



# Ultra™ 40 Workstation Service Manual

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For  
Ultra 40  
and Ultra 40 M2

Sun Microsystems, Inc.  
[www.sun.com](http://www.sun.com)

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# Preface

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The *Sun Ultra™ 40 Workstation Service Manual* provides detailed procedures that describe the removal and replacement of the replaceable parts in the Ultra 40 and Ultra 40 M2 workstations. This manual also includes information about the use and maintenance of the system. This manual is written for trained technical personnel, system administrators, authorized service providers (ASPs), and users who have advanced experience troubleshooting and replacing hardware.

If you are unsure of how to perform any of the procedures described in this book, contact your Sun Microsystems service representative.

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## How This Document Is Organized

[Chapter 1](#) provides an overview of the Sun Ultra 40 Workstation, as well as power-on and power-off procedures and information on adding more components.

[Chapter 2](#) contains troubleshooting procedures for the Sun Ultra 40 Workstation, and describes BIOS POST codes.

[Chapter 3](#) assists you with using the Diagnostics section of the Sun Ultra 40 Workstation Tools and Drivers CD that is packaged with your system.

[Chapter 4](#) describes common tasks that must be completed prior to performing a removal or installation procedure on any Sun Ultra 40 Workstation.

[Chapter 5](#) describes the removal and installation procedures for the Sun Ultra 40 Workstation motherboard and associated components.

[Chapter 6](#) provides the removal and installation procedures for the Sun Ultra 40 Workstation storage devices.

[Chapter 7](#) provides the removal and installation procedures for the Sun Ultra 40 Workstation chassis components.

[Chapter 8](#) describes how to finish the installation of internal workstation replaceable components, close the system, and prepare it for operation.

[Appendix A](#) provides specifications for the Sun Ultra 40 Workstation and Ultra 40 M2 Workstation.

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## Using UNIX Commands

This document might not contain information about basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following sources for this information:

- *Solaris 10 System Administration Guide*
- Online documentation for the Solaris™ Operating System is available at:  
<http://docs.sun.com>
- *Ultra 40 M2 Workstation Installation Guide*, part number 820-0121.

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# Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

---

# Typographic Conventions

Typeface*	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; onscreen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>% You have mail.</code>
<b>AaBbCc123</b>	What you type, when contrasted with onscreen computer output	<code>% <b>su</b></code> <code>Password:</code>
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this. To delete a file, type <code>rm filename</code> .

\* The settings on your browser might differ from these settings.

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## Related Documentation

For the most up-to-date information, go to:

<http://www.sun.com/documentation>

Translated versions of some of these documents are available at the web sites described above in French, Simplified Chinese, Traditional Chinese, Korean, Japanese, and German.

Note that the English documentation is revised more frequently and might therefore be more up-to-date than the translated documentation.

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## Additional Support Resources

This document contains troubleshooting and diagnostic procedures that explain how to identify and replace faulty components. This document is written to help you resolve most common component failures.

TABLE P-1 lists other support resources.

**TABLE P-1** Additional Support Resources

Ultra 40 Support Resources	URL or Telephone Number
PDF files for all the current Sun Ultra 40 Workstation documents.	<a href="http://www.sun.com/documentation/">http://www.sun.com/documentation/</a>
Find Solaris and other software documents here. This is also an alternative web site for some documents. This web site has full search capabilities.	<a href="http://docs.sun.com/documentation">http://docs.sun.com/documentation</a>
Warranty and Contract Support contacts. Links to other service tools.	<a href="http://www.sun.com/service/online/">http://www.sun.com/service/online/</a>
Discussion and troubleshooting forums.	<a href="http://supportforum.sun.com">http://supportforum.sun.com</a>
Support, diagnostic tools and alerts for all Sun products	<a href="http://www.sun.com/bigadmin/">http://www.sun.com/bigadmin/</a>

**TABLE P-1** Additional Support Resources (*Continued*)

Ultra 40 Support Resources	URL or Telephone Number
Links to software patches that are downloadable from SunSolve online. Lists some system specifications, troubleshooting and maintenance information, and other tools.	<a href="http://www.sunsolve.sun.com/handbook_pub/">http://www.sunsolve.sun.com/handbook_pub/</a>
Lists warranties for every Sun product.	<a href="http://www.sun.com/service/support/warranty">http://www.sun.com/service/support/warranty</a>
Sun Service Support phone number.	1-800-872-4786 (1-800-USA-4Sun), select Option 1
This web site lists international telephone numbers for Sun Service Support.	<a href="http://www.sun.com/service/contacting/solution.html">http://www.sun.com/service/contacting/solution.html</a>

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**Note** – Access to some Sun proprietary information is restricted to authorized Sun personnel.

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Some low-level hardware and software failures require troubleshooting techniques that are beyond the scope of this document and are best resolved by those persons with experience and skill in fault analysis. Your Sun Microsystems service representative can provide these types of services.

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or

<http://www.sun.com/service/contacting/solution.html>

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Please include the title and part number of your document with your feedback:

*Sun Ultra 40 Workstation Service Manual*, part number 820-0123-10.

# Introduction to the Sun Ultra 40 Workstation

This chapter provides an overview of the Sun Ultra 40 and the Sun Ultra 40 M2 Workstations, including power-on and power-off procedures.

It includes the following sections:

- Section 1.1, “Workstation Features” on page 1-1
- Section 1.2, “Operating System and Software” on page 1-2
- Section 1.3, “Hardware Features” on page 1-4
- Section 1.4, “Powering the Workstation On and Off” on page 1-11

## 1.1 Workstation Features

TABLE 1-1 shows key components of the Sun Ultra 40 Workstation.

**TABLE 1-1** Sun Ultra 40 and Ultra 40 M2 Features

Component	Ultra 40	Ultra 40 M2 Differences
CPU	<ul style="list-style-type: none"> <li>• Two high-performance AMD Opteron Socket 940 CPUs (single-core or dual-core)</li> <li>• Processor frequencies: 2.0 GHz and faster</li> <li>• Up to 1 MB cache</li> </ul>	<ul style="list-style-type: none"> <li>• Two high-performance AMD Opteron Socket F/1207 CPUs ( dual-core only)</li> </ul>
Memory	<ul style="list-style-type: none"> <li>• Eight PC3200 DIMM slots</li> <li>• 512 MB, 1 GB, or 2 GB registered ECC modules supported</li> <li>• Up to 32 GB ECC memory</li> </ul>	<ul style="list-style-type: none"> <li>• Eight DDR2-667 DIMM slots</li> <li>• 1 GB, 2 GB and 4 GB registered ECC modules supported</li> </ul>
Media storage	DVD-ROM and DVD-RW	
Hard disk drives	Up to four SATA disk drives with optional PCIe HBA for SAS	Up to 8 SATA or 8 SAS with optional PCIe HBA for SAS

**TABLE 1-1** Sun Ultra 40 and Ultra 40 M2 Features (Continued)

Component	Ultra 40	Ultra 40 M2 Differences
Power supply	1000W PSU	
Network I/O	Two on-board 10/100/1000BASE-T Gigabit Ethernet controllers	
PCI I/O	<ul style="list-style-type: none"><li>• Two PCI Express x16 graphics slots</li><li>• Two PCI Express x4 expansion slots</li><li>• Two PCI 33-MHz 32-bit slots</li></ul>	<ul style="list-style-type: none"><li>• Same</li><li>• Two PCI Express x8 expansion slots (mechanically x16)</li><li>• One PCI 33-MHz 32-bit slot</li></ul>
Other I/O	<ul style="list-style-type: none"><li>• Eight USB 2.0 connectors (two on the front and six on the back of the workstation)</li><li>• Two IEEE 1394a (FireWire) connectors on the front panel</li><li>• Line-in/line-out jacks on the back panel</li><li>• Microphone-in jack on the front panel</li><li>• Headphone-out on the front panel</li><li>• SPDIF</li></ul>	

## 1.2 Operating System and Software

The following sections describe the preinstalled and supported software for the Sun Ultra 40 Workstation.

### 1.2.1 Preinstalled Operating System and Software

Solaris™ 10 Operating System, Sun™ Studio 10, Sun Java™ Studio Creator and Sun Java™ Studio Enterprise software are preinstalled on your system.

For information about configuring the preinstalled Solaris 10 OS and other software for the Sun Ultra 40 Workstation, refer to the *Ultra 40 Workstation Operating System Installation*, Part Number 819-7577.

For detailed information about the Solaris 10 OS and other software, see the Sun software documentation site at:

<http://docs.sun.com>

## 1.2.2 Supported Operating Systems

The Solaris 10 Operating System is preinstalled on your workstation. You can also install one of the following supported operating systems:

### Sun Ultra 40

- Red Hat Enterprise Linux (RHEL) 4 32-bit/64-bit Update 2
- RHEL 3 32-bit/64-bit Update 6
- SUSE Linux Enterprise (SLES) 32-bit/64-bit SP3
- Pre-installed Solaris 10 x86 Update 1
- Windows XP 32-bit SP2
- Windows XP 64-bit

### Sun Ultra 40 M2

- Red Hat Enterprise Linux (RHEL) 4 32-bit/64-bit Update 4
- RHEL 3 32-bit/64-bit Update 8
- SUSE Linux Enterprise Desktop (SLED) 64-bit
- Pre-installed Solaris 10 x86 Update 2
- Windows XP 32-bit SP2
- Windows XP 64-bit

Instructions for installing these operating systems are available in the media sets that are packaged with the operating system software.

Note the following before installing a Linux or Windows XP operating system:

- If you are installing a Linux operating system, you will need to set the BIOS Installed O/S option. For more information, see the *Ultra 40 Workstation Operating System Installation Guide*.
- If you are installing Windows XP and you plan to configure RAID on your workstation, you will need to install the RAID drivers in conjunction with Windows XP. For more information, see the *Ultra 40 Workstation Operating System Installation Guide*.
- The default setting in BIOS is "Others." If you are installing Windows, you will have to change it.

If you want to run Red Hat Enterprise Linux WS or SUSE Linux Enterprise System on the Sun Ultra 40 Workstation, you can order it from the from:

<http://www.sun.com/software/linux/index.html>

Support for additional operating systems will be available after the initial release of the Sun Ultra 40 Workstation. Refer to the following URL for information about the operating systems currently supported:

<http://www.sun.com/ultra40>

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**Note** – After installing the operating system, refer to the *Ultra 40 Workstation Operating System Installation*, part number 819-7577, for further information about updates and drivers that must be installed.

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## 1.2.3 Tools and Drivers CD Software

The Sun Ultra 40 Workstation Tools and Drivers CD, included with the workstation, contains the following software:

- Supplemental drivers to support preinstalled or user-installed operating systems. See the *Ultra 40 Workstation Operating System Installation*, part number 819-7577, for information about installing these drivers.
- Eurosoft PC-Check diagnostics software, which provides various diagnostics testing options for the Sun Ultra 40 Workstation. See [Chapter 3](#) for more information.
- Wipedisk utility to erase the preinstalled operating system.
- XpReburn utility to add drivers to an existing XP installation CD.
- Open DOS.

---

## 1.3 Hardware Features

The following sections describe the hardware orientation and features of your Sun Ultra 40 Workstation.

### 1.3.1 Finding the System Serial Number

The system serial number is located on the left side of the system toward the front, as shown in [FIGURE 1-1](#) and [FIGURE 1-3](#). See the corresponding table for part number location.

### 1.3.2 External Features

This section describes the front and back panels of the Sun Ultra 40 Workstation.

FIGURE 1-1 shows the front panel of the Sun Ultra 40 Workstation. TABLE 1-1 lists the controls and indicators.

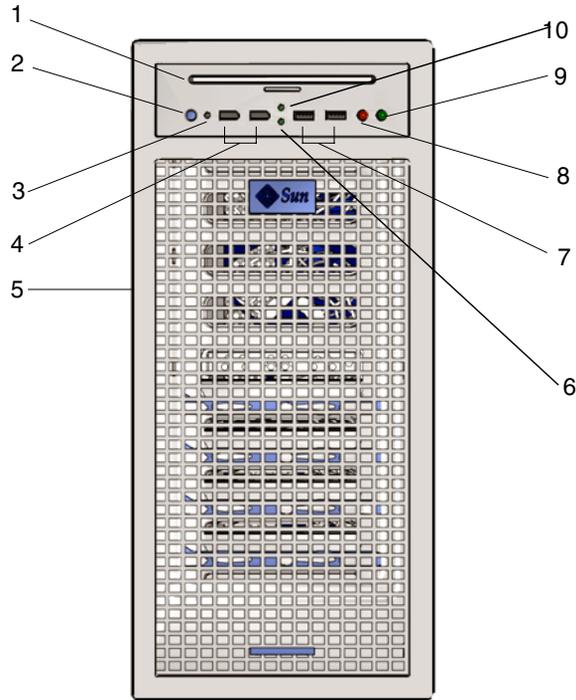


FIGURE 1-1 Front Panel (Ultra 40 M2 shown)

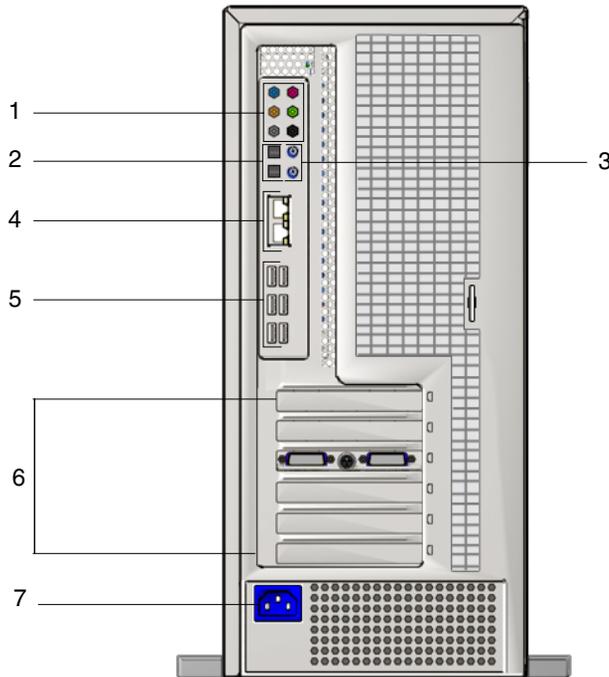
TABLE 1-2 Front Panel Controls and Indicators

Label	Button/LED/Port
1	DVD drive
2	Power button
3	Power LED
4	1394 ports (2)
5	Serial number
6	HD activity indicator LED (Ultra 40 M2 only)
7	USB ports (2)

**TABLE 1-2** Front Panel Controls and Indicators (*Continued*)

Label	Button/LED/Port
8	Microphone-in jack
9	Headphone-out jack
10	DVD activity indicator LED (Ultra 40 M2 only)

shows the back panel of the Sun Ultra 40 Workstation. [TABLE 1-3](#) lists the controls and indicators.



**FIGURE 1-2** Back Panel (Ultra 40 shown)

**TABLE 1-3** Back Panel

Label	Connector/Slot
1	Audio connectors (6)
2	SPDIF coaxial (top: out, bottom: in)
3	SPDIF optical (top: out, bottom: in)

**TABLE 1-3** Back Panel (*Continued*)

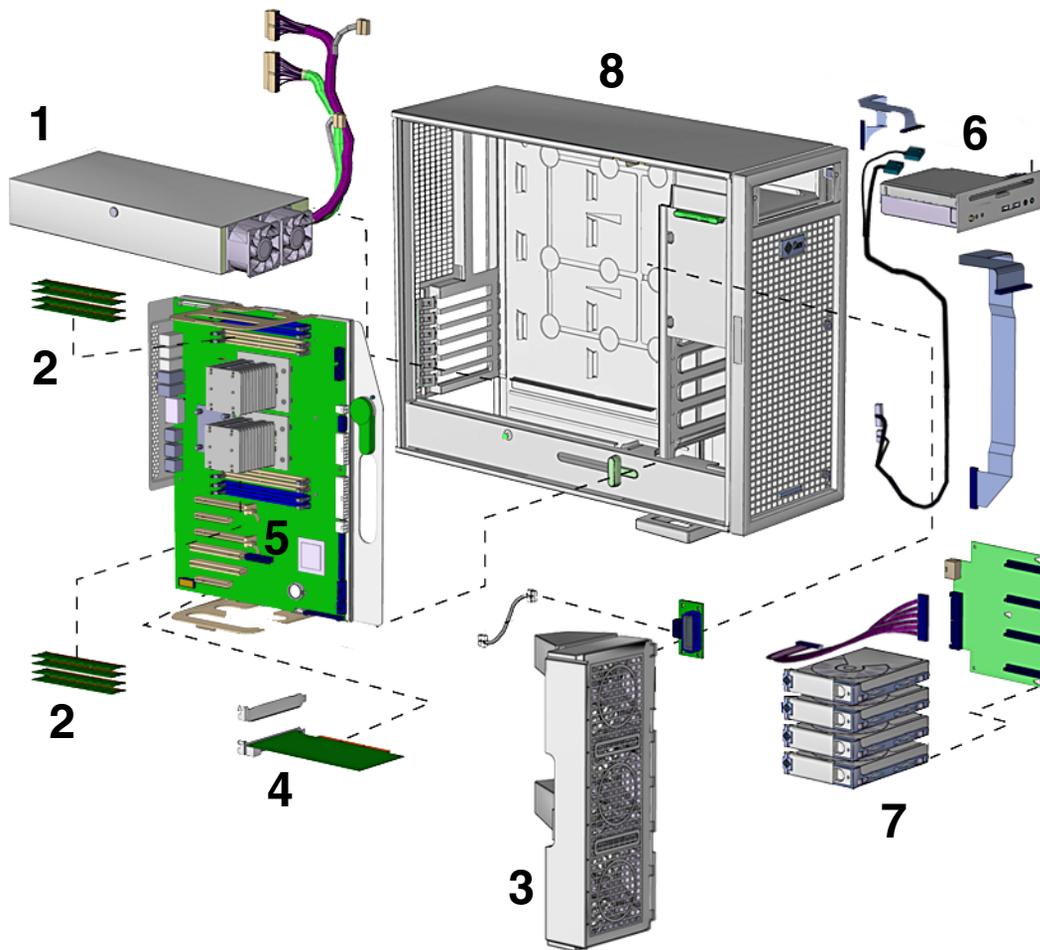
Label	Connector/Slot
4	Ethernet connectors (top: NIC1 (secondary), bottom: NIC0 (primary))
5	USB connectors (6)
6	PCI connectors. See <a href="#">TABLE 1-4</a> .
7	Power connector

**TABLE 1-4** PCI Slots (Top to Bottom)

Ultra 40	Ultra 40 M2
PCI-Express x16 graphics slot	PCI-Express x16 graphics
PCI-Express x4 slot	PCI-Express x8 (mechanically x16)
PCI-Express x16 graphics slot (primary)	PCI-Express x16 graphics (primary)
PCI 33 MHz/32-bit PCI 33/32	PCI 33/32
PCI 33 MHz/32-bit (fits 66 MHz/64-bit card)	PCI-Express x8 (mechanically x16)
PCI-Express x4 slot	

### 1.3.3 Ultra 40 Internal Components

[FIGURE 1-3](#) shows the locations of the components inside the Sun Ultra 40 Workstation.



**FIGURE 1-3** Ultra 40 System Components

**TABLE 1-5** Ultra 40 Components

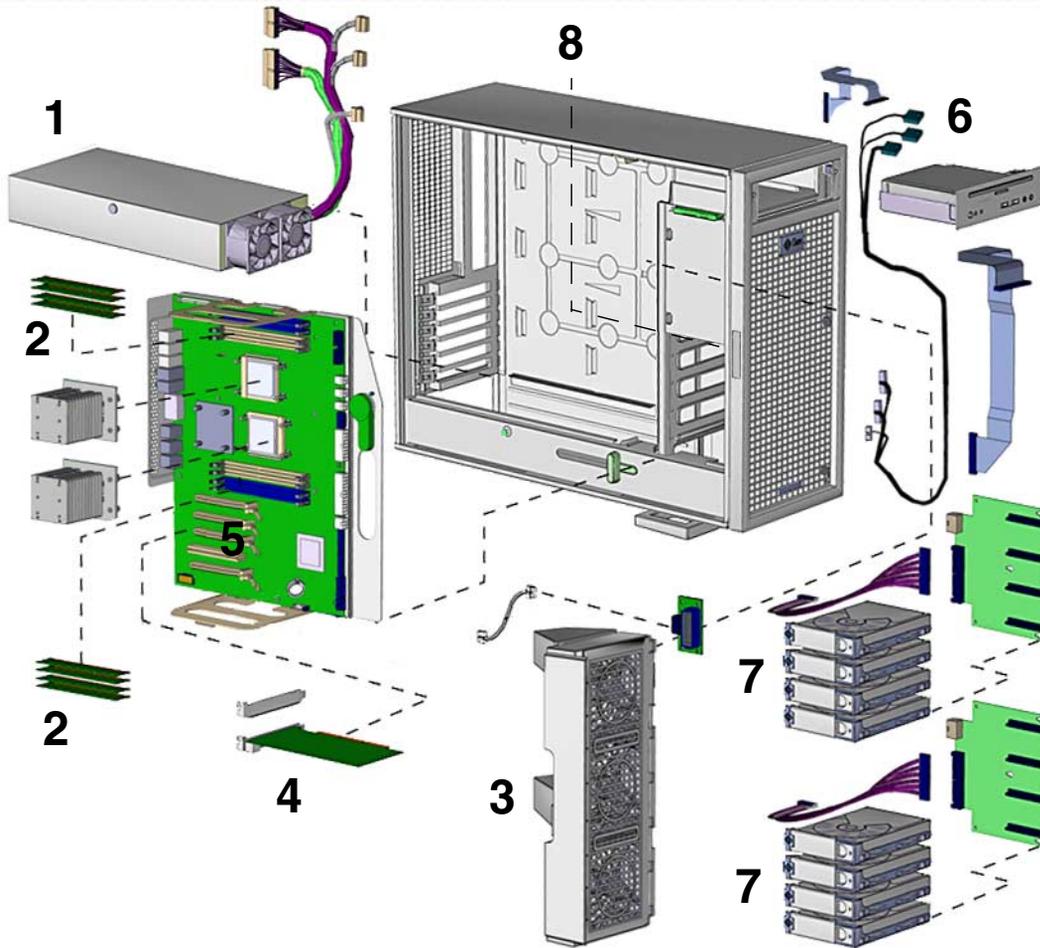
Label	Component
1	Power supply
2	Four DIMM slots
3	System fans
4	PCI Express x16 graphics card (optional)

**TABLE 1-5** Ultra 40 Components (*Continued*)

<b>Label</b>	<b>Component</b>
5	PCI Slots: PCI-Express x16 graphics slot PCI-Express x4 slot PCI-Express x16 graphics slot (primary) PCI 33 MHz/32-bit PCI 33/32 PCI 33 MHz/32-bit (fits 66 MHz/64-bit card) PCI-Express x4 slot
6	I/O module and DVD drive
7	Hard disk drives (up to 4)
8	Serial number

## 1.3.4 Ultra 40 M2 Internal Components

[FIGURE 1-4](#) shows the locations of the components inside the Sun Ultra 40 M2 workstation.



**FIGURE 1-4** Ultra 40 M2 System Components

**TABLE 1-6** Ultra 40 M2 System Components

Label	Component
1	Power supply
2	DIMMs
3	System fans
4	PCI Express x16 graphics slot

**TABLE 1-6** Ultra 40 M2 System Components (*Continued*)

Label	Component
5	PCI Slots: PCI-Express x16 graphics PCI-Express x8 (mechanically x16) PCI-Express x16 graphics (primary) PCI 33/32 PCI-Express x8 (mechanically x16)
6	I/O module and DVD drive
7	Hard disk drives (up to 8)
8	Serial number

---

## 1.4 Powering the Workstation On and Off

This section describes how to power the workstation on and off.

### 1.4.1 Powering On the Workstation

After you have set up the system properly and connected all the required cables as described in the *Ultra 40 Workstation Operating System Installation*, part number 819-7577, you can now power on your system.

---

**Tip** – If you are installing optional internal components, such as additional memory, an SLI connector, DIMMs, PCI cards, optical drives, or hard drives, install those components before you power on the workstation. See [Chapter 6](#) for removal and replacement procedures. If you are not installing optional components, you are ready to power on the workstation.

---

To power on the workstation:

1. **Turn on the power to the monitor and to all external devices.**
2. **Press and release the workstation Power button on the front panel** ([FIGURE 1-1](#)).
3. **Wait several seconds, then verify that the platform Power LED next to the Power button is lit.**

The platform Power LED lights after the workstation begins the internal booting process ([FIGURE 1-1](#)).

4. If you are powering on the workstation for the first time, you might need to configure or install the operating system after the system has finished booting.

See [Section 1.2, “Operating System and Software” on page 1-2](#) for more details.

If you need to change the system parameters in the BIOS, press the F2 key during the POST process to access the BIOS Setup utility.



---

**Caution** – Be careful when making changes to the system BIOS, as some changes can cause your system to malfunction.

---

## 1.4.2 Powering Off the Workstation

To power off the workstation:

1. Save your data and close any open applications.
2. Read all of the following power-off options before powering off the workstation:
  - Power off the workstation by using the operating system shutdown command or the menus.  
  
In most cases, this shuts down the operating system, then turns off the power to the workstation.
  - If the operating system shutdown procedure fails to power off the workstation, or if it is not available, press and release the Power button shown in .
  - This initiates an orderly shutdown of the operating system and powers off the workstation.



---

**Caution** – To avoid data loss, use one of the first two options whenever possible.

---

- If the first two options fail to shut down the workstation, press and hold the Power button for approximately four seconds.

This action shuts down the power to the workstation but does *not* initiate an orderly shutdown of the system. This method might result in data loss.

If the preceding options fail to power off the workstation, see [Chapter 2](#) for more options.



---

**Caution** – After powering off the workstation, wait at least four seconds before powering on the workstation again.

---

## 1.4.3 Power Interruptions

If the power to the system is interrupted for fewer than 10 seconds, do the following to ensure that the standby power is completely shut off:

1. **Unplug the AC power cord from the workstation.**
2. **Wait 10 or more seconds.**
3. **Plug the AC power cord into the workstation.**
4. **Power on the workstation.**



# Troubleshooting

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Before troubleshooting your specific workstation problem, collect the following information:

- What events occurred prior to the failure?
- Was any hardware or software modified or installed?
- Was the workstation recently installed or moved?
- How long has the workstation exhibited symptoms?
- What is the duration or frequency of the problem?

After you have assessed the problem and noted your current configuration and environment, perform the following steps to troubleshoot your workstation:

1. **Inspect your system as described in [Section 2.1, “Visual Inspection”](#) on page 2-1.**
2. **Use the procedures in [Section 2.2, “Troubleshooting Procedures”](#) on page 2-3.**
3. **If you receive a POST code, look for its description in [Section 2.3, “Ultra 40 and Ultra 40 M2 Workstation POST Codes”](#) on page 2-7 in order to isolate the problem.**
4. **Execute diagnostics tests as described in [Chapter 3](#).**
5. **If these actions do not resolve the problem, contact Sun technical support. Support numbers and web sites are listed in [Section 2.4, “Technical Assistance”](#) on page 2-16.**

---

## 2.1 Visual Inspection

Improperly set controls and loose or improperly connected cables often cause problems with hardware components. When investigating a system problem, first verify that all the external switches, controls, and cable connections are set correctly or connected securely. See [Section 2.1.1, “Performing an External Visual Inspection”](#) on page 2-2.

If this does not resolve the problem, visually inspect the system's interior hardware for problems such as loose cards, cable connectors, or mounting screws. See [Section 2.1.2, "Performing an Internal Visual Inspection"](#) on page 2-2.

## 2.1.1 Performing an External Visual Inspection

To perform an external visual inspection:

1. Turn off the system and any attached peripherals (if applicable).
2. Verify that the power cables between the system, the monitor, and all peripherals are properly connected.
3. Inspect connections to any attached devices, including network cables, keyboard, monitor, and mouse, as well as any devices attached to the serial port.

## 2.1.2 Performing an Internal Visual Inspection

To perform an internal visual inspection:

1. Shut down the operating system, if necessary, and turn off the platform power using the Power button on the front of the workstation.
2. Turn off any attached peripherals, but do not disconnect the power cables.
3. Remove the left side panel, following the procedures in [Section 4.3, "Preparing the Workstation for Servicing"](#) on page 4-4.



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**Caution** – Some components, such as the heatsink, can become extremely hot while the system is operating. Allow these components to cool before handling them.

---

4. Verify that the components are fully seated in their sockets or connectors and that the sockets are clean.
5. Verify that all cables inside the system are firmly attached to their appropriate connectors.
6. Replace the left side panel.
7. Reconnect the system and any attached peripherals to their power sources, and then power them on.

---

## 2.2 Troubleshooting Procedures

[TABLE 2-1](#) lists common problems and their solutions. If the solutions listed here do not fix the problem, run the appropriate diagnostic tests described in [Chapter 3](#).

---

**Note** – Keep notes describing any problems and attempted solutions, in case you need to call Sun technical support.

---

**TABLE 2-1** Troubleshooting Procedures

Problem	Possible Solution
Workstation does not power on when the front-panel Power button is pressed.	<ul style="list-style-type: none"><li>• Is the Power button LED illuminated on the front of the system? Ensure that the power cord is connected to the system and to a grounded power receptacle.</li><li>• Does the wall outlet have power? Test it by connecting another device.</li><li>• Does the system beep when the system is powered on? If not, ensure that the keyboard is plugged in.</li><li>• Try another keyboard that you know is functional. Does the system beep when you connect the keyboard and power on the system?</li><li>• Does the monitor sync within five minutes after the power-on? The green LED on the monitor stops flashing and remains illuminated.</li><li>• Is the monitor connected to the on-board video connector or PCI Express video connector?</li></ul>
Workstation powers on, but but a POST code is displayed.	<ul style="list-style-type: none"><li>• Refer to the list of post codes in <a href="#">Section 2.3, “Ultra 40 and Ultra 40 M2 Workstation POST Codes”</a> on page 2-7.</li></ul>
Workstation powers on, but the monitor does not.	<ul style="list-style-type: none"><li>• Is the Power button for the monitor turned on?</li><li>• Is the monitor power cord connected to a wall outlet?</li><li>• Does the wall outlet have power? Test it by connecting another device.</li><li>• Is the monitor connected to the PCI Express video connector?</li></ul>
CD or DVD does not eject when the Eject button is pressed.	<ul style="list-style-type: none"><li>• Move the mouse or press any key on the keyboard. The drive might be in the low-power mode.</li><li>• Use the utility software installed on your workstation to eject the CD.</li></ul>

**TABLE 2-1** Troubleshooting Procedures (*Continued*)

<b>Problem</b>	<b>Possible Solution</b>
Workstation does not power off when the front-panel Power button is pressed.	<ul style="list-style-type: none"><li>• Try all of the power-off options shown in <a href="#">Section 1.4, “Powering the Workstation On and Off” on page 1-11</a>.</li><li>• If the workstation still does not power off, disconnect the power cable from the back of the chassis.</li></ul>
The network status indicator does not light.	<ul style="list-style-type: none"><li>• Check the cabling and network equipment to ensure that all cables are correctly seated.</li><li>• Reinstall the network drivers.</li></ul>
An external device connected to a USB connector does not work.	<ul style="list-style-type: none"><li>• Reduce the number of external devices connected to a USB hub.</li><li>• Connect the device to a USB hub and connect the hub to the USB ports on the workstation.</li><li>• Refer to the documentation that is packaged with the device.</li></ul>
System cannot read the disk.	<ol style="list-style-type: none"><li>1. Turn off the workstation by pressing the Power button.</li><li>2. Remove the left side panel.</li><li>3. Ensure that the power and data cables are connected to the disk drive backplane and that the pins in the cable and connector are not bent.</li><li>4. Replace the left side panel.</li><li>5. Turn on the workstation.</li><li>6. Verify disk appears in BIOS boot menu.</li></ol>
System cannot read the compact disc.	<ul style="list-style-type: none"><li>• Are you using the correct type of compact disc?</li><li>• Is the compact disc properly inserted in the drive?</li><li>• Is the compact disc clean and unscratched?</li><li>• Are the cables connected to the DVD drive?</li></ul>
Keyboard or mouse does not respond to actions.	<ul style="list-style-type: none"><li>• Verify that the mouse and keyboard cables are connected to the on-board USB 2.0 connectors on the workstation.</li><li>• Verify that the workstation is powered on and that the front Power LED is illuminated.</li></ul>
Workstation appears to be in low-power mode, but the Power LED does not blink.	The power-indicator LED blinks only when all workstation components are in low-power mode. A tape drive might be connected to your workstation. Because tape drives do not enter low-power mode, the power-indicator LED does not blink.

