000 Workstation."

- To remove a PCI option board on an R10000 workstation, go to "Removing the PCI Tray: R10000 Workstation."

- To install a digital display adapter board (such as the Presenter 1280 adapter), go to "Installing a Digital Display Adapter Board."

- To remove a digital display adapter board, go to "Removing a Digital Display Adapter Board."

Installing Memory Modules

To see a 3D animation of installing memory modules, click Hardware Central. When the browser window opens, click "Hardware Overview" and then "Installing Memory Modules." (If your web browser is not loaded, it takes a few seconds to load.) If you are viewing this on a remote server, the 3D animation is not available.

Note: The illustrations show an O2 R5000 workstation. Installing and removing memory modules is the same for the O2 R10000 workstation.

Caution: The O2 workstation uses *DIMM*s (Double Inline Memory Modules). DIMMs are extremely sensitive to static electricity. Handle the modules carefully, and wear the wrist strap while installing them.

1. If you have not already done so, remove the power cable, and remove the system module from the chassis. See "Removing the System Module."

2. Components on the system module are extremely sensitive to static electricity. Before touching any of the components, ground yourself to a metal part of the chassis. Attach the wrist strap to your wrist and to the PCI tray (Figure 2-6).
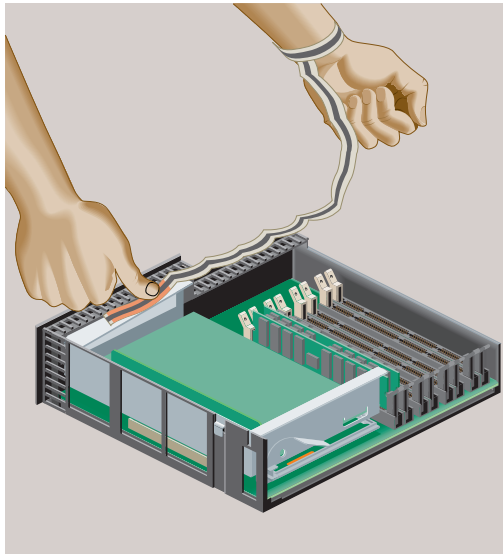
Figure 2-6   Attaching the Wrist Strap

3. Familiarize yourself with the memory (DIMM) banks (Figure 2-7) and (Figure 2-8). There are eight sockets, numbered 1 through 8. Two sockets form a bank.

    The minimum configuration has 32 MB of memory—one 16 MB module installed in slot 1 and one 16 MB module installed in slot 2.
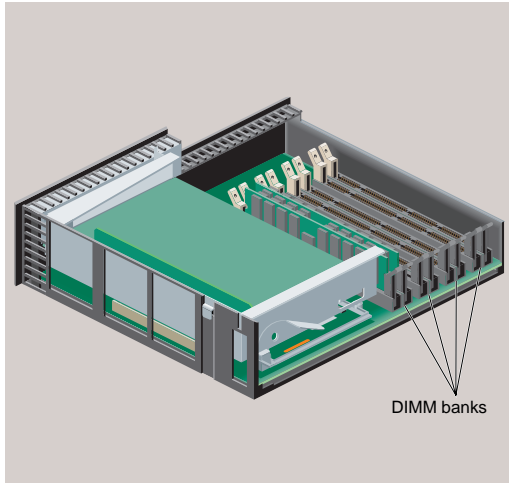
Figure 2-7   Locating the DIMM Banks
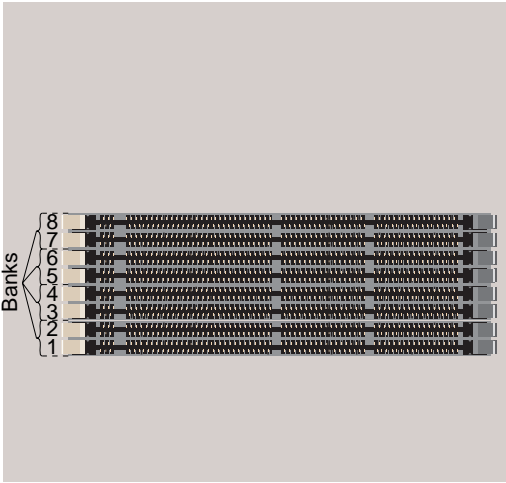
Figure 2-8   Top Down View of the DIMM Banks

4.   Read the following guidelines and then go to the next step.

   •   Sockets 1 and 2 must always be populated.

   •   Install the DIMMs in groups of two.

- A bank of two slots must have a DIMM in each slot or be empty (except for slots 1 and 2 which must always be populated).

- A bank of two slots must have the same capacity DIMM installed in each slot. You cannot mix capacities in one bank.

  For example, you can install a 16 MB module in slot 3, a 16 MB module in slot 4, a 32 MB module in slot 5 and a 32 MB module in slot 6.

  But you *cannot* install a 16 MB module in slot 3 and a 32 MB module in slot 4.

  Note: If you need to remove a DIMM, see "Removing Memory Modules."

5. Install the DIMMs consecutively in group of two, beginning with the lowest open slot (Figure 2-9).

   - Hold the DIMM over the socket without tilting it.

   - Lower the DIMM, pushing it straight down into the socket gently but firmly. You hear a click as it is seated and the latches on each side of the module snap up.
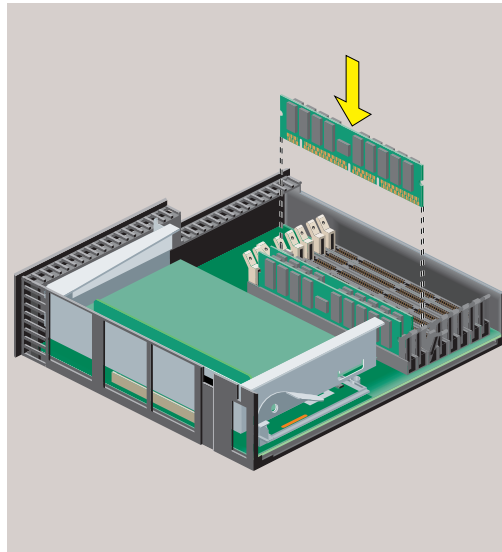
Figure 2-9   Installing the Memory Modules

6. Check the DIMMs visually to make sure they are installed correctly (Figure 2-10).

   - The tops of the DIMMs of the same capacity should be even.

- The DIMMs should all be absolutely vertical (no leaning).
- The latches on the sides should be fitting snugly against the DIMM.
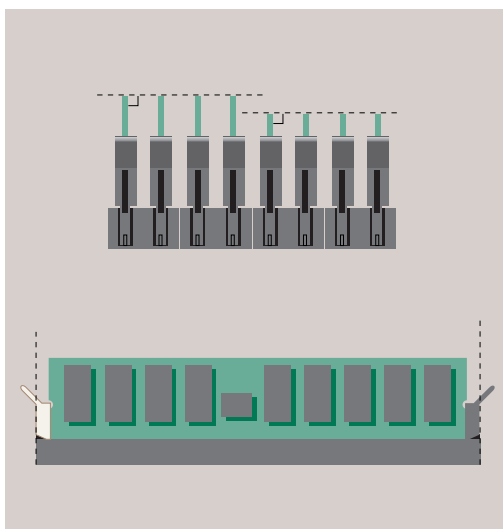
Figure 2-10   Checking the DIMM Installation

7. Remove the wrist strap and go to "Reinstalling the System Module."

Removing Memory Modules

1. If you have not already done so, remove the power cable, and remove the system module from the chassis. See "Removing the System Module."

2. Before touching any of the components, ground yourself to a metal part of the chassis. Attach the wrist strap to your wrist and to the PCI tray (Figure 2-11).
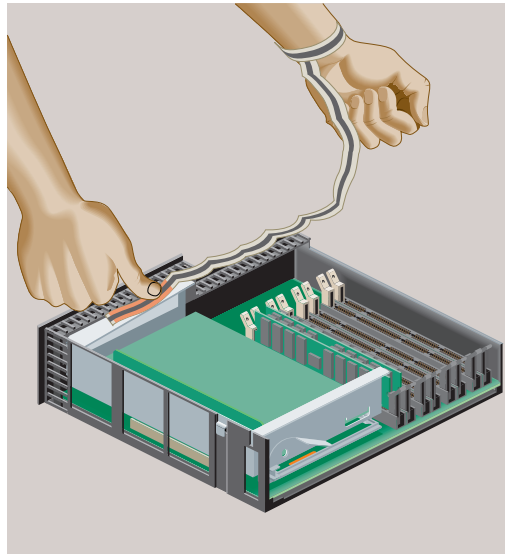
Figure 2-11   Attaching the Wrist Strap

3. Remove the DIMM by pushing down the latches on both sides to release it. Pick up the DIMM and set it aside (Figure 2-12).
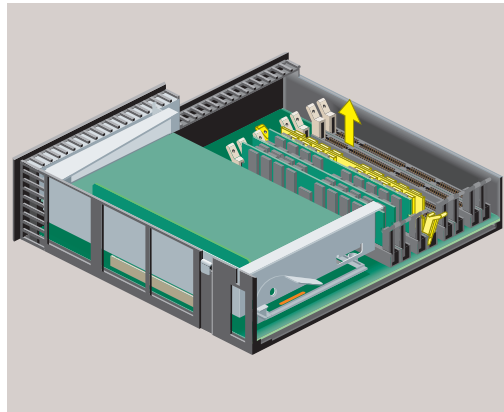
Figure 2-12   Removing the Memory Module

4. To install memory modules, see "Installing Memory Modules."

5. Or, remove the wrist strap and go to "Reinstalling the System Module."

Installing a PCI Board: R5000 Workstation

Note: Check the documentation that comes with the PCI board for instructions on installing the software. The software may include online software guides.

1. If you have not already done so, remove the power cable, and remove the system module from the chassis. (See "Removing the System Module.")

   Caution: The small, printed circuit board beneath the *PCI* tray contains a host chip with important system information such as the serial number. Do not mix PCI trays between workstations. If you remove the PCI tray, always replace it, or the workstation will not operate correctly.

2. Release the PCI tray by pushing up the lever on the side (Figure 2-13). The tray pops up.
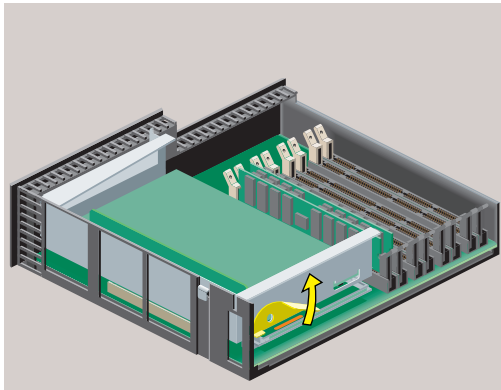
Figure 2-13   Releasing the PCI Tray

3. Push down slightly on the rear of the PCI tray and remove it from the system module (Figure 2-14).
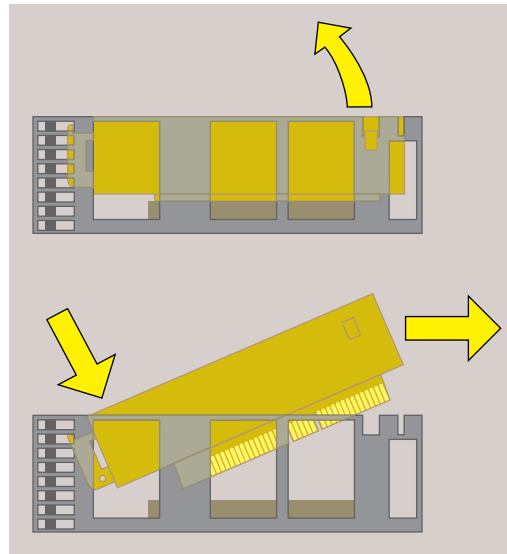
Figure 2-14   Removing the PCI Tray

4. Hold the PCI tray with one hand and remove the screw and the filler panel from the tray (Figure 2-15). Keep the panel and screw. If you later remove the PCI board and do not replace it, you must reinstall the filler panel.
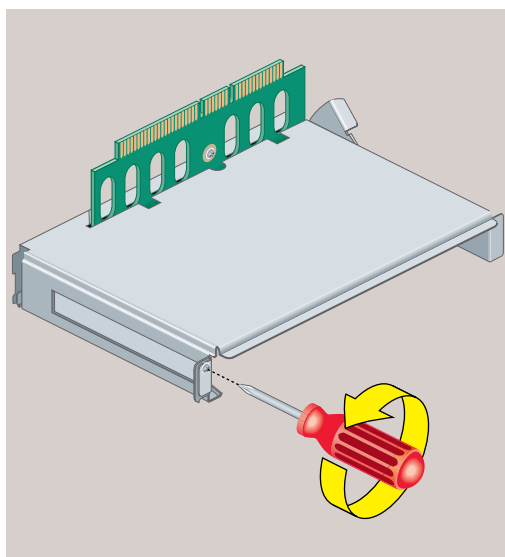
Figure 2-15   Removing the Screw and Filler Panel

5. Slide the PCI board into the tray and push the PCI connector firmly into the slot (Figure 2-16). Make sure it is completely seated.

6. Replace the screw and tighten it (Figure 2-16).
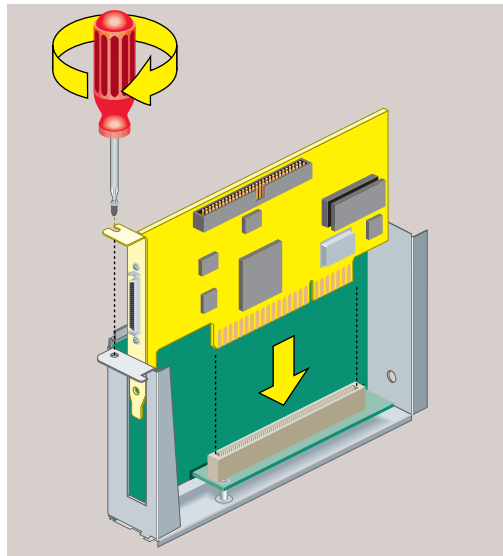
Figure 2-16   Installing the PCI Board

7. Replace the tray in the system module (Figure 2-17).

    •   Engage the hinge on the PCI tray in the slot on the system module.

    •   Lower the tray and insert the connector into the slot, pushing toward the back of the system module as you do this.
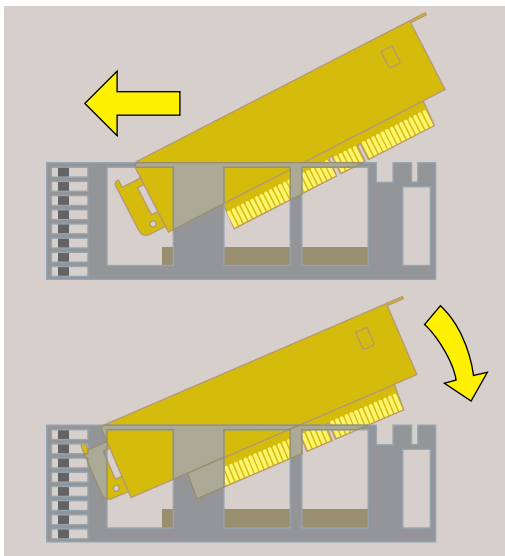
Figure 2-17   Replacing the PCI Tray in the System Module

8. Push the tray down firmly until it is completely seated. Check that the lever returns to its starting position (Figure 2-18).

    Caution: If the PCI tray is not completely seated, the system module will not slide back into the chassis.
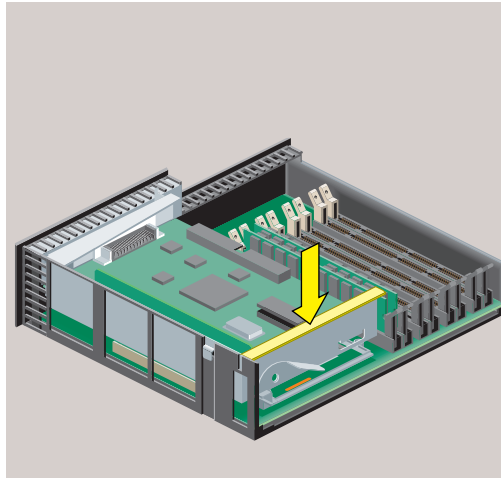
Figure 2-18   PCI Tray Seated Correctly

> **Note:** If the option board you installed comes with a cable, remember to connect the cable to the option board's external port, after reinstalling the system module.

9.   Go to "Reinstalling the System Module."

Removing a PCI Board: R5000 Workstation

1.   If you have not already done so, remove the power cable and remove the system module from the chassis. (See "Removing the System Module.")

2.   Release the PCI tray by pushing up the lever on the side (Figure 2-19). The tray pops up.
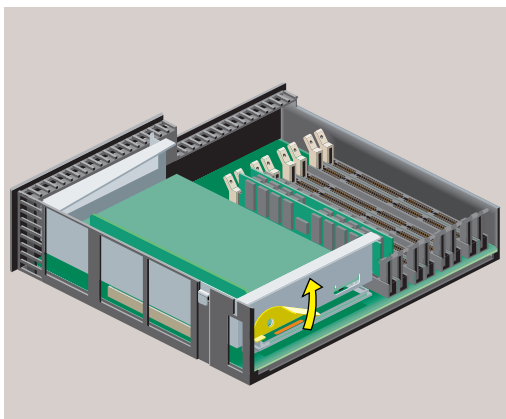
Figure 2-19   Releasing the PCI Tray

3. Push down slightly on the rear of the PCI tray and remove it from the system module (Figure 2-20).
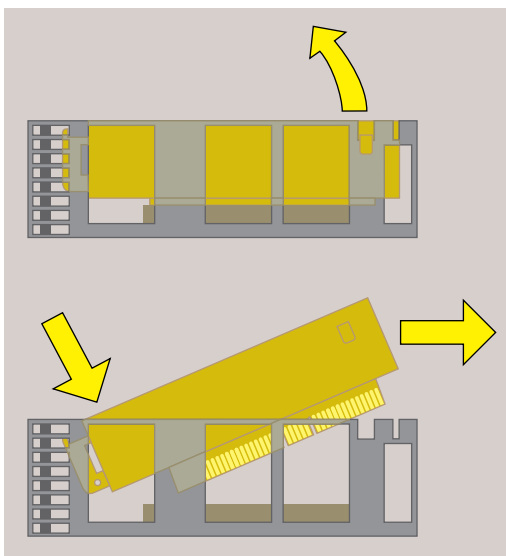
Figure 2-20   Removing the PCI Tray

4. Remove the screw that secures the board (Figure 2-21). Slide the PCI board out of the tray. It may be a little difficult to remove.
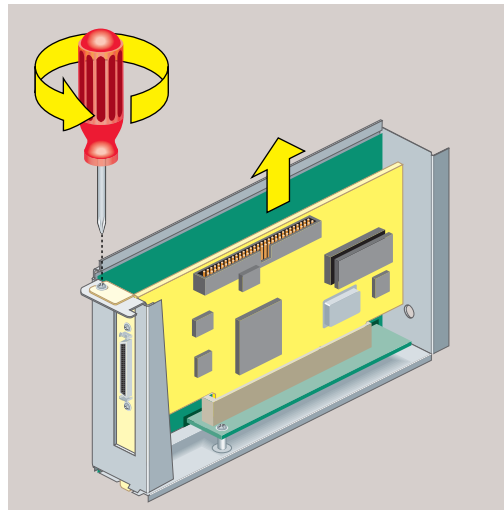
Figure 2-21   Removing the Screw and the PCI Board

5. If you are installing another PCI board, see "Installing a PCI Board: R5000 Workstation" on page 34. Otherwise, replace the filler panel and screw (Figure 2-22). (You removed the panel and screw when you installed the board.)
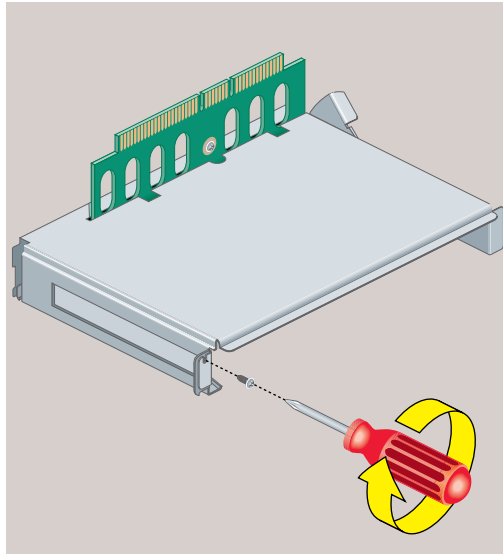
Figure 2-22   Replacing the Filler Panel and Screw on the PCI Tray

6. Go to "Reinstalling the System Module."

Installing a PCI Board: R10000 Workstation

Note: Check the documentation that comes with the PCI board for instructions on installing the software. The software may include online software guides.

1. If you have not already done so, remove the power cable, and remove the system module from the chassis. (See "Removing the System Module.")

    Caution: The small, printed circuit board beneath the *PCI* tray contains a host chip with important system information such as the serial number. Do not mix PCI trays between workstations. If you remove the PCI tray, always replace it, or the workstation will not operate correctly.

2. Remove the screw and filler panel from the PCI tray.

    Keep the panel. If you later remove the PCI board and do not replace it, you must reinstall the filler panel and screw (Figure 2-23).
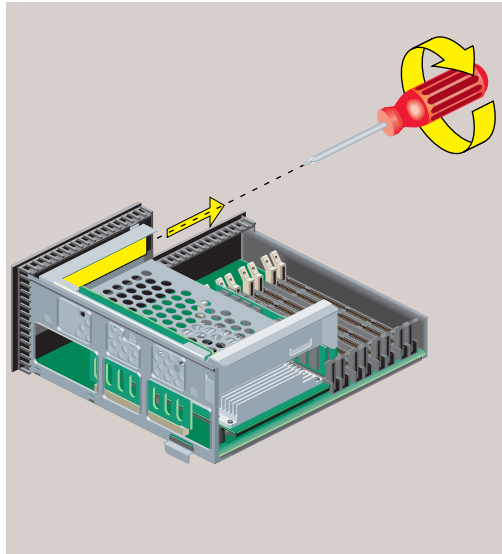
Figure 2-23   Removing the Screw and Filler Panel

3.   Install the PCI board as follows:

   •   Slide the PCI board into the tray and push the PCI connector firmly into the slot. Make sure it is completely seated (Figure 2-24).

       You may need to use some pressure to seat it all the way.
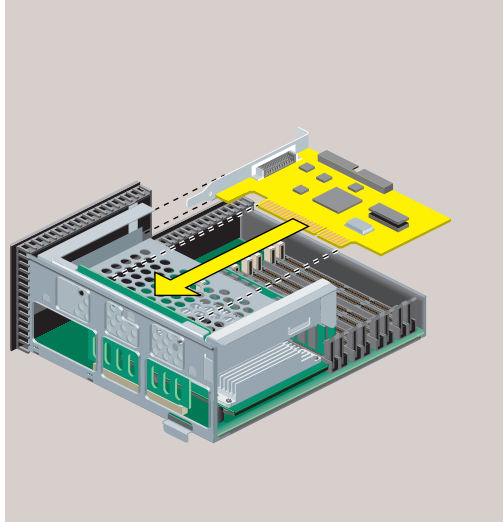
Figure 2-24   Installing the PCI Board on the R10000 Workstation

4.   Insert and tighten the screw that secures the PCI board (Figure 2-25).
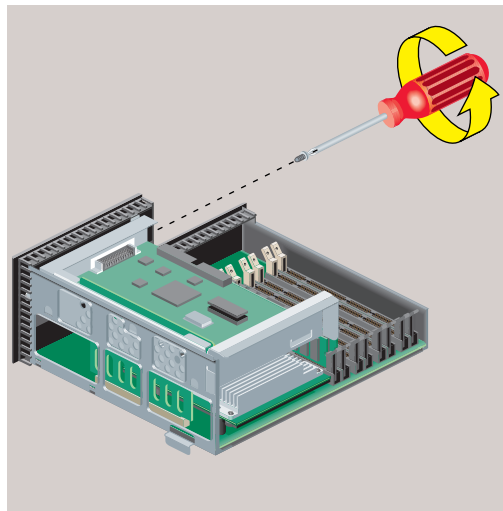
Figure 2-25   Securing the PCI Board

5.   Go to "Reinstalling the System Module."

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Removing a PCI Board: R10000 Workstation

1. Remove the screw that secures the PCI board (Figure 2-26).

2. Slide the PCI board out of the tray. It may be a little difficult to remove.
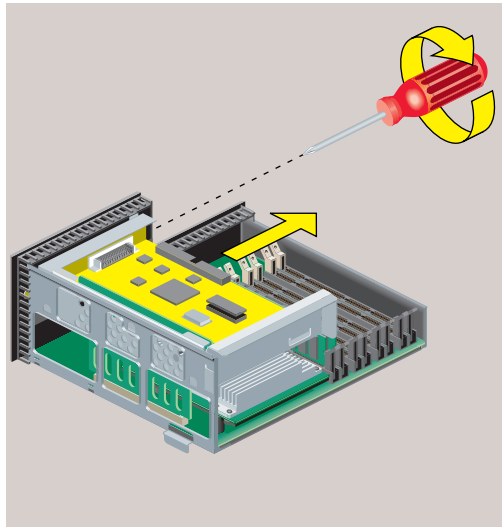
Figure 2-26   Removing the Screw That Secures the PCI Board

3. If you are installing another PCI board, see "Installing a PCI Board: R10000 Workstation." Otherwise, replace the screw and filler panel. (You removed the screw and panel when you first installed the board.)
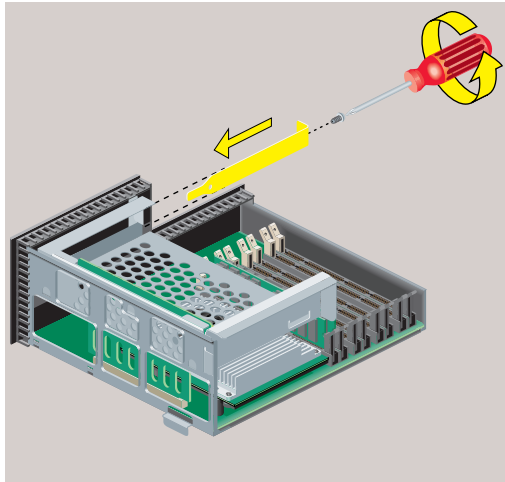
Figure 2-27   Replacing the Filler Panel and Screw

4.   Go to "Reinstalling the System Module."

Installing a Digital Display Adapter Board

The figures in this section show an adapter board similar to the one that supports the Presenter 1280 monitor and stereo view (Figure 2-28).

