Sun Blade™ 100 Service Manual

Regulatory Compliance Statements

Your Sun product is marked to indicate its compliance class:

- Federal Communications Commission (FCC) — USA
- Department of Communications (DOC) — Canada
- Voluntary Control Council for Interference (VCCI) — Japan

Please read the appropriate section that corresponds to the marking on your Sun product before attempting to install the product.

FCC Class A Notice

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

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

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

Shielded Cables: Connections between the workstation and peripherals must be made using shielded cables to comply with FCC radio frequency emission limits. Networking connections can be made using unshielded twisted-pair (UTP) cables.

Modifications: Any modifications made to this device that are not approved by Sun Microsystems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

FCC Class B Notice

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

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

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

Shielded Cables: Connections between the workstation and peripherals must be made using shielded cables in order to maintain compliance with FCC radio frequency emission limits. Networking connections can be made using unshielded twisted pair (UTP) cables.

Modifications: Any modifications made to this device that are not approved by Sun Microsystems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

ICES-003 Class A Notice - Avis NMB-003, Classe A

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

ICES-003 Class B Notice - Avis NMB-003, Classe B

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

VCCI 基準について

クラス A VCCI 基準について

クラス A VCCI の表示があるワークステーションおよびオプション製品は、クラスA情報技術装置です。これらの製品には、下記の項目が該当します。

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

クラス B VCCI 基準について

クラス B VCCI の表示 VCI があるワークステーションおよびオプション製品は、クラスB情報技術装置です。これらの製品には、下記の項目が該当します。

> この装置は、情報処理装置等電波障害自主規制協議会(VCCI)の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをしてください。

BSMI Class A Notice

The following statement is applicable to products shipped to Taiwan and marked as Class A on the product compliance label.

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

Declaration of Conformity

Compliance Model Number: 202
Product Name: Sun Blade™ 100

EMC

USA—FCC Class B

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

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

European Union

This equipment complies with the following requirements of the EMC Directive 89/336/EEC:

EN55022:1995/CISPR22:1997		Class B
EN550024:1998	EN61000-4-2	4 kV (Direct), 8 kV (Air)
	EN61000-4-3	3 V/m
	EN61000-4-4	1.0 kV Power Lines, 0.5 kV Signal Lines
	EN61000-4-5	1 kV Line-Line, 2 kV Line-Gnd Power Lines
	EN61000-4-6	3 V
	EN61000-4-8	3 A/m
	EN61000-4-11	Pass
EN61000-3-2:1995		Pass
EN61000-3-3:1995		Pass

Safety

This equipment complies with the following requirements of the Low Voltage Directive 73/23/EEC:

EC Type Examination Certificates:

EN60950:1992, 2nd Edition, Amendments 1,2,3,4,11	TUV Rheinland Certificate No. S2055723
IEC 950:1991, 2nd Edition, Amendments 1,2,3,4	
Evaluated to all CB Countries	CB Scheme Certificate No. JPTUV-001881

Supplementary Information

This product was tested and complies with all the requirements for the CE Mark.

/S/   /S/

Dennis P. Symanski	DATE	Peter Arkless	DATE
Manager, Compliance Engineering		Quality Manager	

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Safety Agency Compliance Statements

Read this section before beginning any procedure. The following text provides safety precautions to follow when installing a Sun Microsystems product.

Safety Precautions

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

- Follow all cautions and instructions marked on the equipment.
- 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 may be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

Symbols

The following symbols may appear in this book:

Caution – There is risk of personal injury and equipment damage. Follow the instructions.

Caution – Hot surface. Avoid contact. Surfaces are hot and may 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.

Modifications to Equipment

Do not make mechanical or electrical modifications to the equipment. Sun Microsystems is not responsible for regulatory compliance of a modified Sun product.

Placement of a Sun Product

Caution – Do not block or cover the openings of your Sun product. Never place a Sun product near a radiator or heat register. Failure to follow these guidelines can cause overheating and affect the reliability of your Sun product.

Caution – The workplace-dependent noise level defined in DIN 45 635 Part 1000 must be 70Db(A) or less.

SELV Compliance

Safety status of I/O connections comply to SELV requirements.

Power Cord Connection

Caution – Sun products are designed to work with single-phase power systems having a grounded neutral conductor. To reduce the risk of electric shock, do not plug Sun products into any other type of power system. Contact your facilities manager or a qualified electrician if you are not sure what type of power is supplied to your building.

Caution – Not all power cords have the same current ratings. Household extension cords do not have overload protection and are not meant for use with computer systems. Do not use household extension cords with your Sun product.

Caution – Your Sun product is shipped with a grounding type (three-wire) power cord. To reduce the risk of electric shock, always plug the cord into a grounded power outlet.

Lithium Battery

Caution – This system contains a replaceable lithium battery, Mitsubishi Part Number R-2032. Lithium batteries may explode if mishandled. Do not dispose of the battery in fire. Do not disassemble it or attempt to recharge it.

System Unit Cover

You must remove the cover of your Sun computer system unit to add cards, memory, or internal storage devices. Be sure to replace the cover before powering on your computer system.

Caution – Do not operate Sun products without top cover in place. Failure to take this precaution may result in personal injury and system damage.

Laser Compliance Notice

Sun products that use laser technology comply with Class 1 laser requirements.

Class 1 Laser Product
Luokan 1 Laserlaite
Klasse 1 Laser Apparat
Laser KLasse 1

CD-ROM or DVD-ROM

Caution – Use of controls, adjustments, or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

Einhaltung sicherheitsbehördlicher Vorschriften

Auf dieser Seite werden Sicherheitsrichtlinien beschrieben, die bei der Installation von Sun-Produkten zu beachten sind.

Sicherheitsvorkehrungen

Treffen Sie zu Ihrem eigenen Schutz die folgenden Sicherheitsvorkehrungen, wenn Sie Ihr Gerät installieren:

■ Beachten Sie alle auf den Geräten angebrachten Warnhinweise und Anweisungen.

■ Vergewissern Sie sich, daß Spannung und Frequenz Ihrer Stromquelle mit der Spannung und Frequenz übereinstimmen, die auf dem Etikett mit den elektrischen Nennwerten des Geräts angegeben sind.

■ Stecken Sie auf keinen Fall irgendwelche Gegenstände in Öffnungen in den Geräten. Leitfähige Gegenstände könnten aufgrund der möglicherweise vorliegenden gefährlichen Spannungen einen Kurzschluß verursachen, der einen Brand, Stromschlag oder Geräteschaden herbeiführen kann.

Symbole

Die Symbole in diesem Handbuch haben folgende Bedeutung:

Achtung – Gefahr von Verletzung und Geräteschaden. Befolgen Sie die Anweisungen.

Achtung – Hohe Temperatur. Nicht berühren, da Verletzungsgefahr durch heiße Oberfläche besteht.

Achtung – Gefährliche Spannungen. Anweisungen befolgen, um Stromschläge und Verletzungen zu vermeiden.

Nehmen Sie keine mechanischen oder elektrischen Änderungen an den Geräten vor. Sun Microsystems, übernimmt bei einem Sun-Produkt, das geändert wurde, keine Verantwortung für die Einhaltung behördlicher Vorschriften

Aufstellung von Sun-Geräten

Achtung – Um den zuverlässigen Betrieb Ihres Sun-Geräts zu gewährleisten und es vor Überhitzung zu schützen, dürfen die Öffnungen im Gerät nicht blockiert oder verdeckt werden. Sun-Produkte sollten niemals in der Nähe von Heizkörpern oder Heizluftklappen aufgestellt werden.

Achtung – Der arbeitsplatzbezogene Schalldruckpegel nach DIN 45 635 Teil 1000 beträgt 70Db(A) oder weniger.

Einhaltung der SELV-Richtlinien

Die Sicherung der I/O-Verbindungen entspricht den Anforderungen der SELV-Spezifikation.

Anschluß des Netzkabels

Achtung – Sun-Produkte sind für den Betrieb an Einphasen-Stromnetzen mit geerdetem Nulleiter vorgesehen. Um die Stromschlaggefahr zu reduzieren, schließen Sie Sun-Produkte nicht an andere Stromquellen an. Ihr Betriebsleiter oder ein qualifizierter Elektriker kann Ihnen die Daten zur Stromversorgung in Ihrem Gebäude geben.

Achtung – Nicht alle Netzkabel haben die gleichen Nennwerte. Herkömmliche, im Haushalt verwendete Verlängerungskabel besitzen keinen Überlastungsschutz und sind daher für Computersysteme nicht geeignet.

Achtung – Ihr Sun-Gerät wird mit einem dreiadrigen Netzkabel für geerdete Netzsteckdosen geliefert. Um die Gefahr eines Stromschlags zu reduzieren, schließen Sie das Kabel nur an eine fachgerecht verlegte, geerdete Steckdose an.

Lithiumbatterie

Achtung – Dieses System enthält eine austauschbare Lithiumbatterie, Mitsubishi Teilenummer R-2032. Diese Batterie darf nur von einem qualifizierten Servicetechniker ausgewechselt werden, da sie bei falscher Handhabung explodieren kann. Werfen Sie die Batterie nicht ins Feuer. Versuchen Sie auf keinen Fall, die Batterie auszubauen oder wiederaufzuladen.

Gehäuseabdeckung

Sie müssen die obere Abdeckung Ihres Sun-Systems entfernen, um interne Komponenten wie Karten, Speicherchips oder Massenspeicher hinzuzufügen. Bringen Sie die obere Gehäuseabdeckung wieder an, bevor Sie Ihr System einschalten.

Achtung – Bei Betrieb des Systems ohne obere Abdeckung besteht die Gefahr von Stromschlag und Systemschäden.

Einhaltung der Richtlinien für Laser

Sun-Produkte, die mit Laser-Technologie arbeiten, entsprechen den Anforderungen der Laser Klasse 1.

Class 1 Laser Product
Luokan 1 Laserlaite
Klasse 1 Laser Apparat
Laser KLasse 1

CD-ROM or DVD-ROM

Achtung – Die Verwendung von anderen Steuerungen und Einstellungen oder die Durchführung von Prozeduren, die von den hier beschriebenen abweichen, können gefährliche Strahlungen zur Folge haben.

Conformité aux normes de sécurité

Ce texte traite des mesures de sécurité qu'il convient de prendre pour l'installation d'un produit Sun Microsystems.

Mesures de sécurité

Pour votre protection, veuillez prendre les précautions suivantes pendant l'installation du matériel :

- Suivre tous les avertissements et toutes les instructions inscrites sur le matériel.
- Vérifier que la tension et la fréquence de la source d'alimentation électrique correspondent à la tension et à la fréquence indiquées sur l'étiquette de classification de l'appareil.
- Ne jamais introduire d'objets quels qu'ils soient dans une des ouvertures de l'appareil. Vous pourriez vous trouver en présence de hautes tensions dangereuses. Tout objet conducteur introduit de la sorte pourrait produire un court-circuit qui entraînerait des flammes, des risques d'électrocution ou des dégâts matériels.

Symboles

Vous trouverez ci-dessous la signification des différents symboles utilisés :

Attention: – risques de blessures corporelles et de dégâts matériels. Veuillez suivre les instructions.

Attention: – surface à température élevée. Evitez le contact. La température des surfaces est élevée et leur contact peut provoquer des blessures corporelles.

Attention: – présence de tensions dangereuses. Pour éviter les risques d'électrocution et de danger pour la santé physique, veuillez suivre les instructions.

Modification du matériel

Ne pas apporter de modification mécanique ou électrique au matériel. Sun Microsystems n'est pas responsable de la conformité réglementaire d'un produit Sun qui a été modifié.

Positionnement d'un produit Sun

Attention: – pour assurer le bon fonctionnement de votre produit Sun et pour l'empêcher de surchauffer, il convient de ne pas obstruer ni recouvrir les ouvertures prévues dans l'appareil. Un produit Sun ne doit jamais être placé à proximité d'un radiateur ou d'une source de chaleur.

Attention: – Le niveau de pression acoustique au poste de travail s'élève selon la norme DIN 45 635 section 1000, à 70 dB (A) ou moins.

Conformité SELV

Sécurité : les raccordements E/S sont conformes aux normes SELV.

Connexion du cordon d'alimentation.

Attention: – les produits Sun sont conçus pour fonctionner avec des alimentations monophasées munies d'un conducteur neutre mis à la terre. Pour écarter les risques d'électrocution, ne pas brancher de produit Sun dans un autre type d'alimentation secteur. En cas de doute quant au type d'alimentation électrique du local, veuillez vous adresser au directeur de l'exploitation ou à un électricien qualifié.

Attention: – tous les cordons d'alimentation n'ont pas forcément la même puissance nominale en matière de courant. Les rallonges d'usage domestique n'offrent pas de protection contre les surcharges et ne sont pas prévues pour les systèmes d'ordinateurs. Ne pas utiliser de rallonge d'usage domestique avec votre produit Sun.

Attention: – votre produit Sun a été livré équipé d'un cordon d'alimentation à trois fils (avec prise de terre). Pour écarter tout risque d'électrocution, branchez toujours ce cordon dans une prise mise à la terre.

Batterie au lithium

Attention: – Ce système est équipé d'une pile au lithium qui peut être remplacée, référence n° Mitsubishi R-2032. Les piles au lithium risquent d'exploser en cas de manipulation maladroite. Ne jetez en aucun cas la pile au feu. N'essayez en aucun cas de la démonter, ni de la recharger.

Couvercle

Pour ajouter des cartes, de la mémoire, ou des unités de stockage internes, vous devrez démonter le couvercle de l'unité système Sun. Ne pas oublier de remettre ce couvercle en place avant de mettre le système sous tension.

Attention: – il est dangereux de faire fonctionner un produit Sun sans le couvercle en place. Si l'on néglige cette précaution, on encourt des risques de blessures corporelles et de dégâts matériels.

Conformité aux certifications Laser

Les produits Sun qui font appel aux technologies lasers sont conformes aux normes de la classe 1 en la matière.

```
Class 1 Laser Product
Luokan 1 Laserlaite
Klasse 1 Laser Apparat
Laser KLasse 1
```

CD-ROM or DVD-ROM

Attention: – L'utilisation de contrôles, de réglages ou de performances de procédures autre que celle spécifiée dans le présent document peut provoquer une exposition à des radiations dangereuses.

Normativas de seguridad

El siguiente texto incluye las medidas de seguridad que se deben seguir cuando se instale algún producto de Sun Microsystems.

Precauciones de seguridad

Para su protección observe las siguientes medidas de seguridad cuando manipule su equipo:

- Siga todas los avisos e instrucciones marcados en el equipo.
- Asegúrese de que el voltaje y la frecuencia de la red eléctrica concuerdan con las descritas en las etiquetas de especificaciones eléctricas del equipo.
- No introduzca nunca objetos de ningún tipo a través de los orificios del equipo. Pueden haber voltajes peligrosos. Los objetos extraños conductores de la electricidad pueden producir cortocircuitos que provoquen un incendio, descargas eléctricas o daños en el equipo.

Símbolos

En este libro aparecen los siguientes símbolos:

Precaución – Existe el riesgo de lesiones personales y daños al equipo. Siga las instrucciones.

Precaución – Superficie caliente. Evite el contacto. Las superficies están calientes y pueden causar daños personales si se tocan.

Precaución – Voltaje peligroso presente. Para reducir el riesgo de descarga y daños para la salud siga las instrucciones.

Modificaciones en el equipo

No realice modificaciones de tipo mecánico o eléctrico en el equipo. Sun Microsystems no se hace responsable del cumplimiento de las normativas de seguridad en los equipos Sun modificados.

Ubicación de un producto Sun

Precaución – Para asegurar la fiabilidad de funcionamiento de su producto Sun y para protegerlo de sobrecalentamien-tos no deben obstruirse o taparse las rejillas del equipo. Los productos Sun nunca deben situarse cerca de radiadores o de fuentes de calor.

Precaución – De acuerdo con la norma DIN 45 635, Parte 1000, se admite un nivel de presión acústica para puestos de trabajo máximo de 70Db(A).

Cumplimiento de la normativa SELV

El estado de la seguridad de las conexiones de entrada⁄ salida cumple los requisitos de la normativa SELV.

Conexión del cable de alimentación eléctrica

Precaución – Los productos Sun están diseñados para trabajar en una red eléctrica monofásica con toma de tierra. Para reducir el riesgo de descarga eléctrica, no conecte los productos Sun a otro tipo de sistema de alimentación eléctrica. Póngase en contacto con el responsable de mantenimiento o con un electricista cualificado si no está seguro del sistema de alimentación eléctrica del que se dispone en su edificio.

⚠ **Precaución** – No todos los cables de alimentación eléctrica tienen la misma capacidad. Los cables de tipo doméstico no están provistos de protecciones contra sobrecargas y por tanto no son apropiados para su uso con computadores. No utilice alargadores de tipo doméstico para conectar sus productos Sun.

⚠ **Precaución** – Con el producto Sun se proporciona un cable de alimentación con toma de tierra. Para reducir el riesgo de descargas eléctricas conéctelo siempre a un enchufe con toma de tierra.

Batería de litio

⚠ **Precaución** – Este sistema contiene una batería de litio reemplazable, número de pieza Mitsubishi R-2032. Estas baterías pueden explotar si se las manipula incorrectamente. No tire baterías al fuego. No las desarme ni intente recargarlas.

Tapa de la unidad del sistema

Debe quitar la tapa del sistema cuando sea necesario añadir tarjetas, memoria o dispositivos de almacenamiento internos. Asegúrese de cerrar la tapa superior antes de volver a encender el equipo.

⚠ **Precaución** – Es peligroso hacer funcionar los productos Sun sin la tapa superior colocada. El hecho de no tener en cuenta esta precaución puede ocasionar daños personales o perjudicar el funcionamiento del equipo.

Aviso de cumplimiento con requisitos de láser

Los productos Sun que utilizan la tecnología de láser cumplen con los requisitos de láser de Clase 1.

```
Class 1 Laser Product
Luokan 1 Laserlaite
Klasse 1 Laser Apparat
Laser KLasse 1
```

CD-ROM or DVD-ROM

⚠ **Precaución** – El manejo de los controles, los ajustes o la ejecución de procedimientos distintos a los aquí especificados pueden exponer al usuario a radiaciones peligrosas.

GOST-R Certification Mark
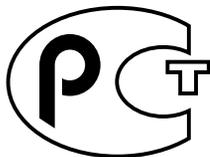
Nordic Lithium Battery Cautions

Norge

> ⚠ **ADVARSEL** – Litiumbatteri —
> Eksplosjonsfare.Ved utskifting benyttes kun
> batteri som anbefalt av apparatfabrikanten.
> Brukt batteri returneres apparatleverandøren.

Sverige

> ⚠ **VARNING** – Explosionsfara vid felaktigt
> batteribyte. Använd samma batterityp eller
> en ekvivalent typ som rekommenderas av
> apparattillverkaren. Kassera använt batteri
> enligt fabrikantens instruktion.

Danmark

> ⚠ **ADVARSEL!** – Litiumbatteri —
> Eksplosionsfare ved fejlagtig håndtering.
> Udskiftning må kun ske med batteri af samme
> fabrikat og type. Levér det brugte batteri
> tilbage til leverandøren.

Suomi

> ⚠ **VAROITUS** – Paristo voi räjähtää, jos se on
> virheellisesti asennettu. Vaihda paristo
> ainoastaan laitevalmistajan suosittelemaan
> tyyppiin. Hävitä käytetty paristo valmistajan
> ohjeiden mukaisesti.

Contents

Figures

Tables

Preface

The *Sun Blade 100 Service Manual* provides detailed procedures that describe the removal and replacement of replaceable parts in the Sun Blade™ 100 computer system. The service manual also includes information about the use and maintenance of the system. This book is written for technicians, system administrators, authorized service providers (ASPs), and advanced computer system end users who have experience troubleshooting and replacing hardware.

About the Multimedia Links in this Manual

Removal and replacement procedures for selected system components are also illustrated with interactive multimedia audio and video instructions in the *Sun Blade 100 Hardware Documentation* CD-ROM, which is linked to the online version of this manual. These multimedia links can be accessed wherever you see this film-clip icon:

How This Book Is Organized

Chapter 1 describes the major components of the system.

Chapter 2 describes the execution of individual tests for verifying hardware configuration and functionality.

Chapter 3 describes the execution of POST and provides examples of POST output patterns.

Chapter 4 provides troubleshooting advice and suggested corrective actions for hardware problems.

Chapter 5 explains how to work safely when replacing system components. Provides procedures for powering off the system, removing the system cover, and attaching the wrist strap.

Chapter 6 provides procedures for removing and replacing major subassemblies.

Chapter 7 provides procedures for removing and replacing storage devices.

Chapter 8 provides procedures for removing and replacing the motherboard and various components.

Chapter 9 provides procedures for replacing the system cover and powering on the system.

Chapter 10 provides OpenBoot Emergency procedures specific to the USB keyboard.

Appendix A provides specifications on power and environment, system dimensions, weight, memory mapping, and peripheral component interconnect (PCI) card slots.

Appendix B provides signal descriptions, instructions for connecting the system unit to a 10BASE-T/100BASE-T twisted-pair Ethernet (TPE) local area network (LAN), and modem settings for systems used in specific network telecommunication applications.

Appendix C provides functional descriptions of the system.

Appendix D provides a discussion of USB devices used in the system.

Using UNIX Commands

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

See one or more of the following for this information:

- Solaris Handbook for Sun Peripherals
- AnswerBook2™ online documentation for the Solaris™ software environment
- Other software documentation that you received with your system

The *Sun Blade 100 Getting Started Guide* gives more information on how to use these documents.

Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
AaBbCc123	Text that you type (when contrasted with the on-screen computer output)	`%` **`su`** `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type `rm` *filename*.

Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Accessing Sun Documentation Online

The `docs.sun.com`[SM] web site enables you to access Sun technical documentation on the Web. You can browse the `docs.sun.com` archive or search for a specific book title or subject at:

```
http://docs.sun.com
```

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Product Description

The Sun Blade™ 100 workstations are uniprocessor systems that use the family of UltraSPARC™ processors. They support high-performance CPU module (UltraSPARC-IIe) processing. FIGURE 1-1 shows the Sun Blade 100 system.

This chapter contains the following topics:

- Section 1.1 "Product Overview" on page 1-3
- Section 1.2 "I/O Devices" on page 1-4
- Section 1.3 "System Description" on page 1-5
- Section 1.4 "Replaceable Components" on page 1-7
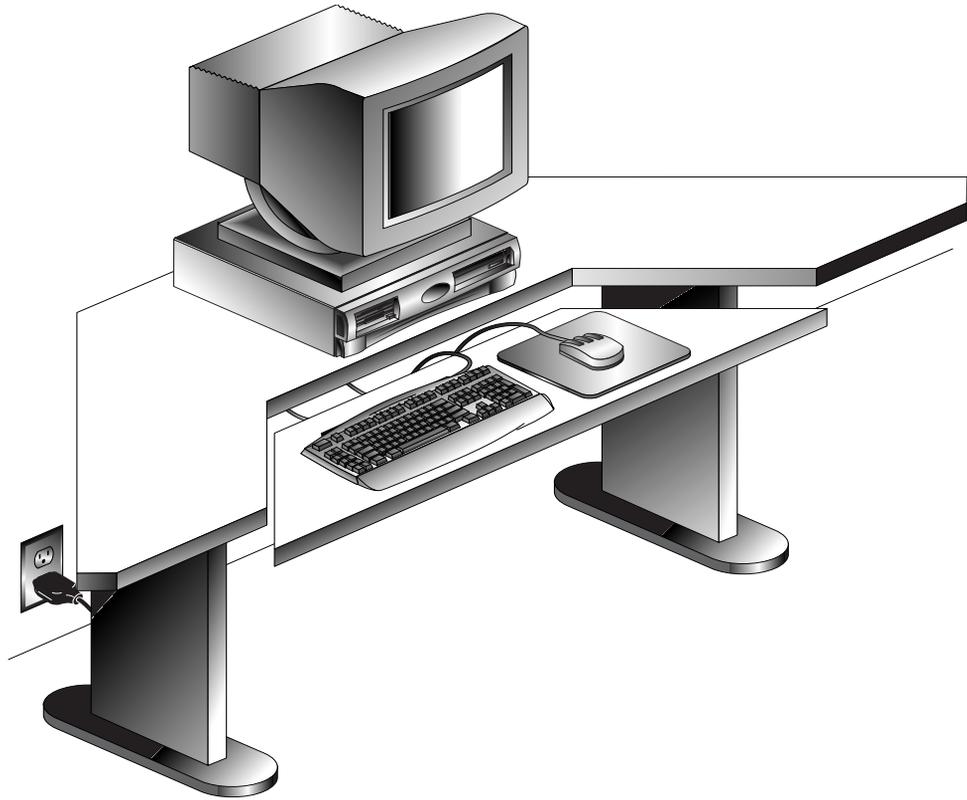
FIGURE 1-1   Sun Blade 100 System

1.1 Product Overview

The Sun Blade 100 system provides the following features:

- Desktop-style system enclosure
- 200-watt power supply
- One ATA66 15-Gbyte hard drive, X-option for an additional hard drive
- CD-ROM drive or DVD-ROM drive
- CD-quality audio
- 1.44-megabyte (Mbyte) manual-eject diskette drive
- Smart card reader
- 500-MHz UltraSPARC-IIe processor (CPU) with heatsink
- Three long PCI slots
- 33-MHz, 32-bit peripheral component interconnect (PCI)
- ATI Rage XL on-board graphics, 8 Mbyte SGRAM (external)
- One serial port
- One parallel port
- 10-megabit/100-megabit per second Ethernet
- Two IEEE 1394 ports
- Four USB ports, two for keyboard and mouse

1.2 I/O Devices

The Sun Blade 100 system uses the I/O devices listed in TABLE 1-1.

TABLE 1-1   Supported I/O Devices

I/O Device	Description
17-inch (43-cm) color monitor	1280 x 1024 resolution, 76- or 66-Hz refresh rate, 110 dots per inch (dpi)
20-inch (51-cm) color monitor	1152 x 900 resolution, 76- or 66-Hz refresh rate, 84 dpi
	1280 x 1024 resolution, 76- or 66-Hz refresh rate, 93 dpi
	960 x 680 resolution, 112-Hz refresh rate, 70 dpi
24-inch (61-cm) color monitor	1920 x 1200 resolution, 70-Hz refresh rate, 103 dpi
	1600 x 1000 resolution, 76- or 66-Hz refresh rate, 86 dpi
	1400 x 900 resolution, 76-Hz refresh rate, 77 dpi
	1280 x 800 resolution, 76-Hz refresh rate, 69 dpi
Keyboard	Sun USB Type-6: AT 101 layout
Mouse	Sun USB: 3-button, crossbow mouse

1.3 System Description

System components are housed in a desktop-style enclosure. Overall chassis dimensions for the Sun Blade 100 system are listed in the following table.

