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  C.2 Supported Operating System Software  C–2
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    C.3.1 System Components and Features  C–3
    C.3.2 Memory Configurations  C–4
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    C.3.6 Environmental Specifications  C–7
Preface

The Sun Ultra 20 M2 Workstation Installation Guide provides the information that you need to set up, power on, and configure the workstation hardware and software.

How This Book Is Organized

This guide is organized into the following chapters:

Chapter 1 contains instructions on unpacking, cabling, and powering the workstation.

Chapter 2 explains how to set up the preinstalled Solaris™ 10 Operating System and additional development software.

Chapter B discusses troubleshooting system issues and obtaining support.

Appendix C provides information regarding the Sun Ultra 20 M2 Workstation Tools and Drivers CD, supported operating systems, and system specifications.
Shell Prompts

<table>
<thead>
<tr>
<th>Shell</th>
<th>Prompt</th>
</tr>
</thead>
<tbody>
<tr>
<td>C shell</td>
<td><code>machine-name%</code></td>
</tr>
<tr>
<td>C shell superuser</td>
<td><code>machine-name#</code></td>
</tr>
<tr>
<td>Bourne shell and Korn shell</td>
<td><code>$</code></td>
</tr>
<tr>
<td>Bourne shell and Korn shell superuser</td>
<td><code>#</code></td>
</tr>
</tbody>
</table>

Typographic Conventions

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

* The settings on your browser might differ from these settings.
Related Documentation

The document set for the Sun Ultra 20 M2 Workstation is described in the Where To Find Sun Ultra 20 M2 Workstation Documentation sheet that is packed with your system. All documents are posted at the product’s documentation site; see the following URL:

http://www.sun.com/documentation

Translated versions of some of these documents are available at the product’s documentation site in Simplified Chinese, Traditional Chinese, French, German, Italian, Japanese, Korean, and Spanish.

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

Documentation, Warranty, Support, and Training URLs

<table>
<thead>
<tr>
<th>Sun Function</th>
<th>URL</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Documentation</td>
<td><a href="http://www.sun.com/documentation">http://www.sun.com/documentation</a></td>
<td>Sun hardware documentation</td>
</tr>
<tr>
<td>Software Documentation</td>
<td><a href="http://docs.sun.com">http://docs.sun.com</a></td>
<td>Solaris OS and other software documentation</td>
</tr>
<tr>
<td>Warranty</td>
<td><a href="http://www.sun.com/service/support/warranty/index.html">http://www.sun.com/service/support/warranty/index.html</a></td>
<td>View specific details regarding your warranty</td>
</tr>
<tr>
<td>Support</td>
<td><a href="http://www.sun.com/support/">http://www.sun.com/support/</a></td>
<td>Obtain technical support, including patches</td>
</tr>
<tr>
<td>Training</td>
<td><a href="http://www.sun.com/training/">http://www.sun.com/training/</a></td>
<td>Learn about Sun courses and educational offerings</td>
</tr>
</tbody>
</table>
Ordering Components

You can order additional components and replacement parts for the Sun Ultra 20 M2 Workstation. Contact your local Sun sales representative for more information. For the most up-to-date component information, see the Sun Ultra 20 M2 Workstation components list at:

http://sunsolve.sun.com/handbook_pub/

Third-Party Web Sites

Sun is not responsible for the availability of third-party web sites mentioned in this document. Sun does not endorse and is not responsible or liable for any content, advertising, products, or other materials that are available on or through such sites or resources. Sun will not be responsible or liable for any actual or alleged damage or loss caused by or in connection with the use of or reliance on any such content, goods, or services that are available on or through such sites or resources.

Safety Information

Read the following documents for safety information:

- *Important Safety Information for Sun Hardware Systems*, 816-7190
- *Sun Ultra 20 M2 Workstation Safety and Compliance Guide*, 819-2149
Sun Welcomes Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. You can submit your comments by going to:

http://www.sun.com/hwdocs/feedback/

Please include the title and part number of your document with your feedback: Sun Ultra 20 M2 Workstation Installation Guide, 819-6587-12.
CHAPTER 1

Introduction to the Sun Ultra 20 M2 Workstation Hardware

This chapter provides an overview of the Sun Ultra 20 M2 Workstation hardware.

This chapter includes the following sections:

■ Section 1.1, “Safety Information” on page 1-1
■ Section 1.2, “Planning the Installation Process” on page 1-2
■ Section 1.3, “Inventorying Package Contents” on page 1-3
■ Section 1.4, “Front Panel” on page 1-4
■ Section 1.5, “Back Panel” on page 1-5
■ Section 1.6, “Interior Components” on page 1-6
■ Section 1.7, “Connecting External Devices to the Workstation” on page 1-7
■ Section 1.8, “Powering On the Workstation” on page 1-9
■ Section 1.9, “Powering Off the Workstation” on page 1-9
■ Section 1.10, “Adding/Removing Devices To/From the Boot Menu” on page 1-10

1.1 Safety Information

Read the following documents for safety information:

■ Important Safety Information for Sun Hardware Systems, 816-7190
■ Sun Ultra 20 M2 Workstation Safety and Compliance Guide, 819-6585
1.2 Planning the Installation Process

Use the following flowchart as a process tool to assist you with installation of the Sun Ultra 20 M2 Workstation.

**FIGURE 1-1** Process for Setting Up the Sun Ultra 20 M2 Workstation

1. **START**
   - Unpack the workstation and familiarize yourself with the workstation features.
   - **Yes**
     - Install optional components?
     - **Yes**
       - See Section 1.4, “Front Panel” on page 1-4 and Section 1.5, “Back Panel” on page 1-5.
     - **No**
       - Install your OS.
       - To install an optional, supported OS, see the Sun Ultra 20 M2 Workstation Operating System Guide.
   - **No**
     - Connect the workstation and external device cables.
     - Power on the workstation.
     - **No**
       - Configure preinstalled OS software?
         - **No**
           - See Section 2.1, “Configuring the Solaris 10 OS” on page 2-1.
         - **Yes**
           - Install your OS.
           - To install an optional, supported OS, see the Sun Ultra 20 M2 Workstation Operating System Guide.
     - **Yes**
       - Install optional components.
       - See Section 1.8, “Connecting External Devices to the Workstation” on page 1-9.
   - See Appendix C and the Sun Ultra 20 M2 Workstation Operating System Guide.