**TABLE 2-1** Troubleshooting Procedures (Continued)

Problem	Possible Solution
Hung or frozen workstation: No response from mouse or keyboard or any application.	Try to access your system from a different workstation on the network. <ol style="list-style-type: none"><li>1. From a terminal window, type: <b>ping</b> <i>hostname</i></li><li>2. If there is no response, log in remotely from another system using <code>telnet</code> or <code>rlogin</code>, and use the <code>ping</code> command again to access the system.</li><li>3. Attempt to kill processes until the system responds.</li></ol> If the above procedures do not work: <ol style="list-style-type: none"><li>1. Press the Power button to power off the system.</li><li>2. Wait 20 to 30 seconds and power on the system.</li></ol> See <a href="#">Section 1.4, “Powering the Workstation On and Off” on page 1-11</a> for more detailed information.
There is no video display on the monitor screen.	Check the following: <ul style="list-style-type: none"><li>• Is the cable connected to the PCI Express video connector?</li><li>• Is the monitor power cord connected to the power outlet?</li><li>• Does the wall outlet have power? Test it by connecting another device.</li><li>• Is the video card seated correctly in its connector?</li><li>• Are the internal cables properly connected to the video card?</li><li>• Does the monitor work when connected to another system?</li><li>• If you have another monitor, does it work when connected to the original system?</li><li>• Verify that the BIOS settings are correct.</li></ul>
External device is not working.	Check the documentation packaged with the device to determine whether any device drivers must be installed. <ul style="list-style-type: none"><li>• Ensure that the cables for the external device are firmly connected and that the pins in the cable and connector are not bent.</li><li>• Power off the system, reattach the external device, and power on the system.</li></ul>

**TABLE 2-1** Troubleshooting Procedures (*Continued*)

Problem	Possible Solution
Newly installed memory is not detected.	<ul style="list-style-type: none"><li>• Ensure that the memory is properly seated on the DIMM sockets.</li><li>• Move the memory to the other DIMM socket to determine whether the socket is defective.</li><li>• Ensure that you are using the correct DIMMs:<ul style="list-style-type: none"><li>• Ultra 40 – 512 MB, 1 GB, 2-GB, or 4 GB DDR 400 SDRAM modules with 3.05-cm max. height.</li><li>• Ultra 40 M2 – 1 GB, 2 GB, or 4 GB DDR2-667 SDRAM modules with 38-mm max. height.</li></ul></li><li>• Ensure that the memory is installed in the following order. Note that the DIMM connectors on the motherboard are color-coded blue and black.<ul style="list-style-type: none"><li>• Single-CPU systems:<ul style="list-style-type: none"><li>0/1 (black)</li><li>2/3 (blue)</li></ul></li><li>• Dual-CPU systems:<ul style="list-style-type: none"><li>0/1 (black)</li><li>4/5 (black)</li><li>2/3 (blue)</li><li>6/7 (blue)</li></ul></li></ul></li><li>• If your system has a single CPU, ensure that no DIMMs are installed in 4/5 or 6/7.</li><li>• Ensure that the DIMMs in each pair are from the same manufacturer and are identical in size and architecture.</li><li>• Ensure that if the DIMMs are different sizes, the largest goes in 0/1.</li></ul> <p>See <a href="#">Section 5.2.1, “DIMM Configuration Rules”</a> on <a href="#">page 5-5</a> for DIMM configuration rules.</p>

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## 2.3 Ultra 40 and Ultra 40 M2 Workstation POST Codes

The following table lists descriptions of system POST codes in the order in which they are generated. These POST codes appear as two digit hexadecimal output (unless specified otherwise) either to the server's display or LED display on the motherboard.

During POST, the BIOS outputs the error code to I/O port 80h. The workstation motherboard is equipped with a two segment LED display that displays the current value of port 80h.

If the BIOS detects a terminal error condition, it issues a terminal-error beep code, attempts to display the error code on upper left corner of the screen and on the port 80h LED display, and halts POST. If the system hangs before the BIOS can process the error, the value displayed at port 80h is the last test performed.

**TABLE 2-2** Ultra 40 and Ultra 40 M2 POST Codes

Code	Beeps	Description
04		Get CPU type from CPU registers and other methods. Save CPU type in NVRAM. NOTE: Hook routine should not alter DX, which holds the powerup CPU ID..
06		Initialize system hardware. Reset the DMA controllers, disable the videos, clear any pending interrupts from the real-time clock and set up port B register.
07		Disable system ROM shadow and start to execute ROMEXEC code from the flash part. This task is pulled into the build only when the ROMEXEC relocation is installed.
08		Initialize chip set registers to the Initial POST Values.
09		Set in-POST flag in CMOS that indicates we are in POST. If this bit is not cleared by postClearBootFlagJ (AEh), the BIOS on next boot determines that the current configuration caused POST to fail and uses default values for configuration. Clear the CMOS diagnostic byte (register E). Check the real-time clock and verify the battery has not lost power. Checksum the CMOS and verify it has not been corrupted (Rel. 6.0).
0A		Initialize CPU registers.
0B		Enable CPU cache. Set bits in cmos related to cache.

**TABLE 2-2** Ultra 40 and Ultra 40 M2 POST Codes (Continued)

Code	Beeps	Description
0C		Set the initial POST values of the cache registers if not integrated into the chipset.
0E		Set the initial POST values for registers in the integrated I/O chip.
0F		Enable the local bus IDE as primary or secondary depending on other drives detected.
10		Initialize Power Management.
11		General dispatcher for alternate register initialization. Set initial POST values for other hardware devices defined in the register tables.
12		Restore the contents of the CPU control word whenever the CPU is reset.
13		Early reset of PCI devices required to disable bus master. Assumes the presence of a stack and running from decompressed shadow memory.
14		Verify that the 8742 keyboard controller is responding. Send a self-test command to the 8742 and wait for results. Also read the switch inputs from the 8742 and write the keyboard controller command byte.
16	1-2-2-3	Verify that the ROM BIOS checksums to zero.
17		Initialize external cache before autosizing memory.
18		Initialize all three of the 8254 timers. Set the clock timer (0) to binary count, mode 3 (square wave mode), and read/write LSB then MSB. Initialize the clock timer to zero. Set the RAM refresh timer (1) to binary count, mode 2 (Rate Generator), and read/write LSB only. Set the counter to 12H to generate the refresh at the proper rate. Set sound timer (2) to binary count, mode 3, and read/write LSB, then MSB.
1A		Initialize DMA command register with these settings: <ul style="list-style-type: none"> <li>1. Memory to memory disabled</li> <li>2. Channel 0 hold address disabled</li> <li>3. Controller enabled</li> <li>4. Normal timing</li> <li>5. Fixed priority</li> <li>6. Late write selection</li> <li>7. DREQ sense active</li> <li>8. DACK sense active low.</li> </ul> Initialize all 8 DMA channels with these settings: <ul style="list-style-type: none"> <li>1. Single mode</li> <li>2. Address increment</li> <li>3. Auto initialization disabled (channel 4 - Cascade)</li> <li>4. Verify transfer</li> </ul>
1C		Initialize interrupt controllers for some shutdowns.
20	1-3-1-1	Verify that DRAM refresh is operating by polling the refresh bit in PORTB.

**TABLE 2-2** Ultra 40 and Ultra 40 M2 POST Codes (*Continued*)

Code	Beeps	Description
22	1-3-1-3	Reset the keyboard.
24		Set segment-register addressability to 4 GB.
28		Using the table of configurations supplied by the specific chipset module, test each DRAM configuration to see if that particular configuration is valid. Then program the chipset to its autosized configuration. Before autosizing, disable all caches and all shadow RAM.
29		Initialize the POST Memory Manager.
2A		Zero the first 512K of RAM.
2C	1-3-4-1	Test 512K base address lines. NOTE: If the BIOS detects error 2C, 2E, or 30 (base 512K RAM error), it displays an additional word-bitmap (xxxx) indicating the address line or bits that failed. For example, "2C 0002" means address line 1 (bit one set) has failed. "2E 1020" means data bits 12 and 5 (bits 12 and 5 set) have failed in the lower 16 bits. The BIOS also sends the bitmap to the port-80 LED display. It first displays the check point code, followed by a delay, the high-order byte, another delay, and then the low-order byte of the error. It repeats this sequence continuously.
2E	1-3-4-3	Test first 512K of RAM. <i>See note for code 2C.</i>
2F		Initialize external cache before shadowing.
30	1-4-1-1	RAM failure on data bits xxxx of high byte of memory bus. <i>See note for code 2C.</i>
32		Compute CPU speed.
33		Initialize the Phoenix Dispatch Manager.
36		Vector to proper shutdown routine.
38		Shadow the system BIOS.
3A		Autosize external cache and program cache size for enabling later in POST.
3C		If CMOS is valid, load chipset registers with values from CMOS, otherwise load defaults and display Setup prompt. If Auto Configuration is enabled, always load the chipset registers with the Setup defaults (Rel 6.0).
3D		Load alternate registers with CMOS values. Registertable pointers are in the altregtable segment.
41		Initialize extended memory for RomPilot.
42		Initialize interrupt vectors 0 thru 77h to the BIOS general interrupt handler.
45		Initialize all motherboard devices.
46	2-1-2-3	Verify the ROM copyright notice.

**TABLE 2-2** Ultra 40 and Ultra 40 M2 POST Codes (Continued)

Code	Beeps	Description
47		Initialize support for I2O by initializing global variables used by the I2O code. Pause POST table processing if a CMOS bit is set (for debugging).
48		Verify that the equipment specified in the CMOS matches the hardware currently installed. If the monitor type is set to 00 then a video ROM must exist. If the monitor type is 1 or 2 set the video switch to CGA. If monitor type 3, set the video switch to mono. Also specify in the equipment byte that disk drives are installed. Set appropriate status bits in CMOS or the BDA if configuration errors are found.
49		Perform these tasks: <ol style="list-style-type: none"><li>1. Size the PCI bus topology and set bridge bus numbers.</li><li>2. Set the system max bus number.</li><li>3. Write a 0 to the command register of every PCI device.</li><li>4. Write a 0 to all 6 base registers in every PCI device.</li><li>5. Write a -1 to the status register of every PCI device.</li><li>6. Find all IOPs and initialize them.</li></ol>
4A		Initialize all video adapters in system.
4B		Initialize QuietBoot if it is installed. Enable both keyboard and timer interrupts (IRQ0 and IRQ1). If your POST tasks require interrupts off, preserve them with a PUSHF and CLI at the beginning and a POPF at the end. If you change the PIC, preserve the existing bits.
4C		Shadow video BIOS ROM if specified by Setup, and CMOS is valid and the previous boot was OK.
4E		Display copyright notice.
4F		Initialize MultiBoot. Allocate memory for old and new MultiBoot history tables.
50		Display CPU type and speed.
51		Checksum CMOS and initialize each EISA slot with data from the initialization data block.
52		Verify keyboard reset.
54		Initialize keystroke clicker if enabled in Setup.
55		Enable USB devices.
58	2-2-3-1	Test for unexpected interrupts. First do an STI for hot interrupts. Secondly, test the NMI for an unexpected interrupt. Thirdly, enable the parity checkers and read from memory, checking for an unexpected interrupt.
59		Register POST Display Services, fonts, and languages with the POST Dispatch Manager.
5A		Display prompt "Press F2 to enter SETUP."

**TABLE 2-2** Ultra 40 and Ultra 40 M2 POST Codes (*Continued*)

<b>Code</b>	<b>Beeps</b>	<b>Description</b>
5B		Disable CPU cache.
5C		Test RAM between 512K and 640K.
60		Determine and test the amount of extended memory available. Determine if memory exists by writing to a few strategic locations and see if the data can be read back. If so, perform an address-line test and a RAM test on the memory. Save the total extended memory size in the CMOS at cmosExtended.
62		Perform an address line test on A0 to the amount of memory available. This test is dependent on the processor, since the test will vary depending on the width of memory (16 or 32 bits). This test will also use A20 as the skew address to prevent corruption of the system memory.
64		Jump to UserPatch1.
66		Set cache registers to their CMOS values if CMOS is valid, unless auto configuration is enabled, in which case load cache registers from the Setup default table.
67		Quick initialization of all Application Processors in a multi-processor system.
68		Enable external cache and CPU cache if present. Configure non-cacheable regions if necessary. NOTE: Hook routine must preserve DX, which carries the cache size to the DisplayCacheSizeJ routine.
69		Initialize the handler for SMM.
6A		Display external cache size on the screen if it is non-zero. NOTE: Hook routine must preserve DX, which carries the cache size from the cacheConfigureJ routine.
6B		If CMOS is bad, load Custom Defaults from flash into CMOS. If successful, reboot.
6C		Display shadow message.
6E		Display the starting offset of the non-disposable segment of the BIOS.
70		Check flags in CMOS and in the BIOS data area for errors detected during POST. Display error messages on the screen.
72		Check status bits to see if configuration problems were detected. If so, display error messages on the screen.
76		Check status bits for keyboard-related failures. Display error messages on the screen.
7C		Initialize the hardware interrupt vectors from 08 to 0F and from 70h to 77H. Also set the interrupt vectors from 60h to 66H to zero.
7D		Initialize Intelligent System Monitoring.

**TABLE 2-2** Ultra 40 and Ultra 40 M2 POST Codes (Continued)

<b>Code</b>	<b>Beeps</b>	<b>Description</b>
7E		The Coprocessor initialization test. Use the floating point instructions to determine if a coprocessor exists instead of the ET bit in CR0.
80		Disable onboard COM and LPT ports before testing for presence of external I/O devices.
81		Run late device initialization routines.
82		Test and identify RS232 ports.
83		Configure Fixed Disk Controller.
84		Test and identify parallel ports.
85		Display any ESCD read errors and configure all PnP ISA devices.
86		Initialize onboard I/O and BDA according to CMOS and presence of external devices.
87		Initialize motherboard configurable devices.
88		Initialize interrupt controller.
89		Enable non-maskable interrupts.
8A		Initialize Extended BIOS Data Area and initialize the mouse.
8B		Setup interrupt vector and present bit in Equipment byte.
8C		Initialize both of the floppy disks and display an error message if failure was detected. Check both drives to establish the appropriate diskette types in the BIOS data area.
8F		Count the number of ATA drives in the system and update the number in bdaFdiskcount.
90		Initialize hard-disk controller. If the CMOS ram is valid and intact, and fixed disks are defined, call the fixed disk init routine to initialize the fixed disk system and take over the appropriate interrupt vectors.
91		Configure the local bus IDE timing register based on the drives attached to it.
92		Jump to UserPatch2.
93		Build the MPTABLE for multi-processor boards.
95		<ol style="list-style-type: none"><li>1. Check CMOS for CD-ROM drive present</li><li>2. Activate the drive by checking for media present</li><li>3. Check sector 11h (17) for Boot Record Volume Descriptor</li><li>4. Check the boot catalog for validity</li><li>5. Pick a boot entry</li><li>6. Create a Specification Packet</li></ol>

**TABLE 2-2** Ultra 40 and Ultra 40 M2 POST Codes (*Continued*)

<b>Code</b>	<b>Beeps</b>	<b>Description</b>
96		Reset segment-register addressability from 4GB to normal 64K by generating a Shutdown 8.
97		Create pointer to Multi Processor table in Extended BDA.
98	1-2	Search for option ROMs. Rom scan the area from C800h for a length of BCP_ROM_Scan_Size (or to E000h by default) on every 2K boundry, looking for add on cards that need initialization.
99		Check support status for Self-Monitoring Analysis Reporting Technology (disk-failure warning).
9A		Shadow miscellaneous ROMs if specified by Setup and CMOS is valid and the previous boot was OK.
9C		Set up Power Management. Initiate power - management state machine.
9D		Initialize Security Engine.
9E		Enable hardware interrupts.
9F		Check the total number of Fast Disks (ATA and SCSI) and update the bdaFdiskCount.
A0		Verify that the system clock is interrupting.
A2		Setup Numlock indicator. Display a message if key switch is locked.
A4		Initialize typematic rate.
A8		Overwrite the "Press F2 for Setup" prompt with spaces, erasing it from the screen.
AA		Scan the key buffer to see if the F2 key was struck after keyboard interrupts were enabled. If an F2 keystroke is found, set a flag.
AC		Enter SETUP. If (F2 was pressed) go to SETUP Else if (errors were found) display "Press F1 or F2" prompt if (F2 is pressed) go to setup else if (F1 is pressed) boot Else boot
AE		Clear ConfigFailedBit and InPostBit in CMOS.

**TABLE 2-2** Ultra 40 and Ultra 40 M2 POST Codes *(Continued)*

<b>Code</b>	<b>Beeps</b>	<b>Description</b>
B0		Check for errors. If (errors were found) beep twice display "F1 or F2" message if (F2 keystroke) go to SETUP if (F1 keystroke) go to BOOT2
B1		Inform RomPilot about the end of POST.
B2		Change status bits in CMOS and/or the BIOS data area to reflect the fact that POST is complete.
B4	1	One quick beep.
B5		Turn off <Esc> and <F2> key checking. IF (VGA adapter is present) IF (OEM screen is still up) Note OEM screen is gone. Fade out OEM screen. Reset video: clear screen, reset cursor, reload DAC. ENDIF ENDIF
B6		If password on boot is enabled, a call is made to Setup to check password. If the user does not enter a valid password, Setup does not return.
B7		Initialize ACPI BIOS.
B9		Clear all screen graphics before booting.
BA		Initialize the SMBIOS header and sub-structures.
BC		Clear parity-error latch.
BD		Display Boot First menu if MultiBoot is installed.
BE		If BCP option is enabled, clear the screen before booting.
BF		Check virus and backup reminders. Display System Summary.
C0		Try to boot with INT 19.
C1		Initialize the Post Error Manager.
C2		Write PEM errors.
C3		Display PEM errors.
C4		Initialize system error handler.
C5		PnPnd dual CMOS (optional).

**TABLE 2-2** Ultra 40 and Ultra 40 M2 POST Codes (*Continued*)

<b>Code</b>	<b>Beeps</b>	<b>Description</b>
C6		Initialize note dock.
C7		Initialize note dock late.
C8		Force check (optional).
C9		Extended checksum (optional).
CA		Redirect Int 15h to enable target board to use remote keyboard (PICO BIOS).
CB		Redirect Int 13h to Memory Technologies Devices such as ROM, RAM, PCMCIA, and serial disk (PICO BIOS).
CC		Redirect Int 10h to enable target board to use a remote serial video (PICO BIOS).
CD		Remap I/O and memory address space for PCMCIA (PICO BIOS).
CE		Initialize digitizer device and display installed message if successful.
D2		Unknown interrupt.
<b>The following are for Boot Block in Flash ROM</b>		
E0		Initialize the chipset.
E1		Initialize the bridge.
E2		Initialize the CPU.
E3		Initialize system timer.
E4		Initialize system I/O.
E5		Check force recovery boot.
E6		Checksum BIOS ROM.
E7		Go to BIOS.
E8		Initialize Multi Processor.
E9		Set Huge Segment.
EA		Initialilze OEM special code.
EB		Initialize PIC and DMA.
EC		Initialize Memory type.
ED		Initialize Memory size.
EE		Shadow Boot Block.
EF		System memory test.
F0		Initialize interrupt vectors.

**TABLE 2-2** Ultra 40 and Ultra 40 M2 POST Codes (*Continued*)

<b>Code</b>	<b>Beeps</b>	<b>Description</b>
F1		Initialize Run Time Clock.
F2		Initialize video.
F3		Initialize System Management Modem.
F4	1	Output one beep.
F5		Boot to Mini DOS.
F6		Clear Huge segment.
F7		Boot to Full DOS.

---

## 2.4 Technical Assistance

If the troubleshooting procedures in this chapter fail to solve your problem, you can receive additional technical support at the Sun web sites and telephone numbers listed in the Preface, [TABLE P-1](#).

## Performing Diagnostic Tests

---

This chapter describes how to resolve problems using the diagnostic tests provided on the Sun Ultra 40 Workstation Tools and Drivers CD for your system, and to interpret system POST BIOS error codes.

This chapter contains the following sections:

- Section 3.1, “PC-Check Diagnostics Overview” on page 3-1
- Section 3.2, “System Information Menu” on page 3-3
- Section 3.3, “Advanced Diagnostics” on page 3-4
- Section 3.4, “Burn-In Testing” on page 3-7
- Section 3.5, “Diagnostic Partition” on page 3-10
- Section 3.7, “Show Results Summary” on page 3-17
- Section 3.8, “Print Results Report” on page 3-19
- Section 3.9, “About PC-Check” on page 3-19
- Section 3.10, “Exit to DOS” on page 3-19

---

### 3.1 PC-Check Diagnostics Overview

The Ultra 40 PC-Check diagnostics can test and detect problems on all motherboard components, drives, ports, and slots. This program can be accessed and executed only from the Sun Ultra 40 Workstation Tools and Drivers CD.

Normally, if you encounter any hardware-related error message (such as memory errors or hard disk errors) on your workstation, you will run one of the following selections from the Diagnostics main menu:

- Use *Immediate Burn-In Test* to run a test script. Sun provides three diagnostic scripts designed to test a full range of system resources.
- Use *Advanced Diagnostics Test* to test a specific hardware component, for example, a CPU or a hard disk.

Other selections on the Diagnostics main menu display information about the system, create disk partitions and display test results.

To access the PC-Check diagnostics:

1. **Insert the Sun Ultra 40 Workstation Tools and Drivers CD into your DVD drive and reboot the system.**

The system boots to the Ultra 40 Workstation Tools and Drivers CD main menu.

2. **Type 1 to run the Hardware Diagnostics Software.**

The License Agreement appears.

3. **Read the License Agreement and click Y to agree.**

The system information loads and the Diagnostics main menu offers the following selections:

- System Information Menu
- Advanced Diagnostics Tests
- Immediate Burn-In Testing
- Deferred Burn-In Testing
- Create Diagnostic Partition
- Show Results Summary
- Print Results Report
- About PC-CHECK
- Exit to DOS

Use the arrow keys on the keyboard to navigate through the diagnostics software, the Enter key to select a menu item, and the ESC key to exit a menu. Navigation instructions appear at the bottom of each screen.

To test a specific hardware component, select “Advanced Diagnostics Test.” See [Section 3.3, “Advanced Diagnostics” on page 3-4](#) for details.

To run a test script, select “Immediate Burn-In Testing.” Sun provides three scripts that include a full test of all possible devices (`full.tst`), a quick test of devices (`quick.tst`), and a test that requires no user interaction (`noinput.tst`). See [Section 3.4.1, “Performing Immediate Burn-In Testing” on page 3-8](#) for details.

To create your own test script, select “Deferred Burn-In Testing.” See [Section 3.4.2, “Performing Deferred Burn-In Testing” on page 3-9](#) for details.

The following sections in this chapter describe the menu items and tests in detail.

---

## 3.2 System Information Menu

Clicking System Information in the Diagnostics main menu causes the System Information menu to appear. Select items in this menu to see detailed information.

TABLE 3-1 describes the selections in the System Information menu.

**TABLE 3-1** System Information Menu Options

Option	Description
System Information Menu	Includes basic information about your system, motherboard, BIOS, processor, memory cache, drives, video, modem, network, buses, and ports.
Hardware ID Image Menu	Enables you to create an XML or .txt document showing your system's hardware ID.
System Management Info	Provides information about the BIOS type, system, motherboard, enclosure, processors, memory modules, cache, slots, system event log, memory array, memory devices, memory device mapped addresses, and system boot.
PCI Bus Info	Includes details about specific devices from <code>pci-config</code> space within the system, similar to the System Management Information section.
IDE Bus Info	Displays information about the IDE bus.
PCMCIA/CardBus Info	Not relevant to the Sun Ultra 40 Workstation.
Interrupt Vectors	Displays a list of interrupt vectors.
IRQ Information	Shows hardware interrupt assignments.
Device Drivers	Shows device drivers loaded under Open DOS.
APM Information	Enables you to test and configure the Advanced Power Management (APM) capabilities of the system. You can choose to change the power state, view the power status, indicate CPU usage, get a power management event, or change the interface mode.
I/O Port Browser	Shows the I/O port assignment for the hardware devices on the system.
Memory Browser	Enables you to view the mapped memory for the entire system.
Sector Browser	Reads sector information from the hard disks and DVD disks sector by sector.

**TABLE 3-1** System Information Menu Options (*Continued*)

Option	Description
CPU Frequency Monitor	Tests the processor speed.
CMOS RAM Utilities	Shows the CMOS settings of the system.
SCSI Utilities	Not applicable for the Sun Ultra 40 Workstation.
Text File Editor	Opens a file editor.
Start-Up Options	Enables you to set up startup options for diagnostics testing.

## 3.3 Advanced Diagnostics

Advanced diagnostics are used to test an individual device on the system. Most of the selections on this menu display information about the corresponding device(s), then offer a menu of testing options. For example, to test CPU 0, you can select Advanced Diagnostics -> Processor -> CPU0.

**Note** – If you do not know which device to test, see [Section 3.4, “Burn-In Testing”](#) on page 3-7.

[TABLE 3-2](#) gives the name and a brief description of the selections in the Advanced Diagnostics Tests Menu.

**TABLE 3-2** Advanced Diagnostics Test Menu Options

Option	Description
Processor	Displays information about the processor(s), and includes a Processor Tests menu.
Memory	Displays information about the memory, and includes tests for the different types of system memory.
Motherboard	Displays information about the motherboard, and includes a Motherboard Tests menu.
Floppy Disks	Not relevant to the Sun Ultra 40 Workstation.

**TABLE 3-2** Advanced Diagnostics Test Menu Options (*Continued*)

<b>Option</b>	<b>Description</b>
Hard Disks	Displays information about the hard disk and includes a Hard Disk Tests menu.  Refer to <a href="#">Section 3.3.1, “Hard Disk Testing”</a> on page 3-6, for detailed information about scripts and about testing hard disks.
CD-ROM/DVD	Displays a CD-ROM/DVD menu to test DVD devices on the system.
ATAPI Devices	Displays information about devices attached to the IDE controllers on the system other than a DVD or hard disks (for example, zip drives).
Serial Ports	Not applicable for the Sun Ultra 40 Workstation.
Parallel Ports	Not applicable for the Sun Ultra 40 Workstation.
Modems	Not applicable for the Sun Ultra 40 Workstation.
ATA	Includes an ATA test menu. Select the parallel ATA driver to test.
USB	Displays information about the USB devices on the system and includes a USB Tests menu.
FireWire	Displays information about FireWire devices and includes a FireWire tests menu.
Network	Performs network register controller tests.
System Stress Test	Exercises and checks the CPU, memory, hard drive and CD/DVD.
Keyboard	Includes a Keyboard Test menu with options for performing different tests on the keyboard.
Mouse	Displays information about the mouse and includes a menu to test the mouse on the system.
Joystick	Displays information about the joystick and includes a menu to test the joystick.
Audio	Displays information about the audio devices on the system and includes an Audio Tests menu to test audio device information. A PCI audio card is required to run this test.

**TABLE 3-2** Advanced Diagnostics Test Menu Options (*Continued*)

<b>Option</b>	<b>Description</b>
Video	Displays information about the video card. Initially, the monitor might flicker, but then it brings up a Video Test Options menu that enables you to perform various video tests.
Printers	Printers are not available for the Sun Ultra 40 Workstation.
Firmware –ACPI	Displays information about Advanced Configurable Power Interface (ACPI) and includes an ACPI Tests menu.

## 3.3.1 Hard Disk Testing

Use these tests to select and test a hard drive. Before starting the test, you can set the parameters using the Test Settings option.

- 1. From the main menu, choose Advanced Diagnostics Tests.**
- 2. From the Advanced Diagnostics Tests menu, choose Hard Disks.**
- 3. From the Select Drive menu, choose the hard disk you need to test.**

The Hard Disk Diagnostics window opens. It displays information about the selected hard drive and the Hard Disk Tests menu, which includes the following options:

- Select Drive
- Test Settings
- Read Test
- Read Verify Test
- Non-Destructive Write Test
- Destructive Write Test
- Mechanics Stress Test
- Internal Cache Test
- SMART Immediate Test
- View Error Log
- Utilities Menu
- Exit

- 4. Click Select Drive to select a hard drive to test.**
- 5. Click Test Settings, if desired, to select options for that test.**

This enables you to change the following parameters:

- Number of Retries  
Selects the number of times to retry testing a device before terminating the test.
  - Maximum Errors  
Selects the number of errors allowed before terminating the test.
  - Check SMART First  
Selects Smart Monitoring Analysis Reporting Test (SMART).
  - HPA Protection  
Selects Host Protected Area (HPA) protection.
  - Media Test Settings  
Selects the test time duration, the percentage of the hard disk to test, and the sectors to be tested on the hard disk.
  - Device Test Settings  
Selects the test time durations of the devices and the test level.
6. **Select a test to begin execution.**

The Read Test, Read Verify Test, the Non-Destructive Write Test, and the Destructive Write Test test the actual media on the physical disk drive.

The Mechanics Stress Test and the Internal Cache Test test non media-related parts of the hard drive hardware.



---

**Caution** – Running the Destructive Write Test destroys any data on the disk.

---

## 3.4 Burn-In Testing

Burn-In testing enables you to run test scripts and to create new scripts.

The Diagnostics main menu provides two burn-in selections, Immediate Burn-In Testing and Deferred Burn-In Testing.

- Immediate Burn-In enables you to run an existing script and to select configuration options.
- Deferred Burn-In enables you to create a new script.

Sun provides three ready-made scripts designed to test the general health of the devices on your system. These scripts include:

- `quick.tst`—This script performs a series of tests that require the user to interact with the test software. When they require a user interaction, they stop and do not time out. These tests are faster than the `full.tst` but they are less thorough. For example, they do not run all the tests associated with a DIMM.
- `noinput.tst`—This script performs a non-detailed test of most hardware components, excluding those components that require user input (keyboard, mouse, sound, and video). This test does not require user input. It is normally the first test performed for hardware-related problems.
- `full.tst`—This script performs a detailed and comprehensive test on all hardware components, including those that require user input. It includes external port tests and requires loopback connectors on COM ports, parallel ports and USB ports. You must interact with the test utility to progress through these interactive tests.

---

**Tip** – Each of these scripts tests the operating status of your entire system. To test specific disk drives independently of the rest of the system, use the procedures in [Section 3.3.1, “Hard Disk Testing”](#) on page 3-6.

---

## 3.4.1 Performing Immediate Burn-In Testing

Use Immediate Burn-In Testing to run test scripts.

To perform immediate burn-in testing:

1. **From the Diagnostics main menu, select Immediate Burn-In Testing.**

The screen displays a list of settings shown in [TABLE 3-3](#) and a Burn-In menu.

2. **From the menu, select Load Burn-In Script.**

A text box appears.

3. **Type the name of the script you want to run.**

- `quick.tst`, `noinput.tst`, or `full.tst`
- If you have created and saved your own script, tupe `d:\testname.tst`

Where *testname* is the name of the script that you have created.

4. **To change any of the options, at the bottom of the screen, select Change Options.**

This opens the Burn-In Options menu, which enables you to modify the options listed in [TABLE 3-3](#) for the currently loaded test script.

## 5. Select Perform Burn-In Tests.

The diagnostics software executes the test script as configured.

**TABLE 3-3** Continuous Burn-In Testing Options

<b>Option</b>	<b>Default – General</b>	<b>Default Using quick.tst, noinput.tst, or full.tst Script</b>	<b>All Possible Choices</b>
Pass Control	Overall Time	Overall Passes	Individual Passes, Overall Passes, or Overall Time
Duration	01:00	1	Enter any number to choose the time duration of the test
Script File	N/A	quick.tst, noinput.tst, or full.tst	quick.tst, noinput.tst, or full.tst
Report File	None	None	User defined
Journal File	None	D:\noinput.jr1, D:\quick.jr1, or D:\full.jr1	User defined
Journal Options	Failed Tests	All Tests, Absent Devices, and Test Summary	Failed Tests, All Tests, Absent Devices, and Test Summary
Pause on Error	N	N	Y or N
Screen Display	Control Panel	Control Panel	Control Panel or Running Tests
POST Card	N	N	Y or N
Beep Codes	N	N	Y or N
Maximum Fails	Disabled	Disabled	1–9999

## 3.4.2 Performing Deferred Burn-In Testing

Use Deferred Burn-In Testing to create scripts. To perform deferred burn-in testing:

- 1. From the Diagnostics main menu, select Deferred Burn-In Testing.**

The screen displays a list of settings shown in [TABLE 3-3](#) and a Burn-In menu.

- 2. Use the menu to configure the following selections:**

- Change Options
    - Opens the Burn-In Options menu, which enables you to modify the options listed in [TABLE 3-3](#) for the currently loaded test script.
  - Select Tests
    - Opens a listing of the tests available for your workstation configuration and the currently loaded test script.
3. **When you are done, select Save Burn-In Script and type the name for the new script.**
- Enter `d:\testname.tst`
- Where *testname* is the name of the script that you have created.
4. **To run the newly created script, go to Immediate Burn-In Testing in [Section 3.4.1](#), “Performing Immediate Burn-In Testing” on page 3-8, and run the script *testname.tst*.**

---

## 3.5 Diagnostic Partition

A diagnostic partition is required for the test scripts to write their log files. Without a diagnostic partition, the only output is the display on the diagnostic screens.

The diagnostic partition is preinstalled on the Sun Ultra 40 Workstation. You do not need to reinstall the diagnostic partition unless you have removed it.

- If you have removed the diagnostic partition, you can re-create it using the Create Diagnostic Partition option.
- If you wish to remove all partitions on the primary drive except for the diagnostic partition, you can use the Wipedisk utility on the Tools and Drivers CD.

---

**Note** – To create a diagnostic partition with a RAID configuration, see the *Ultra 40 Workstation Operating System Installation Guide*, part number 819-7577.

---

The following sections describe how to create and access the diagnostic partition:

- [Section 3.5.1, “Removing Existing Partitions From a Hard Disk” on page 3-11](#)
- [Section 3.5.2, “Adding a Diagnostic Partition to the First Bootable Disk” on page 3-12](#)
- [Section 3.6.3, “Accessing the Diagnostic Partition Under Red Hat Linux” on page 3-15](#)
- [Section 3.6.2, “Accessing the Diagnostic Partition Under the Solaris 10 Operating System” on page 3-14](#)

- [Section 3.6.4, “Accessing the Diagnostic Partition Under Windows XP”](#) on page 3-17

## 3.5.1 Removing Existing Partitions From a Hard Disk

Use this procedure to remove the partitions from a disk prior to installing a diagnostic partition, as described in [Section 3.5.2, “Adding a Diagnostic Partition to the First Bootable Disk”](#) on page 3-12.

If the disk has any existing partitions, you must remove them before creating a diagnostic partition.



---

**Caution** – Removing all hard disk partitions destroys all data on the disk.

---

There are two ways to remove existing partitions from the hard disk:

- Use the Wipedisk utility. It removes all partitions except the diagnostic partition. If you do this, you should not have to create a diagnostic partition.
- Use the following procedure, which removes all partitions including the diagnostic partition. If you do this, you will need to create a diagnostic partition, as described in [Section 3.5.2, “Adding a Diagnostic Partition to the First Bootable Disk”](#) on page 3-12.

To remove existing partitions from a hard disk:

1. **Insert the Tools and Drivers CD into the DVD tray.**
2. **Reboot the workstation.**
3. **From the Tools and Drivers CD main menu, type 4 to exit to DOS.**
4. **Type `fdisk` at the command prompt and press the Enter key.**
5. **Type 4 to select an alternate fixed disk.**

The second hard disk as seen from `fdisk` is the first bootable disk of the system. The first hard disk as seen from `fdisk` is the bootable Tools and Drivers CD.