TABLE 1-2 Sun Blade 100 System Physical Dimensions

Unit	Width	Height	Depth
Sun Blade 100 desktop enclosure	17.52 inches (44.5 cm)	4.65 inches (11.8 cm)	18.00 inches (45.7 cm)

System electronics are contained on a single plug-in printed circuit board (motherboard). The motherboard contains the CPU, memory modules, system control application-specific integrated circuits (ASIC), and I/O ASICs. The motherboard plugs into a riser board that provides the system power and Integrated Drive Electronics (IDE) hard drive data interface. The following figures illustrate the Sun Blade 100 system front and back views.
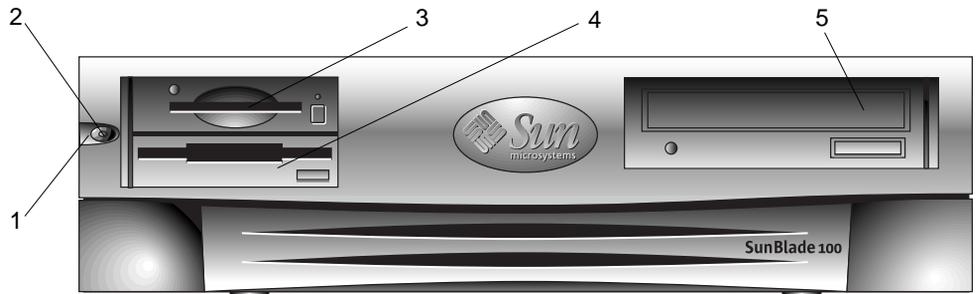
FIGURE 1-2 Front Panel Overview

1. Power switch
2. Power-indicator LED
3. Smart card reader (see note below)
4. 3.5-inch drive bay (optional diskette drive shown)
5. 5.25-inch drive bay (optional DVD-ROM drive shown)

Note – Although the smart card reader is physically configured in the Sun Blade 100 workstation at introduction, the driver support necessary to make the reader functional is not available in the Solaris release preinstalled on this system. The smart card reader driver support will be made available in a future Solaris release.
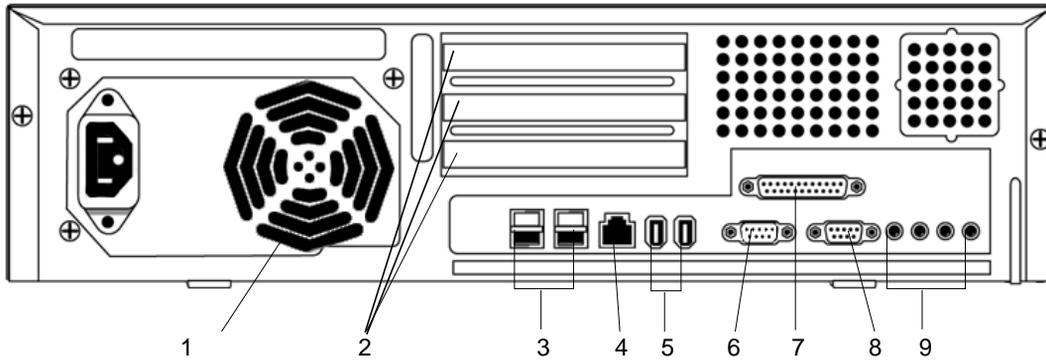
FIGURE 1-3 Back Panel Overview

TABLE 1-3 Back Panel Description and Connector Symbols

Item in Figure 3	Explanation	Back Panel Symbol
1	Power connector	None
2	PCI card slot 3 (33 MHz)	**PCI-3**
2	PCI card slot 2 (33 MHz)	**PCI-2**
2	PCI card slot 1 (33 MHz)	**PCI-1**
3	Universal serial bus (USB) connectors (four)	⊷
4	Twisted-pair Ethernet (TPE) connector	⟷
5	IEEE 1394 connectors (two)	
6	VGA video connector	▯
7	Parallel connector, DB-25	//
8	Serial connector (RS-232)	**SERIAL**
9	Audio module headphones connector	⌒
9	Audio module line-out connector	
9	Audio module line-in connector	
9	Audio module microphone connector	

1.4 Replaceable Components

This section lists the authorized replaceable parts for the Sun Blade 100 system. FIGURE 1-4 illustrates the system components. TABLE 1-4 lists the replaceable components. The numbered components in FIGURE 1-4 correlate to the numbered components listed in TABLE 1-4.

Consult your authorized Sun sales representative or service provider to confirm a part number before ordering a replacement part.

14*

15*

16*

13

12

11

10

1

2

17*

18*

3*

19*

20*

4

5

6

7

8

9
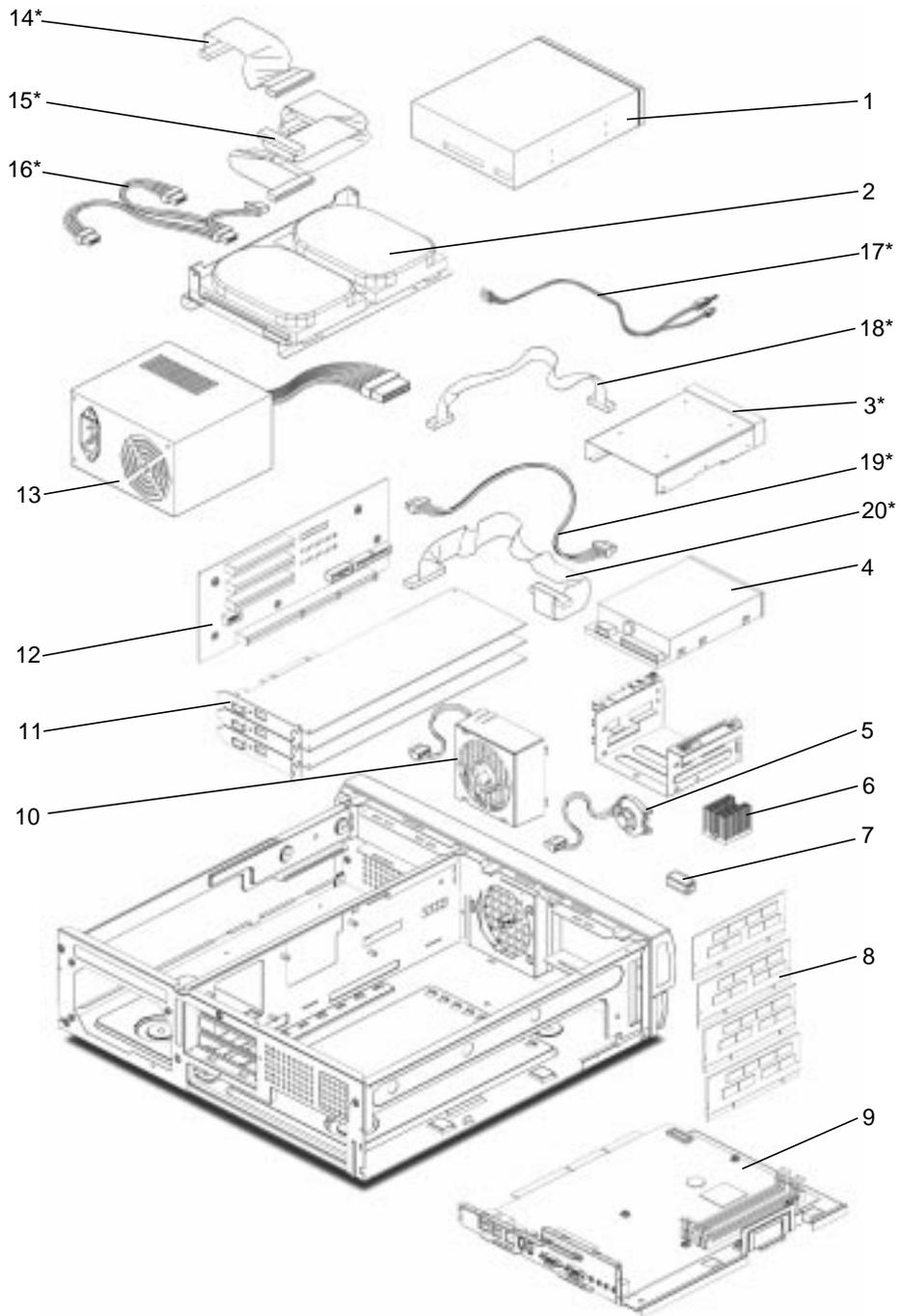
FIGURE 1-4   Sun Blade 100 System Replaceable Parts

TABLE 1-4   Sun Blade 100 System Replaceable Components

Item	Component	Description
1	CD-ROM drive	48x CD-ROM drive
1	DVD-ROM drive	DVD-ROM drive
2	Hard drive (2d drive is X-option)	Disk drive, 15-Gbyte, 7200 RPM, ATA
3	Smart card reader	Smart card reader with enclosure
4	Manual eject diskette drive	Internal diskette drive
5	Speaker assembly	System speaker with cable
6	Central processing unit (CPU)	500-MHz, 256-Kbyte internal cache
7	NVRAM/TOD	Non-volatile RAM/Time of day
8	128-Mbyte DIMM	128-Mbyte DIMM
8	256-Mbyte DIMM	256-Mbyte DIMM
8	512-Mbyte DIMM	512-Mbyte DIMM
9	Motherboard	System main logic board
10	Fan assembly	System cooling fan with cable
11	PCI card	Generic PCI card
12	Riser board	3-slot PCI expansion and power interface card
13	Power supply	200-watt power supply with power cable
*	*Cable kit (items with asterisk)*	*Cables for major components*
14*	Secondary IDE cable	Secondary HDD and IDE2 cable
15*	Primary IDE cable	Primary HDD, CD/DVD-ROM, IDE1 cable
16*	IDE power cable	CD/DVD-ROM, primary hard drive, secondary hard drive power cable
17*	Power switch and LED cable	Power switch, LED, and power cable assembly
18*	Smart card reader cable	Smart card reader cable
19*	Diskette drive power cable	Diskette drive power cable
20*	Diskette drive data cable	Diskette drive data cable

Note – Consult your authorized Sun sales representative or service provider before ordering a replacement part.

CHAPTER **2**

SunVTS Overview

This chapter contains an overview of the SunVTS™ diagnostic tool.

This chapter contains the following topics:
- Section 2.1 "SunVTS Description" on page 2-1
- Section 2.2 "SunVTS Requirements" on page 2-2
- Section 2.3 "SunVTS References" on page 2-2

2.1 SunVTS Description

SunVTS is Sun's online Validation Test Suite. SunVTS is a comprehensive software diagnostic package that tests and validates hardware by verifying the connectivity and functionality of most hardware controllers, devices, and platforms.

SunVTS can be tailored to run on various types of systems ranging from desktops to servers with customizable features to meet the varying requirements of many diagnostic situations.

Use SunVTS to validate a system during development, production, receiving inspection, troubleshooting, periodic maintenance, and system or subsystem stressing.

SunVTS executes multiple diagnostic tests from one graphical user interface (GUI) that provides test configuration and status monitoring. The user interface can run in the Common Desktop Environment (CDE) or OPEN LOOK environments or through a TTY-mode interface for situations when running a GUI is not possible.

The SunVTS interface can run on one system to display the SunVTS test session of another system on the network.

SunVTS is distributed with each SPARC™ Solaris™ operating environment release. It is located on the *Sun Computer Systems Supplement* CD.

2.2 SunVTS Requirements

Your system must meet the following requirements to run SunVTS:

■ The SunVTS packages must be installed. The main package is SUNWvts. There are additional supporting packages that differ based on the version of the Solaris operating environment that is installed. For specific details, refer to the corresponding SunVTS documentation (described below).

■ The system must be booted to the multiuser level (level 3).

■ To run SunVTS with a GUI, that GUI must be installed. Otherwise, run SunVTS with the TTY-mode interface.

2.3 SunVTS References

To find out more information about the use of SunVTS, refer to the SunVTS documentation that corresponds to the Solaris software version that you are running (see TABLE 2-1).

The following list describes the content of each SunVTS document:

■ *SunVTS 4.x User's Guide* describes how to install, configure, and run the SunVTS diagnostic software.

■ *SunVTS 4.x Quick Reference Card* provides an overview of how to use the SunVTS CDE interface.

■ *SunVTS 4.x Test Reference Manual* provides details about each individual SunVTS test.

These documents are part of the *Solaris on Sun Hardware* AnswerBook2™ collection. The part number for each document is different for each version of Solaris: check the version of Solaris that you are using and find the appropriate part number for the document. This collection is distributed on the *Sun Computer Systems Supplement* CD with each SPARC Solaris release and is also accessible at `http://docs.sun.com`.

TABLE 2-1   SunVTS Documentation

Solaris Release	Corresponding SunVTS Release	Document Title
Solaris 8.x	SunVTS 4.x	*SunVTS 4.x User's Guide*
		SunVTS 4.x Quick Reference Card
		SunVTS 4.x Test Reference Manual

Power-On Self-Test

This chapter describes how to initiate power-on self-test (POST) diagnostics.

This chapter contains the following topics:

3.1 POST Overview

POST is useful in determining if a portion of the system has failed and should be replaced. POST detects approximately 95 percent of system faults and is located in the motherboard OpenBoot™ PROM. The setting of two NVRAM variables, `diag-switch?` and `diag-level`, determines whether POST is executed and to what level POST is executed (see Section 3.3 "Initializing POST" on page 3-3).

3.2 Pre-POST Preparation

Pre-POST preparation includes:

- Setting up a terminal interface processor (TIP) connection to another workstation or terminal to view POST progress and error messages. See Section 3.2.1 "Setting Up a TIP Connection" on page 3-2.

■ Verifying baud rates between a workstation and a monitor or terminal. See Section 3.2.2 "Verifying the Baud Rate" on page 3-3.

3.2.1   Setting Up a TIP Connection

A TIP connection enables a remote shell window to be used as a terminal to display test data from a tested system. The serial port B of a tested system is connected to another Sun workstation monitor or TTY-type terminal.

To set up a TIP connection, proceed as follows:

1. **Connect the serial port of the tested system to the serial port of a second Sun workstation using a serial null modem cable (connect cable pins 2-3, 3-2, 7-20, and 20-7), as shown in** FIGURE 3-1**.**
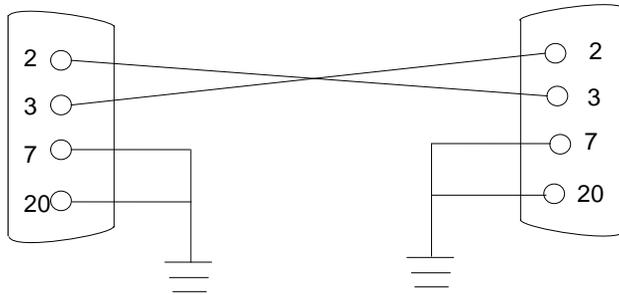
FIGURE 3-1   Setting Up a TIP Connection

2. **At the second Sun workstation, check the** /etc/remote **file by changing to the** /etc **directory and editing the** remote **file. The following sample** remote **file text shows connection to the serial port:**

```
hardwire: /dv=/dev/term:br#9600:el=^C^S^Q^U^D:ie=%$:oe=^D:
```

3. **In a shell window on the second Sun workstation, type** tip hardwire**.**

```
% tip hardwire
connected
```

The shell window becomes a TIP window directed to the serial port of the tested system. When power is applied to the tested system, POST messages are displayed in this shell window.

4. **When POST is completed, disconnect the TIP connection as follows:**

a. **Open another shell window at the second workstation.**

b. **Type** `ps -a` **to view the active TIP line and process ID (PID) number.**

c. **Type the following to disconnect the TIP hardwire process.**

```
% kill -9 PID#
```

3.2.2   Verifying the Baud Rate

To verify the baud rate between the tested system and a terminal or another Sun workstation monitor:

1. **Open a shell window.**

2. **Type** `eeprom`**.**

3. **Verify the following serial port default settings:**

```
tty-mode = 9600,8,n,1
```

Note – Ensure that the settings are consistent with TTY-type terminal or workstation monitor settings.

3.3   Initializing POST

POST can be initialized in two ways, `max` or `min`, by setting the `diag-switch?` to `true` and the `diag-level` to either `max` or `min`, followed by power-cycling the system.

To set the `diag-switch?` to `true` and power-cycle the system:

1. **At the system prompt, type:**

```
ok% setenv diag-switch? true
```

2. **Power-cycle the system by pressing and releasing the power switch on the front panel.**

3. Observe the monitor to **verify that POST is executing.**

4. When the POST is complete, type the following at the system prompt:

```
ok% setenv diag-switch? false
```

3.4   Maximum and Minimum POST Levels

Two levels of POST are available: maximum (`max`) level and minimum (`min`) level. The system initiates the selected level of POST based upon the setting of `diag-level`, an NVRAM variable. The default setting for `diag-level` is `max`.

To set the `diag-level` variable to `min` before power-cycling the system, type:

```
ok% setenv diag-level min
```

To return to the default setting:

```
ok% setenv diag-level max
```

An example of a `max`-level POST output at the serial port is provided in Section 3.4.1 "`diag-level` Variable Set to `max`" on page 3-4. An example of a `min`-level POST output at the serial port is provided in Section 3.4.2 "`diag-level` Variable Set to `min`" on page 3-7.

3.4.1   `diag-level` Variable Set to `max`

When you set the `diag-level` variable to `max`, POST enables an extended set of diagnostic-level tests. This mode requires approximately two minutes to complete (with 128 Mbytes of DIMM installed). CODE EXAMPLE 3-1 shows a typical serial port POST output with `diag-level` set to `max` and a single 512 Mbyte DIMM installed.

Note – Video output is disabled while POST is initialized.

CODE EXAMPLE 3-1 `diag-level` Variable Set to `max`

```
@(#) Sun Blade 100 4.0 [obdiag.fixes] Version 1 created 2000/06/
09 14:42

Executing Power On SelfTest

@(#) Sun (Sun Blade 100) POST 1.2.3 08:55 PM on 05/29/00

Init POST BSS
    Init System BSS
NVRAM Tests
    NVRAM Battery Detect Test
    NVRAM Scratch Addr Test
    NVRAM Scratch Data Test
DMMU TLB Tags
    DMMU TLB Tag Access Test
DMMU TLB RAM
    DMMU TLB RAM Access Test
Probe Ecache
    Probe Ecache
    Ecache Size = 0x00040000 bytes = 256 Kbytes
CPU Clock
    Initializing SouthBridge
    Nominal CPU speed is 500 MHz
All CPU Basic Tests
    V9 Instruction Test
    CPU Soft Trap Test
    CPU Softint Reg and Int Test
All Basic MMU Tests
    DMMU Primary Context Reg Test
    DMMU Secondary Context Reg Test
    DMMU TSB Reg Test
    DMMU Tag Access Reg Test
    IMMU TSB Reg Test
    IMMU Tag Access Reg Test
All Basic Cache Tests
    Dcache RAM Test
    Icache RAM Test
UltraSPARC-IIe MCU Control & Status Regs Init
    Initializing Memory and MC registers
    DIMM 0: 512 MBytes = 0x20000000 bytes
    DIMM 1: 0 MBytes = 0x00000000 bytes
```

CODE EXAMPLE 3-1   `diag-level` Variable Set to `max`

```
    DIMM 2: 0 MBytes = 0x00000000 bytes
    DIMM 3: 0 MBytes = 0x00000000 bytes
    Found 1 DIMMs in bank 0
    Bank 0: 512 MBytes
    DIMM 1: 0 MBytes = 0x00000000 bytes
    DIMM 2: 0 MBytes = 0x00000000 bytes
 DIMM 3: 0 MBytes = 0x00000000 bytes
    Found 1 DIMMs in bank 0
    Bank 0: 512 MBytes
    DIMM0 is a 32M x 8 device
    MC0 = 0x00000000.56a0bc04
    MC1 = 0x00000000.c0804000
    MC2 = 0x00000000.0f15000e
    MC3 = 0x00000000.00000086
Ecache Tests
    Displacement Flush Ecache
    Ecache RAM Addr Test
    Ecache Tag Addr Test
Memory Init
    Malloc Post Memory
    Memory Addr Check w/o Ecache
    Load Post In Memory
    Run POST from MEM
    .........
    Map PROM/STACK/NVRAM in DMMU
    Update Master Stack/Frame Pointers
    CPU MODULE upa_config is 0x0000003e.00000000
All FPU Basic Tests
    FPU Regs Test
    FPU Move Regs Test
All Basic UltraSPARC-IIe IOMMU Tests
    UltraSPARC-IIe IOMMU Regs Test
    UltraSPARC-IIe IOMMU RAM Addr Test
    UltraSPARC-IIe IOMMU CAM Address Test
    PBMA PCI Config Space Regs Test
    PBMA Control/Status Reg Test
    PBMA Diag Reg Test
    UltraSPARC-IIe IO Regs Test
All Advanced CPU Tests
    IU ASI Access Test
    FPU ASI Access Test
All CPU Error Reporting Tests
    CPU Data Access Trap Test
```

CODE EXAMPLE 3-1   `diag-level` Variable Set to `max`

```
    CPU Addr Align Trap Test
    DMMU Access Priv Page Test
    DMMU Write Protected Page Test
Audio Tests
Memory Tests
    Init Memory
    Info : 512MB at DIMM Slot 0
    Start Addr: 0x00000000.00800000  Size: 504 MBytes
Init with 0x00000000.00000000:
.......
Memory Addr Check with Ecache Test
    Info : 512MB at DIMM Slot 0
    Start Addr: 0x00000000.00800000  Size: 504 MBytes
Write 0xffffffff.ffffffff: .......
Read: .......
Write 0xaaaaaaaa.aaaaaaaa: .......
Read: .......
Write 0x55555555.55555555: .......
Read: .......
Write 0x00000000.00000000: .......
Read: .......
    ECC Memory Addr Test
    Info : 512MB at DIMM Slot 0
    Start Addr: 0x00000000.00800000  Size: 504 MBytes

Status of this POST run:PASS
```

3.4.2   `diag-level` Variable Set to `min`

When you set the `diag-level` variable to `min`, POST enables an abbreviated set of diagnostic-level tests. This mode requires approximately one minute to complete (with 128 Mbytes of DIMM installed). CODE EXAMPLE 3-2 shows a serial port POST output with `diag-level` set to `min` and a single 512 Mbyte DIMM installed.

Note – Video output is disabled while POST is initialized.

CODE EXAMPLE 3-2   `diag-level` Variable Set to `min`

```
@(#) Sun Blade 100 4.0 [obdiag.fixes] Version 1
created 2000/06/09 14:42

Executing Power On SelfTest

@(#) Sun Blade 100 POST 1.2.5 09:09 PM on 08/04/00

Init POST BSS
    Init System BSS
NVRAM Tests
    NVRAM Battery Detect Test
    NVRAM Scratch Addr Test
    NVRAM Scratch Data Test
DMMU TLB Tags
    DMMU TLB Tag Access Test
DMMU TLB RAM
    DMMU TLB RAM Access Test
Probe Ecache
    Probe Ecache
    Ecache Size = 0x00040000 bytes = 256 Kbytes
CPU Clock
    Initializing SouthBridge
    Nominal CPU speed is 500 MHz
All CPU Basic Tests
    V9 Instruction Test
    CPU Soft Trap Test
    CPU Softint Reg and Int Test
All Basic MMU Tests
    DMMU Primary Context Reg Test
    DMMU Secondary Context Reg Test
    DMMU TSB Reg Test
    DMMU Tag Access Reg Test
    IMMU TSB Reg Test
    IMMU Tag Access Reg Test
All Basic Cache Tests
    Dcache RAM Test
    Icache RAM Test
UltraSPARC-IIe MCU Control & Status Regs Init
    Initializing Memory and MC registers
    DIMM 0: 512 MBytes = 0x20000000 bytes
    DIMM 1: 0 MBytes = 0x00000000 bytes
```

CODE EXAMPLE 3-2 `diag-level` Variable Set to `min`

```
    DIMM 2: 0 MBytes = 0x00000000 bytes
    DIMM 3: 0 MBytes = 0x00000000 bytes
    Found 1 DIMMs in bank 0
    Bank 0: 512 MBytes
    DIMM0 is a 32M x 8 device
    MC0 = 0x00000000.56a0bc04
    MC1 = 0x00000000.c0804000
    MC2 = 0x00000000.0f1f000e
    MC3 = 0x00000000.00000086
Ecache Tests
    Displacement Flush Ecache
    Ecache RAM Addr Test
    Ecache Tag Addr Test
Memory Init
    Malloc Post Memory
    Memory Addr Check w/o Ecache
    Load Post In Memory
    Run POST from MEM
    .........
    Map PROM/STACK/NVRAM in DMMU
    Update Master Stack/Frame Pointers
    CPU MODULE upa_config is 0x0000003e.00000000
All FPU Basic Tests
    FPU Regs Test
    FPU Move Regs Test
All Basic UltraSPARC-IIe IOMMU Tests
    UltraSPARC-IIe IOMMU Regs Test
    UltraSPARC-IIe IOMMU RAM Addr Test
    UltraSPARC-IIe IOMMU CAM Address Test
    PBMA PCI Config Space Regs Test
    PBMA Control/Status Reg Test
    PBMA Diag Reg Test
    UltraSPARC-IIe IO Regs Test
All Advanced CPU Tests
    IU ASI Access Test
    FPU ASI Access Test
All CPU Error Reporting Tests
    CPU Data Access Trap Test
    CPU Addr Align Trap Test
    DMMU Access Priv Page Test
    DMMU Write Protected Page Test
Audio Tests
Memory Tests
```

CODE EXAMPLE 3-2   `diag-level` Variable Set to `min`

```
    Init Memory
    Info : 512MB at DIMM Slot 0
    Start Addr: 0x00000000.00800000  Size: 504 MBytes
Init with 0x00000000.00000000:..................................
.................................................................
    Memory Addr Check with Ecache Test
    Info : 512MB at DIMM Slot 0
    Start Addr: 0x00000000.00800000  Size: 504 MBytes
Write 0xffffffff.ffffffff:.................................
.................................................................
Read:.....................................................
.................................................................
Write 0xaaaaaaaa.aaaaaaaa:.......................................
.................................................................
Read:.......................................................
.................................................................
Write 0x55555555.55555555:.......................................
.................................................................
Read:.......................................................
.................................................................
Write 0x00000000.00000000:......................................
.................................................................
Read:.......................................................
.................................................................
    ECC Memory Addr Test
        Info : 512MB at DIMM Slot 0
        Start Addr: 0x00000000.00800000  Size: 504 MBytes


Status of this POST run:PASS

manufacturing mode=SYS_INT
Time Stamp [hour:min:sec] 00:52:44  [month/date year] 08/08 2000
Power On Selftest Completed
    Status  = 0000.0000.0000.0000  ffff.ffff.f00b.5ce8
0002.3333.0200.001b
```

3.5 POST Progress and Error Reporting

POST progress indications are visible when a TTY-type terminal or a TIP line is connected between the serial port of the tested system and a second Sun workstation.

In most cases, POST also attempts to send a failure message to the POST monitoring system. CODE EXAMPLE 3-3 shows the typical appearance of an error message.

Note – The system does not automatically boot if a POST error occurs; it halts at the `system` prompt to alert the user to a failure.