The board you are installing may look different, but the installation steps are the same. See also any documentation that comes with the adapter board.

Caution: Option boards are extremely sensitive to static electricity. Handle it carefully, and wear the wrist strap while installing the board.
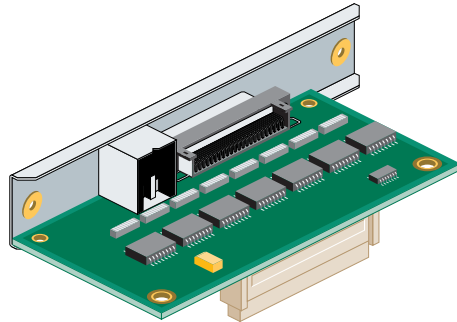
Figure 2-28   Identifying the Presenter 1280/Stereo VIew Board

The slot for the display adapter is on the system module.

1.   If you have not already done so, remove the power cable, and remove the system module from the chassis. (See "Removing the System Module.")

2.   To remove the PCI tray:

     •   If you have an R5000 workstation, go to "Removing the PCI Tray: R5000 Workstation."

     •   If you have an R10000 workstation, go to "Removing the PCI Tray: R10000 Workstation."

Removing the PCI Tray: R5000 Workstation

1. Push up the lever on the side of the PCI tray to release it (Figure 2-29). The tray pops up.
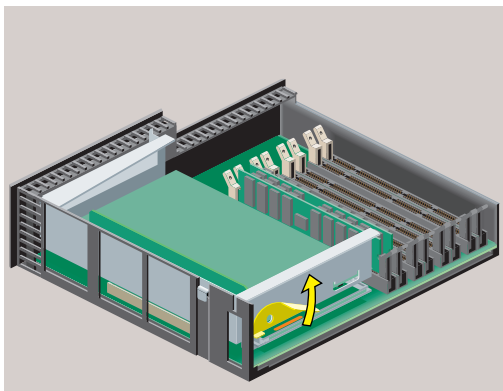
Figure 2-29   Releasing the PCI Tray

2. Push down slightly on the rear of the PCI tray and remove it from the system module (Figure 2-30). *Do not remove the PCI board from the tray, if one is installed.*
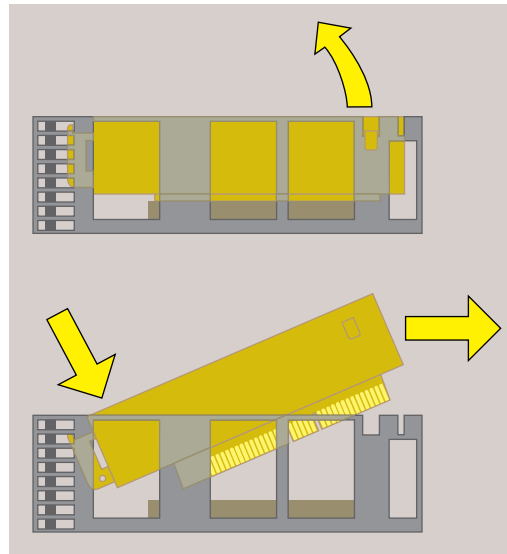
Figure 2-30   Removing the PCI Tray

3.   Go to "Installing the Adapter Board."

Removing the PCI Tray: R10000 Workstation

To remove the PCI tray in an R10000 workstation, you must first remove the plastic face plate on the system module.

1.   Remove the plastic face plate of the system module as follows:

   •   Use a Phillips screwdriver to remove five screws in the rear and two screws on the underside, in the locations shown (Figure 2-31).

      Caution: On the underside, remove only two screws. Do not remove the third screw that attaches the lever to the face plate.
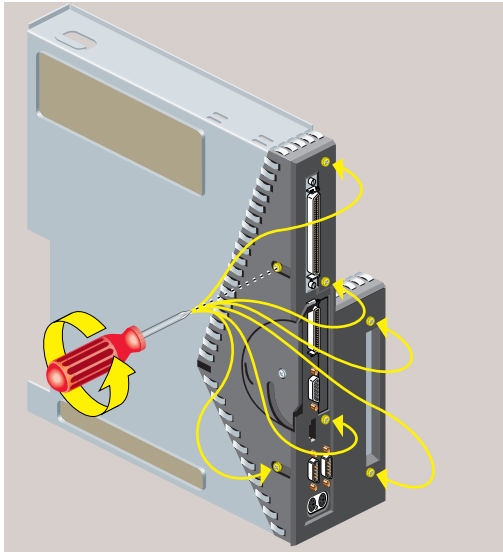
Figure 2-31   Removing the Screws From the Face Plate

- Lift the face plate away from the module. The filler panel covering the I/O port falls away as you remove the face plate.
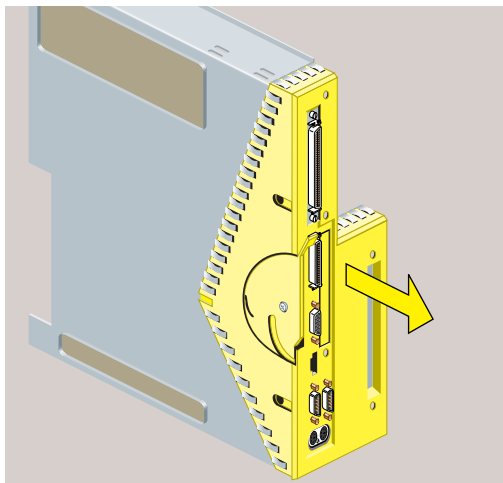
Figure 2-32   Removing the Face Plate From the System Module

2. Remove the PCI tray from the system module. *If a PCI board is installed in the tray, do not remove it from the tray.*

    •   Insert a screwdriver in the small opening shown (Figure 2-33) and a prying or twisting motion to release the PCI tray from the system module.

    •   Pull the PCI tray straight up to remove it and set it aside.
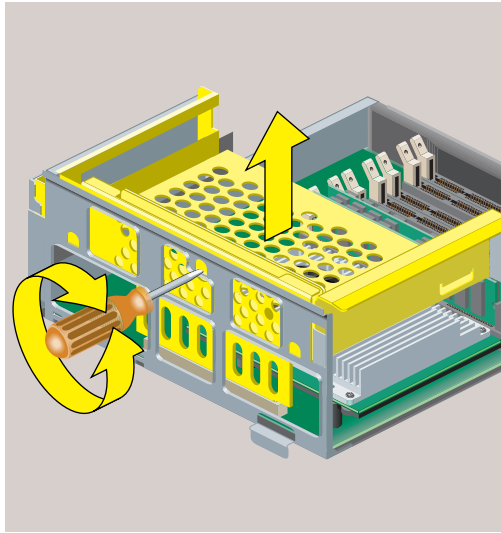
Figure 2-33   Removing the PCI Tray From the R10000 System Module

3. Go to "Installing the Adapter Board."

Installing the Adapter Board

Note: The illustrations show an R5000 workstation. The installation steps are the same for an R10000 workstation.

1. Before touching any of the components, attach the wrist strap to your wrist and to the metal part of the chassis (Figure 2-34).
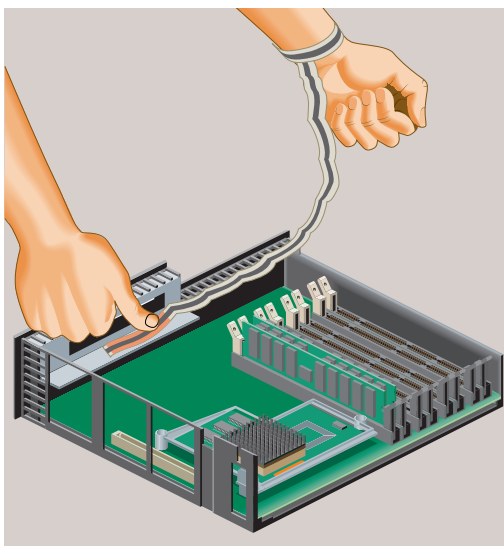
Figure 2-34   Attaching the Wrist Strap

2. If there is a filler panel covering the I/O slot, remove it as follows:

    •   Use a Phillips screwdriver to remove the two screws that hold it (Figure 2-35).

    •   Push the filler panel inward.

    •   Remove the filler panel and save it. In the event that you remove the digital display adapter board and do not replace it, you must reinstall the panel.
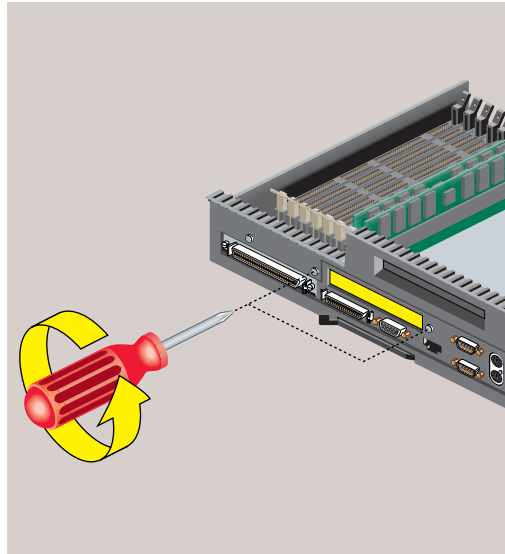
Figure 2-35   Removing the I/O Filler Panel

3.   To install the digital display adapter board, align the connector beneath the board
     with the connector on the system board (Figure 2-36). Push the board firmly into the
     socket until the connectors are completely seated.
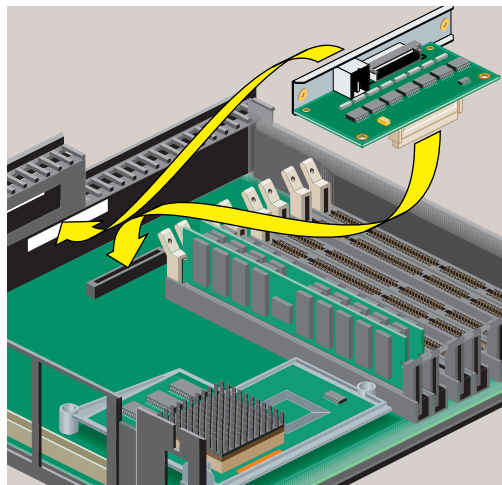
Figure 2-36   Installing the Flat Panel/Stereo View Option Board

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4. Insert and tighten two screws in the locations shown (Figure 2-37).
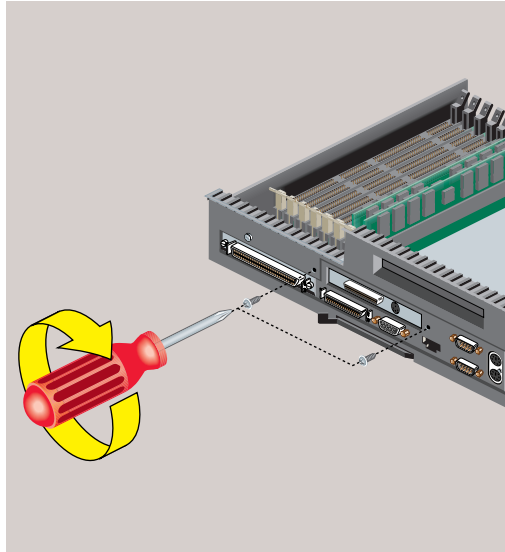
Figure 2-37   Installing the Two Screws

5. Remove the wrist strap.

6. Reinstall the PCI tray.

   • R5000 workstations, go to "Reinstalling the PCI Tray: R5000 Workstation."

   • R10000 workstation, go to "Reinstalling the PCI Tray: R10000 Workstation."

Reinstalling the PCI Tray: R5000 Workstation

1. Reinstall the PCI tray in the system module (Figure 2-38).

   • Engage the hinge on the PCI tray in the slot.

   • Lower the tray and insert the connector into the slot, pushing toward the back of the module as you do this.
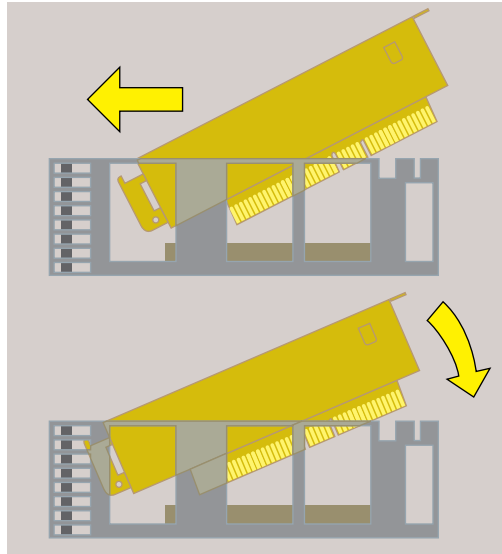
Figure 2-38   Replacing the PCI Tray in the System Module

2. Push the tray down firmly until it is completely seated. Check that the lever returns
    to its starting position (Figure 2-39).

    Caution: If the PCI tray is not completely seated, the system module will not slide
    back into the chassis.
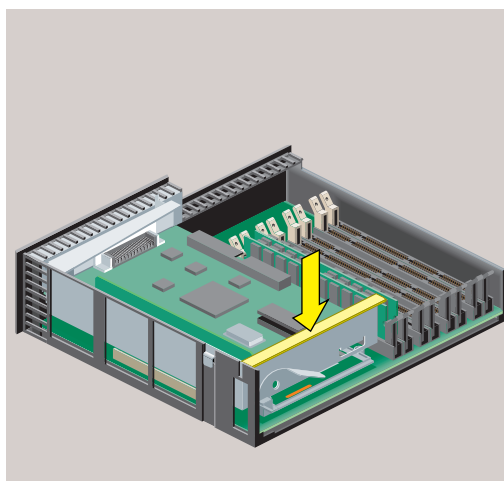
Figure 2-39   PCI Tray Seated Correctly

3.   Go to "Reinstalling the System Module."

Reinstalling the PCI Tray: R10000 Workstation

1.   Replace the PCI tray in the system module as follows:

   •   Lower the PCI tray, engaging it on the tab on the side of the system module
       (Figure 2-40).

   •   Insert the PCI connector beneath the tray into the slot on the system module.

   •   Once the connector is aligned, push down firmly until it is completely seated.

   Note: If the PCI tray is not completely seated, the system module will not slide back
   into the chassis.
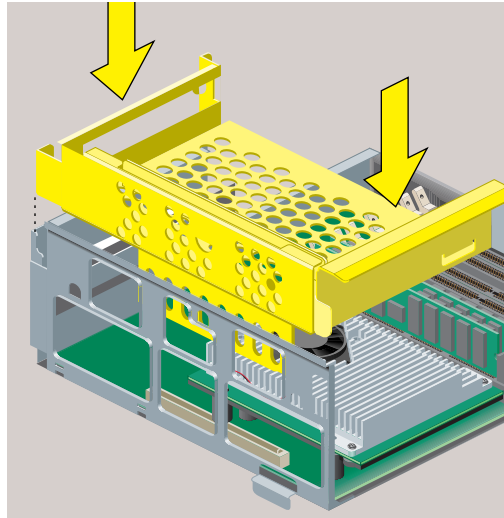
Figure 2-40   Replacing the R10000 PCI Tray in the System Module

2. Replace the face plate on the system module as follows:

    • Replace the filler panel over the I/O opening on the inside of the face plate.

    • Align the face plate on the system module (Figure 2-41).
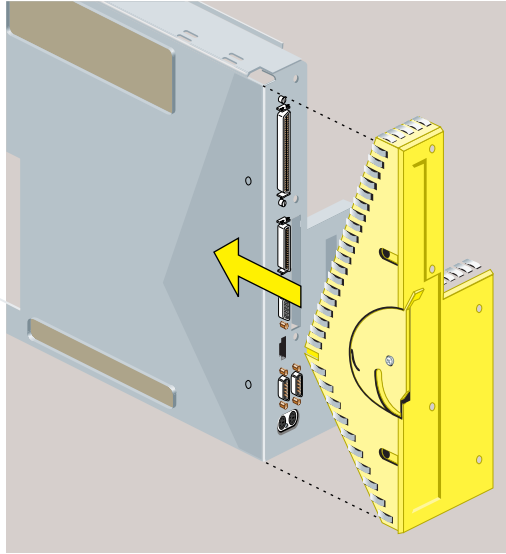
Figure 2-41   Replacing the Face Plate

- Use a Phillips screwdriver to insert and tighten two screws on the underside in the locations shown (Figure 2-42).
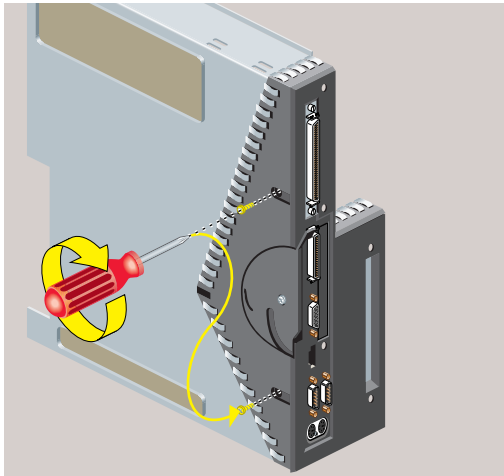
Figure 2-42   Replacing Two Screws on the Face Plate

- Use a Phillips screwdriver to insert and tighten five screws on the rear in the locations shown (Figure 2-43).
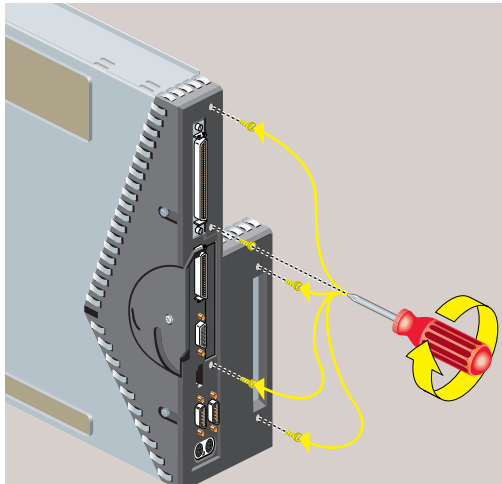
Figure 2-43   Replacing Five Screws on the Face Plate

3. Go to "Reinstalling the System Module."

Removing a Digital Display Adapter Board

1. If you have not already done so, remove the power cable, and remove the system module from the chassis. (See "Removing the System Module.")

2. To reach the digital display adapter board, you must first remove the PCI tray.

   - R5000 workstations, see "Removing the PCI Tray: R5000 Workstation."

   - R10000 workstations, see "Removing the PCI Tray: R10000 Workstation."

3. Before touching any of the components, attach the wrist strap to your wrist and to a metal part of the chassis (Figure 2-28).
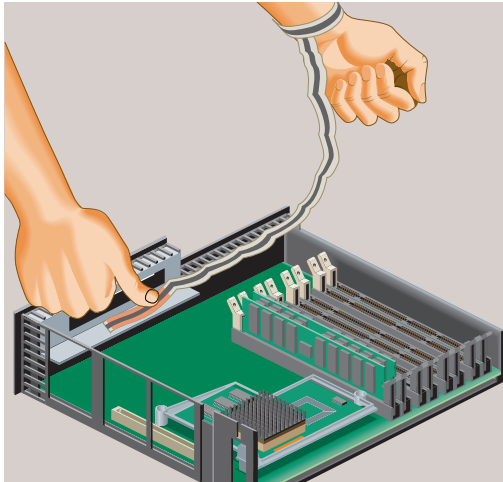
Figure 2-44   Attaching the Wrist Strap

4.   Grasp the board on either side and gently rock it out (Figure 2-45). Do not exaggerate the rocking motion, or you will bend the pins.
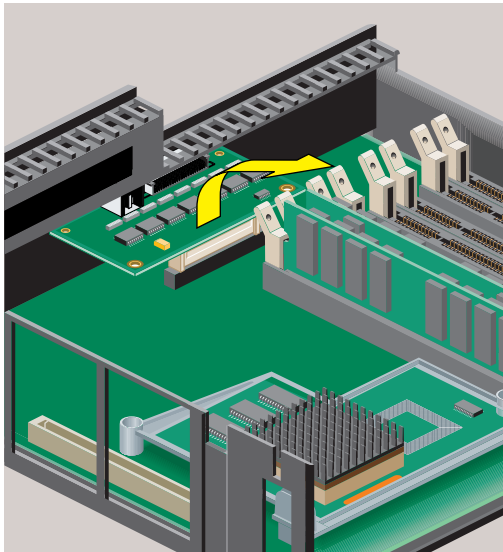
Figure 2-45   Removing the Display Adapter Board

5. If you are installing another display adapter option board, see "Installing the Adapter Board." Otherwise, replace the filler panel that you removed when you installed the first display adapter board.

6. Remove the wrist strap.

7. To reinstall the PCI tray:

    •   R5000 workstations, see "Reinstalling the PCI Tray: R5000 Workstation."

    •   R10000 workstations, see "Reinstalling the PCI Tray: R10000 Workstation."

8. Go to "Reinstalling the System Module."

Reinstalling the System Module

Note: The illustrations show an R5000 workstation. Installing the system module is the same for an R10000 workstation.

1. Return the system module to its upright position (Figure 2-46).
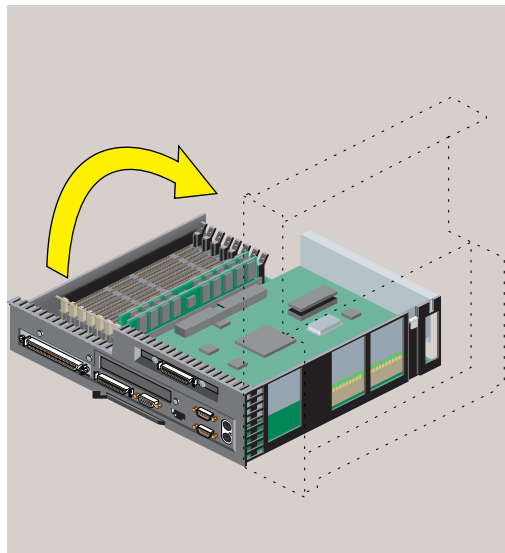
Figure 2-46   Returning the System Module to its Upright Position

2. Slide the system module into the chassis until the lever engages (Figure 2-47).
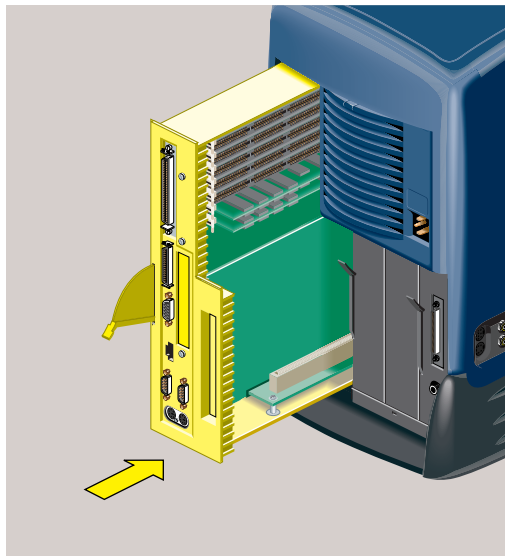
Figure 2-47   Reinstalling the System Module in the Chassis

3.   Push the lever up to lock the module in place (Figure 2-48).

Figure 2-48   Securing the System Module in Place

4. Remove the wrist strap from the chassis.

5. Reconnect the power cable and any other cables you removed (Figure 2-49).

6. If you installed an option board that has a cable, connect the cable to the I/O port on the board you installed.
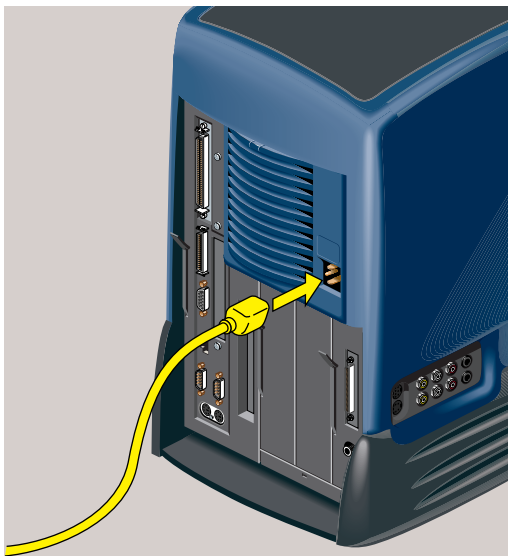
Figure 2-49   Connecting the Power Cable

7. Turn on the workstation by pressing the power button on the front (Figure 2-50).

Figure 2-50   Turning On the Workstation

Verifying the Hardware Installation

Once you've installed memory or option boards, you should verify that the system recognizes the new hardware.