---

**Caution** – When performing the following procedures, be careful not to delete any disk partition that contains data that you want to keep. Removing hard disk partitions destroys all data on the removed partition.

---

6. **Type 1 or 2 depending on what type of partition you want to delete.**  
Disks can include two types of partitions: DOS and non-DOS.
  - If the disk only contains DOS partitions, then 1 = DOS.
  - If the disk contains both DOS and non-DOS partitions, then 1 = DOS and 2 = non-DOS.
  - If the disk only contains non-DOS partitions, then 1 = non-DOS.
7. **Type the number of the partition you want to delete.**
8. **Type Y to erase the data and the partition.**
9. **Repeat Step 6 through Step 8 until all partitions have been removed.**
10. **Press the Esc key to exit, then press any key to reboot the workstation.**

## 3.5.2 Adding a Diagnostic Partition to the First Bootable Disk

Use this procedure to install a diagnostic partition on a disk that has no partitions on it.

PC-Check can access only the first or second hard disk on the system from the boot loader. It automatically installs the diagnostic partition on the first bootable disk.

To add the diagnostic partition to the first bootable disk:

1. **Insert the Tools and Drivers CD into the DVD tray.**
2. **Reboot the workstation.**
3. **At the Tools and Drivers CD main menu, type 1 to run Hardware Diagnostics.**
4. **From the main menu, choose Create Diagnostic Partition.**
  - If the first bootable disk is clear of partitions, the Sun Microsystems Partitioning Utility window appears. It states: "Your primary hard disk is not partitioned. Would you like to partition it now?"
    - Select Yes and press Enter.
    - A window appears, stating, "Partitioning complete. Your machine will now be restarted."
  - If the first bootable disk is not clear of partitions, a window appears stating that the software is unable to create a hardware diagnostic partition because there are already partitions on the disk.
    - If this happens, go to [Section 3.5.1, "Removing Existing Partitions From a Hard Disk"](#) on page 3-11 to clear the partitions from the disk.

- Repeat [Step 1](#) through [Step 4](#) of this procedure.
5. Press Enter to reboot your workstation.

---

## 3.6 Accessing the Diagnostic Partition

The following sections provide procedures for accessing the diagnostic partition to read the log files under DOS, Solaris, Linux and Windows software.

### 3.6.1 Accessing the Diagnostic Partition Under DOS

All the diagnostic scripts on PC-Check create log entries in the diagnostic partition. The files are called *name.jr1*, where *name* is the prefix of the script. For example, `noinput.tst` creates a log file named `noinput.jr1`.

The following procedure shows an example of how to access a log file on the diagnostic partition. The test script `noinput.tst` is used as an example.

To access the diagnostic partition under DOS:

1. **To create a log file, use the procedures in [Section 3.4.1, “Performing Immediate Burn-In Testing”](#) on page 3-8.**
2. **When the tests are complete, press the Esc key to exit the Display Results window.**
3. **Select Exit to DOS and press Enter.**  
The Supplemental Disk menu appears.
4. **Type 4 to exit to DOS.**  
The DOS prompt appears.
5. **At the DOS prompt, type the following:**

```
C:> d:
```

6. Type the following to list the contents of the diagnostic partition.

```
D:> dir
```

The system displays a list of log files (\*.jrl), including the file created when you ran Immediate Burn-In Testing. The file for that test should be titled *name.jrl*, where *name* is the name of the script you ran.

## 3.6.2 Accessing the Diagnostic Partition Under the Solaris 10 Operating System

To access the diagnostic partition when you are running the Solaris 10 operating system:

1. Remove the Tools and Drivers CD from the DVD tray.
2. Reboot the machine and start Solaris x86.
3. Log in as superuser.
4. Type the following command to determine whether your diagnostic partition has been configured to be mounted:

```
# ls /diagpart
```

- If this command fails to list the log files created by the hardware diagnostics software, then the operating system has never been configured to mount the diagnostic partition. Continue to [Step 5](#).
- If this command succeeds in listing the log files created by the hardware diagnostics software, then the operating system has already been configured to mount the diagnostic partition. All users have read access to this partition. Only the superuser has read/write access to this partition. You do not need to continue this procedure.

5. Insert the Tools and Drivers CD into the DVD tray.
6. When the CD is mounted, open a terminal window.
7. Type the following:

```
# cd /cdrom/cdrom0/drivers/sx86
```

8. Type the following to mount the diagnostic partition:

```
# ./install.sh
```

9. Press the Enter key.

The following lines appear if the diagnostic partition is mounted successfully:

```
Mounting Diagnostic Partition  
Installation Successful
```

10. Type the following command:

```
# ls /diagpart
```

The system displays a list of diagnostic log files.

### 3.6.3 Accessing the Diagnostic Partition Under Red Hat Linux

To access the diagnostic partition when you are running a Linux Red Hat™ operating system:

1. Remove the Tools and Drivers CD from the DVD tray.
2. Reboot the workstation and start the Linux Red Hat operating system.
3. Become superuser.
4. Type the following command to determine whether your diagnostic partition has been configured to be mounted:

```
# ls /diagpart
```

- If this command fails to list the log files created by the hardware diagnostics software, then the operating system has never been configured to mount the diagnostic partition. Continue to [Step 5](#).

- If this command succeeds in listing the log files created by the hardware diagnostics software, then the operating system has already been configured to mount the diagnostic partition. All users have read access to this partition. Only the superuser has read/write access to this partition. You do not need to continue this procedure.

5. Insert the Tools and Drivers CD into the DVD tray.
6. When the CD is mounted, open a terminal window.
7. Type the following command:

```
# cd mountpoint/drivers/linux/linux_version
```

Where *mountpoint* is the CD mountpoint and *linux\_version* is the version of Linux that you have installed. For example:

```
# cd /mnt/cdrom/drivers/linux/red_hat
```

8. Type the following to mount the diagnostic partition:

```
# ./install.sh
```

9. Press Enter.

The following lines appear if the diagnostic partition is mounted successfully:

```
Mounting Diagnostic Partition  
Installation Successful
```

10. Type the following command:

```
# ls /diagpart
```

The system displays a list of diagnostic log files.

## 3.6.4 Accessing the Diagnostic Partition Under Windows XP

The Windows XP operating system does not allow the mounting of a diagnostic partition. There is no way to view or gain access to the diagnostic partition if you are running Windows XP on a Sun Ultra 40 Workstation.

The only way to retrieve the contents (log files) on the diagnostic partition is to attach a USB diskette drive to the workstation and complete the following procedure.

To retrieve the log files on the diagnostic partition:

1. **Connect the USB diskette drive to any USB port on the workstation.**
2. **Insert the Tools and Drivers CD into the DVD tray.**
3. **Reboot the workstation.**
4. **At the Tools and Drivers CD main menu, type 3 to exit to DOS.**
5. **Type the following at the DOS command prompt:**

```
C:> d:tgld
```

6. **To copy a file named `noinput.jr1` to the USB floppy diskette, type:**

```
D:> copy d:\noinput.jr1 a:\
```

The journal file is now saved to the diskette in the USB diskette drive.

---

## 3.7 Show Results Summary

Selecting Show Results Summary on the Diagnostics main menu displays the tests that have been run and lists the results, which can be Pass, Fail, or N/A.

The following list describes all the tests that are available with the Tools and Drivers CD. If your system does not have the corresponding option, the results will show as N/A in the Show Results Summary list.

- Processor

This section shows the following tests conducted against the processor: Core Processor Tests, AMD 64-Bit Core Tests, Math Co-Processor Tests – Pentium Class FDIV and Pentium Class FIST, MMX Operation, 3DNow! Operation, SSE Instruction Set, SSE2 Instruction Set, and MP Symmetry.

- Motherboard

This section shows the following tests conducted against the motherboard: DMA Controller Tests, System Timer Tests, Interrupt Test, Keyboard Controller Tests, PCI Bus Tests, and CMOS RAM/Clock Tests.

- Memory, Cache Memory, and Video Memory

This section shows the following tests conducted against the various types of memory: Inversion Test Tree, Progressive Inv. Test, Chaotic Addressing Test, and Block Rotation Test.

- Input Device

This section shows the following tests conducted against the input device: Verify Device, Keyboard Repeat, and Keyboard LEDs.

- Mouse

This section shows the following tests conducted against the mouse: Buttons, Ballistics, Text Mode Positioning, Text Mode Area Redefine, Graphics Mode Positions, Graphics Area Redefine, and Graphics Cursor Redefine.

- Video

This section shows the following tests conducted against the video: Color Purity Test, True Color Test, Alignment Test, LCD Test, and Test Cord Test.

- Multimedia

This section shows the following tests conducted against the multimedia components: Internal Speaker Test, FM Synthesizer Test, PCM Sample Test, CD/DVD Drive Read Test, CD/DVD Transfer (KB/Sec), CD/DVD Transfer Rating, CD/DVD Drive Seek Test, CD/DVD Seek Time (ms), CD/DVD Test Disk Read, and CD/DVD Tray Test.

- ATAPI Devices

This section shows the following tests conducted against ATAPI devices: Linear Read Test, Non-Destructive Write, and Random Read/Write Test.

- Hard Disk

This section shows the following tests conducted against the hard disk: Read Test, Read Verify Test, Non-Destructive Write Test, Destructive Write Test, Mechanics Stress Test, and Internal Cache Test.

- USB

This section shows the following tests conducted against the USB: Controller Tests and Functional Tests.

- Hardware ID

The compare test is used to determine the machine ID for the system. This test is not available for the Sun Ultra 40 Workstation.

---

## 3.8 Print Results Report

The Print Results Report option enables you to print results of the diagnosis of your system.

Ensure that your workstation is connected to a printer, and then enter the required information to print the results.

---

## 3.9 About PC-Check

The About PC-Check window includes general information about the PC-Check software, including resident and nonresident components, such as mouse devices.

---

## 3.10 Exit to DOS

The Exit to DOS option exits the PC-Check software and returns you to the DOS prompt.



# Preparing to Replace Components

---

This chapter describes common tasks that must be completed prior to performing a removal or installation procedure on any Sun Ultra 40 Workstation.

The procedures described in this chapter are written for workstation service providers and system administrators.



---

**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in this chapter before you perform any replacement procedure.

---

This chapter contains the following sections:

- [Section 4.1, “Safety Information” on page 4-1](#)
- [Section 4.2, “Required Tools” on page 4-3](#)
- [Section 4.3, “Preparing the Workstation for Servicing” on page 4-4](#)
- [Section 4.4, “Finding Your Replacement Procedures” on page 4-9](#)

---

## 4.1 Safety Information

This section provides safety precautions to follow when servicing the Sun Ultra 40 Workstation.

## 4.1.1 Safety Precautions

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

- Follow all Sun standard cautions, warnings, and instructions marked on the equipment and described in *Important Safety Information for Sun Hardware Systems*, part number 816-7190.
- Follow the cautions, warnings, and instructions in the *Ultra 40 and Ultra 40 M2 Safety and Compliance Guide*, part number 820-0122. The document is available at: <http://www.sun.com/documentation/>
- Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment's electrical rating label.
- Never push objects of any kind through openings in the equipment. Dangerous voltages might be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

## 4.1.2 Safety Symbols

The following symbols might appear in this book. Please note their meanings:



---

**Caution** – There is a risk of personal injury and equipment damage. To avoid personal injury and equipment damage, follow the instructions.

---



---

**Caution** – Hot surface. Avoid contact. Surfaces are hot and might cause personal injury if touched.

---



---

**Caution** – Hazardous voltages are present. To reduce the risk of electric shock and danger to personal health, follow the instructions.

---

## 4.1.3 Electrostatic Discharge Safety

Certain devices, such as such as the motherboard, PCI cards, and hard drives, are sensitive to electrostatic discharge (ESD). They require special handling.



---

**Caution** – The boards and hard drives contain electronic components that are extremely sensitive to static electricity. Ordinary amounts of static electricity from clothing or the work environment can destroy components. Do not touch the components along their connector edges.

Wear an antistatic wrist strap and use an antistatic mat when handling components such as drive assemblies, boards, or DIMMs. When servicing or removing workstation components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cord from the workstation and the wall receptacle. Following this caution equalizes all electrical potentials with the workstation.

---

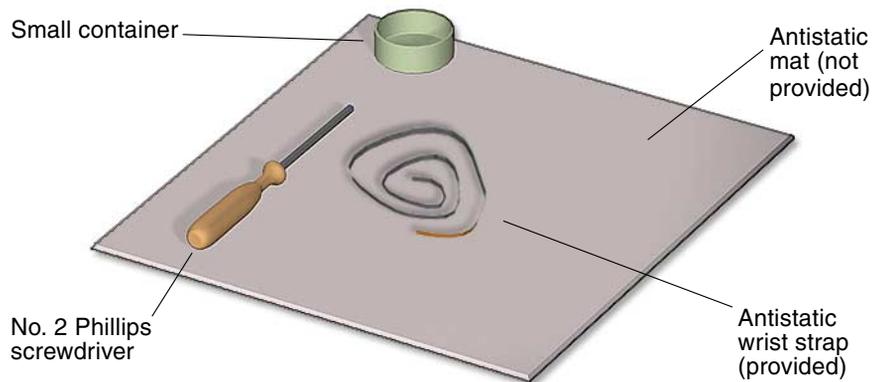
---

## 4.2 Required Tools

The Sun Ultra 40 Workstation was designed to be serviced with the following tools:

- No. 2 Phillips screwdriver
- Antistatic wrist strap
- Antistatic mat
- Container for screws

See [FIGURE 4-1](#).



**FIGURE 4-1** Required Tools

Though not required for component replacement, the following tools have proven helpful in certain situations:

- Needle nose pliers, tweezers, or hemostat
- Large jeweler's screwdriver
- Flashlight

Place ESD-sensitive components such as the motherboard, memory, PCI cards, and hard drives on an antistatic mat. The following items can be used as an antistatic mat:

- Antistatic bag used to wrap a Sun replacement part
- Sun ESD mat, part number 250-1088 (available through your Sun sales representative)
- Disposable ESD mat (might be shipped with replacement parts or optional system components)

---

## 4.3 Preparing the Workstation for Servicing

To prepare the workstation for servicing:

1. **Power off the workstation as described in [Section 1.4.2, "Powering Off the Workstation"](#) on page 1-12.**  
See [FIGURE 4-2](#) for the location of the power button.
2. **Power off and disconnect the monitor, keyboard, mouse, network connections, and any peripherals.**
3. **Disconnect the power cord from the workstation.**  
See [FIGURE 4-3](#).
4. **Press down the two latches on the side cover and lift the cover off the workstation.**  
See [FIGURE 4-4](#), part 1 for [Step 4](#) through [Step 9](#).
5. **Using both hands, place the workstation on its side.**  
See [FIGURE 4-4](#), part 2.
6. **Pivot the workstation support leg underneath the workstation.**  
See [FIGURE 4-4](#), part 2.
7. **Remove the access panel:**
  - a. **Slide the lock block to the front of the system.**

b. Press and release the two latches and lift the access panel.

See [FIGURE 4-4](#), part 4.

**8. Attach the antistatic wrist strap.**

Wrap the adhesive portion around your wrist. Attach the copper end to the rear vent of the chassis. Ensure that the location does not interfere with your service procedure.

See [FIGURE 4-4](#), part 5.

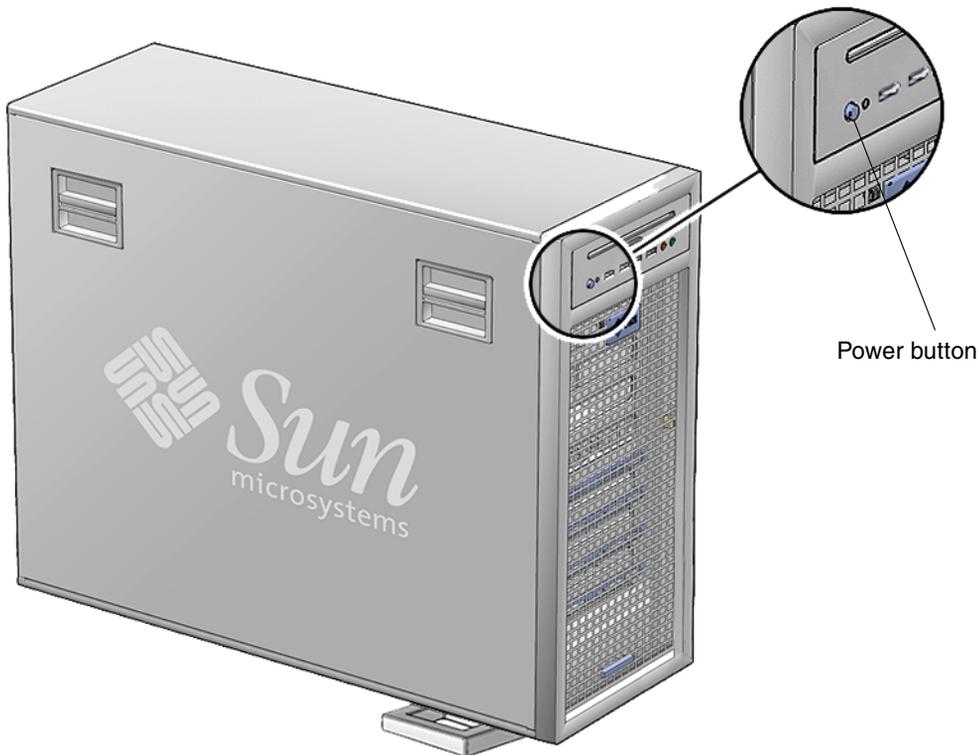
**9. If your procedure requires it, lift the fan module up and out.**

Grasp it by the handle and slide it straight up.

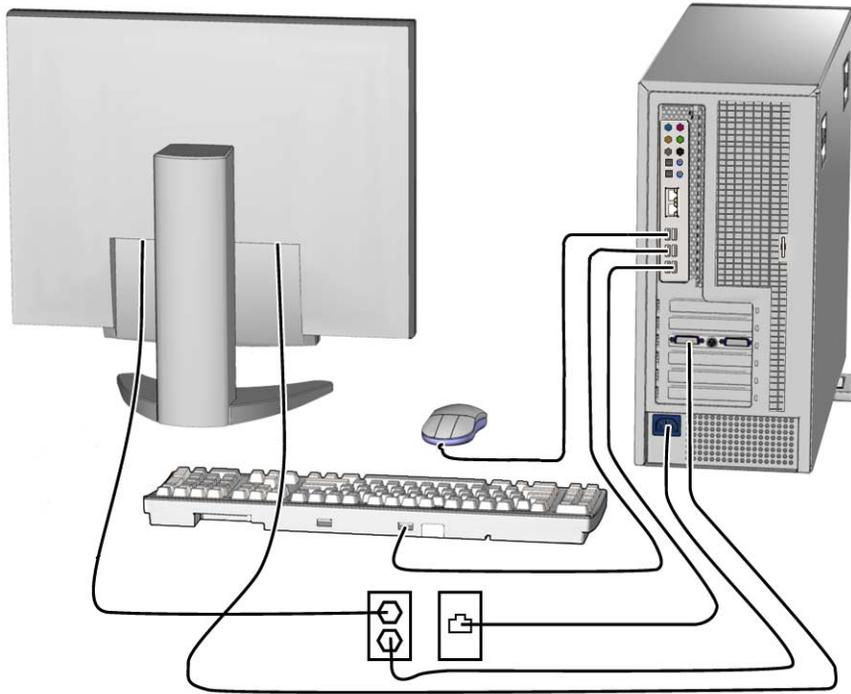
See [FIGURE 4-4](#), part 5.

**10. Find the removal or replacement procedure you need.**

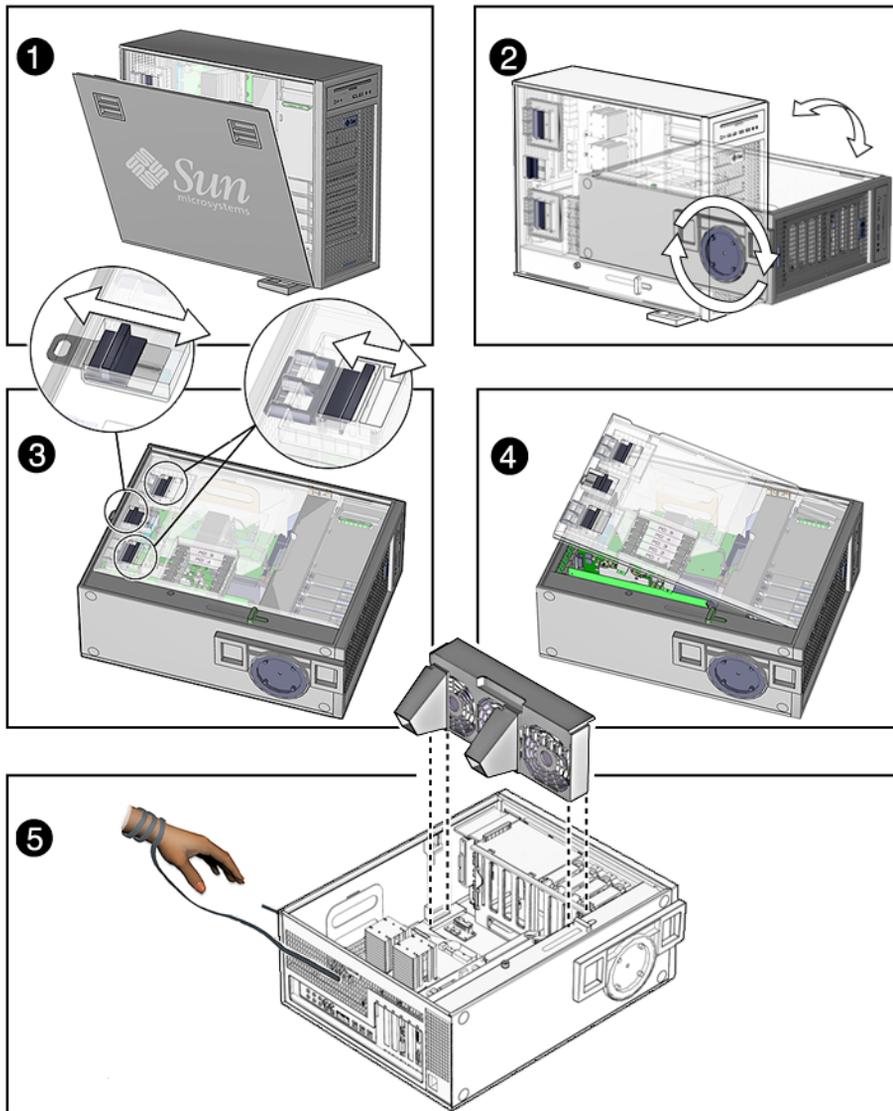
See [TABLE 4-1](#).



**FIGURE 4-2** Power Button Location (Ultra 40 Shown)



**FIGURE 4-3** Disconnecting the Workstation Cables (Ultra 40 Shown)

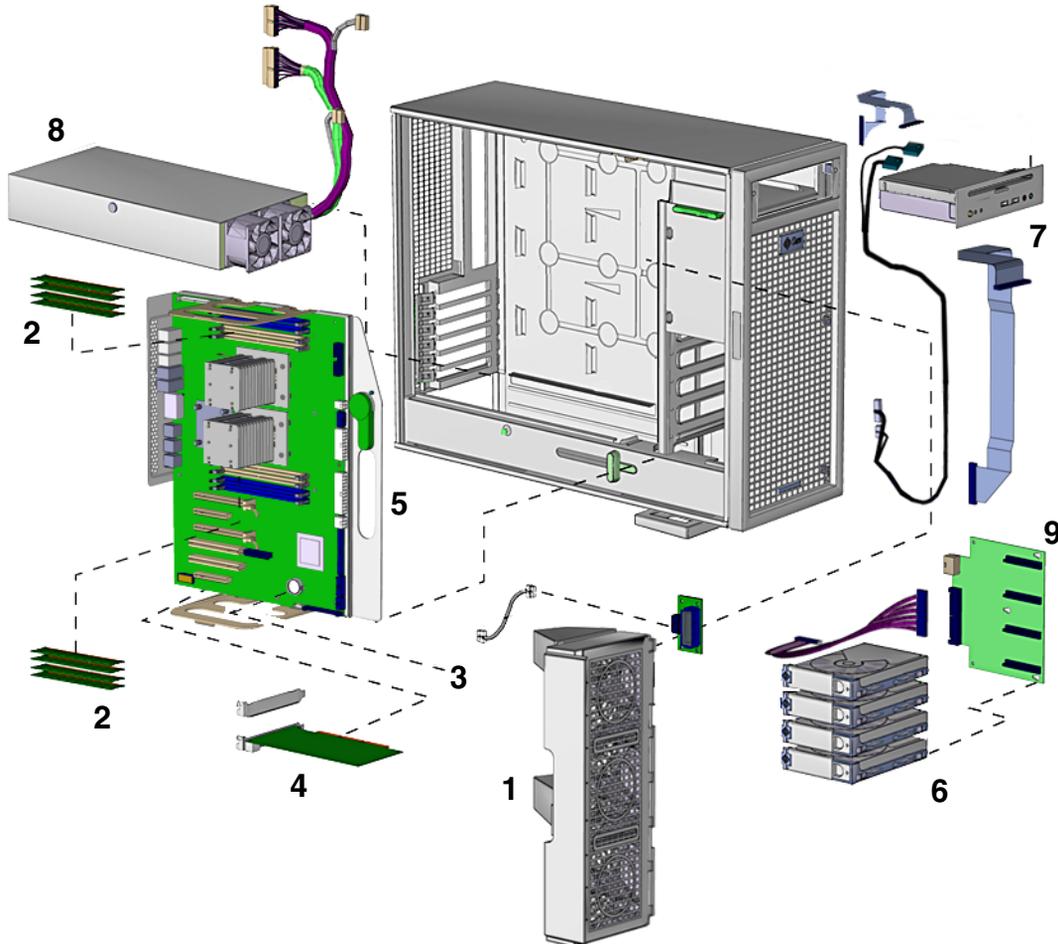


**FIGURE 4-4** Removing, Side Cover, Access Panel, and Fan Module (Ultra 40 Shown)

## 4.4 Finding Your Replacement Procedures

Use the following figures and tables to identify the component that you need to replace and locate the corresponding procedures.

- Ultra 40 – See [FIGURE 4-5](#) and refer to [TABLE 4-1](#).
- Ultra 40 M2 – See [FIGURE 4-6](#) and refer to [TABLE 4-2](#).



**FIGURE 4-5** Ultra 40 Major Workstation Components

**TABLE 4-1** Ultra 40 Component Replacement Procedures

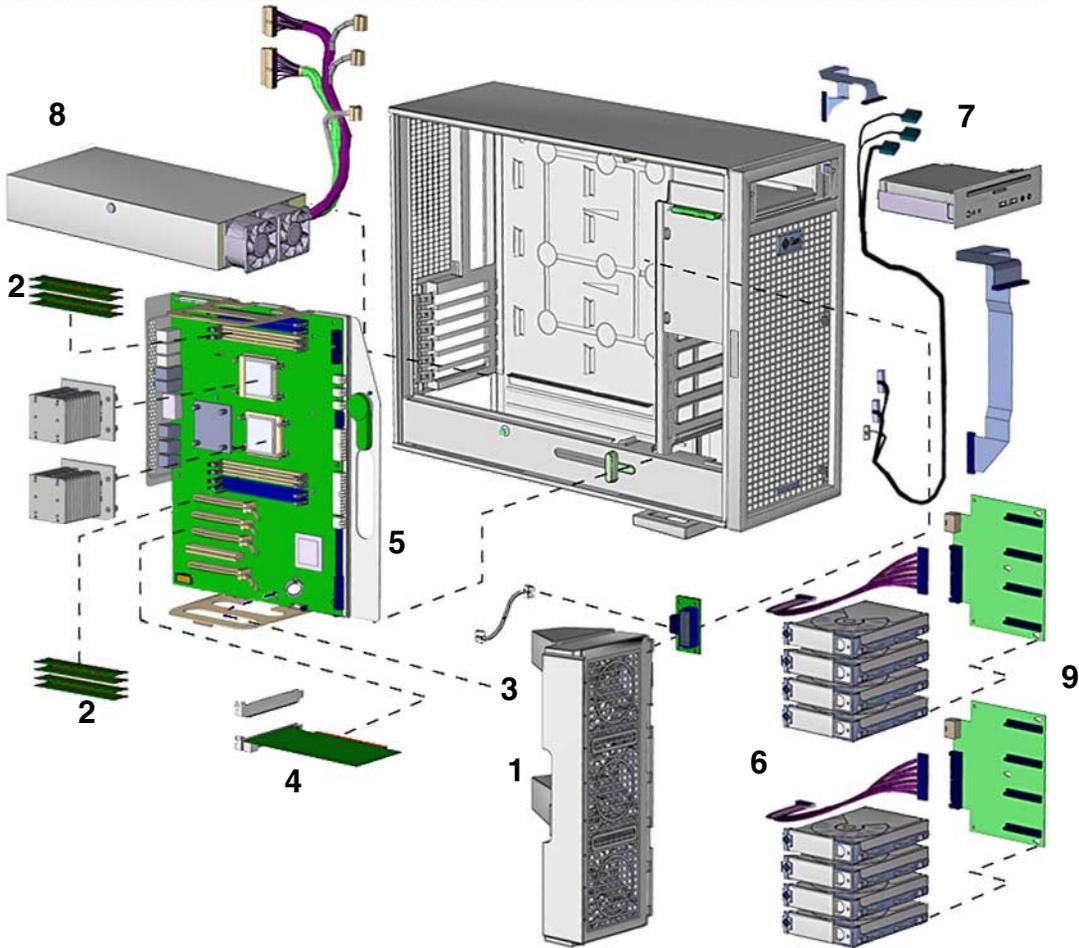
Item Number	Component	Procedure
	Side cover	Section 4.3, "Preparing the Workstation for Servicing" on page 4-4 and Section 8.1, "Reassembling the Workstation" on page 8-1
	Access panel	Section 4.3, "Preparing the Workstation for Servicing" on page 4-4 and Section 8.1, "Reassembling the Workstation" on page 8-1
1	Fan module	Section 4.3, "Preparing the Workstation for Servicing" on page 4-4
2	DIMMs (memory)	Section 5.2, "Replacing the DIMMs" on page 5-5
3	Battery	Section 5.3, "Replacing the Battery" on page 5-16
4	PCI cards	Section 5.4, "Replacing PCI Cards" on page 5-19
5	Motherboard tray assembly	Section 5.5, "Replacing the Motherboard Tray Assembly" on page 5-33
6	Hard drive(s)	Section 6.1, "Replacing a Hard Drive" on page 6-2
7	I/O module, DVD-dual drive and associated cables	Section 6.3, "Replacing the DVD Dual Drive and I/O Module" on page 6-12
8	Power supply	Section 7.2, "Removing and Replacing the Power Supply" on page 7-5
9	Hard drive backplane and cables	Section 6.2, "Replacing the Hard Drive Backplane and Signal Cable" on page 6-5

The following components are not field-replaceable units: side cover and access panel.

---

**Note** – You do not need to remove the fan tray if you are replacing any of the following components: DIMMs, battery, PCI cards, or hard drives.

---



**FIGURE 4-6** Ultra 40 M2 Major Workstation Components

**TABLE 4-2** Ultra 40 M2 Component Replacement Procedures

Item Number	Component	Procedure
	Side cover	<a href="#">Section 4.3, “Preparing the Workstation for Servicing”</a> on page 4-4 and <a href="#">Section 8.1, “Reassembling the Workstation”</a> on page 8-1

**TABLE 4-2** Ultra 40 M2 Component Replacement Procedures (*Continued*)

---

<b>Item Number</b>	<b>Component</b>	<b>Procedure</b>
	Access panel	Section 4.3, "Preparing the Workstation for Servicing" on page 4-4 and Section 8.1, "Reassembling the Workstation" on page 8-1
1	Fan module	Section 4.3, "Preparing the Workstation for Servicing" on page 4-4
2	DIMMs (memory)	Section 5.2, "Replacing the DIMMs" on page 5-5
3	Battery	Section 5.3, "Replacing the Battery" on page 5-16
4	PCI cards	Section 5.4, "Replacing PCI Cards" on page 5-19
5	Motherboard tray assembly	Section 5.5, "Replacing the Motherboard Tray Assembly" on page 5-33
6	Hard drive(s)	Section 6.1, "Replacing a Hard Drive" on page 6-2
7	I/O module, DVD-dual drive and associated cables	Section 6.3, "Replacing the DVD Dual Drive and I/O Module" on page 6-12
8	Power supply	Section 7.2, "Removing and Replacing the Power Supply" on page 7-5
9	Hard drive backplane and cables (filler panel is absent when second backplane is present)	Section 6.2, "Replacing the Hard Drive Backplane and Signal Cable" on page 6-5

---

The following components are not field-replaceable units: side cover and access panel.

---

**Note** – You do not need to remove the fan tray if you are replacing any of the following components: DIMMs, battery, PCI cards, or hard drives.

---



# Replacing the Motherboard and Associated Components

---

This chapter describes the removal and installation procedures for the motherboard and associated components. The procedures described in this chapter are written for workstation service providers and system administrators.

---

**Note** – Only Sun authorized service providers should perform the procedures described in [Section 5.5, “Replacing the Motherboard Tray Assembly”](#) on page 5-33.

---

This chapter contains the following sections:

- [Section 5.1, “Motherboard Overview”](#) on page 5-2
- [Section 5.2, “Replacing the DIMMs”](#) on page 5-5
- [Section 5.3, “Replacing the Battery”](#) on page 5-16
- [Section 5.3, “Replacing the Battery”](#) on page 5-16
- [Section 5.4, “Replacing PCI Cards”](#) on page 5-19
- [Section 5.5, “Replacing the Motherboard Tray Assembly”](#) on page 5-33
- [Section 5.6, “Replacing a CPU and Heatsink/Fan Assembly”](#) on page 5-40



---

**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in [Section 4.1, “Safety Information”](#) on page 4-1 before you perform any replacement procedure. Additional cautions, warnings, and instructions are provided in the *Ultra 40 Workstation Safety and Compliance Guide*, part number 820-0122. The document is available at:  
<http://www.sun.com/documentation/>

---



---

**Caution** – The procedures in this chapter should be performed with the workstation chassis on its side.

---



---

**Caution** – When servicing or removing workstation components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cord from the workstation and the wall receptacle. Following this caution equalizes all electrical potentials within the workstation.