CODE EXAMPLE 3-3 Typical Error Code Failure Message

```
Block Memory Check Test
              Info : 128MB at Dimm Slot 0
              Start Addr: 0x00000000.00800000  Size: 120 MBytes
Write 0x33333333.33333333
..........................................................
...............
......................................
Read
..........................................................
...............
......................................
Write 0x55555555.55555555
..........................................................
......
......................................
Read
..........................................................
...............
......................................
Write 0xcccccccc.cccccccc
..........................................................
...............
......................................
Read
..........................................................
...............
```

CODE EXAMPLE 3-3 Typical Error Code Failure Message

```
.......................................
Write 0xaaaaaaaa.aaaaaaaa
.............................................................
................
......................................
Read
.............................................................
................
......................................


               Info : 128MB at Dimm Slot 1
               Start Addr: 0x00000000.20000000  Size: 128 MBytes
Write 0x33333333.33333333
............................................................
................
...............................................
Read
............................................................
................
...............................................
Write 0x55555555.55555555
............................................................
................
...............................................
Read
............................................................
................
...............................................
Write 0xcccccccc.cccccccc
............................................................
................
...............................................
Read
............................................................
................
...............................................
Write 0xaaaaaaaa.aaaaaaaa
............................................................
................
...............................................
Read
............................................................
................
```

CODE EXAMPLE 3-3   Typical Error Code Failure Message

```
..............................................

               Info : 128MB at Dimm Slot 2
               Start Addr: 0x00000000.40000000  Size: 128 MBytes
Write 0x33333333.33333333
..............................................................
................
.............................................
Read ....

**********************
STATUS =FAILED
TEST   =Block Memory Check
SUSPECT=BMX
MESSAGE=Memory Blk Checker Pat compare error
       blk addr 00000000.40400000

       ------ Exp ------ ------ Obs ------
       33333333.33333333 00000000.00000000
       33333333.33333333 00000000.00000000
       33333333.33333333 00000000.00000000
       33333333.33333333 00000000.00000000
       33333333.33333333 00000000.00000000
       33333333.33333333 00000000.00000000
       33333333.33333333 00000000.00000000
       33333333.33333333 00000000.00000000

Status of this POST run:        FAIL
manufacturing mode=OFF
Time Stamp [hour:min:sec] 19:17:10  [month/date year] 05/22 2000

Power On Selftest Completed
    Status  = 0000.0000.0000.0001  ffff.ffff.f00b.4238
0000.3333.0200.001b

Speed Jumper is set to 0000.0000.0000.0000
Software Power ON

@(#) Sun Grover 4.0 Version 201 created 2000/05/08 15:52
CPU SPEED 0x0000.0000.1dcd.6500
Initializing Memory Controller
MCR0 0000.0000.56a0.bc04
MCR1 0000.0000.c080.4000
```

CODE EXAMPLE 3-3 Typical Error Code Failure Message

```
MCR2 0000.0000.0f70.0aaa
MCR3 0000.0000.0000.018f

Clearing E$ Tags  Done
Clearing I/D TLBs Done
Probing Memory Done
Clearing Memory Done
MEM BASE = 0000.0000.4000.0000
MEM SIZE = 0000.0000.0800.0000
MMUs ON
Copy Done
PC = 0000.01ff.f000.27cc
PC = 0000.0000.0000.2810
Decompressing into Memory Done
Size = 0000.0000.0006.4f10
ttya initialized
Reset Control: BXIR:0 BPOR:0 SXIR:0 SPOR:1 POR:0
Probing upa at 1f,0 pci
Probing upa at 0,0 SUNW,UltraSPARC-IIe SUNW,UltraSPARC-IIe (256
KB)
Loading Support Packages: kbd-translator
Loading onboard drivers: ebus flashprom eeprom idprom
Probing Memory Bank #0 128 Megabytes
Probing Memory Bank #1 128 Megabytes
Probing Memory Bank #2 128 Megabytes
Probing Memory Bank #3   0 Megabytes
Probing /pci@1f,0 Device 7  isa dma floppy parallel power serial
serial
Probing /pci@1f,0 Device 1  Nothing there
Probing /pci@1f,0 Device c  network firewire usb
Probing /pci@1f,0 Device 3  pmu i2c temperature dimm dimm dimm ppm
beep
   fan-control
Probing /pci@1f,0 Device 8  sound
Probing /pci@1f,0 Device d  ide disk cdrom
Probing /pci@1f,0 Device 2  Nothing there
Probing /pci@1f,0 Device 13  SUNW,m64B
Probing /pci@1f,0 Device 5  pci
Probing /pci@1f,0/pci@5 Device 0  Nothing there
Probing /pci@1f,0/pci@5 Device 1  Nothing there
Probing /pci@1f,0/pci@5 Device 2  Nothing there

Sun Grover (UltraSPARC-IIe 500MHz), No Keyboard
OpenBoot 4.0, 384 MB memory installed, Serial #13583889.
```

CODE EXAMPLE 3-3   Typical Error Code Failure Message

```
Ethernet address 8:0:20:cf:46:11, Host ID: 61067537.


Power On Self Test Failed.  Cause: DIMM2
ok
```

3.6 Bypassing POST

To bypass POST:

● **At the system prompt, type:**

```
ok% setenv diag-level? off
ok% setenv diag-switch? false
```

3.7 Resetting Variables to Default Settings

To set the system NVRAM parameters to the original default settings:

● **At the system prompt, type:**

```
ok% set-defaults
```

3.8 Initializing Motherboard POST

To initialize the motherboard POST:

1. **Power off the system.**

2. **Before replacing the motherboard, remove any optional components, such as PCI cards, then repeat the POST.**

Note – Non-optional components such as DIMMs, the motherboard, the power supply, and the keyboard must be installed for POST to execute properly. Removing the optional system components and retesting the system isolates the possibility that those components are the cause of the failure.

Troubleshooting Procedures

This chapter describes how to troubleshoot possible hardware problems and suggests corrective actions.

This chapter contains the following topics:

4.1 Power-On Failure

This section provides examples of power-on failure symptoms and suggested actions.

Symptom

The system does not power up when you press the power switch.

Actions

1. **Ensure that the AC power cord is properly connected to the system and to the wall receptacle. Verify that the wall receptacle is supplying AC power to the system.**

2. **If the wall receptacle AC power has been verified, but the system does not power on, the system power supply may be defective. See Section 4.4 "Power Supply Test" on page 4-4.**

4.2 Video Output Failure

This section provides video output failure symptoms and suggested actions. Perform the suggested actions until you isolate the problem.

Symptom

The video does not display on the system monitor.

Actions

1. **Check the monitor power cord to ensure that the cord is connected to the monitor and to the wall receptacle.**

2. **Verify that the wall receptacle is supplying power to the monitor.**

3. **Check the video cable connection between the monitor and the motherboard video output connector.**

4. **Check that the CPU is properly seated.**

5. **If video still does not display on the monitor, the monitor, graphics card, or motherboard video chip may be defective.**

4.3 Hard Drive, CD-ROM, or DVD-ROM Drive Failure

This section provides hard drive, CD-ROM drive, or DVD-ROM drive failure symptoms and suggested actions. Perform the suggested actions until you isolate the problem.

Symptoms

- A hard drive read, write, or parity error is reported by the operating system or a customer application.
- A CD-ROM or DVD-ROM drive read error or parity error is reported by the operating system or a customer application.

Action

● **Replace the drive indicated by the failure message. The operating system identifies the internal drives as shown in** TABLE 4-1**.**

TABLE 4-1   Internal Drives Identification

Operating Environment Address	Drive Physical Location and Target
c0t0d0s#	Primary hard drive, target 0
c0t1d0s#	Secondary hard drive, target 1 (optional)
c0t6d0s#	CD-ROM or DVD-ROM drive, target 6 (optional)

Note – The # symbol in the operating environment address examples can be a numeral between 0 and 7 that describes the slice or partition on the drive.

Symptom

Hard drive, CD-ROM, or DVD-ROM drive fails to respond to commands.

Action

Test the drive response to the `probe-ide` command as follows:

1. **To bypass POST, type** `setenv diag-switch? false` **at the system** `ok` **prompt.**

2. **At the system** ok **prompt, type:**

```
ok% reset-all
ok% probe-ide
```

- If the hard drive responds correctly to the probe-ide command, the message shown in CODE EXAMPLE 4-4 on page 4-8 is displayed, which means that the system EIDE controller has successfully probed the device. This is an indication that the motherboard is operating correctly.
- If an optional hard drive is installed and one drive does not respond to the EIDE controller probe but the other does, replace the unresponsive drive.
- If the probe-ide test fails to show the device in the message, replace the drive (see Section 7.3 "Hard Drives" on page 7-5). If replacing the hard drive does not correct the problem, replace the motherboard.

4.4 Power Supply Test

This section describes how to test the power supply. FIGURE B-1 on page B-1 and TABLE B-1 on page B-2 describe power supply connector J501.

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

2. **Disconnect the ribbon cables from the riser board to expose connector J501.**

3. **Defeat the power interlock.**

4. **Power on the system.**

   See Chapter 9 "Finishing Component Replacement."

Caution – With the system cover removed and the system powered on, there is unprotected access to voltage and energy levels that are potentially hazardous to equipment and personnel. If you are unsure how to safely proceed, please seek the assistance of qualified service personnel.

5. **Using a digital voltage meter (DVM), check the power supply output voltages as follows:**

Note – Power supply connector J501 must remain connected to the riser board.

a. **With the negative probe of the DVM placed on a connector ground (Gnd) pin, position the positive probe on each power pin.**

See Section B.1 "Power Supply Connectors" on page B-1.

b. **Verify voltage and signal availability as listed in** TABLE B-1 **on page B-2.**

6. **After you finish testing the power supply, remove the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

4.5 DIMM Failure

At times, the operating environment, diagnostic program, or POST might not display a DIMM location (U number) as part of a memory error message. In this situation, the only available information is a physical memory address and failing byte (or bit). The following table lists physical memory addresses that can be used to locate a defective DIMM. For more information on POST diagnostics, see Section 3.1 "POST Overview" on page 3-1.

TABLE 4-2 DIMM Physical Memory Address

DIMM Slot	Physical Address Range	DIMM Starting Address (Hex)
DIMM0 (U2)	0 to 512MB (0 to 0.5GB)	0X 00000000
DIMM1 (U3)	512MB to 1024MB (0.5GB to 1GB)	0X 20000000
DIMM2 (U4)	1024MB to 1536MB (1GB to 1.5GB)	0X 40000000
DIMM3 (U5)	1536MB to 2048MB (1.5GB to 2GB)	0X 60000000

4.6 OpenBoot PROM On-Board Diagnostics

The following sections describe the OpenBoot PROM on-board diagnostics. To execute the OpenBoot PROM on-board diagnostics, the system must be at the `ok` prompt. The OpenBoot PROM on-board diagnostics are described as follows:

- Section 4.6.1 "Watch-Clock Diagnostic" on page 4-6
- Section 4.6.2 "Watch-Net and Watch-Net-All Diagnostics" on page 4-6
- Section 4.6.3 "Probe-IDE Diagnostic" on page 4-8
- Section 4.6.4 "Test device alias, device path, -All Diagnostic" on page 4-8

4.6.1   Watch-Clock Diagnostic

The watch-clock diagnostic reads a register in the NVRAM/TOD chip and displays the result as a seconds counter. During normal operation, the seconds counter repeatedly increments from 0 to 59 until interrupted by pressing any key on the Sun keyboard. The watch-clock diagnostic is initialized by typing the watch-clock command at the ok prompt. The following code example shows the watch-clock diagnostic output message.

CODE EXAMPLE 4-1   Watch-Clock Diagnostic Output Message

```
ok watch-clock
Watching the 'seconds' register of the real time clock chip.
It should be 'ticking' once a second.
Type any key to stop.
49
ok
```

4.6.2   Watch-Net and Watch-Net-All Diagnostics

The watch-net and watch-net-all diagnostics monitor Ethernet packets on the Ethernet interfaces connected to the system. Good packets received by the system are indicated by a period (.). Errors such as the framing error and the cyclic redundancy check (CRC) error are indicated with an "X" and an associated error description. The watch-net diagnostic is initialized by typing the watch-net command at the ok prompt and the watch-net-all diagnostic is initialized by typing the watch-net-all command at the ok prompt. The following code example shows the watch-net diagnostic output message. CODE EXAMPLE 4-2 shows the watch-net-all diagnostic output message.

CODE EXAMPLE 4-2   Watch-Net Diagnostic Output Message

```
ok watch-net
Hme register test --- succeeded.
Internal loopback test -- succeeded.
Transceiver check  -- Using Onboard Transceiver - Link Up.
passed
Using Onboard Transceiver - Link Up.
Looking for Ethernet Packets.
'.' is a Good Packet.  'X' is a Bad Packet.
Type any key to stop.
.................................................
```

CODE EXAMPLE 4-2 Watch-Net Diagnostic Output Message *(Continued)*

```
...........................................................
...........................................................
....................................................
ok
```

CODE EXAMPLE 4-3 Watch-Net-All Diagnostic Output Message

```
ok watch-net-all
/pci@1f,0/pci@1,1/network@1,1
Hme register test --- succeeded.
Internal loopback test -- succeeded.
Transceiver check  -- Using Onboard Transceiver - Link Up.
passed
Using Onboard Transceiver - Link Up.
Looking for Ethernet Packets.
'.' is a Good Packet.  'X' is a Bad Packet.
Type any key to stop.
........
...........................................................
...........................................................
...........................................................
...................................
ok
```

4.6.3　Probe-IDE Diagnostic

The probe-IDE diagnostic transmits an inquiry command to internal and external IDE devices connected to the system's on-board IDE interface. If the IDE device is connected and active, the target address, unit number, device type, and manufacturer name are displayed. Initialize the probe-IDE diagnostic by typing the `probe-ide` command at the `ok` prompt. The following code example shows the probe-IDE diagnostic output message.

CODE EXAMPLE 4-4　Probe-IDE Diagnostic Output Message

```
ok probe-ide
  Device 0  ( Primary Master )
          ATA Model: ST34342A

  Device 1  ( Primary Slave )
          ATA Model: ST34342A

  Device 2  ( Secondary Master )
        Removable ATAPI Model: CRD-8160B

  Device 3  ( Secondary Slave )
        Removable ATAPI Model:

ok
```

4.6.4　Test *device alias, device path*, `-All` Diagnostic

The test diagnostic, when combined with a device alias or device path, enables a device self-test diagnostic program. If a device has no self-test program, the message `No selftest method for device name` is displayed. To enable the self-test program for a device, type the `test` command followed by the device alias or device path name.

The following code example shows the test diagnostic output message. Test diagnostics are initialized by typing the `test` *device alias* or *device path* command at the `ok` prompt. TABLE 4-3 lists the types of tests that can be used, a brief description of each test, and preparation.

Note – The diskette drive (floppy) is selected as the test alias name example.

CODE EXAMPLE 4-5   Test Diagnostic Output Message

```
ok test floppy

Testing floppy disk system. A formatted disk should be in the
drive.
Test succeeded.

ok
```

TABLE 4-3   Selected OpenBoot PROM On-Board Diagnostic Tests

Type of Test	Description	Preparation
test screen	Tests the system video graphics hardware and the monitor.	Diag-switch? NVRAM parameter must be true for the test to execute.
test floppy	Tests the diskette drive response to commands.	A formatted diskette must be inserted into the diskette drive.
test net	Performs an internal/external loopback test of the system auto-selected Ethernet interface.	An Ethernet cable must be attached to the system and to an Ethernet tap or hub.
test -all	Sequentially tests system-configured devices containing selftest.	Tests are sequentially executed in device-tree order (viewed with the show-devs command).

4.7 OpenBoot Diagnostics

The OpenBoot diagnostic is a menu-driven diagnostic tool that verifies:

- Internal I/O system
- Ethernet
- Keyboard
- Mouse
- Diskette drive (floppy)
- Parallel port
- Serial ports
- NVRAM
- Audio
- EIDE
- Video

The OpenBoot diagnostic performs root-cause failure analysis on the referenced devices by testing internal registers, confirming subsystem integrity, and verifying device functionality.

Note – The OpenBoot diagnostic test result data captured in the following code examples represent the test result data that is output when the system being tested is connected to a remote shell window through a TIP connection. When the system being tested is in a stand-alone configuration, the test result data may differ.

4.7.1 Starting the OpenBoot Diagnostics Menu

1. **At the** ok **prompt, type:**

```
ok% setenv mfg-mode on
mfg-mode = on
```

2. **At the** ok **prompt, type:**

```
ok% setenv diag-switch? true
diag-switch? = true
```

3. **At the** `ok` **prompt, type:**

```
ok% setenv auto-boot? false
auto-boot? = false
```

4. **At the** `ok` **prompt, type:**

```
ok% reset-all
```

5. **Verify that the system resets, as shown in** CODE EXAMPLE 4-6.

CODE EXAMPLE 4-6 Reset Verification

```
ok setenv mfg-mode on
mfg-mode =            on
ok setenv diag-switch? true
diag-switch? =        true
ok setenv auto-boot? false
auto-boot? =          false
ok reset-all
Resetting...

Software Power ON

@(#) Sun Blade 100 UPA/PCI 3.11 Version 2created 2000/03/06 10:31
Clearing E$ Tags Done
Clearing I/D TLBs Done
Probing Memory Done
MEM BASE = 0000.0000.2000.0000
MEM SIZE = 0000.0000.1000.0000
11-Column Mode Enabled
MMUs ON
Copy Done
PC = 0000.01ff.f000.1ffc
PC = 0000.0000.0000.2040
Decompressing into Memory Done
Size = 0000.0000.0006.e160
ttya initialized
Reset Control: BXIR:0 BPOR:0 SXIR:0 SPOR:1 POR:0
UltraSPARC-IIe 2-2 module
Probing Memory Bank #0 256 + 256: 512 Megabytes
Probing Memory Bank #2   0 +   0:   0 Megabytes
Probing UPA Slot at 1e,0 SUNW,ffb
```

```
Probing /pci@1f,0/pci@1,1 at Device 1 pci108e,1000 network
Probing /pci@1f,0/pci@1,1 at Device 2 SUNW,m64B
Probing /pci@1f,0/pci@1,1 at Device 3 ide disk cdrom
Probing /pci@1f,0/pci@1 at Device 1 pci
Probing /pci@1f,0/pci@1/pci@1 at Device 0 pci108e,1000 SUNW,hme
Probing /pci@1f,0/pci@1/pci@1 at Device 1 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 2 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 3 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 4 SUNW,isptwo sd st
Probing /pci@1f,0/pci@1/pci@1 at Device 5 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 6 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 7 Nothing there

Probing /pci@1f,0/pci@1/pci@1 at Device 8 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 9 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device a Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device b Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device c Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device d Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device e Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device f Nothing there

Probing /pci@1f,0/pci@1 at Device 2 Nothing there
Probing /pci@1f,0/pci@1 at Device 3 Nothing there
Probing /pci@1f,0/pci@1 at Device 4 Nothing there
Reset Control: BXIR:0 BPOR:0 SXIR:0 SPOR:1 POR:0
UltraSPARC-IIe 2-2 module
Probing Memory Bank #0 256 + 256: 512 Megabytes
Probing Memory Bank #2   0 +   0:   0 Megabytes
Probing UPA Slot at 1e,0 SUNW,ffb
Probing /pci@1f,0/pci@1,1 at Device 1 pci108e,1000 network
Probing /pci@1f,0/pci@1,1 at Device 2 SUNW,m64B
Probing /pci@1f,0/pci@1,1 at Device 3 ide disk cdrom
Probing /pci@1f,0/pci@1 at Device 1 pci
Probing /pci@1f,0/pci@1/pci@1 at Device 0 pci108e,1000 SUNW,hme
Probing /pci@1f,0/pci@1/pci@1 at Device 1 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 2 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 3 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 4 SUNW,isptwo sd st
Probing /pci@1f,0/pci@1/pci@1 at Device 5 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 6 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 7 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 8 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device 9 Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device a Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device b Nothing there
```

```
Probing /pci@1f,0/pci@1/pci@1 at Device c Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device d Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device e Nothing there
Probing /pci@1f,0/pci@1/pci@1 at Device f Nothing there

Probing /pci@1f,0/pci@1 at Device 2 Nothing there
Probing /pci@1f,0/pci@1 at Device 3 Nothing there
Probing /pci@1f,0/pci@1 at Device 4 Nothing there

Sun Blade 100 UPA/PCI (UltraSPARC-IIe 500 MHz), No Keyboard
OpenBoot 3.11, 512 MB memory installed, Serial #9337777.
Ethernet address 8:0:20:8e:7b:b1, Host ID: 808e7bb1.


ok
```

6. **At the** ok **prompt, type** obdiag. **Verify that the OpenBoot diagnostic menu is displayed, as shown in** CODE EXAMPLE 4-7.

7. **At the** OBdiag **menu prompt, type** 16 **to enable script-debug messages.**

8. **At the** OBdiag **menu prompt, type** 18 **to disable external loopback tests.**

CODE EXAMPLE 4-7   OpenBoot Diagnostic Menu

```
ok obdiag
stdin: fffe2008
stdout: fffe2010
loading code into: /pci@1f,0/pci@1,1/ebus@1
loading code into: /pci@1f,0/pci@1,1/ebus@1/eeprom@14,0
loading code into: /pci@1f,0/pci@1,1/ebus@1/ecpp@14,3043bc
loading code into: /pci@1f,0/pci@1,1/ebus@1/su@14,3062f8
loading code into: /pci@1f,0/pci@1,1/ebus@1/se@14,400000
loading code into: /pci@1f,0/pci@1,1/network@1,1
loading code into: /pci@1f,0/pci@1,1/ebus@1/fdthree@14,3023f0
loading code into: /pci@1f,0/pci@1,1/ebus@1/
SUNW,CS4231@14,200000
loading code into: /pci@1f,0/pci@1,1/ide@3
loading code into: /pci@1f,0/pci@1,1/ide@3/disk
loading code into: /pci@1f,0/pci@1,1/ide@3/cdrom
loading code into: /pci@1f,0/pci@1,1/SUNW,m64B@2
Debugging enabled

          OBDiag Menu
```

CODE EXAMPLE 4-7   OpenBoot Diagnostic Menu *(Continued)*

```
 0..... PCI/Cheerio
 1..... EBUS DMA/TCR Registers
 2..... Ethernet
 3..... Keyboard
 4..... Mouse
 5..... Floppy
 6..... Parallel Port
 7..... Serial Port A
 8..... Serial Port B
 9..... NVRAM
10..... Audio
11..... EIDE
12..... Video
13..... All Above
14..... Quit
15..... Display this Menu
16..... Toggle script-debug
17..... Enable External Loopback Tests
18..... Disable External Loopback Tests

 Enter (0-13 tests, 14 -Quit, 15 -Menu) ===>
```

4.7.2   OpenBoot Diagnostics

The OpenBoot diagnostics are described in the following sections:

4.7.2.1   PCI/PCIO Diagnostic

To start the PCI/PCIO diagnostic, type `0` at the `OBdiag` Menu prompt. The PCI/PCIO diagnostic performs the following tests in sequence:

1. `vendor_ID_test` verifies the PCIO ASIC vendor ID is 108e.

2. `device_ID_test` verifies the PCIO ASIC device ID is 1000.

3. `mixmode_read` verifies the PCI configuration space is accessible as half-word bytes by reading the EBus2 vendor ID address.

4. `e2_class_test` verifies the address class code. Address class codes include bridge device (0 x B, 0 x 6), other bridge device (0 x A and 0 x 80), and programmable interface (0 x 9 and 0 x 0).

5. `status_reg_walk1` performs a walk-one test on the status register with mask 0 x 280 (PCIO ASIC is accepting fast back-to-back transactions, DEVSEL timing is 0 x 1).

6. `line_size_walk1` performs tests 1 through 5.

7. `latency_walk1` performs a walk-one test on the latency timer.

8. `line_walk1` performs a walk-one test on the interrupt line.

9. `pin_test` verifies the interrupt pin is logic-level high (1) after reset.

The following code example shows the PCI/PCIO diagnostic output message.

CODE EXAMPLE 4-8   PCI/PCIO Diagnostic Output Message

```
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===> 0

TEST='all_pci/PCIO_test'
SUBTEST='vendor_id_test'
SUBTEST='device_id_test'
SUBTEST='mixmode_read'
SUBTEST='e2_class_test'
SUBTEST='status_reg_walk1'
SUBTEST='line_size_walk1'
SUBTEST='latency_walk1'
SUBTEST='line_walk1'
SUBTEST='pin_test'
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===>
```

4.7.2.2　EBus DMA/TCR Registers Diagnostic

To start the DMA/TCR registers diagnostic, type **1** at the `OBdiag` Menu prompt. The EBus DMA/TCR registers diagnostic performs the following tests in sequence:

1. `dma_reg_test` performs a walking-ones bit test for the control status register, address register, and byte-count register of each channel and verifies that the control status register is set properly.

2. `dma_func-test` validates the DMA capabilities and FIFOs. The test is executed in a DMA diagnostic loopback mode. It initializes the data of transmitting memory with its address, performs a DMA read and write, and verifies that the data received is correct. It repeats for four channels.

The following code example shows the EBus DMA/TCR registers diagnostic output message.

CODE EXAMPLE 4-9　EBus DMA/TCR Registers Diagnostic Output Message

```
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===> 1

TEST='all_dma/ebus_test'
SUBTEST='dma_reg_test'
SUBTEST='dma_func_test'
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===>
```

4.7.2.3　Ethernet Diagnostic

To start the Ethernet diagnostic, type **2** at the `OBdiag` Menu prompt. The Ethernet diagnostic performs the following tests in sequence:

1. `my_channel_reset` resets the Ethernet channel.

2. `hme_reg_test` performs a walk-one test on the following registers set: global register 1, global register 2, bmac xif register, bmac tx register, and mif register.

3. `MAC_internal_loopback_test` performs an Ethernet channel engine internal loopback test.

4. `10_mb_xcvr_loopback_test` enables the 10BASE-T data present at the transmit MII data inputs, to be routed back to the receive MII data outputs.

5. `100_mb_phy_loopback_test` enables MII transmit data to be routed to the MII receive data path.

6. `100_mb_twister_loopback_test` forces the twisted-pair transceiver into loopback mode.

The following code example shows the Ethernet diagnostic output message.

CODE EXAMPLE 4-10 Ethernet Diagnostic Output Message

```
Enter (0-13 tests, 14 -Quit, 15 -Menu) ===> 2

TEST='ethernet_test'
Using Onboard Transceiver - Link Up.
SUBTEST='my_channel_reset'
SUBTEST='hme_reg_test'
SUBTEST='global_reg1_test'
SUBTEST='global_reg2_test'
SUBTEST='bmac_xif_reg_test'
SUBTEST='bmac_tx_reg_test'
SUBTEST='mif_reg_test'
SUBTEST='mac_internal_loopback_test'
SUBTEST='10mb_xcvr_loopback_test'
SUBTEST='100mb_phy_loopback_test'
SUBTEST='100mb_twister_loopback_test'
Enter (0-13 tests, 14 -Quit, 15 -Menu) ===>
```

4.7.2.4   Keyboard Diagnostic

To start the keyboard diagnostic, type **3** at the `OBdiag` Menu prompt. The keyboard diagnostic consists of an external and internal loopback test. The external loopback requires a passive loopback connector. The internal loopback verifies the keyboard port by transmitting and receiving 128 characters.

The following code example shows the keyboard diagnostic output message.

CODE EXAMPLE 4-11 Keyboard Diagnostic Output Message

```
setenv Enter (0-13 tests, 14 -Quit, 15 -Menu) ===> 3

TEST='keyboard_test'
SUBTEST='internal_loopback'
Enter (0-13 tests, 14 -Quit, 15 -Menu) ===>
```

4.7.2.5 Mouse Diagnostic

To start the mouse diagnostic, type **4** at the OBdiag Menu prompt. The mouse diagnostic performs a keyboard-to-mouse loopback test.