**READY TO WORK!**
1.3 Inventorysting Package Contents

Carefully unpack all workstation components from the packing cartons. The following items are contained in the package.

**TABLE 1-1** Items Included in the Sun Ultra 20 M2 Workstation Box

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Sun Ultra 20 M2 Workstation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DMS-59 cable</td>
</tr>
<tr>
<td></td>
<td>(if the workstation is configured with an NVS285 graphics card)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Documentation</th>
<th>Sun Ultra 20 M2 Workstation Installation Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(this document)</td>
</tr>
<tr>
<td></td>
<td>Where to Find Sun Ultra 20 M2 Workstation Documentation</td>
</tr>
<tr>
<td></td>
<td>(lists available online documents for this product)</td>
</tr>
<tr>
<td></td>
<td>Sun safety, warranty, and license documents</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CD-ROM</th>
<th>Sun Ultra 20 M2 Workstation Tools and Drivers CD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(includes drivers and diagnostics software)</td>
</tr>
</tbody>
</table>

If you ordered an optional country kit, the kit ships in a separate package and includes a power cable, keyboard, and mouse.

**Note** – Use only a Type 7 keyboard and Type 7 mouse with the Sun Ultra 20 M2 Workstation.
1.4 Front Panel

FIGURE 1-2 illustrates the front panel of the Sun Ultra 20 M2 Workstation. TABLE 1-2 lists the components called out in the figure.

<table>
<thead>
<tr>
<th>Label</th>
<th>Button/LED/Port</th>
<th>Label</th>
<th>Button/LED/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power button</td>
<td>4</td>
<td>Two USB 2.0 ports</td>
</tr>
<tr>
<td>2</td>
<td>Power LED</td>
<td>5</td>
<td>Microphone-in jack</td>
</tr>
<tr>
<td>3</td>
<td>Two 1394 ports</td>
<td>6</td>
<td>Headphone-out jack</td>
</tr>
</tbody>
</table>
1.5 Back Panel

FIGURE 1-3 depicts the back panel of the Sun Ultra 20 M2 Workstation. TABLE 1-3 lists the components called out in the figure.

![Back Panel Components Diagram]

FIGURE 1-3 Back Panel Components

<table>
<thead>
<tr>
<th>Label</th>
<th>Connector/Slot</th>
<th>Label</th>
<th>Connector/Slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power connector</td>
<td>8</td>
<td>Four USB 2.0 connectors</td>
</tr>
<tr>
<td>2</td>
<td>Power switch</td>
<td>9</td>
<td>PCI Express x16 graphics slot</td>
</tr>
<tr>
<td>3</td>
<td>Onboard DB15 VGA graphics connector (for ES 1000 graphics controller)</td>
<td>10</td>
<td>PCI Express x1 slot</td>
</tr>
<tr>
<td>4</td>
<td>Line-in jack</td>
<td>11</td>
<td>PCI Express x16 mechanical slot (x8 electrical)</td>
</tr>
<tr>
<td>5</td>
<td>Line-out jack</td>
<td>12</td>
<td>Three PCI 33-MHz 32-bit slots</td>
</tr>
<tr>
<td>6</td>
<td>Microphone jack</td>
<td>13</td>
<td>Cover plate, no slot</td>
</tr>
<tr>
<td>7</td>
<td>Two Ethernet connectors</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE 1-3 Back Panel Components
1.6 Interior Components

FIGURE 1-4 illustrates some of the interior components of the Sun Ultra 20 M2 Workstation. TABLE 1-4 lists the items called out in the figure.

For further information about PCI slots, see “PCI-E and PCI Expansion Slots” on page 5. For component installation, removal, and replacement procedures, see the Sun Ultra 20 M2 Workstation Service Manual.

![Internal System Components](image)

TABLE 1-4 Internal System Components

<table>
<thead>
<tr>
<th>Label</th>
<th>Component</th>
<th>Label</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power supply</td>
<td>6</td>
<td>DVD release lever</td>
</tr>
<tr>
<td>2</td>
<td>Memory (DIMMs)</td>
<td>7</td>
<td>I/O board release thumbscrew</td>
</tr>
<tr>
<td>3</td>
<td>System fan</td>
<td>8</td>
<td>Heatsink release lever</td>
</tr>
<tr>
<td>4</td>
<td>PCI Express slots (3) numbered PCI-E slot 0 (top) to PCI-E slot 2</td>
<td>9</td>
<td>System serial number</td>
</tr>
<tr>
<td>5</td>
<td>PCI slots (3) numbered PCI slot 0 (top) to PCI slot 2</td>
<td>10</td>
<td>Hard disk drive(s)</td>
</tr>
</tbody>
</table>
1.7 Connecting External Devices to the Workstation

FIGURE 1-5 illustrates the external device cable connections to the workstation.

Perform this procedure to connect external devices to the workstation.

1. Connect the workstation power cord to a grounded electrical outlet.

2. Connect the keyboard to a USB connector on the back or front panel.

3. Connect the mouse to the USB connector on the underside of the keyboard or to a USB connector on the front or back panel.

4. Connect the Ethernet cable to either Ethernet connector on the Sun Ultra 20 M2 Workstation, and connect the other end of the cable to an Ethernet RJ-45 jack.
5. Connect the monitor cable as follows:
   - If a PCI Express graphics card is not installed in the top PCI-E slot, connect the monitor to the onboard video connector. See the top of FIGURE 1-6.
   - If a PCI Express graphics card is installed in the top PCI-E slot, connect the monitor to the graphics card connector. See the bottom of FIGURE 1-6.
     Your graphics card might require a DVI cable to connect to your monitor.

6. Connect any additional external devices to the workstation’s other connectors.
1.8 Powering On the Workstation

Perform this procedure to power on the workstation.

1. Turn on the power to the monitor and to all external devices.
2. Turn the power switch on the rear of the workstation to the On ( | ) position.
3. Press and release the power switch on the front panel.
4. After several seconds, verify that the platform power LED next to the power switch is lit.
   The platform power LED lights after the workstation begins the internal booting process.
5. 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.

1.9 Powering Off the Workstation

1. Save your data and close any open applications.
2. Read both of the following power-off options, and then follow one of the options to turn off the workstation.
   ■ Power off the workstation by using the operating system shutdown command or menu option.
     In most cases, this initiates an orderly shutdown of the operating system and shuts off the workstation power.

Caution – To avoid data loss, use the first option whenever possible.