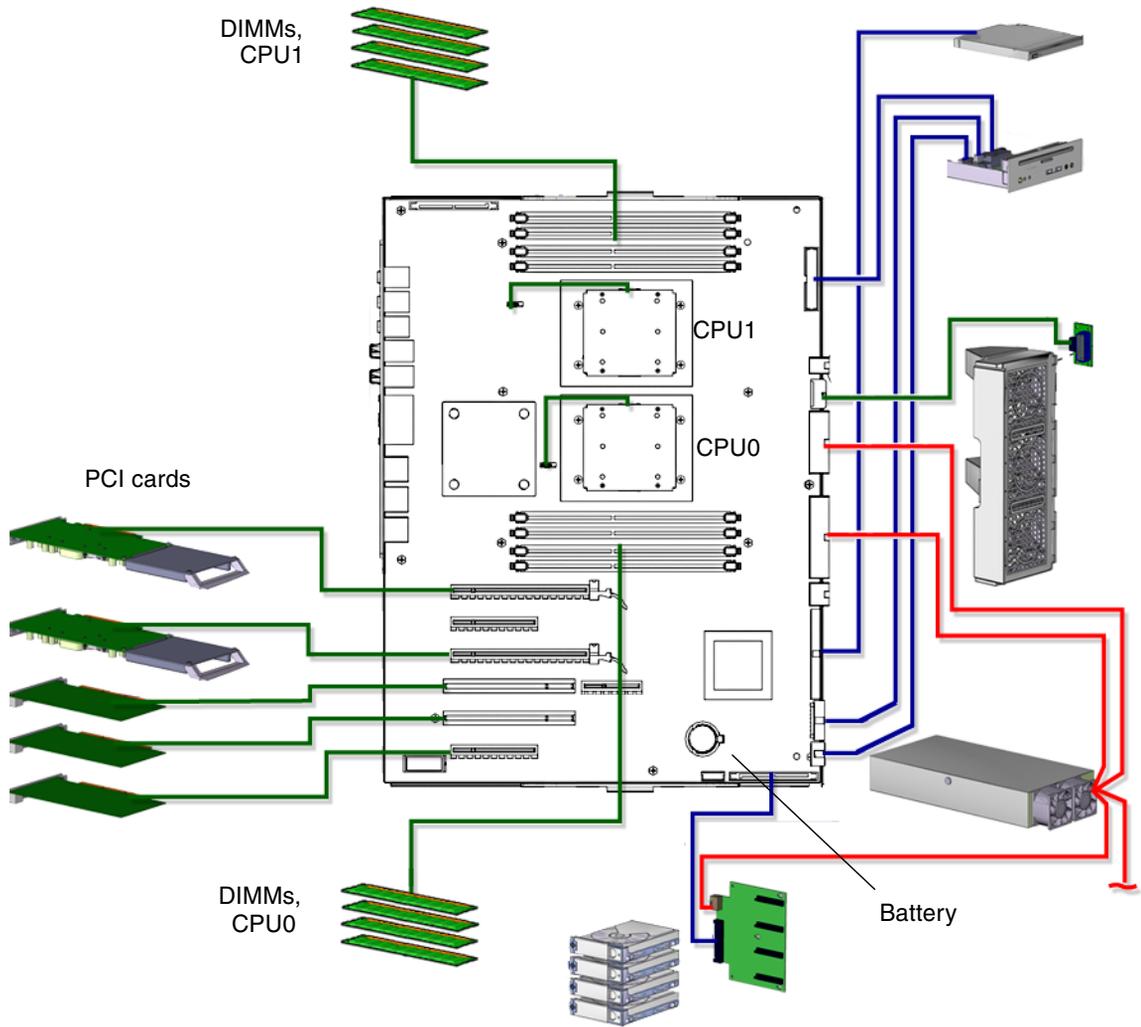
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---

## 5.1 Motherboard Overview

FIGURE 5-1 shows the devices and cables on the Ultra 40 motherboard.

FIGURE 5-2 shows the devices and cables on the Ultra 40 M2 motherboard.



**FIGURE 5-1** Ultra 40 Motherboard Components

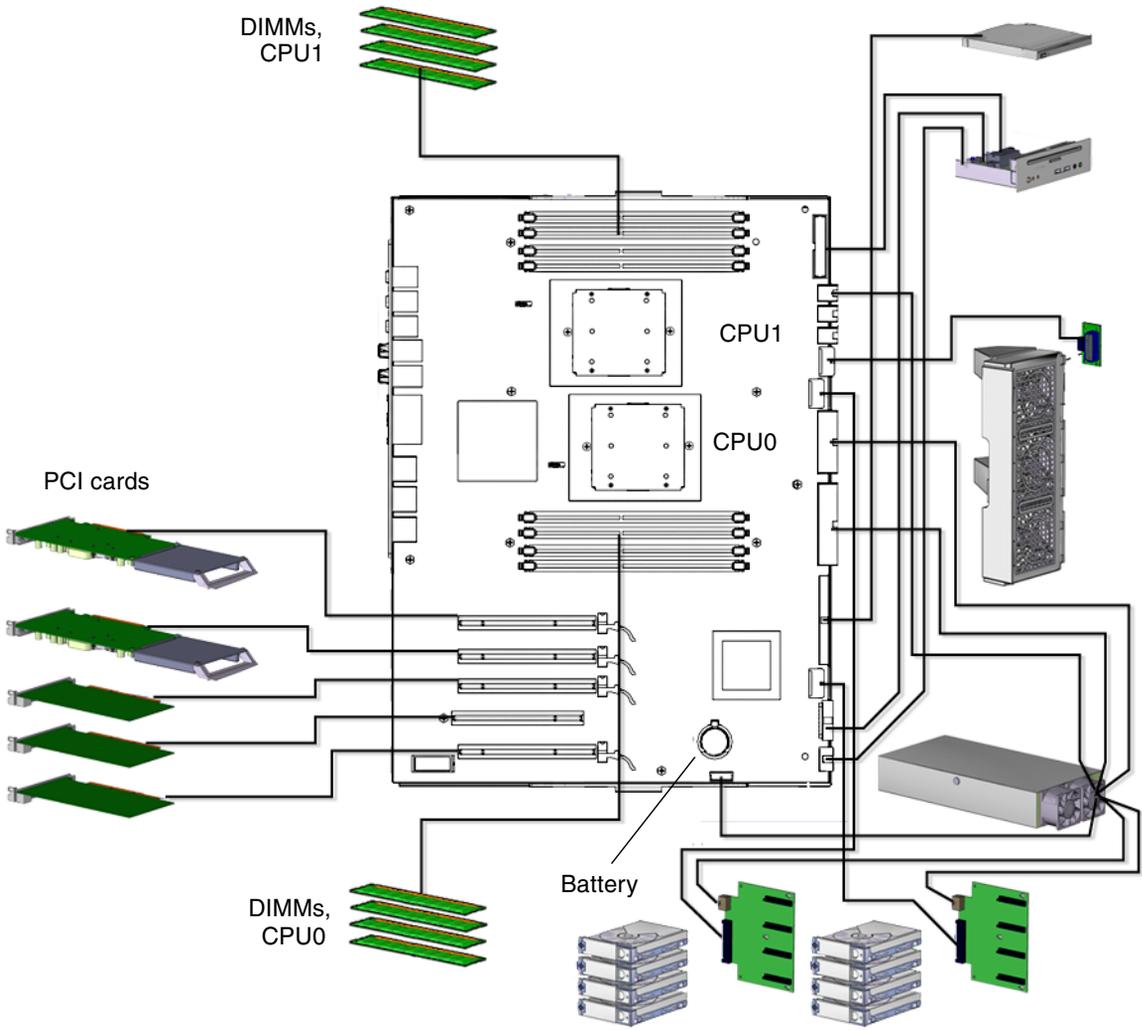


FIGURE 5-2 Ultra 40 M2 Motherboard Components

---

## 5.2 Replacing the DIMMs



---

**Caution** – DIMMs are installed in adjacent pairs. However, if you replace a single DIMM, the new DIMM must be identical to the DIMM that you removed.

---



---

**Caution** – Handle the DIMMs along the outside edges. *Do not* handle the DIMM along the gold contact edge. Do not touch DIMM components or other metal parts. Always wear an antistatic wrist strap when handling DIMMs.

---

### 5.2.1 DIMM Configuration Rules

Sun Ultra 40 memory is installed as pairs of DDR400 PC3200 Registered ECC DIMMs. Sun Ultra 40 M2 memory is installed as pairs of DDR2-667 DIMMs.

The DIMMs in a pair must be identical, from the same manufacturer with the same type and number of memory devices, the same amount of memory per device, and the same memory speed. All installed DIMMs must have the same memory speed.

- The minimum configuration is two 512-Mbyte DIMMs installed in slots 0 and 1.
- Connector slots 0, 1, 2, and 3 are for CPU0, and 4, 5, 6, and 7 are for CPU1. However, the second CPU does not require installed DIMMs. The workstation will operate with only two DIMMs installed in CPU0, even if it has two CPUs.
- DIMMs should be installed in the following order:



---

**Caution** – The Ultra 40 and Ultra 40 M2 DIMMs are numbered the same but located differently, and this difference is critical. On the Ultra 40, DIMM slots 0/1 and 4/5 are *closest* to their respective CPUs. On the Ultra 40 M2, DIMM slots 0/1 and 4/5 are *farthest* from their respective CPUs. See [FIGURE 5-4](#) and [FIGURE 5-5](#) respectively. The slot color coding and provisioning rules are the same.

---

The DIMM connectors on the motherboard are color-coded blue and black:

- Single-CPU systems:
  - 0/1 (black)
  - 2/3 (blue)
- Dual-CPU systems:
  - 0/1 (black)

4/5 (black)

2/3 (blue)

6/7 (blue)

- A single-CPU system cannot have DIMMs in any CPU1 slot (4 through 7).
- Memory should be evenly split across CPUs in a 2 CPU configuration or all on CPU0 in a 1 CPU configuration.
- Larger DIMM pairs go into the lower DIMM slots first.

TABLE 5-1 lists some common DIMM pair configurations.

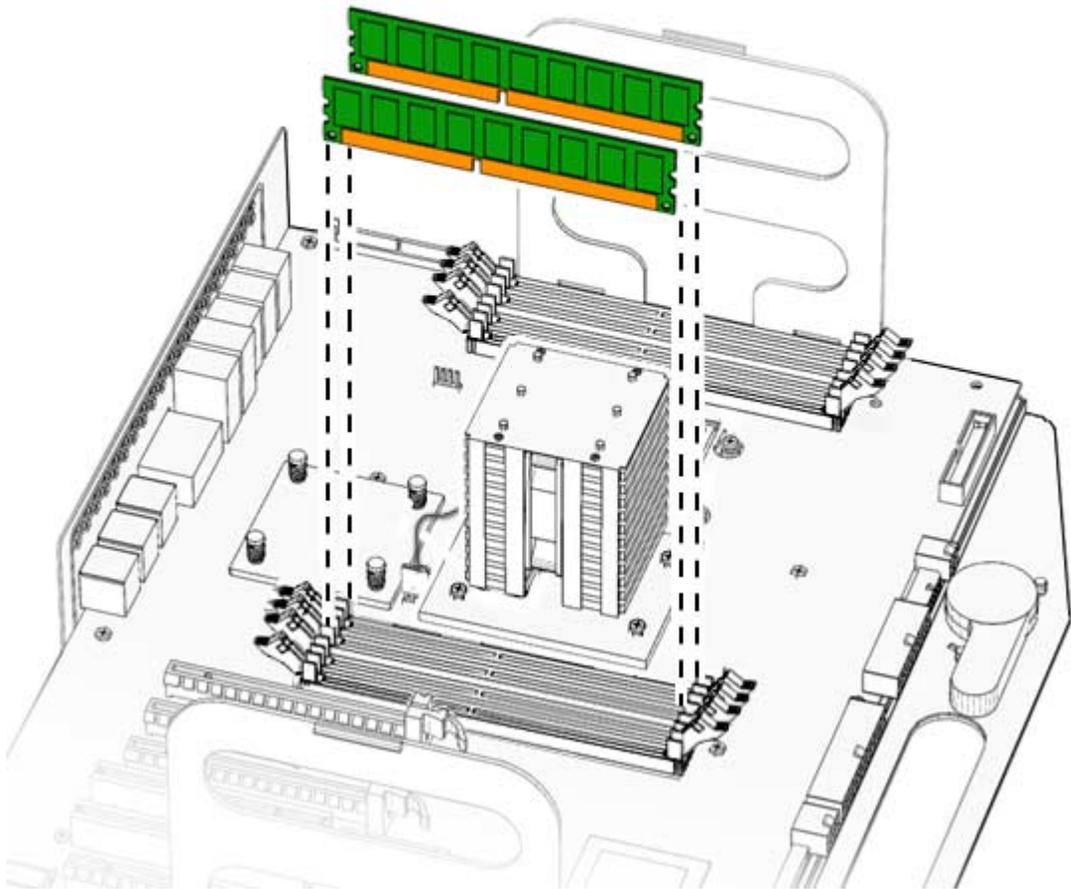
**TABLE 5-1** DIMM Pair Configuration

Memory	Installed DIMMs	Configuration
1 GB	2 x 512 MB	Standard (Ultra 40 only)
2 GB	2 x 1 GB	Standard
4 GB	4 x 1 GB	Standard
8 GB	8 x 1 GB	Optional
16 GB	8 x 2 GB	Optional
32 GB	8 x 4 GB	Optional

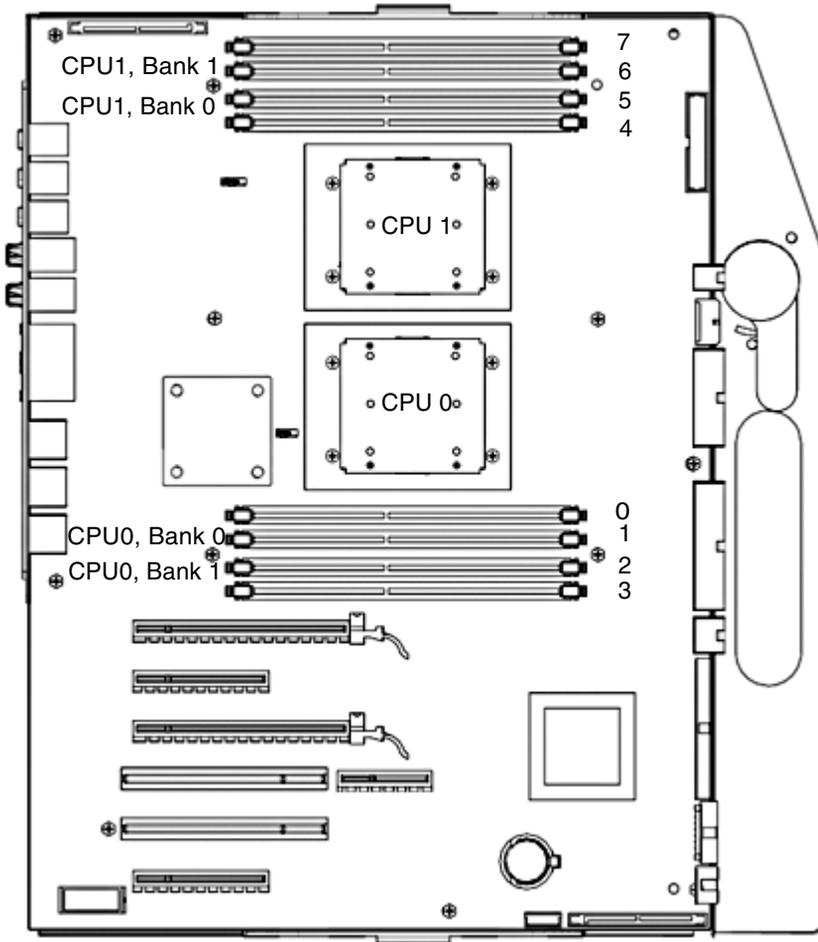
When your workstation boots, the BIOS checks for compatible memory modules. See [Section 5.2.4, “BIOS Memory Check”](#) on page 5-15 for additional information.

Before replacing DIMMs, verify that the latest version of BIOS, system firmware, and recommended system patches are installed on your system. If necessary, check the Sun System Handbook at SunSolve Online:

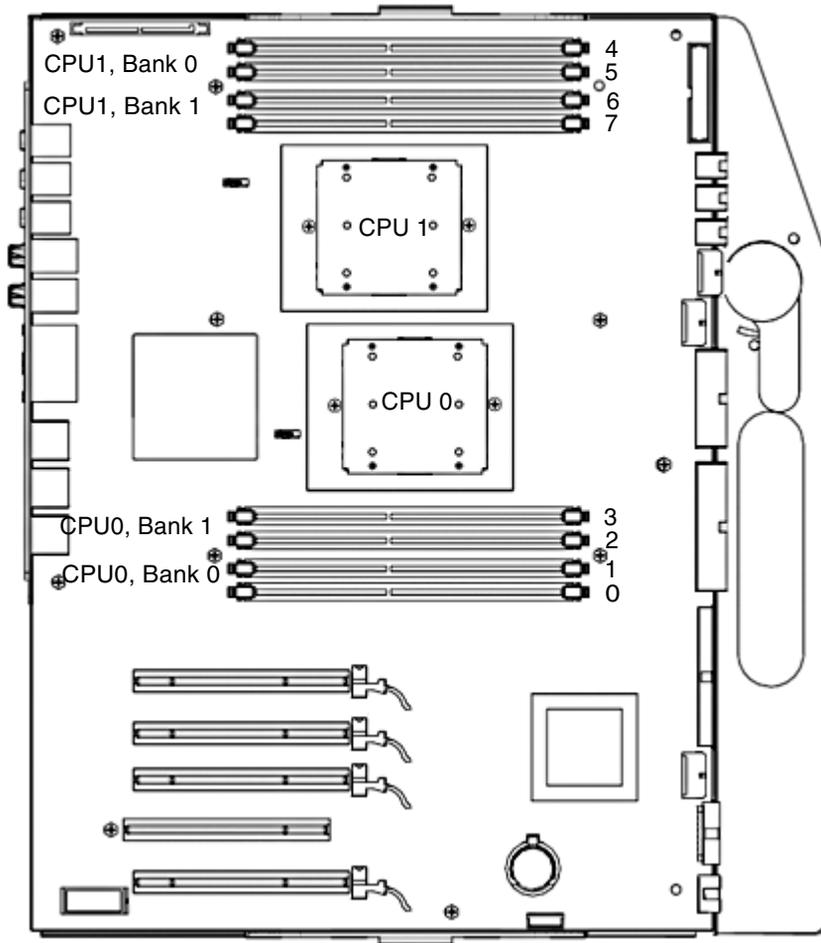
[http://sunsolve.sun.com/handbook\\_pub/](http://sunsolve.sun.com/handbook_pub/)



**FIGURE 5-3** Minimum DIMM Configuration (Ultra 40 shown)



**FIGURE 5-4** Ultra 40 DIMM Configurations for Single and Dual CPU

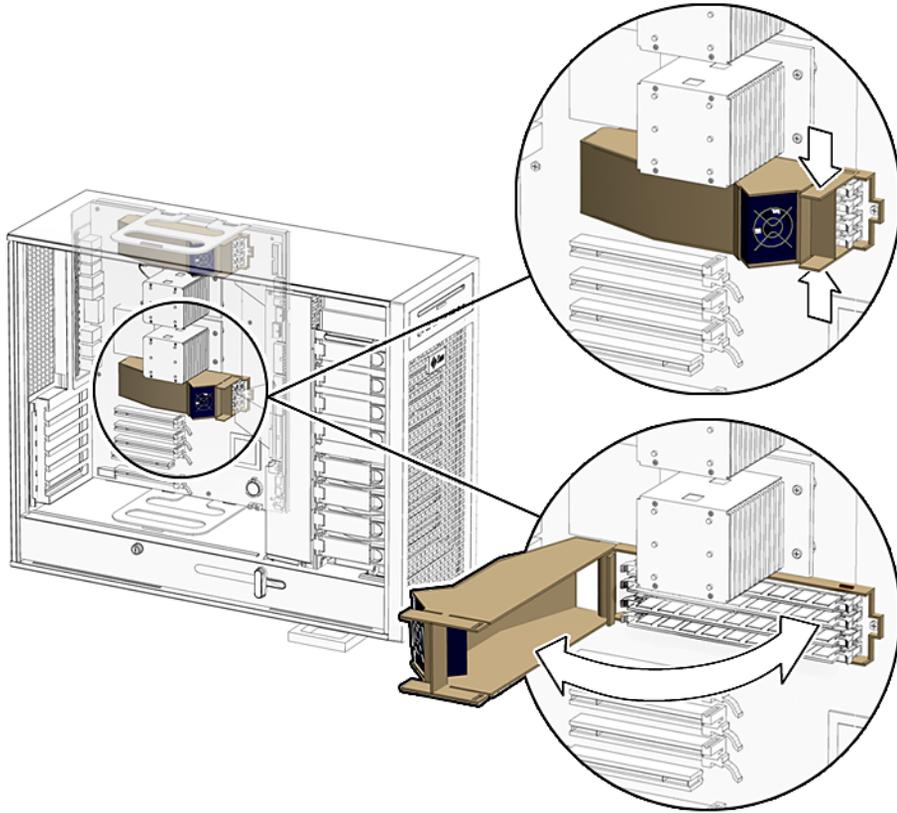


**FIGURE 5-5** Ultra 40 M2 DIMM Configurations for Single and Dual CPU

## 5.2.2 Removing the DIMMs

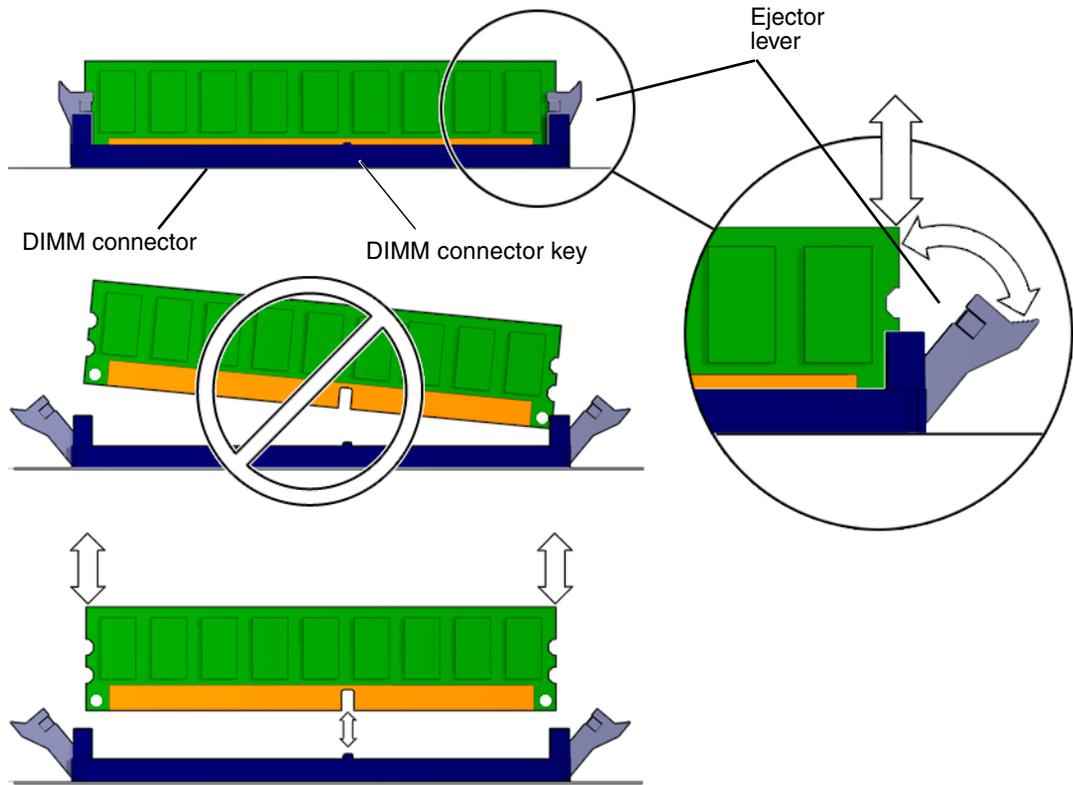
To remove the DIMMs:

1. Power off the system, open and position the chassis, and remove the access panel. Refer to [Section 4.3, "Preparing the Workstation for Servicing"](#) on page 4-4.
2. Open the memory cooler (Ultra 40 M2 Only).
  - a. Squeeze the latch until it releases.
  - b. Raise the housing to expose the DIMMs.  
See [FIGURE 5-6](#).



**FIGURE 5-6** Memory Cooler (Ultra 40 M2 Only)

3. Release the DIMM by simultaneously pressing down on both ejector levers at the ends of the DIMM slot.  
See [FIGURE 5-7](#).



**FIGURE 5-7** Releasing the DIMM

4. Lift the DIMM straight out of the DIMM slot.

See [FIGURE 5-7](#).




---

**Caution** – Handle the DIMMs along the outside edges. Do not handle DIMMs along the gold edge. Do not touch DIMM components or other metal parts. Always wear an antistatic wrist strap when handling DIMMs.

---




---

**Caution** – Do not lift the DIMM out of the DIMM slot at an angle. This can damage the edge connector for the DIMM or the DIMM slot.

---

5. Set the DIMM aside on an antistatic mat.
6. Repeat [Step 3](#) through [Step 5](#) until you have removed all relevant DIMMs.

## 5.2.3 Installing the DIMMs

Before installing new DIMMs, ensure they meet the following requirements:

- DIMMs should be installed in the following order. Note that the DIMM connectors on the motherboard are color-coded blue and black:



---

**Caution** – The Ultra 40 and Ultra 40 M2 DIMMs are numbered the same but located differently, and this difference is critical. On the Ultra 40, DIMM slots 0/1 and 4/5 are *closest* to their respective CPUs. On the Ultra 40 M2, DIMM slots 0/1 and 4/5 are *farthest* from their respective CPUs. See [FIGURE 5-4](#) and [FIGURE 5-5](#) respectively. The slot color coding and provisioning rules are the same.

---

- Single-CPU systems:
  - 0/1 (black)
  - 2/3 (blue)
- Dual-CPU systems:
  - 0/1 (black)
  - 4/5 (black)
  - 2/3 (blue)
  - 6/7 (blue)
- A single-CPU system cannot have DIMMs in any CPU1 slot (4 through 7).
- The DIMMs in a pair must be identical; they must be from the same manufacturer, with the same speed and the same architecture.
- All DIMMs in the system must have the same speed.

Before installing memory, verify that the latest version of BIOS, system firmware, and recommended system patches are installed on your system. If necessary, check the *Sun System Handbook* at SunSolve Online:

[http://sunsolve.sun.com/handbook\\_pub/](http://sunsolve.sun.com/handbook_pub/)



---

**Caution** – Use proper ESD grounding techniques when handling components.

Wear an antistatic wrist strap and use an antistatic mat.

Store ESD-sensitive components in antistatic bags before placing them on any surface. Do not remove any DIMM from its antistatic container until you are ready to install it.

Handle DIMMs only by the edges. Do not touch DIMM components or metal parts.

---

To install DIMMs:

1. **Power off the system, open and position the chassis, and remove the access panel.** Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.
2. **Remove the new DIMM from its antistatic container.**
3. **Review the recommended DIMM installation and configurations before installing the DIMM.**

See [FIGURE 5-4](#) (for Ultra 40) and [FIGURE 5-5](#) (for Ultra 40 M2), and refer to [Section 5.2, “Replacing the DIMMs”](#) on page 5-5.



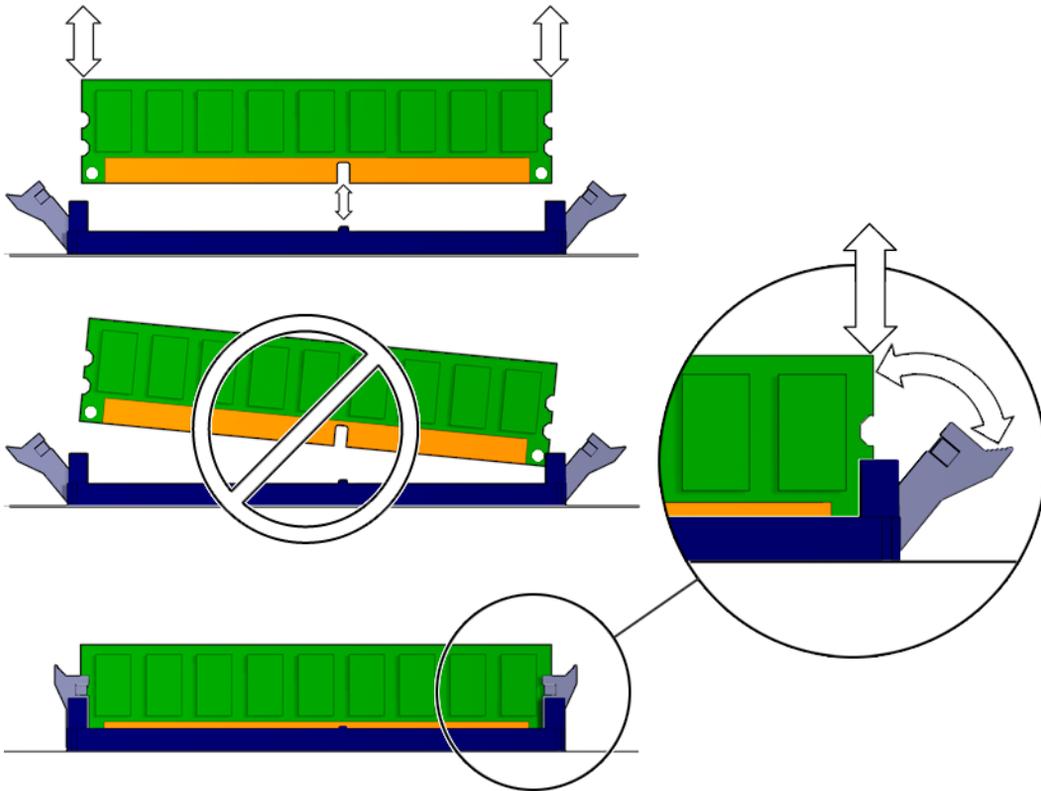
---

**Caution** – If you replace a single DIMM, the replaced DIMM must be identical to the one that you removed.

---

4. **Align the DIMM notch to the DIMM connector key.**

See [FIGURE 5-8](#).



**FIGURE 5-8** Aligning and Securing the DIMM to the DIMM Connector Slot

5. Using both thumbs, press the DIMM straight down into the DIMM connector slot until both ejector levers close, locking the DIMM in the DIMM connector slot.

See [FIGURE 5-8](#).

---

**Note** – The DIMMs must be inserted evenly, straight down into the DIMM connector slot, until the ejector levers lock into place.

---

The DIMM is seated when you hear a click and the ejector levers are in the vertical position.

6. Repeat [Step 4](#) through [Step 5](#) until all DIMMs are installed.
7. Verify that the DIMM ejector levers are upright, seated, and tight.
8. Close the memory cooler as shown in [FIGURE 5-6](#) (Ultra 40 M2 only).

9. Install the side cover and the access panel, power on the system, and verify the installation.

Refer to [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

## 5.2.4 BIOS Memory Check

---

**Note** – Before installing DIMMs, verify that the latest version of BIOS, system firmware, and recommended system patches are installed on your system.

---

During system startup, BIOS checks for DIMM type and DIMM manufacturer, and signals what it finds. [TABLE 5-2](#) shows the result and the action taken by the BIOS.

**TABLE 5-2** BIOS Memory Check Actions

Check Result	Action Taken
Wrong DIMM type	System beeps three times and powers off.
DIMMs in a pair have different architecture	The DIMMs in a pair must have the same architecture. While the system might continue to boot, dissimilar DIMMs in a pair are not supported.
DIMMs in a pair are from different manufacturers	The DIMMs in a pair must be from the same manufacturer. While the system might continue to boot, DIMM pairs from different manufacturers are not supported.

---

**Note** – If you have only one DIMM pair installed and the DIMMs have a different architecture, the system beeps three times and powers off. No message is displayed.

---

Each CPU has four memory slots and two banks. The two black slots comprise physical Bank 0 and the two blue slots comprise physical Bank 1. See [FIGURE 5-4](#) (for Ultra 40) and [FIGURE 5-5](#) (for Ultra 40 M2).

BIOS references memory by bank if a problem is found. For example, if each DIMM of a DIMM pair is from a different manufacturer the following error is displayed:

NOTICE - CPU0 Bank 0 DIMMS are from different vendors.

This message means that each of the two DIMMs in the Bank 0 slots comes from a different manufacturer. The system still attempts to use the DIMMs, but this configuration is not supported.

NOTICE - CPU0 Bank 1 DIMMs have different architectures and will not be used.

This message means that each of the two DIMMs in the blue slots has a different internal memory layout. The system does not use the DIMMs.

A system must have at least one functional pair of DIMMs to display a message. A system with more than one pair of DIMMs might display more than one message.