1. Log in to your account.

2. From the Toolchest, choose System > System Manager > About This System.

Figure 2-51   The Toolchest

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3. Look under the Hardware menu.

- If you installed memory, check the amount of memory shown. It should equal the total amount that you installed.

  For example, if you had 32 MB of memory when you started and you installed another 64 MB, the total shown should be 96 MB.

  If the system does not show the total amount of memory you installed, turn off the workstation, remove the power cable, remove the system module, and make sure all the DIMMs are installed correctly. (See "Installing Memory Modules."). See also Chapter 4, "Troubleshooting."

- If you installed a PCI option board, it will display. (For some option boards, the software must be installed before the board is shown.) If it is not shown, turn off the workstation, and go over the installation steps again to make sure the board is seated correctly. (See "Installing a PCI Board: R5000 Workstation," or "Installing a PCI Board: R10000 Workstation.")

Installing or Removing Peripherals: Internal and External Devices

This chapter tells you how to install or remove a second hard disk drive in your O2 workstation and how to connect external peripherals. The following topics are covered:

- "Installing a Second Internal Hard Drive: R5000 Workstation"
- "Removing the Second Internal Hard Disk Drive"
- "Connecting External SCSI Devices"
- "Connecting Parallel Devices (Floppy Drive and Printer)"
- "Connecting Serial Devices"
- "Connecting Audio and Video Devices"

Installing a Second Internal Hard Drive: R5000 Workstation

Note: The optional drive bay is not available on O2 R10000 workstations.

1. Turn off the workstation by pressing the power button on the front (Figure 3-1).

Figure 3-1   Turning Off the Workstation

2. Locate the optional drive bay (Figure 3-2). This is where you install the second internal hard drive. The drive bay is covered with a blank panel that you must remove.

Figure 3-2   Locating the Optional Drive Bay

3. To remove the panel over the optional drive bay, you must first remove the
    audio-visual module located on the far right as you face the rear of the workstation.
    First, remove the power cable from the rear and any audio-visual cables that are
    connected to the side panel (Figure 3-3).
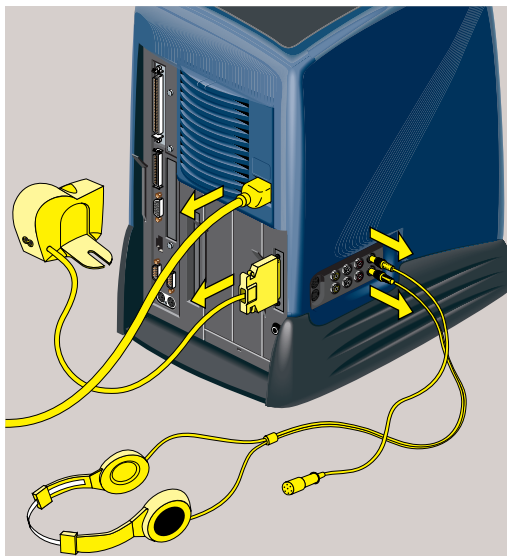
Figure 3-3   Disconnecting the Power Cable and Other Cables

4.   Release the audio-visual module by pulling down the lever (Figure 3-4).

Figure 3-4   Releasing the Audio-Visual Module

5.   Slide the audio-visual module out of the chassis and place it carefully on a clean, flat, antistatic surface, such as your desktop (Figure 3-5).
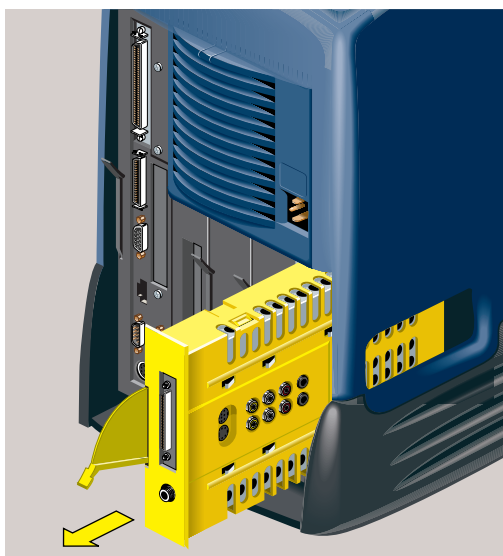
Figure 3-5   Sliding Out the Audio-Visual Module

6. Press the button on the side of the optional drive bay to release the front panel (Figure 3-6).

    Save the panel. If you remove the second drive and do not replace it, you must reinstall the panel.
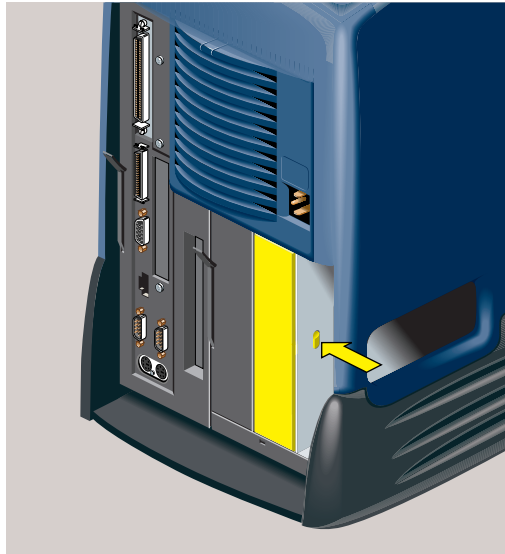
Figure 3-6　　Removing the Panel From the Optional Drive bay

7.　Slide the second hard drive you are installing into the optional drive bay until the lever engages (Figure 3-7).

Note: There is no need to set the SCSI address on the second drive. The optional drive bay on the O2 workstation is preconfigured.
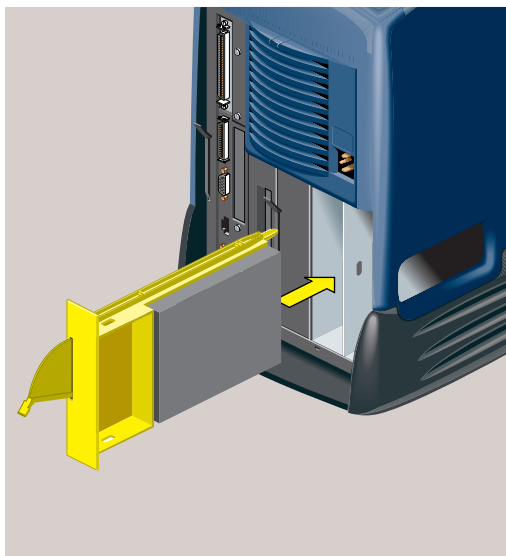
Figure 3-7   Installing the Second Hard Drive Module

8. Push the lever up to lock the drive module in place (Figure 3-8).

Figure 3-8   Securing the Second Hard Drive Module

9. Slide the audio-visual module back into the bay on the far right of the chassis
    (Figure 3-9).
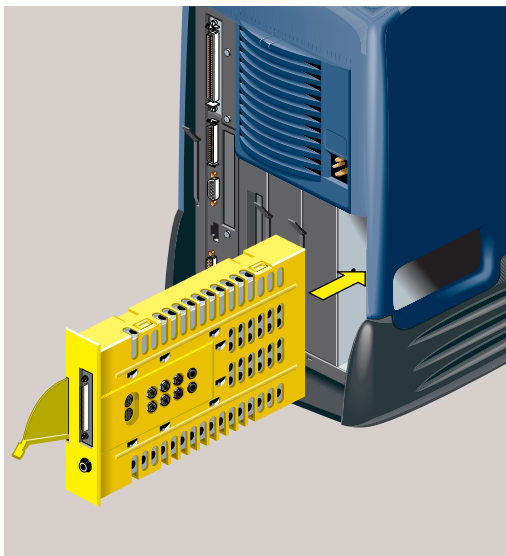
Figure 3-9   Reinstalling the Audio-Visual Module in the Chassis

10. Push the lever up to secure the audio-visual module in place (Figure 3-10).

Figure 3-10   Securing the Audio-Visual Module

11. Reconnect the power cable to the rear of the workstation. Reconnect any audio and video cables you removed from the side panel of the workstation (Figure 3-9).
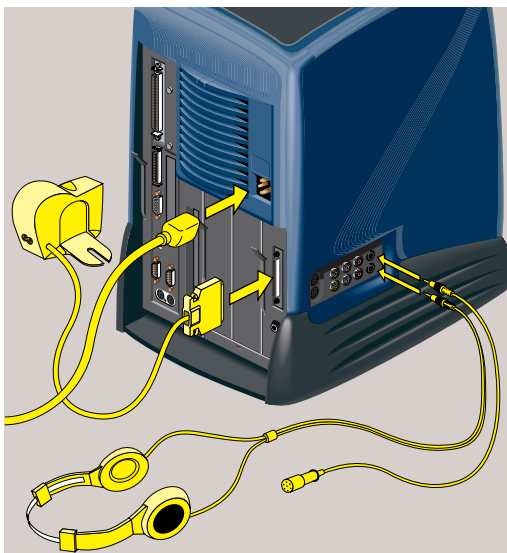
Figure 3-11   Connecting the Power Cable and Other Cables

12. Turn on the workstation by pressing the power button on the front (Figure 3-12).

Figure 3-12   Turning on the Workstation

Verifying the Hardware Installation

To check that the system recognizes the new hard disk drive, from the Toolchest choose System > System Manager > Hardware and Devices > Disk Manager. The system disk and the second disk display.

For information on how to manage your disk space, see "Taking Advantage of a Second Disk" in the *Personal System Administration Guide.*

Removing the Second Internal Hard Disk Drive

1. Turn off the workstation by pressing the power button on the front (Figure 3-13).

Figure 3-13   Turning Off the Workstation

2. The second hard disk is in the optional drive bay—the one between the system drive and the audio-visual module. Pull down the lever on the left side of the optional drive module to release it (Figure 3-14).
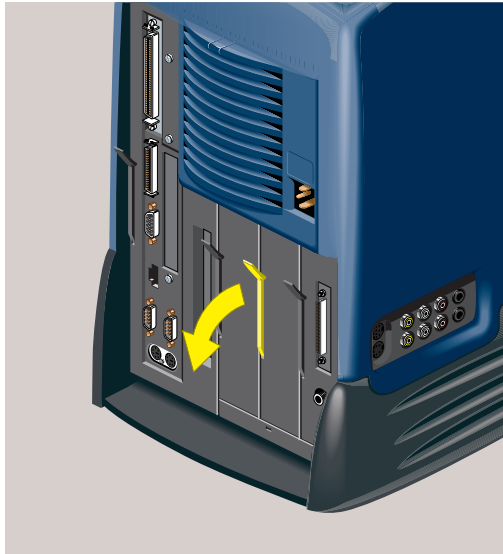
Figure 3-14   Releasing the Optional Drive Module

3. Pull the drive module out of the chassis (Figure 3-15).
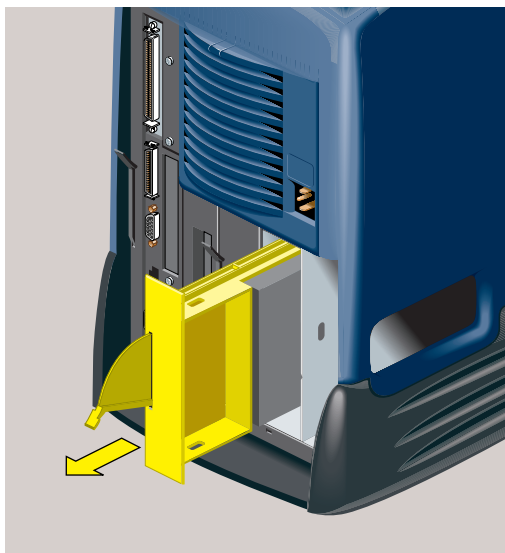
Figure 3-15   Sliding the Second Hard Drive Out of the Chassis

4. If you are installing another optional hard drive, see steps 7 and 8 of "Installing a Second Internal Hard Drive: R5000 Workstation." Otherwise, replace the blank filler panel over the open drive slot (Figure 3-16). (You removed the panel when you first installed the drive.)

Figure 3-16   Replacing the Filler Panel

5. Reconnect the power cable to the rear of the workstation. Reconnect any audio-visual cables you removed from the side or rear panel of the workstation.
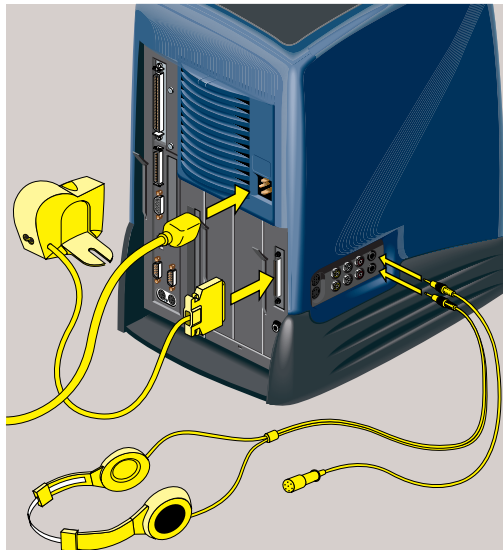
Figure 3-17   Reconnecting the Cables

Connecting External SCSI Devices

The following information is covered in this section:

- "Choosing a SCSI Address for the External Device"

- "Setting the SCSI Address on the External Device"

- "Connecting One External SCSI Device"

- "Connecting More Than One External Device"

- "Where's the Rest"

You can connect one or more external SCSI devices to the O2 workstation in a daisy chain if the maximum combined cable length of all external SCSI cables does not exceed three meters. You can connect either wide (68-pin) or narrow (58-pin) SCSI devices.

Each device has a unique SCSI address and is connected to the other devices in a chain, with the first device connected to the SCSI port on the rear of the workstation. The last device on the daisy chain must be terminated with an active SCSI terminator.

Caution: For external SCSI devices to operate reliably, the maximum combined cable length of all external SCSI cables cannot exceed three meters. Use the cable and active SCSI terminator that came with the device. Using other types of cables or terminators can result in data loss.

External SCSI devices include the following drives: 1/4" cartridge tape, digital audio tape, digital linear tape, optical disk, removable cartridge disk, and hard disk. SCSI scanners are also supported.

Choosing a SCSI Address for the External Device

Each device on the daisy chain needs a unique numeric SCSI address to distinguish it from other devices. The O2 workstation has two built-in SCSI buses. The system drive, the optional hard drive (if installed), and the internal CD-ROM drive are on the internal SCSI bus. All external devices are on the external SCSI bus. You can connect up to fifteen wide or seven narrow external devices, as long as the cable length limitation is not exceeded.

If you have one or more external devices connected to your system, and you are adding another device, check which addresses are assigned to the existing devices and then choose another number. Follow these steps:

1. From the Toolchest, choose System > System Manager > About This System.

2. Pick an unassigned number between 1 and 15 for the device you are adding.

If the SCSI devices and their addresses do not appear under "About This System," type **hinv** from a shell window.

Setting the SCSI Address on the External Device

Now you must set the address manually on the device you are installing. Most SCSI devices have a pushbutton switch or dial. The switch or dial is usually located on the rear or bottom of the device. You may need a small screwdriver or pen tip to set the dial or push the buttons.

*   If you are installing the first external SCSI device, go to "Connecting One External SCSI Device."

*   If you are installing additional SCSI devices, go to "Connecting More Than One External Device."

Connecting One External SCSI Device

1. Turn off the workstation.

Figure 3-18   Turning Off the Workstation

2. Choose the appropriate cable:

   • For a SCSI device with a wide, 68-pin connector, use a 68-pin SCSI-3 to 68-pin SCSI-3 cable (0.75 meter).

   • For a SCSI device with a narrow, 50-pin connector, use a 68-pin SCSI-3 to 50-pin Centronics SCSI-2 cable (0.75 meter).

3. Connect the SCSI cable to the SCSI port on the rear of the workstation and to the SCSI connector on the back of the device. If there are thumbscrews on either side of the connectors, tighten them (Figure 3-19).

   Note: The illustration shows an R5000 workstation. Installing external SCSI devices is the same on an R10000 workstation.

4. Connect the power cable to the SCSI device and to a working electrical outlet.

5. Connect the active SCSI terminator to the device.

6. Turn on the device, and then turn on workstation. It's important that you do it in this order, so that the workstation recognizes the device.
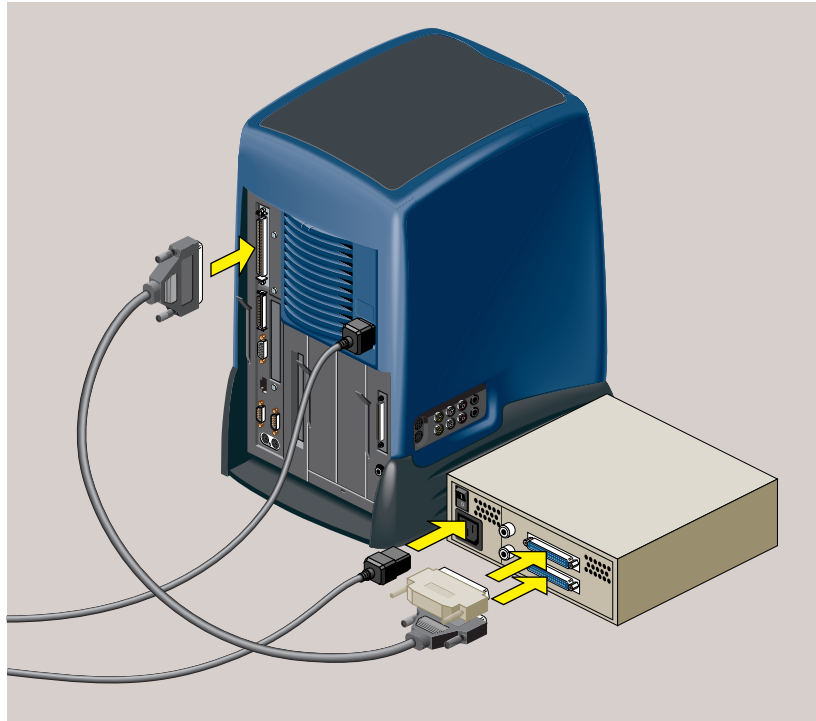
Figure 3-19   Connecting One External Device to the Workstation

Where's the Rest

You'll find more information in "Setting Up Peripheral Connections" in the *Personal System Administration Guide.*

Connecting More Than One External Device

1. Turn off the workstation.

Figure 3-20   Turning Off the Workstation

2. Remove the active SCSI terminator from the first device on the daisy chain.

    Note: You can connect both wide (68-pin) and narrow (50-pin) SCSI devices to the workstation, but keep in mind the following guidelines. If the first external device is a 68-pin, you can daisychain a 50-pin device to it, but you cannot then daisychain a 68-pin to the 50-pin device. You can, however, have a 68-pin as the first device, a 68-pin as the second device, and a 50-pin as the third device.

    Accepted configurations:
    68-pin to 50-pin
    68-pin to 68-pin to 50-pin

    Incorrect configuration:
    68-pin to 50-pin to 68-pin

3. Choose the appropriate SCSI cable:

   First external device:

   - SCSI device with a wide, 68-pin connector, use a 68-pin SCSI-3 to 68-pin SCSI-3 cable (0.75 meter).

   - SCSI device with a narrow, 50-pin connector, use a 68-pin SCSI-3 to 50-pin Centronics SCSI-2 0 cable (0.75 meter).

   Second and all other devices on the daisy chain:

   - SCSI device with a wide, 68-pin connector, use a 68-pin SCSI-3 to 68-pin SCSI-3 cable (0.25 meter).

   - SCSI device with a narrow, 50-pin connector, use a 50-pin Centronics SCSI-2 to 50-pin Centronics SCSI-2 cable
     (.5 meter).

4. Link the devices in a daisychain (Figure 3-21).

   First device: Connect the SCSI cable to the device and to the workstation. If there are thumbscrews on either side of the connectors, tighten them.

   Second and all other devices: Connect the SCSI cable to the connector on the back of each device. If there are thumbscrews on either side of the connectors, tighten them.

   Note: The illustration shows an R5000 workstation. Installing external SCSI devices is the same on an R10000 workstation.

5. Connect a power cable to each SCSI device and to a working electrical outlet.

6. Connect the active SCSI terminator to only the last device on the daisy chain.

7. Turn on each device, and then turn on workstation. It's important that you do it in this order, so that the workstation recognizes the devices.
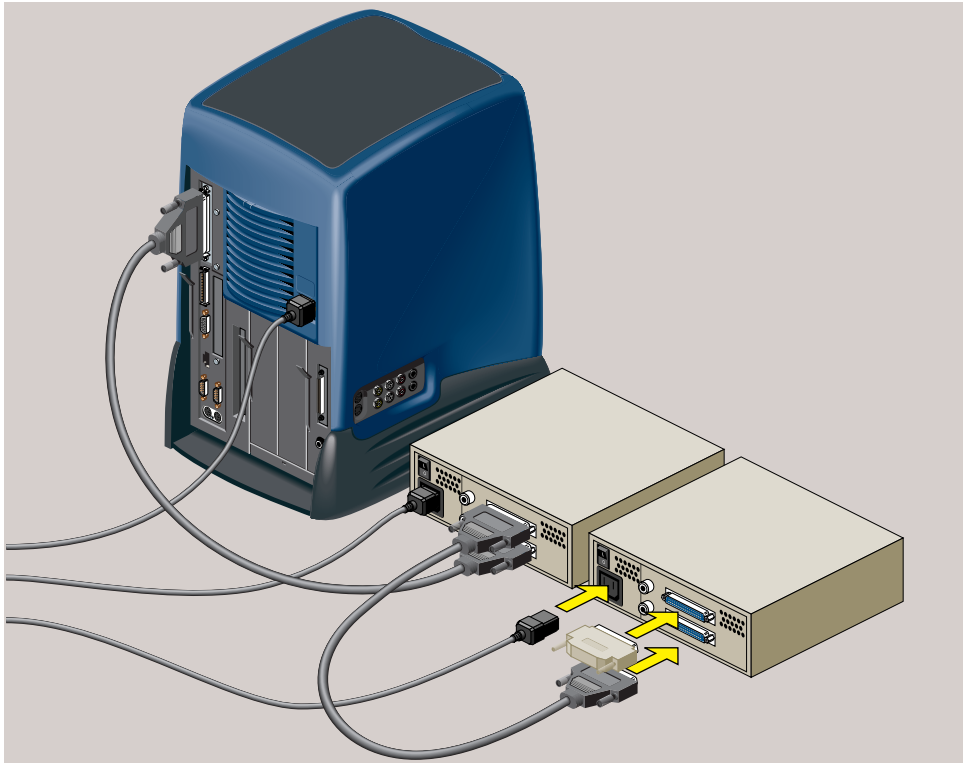
Figure 3-21   Connecting More than One Device in a Daisy Chain

Where's the Rest

You'll find more information in "Setting Up Peripheral Connections" in the *Personal System Administration Guide*.

Connecting Parallel Devices (Floppy Drive and Printer)

Silicon Graphics offers an optional floppy drive that you connect to the parallel port on the O2 workstation. The drive has an additional connector, to which you connect your printer. The printer needs a Silicon Graphics O2 printer cable.

If no floppy drive is connected to the workstation, connect your printer cable to the parallel port on the workstation.

Follow these steps to connect the floppy drive (Figure 3-22).

Note: The illustration shows an R5000 workstation. Installing a floppy drive is the same on an R10000 workstation.

1.   Connect either end of the cable that comes with the drive to the parallel port on the workstation. Connect the other end to the connector on the rear of the drive, below the workstation icon.

2.   Connect your printer to the other connector on the rear of the drive (the one below the printer icon), using a Silicon Graphics O2 printer cable.
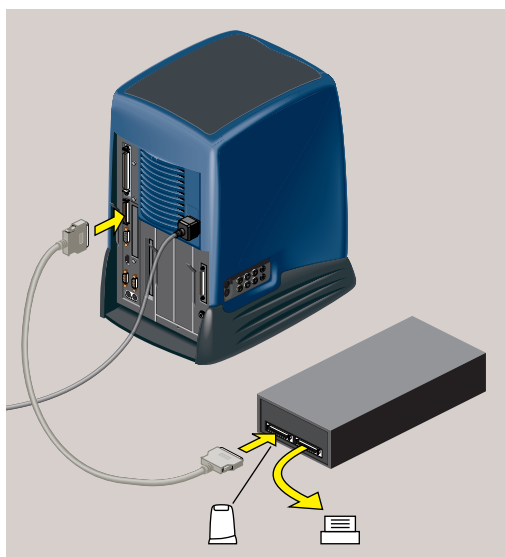
Figure 3-22   Installing the Floppy Drive

Connecting Serial Devices

Examples of serial devices you can connect to your O2 workstation include: dial and button boxes, digitizer tablets, console terminals, modems, optical mice, *MIDI* (Musical Instrument Digital Interface) devices, Spaceball™ and the Logitech Magellan 3D input device.