The following code example shows the mouse diagnostic output message.

CODE EXAMPLE 4-12 Mouse Diagnostic Output Message

```
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===> 4

TEST='mouse_test'
SUBTEST='mouse_loopback'

###OBDIAG_MFG_START###
TEST='mouse_test'
STATUS='FAILED'
SUBTEST='mouse_loopback'
ERRORS='1 '
TTF='1656 '
SPEED='295.99 MHz'
PASSES='1 '
MESSAGE='Error: Timeout receiving a character'
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===>
```

4.7.2.6 Diskette Drive (Floppy) Diagnostic

To start the diskette drive (floppy) diagnostic, type **5** at the OBdiag Menu prompt. The diskette drive diagnostic verifies the diskette drive controller initialization. It also validates the status of a selected disk drive and reads the diskette drive header.

The following code example shows the diskette drive test output message.

CODE EXAMPLE 4-13 Diskette Drive Diagnostic Output Message

```
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===> 5

TEST='floppy_test'
SUBTEST='floppy_id0_read_test'
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===>
```

4.7.2.7　Parallel Port Diagnostic

To start the parallel port diagnostic, type **6** at the OBdiag Menu prompt. The parallel port diagnostic performs the following in sequence:

1. sio-passive-lb sets up the SuperI/O configuration register to enable extended/compatible parallel port select, then does a write 0, walk-one, write 0 x ff to the data register. It verifies the results by reading the status register.

2. dma_read enables ECP mode, ECP DMA configuration, and FIFO test mode. Transfers 16 bytes of data from memory to the parallel port device and then verifies the data is in TFIFO.

The following code example shows the parallel port diagnostic output message.

CODE EXAMPLE 4-14　Parallel Port Diagnostic Output Message

```
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===> 6

TEST='parallel_port_test'
SUBTEST='dma_read'
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===>
```

4.7.2.8　Serial Port Diagnostic

To start the serial port diagnostic, type **7** at the OBdiag Menu prompt. The serial port A diagnostic invokes the uart_loopback test which transmits and receives 128 characters and checks serial port A transaction validity.

The following code example shows the serial port diagnostic output message.

CODE EXAMPLE 4-15　Serial Port Diagnostic Output Message

```
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===> 7

TEST='uarta_test'
BAUDRATE='1200'
SUBTEST='internal_loopback'
BAUDRATE='1800'
SUBTEST='internal_loopback'
BAUDRATE='2400'
SUBTEST='internal_loopback'
BAUDRATE='4800'
SUBTEST='internal_loopback'
BAUDRATE='9600'
```

```
SUBTEST='internal_loopback'
BAUDRATE='19200'
SUBTEST='internal_loopback'
BAUDRATE='38400'
SUBTEST='internal_loopback'
BAUDRATE='57600'
SUBTEST='internal_loopback'
BAUDRATE='76800'
SUBTEST='internal_loopback'
BAUDRATE='115200'
SUBTEST='internal_loopback'
BAUDRATE='153600'
SUBTEST='internal_loopback'
BAUDRATE='230400'
SUBTEST='internal_loopback'
BAUDRATE='307200'
SUBTEST='internal_loopback'
BAUDRATE='460800'
SUBTEST='internal_loopback'
Enter (0-12 tests, 13 -Quit, 14 -Menu) ===>
```

4.7.2.9   NVRAM Diagnostic

To start the NVRAM diagnostic, type 9 at the OBdiag Menu prompt. The NVRAM diagnostic verifies the NVRAM operation by performing a write and read to the NVRAM.

4.7.2.10   Audio Diagnostic

To start the audio diagnostic, type **10** at the OBdiag Menu prompt. The audio diagnostic performs the following in sequence:

1. cs4231_test verifies the cs4231 internal registers.

2. Line-in to line-out external loopback test.

3. Microphone to headphone external loopback test.

The following code example shows the audio diagnostic output message.

CODE EXAMPLE 4-16   Audio Diagnostic Output Message

```
Enter (0-13 tests, 14 -Quit, 15 -Menu) ===> 10

TEST='audio_test'
SUBTEST='cs4231_test'
Codec_ID='8a'
Version_ID='a0'
SUBTEST='external_lpbk'

###OBDIAG_MFG_START###
TEST='audio_test'
STATUS='FAILED'
SUBTEST='external_lpbk'
ERRORS='1 '
TTF='505 '
SPEED='299.80 MHz'
PASSES='1 '
MESSAGE='Error: External Audio Test not run: Please set the mfg-
mode to sys-ext.'
Enter (0-13 tests, 14 -Quit, 15 -Menu) ===>
```

4.7.2.11   EIDE Diagnostic

To start the EIDE diagnostic, type **11** at the OBdiag Menu prompt. The EIDE
diagnostic validates both the EIDE chip and the IDE bus subsystem.

The following code example shows the EIDE diagnostic output message.

CODE EXAMPLE 4-17   EIDE Diagnostic Output Message

```
Enter (0-13 tests, 14 -Quit, 15 -Menu) ===> 11

TEST='ide_test'
SUBTEST='probe-cmd-device'
SUBTEST='hd-and-cd-check'
Enter (0-13 tests, 14 -Quit, 15 -Menu) ===>
```

4.7.2.12 Video Diagnostic

To start the video diagnostic, type **12** at the OBdiag Menu prompt. The video diagnostic validates the graphics.

The following code example shows the video diagnostic output message.

CODE EXAMPLE 4-18   Video Diagnostic Output Message

```
Enter (0-13 tests, 14 -Quit, 15 -Menu) ===> 12

TEST='video_test'
Please connect the monitor and use ttya/ttyb when running this test
if you are using the screen it may be become unreadable
SUBTEST='mach64-chip-id-vendor-id-check'
SUBTEST='video-frame-buffer-test'
SUBTEST='mach64-walk-one-test'
SUBTEST='mach64-walk-zero-test'
Enter (0-13 tests, 14 -Quit, 15 -Menu) ===>
```

4.7.2.13 All Above Diagnostic

To start the all above diagnostic, type **13** at the OBdiag Menu prompt. The all above diagnostic validates the entire system.

The following code example shows the all above diagnostic output message.

CODE EXAMPLE 4-19   All Above Diagnostic Output Message

```
Enter (0-13 tests, 14 -Quit, 15 -Menu) ===> 13

TEST='all_pci/cheerio_test'
SUBTEST='vendor_id_test'
SUBTEST='device_id_test'
SUBTEST='mixmode_read'
SUBTEST='e2_class_test'
SUBTEST='status_reg_walk1'
SUBTEST='line_size_walk1'
SUBTEST='latency_walk1'
SUBTEST='line_walk1'
SUBTEST='pin_test'

TEST='all_dma/ebus_test'
SUBTEST='dma_reg_test'
SUBTEST='dma_func_test'
```

CODE EXAMPLE 4-19 All Above Diagnostic Output Message *(Continued)*

```
TEST='ethernet_test'
Using Onboard Transceiver - Link Up.
SUBTEST='my_channel_reset'
SUBTEST='hme_reg_test'
SUBTEST='global_reg1_test'
SUBTEST='global_reg2_test'
SUBTEST='bmac_xif_reg_test'
SUBTEST='bmac_tx_reg_test'
SUBTEST='mif_reg_test'
SUBTEST='mac_internal_loopback_test'
SUBTEST='10mb_xcvr_loopback_test'
SUBTEST='100mb_phy_loopback_test'
SUBTEST='100mb_twister_loopback_test'

TEST='keyboard_test'
SUBTEST='internal_loopback'

TEST='mouse_test'
SUBTEST='mouse_loopback'

###OBDIAG_MFG_START###
TEST='mouse_test'
STATUS='FAILED'
SUBTEST='mouse_loopback'
ERRORS='1 '
TTF='1011 '
SPEED='299.80 MHz'
PASSES='1 '
MESSAGE='Error: Timeout receiving a character'

TEST='floppy_test'
SUBTEST='floppy_id0_read_test'

TEST='parallel_port_test'
SUBTEST='dma_read'

TEST='uarta_test'
'UART A in use as console - Test not run.'

TEST='uartb_test'
BAUDRATE='1200'
SUBTEST='internal_loopback'
BAUDRATE='1800'
SUBTEST='internal_loopback'
BAUDRATE='2400'
```

```
SUBTEST='internal_loopback'
BAUDRATE='4800'
SUBTEST='internal_loopback'
BAUDRATE='9600'
SUBTEST='internal_loopback'
BAUDRATE='19200'
SUBTEST='internal_loopback'
BAUDRATE='38400'
SUBTEST='internal_loopback'
BAUDRATE='57600'
SUBTEST='internal_loopback'
BAUDRATE='76800'
SUBTEST='internal_loopback'
BAUDRATE='115200'
SUBTEST='internal_loopback'
BAUDRATE='153600'
SUBTEST='internal_loopback'
BAUDRATE='230400'
SUBTEST='internal_loopback'
BAUDRATE='307200'
SUBTEST='internal_loopback'
BAUDRATE='460800'
SUBTEST='internal_loopback'

TEST='nvram_test'
SUBTEST='write/read_patterns'
SUBTEST='write/read_inverted_patterns'

TEST='audio_test'
SUBTEST='cs4231_test'
Codec_ID='8a'
Version_ID='a0'
SUBTEST='external_lpbk'

###OBDIAG_MFG_START###
TEST='audio_test'
STATUS='FAILED'
SUBTEST='external_lpbk'
ERRORS='1 '
TTF='1030 '
SPEED='299.80 MHz'
PASSES='1 '
MESSAGE='Error: External Audio Test not run: Please set the mfg-
mode to sys-ext.'

TEST='ide_test'
```

CODE EXAMPLE 4-19   All Above Diagnostic Output Message *(Continued)*

```
SUBTEST='probe-cmd-device'
SUBTEST='hd-and-cd-check'

TEST='video_test'
Please connect the monitor and use ttya/ttyb when running this test
if you are using the screen it may be become unreadable
SUBTEST='mach64-chip-id-vendor-id-check'
SUBTEST='video-frame-buffer-test'
SUBTEST='mach64-walk-one-test'
SUBTEST='mach64-walk-zero-test'
Enter (0-13 tests, 14 -Quit, 15 -Menu) ===>
```

4.7.3   Exiting the OpenBoot Diagnostic Menu

1. At the ok **prompt, type:**

```
ok% setenv mfg-mode off
mfg-mode = off
```

2. At the ok **prompt, type:**

```
ok% setenv diag-switch? false
diag-switch? = false
```

3. At the ok **prompt, type:**

```
ok% setenv auto-boot? true
auto-boot? = true
```

4. At the ok **prompt, type:**

```
ok% reset-all
```

Preparing for Component Removal and Replacement

This chapter describes the activities you must do to prepare for removal and replacement of internal system components.

Note – It is very important that you review the safety requirements, symbols, and precautions in this chapter before you begin to remove or replace system components.

This chapter contains the following topics:

5.1 Safety Requirements

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

- Follow all cautions, warnings, and instructions marked on the equipment.
- Ensure that the voltages and frequency rating of the power receptacle match the electrical rating label on the equipment.

- Never push objects of any kind through openings in equipment. Objects might touch dangerous voltage points or short components, resulting in fire or electric shock.

- Refer servicing of equipment to qualified personnel.

5.2 Safety Symbols

The following symbols mean:

Caution – Risk of personal injury and equipment damage. Follow the instructions.

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

Caution – Hot surfaces. Avoid contact. Surfaces are hot and may cause personal injury if touched.

5.3 Safety Precautions

Follow all safety precautions.

5.3.1 Modification to Equipment

Caution – Do not make mechanical or electrical modifications to the equipment. Sun Microsystems is not responsible for regulatory compliance of a modified Sun product.

5.3.2 Placement of a Sun Product

Caution – To ensure reliable operation of the Sun product and to protect it from overheating, ensure equipment openings are not blocked or covered. Never place a Sun product near a radiator or hot air register.

5.3.3 Power Cord Connection

Caution – Not all power cords have the same current ratings. Household extension cords do not have overload protection. Do not use household extension cords with a Sun product.

Caution – The power cord serves as the primary disconnect device for the system. Be sure to connect the power cord into a grounded electrical receptacle that is nearby the system and is readily accessible. Do not connect the power cord when the power supply has been removed from the system chassis.

5.3.4 Electrostatic Discharge

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 themselves or any metal parts.

Caution – Wear an antistatic wrist strap and use an ESD-protected mat when handling components. When servicing or removing system components, attach an ESD strap to your wrist, then to a metal area on the chassis. Then disconnect the power cord from the system and the wall receptacle. Following this caution equalizes all electrical potentials with the system.

5.3.5 Lithium Battery

<div>

Caution – This system contains a lithium battery, Mitsubishi part number R-2032. Lithium batteries may explode if mishandled. Do not dispose of a battery in fire. Do not disassemble a battery or attempt to recharge it.

</div>

5.4 Tools Required

The following tools are required to service the Sun Blade 100 system.

- No. 2 Phillips screwdriver (magnetized tip suggested)
- Needle-nose pliers
- Grounding wrist strap
- Digital voltage meter (DVM) (Optional)
- Antistatic mat

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

- Bag used to wrap a Sun replacement part
- Shipping container used to package a Sun replacement part
- Inner side (metal part) of the system cover
- Sun ESD mat, part number 250-1088 (available through your Sun sales representative)
- Disposable ESD mat; shipped with replacement parts or optional system features

5.5 Powering Off the System

To power off the system:

<div>

Caution – Exit from the operating system before turning off system power. Failure to do so may result in data loss.

</div>

1. Back up system files and data.

If Solaris is running in a windowing environment:

a. **Momentarily press and release the front panel power switch (**FIGURE 5-1**) to automatically shut down all programs, the operating system, and power off the system.**

From the system shutdown menu displayed on the monitor, select "Shutdown."

If Solaris is not running in a windowing environment:

b. **Press and hold the front panel power switch (**FIGURE 5-1**) for four seconds to power off the system.**

Caution – This action forces an immediate power off of the system and unsaved data is lost.

Power switch

FIGURE 5-1 Front Panel Power Switch

2. **Verify the following:**

   a. **The front panel power-indicator LED is off.**

   b. **The system fans are not spinning.**

3. **Turn off the power to the monitor and any peripheral equipment.**

4. **Disconnect cables to any peripheral equipment.**

Caution – Pressing the power switch does not remove all power from the system; a trickle current remains in the power supply. To remove all power from the system, disconnect the power cord.

5.6　Removing the System Cover

Remove the system cover as follows (FIGURE 5-2):

1. **Using a No. 2 Phillips screwdriver, remove the two screws securing the system cover to the chassis.**

2. **Slide the system cover toward the rear of the system until the cover tabs release.**

3. **Lift the system cover straight up. Set it aside in a safe place.**
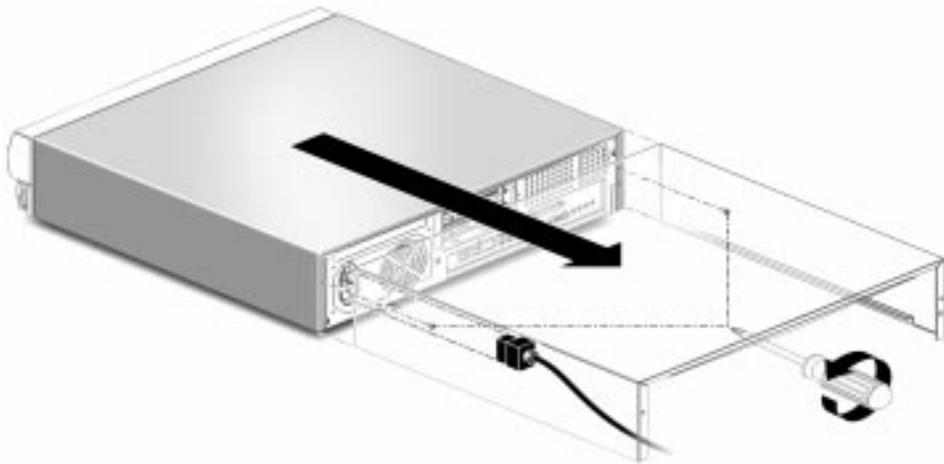
FIGURE 5-2　Removing the System Cover

5.7　Attaching the Antistatic Wrist Strap

1. **Unwrap the first two folds of the wrist strap; wrap the adhesive side firmly against your wrist.**

2. **Peel the liner from the copper foil at the opposite end of the wrist strap.**

3. **Attach the copper end of the wrist strap to the chassis (FIGURE 5-3).**

4. **Disconnect the AC power cord from the system.**

Copper end
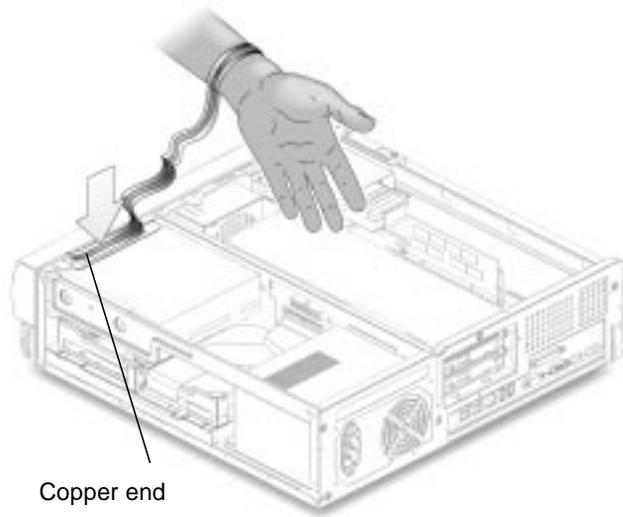
FIGURE 5-3   Attaching the Wrist Strap to the Chassis

Removing and Replacing Major Subassemblies

This chapter describes how to remove and replace the major subassemblies.

This chapter contains the following topics:

6.1 Power Supply

To remove and replace the power supply, proceed as follows.

6.1.1 Removing the Power Supply

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

2. **Disconnect the power cable connector from riser board connector J501 (**FIGURE 6-1**).**

3. **Using a No. 2 Phillips screwdriver, remove the three screws securing the power supply to the back panel.**

4. **Push the power supply toward the chassis front to disengage the power supply from the chassis mounting hooks on the bottom of the chassis.**

5. **Lift the power supply from the chassis.**
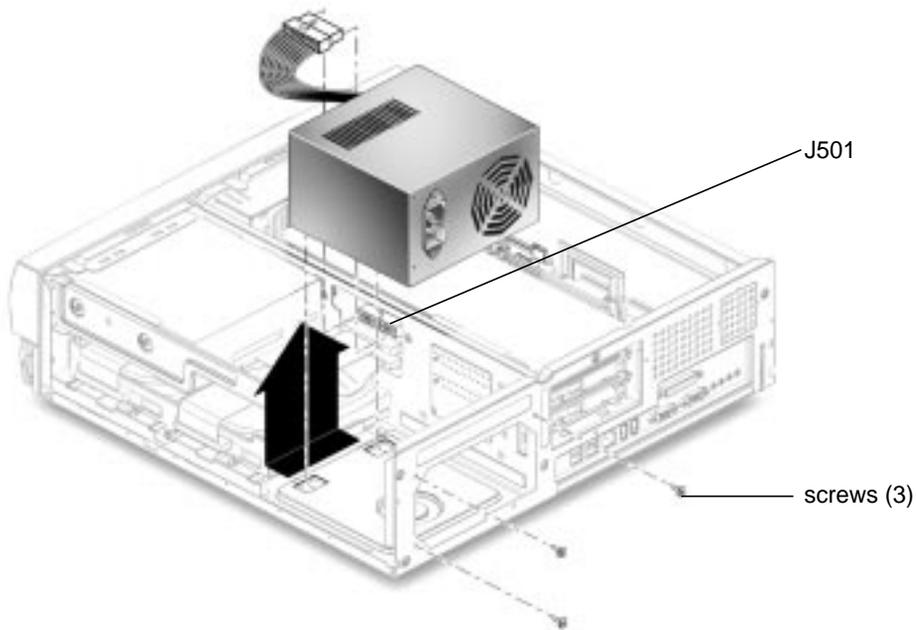
FIGURE 6-1   Removing and Replacing the Power Supply

6.1.2   Replacing the Power Supply

1. **Position the power supply into the chassis, tilting it slightly toward the back of the chassis (**FIGURE 6-1**).**

2. **Push the power supply toward the chassis rear to engage the mounting hooks.**

3. **Using a No. 2 Phillips screwdriver, replace the three screws securing the power supply to the back panel.**

4. **Connect the power cable connector to the riser board connector J501.**

5. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

6.2 Cable Assemblies

The following cable assemblies can be removed and replaced:

- Diskette drive cable assembly
- Diskette drive power cable assembly
- Primary IDE cable assembly
- Secondary IDE cable assembly
- Smart card reader cable assembly
- Power switch/LED assembly

Note – All system cable assemblies are part of a cable kit; they cannot be ordered separately.

6.2.1 Removing the Diskette Drive Data Cable Assembly

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

---

2. **Remove the diskette drive data cable assembly connectors from the following (**FIGURE 6-2**):**
   - Diskette drive
   - Riser board (J9)

3. **Open the two cable routing clips (**FIGURE 6-2**).**

Note – You can move the fan assembly for easier access to the cables. See Section 6.4.1 "Removing the Fan Assembly" on page 6-16.

---

4. **Remove the diskette drive data cable assembly from the chassis.**
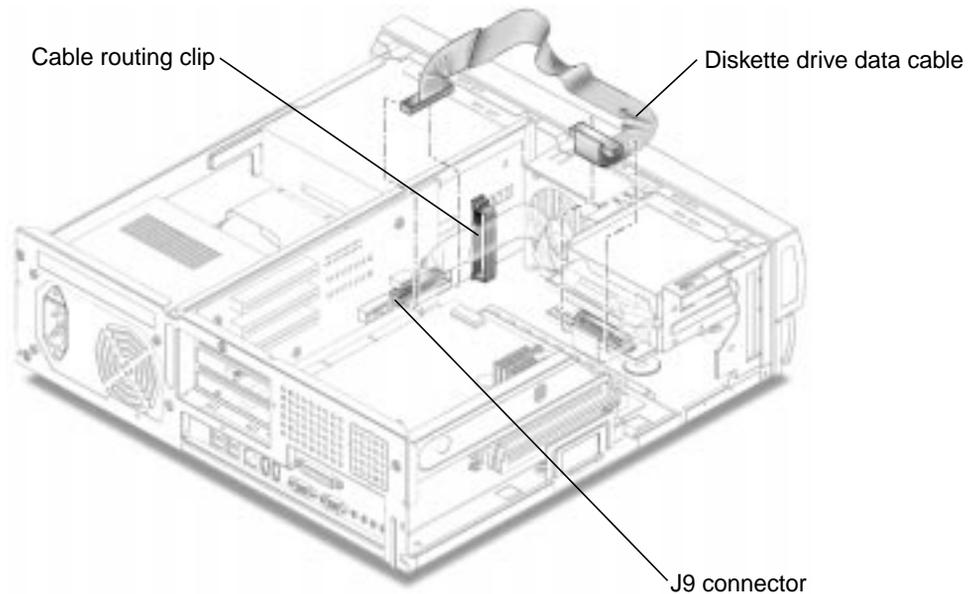
FIGURE 6-2   Removing and Replacing the Diskette Drive Cable Assembly

6.2.2 Replacing the Diskette Drive Data Cable Assembly

1. **Position the diskette drive data cable assembly into the chassis (**FIGURE 6-2**).**

2. **Close the two cable routing clips (**FIGURE 6-2**).**

3. **Connect the diskette drive data cable assembly connectors to the following:**
   - Riser board (J9)
   - Diskette drive

   Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

   ---

4. **If you moved the fan assembly, replace it. See Section 6.4.2 "Replacing the Fan Assembly" on page 6-17.**

5. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

6.2.3 Removing the Diskette Drive Power Cable Assembly

1. Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."

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

2. Remove the diskette drive power cable assembly connectors from the following (FIGURE 6-3**):**
   - Diskette drive
   - Riser board (J10)

3. Open the two cable routing clips (FIGURE 6-3**).**

4. Remove the diskette drive power cable assembly from the chassis.

> **Note –** You can move the fan assembly for easier access to the cables. See Section 6.4.1 "Removing the Fan Assembly" on page 6-16.

Diskette drive power cable

Cable routing clip

J10 connector
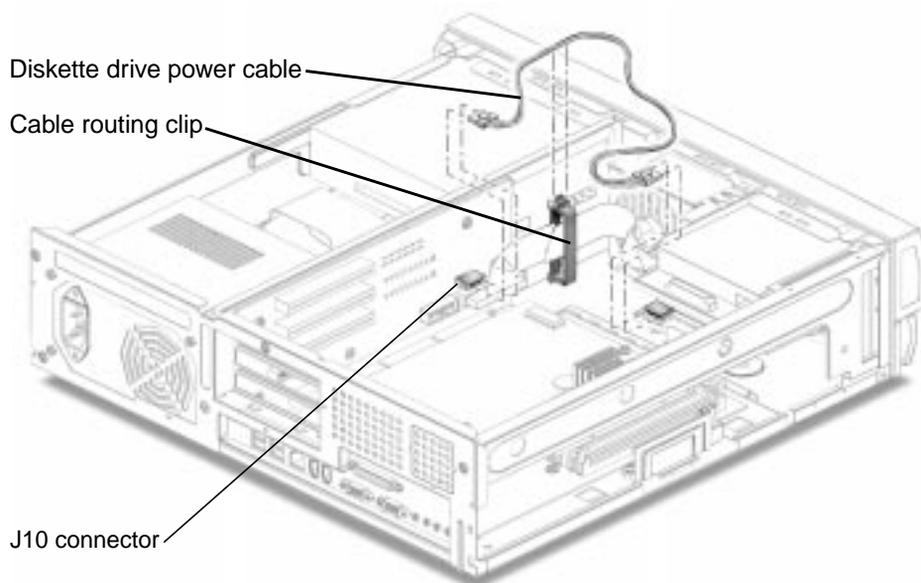
FIGURE 6-3   Removing and Replacing the Diskette Drive Power Cable Assembly

6.2.4 Replacing the Diskette Drive Power Cable Assembly

1. **Position the diskette drive power cable assembly into the chassis (**FIGURE 6-3**).**

2. **Close the two cable routing clips (**FIGURE 6-3**).**

3. **Connect the diskette drive power cable assembly connectors to the following:**
   - Riser board (J10)
   - Diskette drive

Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

---

4. **If you moved the fan assembly, replace it. See Section 6.4.2 "Replacing the Fan Assembly" on page 6-17.**

5. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

6.2.5 Removing the Primary IDE Cable Assembly

The primary IDE cable assembly connects the primary hard drive and the CD-ROM or DVD-ROM drive to the system.