---

## 5.3 Replacing the Battery

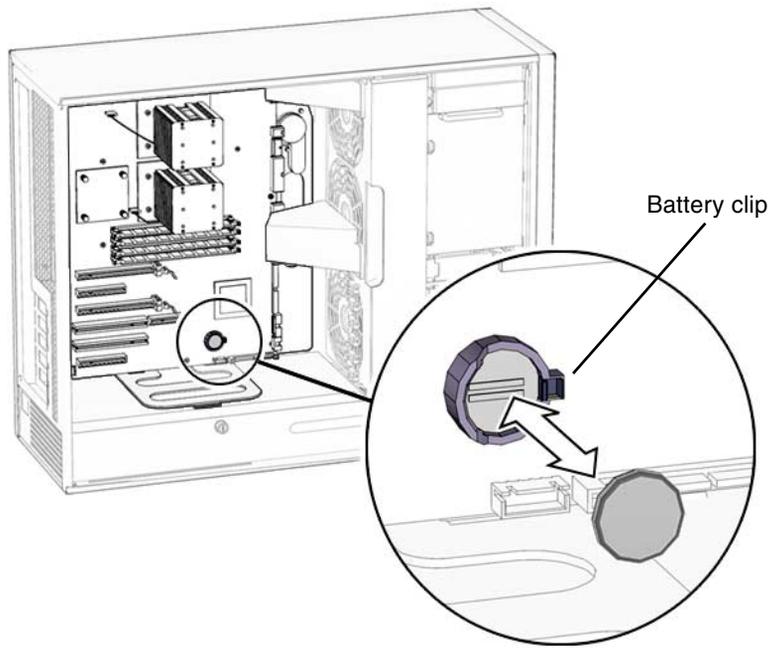
This section describes removal and installation of the battery.

The battery is a CR 2032, part number is F371-2210-01.

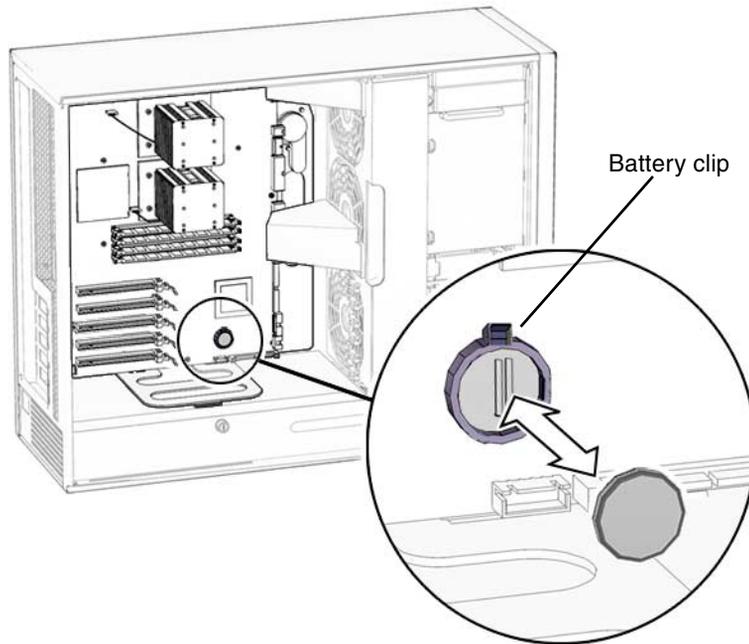
### 5.3.1 Removing the Battery

To remove the battery:

- 1. Power off the system, open and position the chassis, and remove the access panel.**  
Refer to [Section 4.3, "Preparing the Workstation for Servicing"](#) on page 4-4.
- 2. Release the battery by pressing the battery clip away from the battery until the battery shifts out of the battery socket.**  
See [FIGURE 5-9](#) for Ultra 40 and [FIGURE 5-10](#) for Ultra 40 M2.
- 3. Remove the battery.**



**FIGURE 5-9** Removing the Battery From the Motherboard, Ultra 40



**FIGURE 5-10** Removing the Battery From the Motherboard, Ultra 40 M2

TABLE 5-3 lists the battery specifications.

**TABLE 5-3** Battery Specifications

Specification	Value
Voltage	3 VDC
Type	CR 2032

---

**Note** – The workstation does not function without the battery.

---

## 5.3.2 Installing the Battery

The battery fits directly into a socket on the motherboard. There are no additional fasteners or cables.

To install the battery:

1. Identify the battery installation site, as shown in [FIGURE 5-9](#).
2. Position the battery over the battery socket with the plus (+) side up.
3. Press the battery down into the socket until the battery clicks into place.
4. Install the side cover and the access panel, power on the system, and verify the installation.

Refer to [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

## 5.4 Replacing PCI Cards

This section describes the removal and installation of PCI cards in the workstation.

### 5.4.1 General PCI Guidelines

The Ultra 40 motherboard supports six PCI connectors, as listed in [TABLE 5-4](#).

**TABLE 5-4** Ultra 40 PCI Card Connector Specifications

PCI Card Slot	Supported Speed	Power Connector
PCI-E3	x16	From GFX2_PWR_IN (6-pin Y-adapter)
PCI-E2	x4 (Mechanically x8)	None
PCI-E1	x16	From GFX1_PWR_OUT (6-pin to 6-pin)
PCI-1	33 MHz	None
PCI-0*	33 MHz	None
PCI-E0	x4 (Mechanically x8)	None

\* This slot can accept a 64-bit long card.

The Ultra 40 M2 motherboard supports five PCI connectors, as listed in [TABLE 5-4](#).

**TABLE 5-5** Ultra 40 M2 PCI Card Connector Specifications

PCI Card Slot	Supported Speed	Power Connector
PCI-E3	x16	From GFX2_PWR_OUT (6-pin 6-pin)
PCI-E2	x8 (Mechanically x16)	None
PCI-E1	x16	From GFX1_PWR_OUT (6-pin to 6-pin)

**TABLE 5-5** Ultra 40 M2 PCI Card Connector Specifications *(Continued)*

PCI Card Slot	Supported Speed	Power Connector
PCI-0*	33 MHz	None
PCI-E0	x8 (Mechanically x16)	None

\* This slot can accept a 64-bit long card.

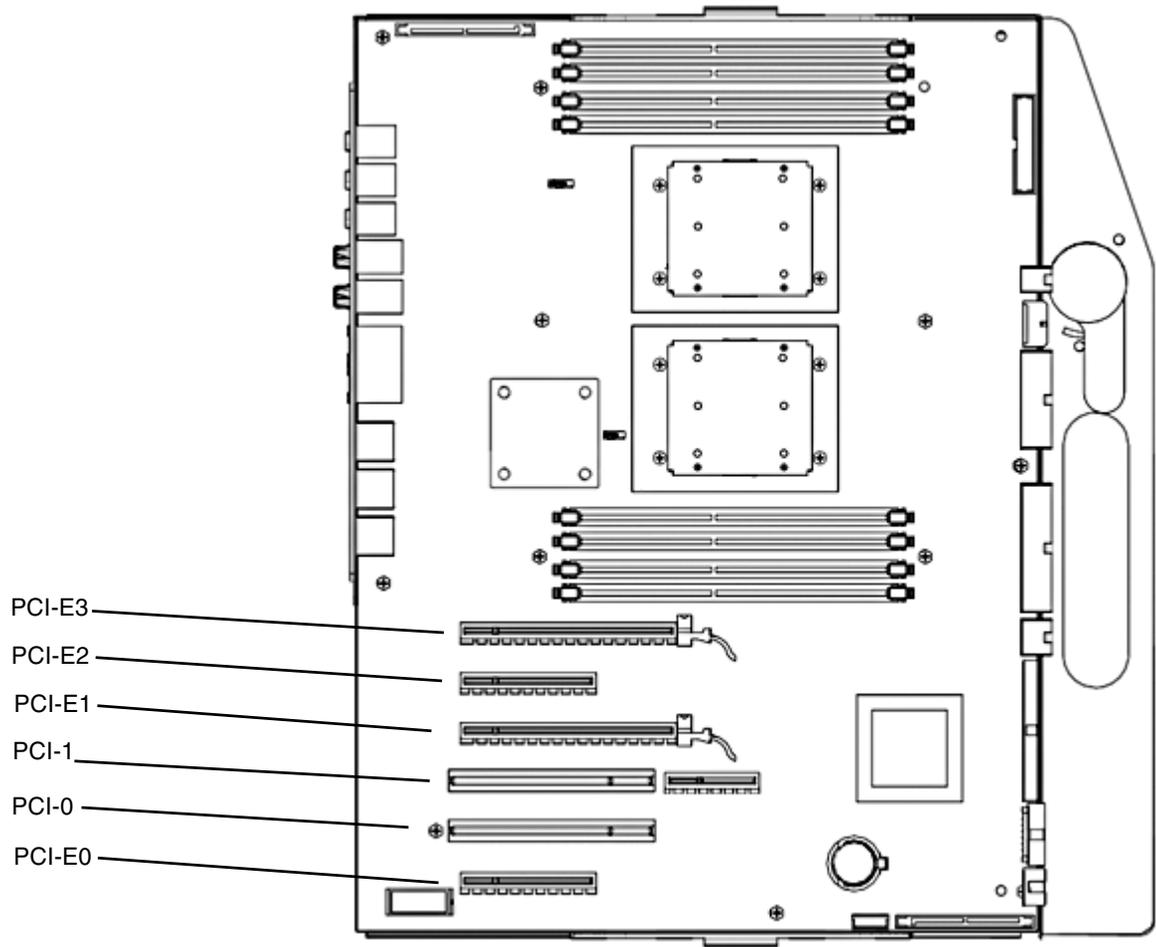
The card in PCI-E1 is designated the default console display and assigned the aliases `screen` and `/dev/fb`. You can move it to PCI-E3, but you must reconfigure the BIOS.

Each x16 slot without supplemental power can supply 75W.

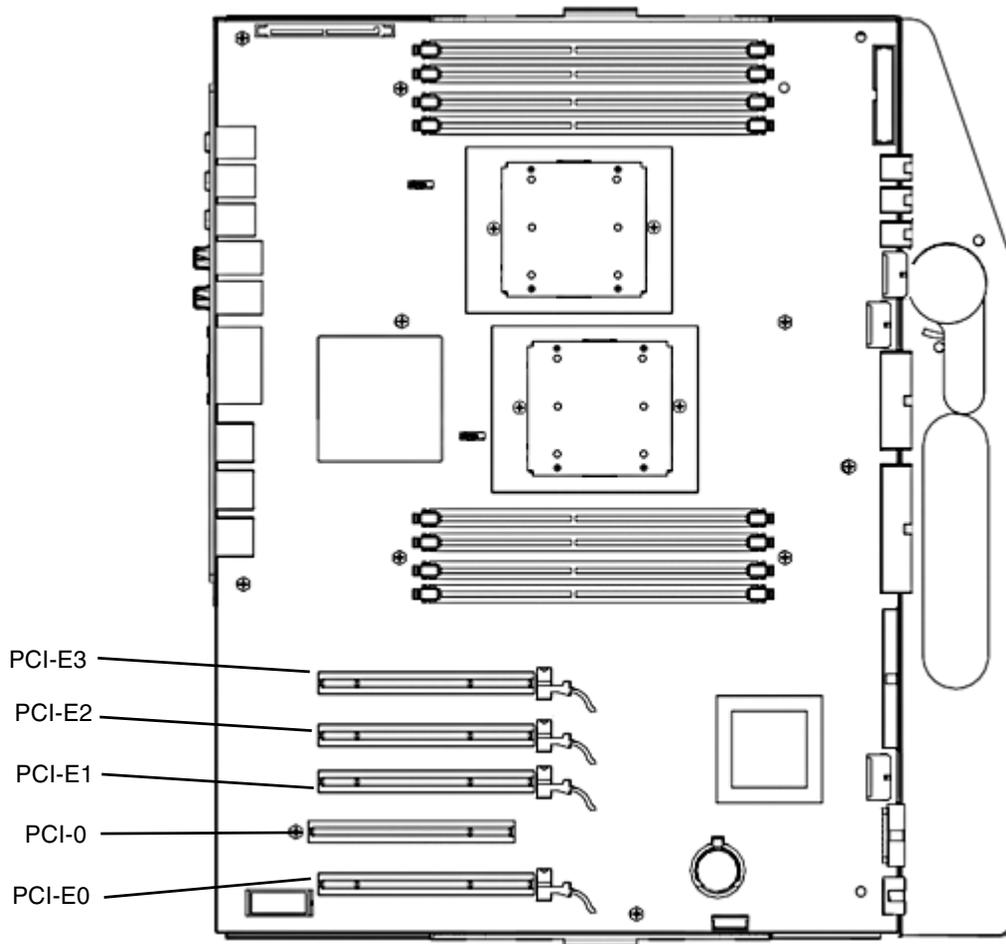
When used with supplemental power, PCI-E1 and PCI-E3 each support a maximum power draw of 150W. This is sufficient for the NVIDIA Quadro FX 4500/5500 or the Quadro FX 3450/3500 3-D PCI E graphics cards supported for that configuration.

## 5.4.2 PCI Card Locations

[FIGURE 5-11](#) shows the location of PCI cards on the Ultra 40. [FIGURE 5-12](#) shows the location of PCI cards on the Ultra 40 M2.



**FIGURE 5-11** Ultra 40 PCI Card Location and Identification



**FIGURE 5-12** Ultra 40 M2 PCI Card Location and Identification

### 5.4.3 Graphics Accelerators

The PCI configuration includes two supplementary power cables used for either the NVIDIA Quadro FX4500/5500 or the Quadro FX3450/3500 graphics cards. The connectors appear in [FIGURE 5-18](#) and [FIGURE 5-19](#).

For Ultra 40:

- The cable from GFX1\_PWR\_OUT provides power to the card in PCI-E1.
- The six-pin Y-adapter in connector P4 provides power to the card in PCI-E3.

For Ultra 40 M2:

- The cable from GFX1\_PWR\_OUT provides power to the card in PCI-E1.
- The cable from GFX2\_PWR\_OUT provides power to the card in PCI-E3.
- If a third card requires power, a Y-adaptor from GFX1\_PWR\_OUT provides power.
- If a fourth card requires power, a Y-adaptor from GFX2\_PWR\_OUT provides power.

The NVIDIA Quadro FX 4500/5500 is a double width card. It is not possible to install more than two in a system (either Ultra 40 or Ultra 40 M2). The Ultra 40 M2 can support up to 4 FX3500, FX1500, FX560 or NVS 285 graphics cards.

## 5.4.4 Enabling SLI

This section describes how to enable SLI.

TABLE 5-6 lists the PCI cards and configurations.

**TABLE 5-6** High-Performance PCI Cards

PCI Card	Type	Maximum Configuration
Quadro FX 5500	Ultra High-End 3D	2 cards for Ultra 40 2 cards for Ultra 40 M2
Quadro FX 4500	Ultra High-End 3D	2 cards for Ultra 40
Quadro FX 3500	High-End 3D	2 cards for Ultra 40 4 cards for Ultra 40 M2
Quadro FX 3450	High-End 3D	2 cards for Ultra 40
Quadro FX 1500	Mid-Range 3D	2 cards for Ultra 40 4 cards for Ultra 40 M2
Quadro FX 560	Entry 3D	2 cards for Ultra 40 4 cards for Ultra 40 M2
Quadro NVS 285	Professional 2D	1 card for Ultra 40 4 cards for Ultra 40 M2

To enable SLI, you need two of same cards installed. The following graphics cards are supported for SLI operation:

- FX3500
- FX5500

If these cards are already installed in your workstation, the SLI connector will be already installed. If you still need to install one or both cards, follow the instructions in [Section 5.4.6, “Installing a PCI Card” on page 5-28](#).

---

**Note** – Before enabling SLI, you will need to install the display drivers from the Ultra 40 Workstation Tools and Drivers CD. See instructions for installing drivers in the *Ultra 40 Workstation Operating System Installation*, part number 819-7577-01.

---

### *Enabling SLI for Windows XP*

To enable SLI for Windows XP:

1. **Right-click on the desktop or click on the NVIDIA setting icon located on the taskbar and select nvidia display -> (select your monitor).**
2. **Select SLI-Multi GPU and select the enable SLI multi-GPU checkbox.**  
A message will appear stating that SLI is enabled and that a reboot is required.
3. **Reboot the workstation.**

### *Enabling SLI for Linux*

To enable SLI for Linux operating systems:

1. **Log in to the workstation as root (superuser).**
2. **Run the command:**  

```
# nvidia-xconfig --sli=on
```

This will modify the X configuration file automatically
3. **Reboot the workstation.**
4. **Refer to the readme for more information on configuring the different operation modes. The readme files are located at:**

- On the hard drive after the display drivers are installed:  
`/usr/share/doc/NVIDIA_GLX-1.0/readme.txt` *or*
- On the Tools and Drivers CD at: `/drivers/linux/OS/display/readme.txt`.  
Where *OS* is `red_hat` or `suse`.

## 5.4.5 Removing a PCI Card

To remove a PCI card:

1. **Power off the system, open and position the chassis, and remove the access panel.**  
Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.
2. **If there is an auxiliary PCI card power cable, disconnect it from the PCI card.**
3. **Using a No. 2 Phillips screwdriver, remove the screw that secures the PCI card retainer to the chassis rear panel.**

See [FIGURE 5-13](#). Place the screw aside in a container.

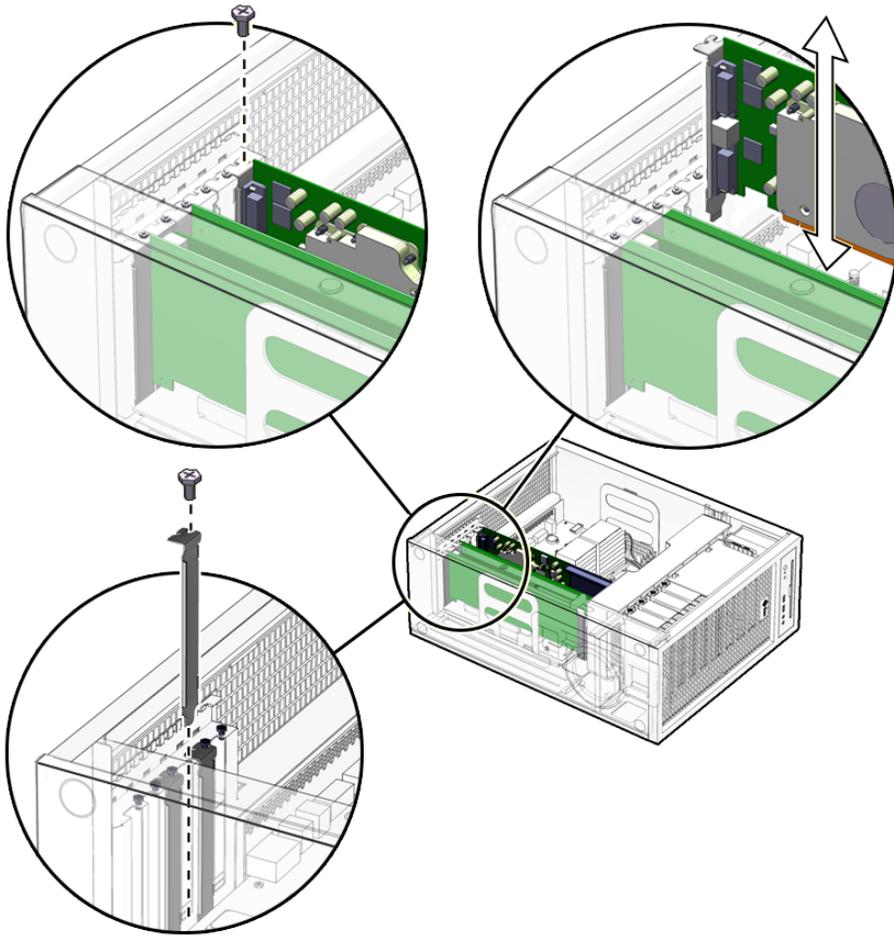


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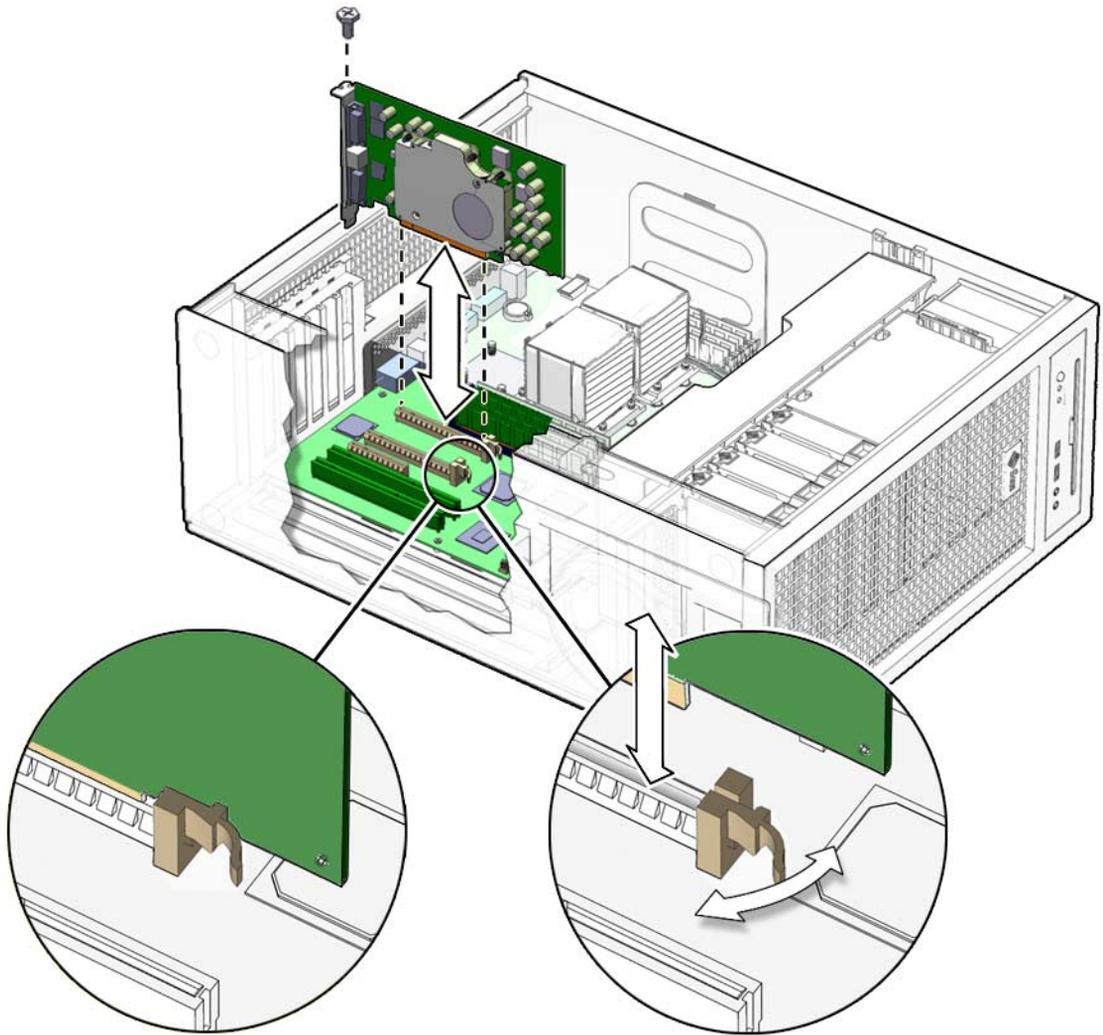
**Caution** – If you are removing a graphics accelerator from a PCI Express connector, ensure that you release the PCI-X connector latch. See [FIGURE 5-14](#).

---

4. **Gently rock the PCI card forward, then lift it straight out of the PCI card slot, and place it aside on an antistatic mat.**



**FIGURE 5-13** Removing the PCI Card Screws (Ultra 40 Shown)



**FIGURE 5-14** Releasing the PCI Card Latches and Removing a PCI Card (Ultra 40 Shown)

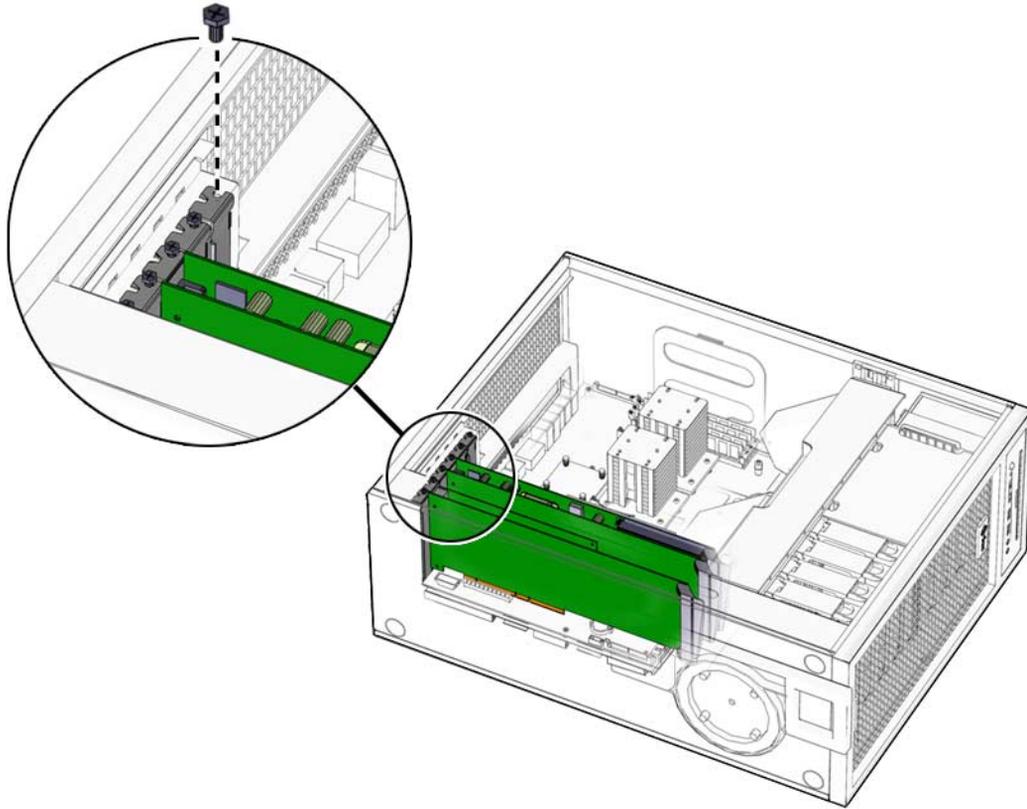
**5. If you are not installing another PCI card in the empty slot:**

**a. Insert a filler panel into the rear panel slot.**

The rear panel slot must be closed with a filler panel to meet system EMI and airflow requirements. See [FIGURE 5-15](#).

b. Install the side cover and the access panel, power on the system, and verify the installation.

Refer to [Section 8.1, "Reassembling the Workstation"](#) on page 8-1.



**FIGURE 5-15** Installing a PCI Card Filler Panel (Ultra 40 Shown)

## 5.4.6 Installing a PCI Card

Before installing a PCI card, refer to [Section 5.4.1, "General PCI Guidelines"](#) on page 5-19 and [Section 5.4.3, "Graphics Accelerators"](#) on page 5-22.

If the card is going to use SLI, see [Section 5.4.4, "Enabling SLI"](#) on page 5-23.

To install a PCI card:

**1. Power off the system, open and position the chassis, and remove the access panel.**  
Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.

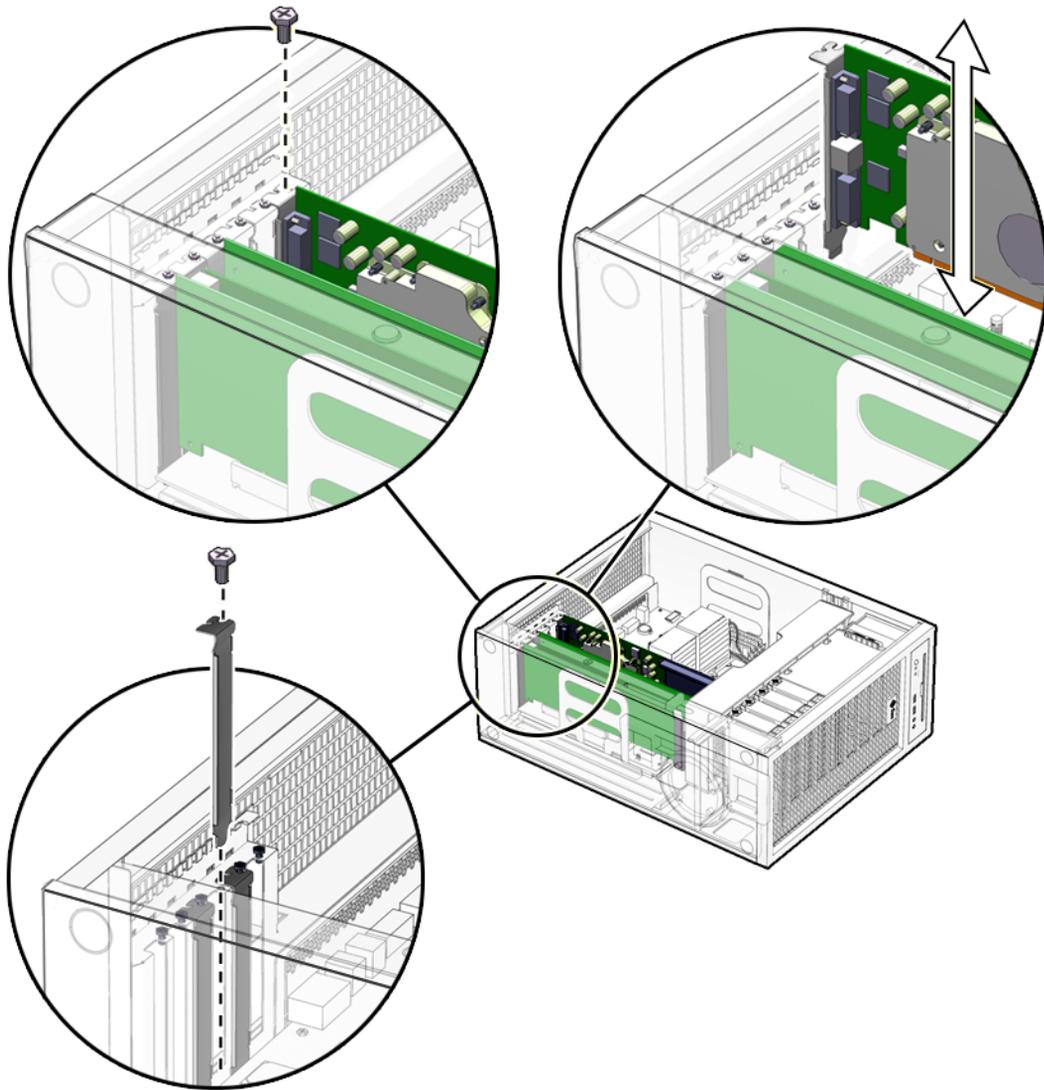
**2. Locate the available PCI card slots.**

If you are installing an additional PCI card, ensure that you install it in an appropriate slot. See [Section 5.4.1, “General PCI Guidelines”](#) on page 5-19.

**3. Use the No. 2 Phillips screwdriver to remove the chassis filler panel from the PCI card slot that you wish to use.**

Some PCI cards require use two slots. If necessary, remove a second chassis filler panel to accommodate these cards.

See [FIGURE 5-16](#).



**FIGURE 5-16** Opening the PCI Card Retainer(Ultra 40 Shown)

**4. Remove the new PCI card from its antistatic container.**

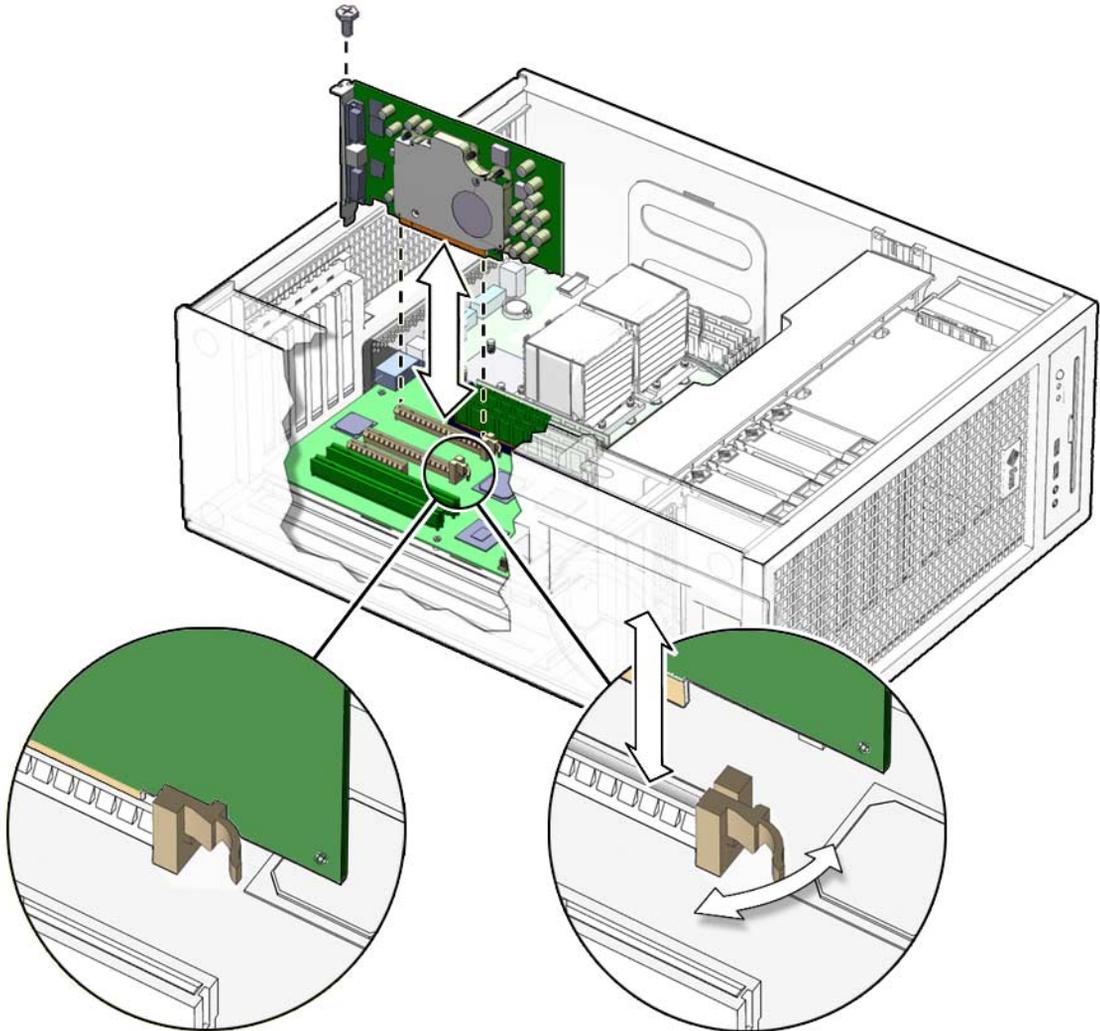


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**Caution** – Incorrect handling can damage the PCI card. Handle the PCI card along the outside edges. Do not handle the PCI card along the contact edge. If you are installing a long PCI E card, be sure to engage the PCI E connector latch.