Figure 3-23 shows the location of the serial ports on the rear of the workstation. The serial ports are labeled **1** and **2** and are DB9 connectors. To view the serial port cable pinouts, and for information on Silicon Graphics serial cables and converters, click Hardware Central. (If your web browser is not loaded, it takes a few seconds to load.) Or, if you're viewing this on a remote server, see Appendix A, "Technical Specifications."

Note: The illustration shows an R5000 workstation. Connecting serial devices is the same on an R10000 workstation.

Serial ports

Figure 3-23   Locating the Serial Ports

1. Before connecting the device, use the Serial Device Manager to configure the serial port you will use. From the Toolchest choose System > System Manager > Hardware and Devices > Serial Devices Manager.

2. Connect one end of the serial cable to the serial port (Figure 3-23). Connect the other end to the serial device. Note the following:

    •   If you are connecting a console terminal, attach it to serial connector **1** only.

    •   If you are connecting a dial and button box, you need to attach a female-to-female adapter to the serial cable before connecting it to the workstation.

    •   If you're connecting Macintosh® compatible *MIDI* (Musical Instrument Digital Interface) equipment, you need the Silicon Graphics MIDI converter. To purchase one, contact your Silicon Graphics service provider.

Connecting Audio and Video Devices

Figure 3-24 shows the location of the audio and video ports on the workstation.

Note: The illustration shows an R5000 workstation. Connecting audio and video devices is the same on an R10000 workstation.

For cable pinout information, click Hardware Central. (If your web browser is not loaded, it takes a few seconds to load.) Or, if you're viewing this on a remote server, see "Cable Pinout Assignments."

For information on digital audio and video tools, see "About The Digital Media Tools Guide".

Audio Devices

The side panel audio ports support:

•   stereo line level in and out (RCA plugs)

•   stereo headphone out (3.5 mm phono)

•   mono microphone in (3.5 mm phono)

The rear panel audio ports support:

- stereo line out (3.5-mm phono)
- embedded microphone in the O2Cam

Video Devices

Note: The video option is not available on all models.

Your workstation can send and receive analog *composite* (RCA) and *s-video* (MINIDIN) signals. In addition, the digital camera port provides a digital video input and output signal. The signal is Silicon Graphics proprietary and is similar to the parallel D-1 signal used in professional video applications.

The analog s-video and analog composite video ports accept most consumer and industrial grade video equipment.

Note: Connect the O2Cam before turning on the workstation, so that the system recognizes the camera.
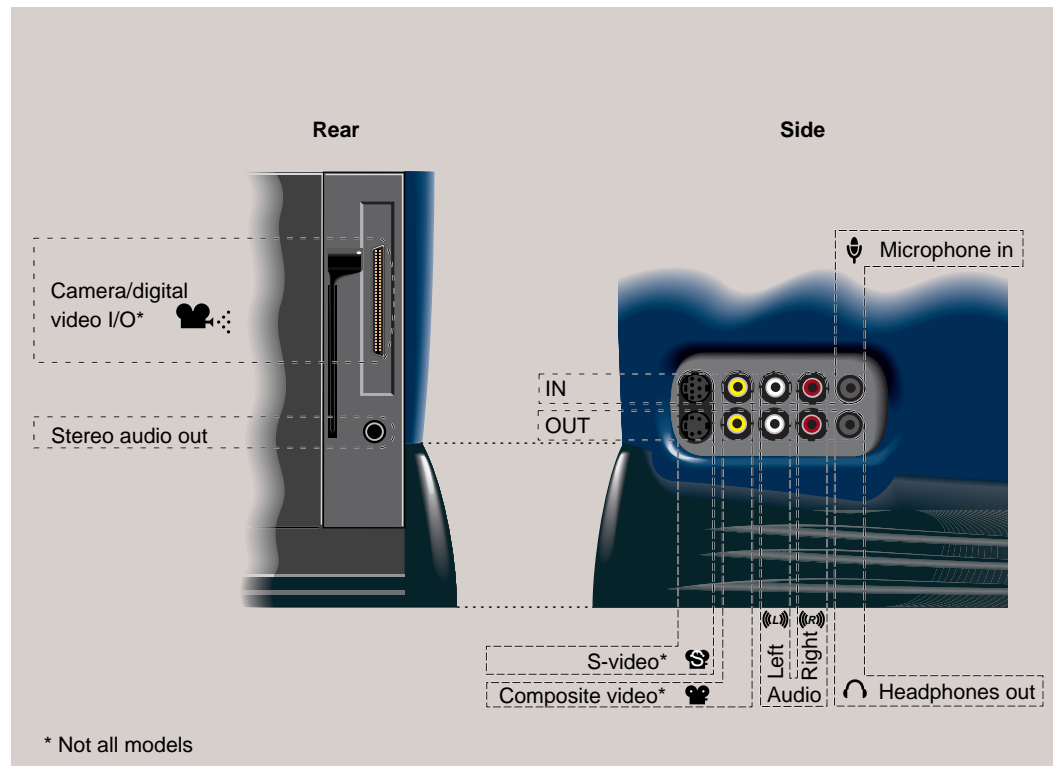
Figure 3-24   Audio and Video Ports

Troubleshooting

This chapter describes how to diagnose hardware problems. It also includes information on running diagnostics. The following topics are covered:

- "Diagnosing the Problem"
- "Running Diagnostic Tests"
- "Recovering from System Crash"
- "Disabling the System Maintenance Password"
- "Service and Support Information"

Diagnosing the Problem

If you suspect there is a problem with your hardware, use the flowchart (Figure 4-1) to help isolate and solve the problem. To view the flowchart, resize the window by placing the cursor on the border. When you see the resize cursor, drag the mouse to the size you need. See also "Running Diagnostic Tests."
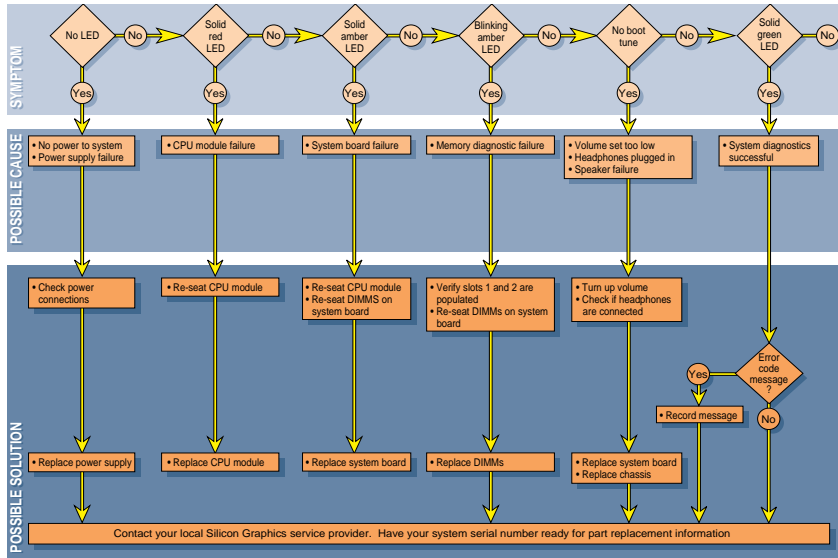
Figure 4-1   Diagnostic Flow Chart #1 (Expand the Window to View)
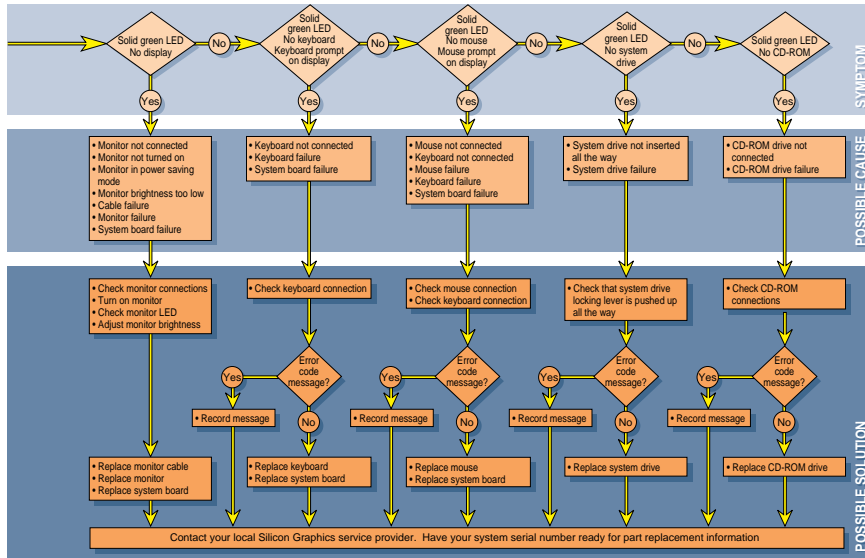
Figure 4-2   Diagnostic Flow Chart #2 (Expand the Window to View)

Running Diagnostic Tests
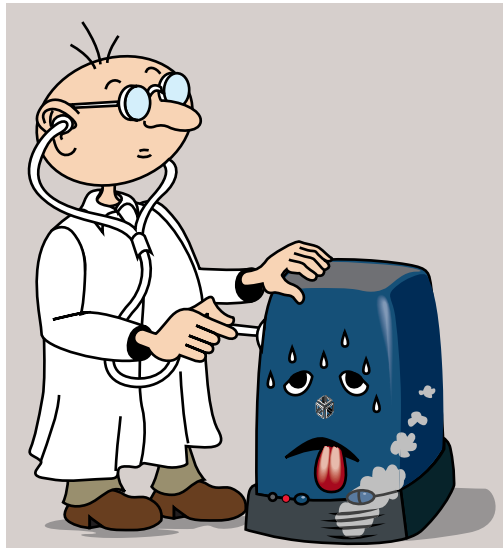
Figure 4-3   System Diagnostic Tests

There are three types of software diagnostics tests provided on the O2 workstation. Each is described below:

- "Power-On Tests"
- "Confidence Tests"
- "IDE Tests"

Power-On Tests

These run automatically on the major hardware components of the workstation each time it is turned on. If the tests find a faulty part, the LED on the front of the system will be red and there will probably be an error message. See also "Diagnosing the Problem."

Confidence Tests

There are confidence tests for the mouse, keyboard, monitor, audio subsystem, external SCSI devices (excluding hard disks), Presenter, and ISDN connection.

To run the Confidence Tests, choose Toolchest > System > Confidence Tests. Double click the icon for the part you believe is faulty, and follow the online instructions.

IDE Tests

The Interactive Diagnostic Environment (IDE) tests are more comprehensive than the Confidence Tests, and take longer (as long as 30-45 minutes) to run. Follow these steps:

1. Turn off the workstation, wait a few seconds, and then turn it on again.

2. When you see the System Startup notifier, click *Stop for Maintenance*, or press **Esc**.
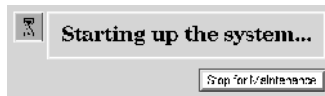
Figure 4-4 System Startup Notifier

3. When you see the System Maintenance Menu, choose `Run Diagnostics,` or type **3** on the keyboard.

   Tip: You can stop the tests at any time by pressing **Esc**.

   Note: If you cannot reach the System Maintenance Menu, your system is faulty. If you cannot run the diagnostics, you may have a faulty disk drive or other problem. Contact your service provider.

4. At the end of the tests you see a message with the results of the tests. Press **Enter** and then **Esc** to return to the System Maintenance Menu, from where you can restart the system.

Recovering from System Crash

In most cases, your system will recover from a system crash automatically if you reboot the system. If, however, you have lost data on your system disk, and you cannot communicate with your system using the mouse or keyboard, or over the network,

follow these instructions. The instructions assume you have a backup tape of your system that has been made using the System Manager backup tool, or with the `/usr/sbin/Backup` script. You also need a CD with your current IRIX operating system level. If you are recovering data from a tape on a remote tape device, you need to know the hostname, tape device name, and IP address of the remote system.

1. Use a pen tip or an unwound paper clip to press the **Reset** button located on the front panel (Figure 4-5).
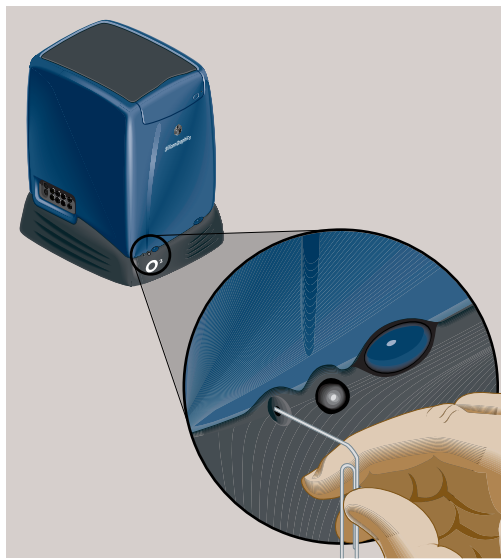
Figure 4-5   Pressing the Reset Button

2. When you see the System Startup *notifier* (Figure 4-6), click *Stop for Maintenance* or press **Esc**.
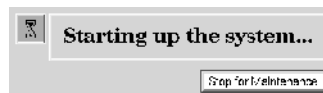
Figure 4-6   System Startup Notifier

3. From the System Maintenance menu, choose *Recover System*, or type **4** on the keyboard.

    The System Recovery Menu appears (Figure 4-7).

Figure 4-7   System Recovery Menu

4. If you have a CD-ROM drive connected to your system and the IRIX CD, click *Local CD-ROM.* Then click *Accept* to start. Insert the CD when prompted. The system takes five minutes or more to copy the information.

    If you don't have a CD-ROM drive, use a drive that is connected to another system on the network. Click *Remote Directory.*

5. When a notifier appears asking you for the remote hostname, type the system's name, a colon (:), and the full pathname of the CD-ROM drive, followed by **/dist.** For example, to access a CD-ROM drive on the system mars, you would type

    mars:/CDROM/dist

    After everything is copied from the CD to the system disk, you can restore your data from a recent full backup tape. The backup must be one that has been made using the System Manager backup tool, or with the **/usr/sbin/Backup** script.

    Tip: If you need to check something on your system during the restore process, you can get a shell prompt by typing **sh** at most question prompts.

6. If you have a local tape device, you see this message:

    ```
    Restore will be from <tapename> OK? ([Y]es, [N]o): [Y]
    ```

    tapename is the name of the local tape device.

7. If you have a remote (network) tape device, when no tape device is found, or when you answered "No" to the question in the previous step, you see this message:

```
Remote or local restore ([r]emote, [l]ocal):
```

- If you answer "remote," you have chosen to restore from the network, and you must know `the hostname, tape device name, and IP address of the remote system. You also need to know the IP address of your system.` The IP address, such as 192.0.2.1, always has four components separated by periods.

- If you answer "local," you have chosen a tape device that is connected to your system, and you are prompted to enter the name of the tape device.

8. When you see the following message, remove the CD-ROM, insert your most recent full backup tape, then press **Enter**.

```
Insert the first backup tape in the drive, then press <Enter>,
[q]uit (from recovery), [r]estart:
```

There is a pause while the program retrieves several files from the tape describing the system state at the time the backup was made. Then you see this message:

```
Erase /x filesystem and make new one (y,n)? [n]
```

It prompts you for every filesystem that was known at the time of the backup.

Read the following to decide whether to answer **y** or **n**.

- If you answer **n** for no, the system tries to salvage as many files as possible. Then it uses your backup tape to replace the files it could not salvage. Usually you should answer no, especially if your backup tape is not very recent. If the file systems were badly damaged, or the backup was from a different level operating system, you may need to answer yes.

- If you answer **y** for yes, the system erases the filesystem and copies everything from your backup tape to the disk. The system loses any information on that filesystem that you created between now and when you made your backup tape.

9. You see this message:

```
Starting recovery from tape.
```

After two or three minutes, the names of the files that the system is copying to the disk start scrolling. When the recovery is complete, you see this message:

```
Recovery complete, restarting system.
```

Note: If your backup tapes were old, or you were changing your operating system level, you should reinstall the operating system from the IRIX CD that came with your system after system recovery is complete. When you see the Startup System notifier, press **Esc**, or click *Stop for Maintenance.* Then click *Install System Software.* For more information on installing the operating system, see "Installing Software" in the *Personal System Administration Guide* or the Appendix of the hardcopy *O2 Workstation Owner's Guide.*

Disabling the System Maintenance Password

If you are in the System Maintenance menu, and you choose `Install System Software`, `Run Diagnostics`, `Recover System`, or `Enter Command Monitor`, you may be prompted for a password.

If you do not know the password, you can disable it by installing a jumper (a small cap that connects two pins) on the system board inside the workstation. The system board is located in the system module. To install the jumper, you must first remove the system module and the PCI tray. Follow these steps:

1. Turn off the workstation by pressing the power button on the front (Figure 4-8).

Figure 4-8   Turning off the Workstation

2. Remove the system module by releasing the lever on the extreme left as you face the rear of the workstation and sliding the module out. (See "Removing the System Module.")

3. Release and remove the PCI tray.

   • R5000 workstations, see "Removing a PCI Board: R5000 Workstation."

   • R10000 workstations, see "Removing a PCI Board: R10000 Workstation."

4. Before touching any of the components, attach the wrist strap to your wrist and to a metal part of the chassis (Figure 4-9).
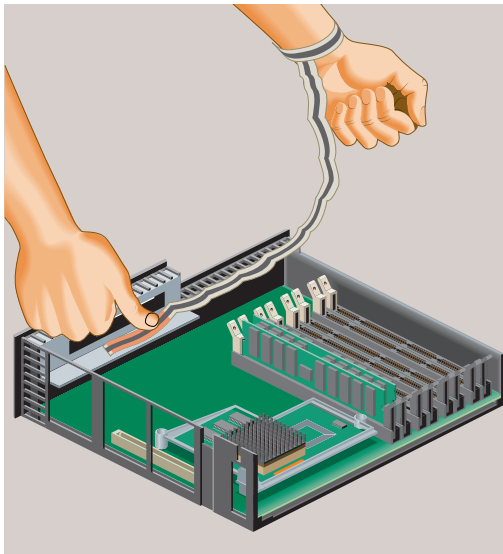
Figure 4-9   Attaching the Wrist Strap

5.   Remove the jumper from the system board in the location shown in Figure 4-10.

Note: You must remove the jumper if you choose to reset the PROM password.

.
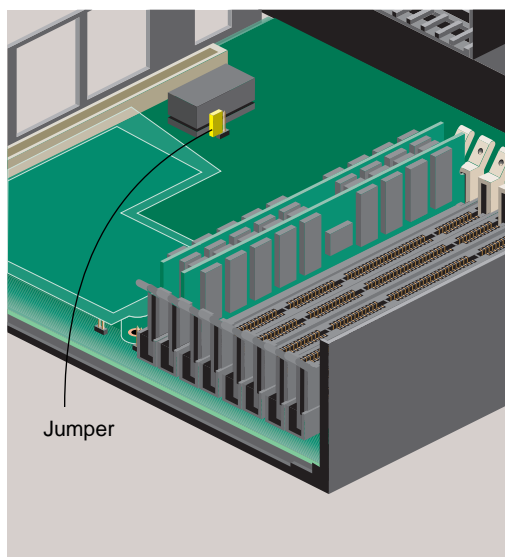
Figure 4-10   Removing the Jumper

6.   Reinstall the jumper in the location shown in Figure 4-11.

Note: The illustration shows an R5000 CPU. If you have an R10000 CPU, the pin location on the system board is the same.
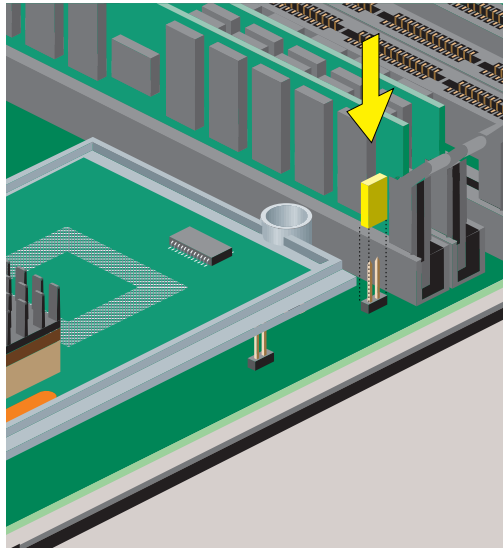
Figure 4-11   Installing the Jumper

7. Remove the wrist strap.

8. Reinstall the PCI tray in the system module:

    •   R5000 workstations, see "Reinstalling the PCI Tray: R5000 Workstation."

    •   R10000 workstations, see "Reinstalling the PCI Tray: R10000 Workstation."

9. Reinstall the system module by sliding it into the chassis. See "Replacing the System Module."

Service and Support Information

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

Ordering, Removing, and Installing Replacement Parts

If you suspect there is a problem with your hardware, use the diagnostic flowchart in "Diagnosing the Problem" on page 97 to help isolate the problem before calling your local Silicon Graphics service provider.

The following topics are covered in this chapter:

- "Ordering a Replacement Part"
- "Replacing the System Module"
- "Replacing the R5000 CPU Module"
- "Replacing the R10000 CPU Module"
- "Replacing the System Drive"
- "Replacing the Audio-Visual Module"
- "Replacing the Power Supply"
- "Replacing the CD-ROM Drive"
- "Replacing the Chassis"

Ordering a Replacement Part

1. Before calling your local Silicon Graphics provider, have the following information ready. You can record the information in the space provided in Table 5-1.

   - system serial number (see "Locating Your Workstation's Serial Number")
   - hardware configuration information including hardware upgrades, and IRIX software version (choose Toolchest > System Manager)
   - description of the problem

2. Use this space to record the information you need for your support call.

Table 5-1   Information Needed for Support Call

System Serial Number	
Model Number	
IRIX Version	
Description of Problem	

3. Remove the faulty part if instructed by your service provider to do so. See these sections:

- "Replacing the System Module"
- "Replacing the R5000 CPU Module"
- "Replacing the R10000 CPU Module"
- "Replacing the System Drive"
- "Replacing the Audio-Visual Module"
- "Replacing the Power Supply"
- "Replacing the CD-ROM Drive"
- "Replacing the Chassis"

Replacing the System Module

If you are instructed by your service provider to replace the system module, follow these steps.

Before replacing your system module, you must remove the memory modules, PCI tray, CPU module, and digital display adapter board (if one is installed) from your existing module and reinstall them on the replacement module you received.

Note: It's important that you remove the PCI tray, because the printed circuit board beneath it contains a host chip with important information such as the workstation's serial number.

Follow these steps:

1. Remove the power cable, and remove the system module from the chassis. See "Removing the System Module" and "Reinstalling the System Module."

2. Remove all of the DIMM modules from the system module you are returning and reinstall them on the replacement system module. See "Removing Memory Modules" and "Installing Memory Modules."

3. Remove the PCI tray from the system module you are returning, and reinstall it on the replacement system module. *If a PCI board is installed in the tray, do not remove it from the tray.*

   • R5000 workstations, see "Removing a PCI Board: R5000 Workstation" and "Installing a PCI Board: R5000 Workstation."

   • R10000 workstations, see "Removing the PCI Tray: R10000 Workstation" and "Installing a PCI Board: R10000 Workstation."

4. Remove the CPU module from the system module you are returning, and reinstall it on the replacement system module.

   • R5000 workstations, see "Replacing the R5000 CPU Module."

   • R10000 workstations, see "Replacing the R10000 CPU Module."

5. Remove the digital display adapter board, if one is installed, and reinstall it on the replacement system module. See "Removing a Digital Display Adapter Board" and "Installing a Digital Display Adapter Board."

6. Ship the stripped-down system module back to Silicon Graphics in the container that held the new system module.

Replacing the R5000 CPU Module

If you are instructed by your service provider to replace the R5000 CPU module, follow these steps.

1. If you haven't already done so, turn off the workstation, remove the power cable, and remove the system module from the chassis. See "Removing the System Module."