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

---

2. **Disconnect the primary IDE cable assembly connectors from the following (**FIGURE 6-4**):**
   - CD-ROM or DVD-ROM drive
   - Primary hard drive
   - Riser board (J504: also labeled IDE1)

3. **Remove the primary IDE cable assembly from the chassis.**
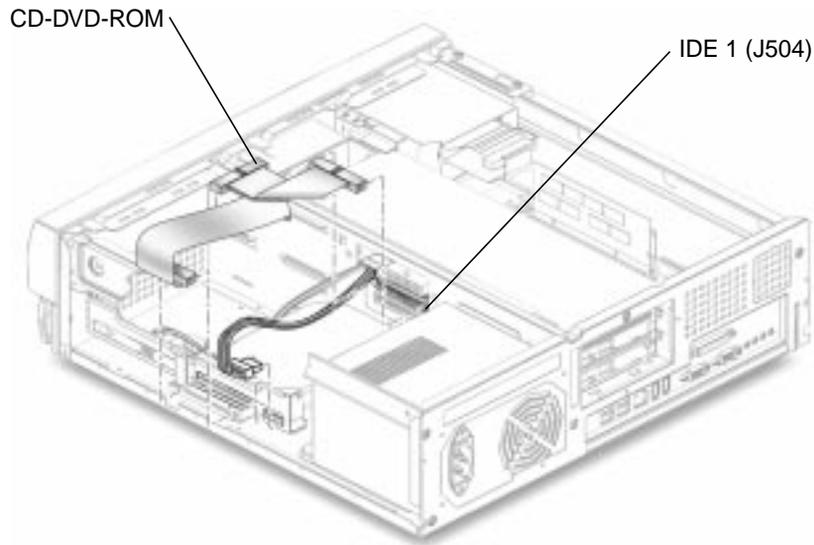
FIGURE 6-4   Removing and Replacing the Primary IDE Cable Assembly

6.2.6   Replacing the Primary IDE Cable Assembly

1. **Position the primary IDE cable assembly into the chassis (**FIGURE 6-4**).**

2. **Connect the primary IDE cable assembly connectors to the following:**
   - Primary hard drive
   - CD-ROM or DVD-ROM drive
   - Riser board (J504: also labeled IDE1)

Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

---

3. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

6.2.7   Removing the Secondary IDE Cable Assembly

The secondary IDE cable assembly connects the optional secondary hard drive to the system.

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

2. **Disconnect the secondary IDE cable assembly connector from the following (**FIGURE 6-5**):**
   - Secondary hard drive
   - Riser board (J503: also labeled IDE2)

3. **Remove the secondary IDE cable assembly from the chassis.**

IDE2 (J503)
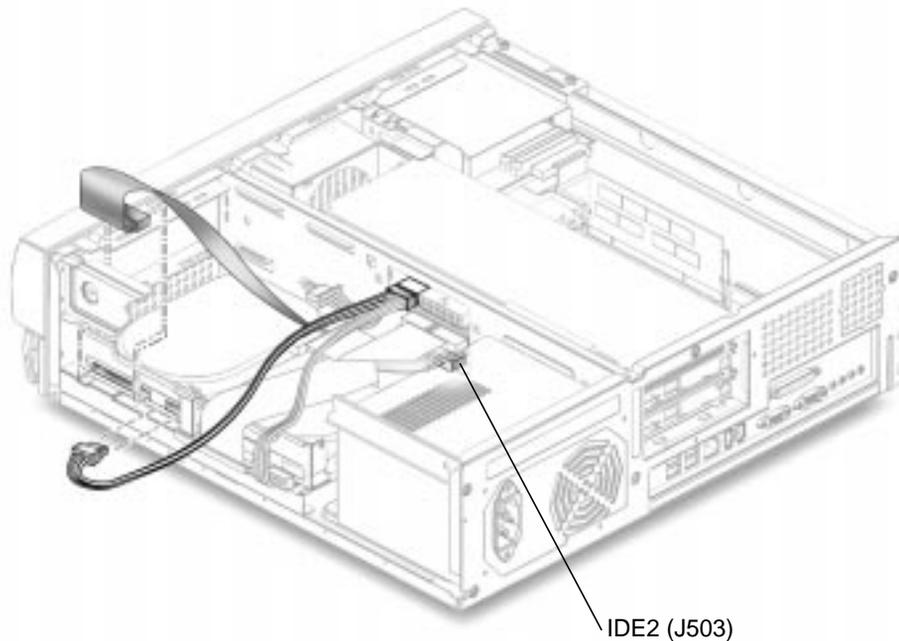
FIGURE 6-5   Removing and Replacing the Secondary IDE Cable Assembly

6.2.8   Replacing the Secondary IDE Cable Assembly

1. **Position the secondary IDE cable assembly into the chassis (**FIGURE 6-5**).**

2. **Connect the secondary IDE cable assembly connectors to the following:**
   - Secondary hard drive
   - Riser board (J503: also labeled IDE2)

Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

3. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

6.2.9   Removing the Smart Card Reader Cable Assembly

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

2. **Disconnect the smart card reader cable assembly connectors from the following** (FIGURE 6-6)**:**
   - Smart card reader
   - Riser board (J8)

3. **Open the cable routing clip.**

4. **Remove the smart card reader cable assembly from the chassis.**

Note – You can move the fan assembly for easier access to the cables. See Section 6.4.1 "Removing the Fan Assembly" on page 6-16.

Smart card reader cable

Cable routing clip

J8 connector
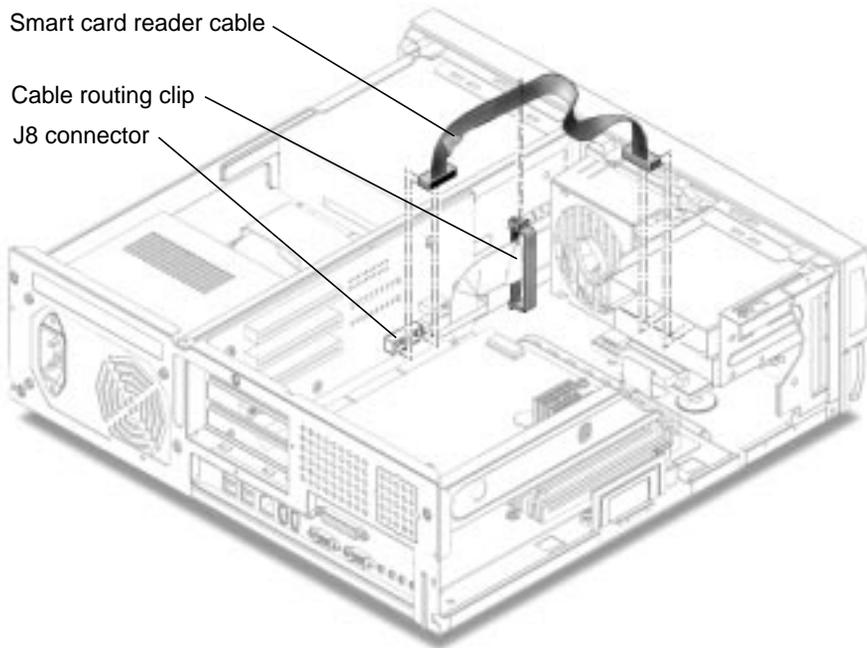
FIGURE 6-6 Removing and Replacing the Smart Card Reader Cable Assembly

6.2.10   Replacing the Smart Card Reader Cable Assembly

1. **Replace the smart card reader cable assembly as follows (**FIGURE 6-6**):**

   a. **Position the smart card reader cable assembly into the chassis.**

   b. **Close the cable routing clip.**

   c. **Connect the smart card reader cable assembly connectors to the following:**
   - Riser board (J8)
   - Smart card reader

   Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

2. **If you moved the fan assembly, replace it. See Section 6.4.2 "Replacing the Fan Assembly" on page 6-17.**

3. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

6.2.11   Removing the Power Switch/LED Assembly

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

⚠️

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

2. **Remove the front panel bezel by lifting the three tabs and gently lifting the bezel from the system (**FIGURE 6-7**).**
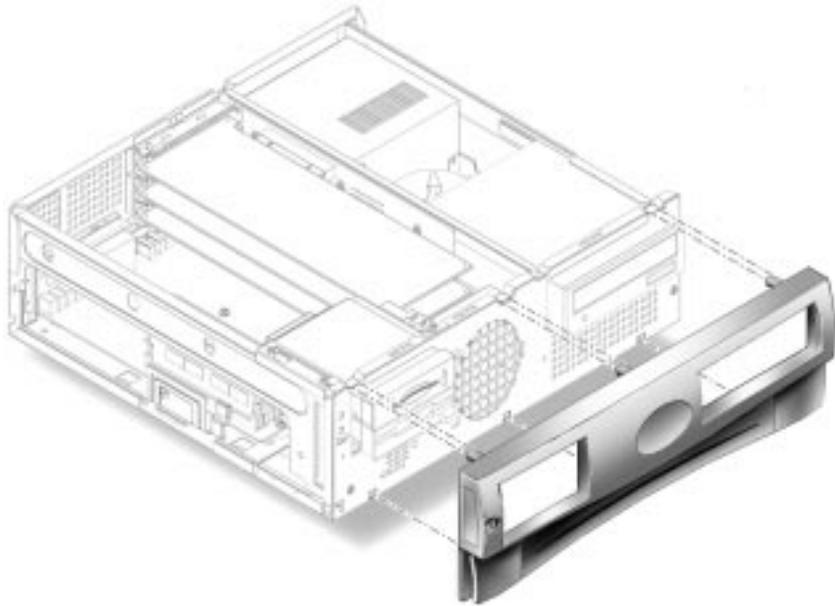
FIGURE 6-7   Removing the Front Bezel

3. **If any long PCI cards are installed, remove them.**

   See Section 8.4.1 "Removing a PCI Card" on page 8-12.

4. **Move the peripheral assembly aside to provide clearance:**

   a. **Open the cable routing clip below the peripheral assembly: this will release the tension from the smart card and diskette drive cables. You do not have to disconnect the cables.**

   b. **Using a No. 2 Phillips screwdriver, loosen (but do not remove) the three screws securing the peripheral assembly to the chassis (see** FIGURE 7-1 **on page 7-2).**

c. Slide the peripheral assembly back and lift it from the chassis. Do not remove any of the cables attached to the peripheral assembly.

d. Set the peripheral assembly on an antistatic mat.

5. Disconnect the power switch/LED cable from the riser board connector J2 (FIGURE 6-8**).**

J2 connector
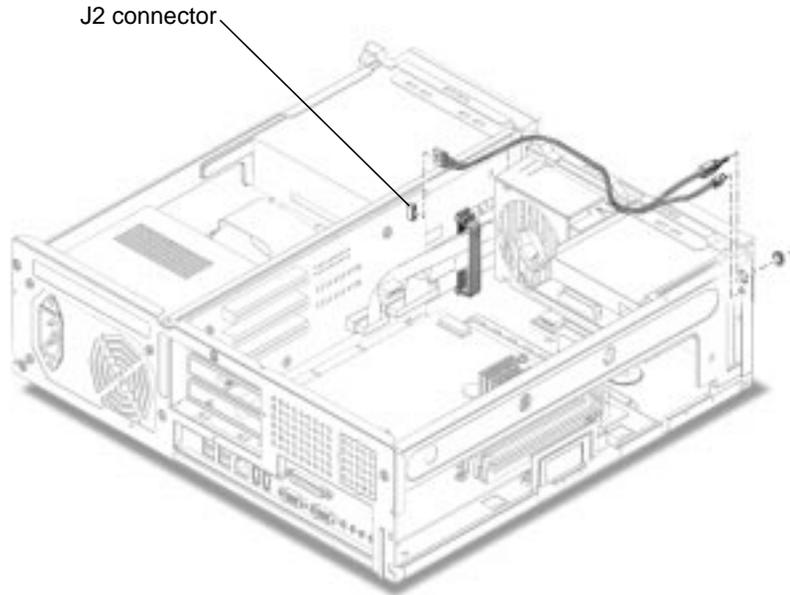
FIGURE 6-8   Removing and Replacing the Power Switch/LED Assembly

6. Open the two cable routing clips on the chassis.

Note – You can move the fan assembly for easier access to the cables. See Section 6.4.1 "Removing the Fan Assembly" on page 6-16.

7. Remove the nut and washer retaining the power switch to the chassis.

8. Press the LED out of the chassis from the front panel side.

9. Remove the power switch/LED assembly from the chassis.

6.2.12   Replacing the Power Switch/LED Assembly

1. Position the power switch/LED assembly into the chassis (FIGURE 6-8**).**

2. Attach the power switch to the chassis with the washer and nut.

3. Press the LED into the chassis from the rear of the front panel.

4. Route the cable along the chassis.

5. Close the cable routing clips.

6. Connect the cable connector to riser board connector J2.

7. If you moved the fan assembly, replace it. See Section 6.4.2 "Replacing the Fan Assembly" on page 6-17.

8. Replace the peripheral assembly:

   a. Place the peripheral assembly back in position, aligning the three holes in the peripheral assembly with the three securing screws on the chassis (see FIGURE 7-1 on page 7-2).

   b. Slide the peripheral assembly forward until it stops.

   c. Using a No. 2 Phillips screwdriver, tighten the three securing screws.

   d. Replace all of the cables into the cable retaining clip and secure the clip.

9. Replace the PCI cards.

   See Section 8.4.2 "Replacing a PCI Card" on page 8-13.

10. Replace the front bezel.

11. Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."

6.3 Speaker Assembly

To remove and replace the speaker assembly, proceed as follows.

6.3.1 Removing the Speaker Assembly

1. Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."

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

2. **Remove the front panel bezel by lifting the three tabs and gently lifting the bezel from the system (**FIGURE 6-7 **on page 6-11).**

3. **If necessary to provide clearance, remove any long PCI cards from the riser board connectors.**

   See Section 8.4.1 "Removing a PCI Card" on page 8-12.

4. **Move the peripheral assembly aside to provide clearance:**

   a. **Open the cable routing clip below the peripheral assembly: this will release the tension from the smart card and diskette drive cables. You do not have to disconnect the cables.**

   b. **Using a No. 2 Phillips screwdriver, loosen (but do not remove) the three screws securing the peripheral assembly to the chassis (see** FIGURE 7-1 **on page 7-2).**

   c. **Slide the peripheral assembly back and lift it from the chassis. Do not remove any of the cables attached to the peripheral assembly.**

   d. **Set the peripheral assembly on an antistatic mat.**

5. **Disconnect the speaker cable from connector J12 on the riser board.**

6. **Press the speaker retaining tab on the chassis front panel.**

7. **Remove the speaker assembly from the chassis.**

J12 connector
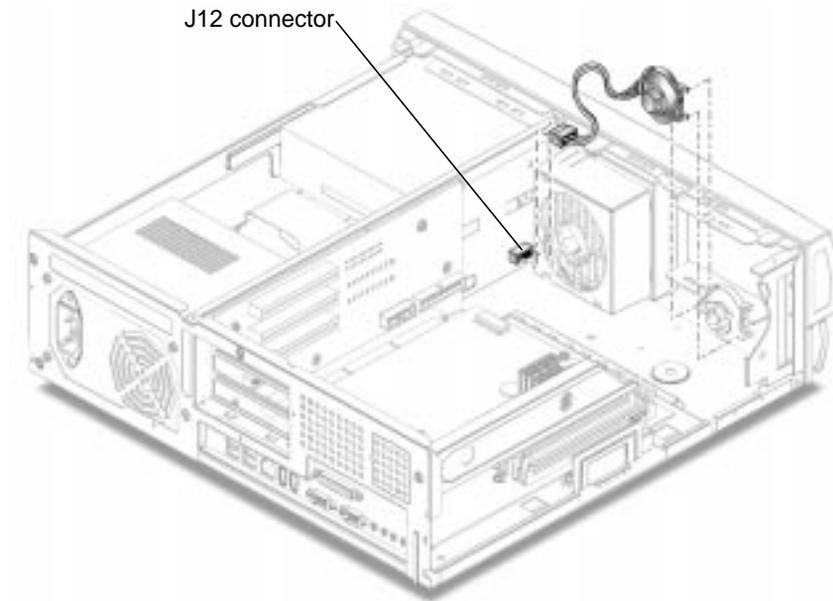
FIGURE 6-9 Removing and Replacing the Speaker Assembly

6.3.2 Replacing the Speaker Assembly

1. **Position the speaker assembly into the chassis (**FIGURE 6-9**).**

2. **Grasp the speaker and press the speaker into the three chassis speaker slots.**

3. **Route the speaker cable and any other loose cables through the cable retaining clip.**

4. **Connect the speaker cable to connector J12 on the riser board.**

5. **Replace the peripheral assembly:**

   a. **Place the peripheral assembly back in position, aligning the three holes in the peripheral assembly with the three securing screws on the chassis (see** FIGURE 7-1 **on page 7-2).**

   b. **Slide the peripheral assembly forward until it stops.**

   c. **Using a No. 2 Phillips screwdriver, tighten the three securing screws.**

   d. **Replace all of the cables into the cable retaining clip and secure the clip.**

6. **If you removed any long PCI cards, replace them.**

   See Section 8.4.2 "Replacing a PCI Card" on page 8-13.

7. Replace the front panel bezel.

8. Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."

6.4 Fan Assembly

To remove and replace the fan assembly, proceed as follows.

6.4.1 Removing the Fan Assembly

1. Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."

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

2. If necessary to provide clearance, remove any long PCI cards from the riser board connectors.

See Section 8.4.1 "Removing a PCI Card" on page 8-12.

3. Disconnect the fan assembly power cable connector from riser board connector J4 (FIGURE 6-10**).**

4. Open the cable retaining clip and remove the fan cable.

5. Press the fan assembly retaining tabs and remove the fan assembly from the chassis.

J4 connector
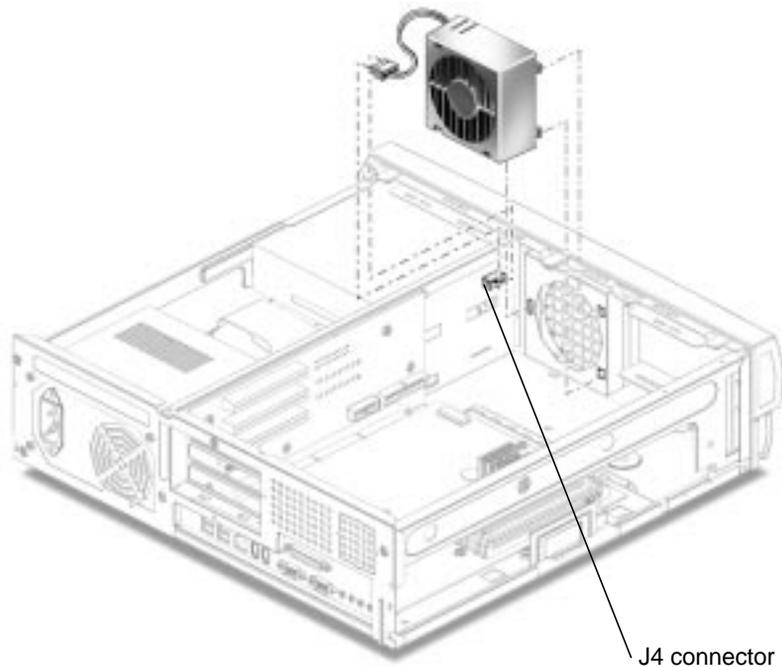
FIGURE 6-10 Removing and Replacing the Fan Assembly

6.4.2 Replacing the Fan Assembly

1. **Position the fan assembly, ensuring that the fan retaining tabs are aligned with the chassis retaining slots (**FIGURE 6-10**).**

2. **Press the fan assembly into the chassis slots.**

3. **Connect the fan assembly power cable connector to the riser board (J4).**

4. **Route the cables through the cable retaining clip and close the clip.**

5. **If you removed any long PCI cards, replace the PCI cards into the riser board.**

   See Section 8.4.2 "Replacing a PCI Card" on page 8-13.

6. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

Removing and Replacing Storage Devices

This chapter describes how to remove and replace the Sun Blade 100 storage devices.

This chapter contains the following topics:

- Section 7.1 "Diskette Drive" on page 7-1
- Section 7.2 "Smart Card Reader" on page 7-3
- Section 7.3 "Hard Drives" on page 7-5
- Section 7.4 "CD-ROM or DVD-ROM Drive" on page 7-10

7.1 Diskette Drive

To remove and replace the diskette drive, proceed as follows.

7.1.1 Removing the Diskette Drive

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

2. **If any long PCI cards are installed, remove them from the riser board connectors.**

   See Section 8.4.1 "Removing a PCI Card" on page 8-12.

3. **If required, remove a diskette from the drive.**

4. **Disconnect the following:**
   - Smart card reader power cable
   - Diskette drive power cable
   - Diskette drive data cable

5. **Using a No. 2 Phillips screwdriver, loosen (but do not remove) the three screws securing the peripheral assembly to the chassis (**FIGURE 7-1**).**

Note – Do not remove the three screws securing the peripheral assembly to the chassis.

FIGURE 7-1   Removing and Replacing the Diskette Drive

6. **Slide the peripheral assembly to the rear of the chassis and lift it from the chassis.**

7. **Using a No. 2 Phillips screwdriver, remove the three screws securing the diskette drive to the peripheral assembly.**

8. **Remove the diskette drive from the peripheral assembly.**

7.1.2   Replacing the Diskette Drive

1. **Position the diskette drive into the peripheral assembly (**FIGURE 7-1**).**

2. **Using a No. 2 Phillips screwdriver, replace the three screws securing the diskette drive to the peripheral assembly.**

3. **Position the peripheral assembly into the chassis, aligning the three holes on the assembly with the three screws on the chassis.**

4. **Slide the peripheral assembly forward until it stops.**

5. **Using a No. 2 Phillips screwdriver, tighten the three screws securing the peripheral assembly to the chassis.**

6. **Connect the following:**
   - Diskette drive data cable
   - Diskette drive power cable
   - Smart card reader power cable

Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

---

7. **If you removed any PCI cards, reinstall them on the riser board.**

   See Section 8.4.2 "Replacing a PCI Card" on page 8-13.

8. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

7.2 Smart Card Reader

To remove and replace the smart card reader, proceed as follows.

7.2.1 Removing the Smart Card Reader

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

---

2. **If any long PCI cards are installed, remove them from the riser board connectors.**

   See Section 8.4.1 "Removing a PCI Card" on page 8-12.

3. **If there is a smart card in the reader, remove the smart card.**

4. **Disconnect the following:**
   - Smart card reader cable
   - Diskette drive power cable
   - Diskette drive data cable

5. **Using a No. 2 Phillips screwdriver, loosen (but do not remove) the three screws securing the peripheral assembly to the chassis (**FIGURE 7-1**).**

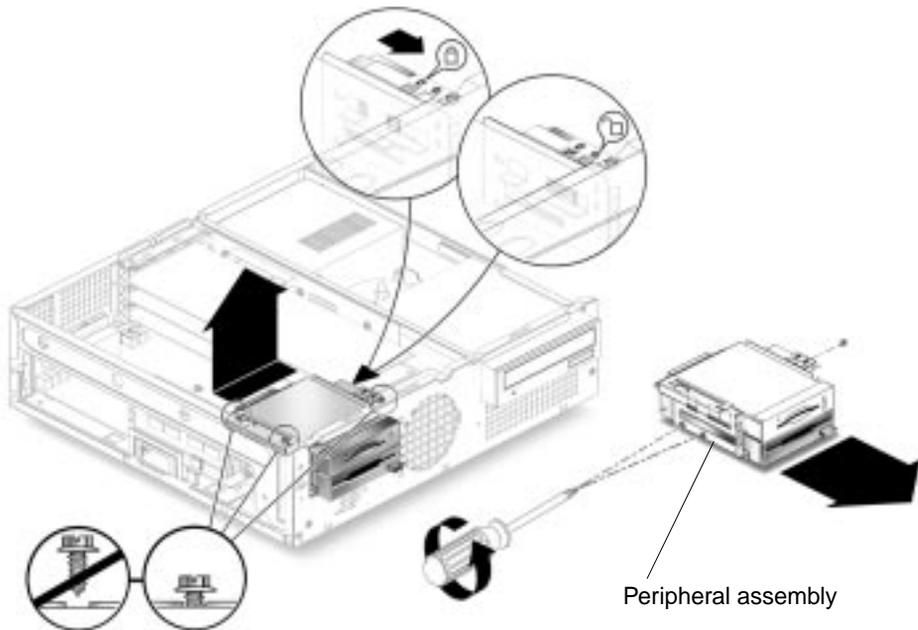**Note –** Do not remove the three screws securing the peripheral assembly to the chassis.

---

6. **Slide the peripheral assembly to the rear of the chassis and lift it from the chassis.**

7. **Using a No. 2 Phillips screwdriver, remove the three screws securing the smart card reader to the peripheral assembly (**FIGURE 7-2**).**
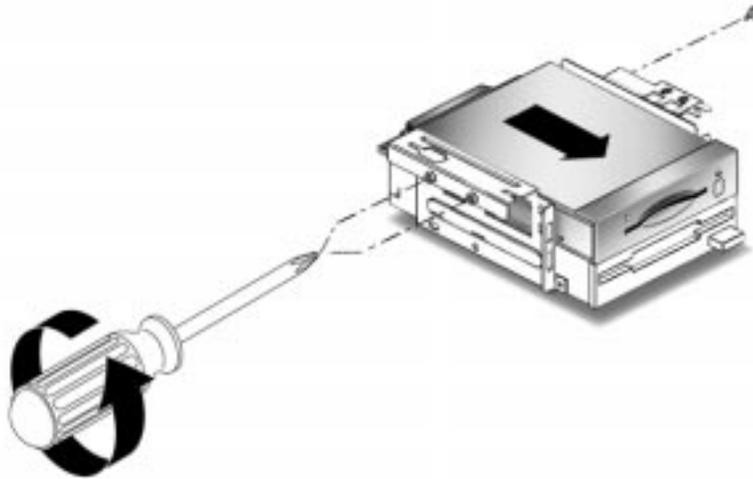
FIGURE 7-2   Removing and Replacing the Smart Card Reader

8. **Remove the smart card reader from the peripheral assembly.**

7.2.2   Replacing the Smart Card Reader

1. **Slide the smart card reader into the peripheral assembly.**

2. **Using a No. 2 Phillips screwdriver, replace the three screws securing the smart card reader to the peripheral assembly (**FIGURE 7-2**).**

3. **Position the peripheral assembly into the chassis, aligning the three holes on the assembly with the three screws on the chassis (**FIGURE 7-1**).**

4. **Slide the assembly forward until it stops.**

5. **Using a No. 2 Phillips screwdriver, tighten the three screws securing the peripheral assembly to the chassis.**

6. **Connect the following:**
   - Diskette drive data cable
   - Diskette drive power cable
   - Smart card reader cable

Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

---

7. **If you removed any PCI cards, reinstall them on the riser board.**

   See Section 8.4.2 "Replacing a PCI Card" on page 8-13.

8. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

7.3   Hard Drives

To remove and replace a primary (master) hard drive, proceed as follows.