---

5. Position the PCI card so that the PCI bracket aligns with the chassis rear panel slot and the PCI card edge aligns with the motherboard PCI card slot.
6. Insert the PCI card into the PCI card slot.  
If you are installing a long PCI Express card, be sure to engage the PCI E connector latch. See [FIGURE 5-17](#).



**FIGURE 5-17** Installing the PCI Card (Ultra 40 Shown)

7. Firmly press the PCI card straight down into the PCI card slot until it is fully seated in the slot.

8. Use a No. 2 Phillips screwdriver to fasten the screw that secures the PCI card retainer.

See [FIGURE 5-17](#).

9. For NVIDIA Quadro FX 4500, FX5500, FX3450 or FX3500 3-D PCI E Gfx cards in that require supplemental power, connect the supplemental power cables as follows:

For the Ultra 40:

- In PCI-E1, connect the cable from GFX1\_PWR\_OUT.
- In PCI-E3, connect the 6-pin end from the Y-adaptor attached to connector P4.

For the Ultra 40 M2:

- In PCI-E1, connect the cable from GFX1\_PWR\_OUT.
- In PCI-E3, connect the cable from GFX2\_PWR\_OUT.
- For a third card, connect the splitter from GFX1\_PWR\_OUT.
- For a fourth card, connect the splitter from GFX2\_PWR\_OUT.

10. Inspect the PCI card fasteners to verify the following:

- The PCI card panel slot screws are tight.
- The PCI cards are secure in the connectors.
- All supplemental power connectors are connected properly.

11. If you are finished working, install the side cover and the access panel, power on the system, and verify the installation.

Refer to [Section 8.1, "Reassembling the Workstation"](#) on page 8-1.

---

**Tip** – Boot the workstation with the `-r` option, so that the Solaris operating system can reconfigure itself for the new component. See [Section 8.1, "Reassembling the Workstation"](#) on page 8-1.

---

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## 5.5 Replacing the Motherboard Tray Assembly

This section describes the removal and installation of the motherboard tray assembly.



---

**Caution** – This procedure is intended for Sun authorized service providers only.

---

## 5.5.1 Identifying the Motherboard Tray Assembly

The motherboard tray assembly is a single replaceable unit consisting of the motherboard and CPUs. See [FIGURE 5-20](#).

CPUs are also available separately. See [Section 5.3, “Replacing the Battery”](#) on page 5-16.

[FIGURE 5-18](#) shows the connectors and slots on the motherboard.

---

**Note** – Do not unscrew the motherboard from the tray assembly.

---

## 5.5.2 Removing the Motherboard Tray Assembly

To remove the motherboard tray assembly:

- 1. Power off the system, open and position the chassis, and remove the access panel.**  
Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.
- 2. Disconnect all external cables from the back panel.**
- 3. If necessary, remove the PCI cards.**  
Refer to [Section 5.4.5, “Removing a PCI Card”](#) on page 5-25  
Place these components onto an antistatic mat.

4. Disconnect the following power and signal cables from the corresponding motherboard connectors and set them out of the way of the motherboard.

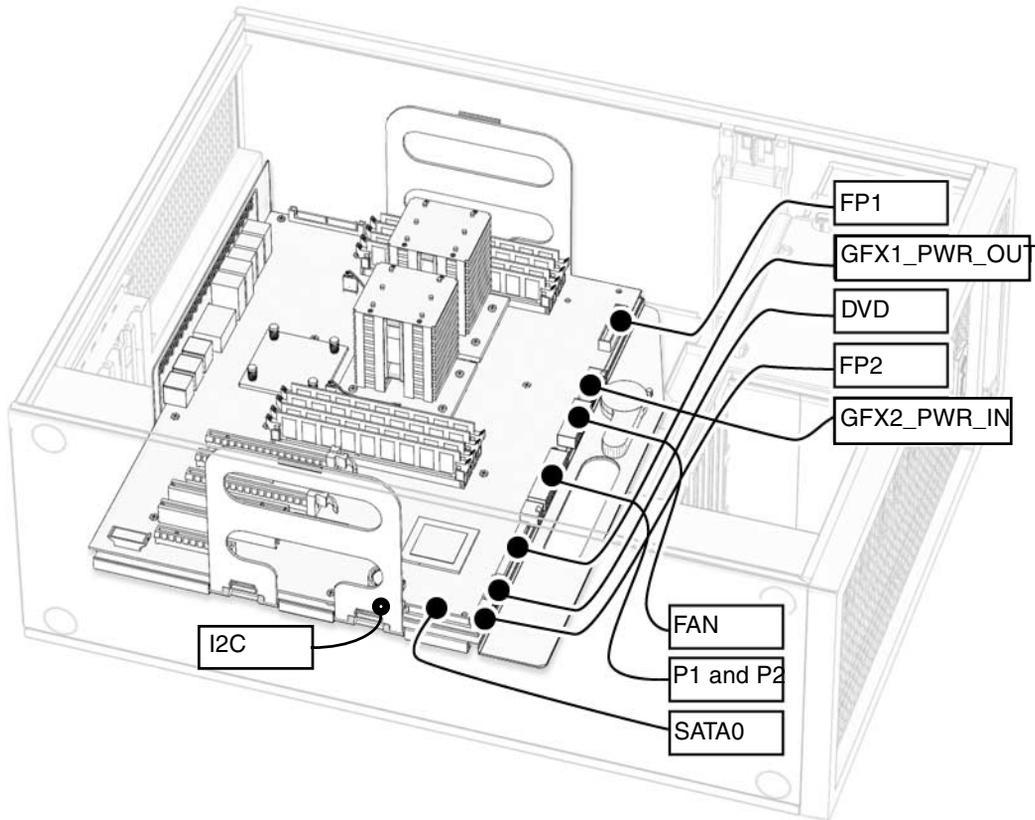
TABLE 5-7 lists the connectors. See FIGURE 5-18 for Ultra 40 and FIGURE 5-19 for Ultra 40 M2.

**TABLE 5-7** Motherboard Connectors

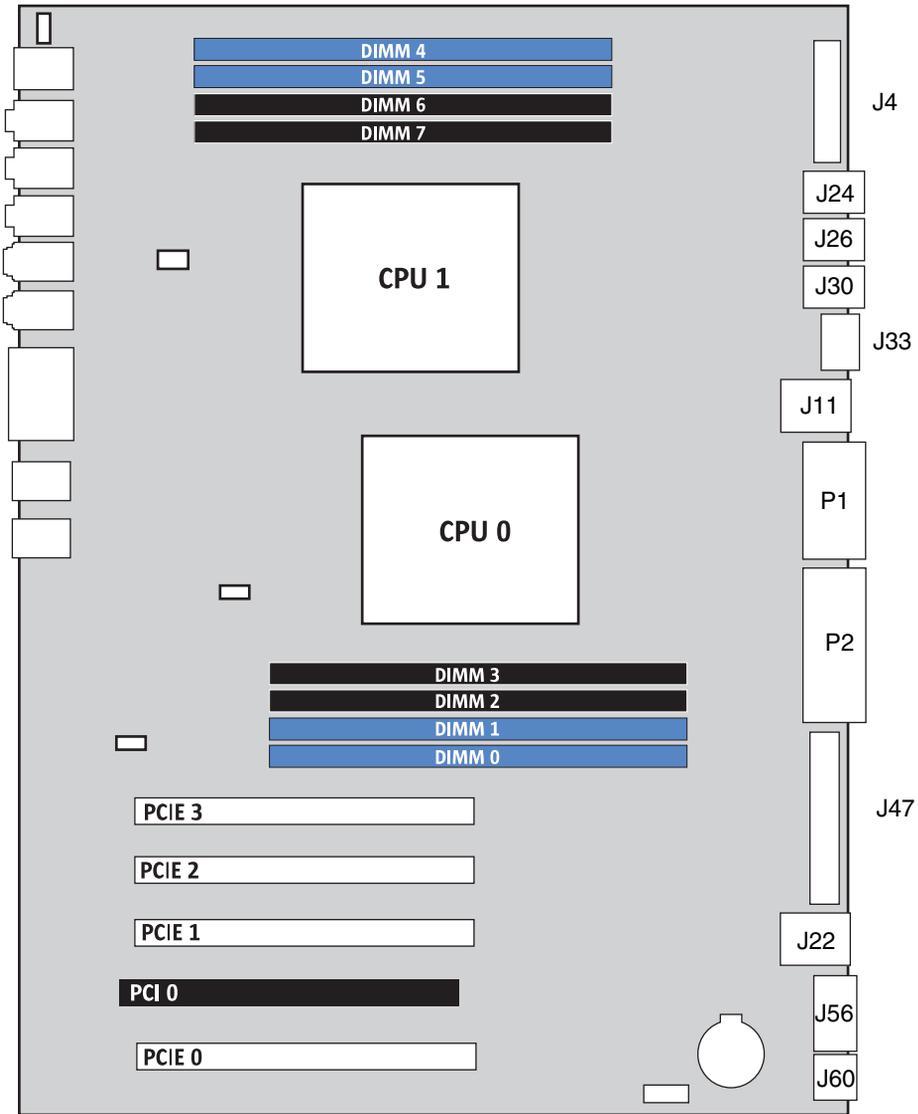
Connector	Function/Destination
<b>Ultra 40</b>	
FP1	I/O Signal
GFX2_PWR_IN	Power for NVIDIA Quadro FX /4500/5500 or Quadro FX 3450/3500 graphics card in PCI-E3
FAN	Power for fan backplane
P1 and P2	Power for motherboard
GFX1_PWR_OUT	Power for NVIDIA Quadro FX /4500/5500 or Quadro FX 3450/3500 graphics card in PCI-E1
DVD	Ribbon cable with signal to DVD
FP2	Unused
FP3	I/O power
SATA0	Signal for hard drive backplane
I2C	Power supply environmental monitor
<b>Ultra 40 M2</b>	
J4	FP1 – Connection from the front I/O board (power on, LED blink, audio, etc)
J24	GFX2_PWR_IN – connection from P4 of the power supply
J26	GFX1_PWR_Out – goes to PCIe slot if Graphics card needing supplemental power is installed
J30	GFX2_PWR_out – goes to PCIe slot if Graphics card needing supplemental power is installed (for second card)
J33	Fan – Power for fan backplane
J11	SATA2 from the second HDD backplane (HDD4 to HDD7) (optional)
P1 and P2	Power for motherboard
J47	Ribbon cable with signal to DVD

**TABLE 5-7** Motherboard Connectors

Connector	Function/Destination
J22	SATA1 from first HDD backplane for HDD0 to HDD3
J56	FP2 – Second cable from the front I/O board
J60	FP2 – Third cable from the front I/O board



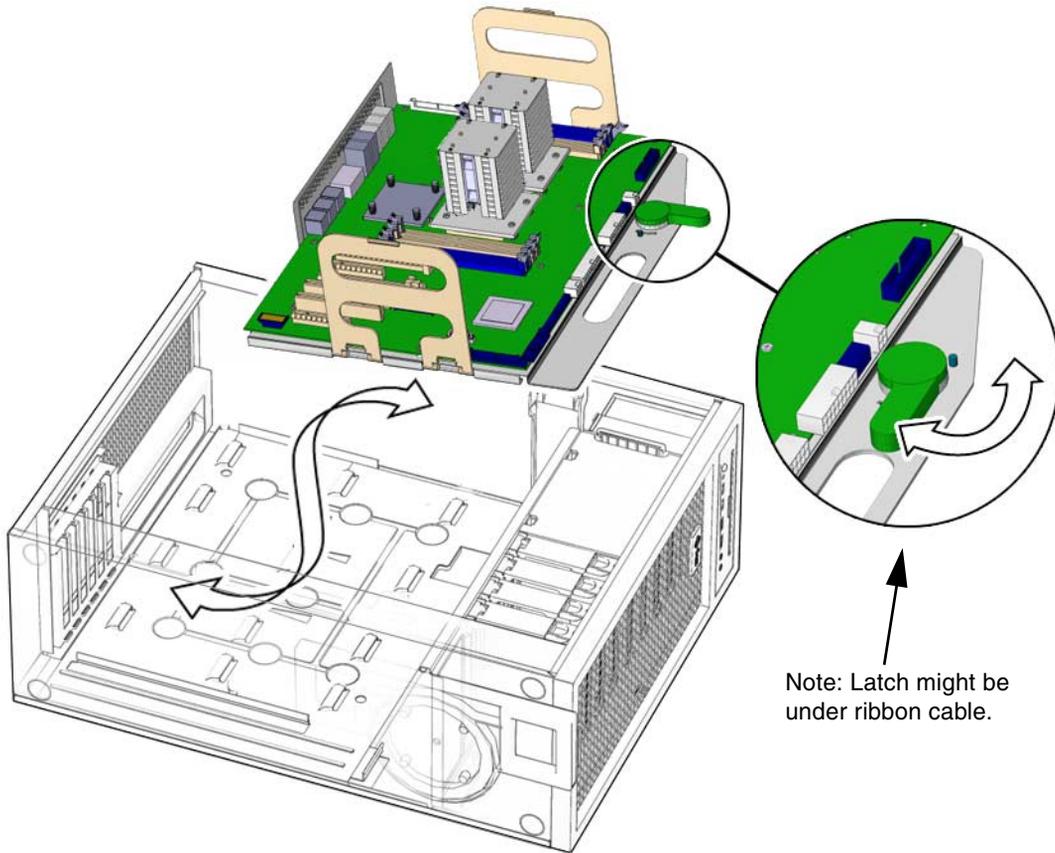
**FIGURE 5-18** Motherboard Connectors for Ultra 40



**FIGURE 5-19** Motherboard Connectors for Ultra 40 M2

5. Turn the motherboard latch 90 degrees counterclockwise.

See [FIGURE 5-20](#).



**FIGURE 5-20** Motherboard, Tray, and Latch (Ultra 40 Shown)

6. Move the cables out of the way.

7. Using the handles on the tray assembly, tilt the motherboard to one side and lift it until it is free of the chassis.

See [FIGURE 5-20](#).

8. Place the motherboard on an antistatic mat.

Proceed to [Section 5.5.3, "Installing the Motherboard Tray Assembly"](#) on page 5-39 to install the new motherboard.

## 5.5.3 Installing the Motherboard Tray Assembly

To install the motherboard tray assembly:

1. Remove the new motherboard tray assembly from its antistatic package and place it on an antistatic mat.
2. Move all cables out of the way.
3. Align the tray assembly's rear panel connectors with the matching holes in the rear panel.
4. Gently lower the tray assembly while tilting it down.  
See [FIGURE 5-20](#).
5. Align the tray assembly so that the hooks fit into the holes of the tray.



---

**Caution** – Ensure that the hooks are located in the holes. Improper alignment might damage the motherboard.

---

6. Turn the tray assembly latch 90 degrees clockwise to secure the motherboard.  
Ensure that the motherboard connector panel aligns with the chassis rear panel.
7. Connect the cables to the corresponding motherboard connectors. See [TABLE 5-7](#) and [FIGURE 5-18](#).
8. Install the PCI cards.  
Refer to [Section 5.2, “Replacing the DIMMs”](#) on page 5-5.
9. Inspect the motherboard to verify the following:
  - All cable connections are tight and cable clips are secured.
  - All cables are routed correctly, where they will not interfere with other equipment.



---

**Caution** – Take particular care to ensure that cables will not interfere with or get tangled in the fan tray.

---

- DIMMs are installed properly.
- PCI cards are seated and secured properly.
- If you have a graphics accelerator with a power cable, ensure that the power cable is connected to the motherboard.

10. Install the side cover and the access panel, power on the system, and verify the installation.

Refer to [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

---

## 5.6 Replacing a CPU and Heatsink/Fan Assembly

This section describes how to remove and replace the CPU and heatsink/fan assembly on a Sun Ultra 40 Workstation.

---

**Note** – The CPU should be replaced only by trained field service technicians.

---

Each CPU is associated with a heatsink, which must be replaced with the CPU.

On single CPU systems, a bridge plug is plugged in to the CPU1 socket.

---

**Note** – System cooling might be affected by dust and contaminant build-up. It is recommended that systems be opened and checked approximately every six months or more often in dirty operating environments. Check system heatsinks, fans, and air openings. If necessary, clean systems by brushing or blowing contaminants or carefully vacuuming contaminants from the system.

---

### 5.6.1 Removing a CPU from an Ultra 40

To remove a CPU from an Ultra 40:

1. **Open and position the chassis.**

Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.

2. **Unfasten the heatsink power cable from the motherboard connector labeled CPU0 Fan or CPU1 Fan. See [FIGURE 5-21](#).**



---

**Caution** – Heatsinks can get extremely hot. To avoid personal injury, allow sufficient time for them to cool before touching them.

---

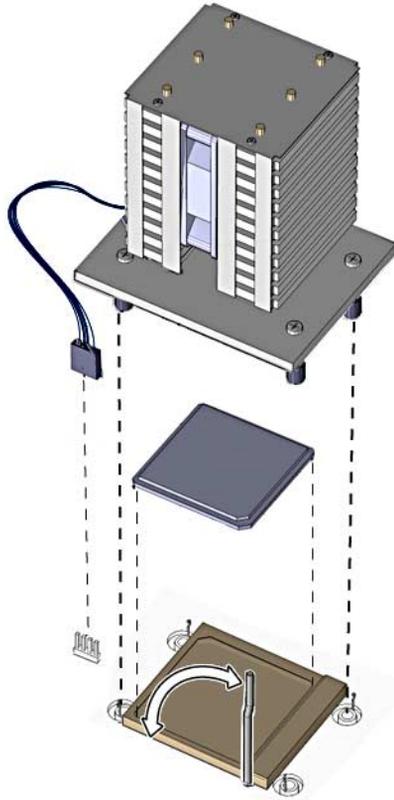
**3. Loosen the four Phillips screws fastening the heatsink to the motherboard.**

The screws are captive, and will not come away from the heatsink assembly.

**4. Disconnect the heatsink power cable from the CPU0 Fan or CPU1 Fan connector on the motherboard.**

**5. Lift the heatsink gently up, exposing the CPU.**

Place the heatsink upside down on a flat surface to prevent the thermal grease from contaminating other components.



**FIGURE 5-21** Removing and Replacing the CPU and Heatsink

**6. Pull up the socket retaining lever holding the CPU in place.**

**7. Lift the CPU out of its socket.**

Place it on an antistatic mat.

## 5.6.2 Replacing a CPU in an Ultra 40

To replace a CPU in an Ultra 40:

1. Remove the new CPU from its antistatic wrapping.



---

**Caution** – Handle the CPU carefully, by its edges. Place it on an antistatic mat when you are not handling it.

---

2. Ensure that the CPU socket retaining lever is in the upright position.
3. Align the CPU to its socket so that pin 1 of the CPU (indicated by the notched corner) is aligned with hole 1 of the socket (indicated by the arrow in the corner of the socket).
4. Insert new CPU in the socket, pushing it gently into place.

See [FIGURE 5-21](#).

When it is properly aligned, the CPU slips easily into its slot. Do not force it or allow the pins to bend.

5. Press down on the socket retaining lever so it is in the fully closed position.

6. Do one of the following:

- If you are installing a new CPU:

- a. Clean any contamination from the top of surface of the CPU, using the supplied alcohol wipe.

The heatsink assembly already has thermal grease applied. You do not need to apply additional thermal grease.

- b. Remove the plastic cover from the heatsink/fan assembly.

- If you are replacing an already used CPU on a new motherboard:

- a. Remove the grease from the CPU and remove the thermal interface material from the heatsink using the alcohol wipe supplied with the motherboard.

- b. Use the syringe that is supplied with the motherboard to apply approximately 0.5 ml of thermal grease to the center of the top of the CPU.

Empty the entire syringe onto the chip.

- c. Using the wrapper of the alcohol wipe or a finger inserted into a clean plastic bag, spread out the thermal grease to a thin uniform thickness over the CPU.



---

**Caution** – Do not use an unprotected finger to spread the thermal grease, as the oils present will degrade the performance.

---

7. **Inspect the heatsink for dust and lint, and clean it if necessary.**
8. **Place the heatsink over the CPU, so that the captive screws align with the receptacles.**

Ensure that the “Air Flow” symbol on top of the heatsink points toward the workstation back panel.

See [FIGURE 5-21](#).
9. **Tighten the Phillips screws until the heatsink is firmly in place.**
10. **Connect the heatsink power cable to the motherboard connector labeled CPU0 fan or CPU1 Fan.**
11. **Inspect the CPU and motherboard to ensure that all connectors are properly connected.**
12. **Verify that you have not left any tools, loose screws, or loose components inside the system.**
13. **Replace the fan tray if you removed it.**
14. **If you are finished working, install the side cover and the access panel, power on the system, and verify the installation.**

Refer to [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

### 5.6.3 Removing a CPU from an Ultra 40 M2

To remove a CPU from an Ultra 40 M2:

1. **Open and position the chassis.**

Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.
2. **Unfasten the heatsink power cable from the motherboard connector labeled CPU0 Fan or CPU1 Fan. See [FIGURE 5-21](#).**



---

**Caution** – Heatsinks can get extremely hot. To avoid personal injury, allow sufficient time for them to cool before touching them.

---

3. **Loosen the two Phillips screws fastening the heatsink to the motherboard.**

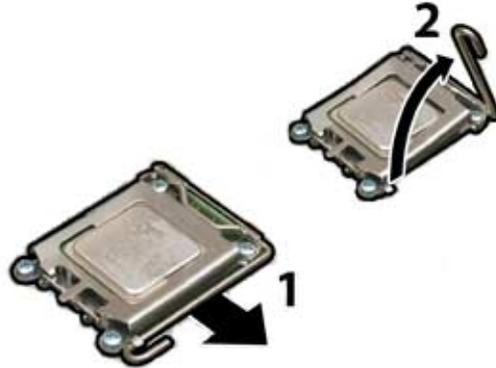
The screws are captive, and will not come away from the heatsink assembly.
4. **Disconnect the heatsink power cable from the CPU0 Fan or CPU1 Fan connector on the motherboard.**

5. Lift the heatsink gently up, exposing the CPU.

Place the heatsink upside down on a flat surface to prevent the thermal grease from contaminating other components.

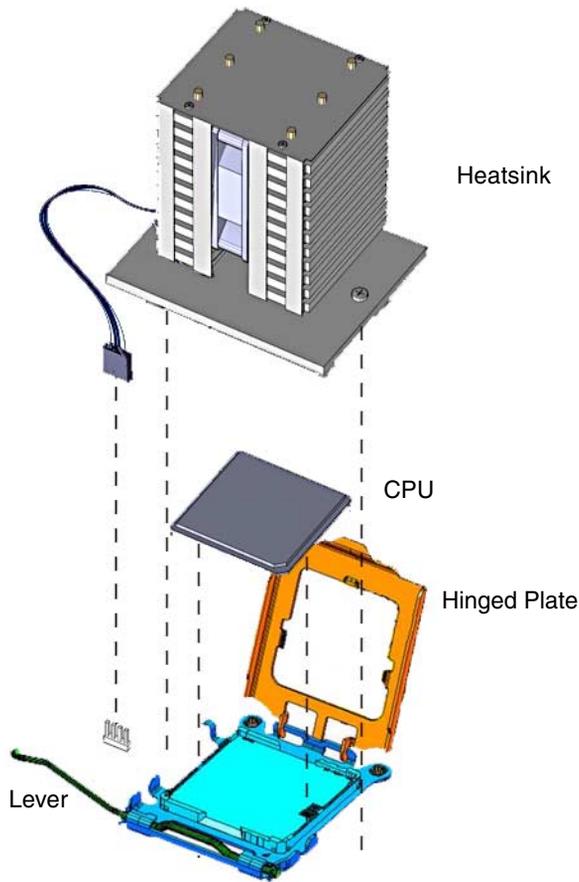
6. Pull the CPU socket lever slightly away from the socket. See [FIGURE 5-22](#).

7. Pivot the lever up, into the fully open, vertical, position.



**FIGURE 5-22** Releasing the Socket Lever

8. Open the hinged plate that covers the CPU until it is in the fully open position. See [FIGURE 5-23](#).



**FIGURE 5-23** Removing and Replacing the CPU and Heatsink

9. Open the hinged plate that covers the CPU until it is in the fully open position. See [FIGURE 5-24](#).
10. Lift the CPU out of the socket, leaving the lever in the vertical, open position. See [FIGURE 5-24](#).  
Place it on an antistatic mat.

## 5.6.4 Replacing a CPU in an Ultra 40 M2

To replace a CPU in an Ultra 40 M2:

1. Remove the new CPU from its antistatic wrapping.



---

**Caution** – Handle the CPU carefully, by its edges. Place it on an antistatic mat when you are not handling it.

---

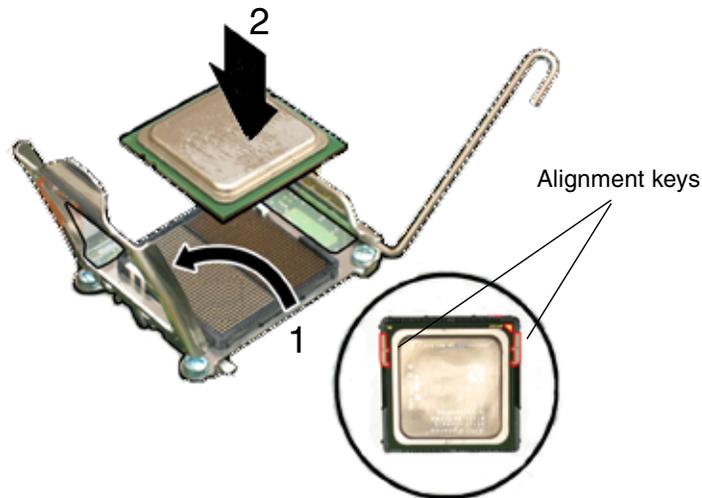
2. Ensure that the CPU socket retaining lever is in the upright position.
3. Align the CPU with the alignment keys, as shown in [FIGURE 5-24](#).

---

**Note** – Use the alignment keys in the CPU socket to match the alignment notches on the sides of the CPU. See [FIGURE 5-24](#).

---

When it is properly aligned, the CPU slips easily into its slot. Do not force it or allow the pins to bend.



**FIGURE 5-24** Opening the Retainer Plate and Installing the CPU

4. Press down on the socket retaining lever so it is in the fully closed position.
5. Do one of the following:
  - If you are installing a new CPU:

- a. **Clean any contamination from the top of surface of the CPU, using the supplied alcohol wipe.**

The heatsink assembly already has thermal grease applied. You do not need to apply additional thermal grease.

- b. **Remove the plastic cover from the heatsink/fan assembly.**

- If you are replacing an already used CPU on a new motherboard:

- a. **Remove the grease from the CPU and remove the thermal interface material from the heatsink using the alcohol wipe supplied with the motherboard.**

- b. **Use the syringe that is supplied with the motherboard to apply approximately 0.5 ml of thermal grease to the center of the top of the CPU.**

Empty the entire syringe onto the chip.

- c. **Using the wrapper of the alcohol wipe or a finger inserted into a clean plastic bag, spread out the thermal grease to a thin uniform thickness over the CPU.**



---

**Caution** – Do not use an unprotected finger to spread the thermal grease, as the oils present will degrade the performance.

---

6. **Inspect the heatsink for dust and lint, and clean it if necessary.**
7. **Place the heatsink over the CPU, so that the captive screws align with the receptacles.**

Ensure that the “Air Flow” symbol on top of the heatsink points toward the workstation back panel.

See [FIGURE 5-21](#).
8. **Tighten the Phillips screws until the heatsink is firmly in place.**
9. **Connect the heatsink power cable to the motherboard connector labeled CPU0 fan or CPU1 Fan.**
10. **Inspect the CPU and motherboard to ensure that all connectors are properly connected.**
11. **Verify that you have not left any tools, loose screws, or loose components inside the system.**
12. **Replace the fan tray if you removed it.**
13. **If you are finished working, install the side cover and the access panel, power on the system, and verify the installation.**

Refer to [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.





## Replacing Storage Devices

---

This chapter provides removal and installation procedures for storage devices.

The procedures described in this chapter are written for workstation service providers and system administrators.

This chapter contains the following sections:

- Section 6.1, “Replacing a Hard Drive” on page 6-2
- Section 6.2, “Replacing the Hard Drive Backplane and Signal Cable” on page 6-5
- Section 6.3, “Replacing the DVD Dual Drive and I/O Module” on page 6-12
- Section 6.4, “Installing SAS Card, Cables, and Hard Drives” on page 6-17
- Section 6.5, “Replacing the Optional SAS Card” on page 6-20



**Caution** – To prevent equipment damage, review the safety information in [Chapter 4](#) before you perform any replacement procedure. Additional cautions, warnings, and instructions are provided in the *Ultra 40 Workstation Safety and Compliance Guide*, part number 820-0122. The document is available at: <http://www.sun.com/documentation>

---



**Caution** – When servicing or removing workstation components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cord from the workstation and the wall receptacle. Following this caution equalizes all electrical potentials with the workstation.

---

## 6.1 Replacing a Hard Drive

The Ultra 40 Workstation supports up to four hard drives. The Ultra 40 M2 supports up to eight hard drives. The hard drives slide into the hard drive bay. The hard drives are labeled HDD0 through HDD3 (or HDD7). HDD0 is the default boot drive. See [FIGURE 6-1](#).

[TABLE 6-1](#) lists the hard drive specifications.

**TABLE 6-1** Hard Drive Specifications

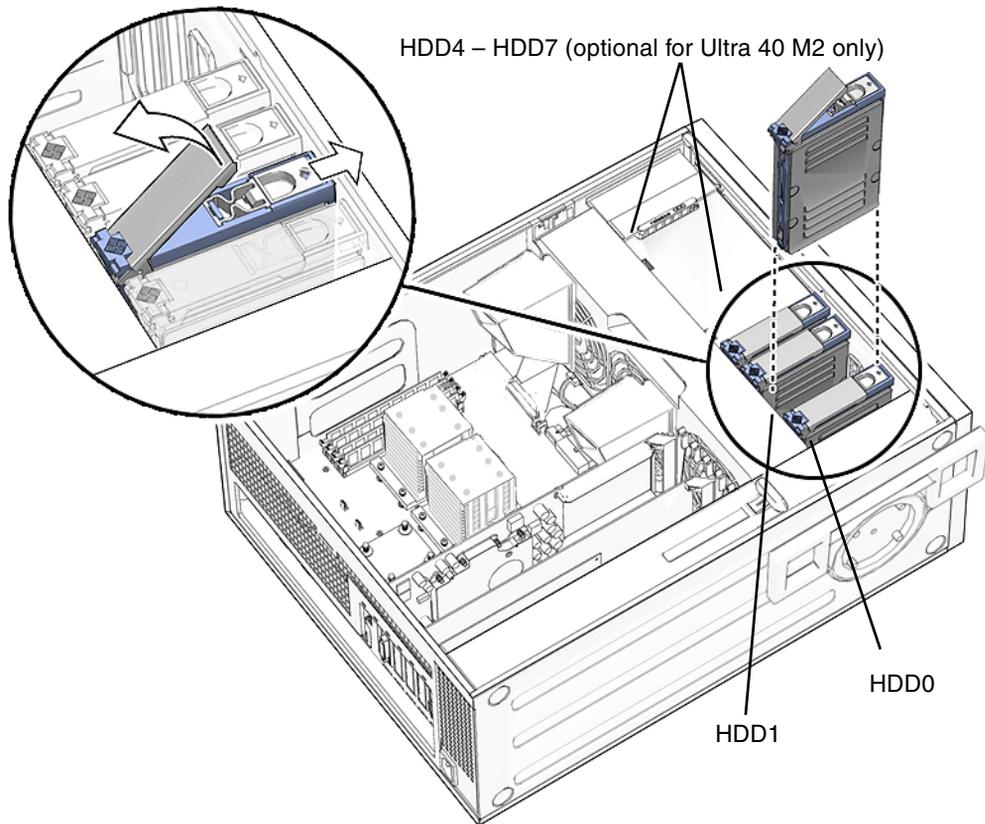
Hard Drive	Specification
SATA	80 GB, 7,200 rpm, 3.5 inch (Ultra 40 only)
SATA	160 GB, 7,200 rpm, 3.5 inch
SATA	250 GB, 7,200 rpm, 3.5 inch
SATA	500 GB, 7,200 rpm, 3.5 inch
SAS	146Gb, 15,000 rpm, 3.5 inch

### 6.1.1 Removing a Hard Drive

If you are not removing an existing hard drive, proceed to [Section 6.1.2, “Installing a Hard Drive”](#) on page 6-3.

To remove a hard drive:

- 1. Power off the system, open and position the chassis, and remove the access panel.**  
Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.
- 2. Slide the hard drive release tab toward the front of the system.**  
The hard drive handle pops up. See [FIGURE 6-1](#).
- 3. Grasp the hard drive handle and pull the hard drive out of the hard drive bay.**  
See [FIGURE 6-1](#).