2. Release the PCI tray by pushing up the lever on the side (Figure 5-1). The tray pops up.
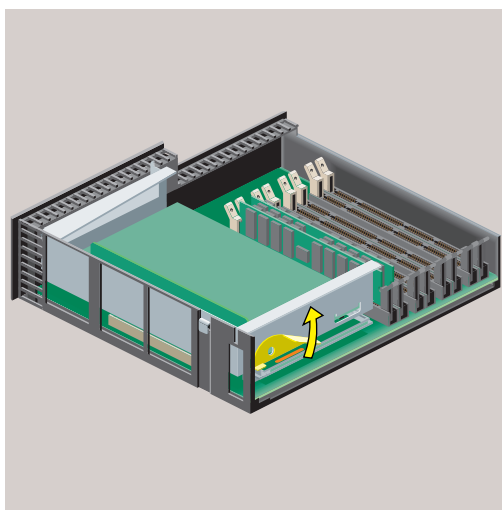
Figure 5-1   Releasing the PCI Tray on the R5000 Workstation

3. Push down slightly on the rear of the PCI tray and remove it from the system module (Figure 5-2). *Do not remove the PCI board (if one is installed) from the tray.*
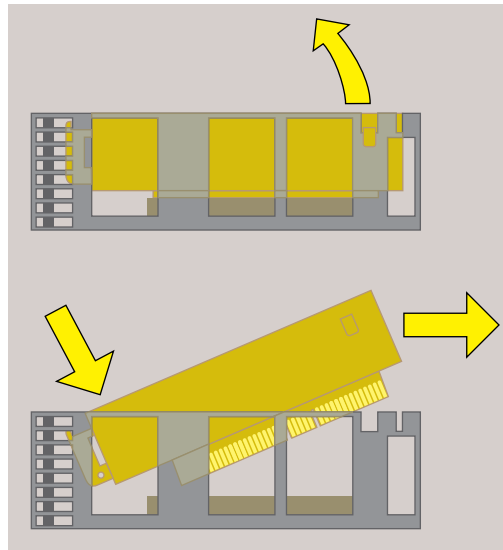
Figure 5-2   Removing the PCI Tray

4. Before touching any of the components, ground yourself to a metal part of the chassis. Attach the wrist strap to your wrist and to the metal flange (Figure 5-3).
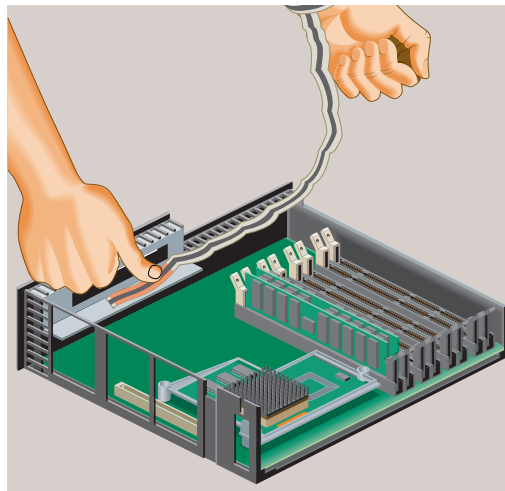
Figure 5-3   Attaching the Wrist Strap

5. Locate the R5000 CPU module (Figure 5-4). Use a Phillips screwdriver to remove the two screws from the locations shown.
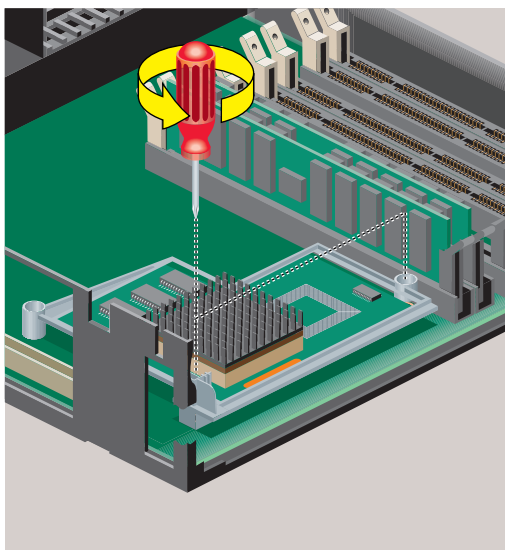
Figure 5-4   Removing the Phillips Screws on the R5000 CPU Module

6. Grasp the CPU module on both sides and gently rock it out (Figure 5-5). Do not exaggerate the rocking motion, or you will bend the pins.
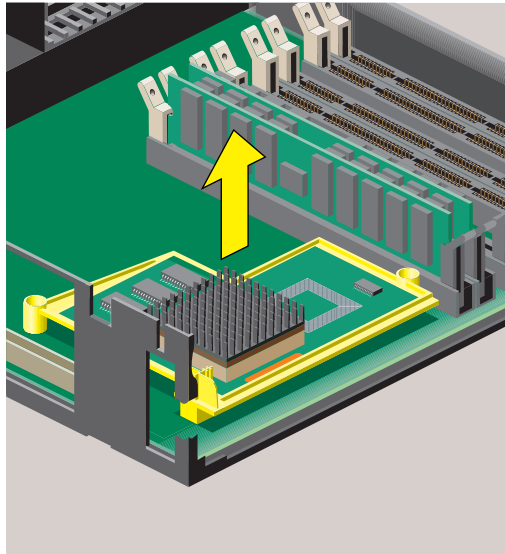
Figure 5-5   Removing the R5000 CPU Module

7. Install the replacement R5000 CPU module (Figure 5-6).

    •   Align the connector beneath the module with the connector on the system
        board. Make sure it is positioned correctly before pressing down.

    •   Press down gently on the CPU module until it is securely seated. You hear a
        click as it connects.

    •   Insert and tighten the two Phillips screws in the locations shown (Figure 5-6).

115
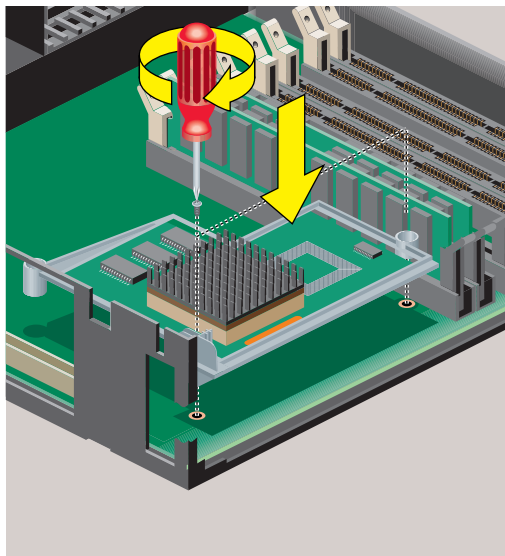
Figure 5-6   Installing the Replacement CPU Module

8. Remove the wrist strap.

9. Reinstall the PCI tray in the system module (Figure 5-7).

    •   Engage the hinge on the PCI tray in the slot.

    •   Lower the tray and insert the connector into the slot, pushing toward the back
        of the module as you do this (Figure 5-7).
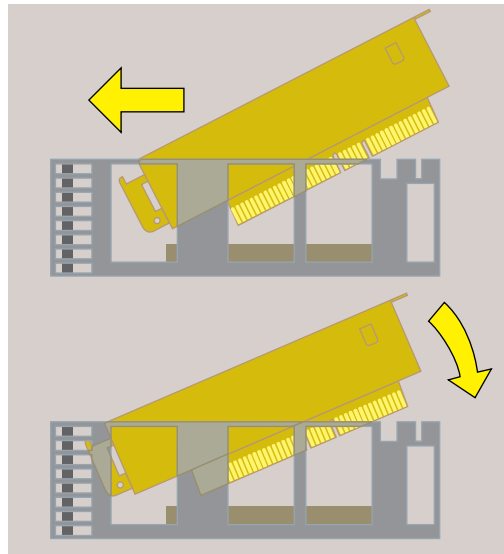
Figure 5-7   Replacing the PCI Tray in the System Module

10. Push the tray down firmly until it is completely seated. Check that the lever returns to its starting position (Figure 5-8).

   Note: If the PCI tray is not completely seated, the system module will not slide back into the chassis.
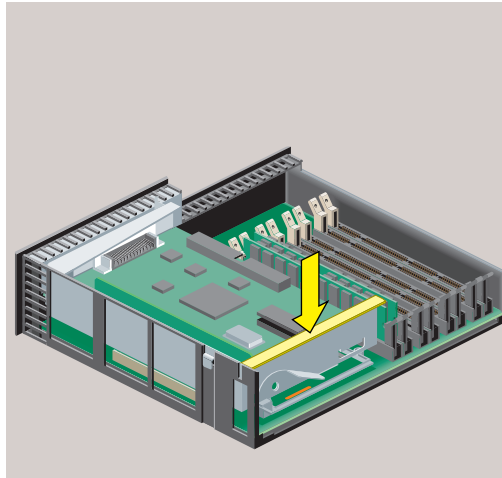
Figure 5-8   PCI Tray Seated Correctly

11. Reinstall the system module, and reconnect the cables. See "Reinstalling the System Module."

12. Ship the old CPU module to Silicon Graphics in the container that held the replacement CPU module.

Replacing the R10000 CPU Module

If you are instructed by your service provider to replace the R10000 CPU module, follow these steps.

To remove the R10000 CPU module, you must first remove the plastic face plate of the system module and the PCI tray.

1. If you haven't already done so, turn off the workstation, remove the power cable, and remove the system module from the chassis. See "Removing the System Module."

2. Remove the plastic face plate from the system module:

   • Use a Phillips screwdriver to remove five screws on the rear and two screws on the underside, in the locations shown (Figure 5-9).

Caution: On the underside, remove only two screws. Do not remove the third screw that attaches the lever to the face plate.
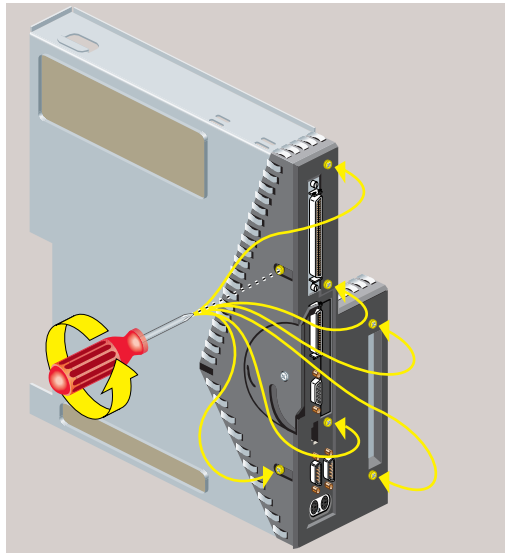
Figure 5-9   Removing Seven Screws From the Face Plate

3. Lift the face plate away from the module (Figure 5-10).

    There is a filler panel covering the I/O port which falls away as you remove the face plate.
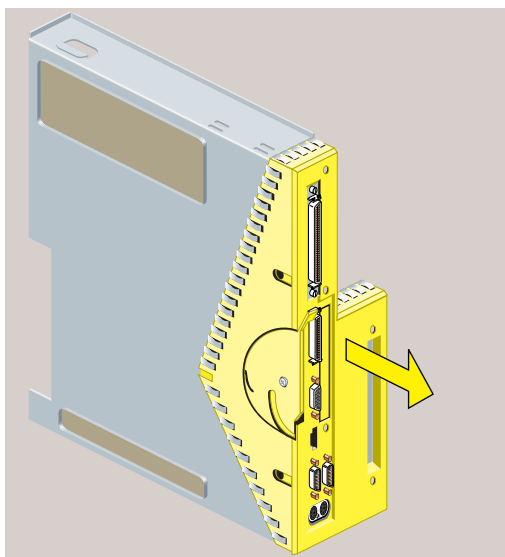
Figure 5-10   Removing the Face Plate From the System Module

4. Release the PCI tray from the system module as follows. *If a PCI board is installed in the tray, do not remove it from the tray.*

    •   Insert a screwdriver in the small opening shown in Figure 5-11 and use and a prying or twisting motion to release the PCI connector from the system module.

    •   Pull the PCI tray straight up to remove it and set it aside.
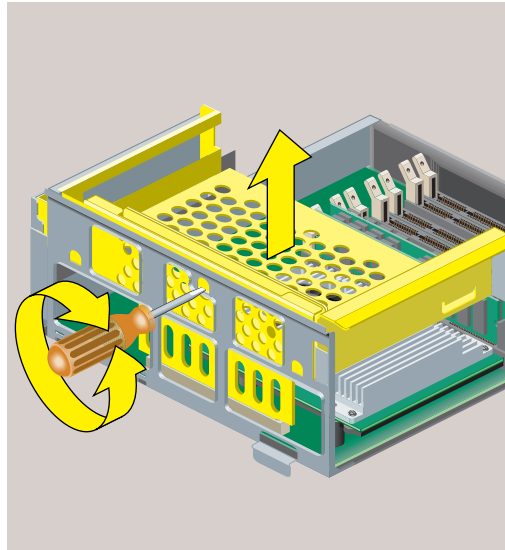
Figure 5-11   Releasing the PCI tray From the System Module

5. Before touching any of the components, ground yourself to a metal part of the chassis. Attach the wrist strap to your wrist and to a metal part of the chassis (Figure 5-12).
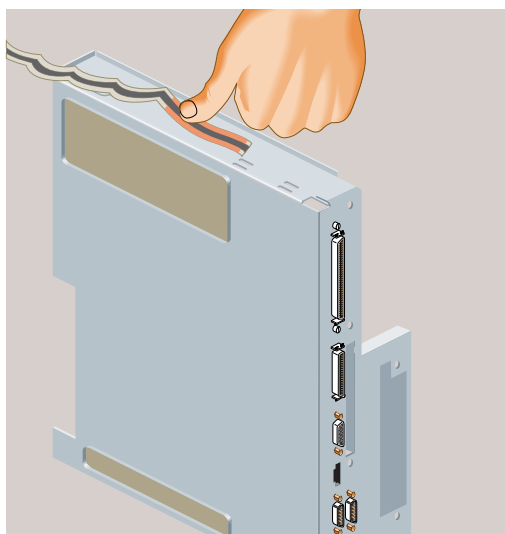
Figure 5-12   Attaching the Wrist Strap

6.   Locate the R10000 CPU module. It is protected by a metal heat sink (Figure 5-13). *Do not remove the heat sink.*

7.   Use a Phillips screwdriver to remove four screws from the locations shown (Figure 5-13).

     Caution: Do not remove the four hex screws. Do not remove the two screws that secure the fan.
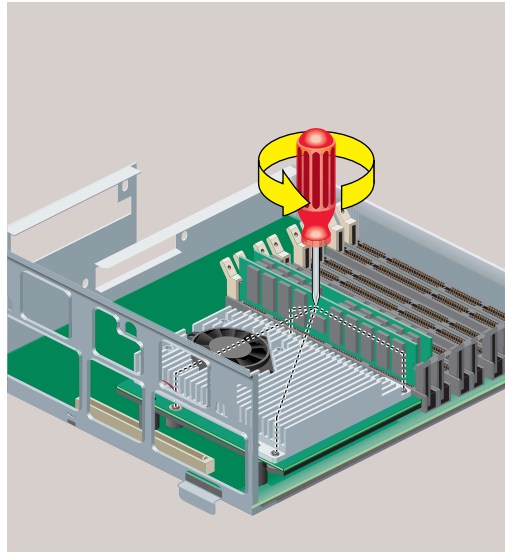
Figure 5-13   Removing the Screws From the R10000 CPU Module

8. Grasp the CPU module on both sides and gently rock it out (Figure 5-14). Do not exaggerate the rocking motion, or you will bend the pins.
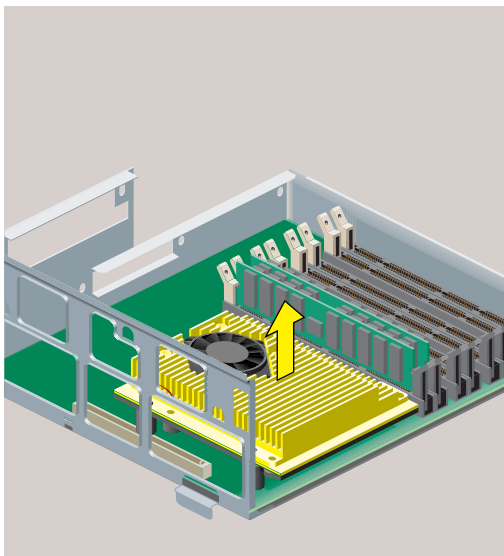
Figure 5-14   Removing the R10000 CPU Module

9. Install the replacement R10000 CPU module (Figure 5-15).

    •   Align the screw holes on the CPU module with the screw holes on the CPU support. Make sure it is positioned correctly before pressing down.

    •   Press down gently on the CPU module until it is securely seated. You hear a click as it connects.

    •   Insert and tighten the four Phillips screws in the locations shown.
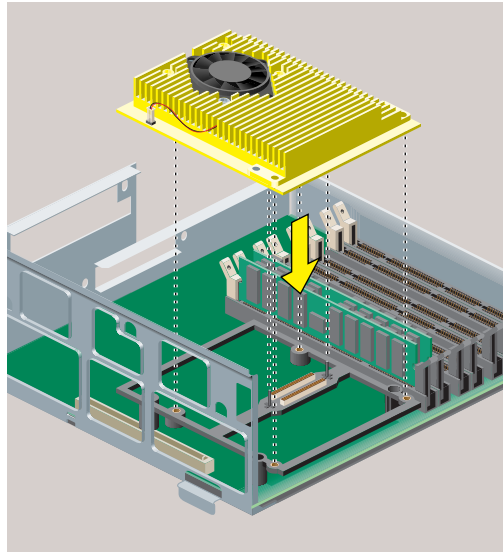
Figure 5-15   Securing the R10000 CPU Module

10. Remove the wrist strap.

11. Replace the PCI tray in the system module as follows:

  •   Lower the PCI tray, engaging it on the tab on the side of the system module (Figure 5-16).

  •   Insert the PCI connector beneath the tray into the slot on the system module.

  •   Once the connector is aligned, push down firmly until it is completely seated.

  Note: If the PCI tray is not completely seated, the system module will not slide back into the chassis.
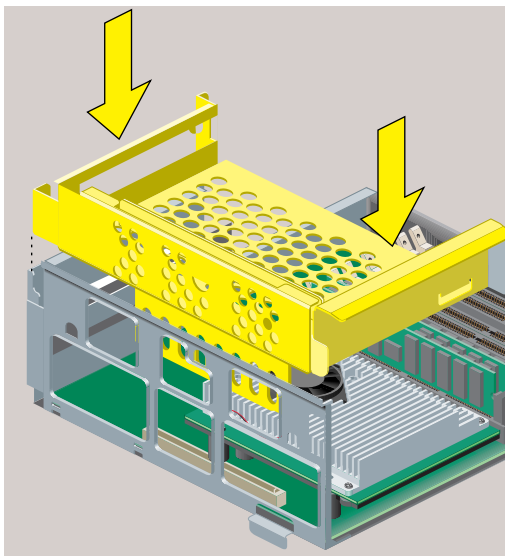
Figure 5-16   Replacing the PCI Tray in the R10000 System Module

12. Replace the plastic face plate on the system module as follows.

- Replace the filler panel over the I/O opening on the inside of the face plate.

- Align the face plate on the system module (Figure 5-17).
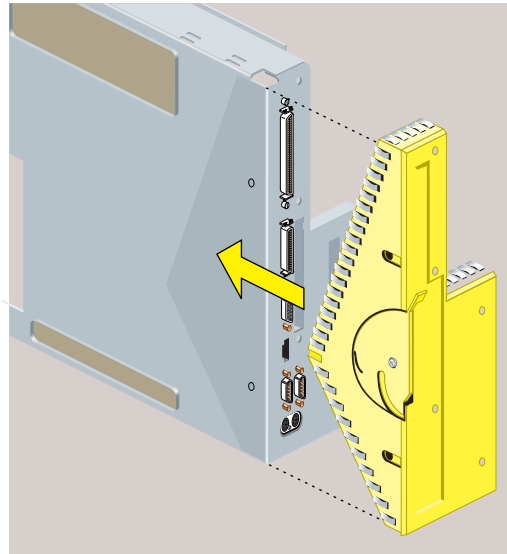
Figure 5-17   Replacing the Face Plate

- Use a Phillips screwdriver to insert and tighten two screws on the underside in the locations shown (Figure 5-18).
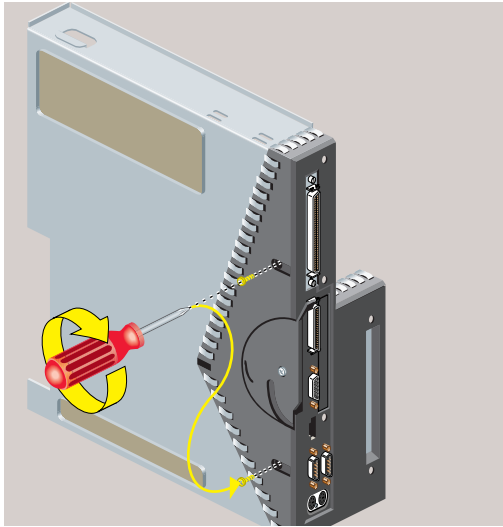
Figure 5-18   Replacing Two Screws on the Underside

- Use a Phillips screwdriver to insert and tighten five screws in the locations shown (Figure 5-19).
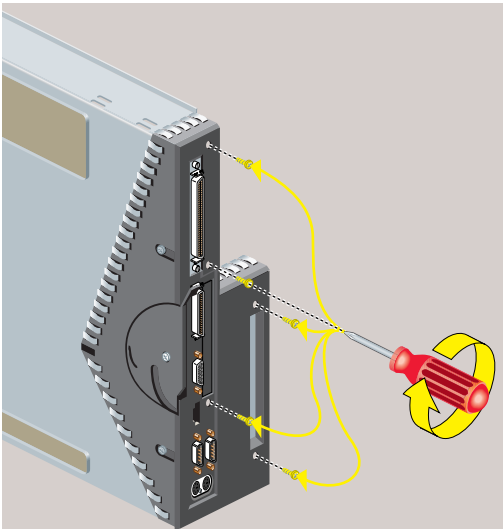
Figure 5-19   Replacing Five Screws on the Face Plate

13. Go to "Reinstalling the System Module."

14. Ship the original CPU module to Silicon Graphics in the container that held the replacement CPU module.

Replacing the System Drive

If you are instructed by your service provider to replace the system drive, follow these steps.

Before replacing the system drive, you must turn off the workstation, remove the power cable and other exterior cables, and attach the wrist strap. Follow these steps:

1. Turn off the workstation.

Figure 5-20   Turning Off the Workstation

2. Remove the power cable from the rear.

   Note: The illustrations show an R5000 workstation. Replacing the system drive is the same on an R10000 workstation.

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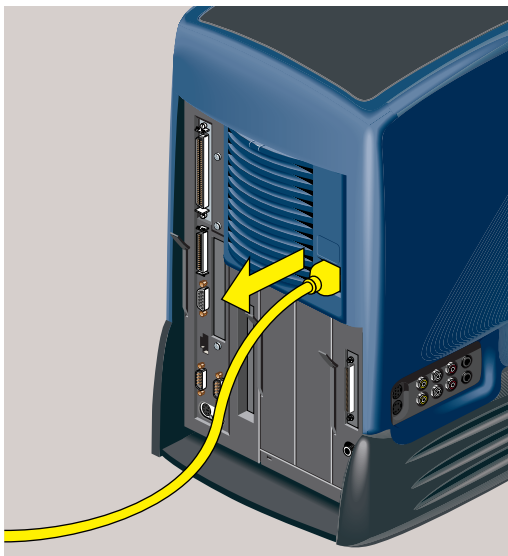
Figure 5-21   Removing the Power Cables

3.   Pull down the lever on the left side of the system drive module to release it
     (Figure 5-22).

Figure 5-22   Releasing the Drive Tray

4.   Pull the system drive module out of the chassis (Figure 5-23).

Figure 5-23   Removing the System Drive Module From the Chassis

5.   Slide the replacement system drive module into the system drive bay (Figure 5-24).
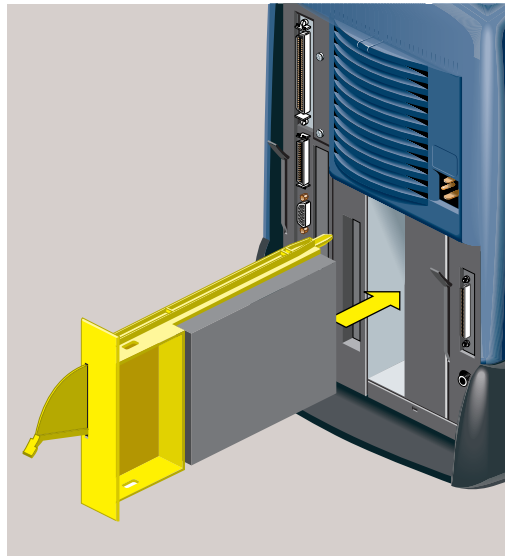
Figure 5-24   Installing the Replacement System Drive Module

6. Push the lever up to lock the tray in place (Figure 5-25).

Figure 5-25   Securing the System Drive Module

7. Reconnect the power cable and turn on the workstation.
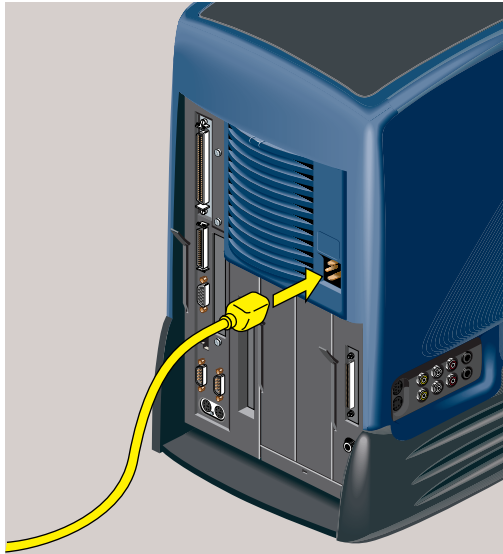
Figure 5-26   Reconnecting the Power Cable

Replacing the Audio-Visual Module

If you are instructed by your service provider to replace the audio-visual module, follow these steps.