7.3.1   Removing a Primary Hard Drive

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

---

2. **Lift the spring-loaded latch upward to release the hard drive tray from the chassis (**FIGURE 7-3**).**

3. **Pull the hard drive tray ejection lever away from the chassis.**

4. **Disconnect the hard drive IDE cable and the power cable connectors from both hard drives (if two drives are installed). Move the cables out of the way (**FIGURE 7-3**).**

5. **Slide the hard drive tray out of the chassis.**

6. **Turn the hard drive tray over and place it on an antistatic mat.**

7. **Using a No. 2 Phillips screwdriver, remove the four screws securing the hard drive to the hard drive tray.**

8. **Lift the hard drive tray from the hard drive.**

CD/DVD-ROM drive
IDE cable connector

IDE 1

1

2

3

4
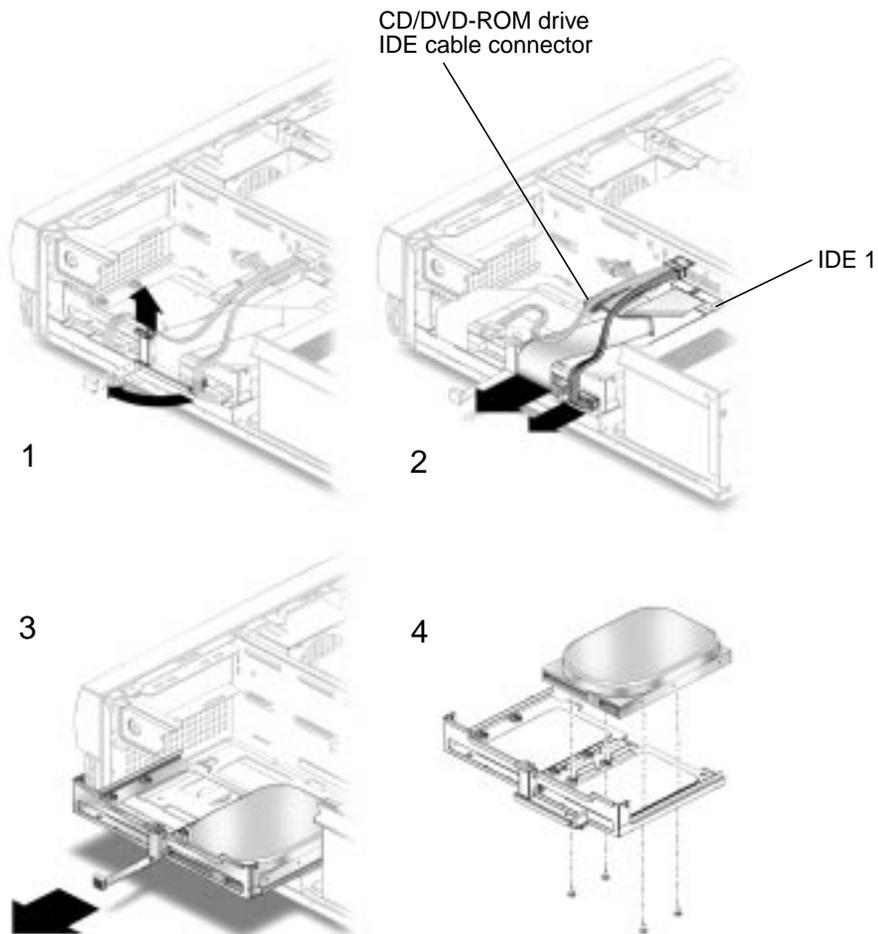
FIGURE 7-3   Removing and Replacing a Primary Hard Drive

7.3.2 Replacing a Primary Hard Drive

Note – Read the hard drive product guide for information about jumpers, switch settings, or other installation tasks.

Note – Before you replace any hard drive, verify that the hard drive mode-select jumper is set to "CS," "Enable Cable Select," or "Cable Select."

1. **Position the hard drive into the hard drive tray (**FIGURE 7-3**).**

2. **Turn the tray upside down on an antistatic mat.**

3. **Using a No. 2 Phillips screwdriver, replace the four screws securing the hard drive to the hard drive tray.**

4. **Position the hard drive tray into the chassis.**

5. **While ensuring that the cables are not damaged, slide the hard drive tray into the chassis until the spring-loaded latch clicks into place.**

6. **Connect the hard drive IDE cable connector labeled Primary HDD to the primary hard drive.**

Note – Ensure that the cables are properly oriented by aligning the connector keys.

7. **Connect the power cable to the hard drive.**

8. **Ensure that the cables will not be damaged when you replace the system cover.**

9. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

7.3.3 Installing a Secondary Hard Drive

The optional secondary hard drive mounts next to the primary hard drive on the hard drive tray (FIGURE 7-4). The secondary IDE cable assembly is used with the secondary hard drive. Use the following procedure to install the optional secondary hard drive.

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

2. **Lift the spring-loaded latch upward to release the hard drive tray from the chassis (**FIGURE 7-4**).**

3. **Pull the hard drive tray ejection lever away from the chassis.**

4. **Disconnect the existing hard drive IDE and power cables from the primary hard drive.**

5. **Slide the hard drive tray out of the chassis.**

6. **Place the new secondary hard drive onto the hard drive tray.**

7. **Turn the tray upside down on an antistatic mat.**

Note – Before installing the hard drive into the system, verify that the drive's back-panel mode-select jumper is set to "CS," "Enable Cable Select," or "Cable Select."

8. **Using a No. 2 Phillips screwdriver, install the four screws that secure the drive to the hard drive tray.**

9. **While ensuring that the cables are not damaged, slide the hard drive tray into the chassis until the spring-loaded latch clicks into place.**

CD/DVD-ROM drive
IDE cable connector

1

2

IDE 1

3

4

Secondary hard drive
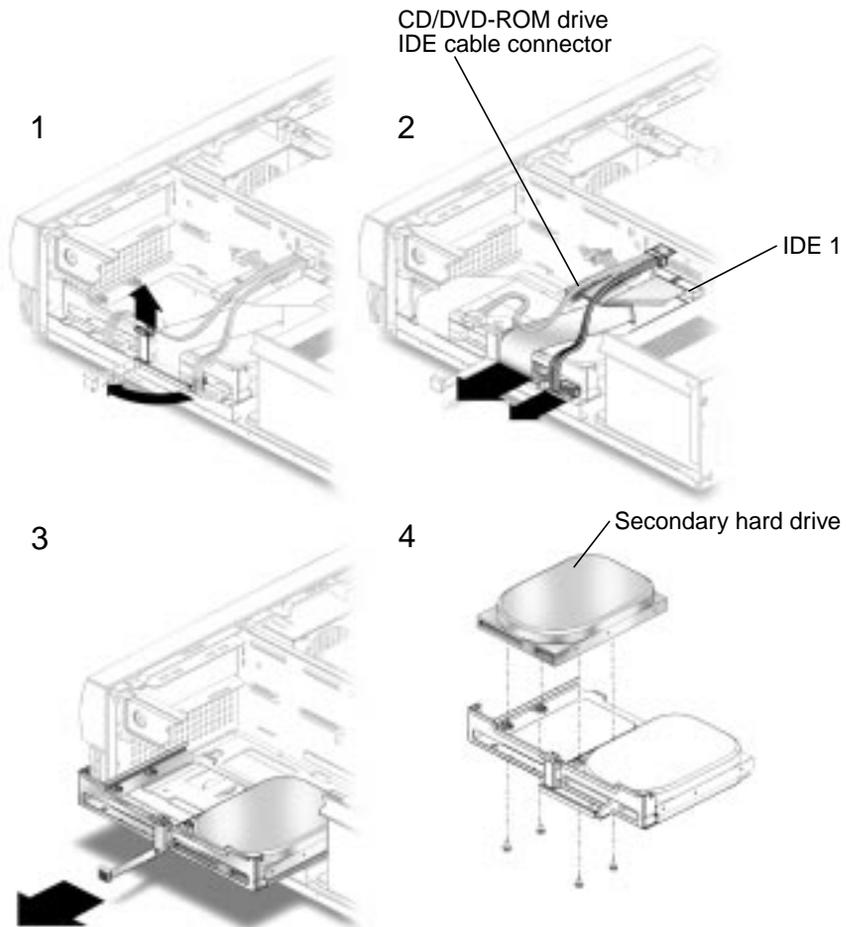
FIGURE 7-4   Installing a Secondary Hard Drive

10. **Verify that the secondary IDE cable connector is connected to riser board connector IDE2 (J503). See** FIGURE 7-5.

Note – Ensure that the cables are properly oriented by aligning the connector keys.

---

11. **Verify that the CD-ROM or DVD-ROM cable is connected to the primary (IDE1) cable connector labeled CD/DVD (**FIGURE 7-4**).**

12. **Connect the hard drive IDE cable connector labeled Primary HDD to the primary hard drive.**

13. **Connect the power cable to the secondary hard drive (**FIGURE 7-5**).**

14. **Connect the power cable to the primary hard drive.**

15. **Connect the secondary hard drive to the cable connector labeled Secondary HDD.**

    The following diagram shows the cabling for the secondary hard drive.

Secondary HDD   IDE2 (J503)

Power cable
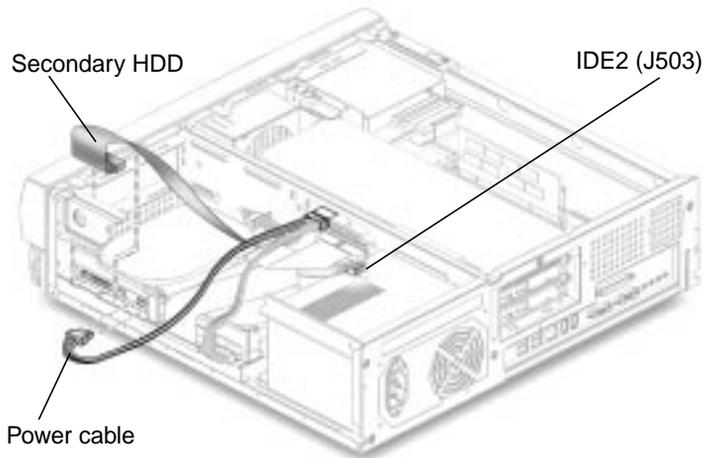
FIGURE 7-5   Secondary Hard Drive Cabling Configuration

16. **Ensure that the cables will not be damaged when you replace the system cover.**

17. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

7.4   CD-ROM or DVD-ROM Drive

To remove and replace a CD-ROM drive, proceed as follows.

7.4.1   Removing a CD-ROM or DVD-ROM Drive

1. **Remove any CD or DVD from the drive.**

2. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

3. **Remove the following from the back of the CD-ROM or DVD-ROM drive (**FIGURE 7-6**):**

   - CD-ROM or DVD-ROM drive IDE cable connector
   - Power cable connector

4. **Using a No. 2 Phillips screwdriver, remove the two screws securing the CD-ROM or DVD-ROM drive to the chassis.**

5. **Place your fingers on the back of the CD-ROM or DVD-ROM drive. Push the CD-ROM or DVD-ROM drive toward the chassis front and remove it.**

6. **Place the CD-ROM or DVD-ROM drive on an antistatic mat.**
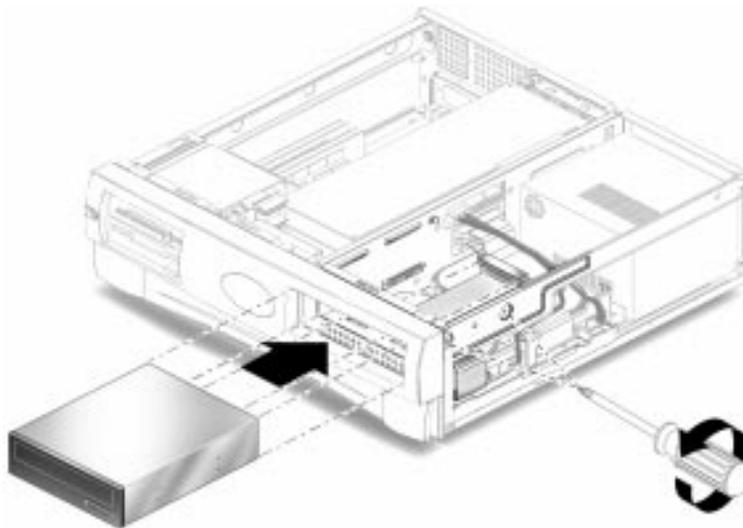
FIGURE 7-6   Removing and Replacing a CD-ROM or DVD-ROM Drive

7.4.2   Replacing a CD-ROM or DVD-ROM Drive

Note – Before you replace the CD-ROM or DVD-ROM drive, verify that the drive back panel mode-select jumper is set to "CS," "Enable Cable Select," or "Cable Select."

1. **Position the CD-ROM or DVD-ROM drive in the chassis (**FIGURE 7-6**).**

2. **Push the CD-ROM or DVD-ROM drive toward the chassis rear.**

3. **Connect the following to the rear of the CD-ROM or DVD-ROM drive:**
   - CD-ROM or DVD-ROM drive cable connector
   - Power cable connector

   Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

   ---

4. **Using a No. 2 Phillips screwdriver, replace the two screws securing the CD-ROM or DVD-ROM drive to the chassis.**

5. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

CHAPTER **8**

Removing and Replacing the Motherboard and Related Components

This chapter describes how to remove and replace the Sun Blade 100 motherboard and motherboard components.

This chapter contains the following topics:

8.1 CPU

To remove and replace the CPU, proceed as follows.

8.1.1 Removing the CPU

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

2. **If necessary, remove any installed PCI cards to provide space to work.**

   See Section 8.4.1 "Removing a PCI Card" on page 8-12.

⚠ **Caution –** The CPU will be damaged if you replace it incorrectly. Before you remove the CPU, look at the CPU and observe where the diagonally cut corner ("key") of the CPU fits onto the socket. Viewed from the front of the system chassis, the key is at the left rear corner of CPU (FIGURE 8-1).

3. **Press the tab on the front of the heatsink retaining clip (**FIGURE 8-1**).**

4. **Gently remove the retaining clip from the heatsink.**

5. **Lift the CPU locking lever to free the CPU from the socket.**

⚠ **Caution –** Be sure that you lift the locking lever all the way back until it is vertical. The CPU could be damaged if the lever is not fully released.

6. **Gently lift the heatsink and CPU from the socket: if the CPU does not lift-off easily, ensure that the locking lever is fully released.**

7. **Place the CPU on an antistatic mat with the heatsink facing up.**
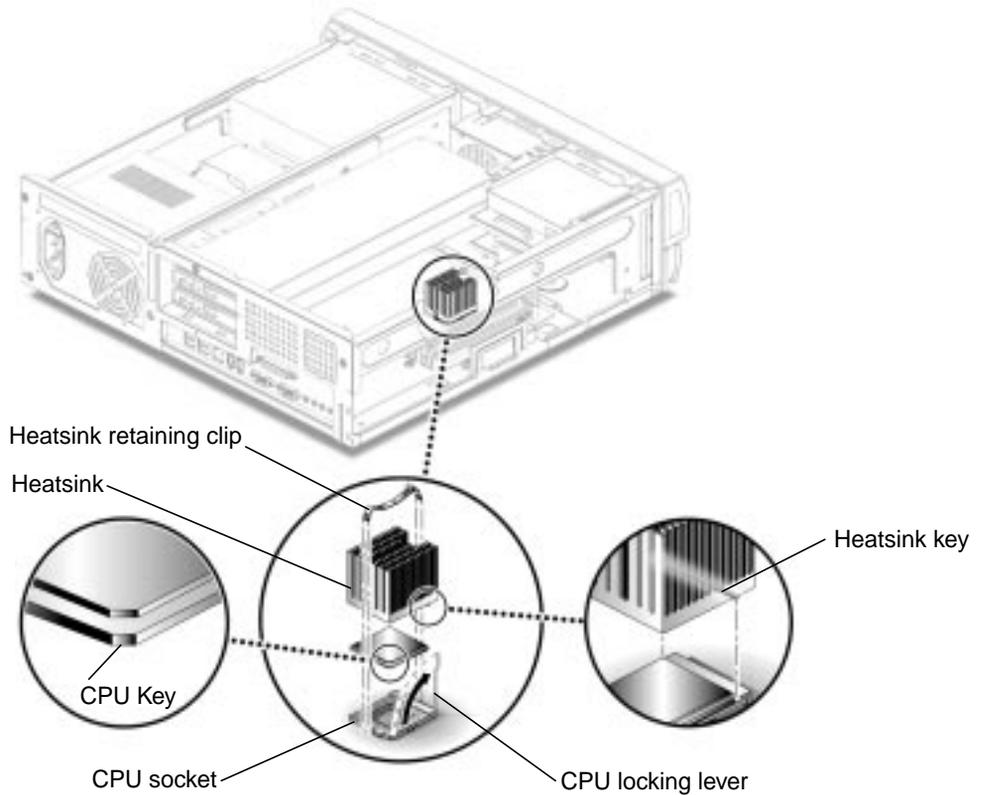
FIGURE 8-1 Removing and Replacing the CPU

8.1.2 Replacing the CPU

Note – If you are replacing an old CPU, the CPU will be permanently bonded to the heatsink. However, if you are installing a new CPU, the heatsink and CPU will be separate.

1. Position the CPU over the motherboard CPU socket (FIGURE 8-1**).**

Caution – The CPU will be damaged if you replace it incorrectly. Ensure that the CPU key is correctly positioned before you attempt to press the CPU into the socket. Viewed from the front of the system chassis, the key is at the left rear corner of CPU. The key is the diagonal corner cut on the CPU (FIGURE 8-1).

2. **Ensure that the CPU locking lever is in the full upright position as shown in** FIGURE 8-1.

3. **Gently place the CPU onto the socket and ensure that the pins are correctly aligned.**

4. **Push the CPU locking lever down to lock the CPU in place.**

5. **Place the heatsink over the CPU.**

⚠

Caution – The CPU could be damaged if you install the heatsink incorrectly. Ensure that the heatsink key is positioned correctly over the CPU. The key is on the bottom of the heatsink. The heatsink key should be installed closest to the front of the system chassis. See FIGURE 8-1.

6. **Position the heatsink retaining clip in the heatsink slot.**

7. **Attach the heatsink retaining clip:**

   a. **Alternately position the heatsink retaining clip openings over the plastic tabs on the CPU socket.**

   b. **Press down on each end of the heatsink retaining clip.**

   c. **Press each tab towards the heatsink to engage the plastic tabs on the CPU socket.**

Note – If you are re-installing the original CPU, or if you are installing an exact replacement for the original CPU, you do not have to complete Step 8. If you are installing a different type of CPU than the original, you may need to change the jumper settings as described in Step 8. Read the documentation that is provided with the new CPU to determine the correct jumper settings.

8. **Using needle-nose pliers, set the motherboard CPU mode detect jumper, JP3.**

Note – For diagnostics, you can always choose CPU Mode A. This mode will work with all CPU speeds and types. However, Mode A may be a lower speed than the CPU.

Note – A jumper switch is *closed* (sometimes referred to as shorted) with the plastic cap inserted over two pins of the jumper. A jumper is *open* with the plastic cap inserted over one or no pin(s) of the jumper. Motherboard jumpers are identified as JP. Jumper pins are located immediately adjacent to the designation number.

FIGURE 8-2 shows examples of closed and open jumpers. TABLE 8-1 shows the JP3 jumper configurations.
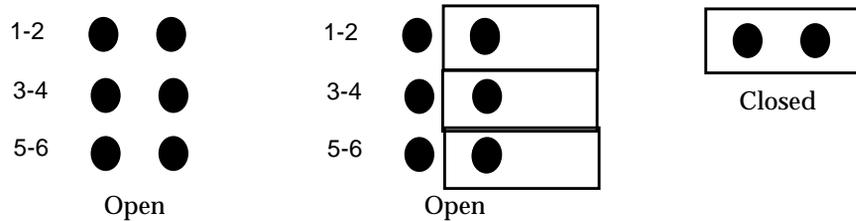
FIGURE 8-2   Example of Open and Closed Speed Setting Jumpers

TABLE 8-1   CPU Speed Detect Jumper, JP3 Settings

Jumper Setting	CPU Mode
All open	A (current CPU default)
1-2 closed	B
3-4 closed	C
1-2, 3-4 closed	D
5-6 closed	E
1-2, 5-6 closed	F
3-4, 5-6 closed	G
1-2, 3-4, 5-6 closed	H

9. **If you removed any PCI cards, replace them.**

    See Section 8.4.2 "Replacing a PCI Card" on page 8-13.

10. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

8.2 NVRAM/TOD

To remove and replace the NVRAM/TOD, proceed as follows.

8.2.1 Removing the NVRAM/TOD

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

2. **Remove any PCI cards installed in PCI slots 1 and 3.**

   See Section 8.4.1 "Removing a PCI Card" on page 8-12.

3. **Locate the NVRAM/TOD and carrier on the motherboard (**FIGURE 8-3**).**

⚠ **Caution –** Do not remove the NVRAM/TOD from the carrier.

4. **Grasp the NVRAM/TOD carrier at each end and pull it straight up, gently wiggling it as necessary.**

5. **Place the NVRAM/TOD and carrier on an antistatic mat.**
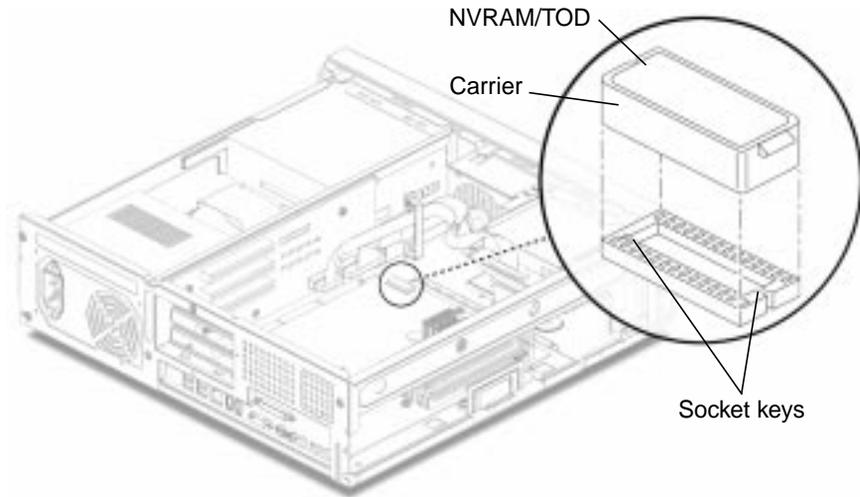
FIGURE 8-3   Removing and Replacing the NVRAM/TOD

8.2.2   Replacing the NVRAM/TOD

1. **Replace the NVRAM/TOD as follows (**FIGURE 8-3**):**

   a. **Position the NVRAM/TOD carrier on the motherboard.**

      See FIGURE C-7 on page C-23.

   b. **Carefully insert the NVRAM/TOD carrier into the motherboard socket.**

   Note – The carrier is keyed so that the NVRAM/TOD can be installed only one way.

   ---

   c. **Push the NVRAM/TOD carrier into the socket until it is properly seated.**

2. **Replace any PCI card(s) removed from slots 1 and 3.**

   See Section 8.4.2 "Replacing a PCI Card" on page 8-13.

3. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

8.3 DIMMs

⚠ **Caution –** For maximum performance, the DIMMs in this system have been specifically designed for it. Do not use DIMMs from a different system to upgrade or replace the DIMMs in this system. Verify with your Sun sales or service representative that the DIMMs you order have been Sun-certified for this system.

A failed DIMM can be identified by the address displayed in a memory failure error message, or in POST. To identify a failed DIMM, see TABLE 4-2 on page 4-5.

To remove and replace a DIMM, proceed as follows.

⚠ **Caution –** DIMMs consist of electronic components that are extremely sensitive to static electricity. Ordinary amounts of static electricity from clothing or work environment can destroy the DIMM.

8.3.1 Removing a DIMM

⚠ **Caution –** Handle DIMMs only by the edges. Do not touch the DIMM components or metal parts. Always wear an antistatic wrist strap when handling a DIMM.

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

Note – Always remove and replace DIMMs in order, beginning with the DIMM closest to the edge of the motherboard (FIGURE 8-4).
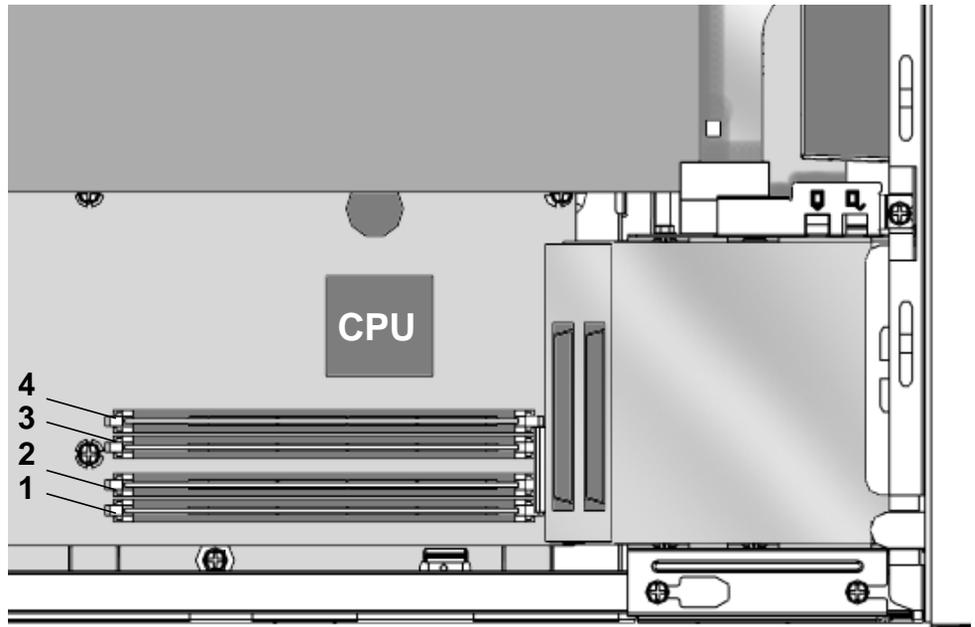
FIGURE 8-4 DIMM Installation Order

2. **Locate the DIMM to be removed.**

3. **Push the ejection levers at each end of the DIMM connector away from the DIMM (**FIGURE 8-5**).**

4. **Lift the DIMM straight up from the motherboard connector.**

5. **Place the DIMM on an antistatic mat.**

Ejection lever
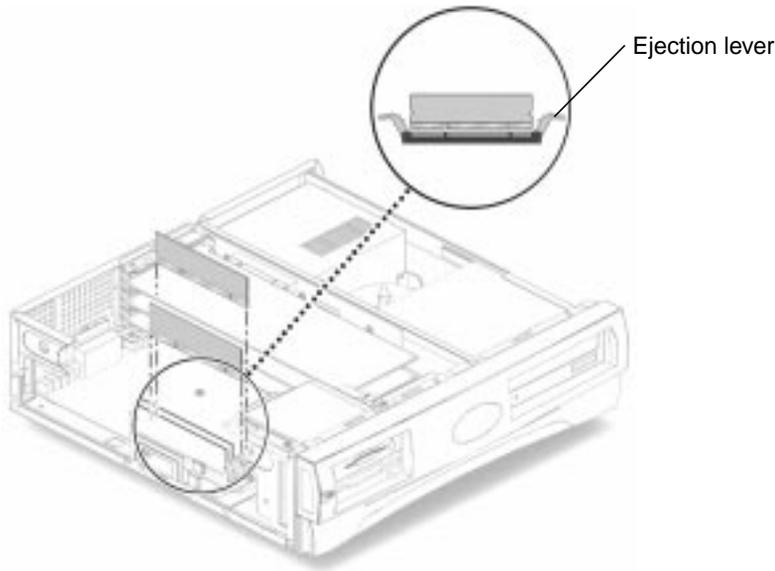
FIGURE 8-5 Removing and Replacing a DIMM

8.3.2   Replacing a DIMM

Caution – Do not remove any DIMM from the antistatic container until you are ready to install it on the motherboard. Handle DIMMs only by their edges. Do not touch DIMM components or metal parts. Always wear an antistatic wrist strap when handling DIMMs.