■ If the first option does not shut off the workstation power, press and hold the power button for approximately four seconds.
   This option shuts down the power to the workstation but does not initiate an orderly shutdown of the operating system. This option might result in data loss.
If the proceeding options do not power off the workstation, turn the power switch on the back panel to the Off (0) position.

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

1.10 Adding/Removing Devices To/From the Boot Menu

The boot menu lists the devices from which the system can boot. If you want to boot from a newly installed or attached device, you must add it to the boot menu.

To add or remove devices to/from the boot menu (accessed by pressing the F8 key during boot), perform the following steps:

1. **Press the F2 key during system boot.**
   The BIOS Setup screen displays.

2. **In the Boot Settings menu, add or remove the device from the boot device list.**

3. **Press the F10 key to save your settings and exit.**
The Solaris™ 10 Operating System (OS) is preinstalled on the Sun Ultra 20 M2 Workstation, along with developer software. This chapter contains instructions for configuring the preinstalled Solaris 10 OS, and information regarding the developer software.

To install Linux, Windows, or a different version of the Solaris OS, see the Sun Ultra 20 M2 Workstation Operating System Installation Guide, available on the Sun documentation web site. Also, refer to Appendix C for a list of supported operating systems.

This chapter contains the following sections:

- Section 2.1.1, “Licensing Information” on page 2-2
- Section 2.1.2, “Disk Configuration” on page 2-2
- Section 2.1.3, “Installation Flowchart” on page 2-3
- Section 2.1.4, “Configuring the Preinstalled Solaris 10 OS” on page 2-4

2.1 Configuring the Solaris 10 OS

The following topics are covered in this section:

- Section 2.1.1, “Licensing Information” on page 2-2
- Section 2.1.2, “Disk Configuration” on page 2-2
- Section 2.1.3, “Installation Flowchart” on page 2-3
- Section 2.1.4, “Configuring the Preinstalled Solaris 10 OS” on page 2-4
2.1.1 Licensing Information

The Solaris 10 OS installed on your system requires no licensing fee. The Sun Ultra 20 M2 Workstation requires Solaris 10 6/06 or a subsequent compatible version of the Solaris OS. For more information, refer to the following web site:


2.1.2 Disk Configuration

The exact disk configuration that is preinstalled is as follows:

- Hard drive root partition—14.0-GB
- Hard drive swap partition—2.0-GB
- Hard drive var partition—6.0-GB
- Hard drive export partition—remainder of the disk
2.1.3 Installation Flowchart

Use the flowchart in FIGURE 2-1 to assist with setting up your OS.

START

Power on the system.

Yes

Use a preinstalled version of software?

No

Install different OS from other media.

Configure the Solaris 10 OS.

Explore developer software.

READY TO WORK!

FIGURE 2-1  Installation Flow Diagram

See “Section 1.8, “Powering On the Workstation” on page 1-9.

For instructions, refer to Appendix C, the Sun Ultra 20 M2 Workstation Operating System Installation Guide, and the documentation for your OS.

See Section 2.1.4, “Configuring the Preinstalled Solaris 10 OS” on

See Section 2.2, “Exploring Preinstalled Developer Software” on
2.1.4 Configuring the Preinstalled Solaris 10 OS

Complete the following steps to configure the preinstalled Solaris 10 OS.

1. **Power on the workstation.** See Section 1.8, “Powering On the Workstation” on page 1-9.

2. **Answer the setup prompts by following the on-screen instructions.**
   Use a copy of TABLE 2-1 to write down the information that you might need to collect before setting up the Solaris 10 OS.
   To help you fill out the information in the table, your system administrator (SA) should provide you with information specific to your site before you begin. Check with your SA about whether some of the information is available on your network.

   **Note** – When you originally configure your system, under Xserver Selection, you will be given a choice of Xorg server or Xsun server. Choose Xorg server.

3. **When you finish the configuration, the system reboots.**
   The workstation displays the login window.

4. **Type your user name and password to log in and begin using the workstation.**

5. **Review the Solaris 10 Operating System Release Notes for any late-breaking information about your preinstalled software.**
   The Solaris 10 Operating System Release Notes documentation is located at the following web site:
   
   http://docs.sun.com
### TABLE 2-1  Information for Preinstalled Solaris 10 OS Configuration

<table>
<thead>
<tr>
<th>Setup Window</th>
<th>Explanation and Notes</th>
<th>Your Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select Language and Locale</td>
<td>Native language and locale to use for the workstation.</td>
<td></td>
</tr>
<tr>
<td>Host Name</td>
<td>A name to give the workstation.</td>
<td></td>
</tr>
<tr>
<td>Terminal Type</td>
<td>Type of terminal to use on the workstation.</td>
<td></td>
</tr>
<tr>
<td>Network Connectivity (IP Address)</td>
<td>Network or standalone workstation protocols. A system administrator might be required to complete this section.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Depending on how you answer and what information is provided by your network, you might also be prompted for the workstation’s IP address.</td>
<td></td>
</tr>
<tr>
<td>IPv6</td>
<td>Option to enable IPv6 on the workstation.</td>
<td></td>
</tr>
<tr>
<td>Security Settings</td>
<td>Security settings and protocols.</td>
<td></td>
</tr>
<tr>
<td>Name Service</td>
<td>Name service to use: NIS+, NIS, DNS, LDAP, or None.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This window displays only if the workstation is connected to a network.</td>
<td></td>
</tr>
<tr>
<td>Domain Name</td>
<td>NIS or NIS+ domain for this workstation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This window displays only if you specify NIS or NIS+ as the Name Service.</td>
<td></td>
</tr>
<tr>
<td>Name Server/Subnet/Subnet Mask</td>
<td>Name server (specify the server or have the workstation find one on a local subnet).</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This window displays only if the workstation is connected to a network.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Depending on how you answer and what information is provided by your network, you might also be prompted for:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The subnet for the workstation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The subnet mask for the workstation</td>
<td></td>
</tr>
<tr>
<td>Time Zone</td>
<td>Local time zone (select by geographic region, GMT offset, or a time zone file).</td>
<td></td>
</tr>
</tbody>
</table>
2.2 Exploring Preinstalled Developer Software

The following minimum versions of Sun's developer software are preinstalled or preloaded onto your Sun Ultra 20 M2 Workstation. An overview of each developer software package is presented in the following sections.