1. Turn off the workstation.

Figure 5-27   Turning Off the Workstation

2. Remove the power cable and any cables that are connected to the rear or side panel of the audio-visual module (Figure 5-28).

    Note: The illustrations show an R5000 workstation. Replacing the audio-visual module is the same on an R10000 workstation.
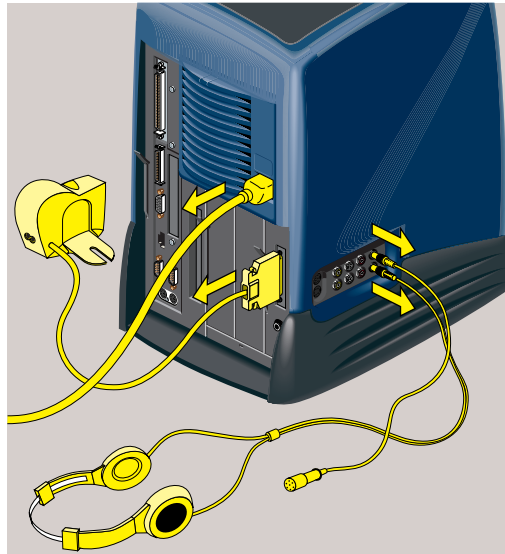
Figure 5-28   Removing the Cables From the Audio-Visual Module

3. Pull down the lever on the left side of the audio-visual module to release it
    (Figure 5-29).
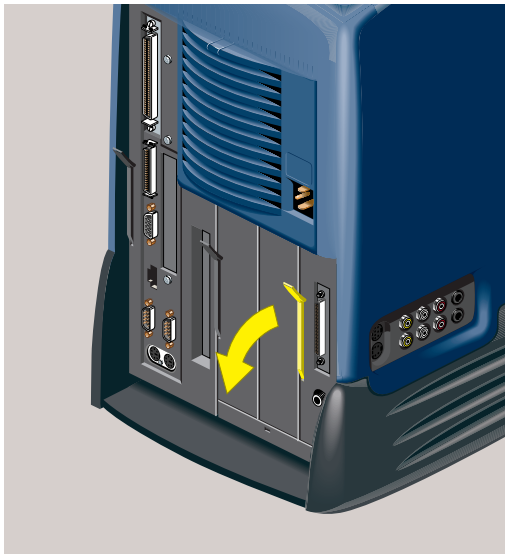
Figure 5-29   Releasing the Audio-Visual Module

4. Pull the audio-visual module out of the chassis (Figure 5-30).
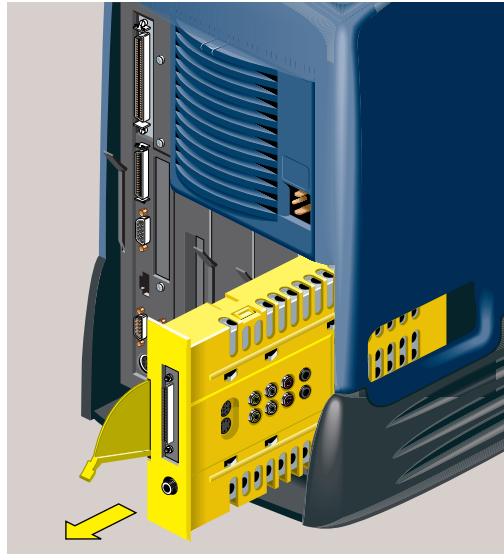
Figure 5-30   Removing the Audio-Visual Module From the Chassis

5.   Slide the replacement audio-visual module into the chassis (Figure 5-31).
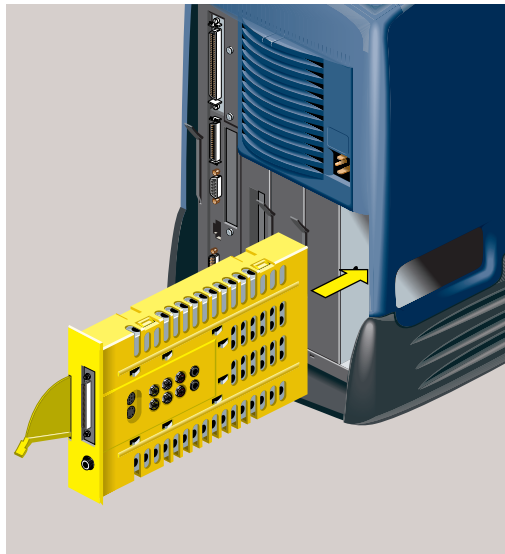
Figure 5-31   Installing the Replacement Audio-Visual Module

6.   Push the lever up to lock the tray in place (Figure 5-32).

Figure 5-32   Securing the Audio-Visual Module

7. Reconnect the power cable any audio-visual cables that you removed earlier
    (Figure 5-33).

Figure 5-33   Reconnecting the Audio -Visual Cables

8.   Turn on the workstation (Figure 5-34).

Figure 5-34   Turning on the Workstation

Replacing the Power Supply

If you are instructed by your service provider to replace the power supply, follow these steps.

1. Turn off the workstation (Figure 5-35).

Figure 5-35   Turning Off the Workstation

2. Remove the power cable from the rear (Figure 5-36).

    Note: The illustrations show an R5000 workstation. Replacing the power supply is the same on an R10000 workstation.
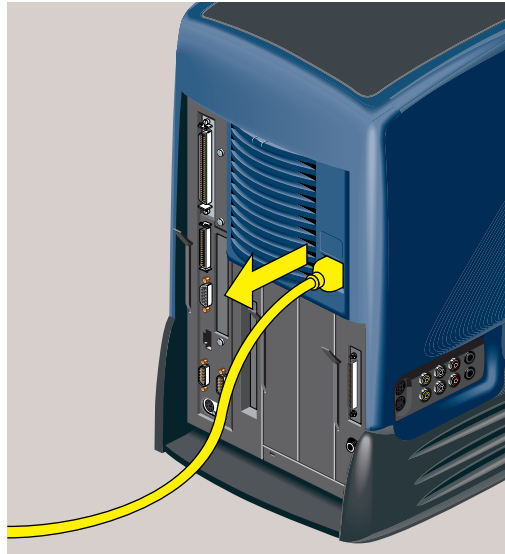
Figure 5-36   Removing the Power Cable

3. To release the bezel that covers the power supply, press the latch at the top of the bezel (Figure 5-37). It swings out toward you. Remove it from the chassis.

Figure 5-37   Removing the Bezel From the Power Supply

4.   Slide the lever to the right to release the power supply (Figure 5-38).

Figure 5-38   Releasing the Power Supply

5.   Grasp the pull ring and slide the power supply out of the chassis (Figure 5-39). Put
     it aside.

Figure 5-39   Removing the Power Supply From the Chassis

6.   Slide the new power supply in to the chassis, pushing it until it stops (Figure 5-40).
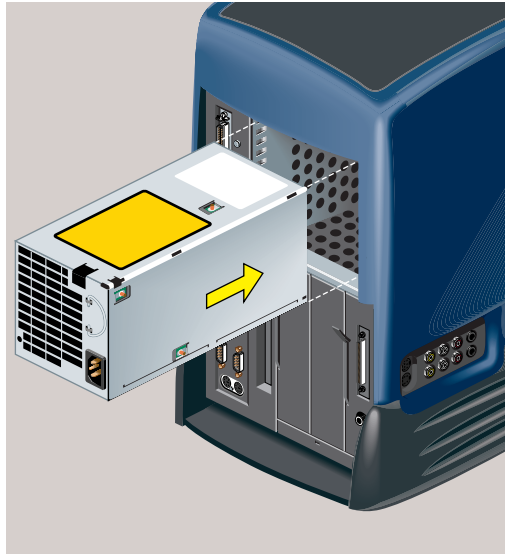
Figure 5-40   Installing the Replacement Power Supply

7.   Push the lever to the left until it clicks (Figure 5-41).

Figure 5-41   Locking the Power Supply in Place

8. Replace the bezel over the power supply. Place the tabs at the bottom of the bezel in the slots on the chassis and snap it up into place (Figure 5-42).

Figure 5-42   Replacing the Bezel on the Power Supply

9. Reconnect the power cable and turn on the workstation.

Figure 5-43   Reconnecting the Power Cable

Replacing the CD-ROM Drive

If you are instructed by your service provider to replace the CD-ROM drive, follow these steps.

Replacing the CD-ROM drive involves several steps. You must first remove the exterior covers before you can reach the drive. Follow these steps:

1. If the CD eject button does not work, insert a straightened paper clip in the tiny hole beneath the eject button to release the CD-ROM tray (Figure 5-44). (The CD eject button may not work if the CD-ROM has failed.)

Figure 5-44   Opening the CD-ROM Drive

2. Remove the CD-ROM drive face plate as follows (Figure 5-45).

    *   Hold the face plate between the thumb and forefinger of one hand while bracing the tray with the other hand.

    *   Push the face plate (but not the tray) upward with the thumb until it snaps away from the tray.

    *   Push the tray gently back into the drive until it is just inside the bezel. Do not push it all the way. It will be easier for you later to extract the tray to reinstall the face plate.
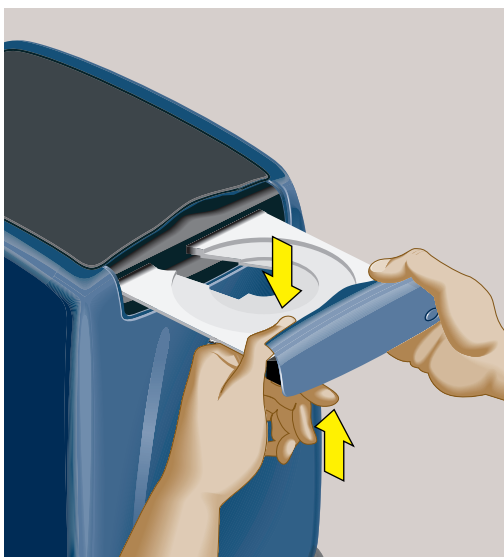
Figure 5-45   Removing the CD-ROM Drive Face Plate

3. Turn off the workstation and remove the power cable from the rear.

4. To release the bezel that covers the power supply, press the latch at the top of the bezel. It swings out toward you (Figure 5-46). Remove it from the chassis.

   Note: The illustrations show an R5000 workstation. Replacing the CD-ROM drive is the same on an R10000 workstation.

Figure 5-46   Removing the Power Supply Bezel

5. Remove the top cover of the CD-ROM drive as follows (Figure 5-47).

    •   Look beneath the plastic cover for a release tab.

    •   Press the tab toward the chassis and push the cover upward.
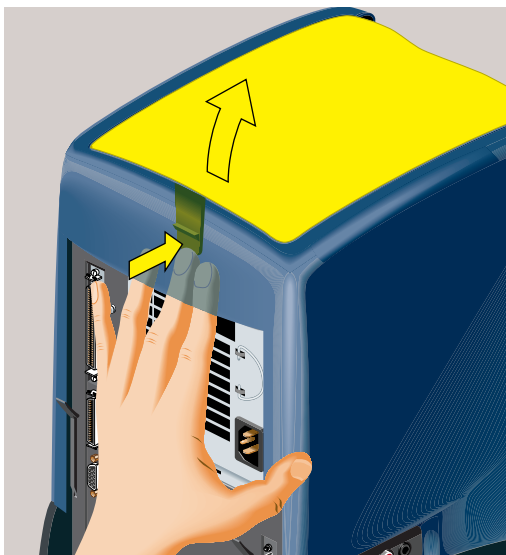
Figure 5-47   Removing the Top Cover of the CD-ROM Drive

6.   Use a Phillips screwdriver to remove the three screws that secure the outer cover
     (Figure 5-48).
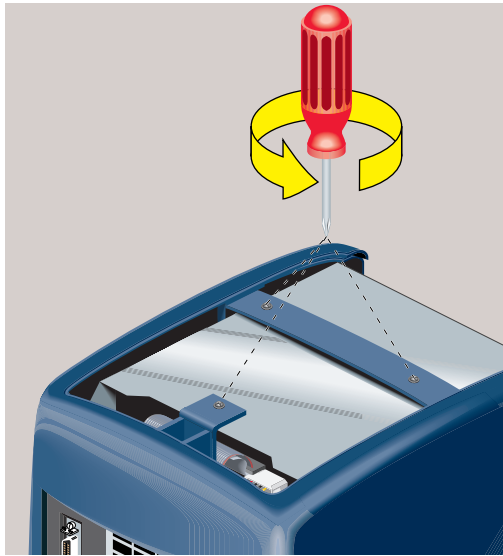
Figure 5-48   Removing the Three Phillips Screws

7. Remove the outer cover by grasping the plastic cross-piece and lifting up the cover (Figure 5-49).

Figure 5-49   Removing the Outer Cover

8. Use a Phillips screwdriver to remove the two screws that secure the CD-ROM drive (Figure 5-50).
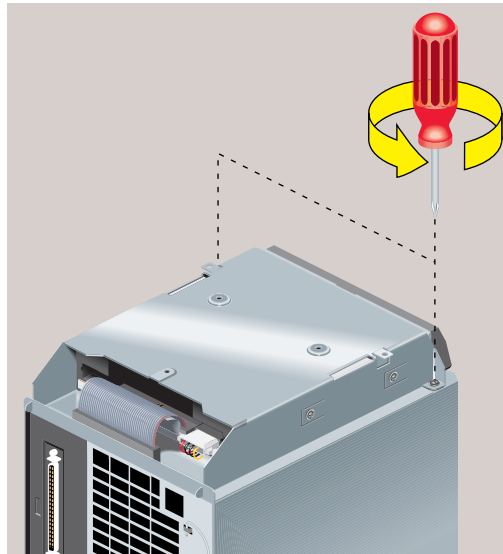
Figure 5-50   Removing the Screws From the CD-ROM Drive

9.   Tilt the CD-ROM drive upward and unhinge it from the chassis. (Figure 5-51).

     Caution: The CD-ROM drive has sharp metal edges. Be cautious when you handle it.
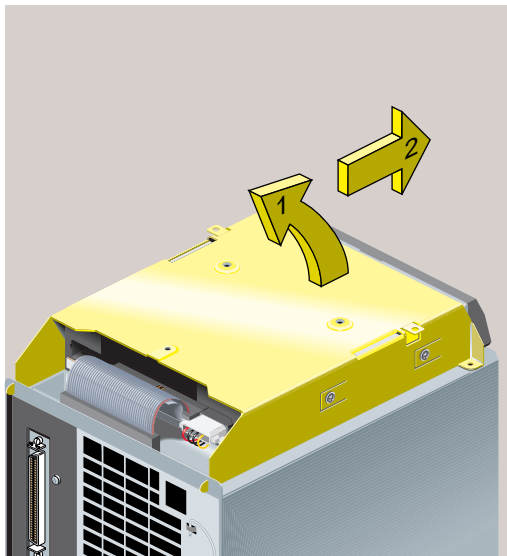
Figure 5-51   Removing the CD-ROM Drive

10. Disconnect the SCSI and power cables as follows (Figure 5-52).

   • Remove the SCSI cable by pulling on the thin plastic tab attached to the cable.

   • Remove the four-wire power cable by pulling on the wing tabs on either side of the connector. It may be tight, and you may need to wiggle it slightly as you pull.
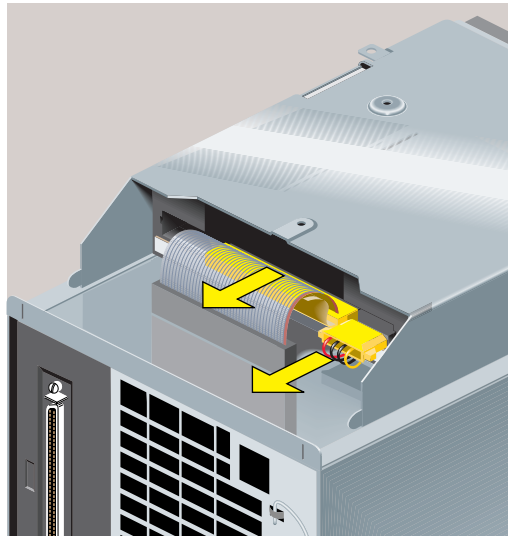
Figure 5-52   Disconnecting the SCSI and Power Cables

11. Place the faulty CD-ROM drive aside.

12. Pick up the replacement CD-ROM drive.

- Reconnect the SCSI cable and the four-wire power cable to the replacement CD-ROM drive (Figure 5-53).

- Press each connector in firmly.

- Tuck the excess length of the SCSI cable with the terminator into the cavity between the connector and the sheet metal.

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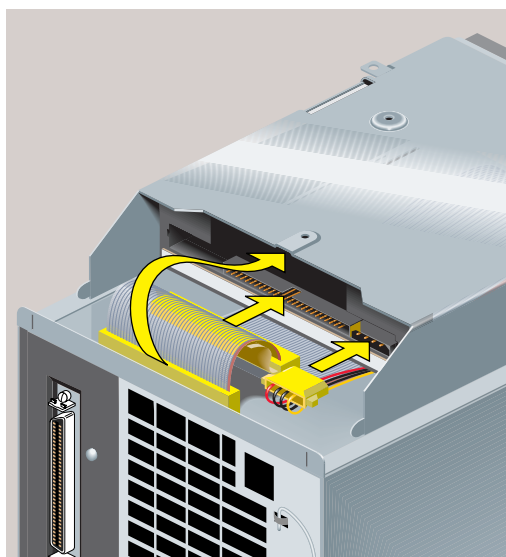
Figure 5-53   Reconnecting the SCSI and Power Cables

13. Install the replacement CD-ROM drive by sliding the two hinges on the drive's bezel into the slots on the chassis and lowering the drive until it is fully seated (Figure 5-54). Make sure that you do not pinch the SCSI and power cables as you lower the drive.
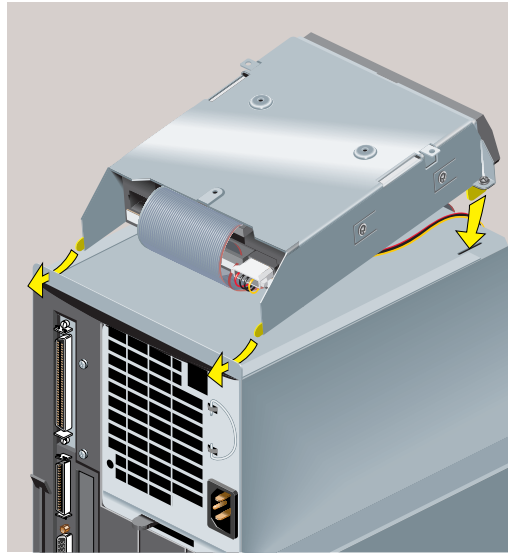
Figure 5-54   Installing the Replacement CD-ROM Drive

14. Insert and tighten the two screws that secure the CD-ROM drive (Figure 5-55).
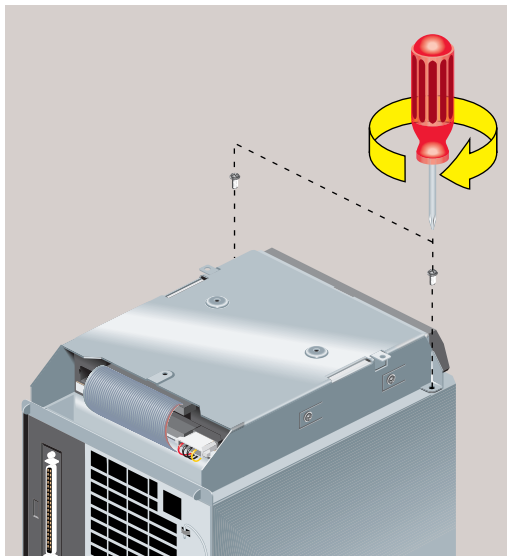
Figure 5-55   Securing the CD-ROM Drive

15. Replace the outer cover by aligning the three screw holes on the cover with the
    screw holes in the CD-ROM tray and lowering the cover until it is fully seated
    (Figure 5-56).
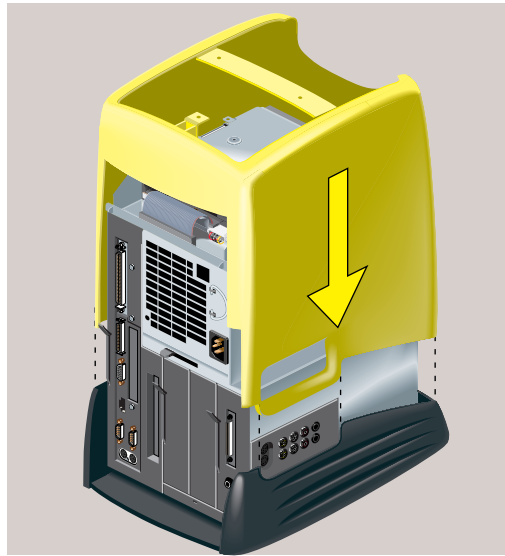
Figure 5-56   Replacing the Outer Cover

16. Insert and tighten the three screws that secure the outer cover (Figure 5-57).
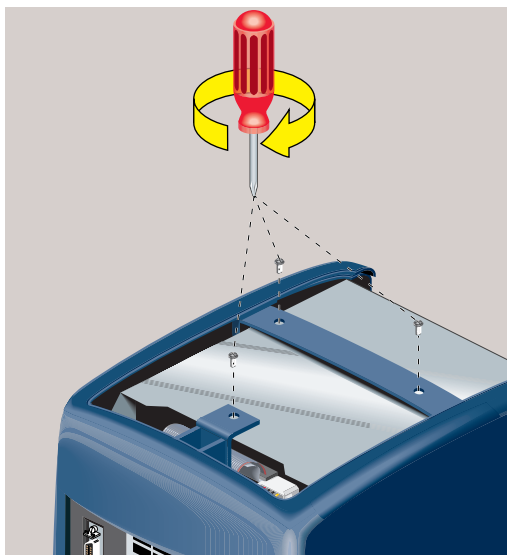
Figure 5-57   Securing the Outer Cover

17. Replace the top cover (Figure 5-58).

   •   Hold it at an angle and slide the tabs at the front end under the outer cover.

   •   Lower it until the release tab snaps into place.
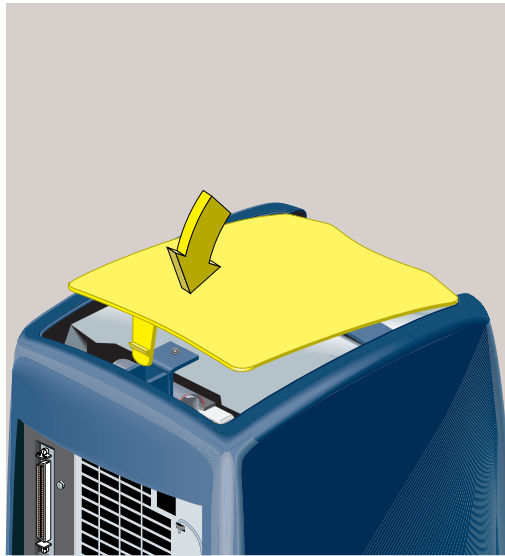
Figure 5-58   Replacing the Top Cover of the CD-ROM Drive

18. Replace the plastic bezel over the power supply by inserting the hinges into the slots
    beneath the power supply and pivoting the bezel up until it snaps into place
    (Figure 5-59).

Figure 5-59   Replacing the Power Supply Bezel

19. Replace the CD-ROM drive face plate as follows (Figure 5-60).

- Pull the tray out gently.

- Align the guides on the sides of the face plate with the grooves on the sides of the CD-ROM tray.

- Push the face plate down while supporting the tray, until the release tabs lock. *Do not place too much downward pressure on the tray.*

- Push the tray back into the drive.
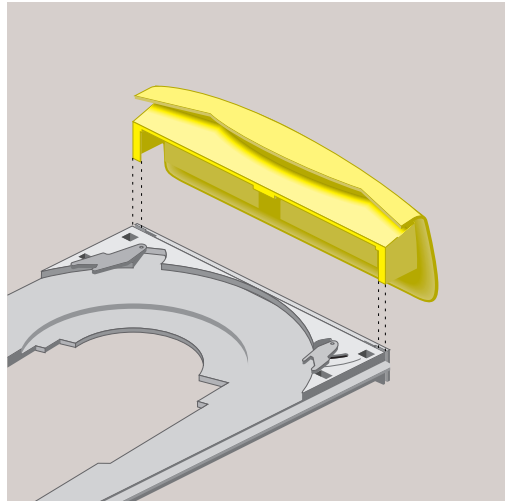
Figure 5-60   Replacing the CD-ROM Face Plate

20. Reconnect the power cable and turn on the workstation.
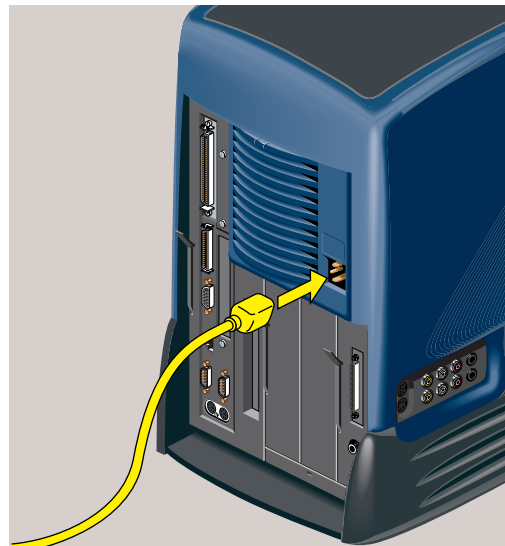
Figure 5-61   Reconnecting the Power Cable

Replacing the Chassis

If you are instructed by your service provider to replace the chassis, follow these steps.