Note – Always remove and replace DIMMs in order, beginning with the DIMM closest to the edge of the motherboard (FIGURE 8-4).

1. **Remove the DIMM from the antistatic container.**

2. **Position the DIMM in the connector, ensuring that the notches on the bottom of the DIMM are aligned with the connector alignment keys (**FIGURE 8-5**).**

Note – DIMM alignment notches and connectors are keyed to ensure proper DIMM orientation.

	Caution – If the DIMM is not seated into its slot evenly, it can cause electrical short circuits that will damage the system. Ensure that all contacts engage at the same time by pressing evenly on both ends of the DIMM—do not rock the DIMM into place. When the DIMM is properly seated, you should hear a click.

3. **Press firmly on the top ends of the DIMM at the same time until the DIMM is properly seated.**

4. **Verify that the ejection levers are closed toward the DIMM.**

5. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

8.4 PCI Card

To remove and replace a PCI card, proceed as follows.

8.4.1 Removing a PCI Card

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

2. **Disconnect all external cables from the PCI card (**FIGURE 8-6**).**

3. **Using a No. 2 Phillips screwdriver, remove the screw securing the PCI card bracket retainer to the chassis.**

4. **Remove the PCI bracket retainer from the system.**

5. **If you are removing a long PCI card, slide back the retractable card guide to release the card.**

⚠ **Caution –** To avoid damaging the card's connector, do not apply force to only one end or one side of the card.

6. **Grasp the two corners of the PCI card and pull the card straight out from the riser board connector.**

7. **Place the PCI card on an antistatic mat.**

PCI card bracket retainer

Detent

Retractable card guide
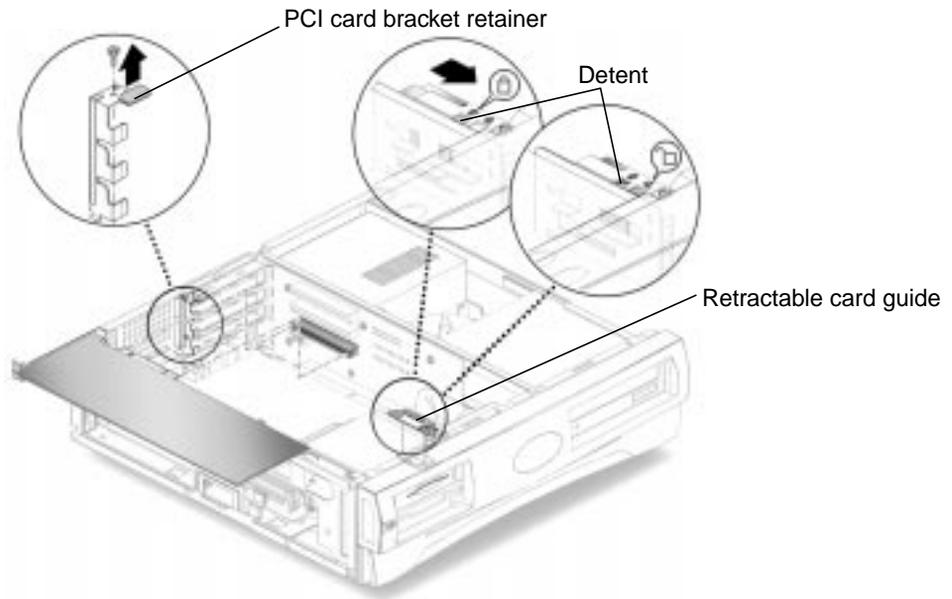
FIGURE 8-6   Removing and Replacing a PCI Card

8.4.2   Replacing a PCI Card

> **Note –** Read the PCI card product guide for information about jumper or switch settings, slot requirements, and required tools.

1. **Ensure that there is no back plate in the PCI slot that you intend to use.**

2. **Position the PCI card into the chassis (**FIGURE 8-6**).**

3. **Insert the PCI card connector so that it touches the associated riser board connector.**

4. **Guide the PCI card bracket tab into the back panel slot of the chassis: ensure that the card bracket tab fits under the retaining tab on the back of the chassis.**

5. **At the two corners of the card, push the card into the riser board connector until the card is fully seated.**

6. **If you are installing a long PCI card, depress the detent and slide the retractable card guide forward to secure the rear of the PCI card.**

7. **Position the PCI card bracket retainer onto the chassis.**

8. **Using a No. 2 Phillips screwdriver, replace the screw securing the PCI card bracket retainer to the system chassis.**

9. **Connect all external cables to the PCI card.**

10. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

8.5 Motherboard

To remove and replace a motherboard, proceed as follows.

⚠ **Caution –** Use an antistatic mat when working with the motherboard. An antistatic mat contains the cushioning needed to protect the underside components, to prevent motherboard flexing, and to provide antistatic protection.

8.5.1 Removing the Motherboard

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

2. **Pull the motherboard ejection lever away from the chassis to release the motherboard from the riser board connector (**FIGURE 8-7**).**

3. **Slide the motherboard out of the chassis.**

4. **Place the motherboard on an antistatic mat.**

5. **Remove the following from the motherboard:**

   ■ CPU module

   See Section 8.1.1 "Removing the CPU" on page 8-2.

   ■ NVRAM/TOD with carrier

   See Section 8.2.1 "Removing the NVRAM/TOD" on page 8-6.
   ■ DIMMs

   See Section 8.3.1 "Removing a DIMM" on page 8-8.

Note – The NVRAM/TOD contains the system host identification (ID) and Ethernet address. If the same ID and Ethernet address will be used on the replacement motherboard, remove the NVRAM/TOD carrier from the motherboard and install it on the new motherboard. See Section 8.2.2 "Replacing the NVRAM/TOD" on page 8-7.
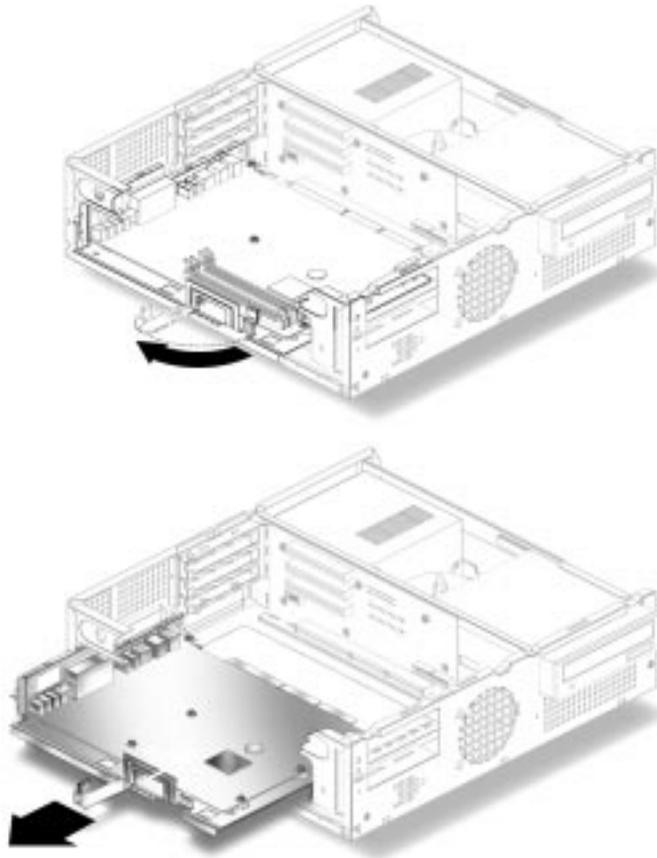

FIGURE 8-7   Removing and Replacing the Motherboard

8.5.2   Replacing the Motherboard

Replace the motherboard as follows (FIGURE 8-7).

⚠️ **Caution –** Handle the motherboard by the back panel or the edges only.

Note – If you will re-install the same motherboard you do not need to change the CPU speed setting jumpers or the Flash PROM jumpers.

1. **Using needle-nosed pliers, set the Flash PROM Jumpers, JP1 and JP2.**

   Flash PROM jumpers JP1 and JP2 are used for reprogramming specific code blocks and remote programming of the flash PROM. FIGURE 8-8 illustrates the default JP1/JP2 jumper settings for the flash PROM. TABLE 8-2 identifies the flash PROM jumper settings. The default shunt settings of jumpers JP1 and JP2 are 1-2. Placing the shunt on pins 2 and 3 enables the flash PROM for reprogramming.
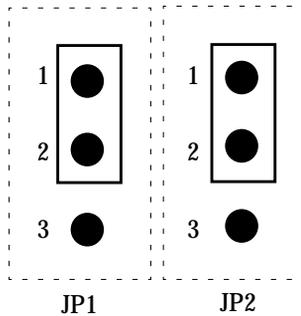
FIGURE 8-8   JP1/JP2 Jumper Settings for the Flash PROM

TABLE 8-2   Flash PROM Jumper Settings

Jumper	Pins 1-2 Select	Pins 2-3 Select	Default Jumper on Pins
JP1	To onboard PROM (default)	To ROMBO	1-2
JP2	Disable	Enable	1-2

2. **Replace the DIMMs.**

   See Section 8.3.2 "Replacing a DIMM" on page 8-10.

3. **Replace the NVRAM/TOD with carrier.**

   See Section 8.2.2 "Replacing the NVRAM/TOD" on page 8-7.

4. **If you removed the CPU or will install a new CPU, see Section 8.1.2 "Replacing the CPU" on page 8-3.**

5. **Carefully, slide the motherboard tray into the chassis.**

6. **Position the motherboard connector against the riser board connector and ensure that the connector keys are properly aligned.**

   a. **Push the motherboard ejection lever toward the chassis to lock the motherboard into the riser board connector.**

   b. **Verify that the motherboard is firmly locked into the riser board by gently pressing the motherboard tray into the riser board connector.**

7. **Replace the PCI card(s).**

   See Section 8.4.2 "Replacing a PCI Card" on page 8-13.

8. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

8.6 Riser Board

To remove and replace the riser board, proceed as follows.

8.6.1 Removing the Riser Board

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

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

2. **Remove the PCI card(s) from the riser board.**

   See Section 8.4.1 "Removing a PCI Card" on page 8-12.

3. **Remove all the cables connected to both sides of the riser board.**

4. **Remove the motherboard.**

   See Section 8.5.1 "Removing the Motherboard" on page 8-15.

5. **Using a No. 2 Phillips screwdriver, remove the three screws securing the riser board to the system chassis (**FIGURE 8-9**).**

6. **Remove the riser board from the chassis.**

Screws (3)
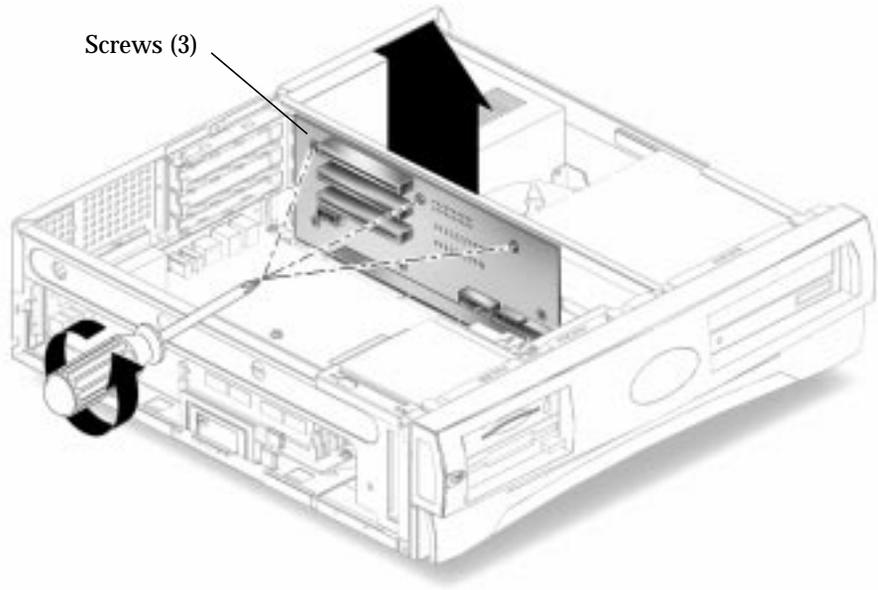
FIGURE 8-9   Removing and Replacing the Riser Board

8.6.2   Replacing the Riser Board

1. **Position the riser board into the chassis (**FIGURE 8-9**).**

   The riser board fits between the staggered tabs on the chassis.

2. **Using a No. 2 Phillips screwdriver, replace the three screws securing the riser board to the system chassis.**

3. **Replace the motherboard.**

   See Section 8.5.2 "Replacing the Motherboard" on page 8-17.

4. **Reconnect all the cables to both sides of the riser board.**

5. **Replace the PCI card(s) into the riser board.**

   See Section 8.4.2 "Replacing a PCI Card" on page 8-13.

6. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

Finishing Component Replacement

This chapter describes the activities you must complete after you finish removing and replacing internal system components. This chapter also explains how to externally control standby operation.

This chapter contains the following topics:

- Section 9.1 "Replacing the System Cover" on page 9-1
- Section 9.2 "Powering On the System" on page 9-2

9.1 Replacing the System Cover

1. **Remove the wrist strap from the system chassis and from your wrist.**

2. **Position the system cover onto the system chassis. Slide the system cover toward the front of the system until the cover tabs lock (**FIGURE 9-1**).**

3. **Using a No. 2 Phillips screwdriver, replace the two screws securing the system cover to the chassis.**
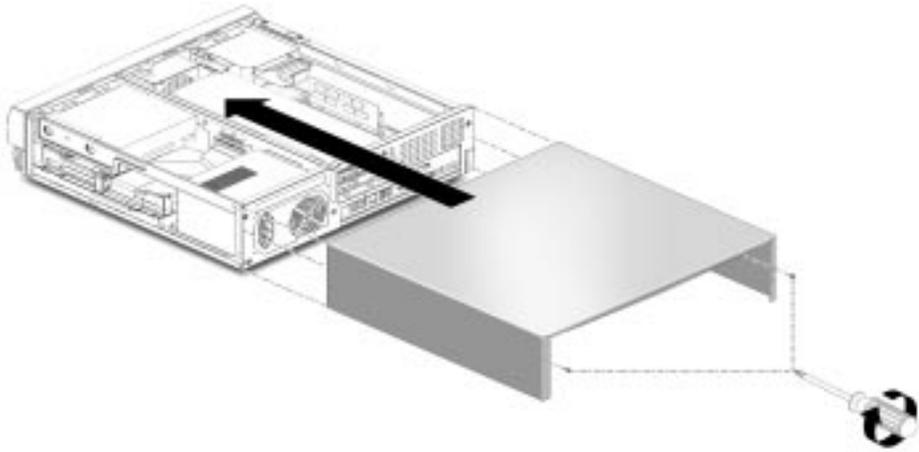
FIGURE 9-1   Replacing the System Cover

9.2   Powering On the System

To power on the system:

1. **Connect the system power cord to the system and to an AC power outlet.**

2. **Reconnect and turn on power to any peripherals (so that the system can recognize the peripherals when it is powered on).**

3. **Press the front panel power switch (**FIGURE 9-2**).**

Power switch

FIGURE 9-2   System Power Switch

4. **Verify the following:**

      a. The front panel power indicator LED is on.

      b. The system fans are spinning.

5. If the system does not power on, see the Troubleshooting section in the *Getting Started Guide.*

CHAPTER **10**

OpenBoot Emergency Procedures

The introduction of USB keyboards with Sun's newest desktop systems has made it necessary to change some of the OpenBoot emergency procedures, specifically, the Stop-N, Stop-D, and Stop-F commands that are available on systems that have standard (non-USB) keyboards and are not supported on systems that have USB keyboards. The following sections describe the OpenBoot emergency procedures for systems with standard keyboards and for newer systems with USB keyboards.

10.1 OpenBoot Emergency Procedures for Systems With Standard (Non-USB) Keyboards

When issuing any of these commands, hold down the keys immediately after turning on the power to your system, and keep them pressed for a few seconds until the keyboard LEDs flash.

Command	Description
Stop	Bypass POST. This command does not depend on security-mode. (Note: Some systems bypass POST as a default; in such cases, use Stop-D to start POST).
Stop-A	Abort.
Stop-D	Enter the diagnostic mode (set `diag-switch?` to `true`).
Stop-F	Enter Forth on TTYA instead of probing. Use `fexit` to continue with the initialization sequence. Useful if hardware is broken.
Stop-N	Reset NVRAM contents to default values.

10.2 OpenBoot Emergency Procedures for Systems With USB Keyboards

The following sections describe how to perform the functions of the Stop-commands on systems that have USB keyboards.

10.2.1 Stop-A Functionality

Stop-A (Abort) works the same as it does on systems with standard keyboards, except that it does not work during the first few seconds after the machine is reset.

10.2.2 Stop-N Equivalent Functionality

1. **After turning on the power to your system, wait until the front panel power-indicator LED begins to blink and you hear an audible beep.**

2. **Quickly press the front panel power switch twice (similar to the way you would double-click a mouse).**

   A screen similar to the following is displayed to indicate that you have successfully reset the NVRAM contents to the default values. If a screen similar to the following is not displayed, repeat steps 1 and 2.

```
Sun Blade 100 (UltraSPARC-IIe 500MHz), Keyboard Present
OpenBoot 4.0, 512 MB memory installed, Serial #135883889.
Ethernet address 8:0:20:cf:46:11, Host ID: 80cf4611.


Safe NVRAM mode, the following nvram configuration variables have
been overridden:
  'diag-switch?' is true
  'use-nvramrc?' is false
  'input-device', 'output-device' are defaulted
  'ttya-mode', 'ttyb-mode' are defaulted

These changes are temporary and the original values will be restored
after the next hardware or software reset.

ok
```

Some NVRAM configuration parameters are reset to their defaults. They include parameters that are more likely to cause problems, such as TTYA settings. These NVRAM settings are only reset to their defaults for this power cycle. If you do nothing other than resetting the system at this point, the values are not permanently changed. Only settings that you change manually at this point become permanent. All other customized NVRAM settings are retained.

Typing **set-defaults** discards any customized NVRAM values and permanently restores the default settings for all NVRAM configuration parameters.

Note – Once the power-indicator LED stops blinking and stays lit, pressing the power switch again will power off the system.

10.2.3   Stop-F Functionality

The Stop-F functionality is not available in systems with USB keyboards.

10.2.4   Stop-D Functionality

The Stop-D (diags) key sequence is not supported on systems with USB keyboards. However, the Stop-D functionality can be closely emulated by using the power button double-tap (see Section 10.2.2 "Stop-N Equivalent Functionality" on page 10-2), since this temporarily sets diag-switch? to true. If you want to turn on the diagnostic mode permanently, type:

```
ok setenv diag-switch? true
```

Product Specifications and Reference Information

This appendix provides product specifications for the Sun Blade 100 system.

- Section A.1 "Physical Specifications" on page A-1
- Section A.2 "Electrical Specifications" on page A-2
- Section A.5 "Modem Setup Specifications" on page A-5
- Section A.3 "Environmental Requirements" on page A-2
- Section A.4 "Reference Information" on page A-3

A.1   Physical Specifications

The following table lists the Sun Blade 100 physical specifications.

TABLE A-1   Sun Blade 100 Physical Specifications

Specification	U.S.A.	Metric
Height	4.65 in.	11.8 cm
Width	17.56 in.	44.60 cm
Depth	18.00 in.	45.7 cm
Weight (approximate)	25.22 lb	11.43 kg

A.2   Electrical Specifications

The following table lists the electrical specifications for the Sun Blade 100 system.

TABLE A-2   Sun Blade 100 System Electrical Specifications

Parameter	Value
AC input	47 to 63 Hz, 90 to 132 VAC or 180 to 264 VAC
DC output	200 watts (maximum)
Output 1	+3.3 VDC, 14.0A
Output 2	+5.0 VDC, 22.0A
Output 3	+12.0 VDC, 6.0A
Output 4	-5.0 VDC, 0.5A
Output 5	-12.0 VDC, 0.8A
Output 6 (Standby)	+5.0 VDC, 0.2A

A.3   Environmental Requirements

The following table lists environmental requirements for the Sun Blade 100 system.

TABLE A-3   Sun Blade 100 System Environmental Requirements

Environmental	Operating	Non-operating
Temperature	4 to 95 degrees F (-15 to 35 degrees C)	-4 to 140 degrees F (-20 to 60 degrees C)
Humidity	80% (max) noncondensing at 95 degrees F (35 degrees C)	95% noncondensing at 140 degrees F (60 degrees C)
Altitude	10,000 ft (3 km)	40,000 ft (12 km)

A.4　Reference Information

This section contains the following reference information:

- Section A.4.1 "IDE Cabling Configuration" on page A-3
- Section A.4.2 "Jumper Settings" on page A-3
- Section A.4.3 "CD Handling and Use" on page A-4

A.4.1　IDE Cabling Configuration

FIGURE A-1 shows the IDE cabling. The Sun Blade 100 system can support an optional secondary hard drive. An optional cable with two connectors is shipped with the secondary drive and is connected as shown in FIGURE A-1.
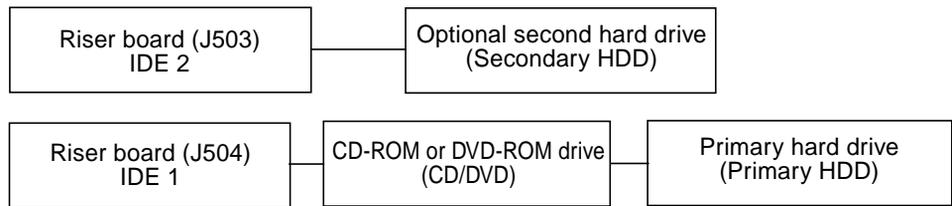


```
+----------------------+        +----------------------------+
| Riser board (J503)   |--------| Optional second hard drive |
|      IDE 2           |        |     (Secondary HDD)        |
+----------------------+        +----------------------------+

+----------------------+    +--------------------------+    +----------------------+
| Riser board (J504)   |----| CD-ROM or DVD-ROM drive  |----| Primary hard drive   |
|      IDE 1           |    |        (CD/DVD)          |    |    (Primary HDD)     |
+----------------------+    +--------------------------+    +----------------------+
```

FIGURE A-1　IDE Cabling Configuration

A.4.2　Jumper Settings

Before you install a CD-ROM or DVD-ROM drive or a hard drive in a Sun Blade 100 system, verify that the drive's back panel mode-select jumper is set as follows:

Set the CD-ROM drive jumper (located on the CD-ROM drive back panel) to either "CS," "Enable Cable Select," or "Cable Select."

A.4.3   CD Handling and Use

The following topics are discussed in this section.

- "Inserting a CD Into the CD-ROM or DVD-ROM Drive" on page A-4
- "Ejecting a CD From the CD-ROM or DVD-ROM Drive" on page A-4
- "Cleaning the CD-ROM or DVD-ROM Drive" on page A-4
- "Handling and Storing CDs" on page A-5

A.4.3.1   Inserting a CD Into the CD-ROM or DVD-ROM Drive

1. **After the system is powered on, push the eject button on the CD-ROM or DVD-ROM drive to open the drive tray.**

2. **Place the CD (label side up) into the drive tray.**

   Ensure that the CD is properly set into the recessed area of the drive tray.

A.4.3.2   Ejecting a CD From the CD-ROM or DVD-ROM Drive

To eject a CD, press the eject button on the front of the drive.

It may be necessary to unmount the CD before manually ejecting it. The CD can also be ejected by using software commands. Refer to the peripherals handbook that corresponds with your operating environment.

If the motorized eject mechanism does not operate, insert a thin, stiff wire (such as a paper clip) into the hole next to the eject button to manually eject the CD.

A.4.3.3   Cleaning the CD-ROM or DVD-ROM Drive

If the CD-ROM or DVD-ROM drive cannot read a CD, the cause might be a dirty CD. Follow these guidelines to clean a CD:

⚠ **Caution –** Do not use solvents such as benzine, paint thinner, antistatic aerosol spray, or abrasive cleaners to clean CDs.

- Use a professional CD cleaning kit.
- Use a soft, clean, lint-free, dry cloth.
- Clean the non-labeled side of the CD.
- Wipe the CD radially from the center to the outside.

A.4.3.4 Handling and Storing CDs

Follow these guidelines when handling and storing CDs:

- Handle CDs only by their edges; avoid touching CD surfaces.
- Do not write on CDs with permanent marking pens.
- Do not use CDs in high-dust environments.
- Keep CDs out of direct sunlight, away from extreme sources of heat or cold, and away from dust and moisture.
- Make sure CDs are at room temperature before using them.
- Store CDs in storage boxes so that they remain clean and free of dust.

A.5   Modem Setup Specifications

- Section A.5.1 "Setting Up the Modem" on page A-5
- Section A.5.2 "Changing the Serial Port Speed" on page A-6
- Section A.5.3 "Modem Recommendations" on page A-6

A.5.1   Setting Up the Modem

Any modem that is compatible with CCITT V.24 can be connected to the system serial port. Modems can be set up to function in one of three ways:

- Dial out only
- Dial in only
- Bidirectional

To set up a modem:

1. **Become superuser and type** admintool.

```
% su
Password:
# admintool
```

2. **In the Admintool window, select Serial Port Manager.**

3. **Choose Edit.**

The Serial Port Manager Modify Service window is displayed.

4. **Choose the Expert level of detail.**

5. **From the Use Template menu, choose one of the following:**

   - Modem - Dial-out only
   - Modem - Dial-in only
   - Modem - Bidirectional

6. **Choose Apply.**

7. **Set your modem auto-answer switch to one of the following:**

   - Off – Dial-out only
   - On – dial-in only
   - On – Bidirectional

A.5.2 Changing the Serial Port Speed

To change the speed of a serial port, edit the `/etc/remote` file as follows:

1. **Become superuser, and type** `cd /etc`.

```
% su
Password:
# cd /etc
```

2. **Type** `vi remote` **to open the** `remote` **file in a** `vi` **text editor.**

3. **Type** `tip` *speed* *device-name*.

   Typical speeds are 9600, 19200 to 38400 bps.
   The device name is the serial port name—for example,
   `/dev/tty[a,b]` or `/dev/term/[a,b]`.

4. **Press Esc and Shift-colon, then type** `wq` **to save your file change(s) and to exit from the** `vi` **text editor.**

A.5.3 Modem Recommendations

A.5.3.1 Cable

For a modem-to-host (system) connection, use an RS-423/RS-232 straight-through cable with DB-25 male connectors at both ends.

A.5.3.2 Modem Switch Settings (AT Commands)

Note – These settings are guidelines only. These guidelines might change depending on site requirements and the chosen modem.

- Enable transmit flow control (AT&H1) [suggested setting]
  (Required for sending binary/8-bit data.)
- Set link rate to fixed
  (Will not track modem data rate, AT&Bn; n = menu choice in modem manual.)
- Set display result codes (ATQ0)
- Set verbal result codes (ATV1)
- Set result code subset (ATXn; n = option choice)
- Save settings in NVRAM (AT&W)

For additional information about modem switch settings, see the documentation that came with the modem.

Signal Descriptions

This appendix describes the Sun Blade 100 motherboard connector signals and pin assignments.