- Sun Studio 11 (see Section 2.2.1, “Sun Studio Software” on page 2-6)
- Sun Java Studio Creator 2 (see Section 2.2.2, “Sun Java Studio Creator” on page 2-7)
- Sun Java Studio Enterprise 8 (see Section 2.2.3, “Sun Java Studio Enterprise” on page 2-7)
- NetBeans IDE 5.0 (Section 2.2.4, “NetBeans IDE” on page 2-8)

Your system might have later versions of this software preinstalled.

2.2.1 Sun Studio Software

Sun Studio software provides a comprehensive, productive environment for developing reliable, scalable, high-performance applications using C, C++, and FORTRAN for the Solaris OS. The software package includes compilers, performance analysis tools, and a powerful debugger, as well as an integrated development environment (IDE).

The Sun Studio IDE provides modules for creating, editing, building, debugging, and analyzing the performance of C, C++, or FORTRAN applications. It includes a set of basic Java™ language support modules that can be enabled if needed for JNI (Java Native Interface) development.

The Sun Studio software consists of two major components:
The Sun Studio component, which includes the IDE, compilers, tools, and core platform.

The Java 2 Platform, Standard Edition (J2SE) technology on which the core platform runs.

For more information regarding the Sun Studio software, see the product documentation at the following web site:

http://developers.sun.com/sunstudio

### 2.2.2 Sun Java Studio Creator

The Sun Java Studio Creator development environment (formerly “Project Rave”) is the next-generation tool for Java application development. This product combines the power of 100% Java standards with simplified visual development techniques to give developers the most effective, most productive way to build applications in Java.

The Java Studio Creator environment was designed and tested to meet the needs of skilled developers whose primary concern is rapid turnaround of business-critical applications. Java Studio Creator enables these developers to leverage the power of the Java platform to solve business problems, without forcing them to give up the highly-productive, visual style to which they are accustomed.

For additional information about Sun Java Studio Creator, see the product documentation at the following web site:

http://developers.sun.com/jscreator

### 2.2.3 Sun Java Studio Enterprise

Sun Java Studio Enterprise is a complete, cost-effective, unified platform of tools, support, and services designed to fully integrate with the capabilities of the Sun Java Enterprise System. Java Studio Enterprise enables you to develop applications in an environment carefully designed to:

- Improve productivity
- Simplify the creation of sophisticated network applications that are ready to be deployed on the Java Enterprise System

For additional information about Sun Java Studio Enterprise, see the product documentation at the following web site:

http://developers.sun.com/jsenterprise
2.2.4 NetBeans IDE

The NetBeans IDE 5.0 includes Java 2 Platform, Enterprise Edition (J2EE) development capabilities. This new release enables developers to not only develop applications in the web tier, but also includes Enterprise JavaBeans (EJBs) and web service development capabilities.

The NetBeans IDE is a single platform with out-of-the-box development capabilities and support for enterprise (J2EE 1.4) applications and web services, mobile/wireless Java 2 Platform, Micro Edition (J2ME) applications and services, and desktop Java 2 Platform, Standard Edition (J2SE) applications. The robust open source Java IDE, has everything that Java software developers need to develop cross-platform desktop, web, and mobile applications straight out of the box.

For more information about the NetBeans IDE, see the following website:

http://www.netbeans.org

2.3 Restoring, Reinstalling, and Backing Up Preinstalled Software

The hard disk drive for your system contains preinstalled software, including the Solaris 10 OS, developer software, and other applications. The preinstalled OS is preconfigured with drivers required to support the workstation’s hardware.

The Solaris 10 6/06 OS (or a later, compatible version) is available for download, as are the developer applications, drivers, and other applications. However, if you reinstall the OS, you will need to follow the instructions in the Sun Ultra 20 M2 Workstation Operating System Installation Guide to configure the OS and install the drivers.

Instead of downloading software, you can purchase the Solaris 10 media from the following web site:

http://store.sun.com/
2.3.1 Backing-up and Restoring the Solaris OS

To restore the Solaris OS, make and keep a full backup of the OS. The Solaris 10 System Administration Collection includes instructions for backing up your OS and is available on the following web site:

http://docs.sun.com/

2.3.2 Downloading Developer Software

You can download the developer software packages from the following web sites. The sites contain the software packages, updates, documentation, and more.

If you purchased the Solaris 10 media, some of the software is included on the media.

<table>
<thead>
<tr>
<th>Software Package</th>
<th>Download Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun Studio</td>
<td><a href="http://developers.sun.com/sunstudio">http://developers.sun.com/sunstudio</a></td>
</tr>
<tr>
<td>Java Studio Enterprise</td>
<td><a href="http://developers.sun.com/jsenterprise">http://developers.sun.com/jsenterprise</a></td>
</tr>
<tr>
<td>Java Studio Creator</td>
<td><a href="http://developers.sun.com/jscreator">http://developers.sun.com/jscreator</a></td>
</tr>
<tr>
<td>NetBeans</td>
<td><a href="http://www.netbeans.org">http://www.netbeans.org</a></td>
</tr>
</tbody>
</table>

2.3.3 Hard Drive Mirroring

To perform hard drive mirroring using the Solaris 10 operating environment, use Solaris Volume Manager.

For information about Solaris Volume Manager, see the Solaris Volume Manager Administration Guide at the following web site:

http://www.sun.com/documentation/
Configuring the System for Dual Monitors

This chapter describes how to configure the following operating systems for dual monitors:

- Section 1.1, “Solaris” on page A-2
- Section 1.2, “Windows” on page A-2
- Section 1.3, “Linux” on page A-3
1.1 Solaris

To configure Solaris for dual monitors, follow these steps:

1. **Install the two video cards you intend to use, attach monitors to the cards, and boot the system.**

   **Note** – X-windows may not start, initially, due to the change in configuration.

   The system outputs to PCI-E slot 2 (lower slot) until X-windows comes up.

2. **When the system boots, insert the Tools and Drivers CD, and change directory to the following location:**

   /cdrom/<T&D_disk_name>/drivers/solx86

3. **Run the install.sh and the dual_monitor.sh scripts.**

4. **Reboot the system.**

   The dual monitors should come up.

5. **To change from Clone to Xinerama modes,** edit the file /etc/X11/xorg.conf and turn the appropriate settings in the file *on* or *off.*

1.2 Windows

To configure Windows for dual monitors, follow these steps:

1. **Install the two cards which you wish to use, attach monitors to the cards, and boot the system.**

   The system outputs to PCI-E slot 2 (lower slot) until X-windows comes up.