**FIGURE 6-1** Removing a Hard Drive (Ultra 40 Shown)

4. Place the hard drive aside on an antistatic mat.

## 6.1.2 Installing a Hard Drive



---

**Caution** – Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an antistatic mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

---

To install a hard drive:

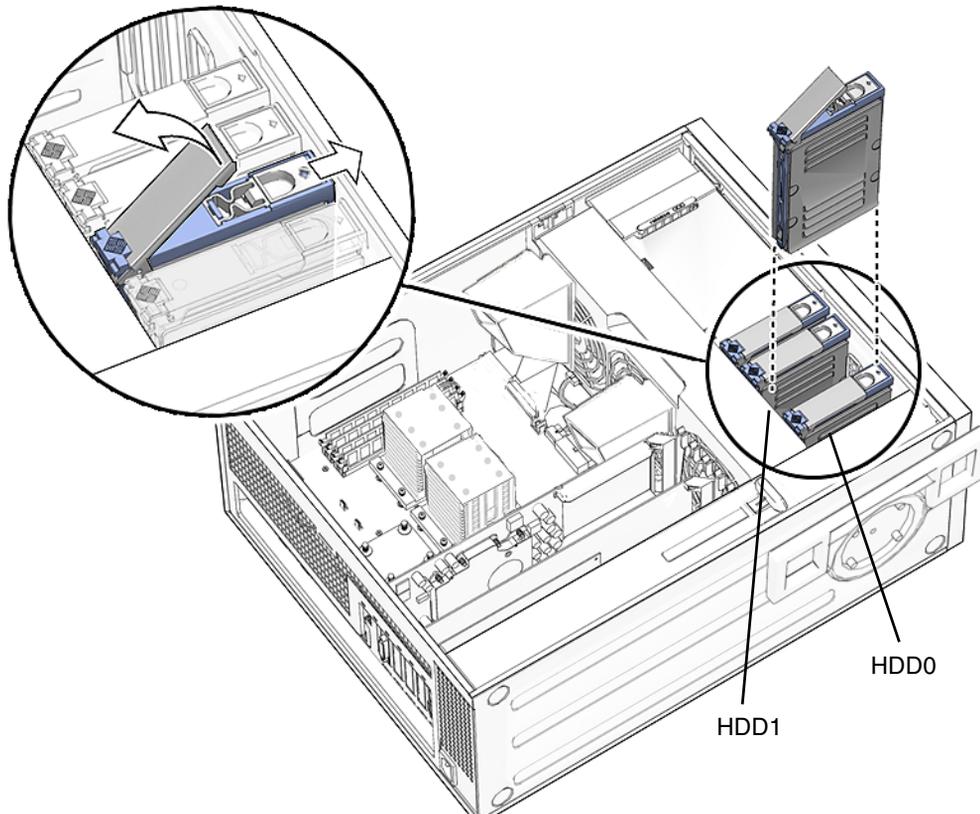
1. Power off the system, open and position the chassis, and remove the access panel. Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.

---

**Note** – By default, the system boots from the hard drive in HDD0. If there is no drive there, it boots from the drive in HDD1.

---

2. **Remove the new hard drive from its packaging.**  
Refer to the hard drive documentation for configuration instructions.
3. **Install the hard drive.**  
See [FIGURE 6-2](#).
4. **Slide the hard drive into the hard drive bay.**
5. **Close the latch on the hard drive until it clicks and is secure.**



**FIGURE 6-2** Installing a Hard Drive (Ultra 40 Shown)

6. If you are finished working, install the side cover and the access panel, power on the system, and verify the installation.

Refer to [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

---

**Tip** – Boot the workstation with the `-r` option, so that the Solaris operating system can reconfigure itself for the new component. See [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

---

## 6.2 Replacing the Hard Drive Backplane and Signal Cable

This section provides procedures for removing and installing the hard drive backplane and signal cable.

On Sun Ultra 40 M2 systems, if you have a single hard drive backplane, and you are adding a second hard drive backplane, go directly to [Section 6.2.2, “Installing the Hard Drive Backplane and Signal Cable”](#) on page 6-8.

The hard drive backplane power cable is an integral part of the power supply. To replace it, you must replace the power supply as described in [Section 7.2, “Removing and Replacing the Power Supply”](#) on page 7-5. *Normally, this is not necessary when replacing the hard drive backplane and signal cable.*

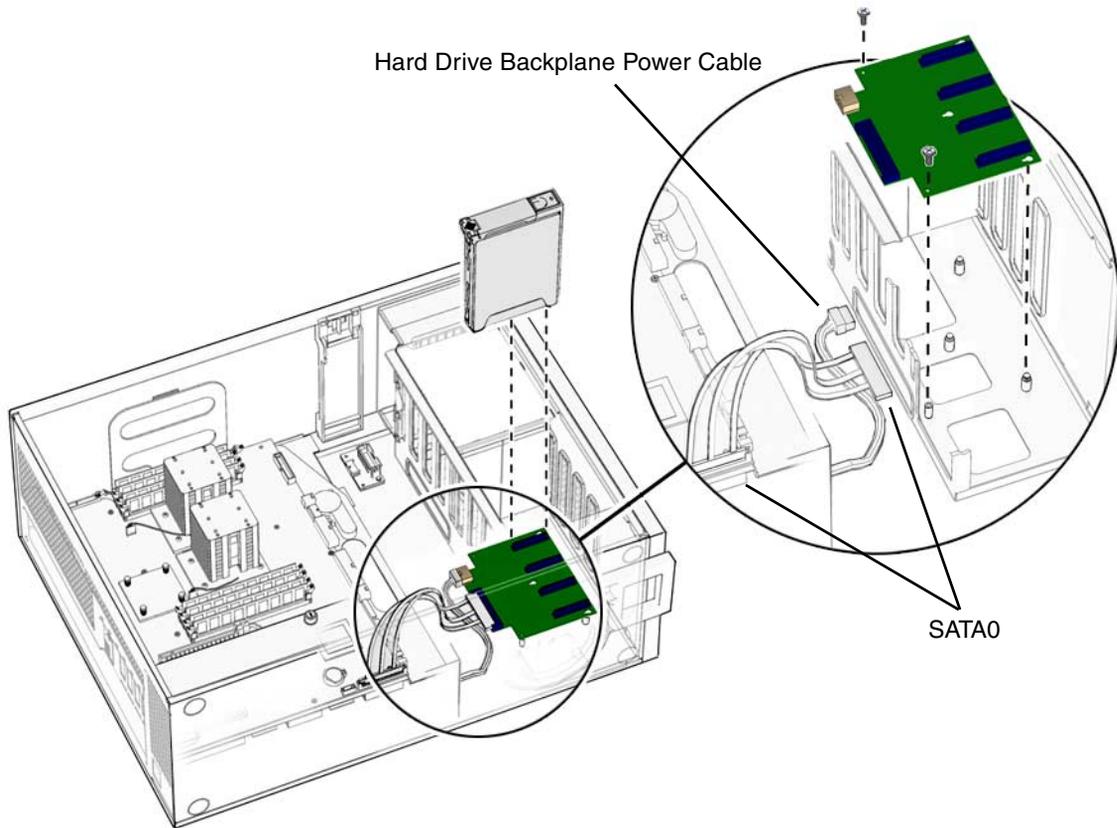
### 6.2.1 Removing the Hard Drive Backplane and Signal Cable

Sun Ultra 40 systems have a single hard drive backplane that supports HDD0 through HDD3.

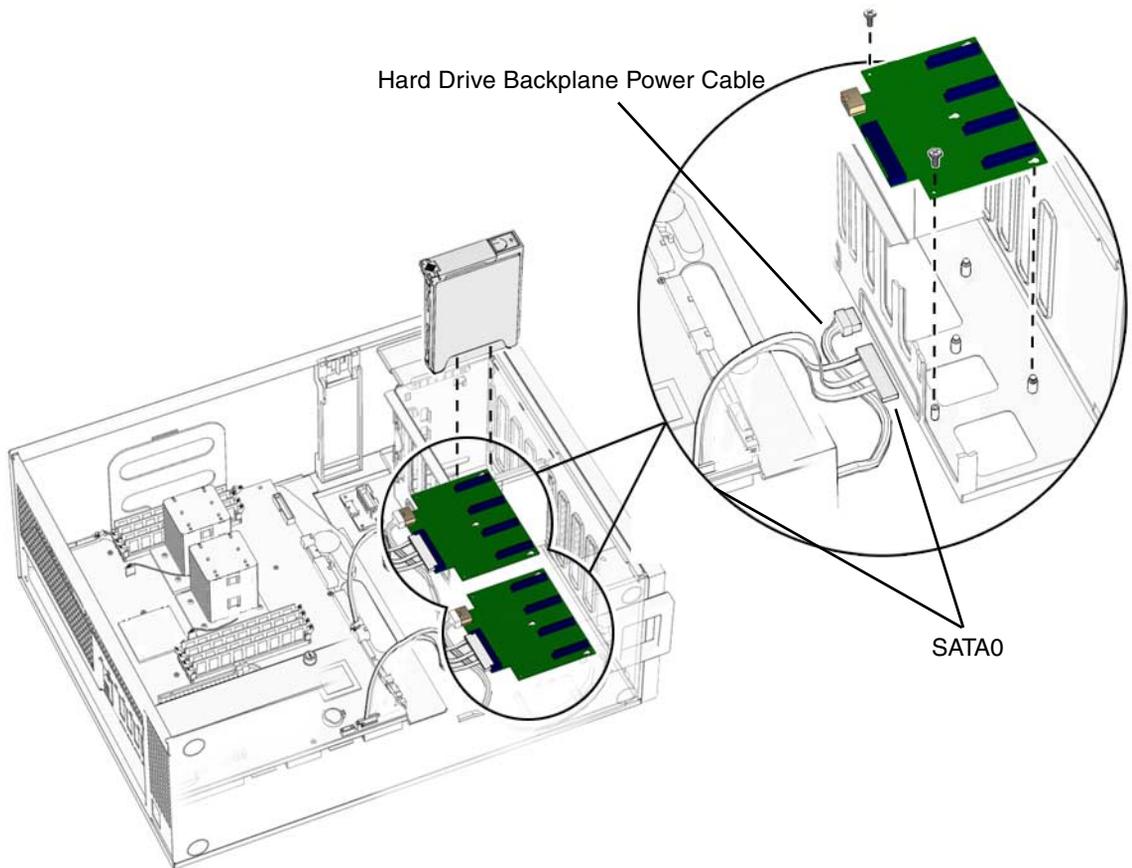
Sun Ultra 40 M2 systems have an optional second hard drive backplane that supports HDD4 through HDD7.

To remove the hard drive backplane and signal cable:

1. **Power off the system, open and position the chassis, and remove the access panel.**  
Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.



**FIGURE 6-3** Disconnecting the Cables From the Hard Drive Backplane for Ultra 40



**FIGURE 6-4** Disconnecting the Cables From the Hard Drive Backplane for Ultra 40 M2

**2. Remove all hard drives.**

Refer to [Section 6.1, “Replacing a Hard Drive”](#) on page 6-2.

**3. Disconnect the hard drive signal cable from the connector of the hard drive backplane.**

For the Ultra 40, it is connector J4.

For the Ultra 40 M2:

- HDD0 through HDD3 – J22.
- HDD4 through HDD7 – J11.

4. **Disconnect the power cable from the corresponding hard drive backplane. See [FIGURE 6-3](#) or [FIGURE 6-4](#):**
  - For HDD0 through HDD3, disconnect P3.
  - For HDD4 through HDD7, disconnect P4.

---

**Note** – P4 has a splitter; one part goes to the hard drive backplane, and the other part goes to the motherboard. Disconnect only the part that goes to hard drive backplane.

---

5. **Using a No. 2 Phillips screwdriver, remove the two screws that secure the hard drive backplane.**
6. **If you are replacing the hard drive signal cable, disconnect it from the SAT0 connector on the motherboard.**

---

**Note** – The hard drive power cable is part of the power supply assembly. To replace it, you must replace the power supply.

---

7. **Slide the hard drive backplane toward the back of the system (toward the motherboard) until the studs protrude through the wide side of the mounting slots.**
8. **Lift the hard drive backplane out and away from the chassis.**

## 6.2.2 Installing the Hard Drive Backplane and Signal Cable

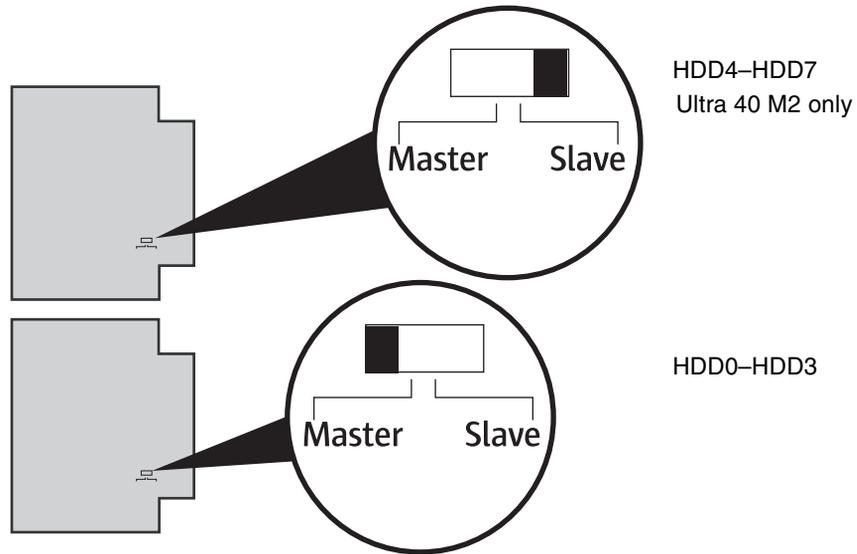
To install the hard drive backplane and signal cable:

1. **Remove the new hard drive backplane and the hard drive signal cable from the packaging.**
2. **Verify that the master/slave switch is in the correct position. See [FIGURE 6-5](#).**
  - a. **Flip the backplane over.**
  - b. **Verify that the switch is in the correct position, and correct it if it is not.**
    - For HDD0 through HDD3, select the Master position.
    - For HDD4 through HDD7, select the Slave position.

---

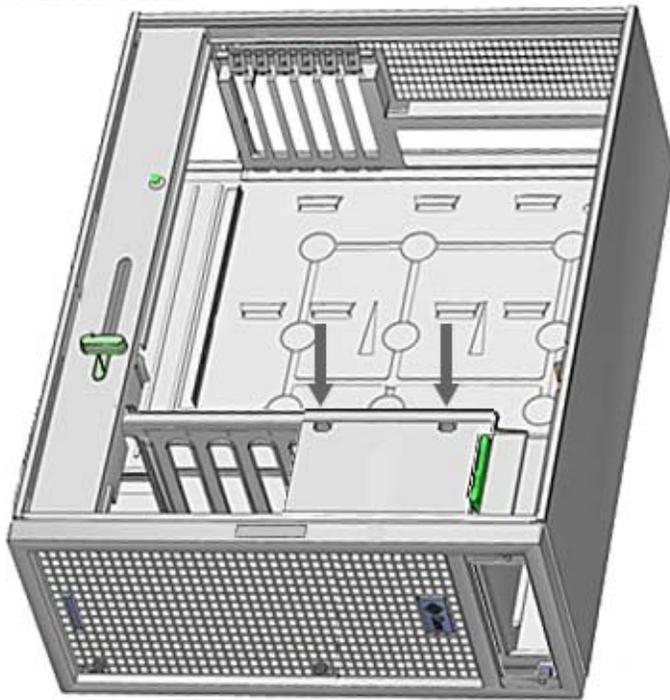
**Note** – This switch might not be present on Sun Ultra 40 systems.

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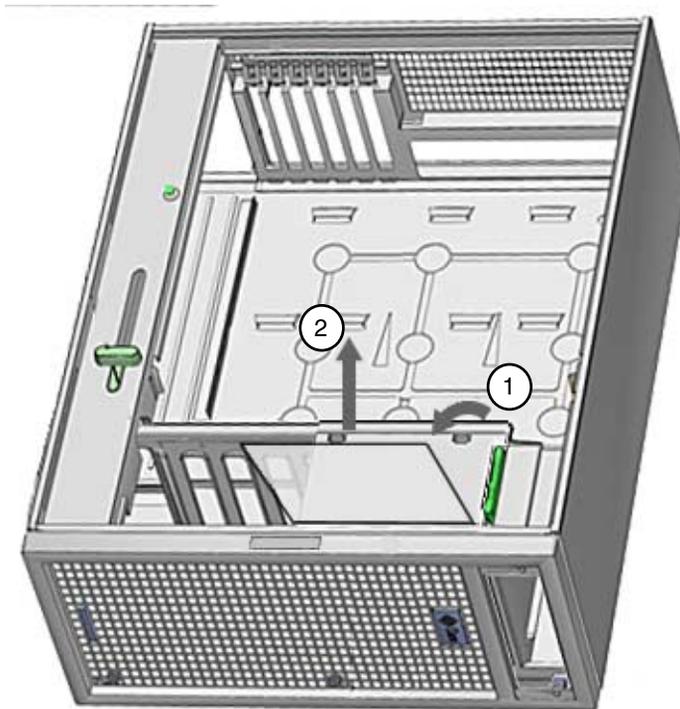


**FIGURE 6-5** Master/Slave Switch on HDD Backplane

3. If you are adding a second backplane to an Ultra 40 M2, remove the filler panel. If not, proceed to [Step 4](#).
  - a. Release the two latches by pressing them towards the front of the system.  
See [FIGURE 6-6](#).
  - b. Swing the filler panel out (1) then lift it away (2).  
See [FIGURE 6-7](#).



**FIGURE 6-6** Release the Latches



**FIGURE 6-7** Swing The Panel Out

4. Place the new hard drive backplane in the chassis so that the studs protrude through the fat end of the slots.
5. Slide the backplane toward the motherboard so that the studs hold the backplane securely in place.
6. Using a No. 2 Phillips screwdriver, replace the two screws that secure the hard drive backplane.
7. To reconnect the hard drive signal cable:
  - If you are replacing the hard drive signal cable, connect one end to the connector on the hard drive backplane and the other end to the SATA0 connector on the motherboard.Route the cable under the hard drive power cable in such a way that it will not interfere with the fan tray.

- If you are not replacing the hard drive signal cable, connect the existing cable to the connector of the hard drive backplane.

For the Ultra 40, it is connector J4.

For the Ultra 40 M2:

- HDD0 through HDD3 – J22.
- HDD4 through HDD7 – J11.

---

**Note** – For HDD0 through HDD3, it is connector J22. For HDD4 through HDD7, it is connector J11.

---

**8. Reconnect the power cable to the corresponding hard drive backplane. See**

**FIGURE 6-3 or FIGURE 6-4:**

- For HDD0 through HDD3, connect P3.
- For HDD4 through HDD7, connect P4.

---

**Note** – P4 has a splitter; one part goes to the hard drive backplane and the other part goes to the motherboard. The part that goes to the motherboard should have remained connected.

---

**9. Inspect the cabling to verify that the signal and power cables are both secure at the backplane and that the signal cable is secure at the motherboard.**

**10. Replace any hard drives.**

See [FIGURE 6-2](#) and refer to [Section 6.1.2, “Installing a Hard Drive” on page 6-3](#).

**11. Install the side cover and the access panel, power on the system, and verify the installation.**

Refer to [Section 8.1, “Reassembling the Workstation” on page 8-1](#).

---

## 6.3 Replacing the DVD Dual Drive and I/O Module

This section describes how to change the I/O module and DVD drive and their associated cables. The I/O module and DVD drive are a single assembly mounted in the removable media bay in the front of the chassis.

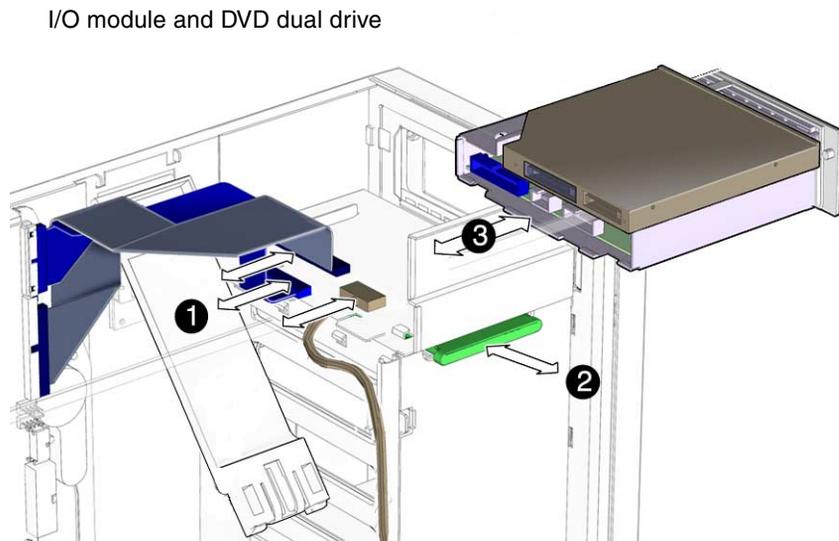
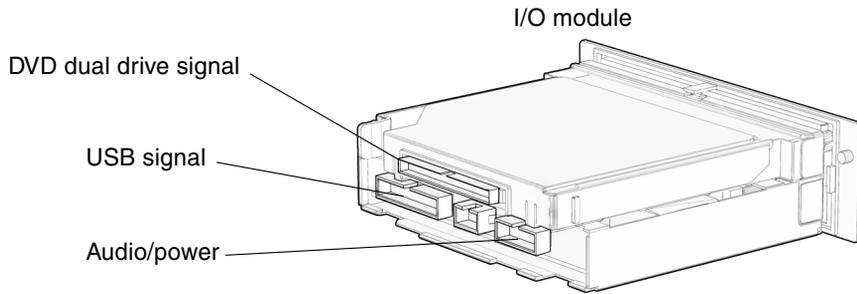
Use the following procedures to remove and replace the I/O module, and associated cables (the audio power cable, USB signal cable, and the DVD dual drive signal cable).

### *Preparing the System*

- 1. Power off the system, open and position the chassis, and remove the access panel.**  
Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.
- 2. Using the handle, pull the fan tray from the chassis and set it aside.**  
See [FIGURE 7-1](#) for details.

### *Removing the I/O Module From the Chassis*

- 1. Disconnect the following cables from back of the I/O module (1):**
  - DVD dual drive signal cable
  - Audio/power cable
  - USB signal cableSee [FIGURE 6-8](#) for (1) through (5).



**FIGURE 6-8** I/O Module Assembly and Cables

2. Push in the I/O module release latch (2).
3. Pull the I/O module out from the front of the workstation chassis (3).
4. Place the I/O module down on an antistatic mat.

---

**Note** – Do not attempt to remove the bezel from the front of the I/O module.

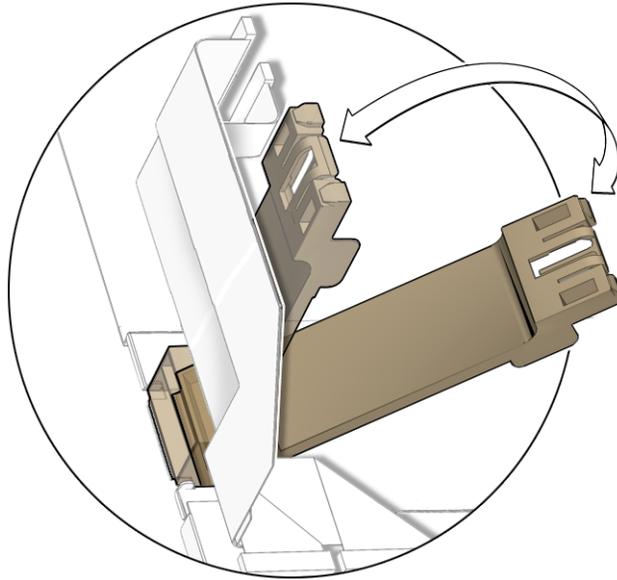
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5. Remove the new I/O module from its packaging.

## *Removing and Replacing the USB Signal Cable and the DVD dual Drive Signal Cable*

1. **Unsnap the cable clamp that secures the USB signal cable and the DVD dual drive signal cable to the chassis.**

Pull the clamp gently away from the chassis at the top, as shown in [FIGURE 6-9](#).



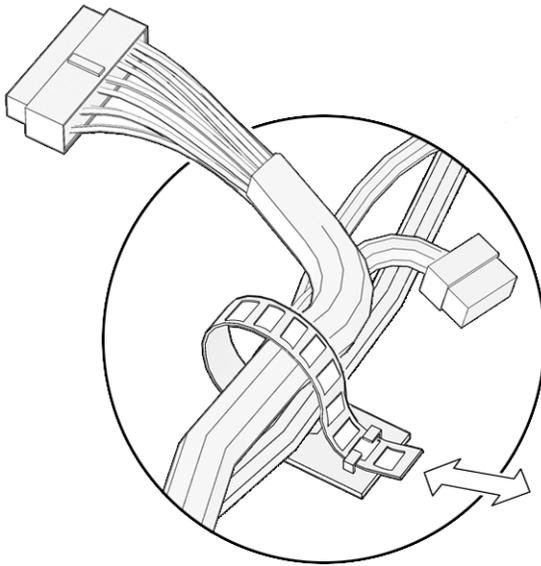
**FIGURE 6-9** Unsnapping the Cable Clamp

2. **Disconnect the USB signal cable from the motherboard connector FP1.**
3. **Remove the old USB signal cable and route the new cable in exactly the same way.**  
Route the cable from the back of the I/O module, under the cable clamp, to the motherboard.
4. **Connect the new USB signal cable to the motherboard connector FP1.**
5. **Disconnect the old DVD dual drive signal cable from the motherboard DVD connector.**
6. **Remove the old cable and route the new cable in exactly the same way.**  
Route the cable underneath the other motherboard cables to the top of the chassis. Do not unfold the cable or add any folds to it.

7. Connect the new DVD dual drive signal cable to the motherboard connector labeled DVD.
8. Close the cable clamp.

### *Removing and Replacing the I/O Power Cable*

1. Disconnect the I/O power cable from motherboard connector FP3.
2. Unfasten the cable ties that secure the I/O power cable to the disk drive bay.  
See [FIGURE 6-10](#).



**FIGURE 6-10** Unfastening the I/O Power Cable Ties

3. Route the replacement cable in the same way, from the I/O board, through the cable ties on the side of the disk drive bay, to motherboard connector FP3.
4. Fasten the I/O power cable to motherboard connector FP3.
5. Re-fasten the cable ties.

### *Replacing the I/O Module in the Chassis*

1. Slide the I/O module back into the front of the workstation chassis.

**2. Connect the following cables to the I/O module:**

- DVD dual drive signal cable
- Audio/power cable
- USB signal cable

See [FIGURE 6-8](#).

**3. Inspect the cabling to verify that all connectors are firmly connected at both ends.**

**4. Slide the fan tray back into the chassis.**

See [FIGURE 7-1](#) for details.

**5. Install the side cover and the access panel, power on the system, and verify the installation.**

Refer to [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

---

**Tip** – Boot the workstation with the `-r` option, so that the Solaris operating system can reconfigure itself for the new component. See [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

---

## 6.4 Installing SAS Card, Cables, and Hard Drives

If you want to replace the SATA drives with SAS drives, use the following procedure. You will need to order a SAS installation kit, that includes a SAS controller card (SG-PCIE8SAS-Z, LSI-based), cable kit, and SAS HDDs.

The following procedure describes how to modify the current installation and install the SAS components:

**1. Power off the system, open and position the chassis, and remove the access panel.**

Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.

**2. Using the handle, pull the fan tray from the chassis and set it aside.**

See [FIGURE 7-1](#) for details.

**3. Remove the current SATA hard drive(s) from the server.**

**4. Remove and discard the cables currently connected to the HDD backplanes and motherboard connectors. See [FIGURE 6-3](#).**

---

**Note** – If there is a card in the PCI-E0 slot, you should remove and relocate it as described in [Section 5.4, “Replacing PCI Cards”](#) on page 5-19.

---

**5. Connect the cables.**

---

**Note** – Connect the cables before inserting the SAS card in the PCI-E0 slot.

---

**a. For the Sun Ultra 40, see [FIGURE 6-11](#) and connect the following cables:**

- i. Connect the large connector cable to the HDD backplane.**
- ii. Using the SAS cable kit, connect the SAS cables to the SAS card connectors before the SAS card is installed.**
  - Connect the cable labeled PHY0 to card connector labeled PHY 0.
  - Connect the cable labeled PHY1 to card connector labeled PHY1.
  - Connect the cable labeled PHY2 to card connector labeled PHY 2.
  - Connect the cable labeled PHY3 to card connector labeled PHY 3.

**b. For the Sun Ultra 40 M2, see [FIGURE 6-11](#) and connect the following cables:**

- i. Connect the shorter RED cable (from the lower backplane) to the card connector labeled "Port 0..3"**
- ii. Connect the longer ORANGE cable (from the upper backplane) to the card connector labeled "Port 4..7". If no upper backplane is present, leave this cable to dangle.**
- i. If you ordered an external LED cable, connect it from the PCI card to the connector to the right of the battery.**

**6. Locate the PCI-E0 card slot.**

The SAS card is restricted to slot PCI-E0. This restriction is for cable routing purposes only and will not interfere with high end graphics cards that would use the upper slots

See [FIGURE 5-11](#) and [FIGURE 5-12](#) for PCI card locations.

**7. Use the No. 2 Phillips screwdriver to remove the chassis filler panel from the PCI card slot.**

See [FIGURE 5-13](#). Place the screw aside in a container.

**8. Insert the SAS card into the PCI card slot.**

To keep the cable out of the air stream, you should route the cable between the power supply and PCI-E0 slot.

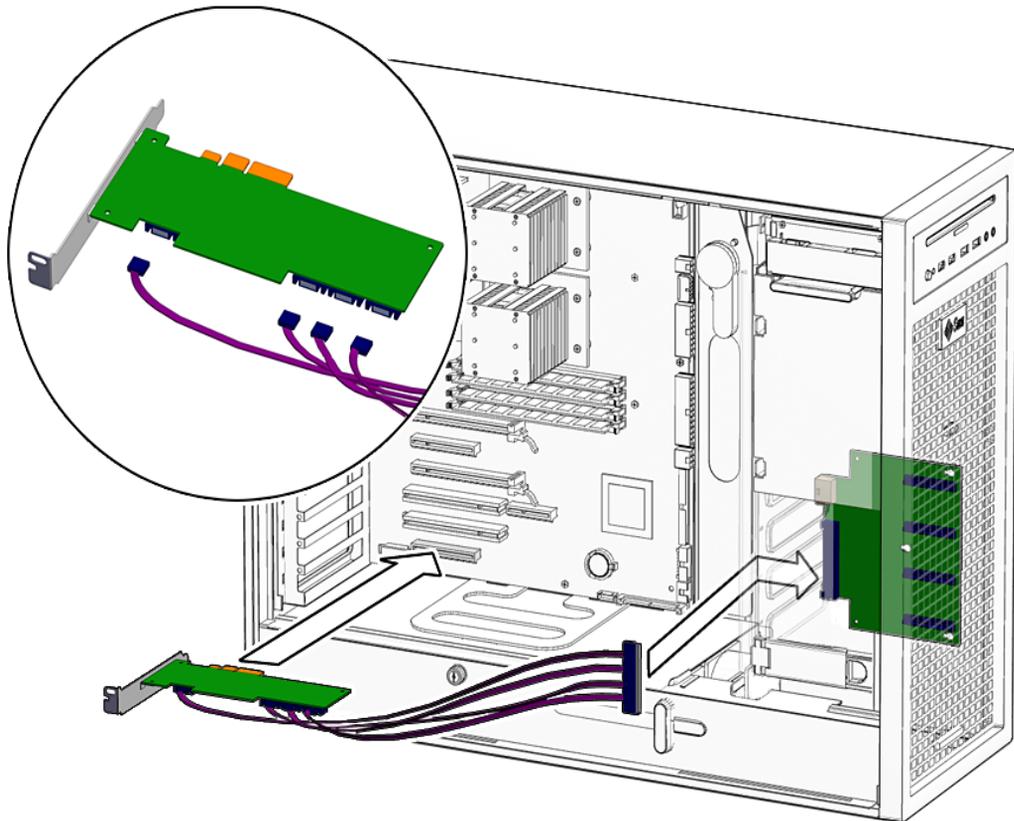
9. Reinstall fan module.
10. Replace the system cover.
11. Install the SAS hard drives.
12. If you are finished working, install the side cover, the access panel, power on the system, and verify the installation.

Refer to [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

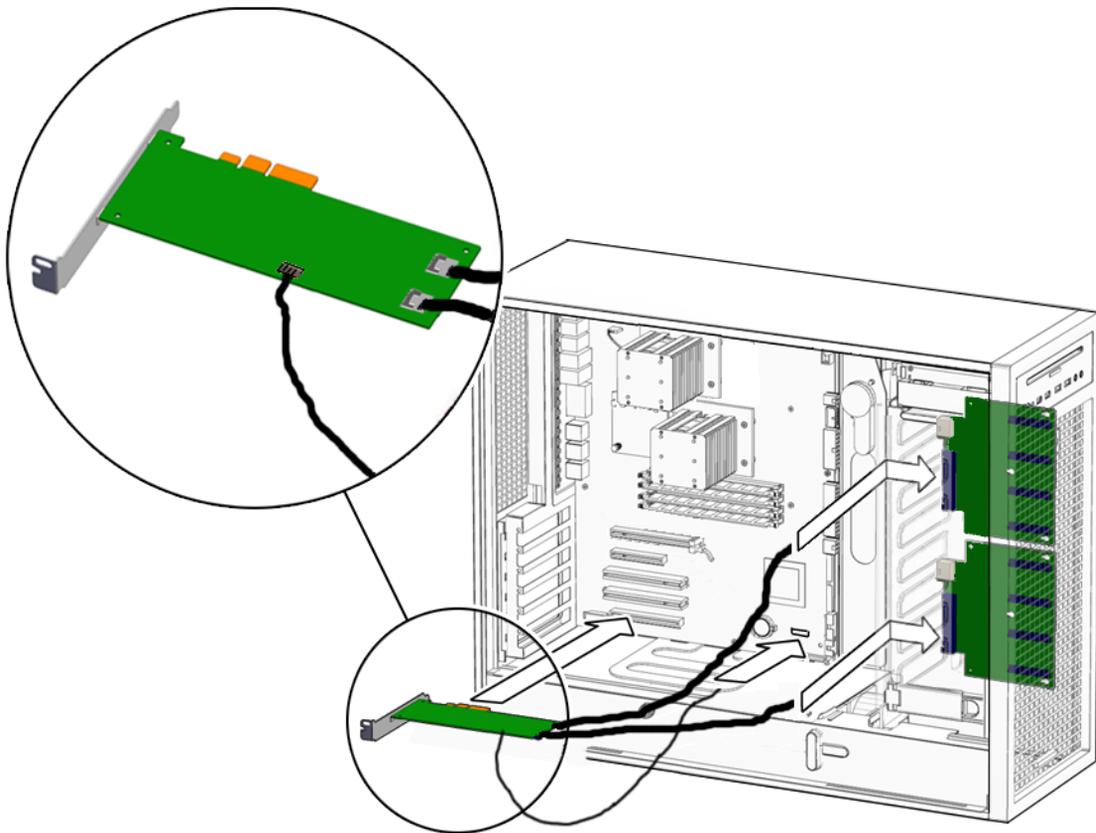
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**Tip** – Boot the workstation with the `-r` option, so that the Solaris operating system can reconfigure itself for the new component. See [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

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**FIGURE 6-11** Installing a SAS Card in the Sun Ultra 40



**FIGURE 6-12** Installing a SAS Card in the Sun Ultra 40 M2

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## 6.5 Replacing the Optional SAS Card

If you've upgraded the workstation to SAS drives and later need to replace the SAS controller card (SG-PCIE8SAS-Z, LSI-based), do the following:

1. **Power off the system, open and position the chassis, and remove the access panel.**  
Refer to [Section 4.3, "Preparing the Workstation for Servicing"](#) on page 4-4.
2. **Using the handle, pull the fan tray from the chassis and set it aside.**  
See [FIGURE 7-1](#) for details.