Replacing the chassis consists of several steps. You must remove all of the removable modules and reinstall them on the new chassis.

Caution: The chassis has sharp metal edges. Be cautious when you handle it.

1. Turn off the workstation, remove the power cable, and remove the system module from the chassis. See "Removing the System Module". Reinstall the system module on the replacement chassis. See "Reinstalling the System Module."

2. Remove the system disk drive and reinstall it on the replacement chassis. See "Replacing the System Drive."

3. R5000 workstations: If an optional internal hard drive is installed, remove it and reinstall it on the replacement chassis. See "Removing the Second Internal Hard Disk Drive."

4. Remove the audio-visual module and reinstall it on the replacement chassis. See "Replacing the Audio-Visual Module."

5. Remove the power supply and reinstall it on the replacement chassis. See "Replacing the Power Supply."

6. Remove the CD-ROM drive and reinstall it on the replacement chassis. See "Replacing the CD-ROM Drive."

7. Ship the stripped-down chassis shown in Figure 5-62 to Silicon Graphics.
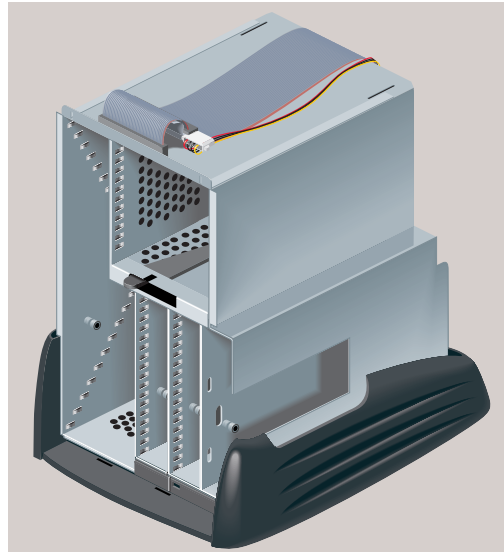
Figure 5-62   The Stripped Down Workstation Chassis

8. Reconnect the power cable and turn on the workstation.

Replacing the PCB on the PCI Tray

The system serial number is stored electronically (nvram) on the printed circuit board on the PCI tray. If nvram is corrupted, you may be instructed by your service provider to replace the PCI tray that contains the printed circuit board. Follow these steps:

1. Turn off the workstation, remove the power cable, and remove the system module from the chassis. See "Removing the System Module."

    Note: You can find illustrations for all the following steps in "Installing a PCI Board: R5000 Workstation," "Removing the PCI Tray: R5000 Workstation," "Installing a PCI Board: R10000 Workstation," and "Replacing the R10000 CPU Module."

2. Remove the PCI tray from the system module.

3. If a PCI board is installed in the tray, remove it. If not, remove the filler panel and screw.

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4. Reinstall the PCI board into the new PCI tray. If no PCI board was installed, reinstall the filler panel and screw.

5. Reinstall the PCI tray into the system module.

6. Reinstall the system module into the chassis. See "Reinstalling the System Module."

7. Ship the PCI tray with the faulty PCB to Silicon Graphics in the container that contained the new PCI tray.

Safety and Regulatory Information

This chapter provides guidelines for adjusting your work surface to increase your comfort and safety. It also contains environmental specifications and regulatory statements. The following topics are covered.

- "Human Factors Guidelines for Setting Up Your O2 Workstation"
- "Regulatory Information"

Human Factors Guidelines for Setting Up Your O2 Workstation

You can increase the comfort and safety of your work environment, and decrease your chances of repetitive strain injuries by following the guidelines given below. These guidelines help you create a healthy and productive work environment.

To browse through additional information on setting up your workstation area, taking frequent breaks, exercises you can do, and practicing safe work habits, click Hardware Central. If your web browser is not loaded, it takes a few seconds to load. (This option is not available if you're viewing this on a remote server.)

ANSI Standard for Visual Display Terminal Workstations

Table 6-1 shows recommended guidelines for furniture and system adjustment, as developed by the American National Standards Institute (ANSI).[1]

Local Visual Display Terminal (VDT) guidelines issued by country, state, or municipality may apply and supercede the guidelines in Table 6-1.

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[1] *American National Standard for Human Factors Engineering of Visual Display Terminal Workstations.* ANSI/HFS 100-1988. Available through the Human Factors Society, Inc. P.O. Box 1369, Santa Monica CA 90406, USA.

Table 6-1   ANSI/HFS 100-1988 Guidelines for VDT Workplace Adjustment

Adjustment	Small Female cm (in)	Midpoint cm (in)	Large Male cm (in)
Seat pan height	40.6 (16.0)	46.3 (18.2)	52.0 (20.5)
Work surface height (keyboard and mouse)	58.5 (23.0)	64.75 (25.5)	71.0 (28.0)
Screen viewing height	103.1 (40.6)	118.1 (46.5)	133.1 (52.4)
Screen viewing distance	>30.5 (>12)	>30.5 (>12)	>30.5 (>12)
Screen viewing angle	0-60 degrees	0-60 degrees	0-60 degrees

Adjustment parameters are defined in Figure 6-1. Guidelines are shown for small females (standing height of 150 cm, or 59 in) and large males (standing height of 185 cm, or 73 in). Midpoints are also interpolated for persons of more average height.
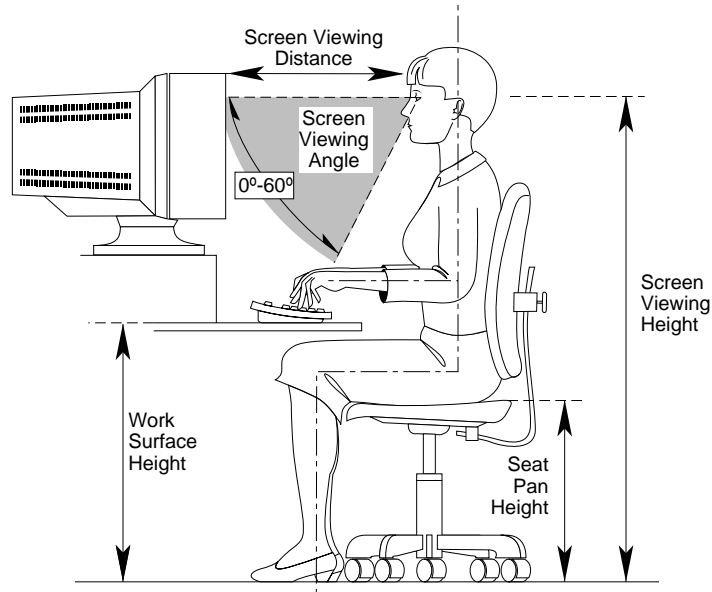
Figure 6-1   Basic Parameters of Visual Display Terminal Workstation Adjustment (Adapted From ANSI/HFS 100-1988)

CAD Operator Preferences

If you work on a CAD system, you may feel more comfortable using the ranges of adjustment shown in Table 6-2.

Table 6-2   Workstation Adjustments Preferred by CAD Users[a]

Adjustment cm (in)	Mean cm (in)	Range cm (in)
Seat pan height	54 (21.3)	50-57 (19.7-22.4)
Work surface height	73 (28.7)	70-80 (27.6 -31.5)
Monitor center above floor	113 (44.5)	107-115 (42.1-45.3)
Screen viewing distance	70 (27.6)	59-78 (23.2-30.7)

Table 6-2 (continued)   Workstation Adjustments Preferred by CAD Users[a]

Adjustment cm (in)	Mean cm (in)	Range cm (in)
Work surface tilt	8.6 degrees	2-13 degrees
Monitor tilt[b]	-7.7 degrees	-15 - +1 degrees

a. Derived from Grandjean, Etienne. *Ergonomics in Computerized Offices.* London: Taylor & Francis Ltd., 1987, p. 148.

b. negative tilt = a forward monitor inclination (top of the screen toward the operator)

Regulatory Information

The following topics are covered in this section:

- "Regulatory Information"
- "Electromagnetic Emissions"
- "Radio and Television Interference"
- "Electrostatic Discharge"
- "Shielded Cables"

Manufacturer's Declaration of Conformity

Caution: This product 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.

The O2 workstation conforms to several national and international specifications and European Directives listed on the Manufacturer's Declaration of Conformity. The CE mark insignia displayed on the device is an indication of conformity to the European requirements.

A Manufacturer's Declaration of Conformity is available on the World Wide Web. Look on the system (regulatory) label on the rear or underneath your workstation to determine your CMN (model) number. You need this number to identify the Declaration of Conformity on the Web.

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

`http://www.sgi.com/Products/compliance/index.html`

Locate and print or save your Declaration of Conformity. Make a note of your CMN number and the date of the Declaration of Conformity here for future reference.

Electromagnetic Emissions

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

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

This digital device meets with Class B limits of the FCC rules and is intended for both residential and business locations.

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

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

This device complies with Class B electromagnetic emissions limits of C.I.S.P.R. Publication 22, Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment, Germany's BZT Class B limits for Information Technology Equipment, and with Japan's VCCI Class 2 limits.

この装置は、第二種情報装置（住宅地域又はその隣
接した地域において使用されるべき情報装置）で住宅
地域での電波障害防止を目的とした情報処理装置等電
波障害自主規制協議会（VCCI）基準に適合しておりま
す。
　しかし、本装置をラジオ、テレビジョン受信機に近
接してご使用になると、受信障害の原因となることが
あります。
　取扱説明書に従って正しい取り扱いをして下さい。
VCCI-2、CISPR-22　Class B

Figure 6-2　　VCCI Class 2 Statement for Japan

Radio and Television Interference

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

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

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

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

Turn the television or radio antenna until the interference stops.

Move the workstation to one side or the other of the radio or television.

Move the system farther away from the radio or television.

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

Electrostatic Discharge

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

It is important that while you are operating your workstation you keep the top cover in place. The shielded cables that came with the system and its peripherals should be installed correctly, with all screws/thumbscrews fastened securely.

An ESD wrist strap is included with some products such as memory and graphics upgrades. The wrist strap is used when installing these upgrades to prevent the discharge of static electricity, and it should protect your system from ESD damage.

Shielded Cables

The O2 workstation is FCC-compliant under test conditions that include the use of shielded cables between the workstation and its peripherals. Your O2 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.

Technical Specifications

To see this information in a web browser, click Hardware Central. (If your web browser is not loaded, it takes a few seconds to load.) Or, if you are viewing this on a remote system, see the sections below.

- "Cable Pinout Assignments"
- "Serial Cables and Converters"
- "O2 Camera Technical Specifications"
- "Physical Environment Specifications"

Cable Pinout Assignments

This section contains cable pinout information for the following O2 ports:

- "Serial"
- "Parallel"
- "Ethernet 10-Base T/100-Base T"
- "Keyboard and Mouse"
- "SCSI"
- "Audio"
- "Composite Video (Analog) In and Out"
- "S-Video (Analog) In and Out"
- "Digital Video In and Out"
- "Monitor"
- "Stereo View"
- "Presenter 1280 Flat Panel Adapter (Optional)"

Serial

Table A-1 shows cable pinout assignments for the serial ports.

Table A-1   Serial Port Pinout Assignments

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

Parallel

Table A-2 shows the cable pinout assignments for the IEEE 1284-C parallel port for Silicon Graphics' floppy drive or for a printer. (The floppy drive has an additional connector for a printer.)

Table A-2   Parallel Port (IEEE 1284-C) Pinout Assignments

Pin	Assignment	Pin	Assignment
1	BUSY	19	SIGNAL GROUND (BUSY)
2	SELECT	20	SIGNAL GROUND (SELECT)
3	nACK	21	SIGNAL GROUND (nACK)
4	nFAULT	22	SIGNAL GROUND (nFAULT)
5	pERROR	23	SIGNAL GROUND (pERROR)

Table A-2 (continued)   Parallel Port (IEEE 1284-C) Pinout Assignments

Pin	Assignment	Pin	Assignment
6	DATA 1	24	SIGNAL GROUND (DATA 1)
7	DATA 2	25	SIGNAL GROUND (DATA 2)
8	DATA 3	26	SIGNAL GROUND (DATA 3)
9	DATA 4	27	SIGNAL GROUND (DATA 4)
10	DATA 5	28	SIGNAL GROUND (DATA 5)
11	DATA 6	29	SIGNAL GROUND (DATA 6)
12	DATA 7	30	SIGNAL GROUND (DATA 7)
13	DATA 8	31	SIGNAL GROUND (DATA 8)
14	nINIT	32	SIGNAL GROUND (nINIT)
15	nSTROBE	33	SIGNAL GROUND (nSTROBE)
16	nSELECTIN	34	SIGNAL GROUND (nSELECTIN)
17	nAUTOFD	35	SIGNAL GROUND (nAUTOFD)
18	HOST LOGIC HIGH	36	PERIPHERAL LOGIC HIGH

Ethernet 10-Base T/100-Base T

Table A-3 shows the cable pinout assignments for the Ethernet 10-Base T/100-Base T port.

Table A-3   Ethernet 10-BASE T/100-Base T Port Pinout Assignments

Pin	Assignment
1	TRANSMIT+
2	TRANSMIT–
3	RECEIVE+
4	(Reserved)
5	(Reserved)

Table A-3 (continued)   Ethernet 10-BASE T/100-Base T Port Pinout Assignments

Pin	Assignment
6	RECEIVE–
7	(Reserved)
8	(Reserved)

Keyboard and Mouse

Table A-4 shows the cable pinout assignments for the keyboard and mouse ports.

Table A-4   Keyboard and Mouse Ports (6-pin MINIDIN) Pinout Assignments

Pin	Assignment
1	KEYBOARD/MOUSE DATA
2	(Reserved)
3	GROUND
4	KEYBOARD/MOUSE POWER (+5V)
5	KEYBOARD/MOUSE CLOCK
6	(Reserved)

SCSI

Table A-5 shows the cable pinout assignments for the SCSI port.

Table A-5   SCSI Port Pinout Assignments

Pin	Assignment	Pin	Assignment
1	GROUND	35	-DB(12)
2	GROUND	36	-DB(13)
3	GROUND	37	-DB(14)
4	GROUND	38	-DB(15)

Table A-5 (continued)   SCSI Port Pinout Assignments

Pin	Assignment	Pin	Assignment
5	GROUND	39	-DB(P1)
6	GROUND	40	-DB(0)
7	GROUND	41	-DB(1)
8	GROUND	42	-DB(2)
9	GROUND	43	-DB(3)
10	GROUND	44	-DB(4)
11	GROUND	45	-DB(5)
12	GROUND	46	-DB(6)
13	GROUND	47	-DB(7)
14	GROUND	48	-DB(P)
15	GROUND	49	GROUND
16	GROUND	50	GROUND
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	OPEN	53	OPEN
20	GROUND	54	GROUND
21	GROUND	55	-ATN
22	GROUND	56	GROUND
23	GROUND	57	-BSY
24	GROUND	58	-ACK
25	GROUND	59	-RST
26	GROUND	60	-MSG
27	GROUND	61	-SEL
28	GROUND	62	-C/D

Table A-5 (continued)   SCSI Port Pinout Assignments

Pin	Assignment	Pin	Assignment
29	GROUND	63	-REQ
30	GROUND	64	-I/O
31	GROUND	65	-DB(8)
32	GROUND	66	-DB(9)
33	GROUND	67	-DB(10)
34	GROUND	68	-DB(11)

Audio

Figure A-1 shows the cable pinout assignments for the audio ports.
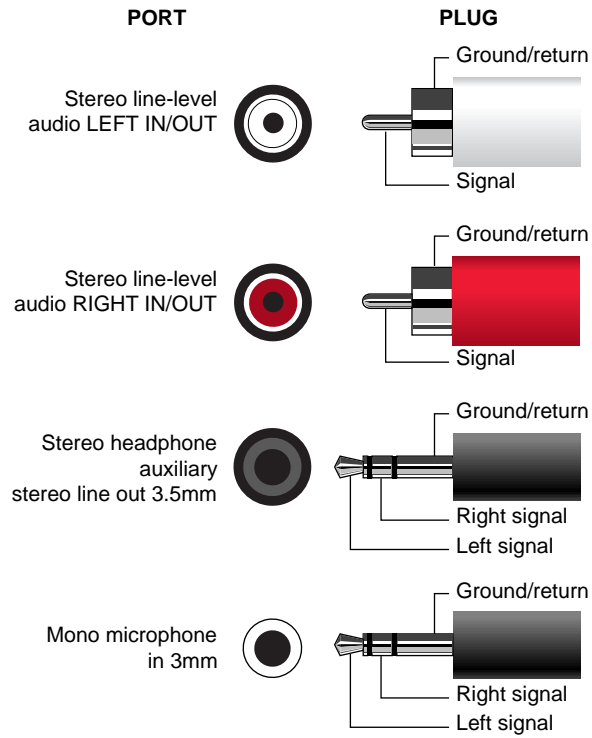
Figure A-1   Audio Ports Pinout Assignments

Composite Video (Analog) In and Out

Table A-6 shows the cable pinout assignments for the analog composite video in and out ports (RCA jack, NTSC or PAL formats)

Table A-6   Analog Composite Video Port(RCA, NTSC or PAL Formats) Pinout Assignments

Pin	Assignment
2 (sleeve)	GROUND
3 (tip)	DATA

S-Video (Analog) In and Out

Figure A-2 shows the cable pinout assignments for the analog s-video in and out port. (The video option is not available on all models).

S-video IN

Chromaingnd
Chromain
V12V
SDA
SCL
Lumaingnd
Lumain

S-video OUT

Chromaoutgnd
Chromaout
Lumaoutgnd
Lumaout
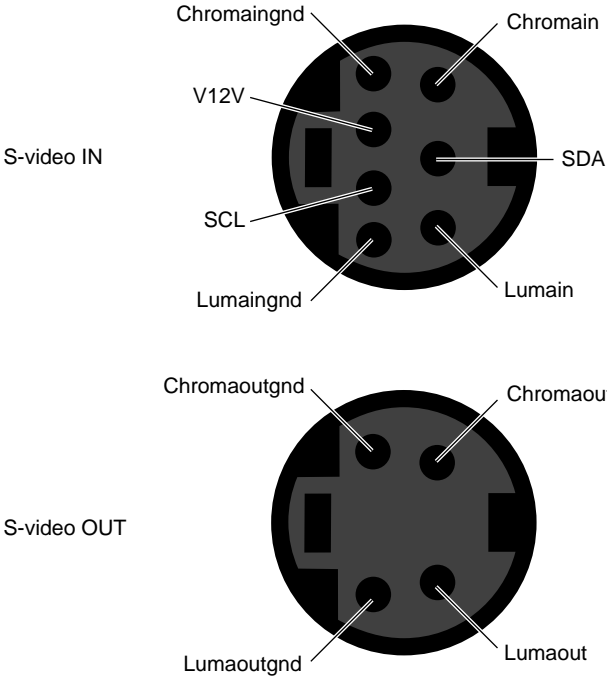
Figure A-2   S-Video (Analog) Port Pinout Assignments

Digital Video In and Out

Table A-7 shows the cable pinout assignments for the digital video in/out port for the Silicon Graphics O2Cam digital video camera. (The video option is not available on all models).

Table A-7   Digital Video Port for the O2Cam Camera

Pin	Assignment	Pin	Assignment
1	+5V	35	+5V
2	I^2C_SCL	36	I^2C_SDA
3	GPI IN	37	GPI OUTGND
4	GPI INGND	38	GPI OUT
5	OUTDATACLK	39	CAM MIC POS
6	OUTDATACLKGND	40	CAM MIC NEG
7	INDATA9GND	41	OUTDATA9
8	INDATA9	42	OUTDATA9GND
9	INDATA8GND	43	OUTDATA8
10	INDATA8	44	OUTDATA8GND
11	INDATA7GND	45	OUTDATA7
12	INDATA7	46	OUTDATA7GND
13	INDATA6GND	47	OUTDATA6
14	INDATA6	48	OUTDATA6GND
15	INDATA5GND	49	OUTDATA5
16	INDATA5	50	OUTDATA5GND
17	INDATA4GND	51	OUTDATA4
18	INDATA4	52	OUTDATA4GND
19	INDATA3GND	53	OUTDATA3
20	INDATA3	54	OUTDATA3GND

Table A-7 (continued)   Digital Video Port for the O2Cam Camera

Pin	Assignment	Pin	Assignment
21	INDATA2GND	55	OUTDATA2
22	INDATA2	56	OUTDATA2GND
23	INDATA1GND	57	OUTDATA1
24	INDATA1	58	OUTDATA1GND
25	INDATA0GND	59	OUTDATA0
26	INDATA0	60	OUTDATA0GND
27	INDATACLK	61	RESERVED
28	INDATACLKGND	62	RESERVED
29	RESERVED	63	RESERVED
30	-12V	64	+12V
31	RESERVED	65	RESERVED
32	RESERVED	66	RESERVED
33	RESERVED	67	RESERVED
34	RESERVED	68	RESERVED

Monitor

Table A-8 shows the cable pinout assignments for the O2 monitor DSUB15 port.

Table A-8   Monitor Port (DSUB15) Pinout Assignments

Pin	Assignment
1	RED
2	GREEN (complete sync in some modes)
3	BLUE
4	RESERVED

Table A-8 (continued)   Monitor Port (DSUB15) Pinout Assignments

Pin	Assignment
5	GROUND
6	RED RETURN
7	GREEN RETURN
8	BLUE RETURN
9	+5V, limited current
10	GROUND
11	RESERVED
12	IIC DATA
13	HORIZONTAL SYNC
14	VERTICAL SYNC
15	IIC CLOCK

Stereo View

Table A-9 shows the cable pinout assignments for the stereo view port on the optional Presenter 1280/stereo view adapter board..

Table A-9   Optional Stereo View Port Pin Assignments

Pin	Assignment
1	STEREO POWER (+12V, 0.5A)
2	STEREO GROUND
3	VERTICAL - ODD FIELD

Presenter 1280 Flat Panel Adapter (Optional)

Table A-10 shows the cable pinout assignments for the optional Presenter 1280 adapter board.

Table A-10   Presenter 1280 Monitor Port (Optional)

Pin	Assignment	Pin	Assignment
1	RED_P[0]	35	RED_P[1]
2	RED_N[0]	36	RED_N[1]
3	RED_P[2]	37	RED_P[3]
4	RED_N[2]	38	RED_N[3]
5	RED_P[4]	39	RED_P[5]
6	RED_N[4]	40	RED_N[5]
7	RED_P[6]	41	RED_P[7]
8	RED_N[6]	42	RED_N[7]
9	GRN_P[0]	43	GRN_P[1]
10	GRN_N[0]	44	GRN_N[1]
11	GRN_P[2]	45	GRN_P[3]
12	GRN_N[2]	46	GRN_N[3]
13	GRN_P[4]	47	GRN_P[5]
14	GRN_N[4]	48	GRN_P[5]
15	GRN_P[6]	49	GRN_P[7]
16	GRN_N[6]	50	GRN_P[7]
17	BLUE_P[0]	51	BLUE_P[1]
18	BLUE_N[0]	52	BLUE_N[1]
19	BLUE_P[2]	53	BLUE_P[3]
20	BLUE_N[2]	54	BLUE_N[3]
21	BLUE_P[4]	55	BLUE_P[5]
22	BLUE_N[4]	56	BLUE_N[5]
23	BLUE_P[6]	57	BLUE_P[7]

Table A-10 (continued)   Presenter 1280 Monitor Port (Optional)

Pin	Assignment	Pin	Assignment
24	BLUE_N[6]	58	BLUE_N[7]
25	FP_PIXEL_CLK_P	59	FP_HSYNC_CLK_P
26	FP_PIXEL_CLK_N	60	FP_HSYNC_CLK_N
27	FP_VSYNC_CLK_P	61	FP_AUDIO_R-P
28	FP_VSYNC_CLK_N	62	FP_AUDIO_R-N
29	POWERGOOD	63	FP_AUDIO_L-P
30	RESERVED	64	FP_AUDIO_L-N
31	CABLE_GND	65	CABLE_GND
32	CABLE_GND	66	CABLE_GND
33	FP_12C_DATA	67	FP_12C_CLK
34	CABLE_GND	68	CABLE_GND

Serial Cables and Converters

This section contains cable pinout information for serial cables that you can connect to your O2 workstation. It also describes Silicon Graphics' serial port converters. The following topics are covered:

- "Printer/Dumb Terminal Serial Cable"
- "PC Modem Serial Cable"
- "Serial Port Converters"

Printer/Dumb Terminal Serial Cable

For serial printers and dumb terminals, use a 3-wired standard PC cable. Table A-11 shows the cable connector pinout assignments for this cable.

Note: For a 3-wire cable and no hardware flow control modem, you must use the */dev/ttyd** command devices in the configuration files. For more detailed information, see the *serial* man page. To access the man page, from the Toolchest choose Help > InfoSearch and select "Man pages." Or place the cursor in the console window and type

```
man serial
```

Table A-11   Cable Pinout Assignments for the Printer/Dumb Terminal Serial Cable

Signal Description	Pin Number DB9 Connector (Female)	Pin Number DB-25 Connector (Male)
	1	NOT CONNECTED
RXD	2	2
TXD	3	3
	4	NOT CONNECTED
GND	5	7
	6	NOT CONNECTED
	7	NOT CONNECTED
	8	NOT CONNECTED
	9	NOT CONNECTED

PC Modem Serial Cable

Use a full-handshake (includes RTS and CTS) PC modem serial cable for a modem with RTS/CTS flow control. Table A-12 shows the cable connector pin assignments for this cable.