2. **When the system boots, insert the Tools and Drivers CD, and change directory to the following location:**

   /cdrom/<T&D_disk_name>/drivers/winxp

3. **Change to the appropriate OS (32- or 64-bit) and load the video drivers.**

4. **Reboot the system.**
5. Open Control Panel > Display > Settings to adjust the parameters of the two screens.
   You may have to choose Extend Desktop to this monitor for the secondary screen.

6. Adjust the parameters as desired.
   A second reboot may be necessary for the system to see both screens.

1.3 Linux

To configure Linux for dual monitors, follow these steps:

1. Install the two cards which you wish to use, attach monitors to the cards, and boot the system.

   **Note** – X-windows may not start, initially, due to the change in configuration.

   The system outputs to PCI-E slot 2 (lower slot) until X-windows comes up.

2. When the system boots, insert the Tools and Drivers CD, and change directory to the following location:

   `/cdrom/<T&D_disk_name>/drivers/linux/<OS>`
   where OS can be either redhat or suse.

3. Run the install.sh script.

4. Change directory to the following location:

   `/etc/X11`

5. Copy the current xorg.conf (or XF86Config) file to a backup file.

6. Edit the xorg.conf file to add the new screens and cards.

   **Note** – The top card is at PCI address (2,0,0) and the bottom is at (7,0,0).
An example xorg.conf file is shown below:

```plaintext
# nvidia-xconfig: X configuration file generated by nvidia-xconfig
# nvidia-xconfig: version 1.0 (buildmeister@builder26) Mon Oct 16 22:13:48 PDT 2006
# XFree86 4 configuration created by pyxf86config
Section "ServerLayout"
  Identifier     "Default Layout"
  Screen 0 "Screen0" 0 0
  InputDevice    "Mouse0" "CorePointer"
  InputDevice    "Keyboard0" "CoreKeyboard"
EndSection
Section "ServerLayout"
  Identifier     "Default Layout"
  Screen 0 "Screen 0"
  Screen 1 "Screen 1" RightOf "Screen 0"
  InputDevice    "Mouse0" "CorePointer"
  InputDevice    "Keyboard0" "CoreKeyboard"
EndSection
Section "Files"
  RgbPath         "/usr/X11R6/lib/X11/rgb"
  FontPath        "unix:/7100"
EndSection
Section "Module"
  Load           "dbe"
  Load           "extmod"
  Load           "fbdevhw"
  Load           "glx"
  Load           "record"
  Load           "freetype"
  Load           "type1"
EndSection
```
Section "InputDevice"
# Specify which keyboard LEDs can be user-controlled (eg, with xset(1))
# Option "Xleds" "1 2 3"
# To disable the XKEYBOARD extension, uncomment XkbDisable.
# Option "XkbDisable"
# To customise the XKB settings to suit your keyboard, modify the
# lines below (which are the defaults). For example, for a non-U.S.
# keyboard, you will probably want to use:
# Option "XkbModel" "pc102"
# If you have a US Microsoft Natural keyboard, you can use:
# Option "XkbModel" "microsoft"
# Then to change the language, change the Layout setting.
# For example, a german layout can be obtained with:
# Option "XkbLayout" "de"
# or:
# Option "XkbLayout" "de"
# Option "XkbVariant" "nodeadkeys"
# If you'd like to switch the positions of your capslock and
# control keys, use:
# Option "XkbOptions" "ctrl:swapcaps"
# Or if you just want both to be control, use:
# Option "XkbOptions" "ctrl:nocaps"

Identifier     "Keyboard0"
Driver         "kbd"
Option         "XkbModel" "pc105"
Option         "XkbLayout" "us"
EndSection

Section "InputDevice"
Identifier     "Mouse0"
Driver         "mouse"
Option         "Protocol" "IMPS/2"
Option         "Device" "/dev/input/mice"
Option         "ZAxisMapping" "4 5"
Option         "Emulate3Buttons" "yes"
EndSection
Section "Monitor"
  Identifier "Monitor0"
  VendorName "Monitor Vendor"
  ModelName "Unprobed Monitor"
  HorizSync 31.5 - 67.0
  VertRefresh 50.0 - 75.0
  Option "dpms"
EndSection
Section "Monitor"
  Identifier "Monitor1"
  VendorName "Sun Microsystems"
  ModelName "X7198A"
  HorizSync 31.5 - 67.0
  VertRefresh 50.0 - 75.0
  Option "dpms"
EndSection
Section "Device"
  Identifier "Videocard0"
  Driver "nvidia"
  VendorName "Videocard vendor"
  BoardName "VESA driver (generic)"
  BusID "PCI:2:0:0"
EndSection
Section "Device"
  Identifier "Videocard1"
  Driver "nvidia"
  VendorName "Videocard vendor"
  BoardName "VESA driver (generic)"
  BusID "PCI:7:0:0"
EndSection
Section "Screen"
  Identifier "Screen 0"
  Device "Videocard0"
  Monitor "Monitor0"
  DefaultDepth 24
  Option "TwinView" "True"
  Option "TwinViewOrientation" "LeftOf"
  Option "UseEdidFreqs" "True"
  Option "MetaModes" "800x600,800x600"
SubSection  "Display"
    Viewport    0 0
    Depth       24
    Modes      "800x600" "640x480"
EndSubSection
EndSection
Section "Screen"
    Identifier     "Screen 1"
    Device         "Videocard1"
    Monitor        "Monitor1"
    DefaultDepth    24
    Option         "TwinView" "True"
    Option         "TwinViewOrientation" "LeftOf"
    Option         "UseEdidFreqs" "True"
    Option         "MetaModes" "1024x768, 1024x768"
SubSection  "Display"
    Viewport    0 0
    Depth       24
    Modes      "800x600" "640x480"
EndSubSection
EndSection
Troubleshooting Setup and Obtaining Technical Assistance

This chapter contains information to help you troubleshoot minor system problems, and includes information on the following topics:

■ Section 2.1, “Troubleshooting the Sun Ultra 20 M2 Workstation Setup” on page B-2
■ Section 2.2, “Technical Assistance” on page B-4
# 2.1 Troubleshooting the Sun Ultra 20 M2 Workstation Setup

If you experience problems while setting up your system, refer to the troubleshooting information in TABLE 2-1. For additional troubleshooting information, see the *Sun Ultra 20 M2 Workstation Service Manual*.