3. Disconnect the SAS cables from the SAS controller card to be replaced.  
See [FIGURE 6-12](#) for details.
4. Remove the SAS controller card from the system PCI-E0 slot and install the new one in the same PCI-E0 slot.
5. Reconnect the SAS cables to the new SAS controller card.  
See [FIGURE 6-12](#) for details.
6. Re-install the side cover, the access panel, power on the system, and verify the installation.  
  
Refer to [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.
7. Boot the workstation with the `-r` option, so that the Solaris operating system can reconfigure itself for the new component. See [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.
8. If the workstation’s SAS drives were previously configured in a RAID using the old SAS controller card, you will need to re-activate the existing array for use with the new SAS controller card. Reboot the workstation.
9. When the BIOS loads during boot and you see the message about the LSI Configuration Utility, press `Ctrl-C` to start the LSI BIOS Configuration Utility.
10. At the Adapter List screen, use the arrow keys to select the SAS adapter, then press `Enter`.

The Adapter Properties screen displays.

```

LSI Logic MPT Setup Utility   vx.xx.xx.xx
Adapter Properties -- SAS1068

Adapter                SAS1068
PCI Slot                03
PCI Address (Bus/Dev/Func) 03:00:00
MPT Firmware Revision   00.03.23.00-IT
SAS Address             500605B0:0000C580
Status                  Enabled
Boot Order              1
Boot Support             [Enabled BIOS & OS]

RAID Properties

SAS Topology

Advanced Adapter Properties

Esc = Exit Menu      F1/Shift+1 = Help
Enter = Select Item  -/+ = Change Item

```

**FIGURE 6-13** Example Adapter Properties Screen

**11. Select the RAID Properties option.**

The properties of the current volume are displayed.

**12. Select the Manage Array option and press Enter.**

The Manage Array screen is displayed.

```
LSI Logic MPT Setup Utility   vx.xx.xx.xx
Manage Array -- SAS1068

Identifier                    LSILOGICLogical Volume 3000
Type                          IM
Scan Order                     1
Size (MB)                      34332
Status                         Optimal

Manage Hot Spare

Synchronize Array

Activate Array

Delete Array

Esc = Exit Menu      F1/Shift+1 = Help
Enter = Choose array type to create  Esc = Return to Adapter Properties
```

**FIGURE 6-14** Example Manage Array Screen

**13. At the Manage Array screen, select Activate Array.**

**14. Press Y to proceed with the activation.**

After a pause, the array will become active.

**15. Follow the on-screen instructions to exit the utility (save as prompted).**

## Replacing Chassis Components

---

This chapter provides removal and installation procedures for the chassis components.

This chapter contains the following sections:

- Section 7.1, “Replacing the Fan Tray and Fan Tray Backplane” on page 7-1
- Section 7.2, “Removing and Replacing the Power Supply” on page 7-5



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**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in [Chapter 4](#) before you perform any replacement procedure. Additional cautions, warnings, and instructions are provided in the *Ultra 40 Workstation Safety and Compliance Guide*, part number 820-0122-10. The document is available at:

<http://www.sun.com/documentation>

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**Caution** – When servicing workstation components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cord from the workstation and the wall receptacle. Following this caution equalizes all electrical potentials with the workstation.

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### 7.1 Replacing the Fan Tray and Fan Tray Backplane

This section describes the removal and installation of the fan tray and fan tray backplane.



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**Caution** – Do not operate the workstation without the fan tray.

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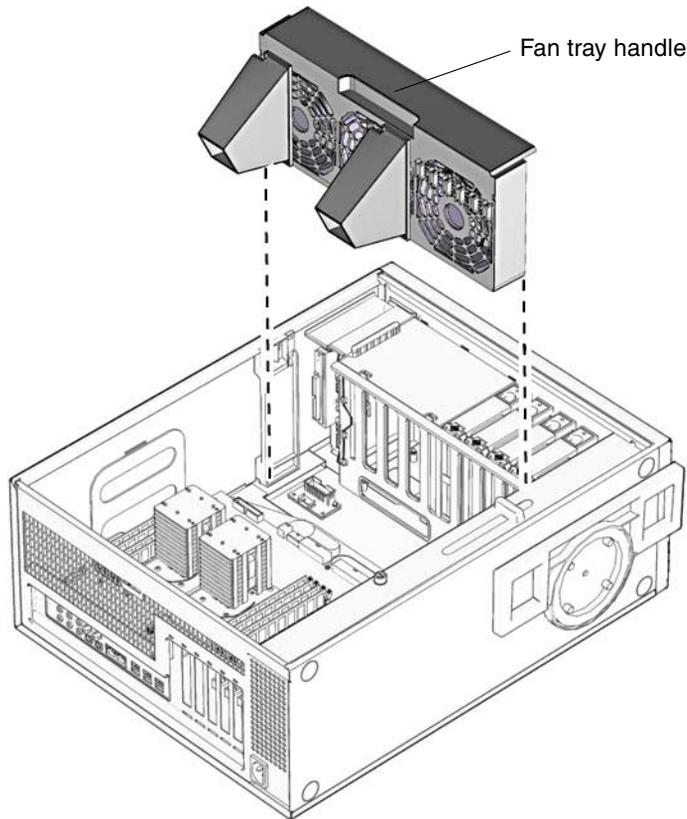
## 7.1.1 Removing the Fan Tray

To remove the fan tray:

1. **Power off the system and open the chassis.**

Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.

2. **Using the handle, pull the fan tray from the chassis and set it aside.**



**FIGURE 7-1** Removing the Fan Tray (Ultra 40 Shown)

## 7.1.2 Removing and Replacing the Fan Tray Backplane

To remove and replace the fan tray backplane:

**1. Remove the fan tray.**

Refer to [Section 7.1.1, “Removing the Fan Tray”](#) on page 7-2.

**2. Disconnect the fan tray backplane power cable from the fan tray backplane.**

See [FIGURE 7-1](#).

**3. If you are replacing the fan tray backplane power cable, disconnect the cable from the motherboard FAN connector and set it aside.**

**4. Using a No. 2 Phillips screwdriver, remove the two screws securing the fan tray backplane.**

**5. Slide the fan tray backplane toward the front of the system so that the two studs protrude from the wide side of the slots.**

**6. Remove the fan tray backplane and set it aside.**

**7. Remove the new fan tray backplane (and cable) from its wrapping.**

**8. Place the new fan tray backplane so that the studs protrude from the wide side of the slots,**

**9. Slide the new fan tray backplane toward the back of the system so that the studs hold the backplane in place.**

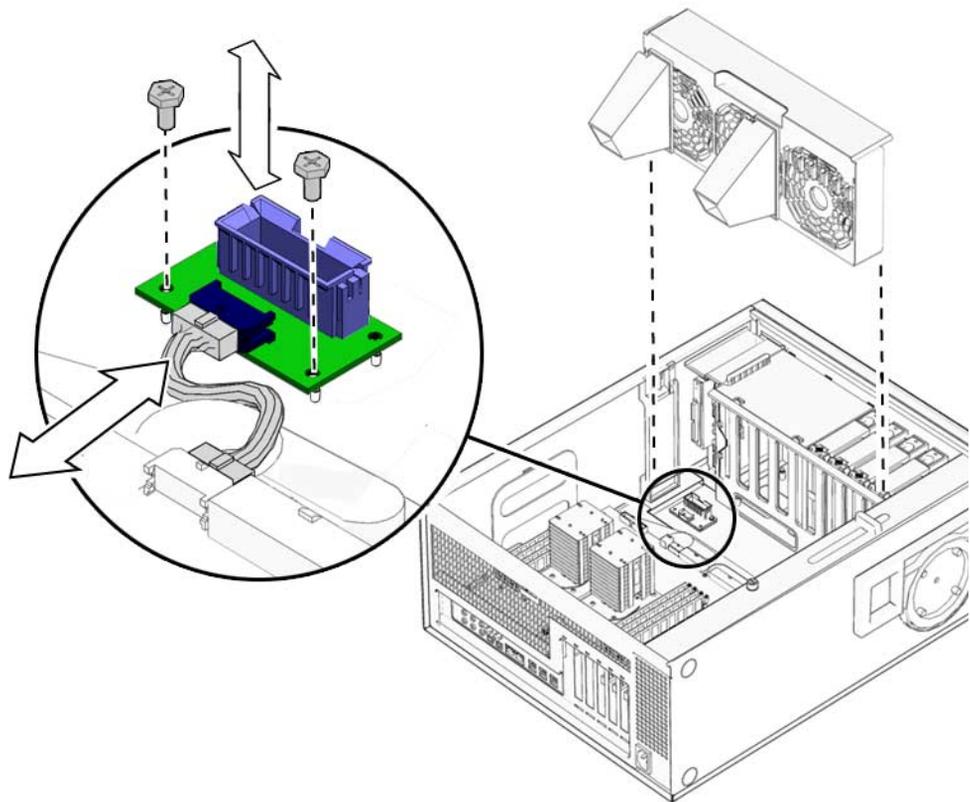
**10. Using a No. 2 Phillips screwdriver, replace the two screws that secure the backplane.**

**11. If you are replacing the fan tray backplane power cable, connect one end of the cable to the motherboard FAN connector,**

**12. Connect the fan tray backplane cable to the fan tray backplane.**

**13. Replace the fan tray.**

Refer to [Section 7.1.3, “Installing the Fan Tray”](#) on page 7-4



**FIGURE 7-2** Removing the Fan Tray Backplane (Ultra 40 Shown)

## 7.1.3 Installing the Fan Tray

To install the fan tray:

1. If you have not already done this, power off the system, open and position the chassis, and remove the access panel.  
Refer to [Section 4.3, "Preparing the Workstation for Servicing"](#) on page 4-4.
2. Align the fan tray in the chassis slot so that the connector is closest to the top of the chassis and the air ducts point toward the motherboard.

See [FIGURE 7-2](#).

3. **Slide the fan tray into place.**

Ensure that it does not pinch or tangle any wires or cables.

4. **If you are finished working, install the side cover and the access panel, power on the system, and verify the installation.**

Refer to [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

---

## 7.2 Removing and Replacing the Power Supply

This section describes the removal and installation of the power supply.

[TABLE 7-1](#) lists the power supply specifications.

**TABLE 7-1** Power Supply Specifications

Specification	Value
Input Voltage	100 VAC (Range 1) 110–127 VAC (Range 2) 200–240 VAC (Range 3)
Frequency	50-60 Hz
Current	13 amps (Range 1) 12 amps (Range 2) 7 amps (Range 3)
Wattage	1,000 W maximum

### 7.2.1 Removing the Power Supply



---

**Caution** – If you need to replace the power supply unit or system DC fan unit, contact your local Sun Service personnel. Go to the following URL for contact information: <http://www.sun.com/service/contacting/solution.html>

---



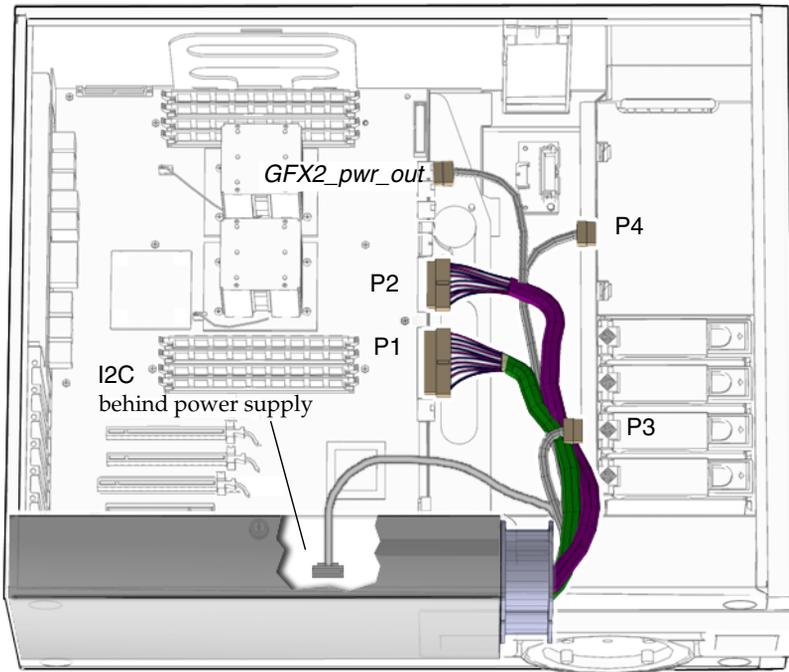
---

**Caution** – Electrical hazard or personal injury can result from using a fan or power supply unit not recommended by Sun Service personnel.

---

To remove the power supply:

1. Power off the system, open and position the chassis, and remove the access panel. Refer to [Section 4.3, "Preparing the Workstation for Servicing"](#) on page 4-4.



**FIGURE 7-3** Power Supply Cables

2. Squeeze the power supply connector clip to disconnect the following cables from the motherboard.

- P1 on the motherboard
- P2 on the motherboard
- I2C on the motherboard
- GFX2\_pwr\_in

See [FIGURE 7-3](#).

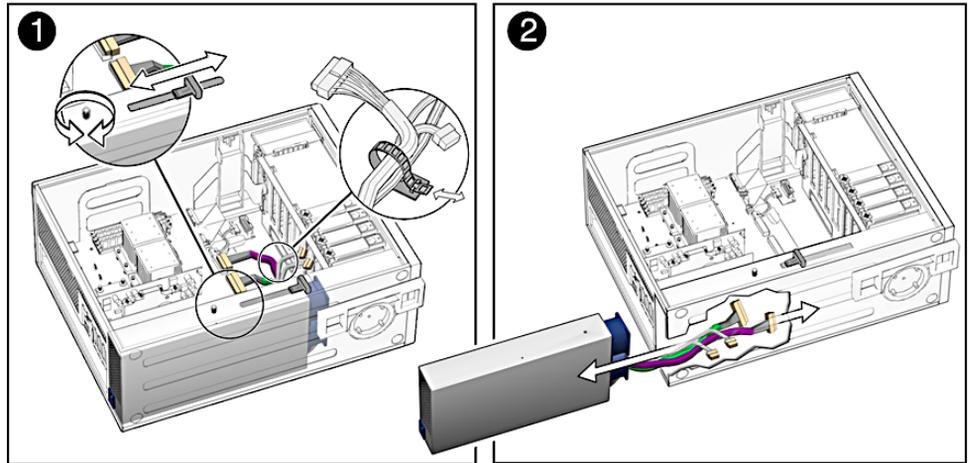
3. Remove the hard drive power cable at connector P3.
4. If P4 is connected to the second hard drive backplane, disconnect it (Ultra 40 M2 only/optional).

If there is no second hard drive backplane, allow P4 to dangle.

---

**Note** – If any extended PCI cards interfere with your ability to access the power cords or connectors, remove the cards as described in [Section 5.4, “Replacing PCI Cards”](#) on page 5-19.

---



**FIGURE 7-4** Removing the Power Supply (Ultra 40 Shown)

5. Turn the captive screw that secures the power supply to the chassis.  
See [FIGURE 7-4](#).
6. Using the plastic handle, push the power supply out of the back of the chassis.
7. Guide the power cables out of the chassis as you push the power supply out the back of the chassis.  
Place the power supply aside on an antistatic mat.  
Proceed to [Section 7.2.2, “Installing the Power Supply”](#) on page 7-7.

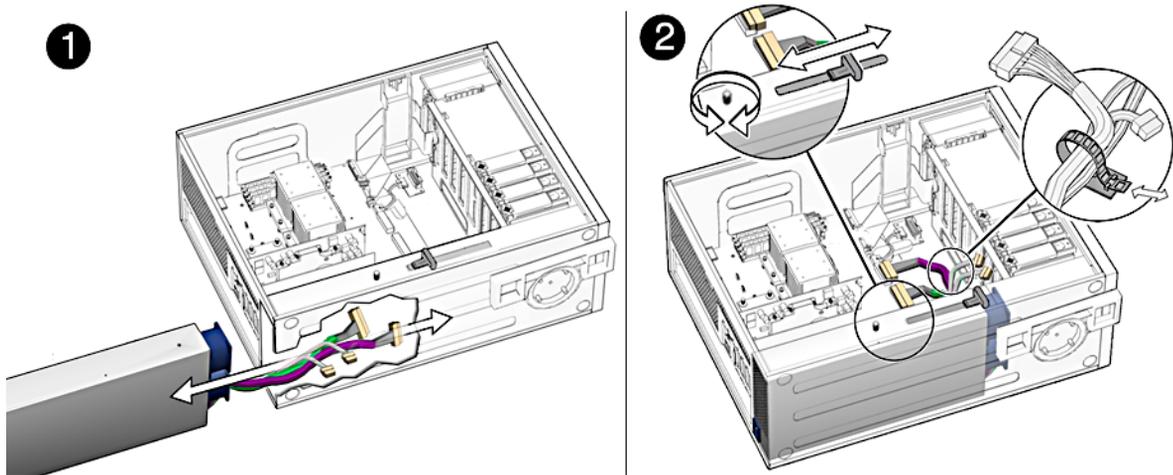
## 7.2.2 Installing the Power Supply

To install the power supply:

1. Open and position the chassis.  
Refer to [Section 4.3, “Preparing the Workstation for Servicing”](#) on page 4-4.
2. Remove the new power supply from its package.

3. Align the power supply IEC-320 connector (power cord socket) so that the socket is nearest the left rear of the chassis (left rear when viewed from the back).

See [FIGURE 7-5](#).



**FIGURE 7-5** Replacing the Power Supply (Ultra 40 Shown)

4. Guide the cables and push the power supply into the chassis opening until the back of the power supply aligns with the back of the chassis.

5. Tighten the captive screw that secures the power supply to the chassis.

See [FIGURE 7-5](#).

6. Route the cables under the hard drive signal cable, and over the DVD signal cable.



---

**Caution** – Take particular care to ensure that cables will not interfere with or get tangled in the fan tray.

---

7. Connect the following cables to the motherboard.

- P1 on the motherboard
- P2 on the motherboard
- I2C on the motherboard
- GFX2\_pwr\_in (Ultra 40), or GFX2\_pwr\_out (Ultra 40 M2)

See [FIGURE 7-3](#).

8. Connect the hard drive power cable at P3.

9. Connect the splitter on cable P4 to GFX2\_pwr\_in (or GFX2\_pwr\_out) on the motherboard.

10. If a second hard drive backplane is present, connect P4 to it (Ultra 40 M2 only/optional).

See [FIGURE 7-3](#).

11. Inspect the power supply fasteners to verify that they are connected properly.

- The power supply push bar is seated.
- The power supply captive screw is tight.

12. Inspect the power supply cabling to verify that the cables are routed and connected properly.

- P1 on the motherboard
- P2 on the motherboard
- I2C on the motherboard
- GFX2\_pwr\_in (\_out) on the motherboard
- P3 to the hard drive backplane
- P4 to the second hard drive if one is present (Sun Ultra 40 M2 only/optional). Otherwise, leave it unconnected.

13. If you removed any extended PCI cards to access the cables or connectors, replace them.

Refer to [Section 5.4, “Replacing PCI Cards”](#) on page 5-19.

14. Install the side cover and the access panel, power on the system, and verify the installation.

Refer to [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

---

**Tip** – Boot the system with the `-r` option, so that the Solaris operating system can reconfigure itself for the new component. See [Section 8.1, “Reassembling the Workstation”](#) on page 8-1.

---



# Finishing Component Replacement

---

This chapter describes how to finish the replacement of internal workstation replaceable components, close the system, and prepare it for operation.

---

## 8.1 Reassembling the Workstation

1. **Verify that you have not left any tools, loose screws, or loose components inside the system.**
2. **Replace the fan tray if you removed it.**

See [FIGURE 8-1](#).



---

**Caution** – Take particular care to ensure that cables will not interfere with or get tangled in the fan tray.

---

3. **Remove the wrist strap from your wrist and from the workstation.**
  4. **Fit the access panel into the chassis.**
    - a. **Ensure that the access panel latches are secure.**
    - b. **Slide the lock block to the left.**
- See [FIGURE 8-1](#).
5. **Return the chassis to the upright position.**
  6. **Pivot the support leg from underneath the workstation.**
- See [FIGURE 8-1](#).
7. **Lift the side cover and press it in until the latches click.**

8. Reconnect the keyboard, mouse, monitor, network connections, and any peripherals.

See .

9. Reconnect the power cord to the workstation and the power source.

10. Power on any connected peripherals or monitors.

---

**Note** – The monitor must be powered on before the workstation so that the monitor can communicate with the graphics accelerator when the workstation powers on.

---

11. Power on the system by pressing the Power button on the front panel.

See [FIGURE 8-3](#).

12. Select a boot source and insert the media, if necessary.

13. If you installed a hard drive, a CD-RW drive, or a PCI-X card, log in as superuser and reboot the workstation.

For example, type:

```
# reboot -- -r
```

This forces the system to recognize newly installed hardware.

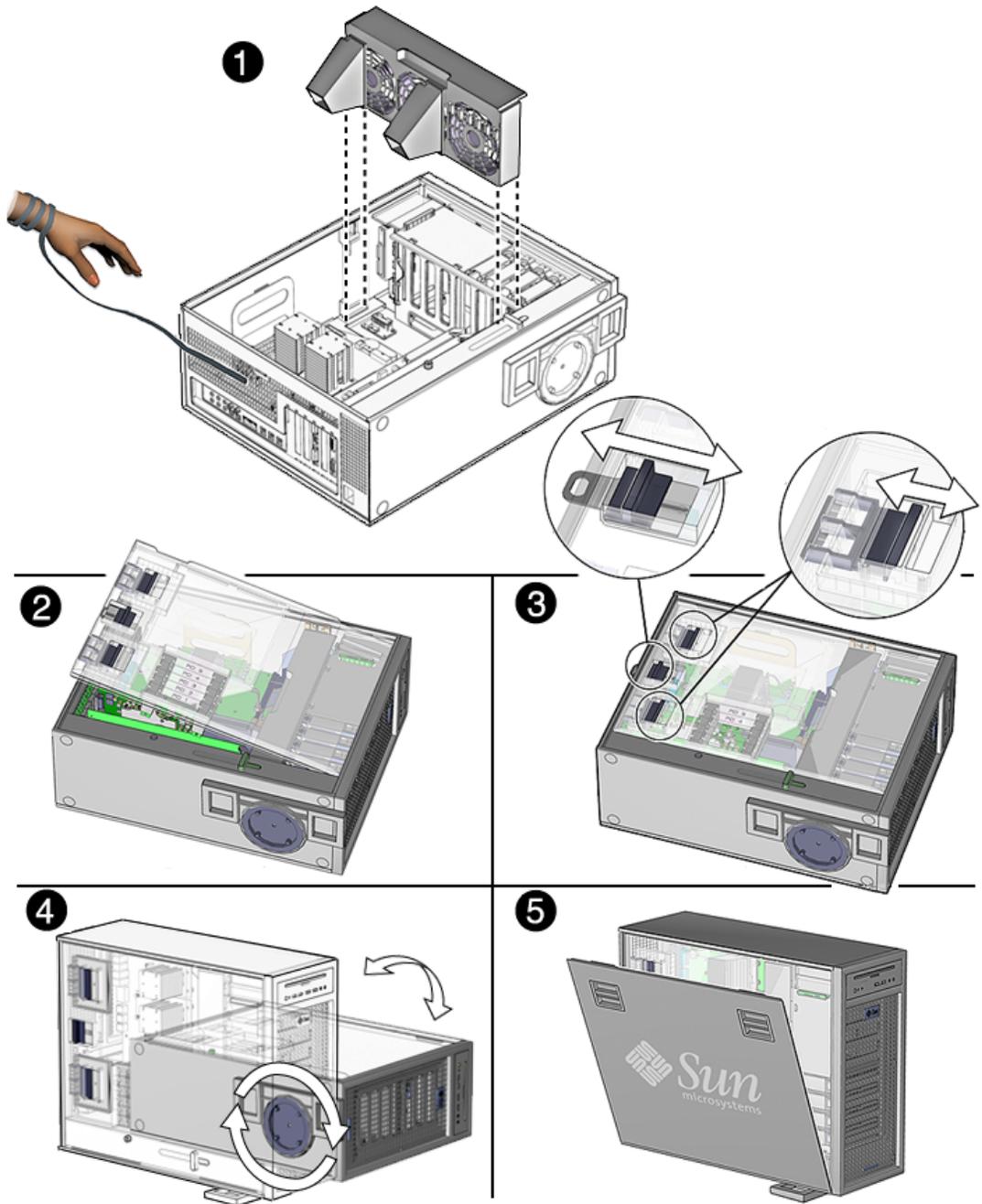
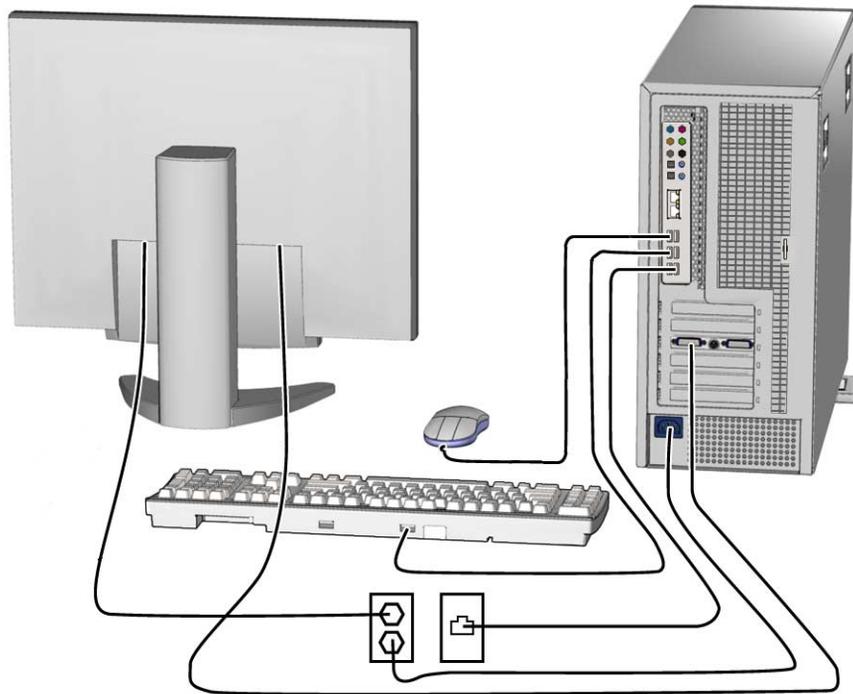
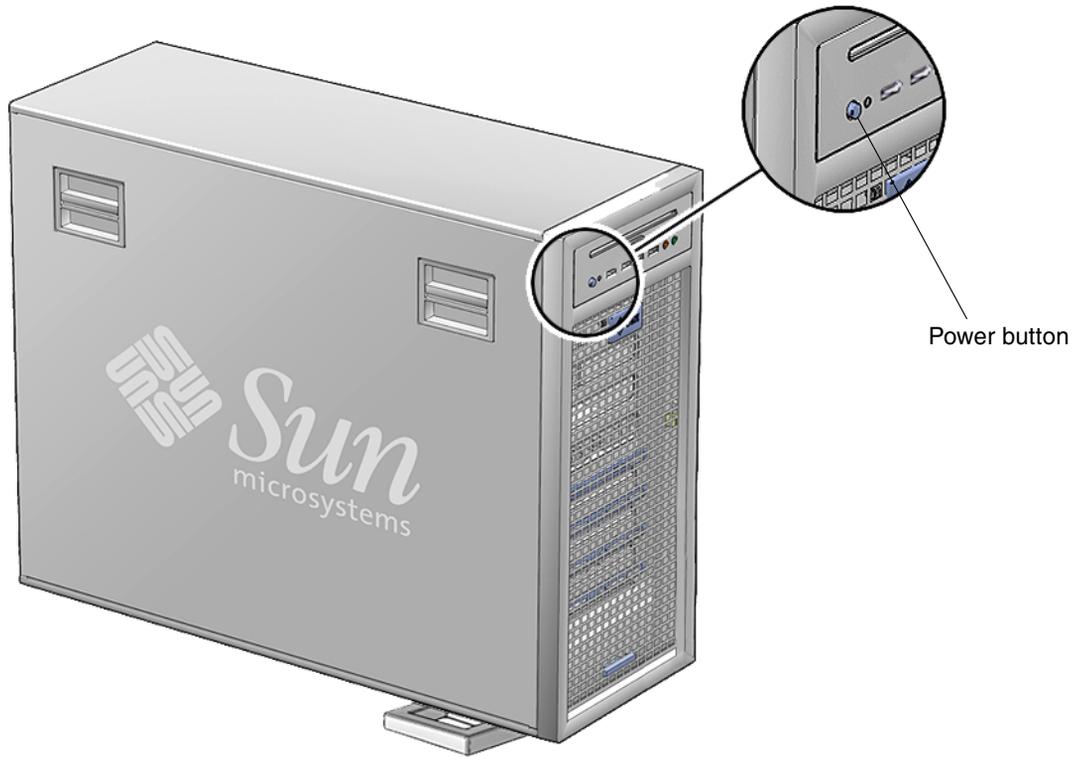


FIGURE 8-1 Reassembling the Workstation



**FIGURE 8-2** Reconnecting the Cables



**FIGURE 8-3** Powering On the Workstation



# Product Specifications

---

This appendix lists the specifications for the Ultra 40 and Ultra 40 M2 workstations. Topics include:

- [Section A.1, “Physical Specifications” on page A-1](#)
- [Section A.2, “Electrical Specifications” on page A-2](#)
- [Section A.3, “Acoustic Specifications” on page A-2](#)
- [Section A.4, “Environmental Requirements” on page A-3](#)
- [Section A.5, “Shock and Vibration Specifications” on page A-3](#)

---

## A.1 Physical Specifications

[TABLE A-1](#) lists the physical specifications of the Sun Ultra 40 and Ultra 40 M2 workstation.

**TABLE A-1** Sun Ultra 40 and Ultra 40 M2 Workstation Physical Specifications

Length	Width	Height	Weight
22.4 in. (569 mm)	8.1 in. (205 mm)	17.5 in. (445 mm)	49.6 lbs (22.5 kgs)

If you replace the workstation enclosure, allow adequate airflow from front to rear. The enclosure interior dimensions should be no less than those in [TABLE A-2](#).

**TABLE A-2** Enclosure Interior Dimensions for the Sun Ultra 40 and Ultra 40 M2 Workstation.

Length	Width	Height
22 in. (558 mm)	8.1 in. (205 mm)	17.5 in. (445 mm)

---

## A.2 Electrical Specifications

TABLE A-1 lists electrical specifications for the Sun Ultra 40 and Ultra 40 M2 workstation.

**TABLE A-3** Sun Ultra 40 and Ultra 40 M2 Workstation Electrical Specifications

Specification	Value
Voltage	100/ 110-127/200-240 VAC
Current	13/12/7 Amps
Wattage	1000 Watts (maximum)
Frequency	50–60 Hz

---

## A.3 Acoustic Specifications

TABLE A-4 lists acoustic specifications for the Sun Ultra 40 and Ultra 40 M2 workstation.

---

**Note** – Acoustic specifications are configuration dependent.

---

**TABLE A-4** Sun Ultra 40 and Ultra 40 M2 Workstation Acoustic Specifications

Specification	System State	Value
Sound power	Operating with HDD	4.9 Bels (approximate)
	Idle	4.7 Bels (approximate)
Acoustics	Operating with HDD or ODD	Lpam = 34 dba
	Idle	Lpam = 33 dba

---

## A.4 Environmental Requirements

TABLE A-5 lists environmental requirements for the Sun Ultra 40 and Ultra 40 M2 workstation.

TABLE A-5 Sun Ultra 40 and Ultra 40 M2 Workstation Environmental Requirements

Specification	Value
Temperature	41° to 95° F (5° to 35° C) operating -40° to 149° F (-40° to 65° C) nonoperating
Humidity	7 – 93% RH (noncondensing) operating 93% RH (noncondensing) nonoperating
Pressure	9.43 PSI (65 KPa), 95° F (35° C) operating 3.62 PSI (25 KPa), 77° F (25° C) nonoperating

---

## A.5 Shock and Vibration Specifications

TABLE A-6 lists vibration specifications for the Sun Ultra 40 Workstation.

TABLE A-6 Sun Ultra 40 and Ultra 40 M2 Workstation Shock and Vibration Specifications

Constraint	Operating	Nonoperating
Shock	4.5 G, 11 msec, half sine	33 G, 11 msec, sine
Vibration	0.25 G <sup>2</sup> /Hz random, 5 to 500 Hz (0.70 Grms)	1.2 G <sup>2</sup> /Hz random, 5 to 500 Hz (1.11 Grms)
Drop	N/A	1.97 in. (50 mm)



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