You can use this cable for all serial devices except those that do not need RTS flow control. Devices like serial printers and dumb terminals that do not need RTS flow control can still be used with this cable provided that a null modem adapter is added to one end of the cable. You can purchase the full-handshake PC modem serial cable from Silicon Graphics or your local service provider.

Note: If you are attaching a modem with modem signals and RTS⁄CTS flow control, you must use the */dev/ttyf** command devices in the configuration files. For more detailed information, see the *serial* man page. To access this man page, from the Toolchest choose Help > InfoSearch and select "Man pages." Or place the cursor in the console window and type

```
man serial
```

Table A-12   Cable Pinout Assignments for a PC Modem Cable

Signal Description	Pin Number DB9 Connector (Female)	Pin Number DB-25 Connector (Male)
DCD	1	8
RXD	2	3
TXD	3	2
DTR	4	20
GND	5	7
DSR	6	6
RTS	7	4
CTS	8	5
RI	9	22

Serial Port Converters

The O2 workstation's serial ports conform to the PC standard pinout for EIA standard RS-232 signals. The transmit and receive circuits are also capable of higher speed signalling according to the EIA RS-423 standard. In addition, you can convert these signals to support other interfaces.

Silicon Graphics offers two converters: one for the RS-422, commonly used for video deck control, and an Apple Macintosh® to MIDI converter for the RS-422-like signalling used by MIDI devices to connect to Apple Macintosh serial ports.

RS-422 Converter (DB-9 Female) For Video Deck Control

The Silicon Graphics RS-422 Converter takes the O2 workstation's RS-232 Transmit Data and Receive Data signals and converts them to SMPTE 207M-compatible RS-422 for video deck control.

Table A-13 shows the pinouts for the O2 workstation end. Table A-14 shows the pinouts for the video deck end.

Table A-13   RS-422 Converter (DB-9 Female): Workstation End

Workstation Signal Description	Pin Number	Voltage With Regard to Ground Received From or Supplied to Workstation
DCD	1	Passed through from RS-422 spare
RXD	2	Supplies -5V typical low, +5V typical high (RS-423)
TXD	3	0V maximum low, 1.6V minimum high
DTR	4	Requires -12V maximum low, +12 V minimum high
SG	5	0
DSR	6	Not connected
RTS	7	Requires +12V to power the converter
CTS	8	Not connected
RD	9	Not connected

Table A-14   RS-422 Converter (DB-9 Female): Video Deck End

Video Deck End Signal Description	Pin Number	Voltage (Across Pair)
Frame GND	1	Not connected
Spare (Priority In)	5	Passed through to workstation DCD
Controller Rcv A&B	2(-) and 7	Requires 0V maxmum low, 1.6V minimum high
Controller Xmit A&B	8(-) and 3	Supplies 0V typical low, +5V typical high
Signal GND	4, 6	0
Frame GND	9	Not connected

Macintosh to MIDI Converter (DB-9 Female to MiniDIN-8 Female)

The Silicon Graphics Macintosh to MIDI converter takes the O2 workstation's RS-232 Transmit Data and Receive Data signals and converts them to RS-422-like signalling used by MIDI devices to connect to Apple Macintosh serial ports.

Table A-15 shows the pinouts for the O2 workstation end. Table A-16 shows the pinouts for the MIDI interface end.

Table A-15   Macintosh to MIDI Converter (DB-9 Female): Workstation End

Workstation Signal Description	Pin Number	Voltage with Regard to Ground Required From or Supplied to Workstation
DCD	1	Passed through from GPi
RXD	2	Supplies 0V typical low, +5V typical high
TXD	3	Requires 0V maximum low, 1.6V minimum high (RS-423)

Table A-15   Macintosh to MIDI Converter (DB-9 Female): Workstation End

Workstation Signal Description	Pin Number	Voltage with Regard to Ground Required From or Supplied to Workstation
DTR	4	Requires -12V maximum low to +12V minimum high
SG	5	0
DSR	6	Not connected
RTS	7	Requires +12V to power the converter
CTS	8	Passed through from handshake in
RD	9	Not connected

Table A-16   Macintosh to MIDI Converter (MiniDIN-8): MIDI Interface End

Macintosh Signal Description	Pin Number	Voltage With Regard to Ground Supplied to or Required From MIDI Interface Unit
GPi	7	Passed through to DCD
RXD	5(-) and 8	Requires -0.2V maximum low, 0.2V minimum high
TXD	32(-) and 6	Supplies -5V typical low, +5V typical high
HANDSHAKE OUT	1	Supplies -5V typical low, +5V typical high
SIGNAL GROUND	4	0
HANDSHAKE IN	2	Passed through to DCD

O2 Camera Technical Specifications

Table A-17 below lists O2Cam's technical specifications.

Table A-17   O2Cam Technical Specificatons

Sensor	512 x 480 NTSC Color CCD, 1/3" format
Standard lens	F2.0, 6mm with M11 screw mount and built-in IR filter.
Output format	Outputs 640 x 480 Square Pixel NTSC frames @ 29.97Hz (780 x 525 total frame), as 422YCrCb pixels with 1 byte luminance followed by 1 byte chrominance, on a 24.5 MHz interface clock.
Automatic Gain Control	Automatic Gain Control adjusts gain to achieve average output brightness. AGC can be activated or overridden (via new gain value) from workstation.
Shutter speeds	Selectable from 1/60 through 1/10,000 second
Auto white balance	Software initializes camera at workstation power on and loads red and blue balance, red and blue saturation, and gamma values that are balanced for offices with or without windows, with incandescent and/or fluorescent lights. User can make additional white balance adjustments with the digital media software.
Gamma correction	Gamma factor of 0 or 255 can be loaded into camera by workstation at any time.
Push button	The control button drives the GPIBIN line on the 68-pin connector. While button is up, voltage is high; while button is down, voltage is low.
Power requirements	1W @ 5V (200mA), 1W @ 12V (80mA), and 12 mW @ -12V (1mA) are provided by the workstation. These are maximum amounts available to the camera, actual consumption should be lower.
LED indicator	On/off state is controlled by the workstation via I^2C.

Table A-17 (continued)   O2Cam Technical Specificatons

Workstation interface	DVCI uses 68-position 0.8 mm Champ connector on far end of attached 8 ft cable. Video is transmitted at TTL levels, 1 byte wide plus hsync and vsync. All camera parameters are accessed and controlled by the workstation via I^2C. Workstation provides 5V power.
Focus adjustment	Focal distance from 3" to infinity with standard lens.
Microphone	Built-in directional microphone and preamp produces a monoaural, single-ended line level signal.

Physical Environment Specifications

Table A-18   Physical Environment Specifications for the O2 Workstation

Workstation's dimensions	12"H x 9"W x 5"D
Power Requirements	100 - 132 VAC, 2.4 - 1.8A 200 - 264 VAC, 1.2 - 0.9 A 47 - 63 Hz 3-pin, earth grounded plug
Ambient Temperature	+10°C to 35°C (operating) -40°C to +65°C (non-operating
Relative Humidity	10% to 80% operating (no condensation) 5% to 90% non-operating (no condensation)
Heat Dissipation	245 watts
Altitude	10,000' (operating) 40,000 (non-operating)
Vibration	0.02" displacement, 5-19 Hz. 0.25 G, 5 - 500 Hz
Noise	35 dB (A) in typical operating position

Glossary

account

See login account.

active window

The only window that recognizes input (activity) from the keyboard and mouse; only one window is active at a time.

address dial

See SCSI address dial.

administrator

The person who can use the most privileged account, root. This person must have a personal login account for daily use, but when there are serious system problems to correct, the person logs in to the root account to change system information using the graphical tools or using the IRIX shell.

The Administrator has all the capabilities of a Privileged User, plus the capability to change information in the root account (such as the password) and to log in to an IRIX shell as root. Because there is only one root account, there is only one Administrator per system. The Information Panel for a particular system includes the name of the system's Administrator so other users know whom to contact for help.

See network administrator.

back up

To copy a certain set of files and directories from your hard disk to a tape or other media.

backup tape

A tape that contains a copy of a set of files and directories that are on your hard disk. A full backup tape contains a copy of all files and directories, including IRIX, that are on your hard disk.

baud rate

A term used for the speed (calculated as bits per second) at which the computer sends information to a serial device, such as a modem or terminal.

boot

To start up the system by turning on the workstation and monitor; the system is fully booted when you see the console login prompt or the login screen.

button

On a mouse, a button is a switch that you press with a finger. In a window on your screen, a button is a labelled rectangle that you click using the cursor and mouse.

CCIR 601

A high-end digital video interface standard developed by the CCIR (Comité Consultatif International de Radiodiffusion, or International Radio Consultative Committee). In CCIR 601 the luminance and chrominance are broken down into three digital signals: one for luminance (brightness) and two for chrominance (color) information. The color information is spatially subsampled horizontally so that the two chroma components occupy the same data bandwidth as the luminance component. Both the luminance and chrominance are then multiplexed up to a double rate byte wide data stream. The Silicon Graphics digital standard used in the Moosehead workstation is very similar to 601, with the exception that 601 is balanced ECL, while Silicon Graphics uses single-ended TTL. Additionally, 601 requires a fixed number of samples per horizontal line, while the Silicon Graphics implementation is programmable.

CD-ROM disk (CD)

A flat metallic disk that contains information that you can view and copy onto your own hard disk; you cannot change or add to the information on the CD-ROM. CD-ROM is short for compact disk: read-only memory.

centralized network

A network where a central server controls services and information; the server is maintained by one or more individuals called network administrators. On a centralized network that uses NIS, this server is called the NIS master, and all other systems on the network are called NIS clients. *See also* network administrator, NIS, NIS client, NIS domain, and NIS master.

chassis

The external metal framework of the workstation that contains its working parts.

chrominance

In an image reproduction system, a separate signal that contains the color information. Black, white, and all shades of gray have no chrominance and contain only the luminance (brightness) portion of the signal. However, all colors have both chrominance and luminance.

Chrominance is derived from the I and Q signals in the NTSC television system and the U and V signals in the PAL television system. *See also* luminance.

click

To hold the mouse still, and then press and immediately release a mouse button.

composite video

A color encoding method or a video signal that contains all of the color, brightness, and synchronizing information in one signal. The chief composite television standard signals are NTSC, PAL, and SECAM. *See also* NTSC and PAL.

configuration file

A system file that you change to customize the way your system behaves. Such files are sometimes referred to as customization files.

confidence test

A test that you run to make sure a particular device (such as the keyboard, mouse, or a drive) is set up and working properly.

connector

Hardware at the end of a cable that lets you fasten the cable to an outlet, port, or another connector.

console window

The window that appears as a stowed icon each time you log in; IRIX reports all status and error messages to this window.

CPU module

The printed circuit board within your workstation chassis that contains the central processing unit.

current working directory

The directory within the filesystem in which you are currently located when you are working in a shell window.

cursor

The small red arrow on the screen that echoes the movements of the mouse. It changes shape depending on its location on the screen.

DAT (Digital Audio Tape)

A magnetic tape from which you can read and to which you can copy audio and digital information.

default printer

The printer to which the system directs a print request if you do not specify a printer when you make the request. You set the default printer using the Print Manager.

default subsystems

Portions of a product that are installed automatically if you do not customize a product installation.

defaults

A set of behaviors that Silicon Graphics specifies on every system. You can later change these specifications, which range from how your screen looks to what type of drive you want to use to install new software.

diagnostics

A series of tests that check all hardware components of your system.

DIMM (double inline memory module)

A small printed circuit board with several chips that contain additional megabytes of random-access memory (RAM).

DIMM socket

A long, thin, female connector located on the system board into which you insert a DIMM.

directory

A container in the filesystem in which you store other directories and files.

disk resource

Any disk (hard, CD-ROM, floppy, or floptical) that you can access either because it is physically attached to your workstation with a cable, or because it is available over the network using NFS. *See also* NFS.

disk use

The percentage of space on your disk that contains information.

double-click

To hold the mouse still, then press and release it twice, very rapidly. When you double-click an icon it opens into a window; when you double-click the Window menu button the window closes.

drag

To press and hold down a mouse button, then move the mouse. This drags the cursor to move icons or to highlight menu items.

drive

A hardware device that lets you access information on various forms of media, such as hard, floppy, and CD-ROM discs, and magnetic tapes.

drive address

See SCSI address.

external device

Any piece of hardware that is attached to the workstation with a cable.

export

To use NFS software to make all or part of your filesystem available to other users and systems on the network.

female connector

A connector that has indentations or holes into which you plug a male connector. An example of a female connector is an electrical wall outlet that accepts an electrical plug.

field

An area in a window in which you can type text.

file

A container in which you store information such as text, programs, or images you create using an application.

filesystem

A hierarchy of directories and files. Directories contain other directories and files; files cannot contain directories. The root (/) directory is at the top of the hierarchy.

form

A window that contains buttons that you must click and/or editable fields that you must fill in.

grounded electrical outlet

An electrical wall outlet that accepts a plug that has a grounding prong. In the USA, all three-prong outlets are grounded.

handshake

The protocol that controls the flow of information between a workstation and a printer or any other peripheral. A hardware handshake uses only cable wires and pins to control the flow. A software handshake (also called xon-xoff flow control) uses a combination of pins, wires, and software.

highlight

To change the color of an item on the screen by positioning the cursor over it (locate-highlight) or by positioning the cursor over it and pressing a mouse button.

home directory

The directory into which IRIX places you each time you log in. It is specified in your login account; you own this directory and, typically, all its contents.

host

Any system connected to the network.

hostname

The name that uniquely identifies each host (system) on the network.

human factors guidelines

A set of standards and suggestions for making your working environment more comfortable and healthy.

icon

A small picture that represents a stowed or closed file, directory, application, or IRIX process.

internal drive

A drive that fits inside the workstation and connects to an internal port; it is never connected with a cable to a visible external port. An internal drive is occasionally referred to as a front-loading drive.

IP address

The Internet Protocol number that uniquely identifies each host (system) on the network. 192.0.2.1 is an example of an IP address. It always has four components, separated by periods.

IRIX

Silicon Graphics's version of the UNIX operating system. *See also* system software.

ISDN (integrated services digital network)

A combination of software, hardware, and telephone services that let you communicate with other systems and networks over a high-speed telephone line just as you communicate with other systems and networks over an Ethernet cable.

jot

The text editor that comes as a standard utility on Silicon Graphics workstations.

KB (kilobyte)

A standard unit for measuring the information storage capacity of disks and memory (RAM and ROM); 1024 bytes make one kilobyte.

LED (light emitting diode)

A light on a piece of hardware that indicates status or error conditions.

launch

To start up an application, often by double-clicking an icon.

local workstation, drive, disk, filesystem, or printer

The physical workstation whose keyboard and mouse you are using, all hardware that is connected to that workstation, and all software that resides on that hardware or its removable media.

log in

To give the system your login name so you can start a session on the workstation.

log out

To end a session on the workstation.

login account

A database of information about each user that, at the minimum, consists of login name, user ID, and a home directory.

login name

A name that uniquely identifies a user to the system.

login screen

The window that you see after powering on the system, before you can access files and directories. The window can contain one icon for each login account on the system.

luminance

The perceived brightness of a surface. Typically refers to a weighted average of red, green, and blue color values that gives the perceived brightness of the combination. For video systems, luminance is the video signal that describes the amount of light in each pixel. *See also* chrominance.

MB (megabyte)

A standard unit for measuring the information storage capacity of disks and memory (RAM and ROM); 1024 kilobytes make one megabyte.

male connector

A connector that has raised edges, pins, or other protruding parts that you plug into a female connector. An example of a male connector is an electrical plug that you plug into a wall outlet.

man page

An online document that describes how to use a particular IRIX command.

menu

A list of operations or commands that the workstation can carry out on various objects on the screen.

MIDI (Musical Instrument Digital Interface)

On the Moosehead workstation, a MIDI devices (such as a keyboard) can be connected to the serial ports.

monitor

A hardware device that displays the images, windows, and text with which you interact to use the system. It is also called a video display terminal (VDT).

monitor video cable

The cable that connects the monitor to the workstation to transmit video signals. It is thick and beige, with large connectors on both ends.

monitor power cable

The cable that connects the monitor to the workstation to provide power to the monitor. It is thick and beige, with a male connector on one end and a female connector on the other.

mount point

The directory on your workstation from which you access information that is stored on a local or remote disk resource.

mount

To make a filesystem that is stored on a local or remote disk resource accessible from a specific directory on your workstation.

mouse

A hardware device you use to communicate with windows and icons. You move the mouse to move the cursor on the screen, and you press its buttons to initiate operations. An optical mouse must always be on the mouse pad for the IRIS system to interpret its movements; a mechanical mouse works on any clean, flat surface.

mouse pad

For an optical mouse, this is the rectangular, metallic surface that "reads" the movements of the mouse. For a mechanical mouse, this is a clean, soft rectangular surface that makes the mouse's track ball roll efficiently.

network

A group of computers and other devices (such as printers) that can all communicate with each other electronically to transfer and share information.

network administrator

The individual(s) responsible for setting up, maintaining, and troubleshooting the network, and for supplying setup information to system administrators of each system.

NFS® (Network File System)

A networking software option that lets you access files and directories that reside on the disks of other workstations as if they resided on a local disk in your own workstation.

notifier

A form that appears when the system requires you to confirm an operation that you just requested, or when an error occurs.

NTSC

A color television standard or timing format encoding all of the color, brightness, and synchronizing information in one signal. Used in North America, most of South America, and most of the Far East, this standard is named after the National Television Systems Committee, the standardizing body that created the system in the United States in 1953. NTSC uses a total of 525 horizontal lines per frame, with two fields per frame of 262.5 lines each. Each field refreshes at 60 Hz (actually 59.94 Hz).

open

To double-click an icon, or to select an icon, then choose "Open" from a menu in order to display a window that contains the information that the icon represents.

option drive

Any internal drive other than the system disk. Option drives include floppy disk drives, floptical disk drives, secondary hard disk drives, or DAT drives.

outlets

Openings in the hardware to which you attach connectors to make an electrical connection.

PAL

Stands for Phase Alternation Line or Phase Alternated by Line, by which the workstation attempts to correct some of the color inaccuracies in NTSC. PAL is a color television standard or timing format developed in West Germany and used by most other countries in Europe (including the United Kingdom but excluding France), as well as Australia and parts of the Far East. PAL uses a total of 625 horizontal lines per frame, with two fields per frame of 312.5 lines per field. Each field refreshes at 50 Hz. PAL color encoding is different from NTSC encoding. *See also* NTSC.

PCI

Stands for Peripheral Component Interconnect—a bus specification. The PCI bus is a high-performance local bus used to connect peripherals to memory and a microprocessor. A wide range of vendors make devices that plug into the PCI bus.

PROM monitor

The interface that you use to communicate with the system after it is powered on, but before it is booted and running IRIX.

Printer Manager

A tool that you access through the System Manager. You use it to set up printer software and monitor jobs that you send to the printer.

parallel device

Any hardware device that requires a parallel cable connection to communicate with the workstation. A parallel interface transfers bits of information down a number of wires simultaneously.

parallel port

An outlet on the workstation to which you connect external parallel devices. A parallel interface transfers bits of information down a number of wires simultaneously.

password

A combination of letters and/or numbers that only you know; it is an optional element of your login account. If you specify a password for your account, you must type it after you type your login name before the system lets you access files and directories.

pathname
The list of directories that leads you from the root (/) directory to a specific file or directory in the filesystem.

peripheral
A hardware device that adds more functionality to the basic workstation, such as a tape drive. *See also* external devices *and* internal drives.

port
An outlet on the workstation to which you attach cable connectors.

power-on diagnostics
A series of tests that automatically check hardware components of your system each time you turn it on.

power cable
The cable that connects the workstation to a grounded electrical outlet.

power off
To turn off the power switches on the workstation chassis and the monitor.

power supply
The piece of hardware within the chassis that directs power from an electrical outlet to the chassis, the monitor, and internal SCSI devices. It also contains the power switch, reset button, and fan.

power on
To turn on the power switches on the workstation chassis and the monitor.

prompt
A character or word that the system displays in an IRIX shell. Indicates that the system is ready to accept commands. The default prompt for regular user accounts is %; the default prompt for the root account is #.

quit
To stop running an application.

remote workstation, drive, disk, filesystem, or printer

A hardware device or the information or media it contains that you can access across the network; it is not physically connected to your workstation.

reset button

A physical button on the workstation that you press to cut off then immediately restore power to the workstation. You should never press this button while IRIX is running, unless all attempts to shut down the system using software fail. See also shut down.

restore (files)

To copy files that once resided on your hard disk from another disk or a tape back onto your hard disk.

root account

The standard IRIX login account reserved for use by the system administrator. This account's home directory is the root (/) directory of the filesystem; the user of the root account has full access to the entire filesystem (that is, can change and delete any file or directory). The user of this account is sometimes referred to as the superuser.

root (/) directory

The directory at the top of the file system hierarchy.

SCSI (small computer system interface)

Pronounced "scuzzy." SCSI is a high-speed input/output specification for small computers.

SCSI address

A number from one to seven that uniquely identifies a SCSI device to a system. No two SCSI devices that are physically connected to the same workstation can have the same SCSI address.

SCSI address dial

A small plastic dial connected to most external SCSI devices supplied by Silicon Graphics. You click on its small buttons to select a SCSI address for a new SCSI device.

SCSI bus line

The combined length of all internal and external SCSI cables in a system.

SCSI cable

A cable that connects a SCSI device to a SCSI port on a workstation.

SCSI device

A hardware device that uses the Small Computer System Interface (SCSI) protocol to communicate with the system. Hard disk, floppy disk, floptical disk, CD-ROM, and tape drives are all SCSI devices.

SCSI terminator

A metal cap that you plug into any open SCSI port on a SCSI bus line. No SCSI devices on a SCSI bus line will work unless all SCSI ports are occupied by either a cable or terminator.

screen

The portion of the monitor that displays information.

select

To position the cursor over an icon then click the (left) mouse button. Once an icon is selected, it is the object of whatever operation you select from a menu.

serial device

Any hardware device that requires a serial cable connection to communicate with the workstation.

serial port

An outlet on the workstation to which you connect external serial devices.

server

A system that other systems on the network access to use its disk space, software, or services.

shell

A window into which you type IRIX commands.

shielded cable

A cable with a protective covering that reduces the possibility of interference with radio, television, and other devices.

shut down

To safely close all files, log out, and bring the workstation to a state where you can safely power it off. Choose "System Shutdown" from the System toolchest menu to do this.

software option

Any software product that you buy from Silicon Graphics other than the standard system software that comes on your system disk.

standalone workstation

A workstation that is not connected to a network.

static electricity

Whenever your body comes in physical contact with metal parts (including printed circuit boards) of computer equipment there is the potential for you to feel an electrical shock (electro-static discharge or ESD) which could damage the equipment. To prevent this, you must always wear a wrist strap when working with internal parts of a workstation.

subsystem

A portion of a software product. Each product consists of several subsystems; some are required and some are optional.

superuser

An alternate name for the user of the root login account. *See also* system administrator.

s-video

An increasingly popular analog video signal format that achieves higher picture quality than composite video by passing the luminance (brightness) and chrominance (color) information on separate wires.

system

All the hardware and software that make up the workstation.

system administration

The tasks associated with setting up, maintaining, and troubleshooting a networked or standalone system.

system crash

When the IRIX operating system fails and the system will not accept any keyboard or mouse input.

system disk

The physical disk that contains the standard IRIX operating system software—the software that makes your workstation run.

System Manager

A set of tools that the administrator uses to set up and manage the workstation. You access the System Manager through the System menu in the Toolchest.

system software

The standard IRIX operating system software and Silicon Graphics tools that come on the system disk and on the tape or CD-ROM that you use in the event of a system crash.

TCP/IP

Stands for Transmission Control Protocol/Internet Protocol. A set of networking protocols for wide area networks (WANs). It is also gaining popularity on local area networks (LANs).

thumbscrew

The ridged knob attached to a screw in a cable connector that you turn to secure the connector to an outlet.

Toolchest

The menus in the upper left-hand corner of the desktop. You start system tools such as the System Manager and Software Manager using its menus.

upgrade (hardware)

Hardware that you add to the basic workstation that increases performance, such as additional memory and option boards.

unmount

To make a filesystem that is accessible from a specific directory on your workstation temporarily unaccessible.

user ID

A number that uniquely identifies a user to the system.

window

A portion of the screen that you can manipulate that contains text or graphics.

workstation

The physical hardware that contains the CPU and graphics boards, a system disk, and a power supply. You connect it to a monitor, keyboard, and mouse to configure a working system. It is also sometimes referred to as the chassis.

wrist strap

A band with a loop for your wrist at one end and copper foil at the other. You attach the end with the foil to a metal part of the workstation and place the loop around your wrist. You use the strap whenever you work with internal components of the workstation to avoid electrical shocks to yourself and the components. *See also* static electricity.