**TABLE 2-1  Troubleshooting Procedures**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>System powers on, but the monitor does not.</td>
<td>• Is the Power button for the monitor turned on?</td>
</tr>
<tr>
<td></td>
<td>• Is the monitor power cord connected to a wall outlet?</td>
</tr>
<tr>
<td></td>
<td>• Does the wall outlet have power? Test by plugging in another device.</td>
</tr>
<tr>
<td></td>
<td>• Is the monitor connected to the onboard video connector or PCI Express video</td>
</tr>
<tr>
<td></td>
<td>connector?</td>
</tr>
<tr>
<td>CD or DVD does not eject from the media tray when you press the Eject button.</td>
<td>• Move the mouse or press any key on the keyboard. The drive might be in low-power</td>
</tr>
<tr>
<td></td>
<td>mode.</td>
</tr>
<tr>
<td></td>
<td>• Use the utility software installed on your system to eject the CD.</td>
</tr>
<tr>
<td>No video displays on the monitor screen.</td>
<td>• Is the monitor cable attached to the onboard video connector or PCI Express video</td>
</tr>
<tr>
<td></td>
<td>connector?</td>
</tr>
<tr>
<td></td>
<td>• Does the monitor work when connected to another system?</td>
</tr>
<tr>
<td></td>
<td>• If you have a known-good monitor, does it work when connected to this system?</td>
</tr>
<tr>
<td></td>
<td>• Verify that the BIOS settings are correct.</td>
</tr>
<tr>
<td></td>
<td>• Review the Sun Ultra 20 M2 Workstation Product Notes for any issues that might</td>
</tr>
<tr>
<td></td>
<td>impact your specific software and hardware configuration.</td>
</tr>
<tr>
<td>System does not power on when the front panel Power button is pressed.</td>
<td>Keep notes on the following situations in case you need to call service:</td>
</tr>
<tr>
<td></td>
<td>• Is the power switch on the back of the system turned on (see FIGURE 1-3)?</td>
</tr>
<tr>
<td></td>
<td>• Is the Power button LED illuminated on the front of the system? (Ensure that the</td>
</tr>
<tr>
<td></td>
<td>power cord is connected to the system and to a grounded power receptacle.)</td>
</tr>
<tr>
<td></td>
<td>• Does the wall outlet have power? Test by plugging in another device.</td>
</tr>
<tr>
<td></td>
<td>• Do you hear a beep when the system is powered on? (Ensure that the keyboard is</td>
</tr>
<tr>
<td></td>
<td>plugged in.)</td>
</tr>
<tr>
<td></td>
<td>• Test with another keyboard that you know is functional. Do you hear a beep when</td>
</tr>
<tr>
<td></td>
<td>you connect the keyboard and power on the system?</td>
</tr>
<tr>
<td></td>
<td>• Does the monitor synchronize within 5 minutes after power on? (The green LED on</td>
</tr>
<tr>
<td></td>
<td>the monitor stops flashing and remains illuminated.)</td>
</tr>
</tbody>
</table>
Keyboard or mouse does not respond to actions.

- Verify that the keyboard cable is connected to an on-board USB 2.0 connector on the system, and that the mouse is connected to a USB connector on the keyboard or on the system.
- Verify that the system is powered on and the front Power LED is illuminated.

System appears to be in low-power mode, but the Power button LED does not blink.

The power-indicator LED blinks only when all system components are in low-power mode. A tape drive might be connected to your system. Because tape drives do not enter low-power mode, the power-indicator LED does not blink.

Hung or frozen system: No response from mouse, keyboard, or any application.

Are the keyboard and mouse Type 7? (Verify the model on the underside of the keyboard).

Try to access your system from another system on the network.

1. From a terminal window, type `ping hostname`
2. If there is no response, remotely log in from another system using `telnet` or `rlogin`, and type the `ping hostname` command again.
3. Attempt to terminate processes until the system responds.

If the above procedure does not work:

1. Press the Power button to power off the system.
2. Wait 20 to 30 seconds and power on the system.

---

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

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Solution</th>
</tr>
</thead>
</table>
| Keyboard or mouse does not respond to actions. | • Verify that the keyboard cable is connected to an on-board USB 2.0 connector on the system, and that the mouse is connected to a USB connector on the keyboard or on the system.  
• Verify that the system is powered on and the front Power LED is illuminated. |
| System appears to be in low-power mode, but the Power button LED does not blink. | The power-indicator LED blinks only when all system components are in low-power mode. A tape drive might be connected to your system. Because tape drives do not enter low-power mode, the power-indicator LED does not blink. |
| Hung or frozen system: No response from mouse, keyboard, or any application. | Are the keyboard and mouse Type 7? (Verify the model on the underside of the keyboard).  
Try to access your system from another system on the network.  
1. From a terminal window, type `ping hostname`  
2. If there is no response, remotely log in from another system using `telnet` or `rlogin`, and type the `ping hostname` command again.  
3. Attempt to terminate processes until the system responds.  
If the above procedure does not work:  
1. Press the Power button to power off the system.  
2. Wait 20 to 30 seconds and power on the system. |
2.2 Technical Assistance

If the troubleshooting procedures in this chapter fail to solve your problem, use TABLE 2-2 to collect information that you might need to communicate to the support personnel.

TABLE 2-3 lists Sun web sites and telephone numbers for additional technical support. You can also refer to the web sites listed in “Documentation, Warranty, Support, and Training URLs” on page vii.

TABLE 2-2 System Information Required for Support

<table>
<thead>
<tr>
<th>System Configuration Information Needed</th>
<th>Your Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun service contract number</td>
<td></td>
</tr>
<tr>
<td>System model</td>
<td></td>
</tr>
<tr>
<td>Operating system, including service pack number or update number</td>
<td></td>
</tr>
<tr>
<td>System serial number</td>
<td></td>
</tr>
<tr>
<td>Peripherals attached to the system</td>
<td></td>
</tr>
<tr>
<td>Hardware configuration information, including the following:</td>
<td></td>
</tr>
<tr>
<td>• Graphics card installed</td>
<td></td>
</tr>
<tr>
<td>• PCI or PCI Express cards installed</td>
<td></td>
</tr>
<tr>
<td>• Amount of memory</td>
<td></td>
</tr>
<tr>
<td>• Processor speed</td>
<td></td>
</tr>
<tr>
<td>• Optical disk type</td>
<td></td>
</tr>
<tr>
<td>Email address and phone number for you and a secondary contact</td>
<td></td>
</tr>
<tr>
<td>Street address where the system is located</td>
<td></td>
</tr>
<tr>
<td>Superuser password</td>
<td></td>
</tr>
<tr>
<td>Summary of the problem and the work being done when the problem occurred</td>
<td></td>
</tr>
<tr>
<td>Output of diagnostics test, if applicable</td>
<td></td>
</tr>
<tr>
<td>Other useful information</td>
<td></td>
</tr>
<tr>
<td>IP address</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 2-2  System Information Required for Support  *(Continued)*

<table>
<thead>
<tr>
<th>System Configuration Information Needed</th>
<th>Your Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workstation name (system host name)</td>
<td></td>
</tr>
<tr>
<td>Network or Internet domain name</td>
<td></td>
</tr>
<tr>
<td>Proxy server configuration</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 2-3  Sun Web Sites and Telephone Numbers

<table>
<thead>
<tr>
<th>Workstation Documents and Support Resources</th>
<th>URL or Telephone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service support phone numbers</td>
<td>1-800-872-4786 (1-800-USA-4Sun) Select Option 1</td>
</tr>
<tr>
<td>Warranty and contract support contacts; Links to other service tools</td>
<td><a href="http://www.sun.com/service/warrantiescontracts/">http://www.sun.com/service/warrantiescontracts/</a></td>
</tr>
<tr>
<td>Warranties for every Sun product</td>
<td><a href="http://www.sun.com/service/warranty">http://www.sun.com/service/warranty</a></td>
</tr>
</tbody>
</table>
Tools and Drivers CD, Supported Operating Systems, and System Specifications

This appendix contains the following sections:

- “Tools and Drivers CD Software” on page 1
- “Supported Operating System Software” on page 2
- “Sun Ultra 20 M2 Workstation Features and Specifications” on page 3

For maximum reliability and performance, install your system into an appropriate environment and ensure correct configuration as discussed in this document.

C.1 Tools and Drivers CD Software

The Sun Ultra 20 M2 Workstation Tools and Drivers CD, included with the workstation, contains the following software:

- Supplemental drivers to support preinstalled, or supported and user-installed, operating systems. See the Sun Ultra 20 M2 Workstation Operating System Guide for information on installing these drivers.

- Eurosoft Pc-Check diagnostics software, which provides various diagnostics testing options for the Sun Ultra 20 M2 Workstation. See the Sun Ultra 20 M2 Workstation Service Manual for more information.

- Erase Primary Boot Hard Disk utility to erase the preinstalled operating system.

- XpReburn utility to add drivers to an existing XP installation CD.

- Open DOS.
C.2 Supported Operating System Software

The Solaris 10 6/06 OS is preinstalled on the Sun Ultra 20 M2 Workstation. Previous versions of the Solaris OS are not supported.

The following operating systems (or later versions) are also supported for this workstation:

- Red Hat Enterprise Linux 3 WS Update 7, 32-bit and 64-bit
- Red Hat Enterprise Linux 4 WS Update 3, 32-bit and 64-bit
- SUSE Linux Enterprise Server 9 SP 3, 64-bit only
- Windows XP, 32-bit (SP2) and 64-bit (WHQL certified)

For an updated list of supported operating systems, refer to the following web site:

http://www.sun.com/ultra20

You can order Red Hat Enterprise Linux WS or SUSE Linux Enterprise Server for the Sun Ultra 20 M2 Workstation from the following Sun web site:


Follow the installation instructions provided with the operating systems. The Sun Ultra 20 M2 Workstation Operating System Guide contains instructions and information relating to driver installation for supported operating systems.
C.3 Sun Ultra 20 M2 Workstation Features and Specifications

C.3.1 System Components and Features

**TABLE C-1** shows the system’s key components.

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
</table>
| **CPU**           | • One dual-core AMD Opteron processor  
 |                   | • Processor frequencies: 1.8 GHz and faster  
 |                   | • 1 MB Level 2 Cache per processor core                                                                                                     |
| **Memory**        | • Four DIMM slots  
 |                   | • 512 MB, 1 GB, 2 GB unbuffered DDR2-667, unbuffered, ECC DIMM modules supported (see **Section C.3.2, “Memory Configurations” on page C-4**) |
| **Media storage** | DVD-ROM or DVD-Dual                                                                                                                                 |
| **Hard disk drives** | Up to two SATA disk drives                                                                                                                     |
| **Power supply**  | 400W PSU                                                                                                                                 |
| **Network I/O**   | Onboard 10/100/1000BASE-T Gigabit Ethernet controller providing 2 RJ45 connectors on the back panel                                           |
| **Video**         | Onboard ATI graphics controller with DB15 VGA graphics connector                                                                                     |
| **PCI-E I/O and PCI I/O** | One PCI Express x16 graphics slot  
 | (see **Section C.3.3, “PCI-E and PCI Expansion Slots” on page C-5**)  
 |                   | One PCI Express x1 expansion slot  
 |                   | One PCI Express x16 mechanical connector slot (PCI-E x8 electrical)                                                                                |
|                   | Three PCI 33 MHz 32-bit slots                                                                                                                                 |
| **Other I/O**     | Six USB 2.0 connectors (two on the front and four on the back of the workstation)  
 |                   | Two IEEE 1394 connectors on the front panel  
 |                   | Line-in/line-out jacks on the back panel  
 |                   | Microphone-in jack on the front and back panels  
 |                   | Headphone-out jack on the front panel
C.3.2 Memory Configurations

TABLE C-2 lists the possible memory configurations for the Sun Ultra 20 M2 Workstation.

The system requires DDR2-667, unbuffered, ECC DIMMs installed in pairs (except the base 512 MB configuration). You can purchase DIMM kits at:

http://store.sun.com

DIMM slots are numbered from DIMM 0 to DIMM 3. Populate DIMM slots starting farthest from the CPU (that is, starting with slot 3).

**TABLE C-2** Sun Ultra 20 M2 Workstation Memory Configurations

<table>
<thead>
<tr>
<th>Total Memory</th>
<th>Supported DIMM Configuration 1</th>
<th>Supported DIMM Configuration 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>512 MB</td>
<td>1 x 512 MB</td>
<td></td>
</tr>
<tr>
<td>1 GB</td>
<td>2 x 512 MB</td>
<td></td>
</tr>
<tr>
<td>2 GB</td>
<td>2 x 1 GB</td>
<td>4 x 512 MB</td>
</tr>
<tr>
<td>3 GB</td>
<td>2 x 1 GB and 2 x 512 MB</td>
<td></td>
</tr>
<tr>
<td>4 GB</td>
<td>2 x 2 GB</td>
<td>4 x 1 GB</td>
</tr>
<tr>
<td>5 GB</td>
<td>2 x 2 GB and 2 x 512 MB</td>
<td></td>
</tr>
<tr>
<td>6 GB</td>
<td>2 x 2 GB and 2 x 1 GB</td>
<td></td>
</tr>
<tr>
<td>8 GB</td>
<td>4 x 2 GB</td>
<td></td>
</tr>
</tbody>
</table>
C.3.3 PCI-E and PCI Expansion Slots

TABLE C-3 lists the characteristics of the available PCI-E and PCI expansion slots.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Connector Type</th>
<th>Length</th>
<th>Height</th>
<th>Description</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PCI-Express x16 (x16 electrical)</td>
<td>x16</td>
<td>Full</td>
<td>Nearest to power supply. For FX 3500, FX 1500, FX 560, or NVS 285 graphics accelerator, or any PCI-Express expansion cards such as NIC adapters.</td>
<td>Top</td>
</tr>
<tr>
<td>1</td>
<td>PCI-Express x1</td>
<td>x1</td>
<td>Full</td>
<td>Not for graphics accelerators. Intended for PCI-Express expansion cards such as NIC.</td>
<td>Middle</td>
</tr>
<tr>
<td>2</td>
<td>PCI-Express x16 mechanical (x8 electrical)</td>
<td>x16</td>
<td>Full</td>
<td>Not for graphics accelerators. Intended for PCI-Express expansion cards such as NIC.</td>
<td>Bottom</td>
</tr>
<tr>
<td>0</td>
<td>Conventional PCI (PCI v2.3 32-bit/33 Mhz, 5V)</td>
<td>Full</td>
<td>Full</td>
<td>Open slot. Accommodates only 32-bit cards. 64-bit cards will not fit on the motherboard.</td>
<td>Top</td>
</tr>
<tr>
<td>1</td>
<td>Conventional PCI (PCI v2.3 32-bit/33 Mhz, 5V)</td>
<td>Full</td>
<td>Full</td>
<td>Open slot. Accommodates 64-bit PCI cards, but cards operate in 32-bit mode.</td>
<td>Middle</td>
</tr>
<tr>
<td>2</td>
<td>Conventional PCI (PCI v2.3 32-bit/33 Mhz, 5V)</td>
<td>Full</td>
<td>Full</td>
<td>Open slot (farthest from power supply). Accommodates 64-bit PCI cards, but cards operate in 32-bit mode.</td>
<td>Bottom</td>
</tr>
</tbody>
</table>

C.3.4 Physical Specifications

TABLE C-4 lists the physical specifications for the Sun Ultra 20 M2 Workstation.

<table>
<thead>
<tr>
<th>Specification</th>
<th>British</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>7.9 in.</td>
<td>200 mm</td>
</tr>
<tr>
<td>Depth</td>
<td>18.5 in.</td>
<td>470 mm</td>
</tr>
<tr>
<td>Height</td>
<td>17.1 in.</td>
<td>435 mm</td>
</tr>
<tr>
<td>Weight (max with packaging)</td>
<td>34 lb</td>
<td>15.4 kg</td>
</tr>
</tbody>
</table>
C.3.5 Power Specifications

The maximum continuous power for the Sun Ultra 20 M2 Workstation is 400W. TABLE C-5, TABLE C-6, and TABLE C-7 list additional power specifications for the system.

**TABLE C-5**  Input Voltage Range

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Minimum</th>
<th>Nominal</th>
<th>Maximum</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range 1</td>
<td>90</td>
<td>115</td>
<td>132</td>
<td>Vrms</td>
</tr>
<tr>
<td>Range 2</td>
<td>180</td>
<td>230</td>
<td>264</td>
<td>Vrms</td>
</tr>
</tbody>
</table>

**TABLE C-6**  Input Frequency Range

<table>
<thead>
<tr>
<th>Input Frequency</th>
<th>Minimum</th>
<th>Nominal</th>
<th>Maximum</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range 1</td>
<td>57</td>
<td>60</td>
<td>63</td>
<td>Hz</td>
</tr>
<tr>
<td>Range 2</td>
<td>47</td>
<td>50</td>
<td>53</td>
<td>Hz</td>
</tr>
</tbody>
</table>

**TABLE C-7**  Input Current

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Maximum Input Current</th>
<th>Maximum Inrush Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range 1</td>
<td>10A</td>
<td>50 A_{peak}</td>
</tr>
<tr>
<td>Range 2</td>
<td>5A</td>
<td>100 A_{peak}</td>
</tr>
</tbody>
</table>
### C.3.6 Environmental Specifications

*TABLE C-8* lists the environmental specifications for the Sun Ultra 20 M2 Workstation.

<table>
<thead>
<tr>
<th>Specification</th>
<th>State</th>
<th>British</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity</td>
<td>Operating</td>
<td>7%–93% RH noncondensing, 100.4˚ F max wet bulb</td>
<td>7%–93% RH noncondensing, 38˚ C max wet bulb</td>
</tr>
<tr>
<td></td>
<td>Nonoperating</td>
<td>93% RH, noncondensing, 109.4˚ F max wet bulb</td>
<td>93% RH, noncondensing, 43˚ C max wet bulb</td>
</tr>
<tr>
<td>Vibration</td>
<td>Operating</td>
<td>0.25G in all axes, 5–500 Hz sine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nonoperating</td>
<td>1.2G in all axes, 5–500 Hz sine</td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>Operating</td>
<td>4.5G, 11 msec. half-sine</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>Operating</td>
<td>41˚ F to 95˚ F</td>
<td>5˚ C to 35˚ C</td>
</tr>
<tr>
<td></td>
<td>Nonoperating</td>
<td>–40˚ F to 149˚ F</td>
<td>–40˚ C to 65˚ C</td>
</tr>
<tr>
<td>Maximum operating</td>
<td></td>
<td>–1.8˚ F for every 985 ft in altitude</td>
<td>–1˚ C for every 300 m in altitude</td>
</tr>
<tr>
<td>temperature rating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Altitude</td>
<td>Operating</td>
<td>max 9,843 ft</td>
<td>max 3,000 m</td>
</tr>
<tr>
<td></td>
<td>Nonoperating</td>
<td>max 39,370 ft</td>
<td>max 12,000 m</td>
</tr>
</tbody>
</table>