- Section B.1 "Power Supply Connectors" on page B-1
- Section B.2 "Universal Serial Bus Connector" on page B-3
- Section B.3 "IEEE 1394 Connector" on page B-4
- Section B.4 "Twisted-Pair Ethernet Connector" on page B-5
- Section B.5 "Serial Port Connector" on page B-7
- Section B.6 "Parallel Port Connector" on page B-8
- Section B.7 "Audio Connectors" on page B-10
- Section B.8 "Video Connector" on page B-11

B.1   Power Supply Connectors

There is one power supply connector on the riser board. The Sun Blade 100 riser board uses a standard ATX style connector (J501).
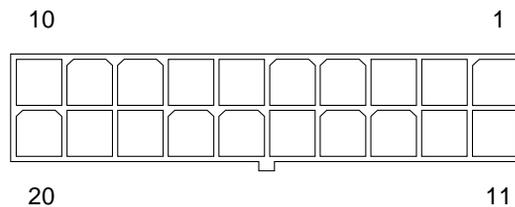
FIGURE B-1   Power Supply Connector J501 Pin Configuration

TABLE B-1   Power Supply Connector J501 Pin Assignments

Pin	Signal	Description
1	+3.3V	+3.3 VDC
2	+3.3V	+3.3 VDC
3	Gnd	Chassis ground
4	+5V	+5 VDC
5	Gnd	Chassis ground
6	+5V	+5 VDC
7	Gnd	Chassis ground
8	PWR_OK	Power okay
9	5VSB	
10	+12V	+12 VDC
11	+3.3V	+3.3 VDC
12	-12V	-12 VDC
13	Gnd	Chassis ground
14	PS_ON	Power supply on
15	Gnd	Chassis ground
16	Gnd	Chassis ground
17	Gnd	Chassis ground
18	-5V	-5 VDC
19	+5V	+5 VDC
20	+5V	+5 VDC

B.2   Universal Serial Bus Connector

Four universal serial bus (USB) connectors are located on the back panel. Two are used for the Sun USB Type-6 keyboard and the USB mouse.
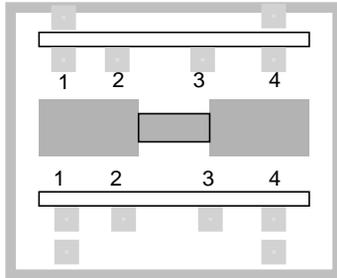
FIGURE B-2   USB Connector J17, J18 Pin Configuration

TABLE B-2   USB Connector J17, J18 Pin Assignments

Pin	Signal Name
A1	USB0_VCC
A2	CM_USB_D0_N
A3	CM_USB_D0_P
A4	Gnd
B1	USB1_VCC
B2	CM_USB_D1_N
B3	CM_USB_D1_P
B4	Gnd

B.3 IEEE 1394 Connector

Two IEEE 1394 connectors are located on the back panel.
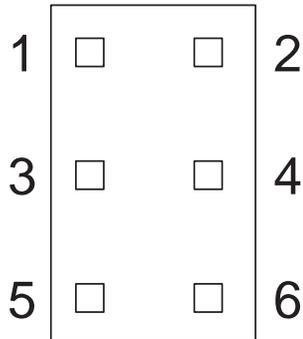
FIGURE B-3 IEEE 1394 Connector J20, J30 Pin Configuration

TABLE B-3 IEEE 1394 Connector J20, J30 Pin Assignments

Pin	Signal Name	Description
1	P1394_EX_BUSPOWER	Bus power
2	Gnd	Ground
3	CM_P1394_TPB1_OUT_N	
4	CM_P1394_TPB1_OUT_P	
5	CM_P1394_TPA1_OUT_N	
6	CM_P1394_TPA1_OUT_P	

B.4 Twisted-Pair Ethernet Connector

The twisted-pair Ethernet (TPE) connector is an RJ-45 type connector located on the back panel.

Caution – Connect only TPE-type cables into the TPE connector.
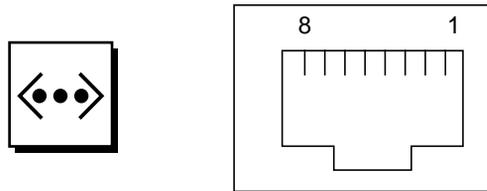
FIGURE B-4 TPE Connector J19 Pin Configuration

TABLE B-4 TPE Connector J19 Pin Assignments

Pin	Signal	Description
1	tpe0	Transmit data +
2	tpe1	Transmit data -
3	tpe2	Receive data +
4	Common mode termination	Termination
5	Common mode termination	Termination
6	tpe3	Receive data -
7	Common mode termination	Termination
8	Common mode termination	Termination

B.4.1　TPE Cable-Type Connectivity

The following types of TPE cables can be connected to the TPE connector:

- For 10BASE-T applications, unshielded twisted-pair (UTP) cable:
  - Category 3 (UTP-3, "voice grade")
  - Category 4 (UTP-4)
  - Category 5 (UTP-5, "data grade")
- For 100BASE-T applications, UTP cable, UTP-5, "data grade"

B.4.2　External UTP-5 Cable Lengths

TABLE B-5　TPE UTP-5 Cables

Cable Type	Application(s)	Maximum Length (Metric)	Maximum Length (US)
UTP-5, "data grade"	10BASE-T or 100BASE-T	100 meters	109 yards

B.5 Serial Port Connector

The serial port connector is a DB-9 type connector located on the back panel. The serial port connector provides asynchronous serial communications.
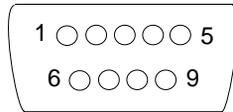
FIGURE B-5   Serial Port Connector J36 Pin Configuration

TABLE B-6   Serial Port Connector J36 Pin Assignments

Pin	Signal	Description
1	CD	Carrier detect
2	RD	Receive data
3	TD	Transmit data
4	DTR	Data terminal ready
5	GND	Ground
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Clear to send
9	RI	Ring indicator

B.6 Parallel Port Connector

The parallel port connector is a DB-25 type connector located on the back panel.
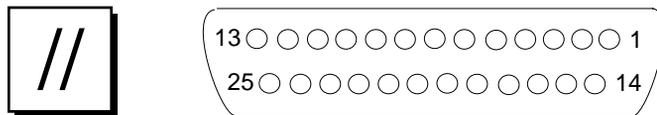
FIGURE B-6 Parallel Port Connector J9 Pin Configuration

TABLE B-7 Parallel Port Connector J9 Pin Assignments

Pin	Signal	Description
1	Data_Strobe_L	Set low during forward channel transfers to latch data into peripheral device. Set high during reverse channel transfers.
2 to 9	Data[0.7]	The main data bus for the parallel port. Data0 is the least significant bit (LSB). Not used during reverse channel transfers.
10	ACK_L	Driven low by the peripheral device to acknowledge data byte transfer from host during forward channel transfer. Qualifies data being transferred to host in reverse channel transfer.
11	BUSY	Driven high to indicate the peripheral device is not ready to receive data during forward channel transfer. Used to send Data3 and Data7 during reverse channel transfer.
12	PERROR	Driven high by peripheral device to indicate an error in the paper path during forward channel transfer. Used to send Data2 and Data6 during reverse channel transfer.
13	SELECT_L	Indicates the peripheral device is on-line during forward channel transfer. Used to send Data1 and Data5 during reverse channel transfer.
14	AFXN_L	Set low by the host to drive the peripheral into auto-line feed mode during forward channel transfer. During reverse channel transfer, set low to indicate host can receive peripheral device data and then set high to acknowledge receipt of peripheral data.
15	ERROR_L	Set low by the peripheral device to indicate an error during forward channel transfer. In reverse channel transfer, set low to indicate peripheral device has data ready to send to the host. Used to send Data0 and Data4.

TABLE B-7   Parallel Port Connector J9 Pin Assignments *(Continued)*

Pin	Signal	Description
16	INIT_L	Driven low by the host to reset peripheral.
17	PAR_IN_L	Set low by the host to select peripheral device for forward channel transfer. Set high to indicate bus direction is from peripheral to host.
18	Signal ground	Signal ground
19	Signal ground	Signal ground
20	Signal ground	Signal ground
21	Signal ground	Signal ground
22	Signal ground	Signal ground
23	Signal ground	Signal ground
24	Signal ground	Signal ground
25	Signal ground	Signal ground

B.7 Audio Connectors

The audio connectors are located on the back panel. These connectors use EIA standard 0.125-inch (3.5-mm) jacks.

Headphones   Line-out   Line-in   Microphone
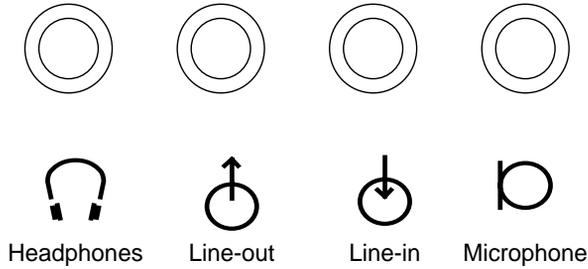
FIGURE B-7 Audio Connector Configuration

TABLE B-8 Audio Connector Line Assignment

Component	Headphones	Line-Out	Line-In	Microphone
Tip	Left channel	Left channel	Left channel	Left channel
Ring (center)	Right channel	Right channel	Right channel	Right channel
Shield	Ground	Ground	Ground	Ground

B.8 Video Connector

The video connector is a 15-pin mini D-sub connector located on the back panel.
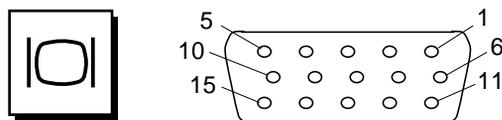
FIGURE B-8 Video Connector J37 Pin Configuration

TABLE B-9 Video Connector J37 Pin Assignments

Pin	Signal	Description
1	Red	Red video signal
2	Green	Green video signal
3	Blue	Blue video signal
4	Gnd	Ground
5	NC	Not connected
6	Gnd	Ground for red video signal
7	Gnd	Ground for green video signal
8	Gnd	Ground for green video signal
9	NC	Not connected
10	Gnd	Ground
11	Gnd	Ground
12	SDA	Bidirectional data
13	Horizontal sync	Horizontal synchronizing signal
14	Vertical sync	Vertical sync clock
15	SCL	Data clock

Functional Description

This appendix provides a functional description of the Sun Blade 100 system.

- Section C.1 "System" on page C-1
- Section C.2 "Motherboard Components" on page C-3
- Section C.3 "Reset Types" on page C-9
- Section C.4 "Clocking" on page C-10
- Section C.5 "Power Control" on page C-11
- Section C.6 "Memory Architecture" on page C-14
- Section C.7 "Address Mapping" on page C-18
- Section C.8 "Interrupts" on page C-20
- Section C.9 "Power" on page C-20
- Section C.10 "Motherboard" on page C-22
- Section C.11 "Riser Board" on page C-24
- Section C.12 "Jumper Descriptions" on page C-25
- Section C.13 "Enclosure" on page C-26

C.1   System

The Sun Blade 100 system is an UltraSPARC port architecture-based uniprocessor machine that uses the peripheral component interconnect (PCI) as the I/O bus. The CPU and ATI graphics ASIC communicate with each other using the UPA64S and PCI protocols.

The following figure shows a functional block diagram of the system.
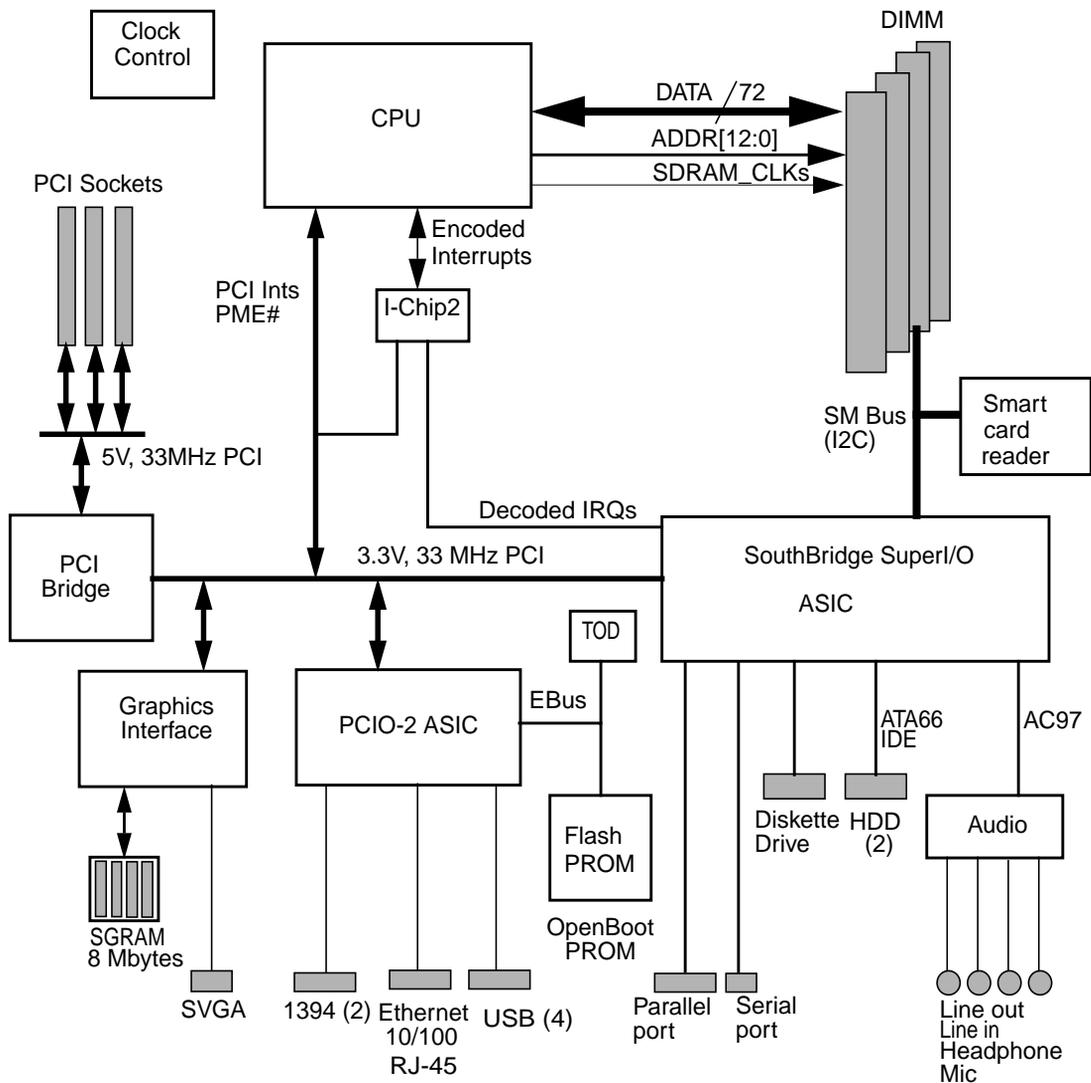
FIGURE C-1 Sun Blade 100 System Functional Block Diagram

C.2 Motherboard Components

This section describes all the Sun Blade 100 system components. Most of the devices are connected through the PCI interface that is supported by the CPU. The CPU has one 32-bit 33/66 MHz PCI bus. The PCI bus from the CPU is 3.3V. All the PCI devices on the motherboard are 3.3V devices. The 5-volt PCI cards are supported through plug-in slots on the secondary bus of the PCI-PCI bridge. The PCI bus runs at 33 Mhz.

This section discusses the following topics:

- Section C.2.1 "CPU" on page C-3
- Section C.2.2 "IChip2 ASIC" on page C-4
- Section C.2.3 "SouthBridge ASIC" on page C-4
- Section C.2.4 "PCI Graphics" on page C-6
- Section C.2.5 "PCIO-2 ASIC" on page C-6
- Section C.2.6 "PCI to PCI Bridge ASIC" on page C-7
- Section C.2.7 "Flash PROM" on page C-7
- Section C.2.8 "Smart Card Interface" on page C-8
- Section C.2.9 "NVRAM/TOD" on page C-9

C.2.1 CPU

The system CPU is the UltraSPARC-IIe processor. The CPU is a high-performance, highly-integrated superscalar processor implementing the SPARC-V9 64-bit RISC V9 architecture. A PCI bus controller (rev. 2.1 compatible) and a memory management unit that supports synchronous DRAM are integrated into the unit. The CPU integrates the L2 cache megacell, which contains a total of 256 Kbytes of L2 cache. The CPU uses a pipelined L2 cache which requires the L2 cache to sustain the bandwidth of two-cycle throughput.

The CPU characteristics and associated features include:

- SPARC-V9 architecture compliant
- Binary compatibility with all SPARC application code
- 16 Kbyte non-blocking data cache
- 16 Kbyte instruction cache with single cycle branch following
- Power management
- PCI interface
- Memory management unit (MMU)

C.2.2   IChip2 ASIC

IChip2 is a 128-pin thin quad flat package (TQFP) ASIC which functions as an interrupt concentrator. The interrupt concentrator is capable of processing 11 major groups of interrupts comprising a total of 48 different interrupt signals at the same time. The result is a 6-bit encoding, which designates the source of the interrupt. The IChip2 can prioritize the interrupts based on the round-robin scheduling scheme. It also supports three types of interrupts: level high, level low, and pulse low.

C.2.3   SouthBridge ASIC

The Sun Blade 100 system uses the SouthBridge ASIC which is a highly integrated system I/O chip set in a 328-pin, ball grid array (BGA) package. It has the following integrations:

- PCI to ISA bridge
- SuperI/O interface
- PCI IDE controller (UltraDMA 66)
- AC97-compliant audio interface
- SMBus (I2C) interface

C.2.3.1   SuperI/O Functions

Serial Port

The serial port is a 16450/16550-compatible UAR with 16-byte FIFOs. The serial port has a programmable baud rate generator and contains dedicated pins and a COM port for infrared transmissions.

Parallel Port

The parallel port supports ECP/EPP/PS/2/SPP and IEEE 1284 compliance.

Floppy Drive Controller (FDC)

The floppy drive controller (FDC) is software compatible with 82077 and supports 16-byte data FIFOs. The interface supports standard 1 Mbit/sec, 500 Kbit/sec, 300 Kbit/sec, 250 Kbit/sec data transfer rates.

C.2.3.2　PCI IDE Controller

There are two IDE channels within the IDE controller to support up to four devices. Each channel can operate at DMA mode 4 speed independently. The target devices are one or two UltraDMA/66 capable hard drives and a DVD-ROM or CD-ROM drive. The PCI IDE controller:

- Supports PCI bus mastering at 132 Mbyte/sec transfer rate
- Two separate IDE channels that support ultra 66 high performance ATA bus for 66 Mbytes transfer rate and concurrent operation
- Dedicated ATA bus pins and buffers for each channel

C.2.3.3　AC97 Compliant Audio Interface

The system audio consists of a single-chip CODEC, integrated amplifier, and supporting analog circuitry.

The CODEC is a single-chip stereo, analog-to-digital and digital-to-analog converter based on delta-sigma conversion technique. The microphone input specifications are designed for the SunMicrophone II or equivalent. The following figure shows a functional block diagram of the system audio circuit.
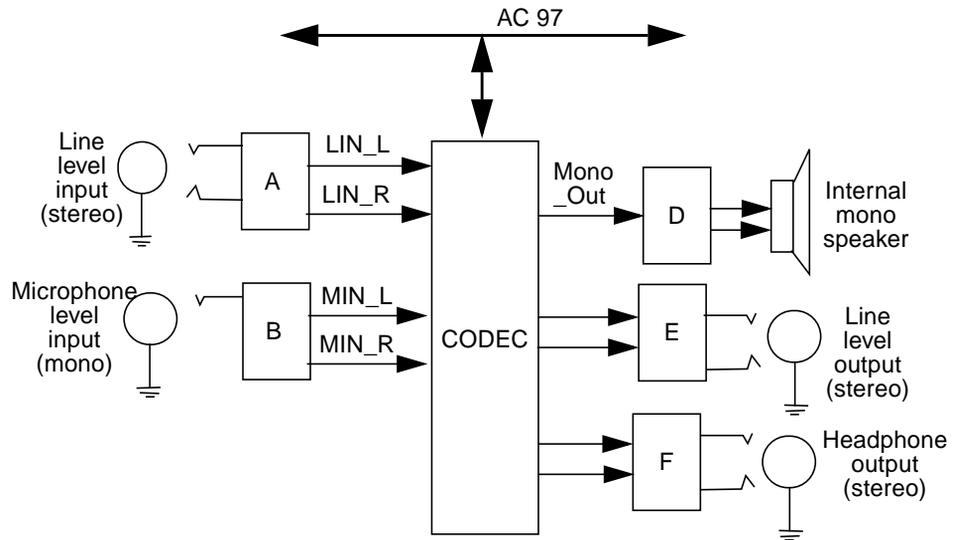
FIGURE C-2　Audio Circuit Functional Block Diagram

An internal speaker is connected to the motherboard through the riser card and used by SW to make "beep" sounds as well as audio sound output.

C.2.3.4 SMBus Interface

The SMBus host controller provides the communication channel with other serial devices through SMBus protocol. In the Sun Blade 100 system, this SMBus is connected to the four SDRAM DIMM modules, so that on system power-up OpenBoot PROM can access the information regarding each DIMM type and configuration stored inside the serial EEPROM on each DIMM module.

C.2.4 PCI Graphics

C.2.4.1 ATI Rage XL ASIC

ATI Rage XL is the graphics controller in a 256 BGA package. It provides PCI based graphics with a 64 bit memory path supporting SGRAM. The system uses two chips, based on a 32 Mbit SGRAM (512k x 32 x 2 banks).

C.2.4.2 Graphics Memory

The ATI Rage Pro memory interface supports a 64-bit memory path. The system has 8 Mbytes of SGRAM on the motherboard.

C.2.5 PCIO-2 ASIC

The PCIO-2 is a highly integrated in a 256-pin Ball Grid Array (BGA) package. It contains the following interfaces:
- EBus Channel Engine which can interface standard off-the-shelf ISA devices
- Full duplex Ethernet Engine with Media Access Control function providing a 10/100 Mbps network interface
- IEEE-1394 standard interface capable of 100, 200, 400 Mbit/sec transfers
- Open HCI compliant USB host controller capable of supporting 1.5, 12 Mbit/sec transfer rate

C.2.5.1 Ethernet

PCIO-2 includes a 10/100Mbps ethernet MAC. The Sun Blade 100 uses the Lucent LU3X31T PHY chip attached to the PCIO-2 MII interface.

C.2.5.2 USB

The PCIO-2 USB interface is an industry standard low-cost serial bus intended for slower peripheral devices such as keyboard and mouse. The protocol on the USB is of a master/slave polling nature with the following features:

- OpenHCI Host Controller
- 1.5 and 12 Mb/s transfer rate
- Four host ports

The Sun Blade 100 uses two USB ports for the keyboard and mouse.

See Appendix D for details.

C.2.5.3 IEEE 1394

The Sun Blade 100 provides a dual IEEE-1394 interface for faster asynchronous peripheral devices of transfer rate up to 400Mb/s.

C.2.6 PCI to PCI Bridge ASIC

This ASIC provides the PCI bus extension for plug-in PCI devices and is compliant with PCI Spec 2.1 and PCI Power Management Spec 1.0.

C.2.7 Flash PROM

The Sun Blade 100 motherboard contains 1 Mbyte of flash memory which is connected to the EBus of the PCIO-2 ASIC. The flash PROM is an 8 Mbit, 5.0 volt flash memory with faster than 120ns access time.

The 1 Mbyte of the PROM is divided into two halves, the OpenBoot PROM and the Power-On Self Test (POST). The OpenBoot PROM and POST image reside in a separate address space off of the EBus space. There is a ROMBO connector for

OpenBoot PROM and POST software development during initial bringup phase and two jumpers, one for enabling the use of connector ROMBO, the other for flash PROM write protect.
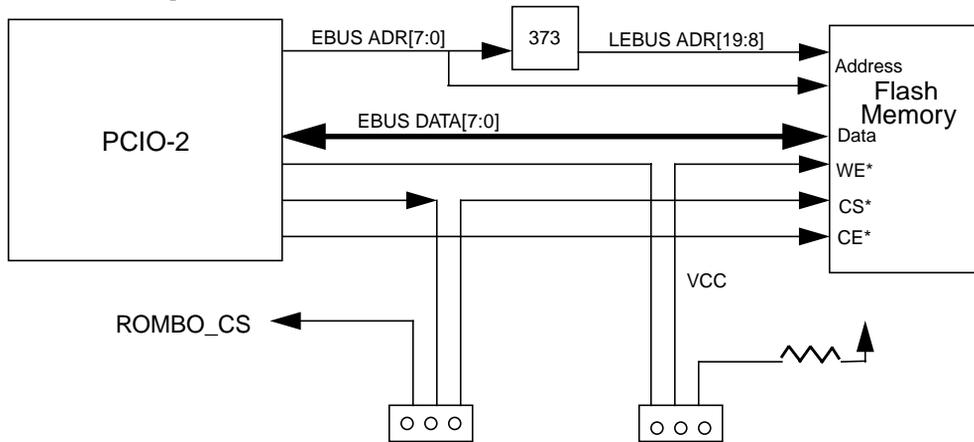
FIGURE C-3 PROM Interface

C.2.8 Smart Card Interface

Note – Although the smart card reader is physically configured in the Sun Blade 100 workstation at introduction, the driver support necessary to make the reader functional is not available in this Solaris release. The smart card reader driver support will be made available in a future Solaris release.

The smart card reader interface is ISO 7816 compliant. The smart card reader is mounted to the peripheral assembly at the front of the system chassis. A 10-pin ribbon cable connects the smart card PCB to the connector of the riser board. The smart card will connect to the on-board I2C (SMBus) interface on the SouthBridge ASIC.
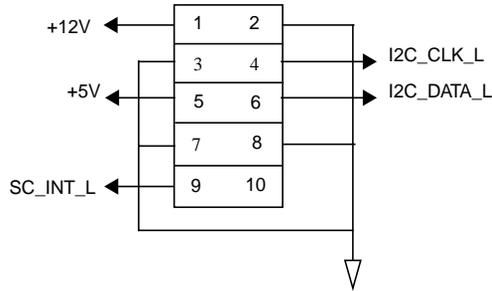
FIGURE C-4   Smart Card Interface Header

C.2.9   NVRAM/TOD

The system requires at least 8 Kbytes of non-volatile static RAM to store the variables for the operating system and a real time clock to do timekeeping. This device has both functions integrated plus the self-contained battery. It also has a programmable alarm interrupt output which can be used by the software to enable auto-shutdown (auto suspend/resume) as a power management choice.

C.3   Reset Types

The CPU has several types of resets. The resets affect different levels of the system devices and the processor. As an example, a Power-on Reset (POR) will reset all devices on the motherboard as well as any PCI card that is plugged in. A soft reset is under software control and is used to reset particular registers that reside in the devices on the motherboard.

C.4 Clocking

C.4.1 Clock Generation

There are four clock domains in Sun Blade 100. The domains are CPU, SDRAM, PCI, and miscellaneous clocks.

All the clocks in those four domains are generated from clock synthesizers or dedicated crystals on the motherboard except SDRAM clocks, which are generated by the CPU.

TABLE C-1 lists all the clocks present on the system. Each of the clocks listed is generated by the clock generator or a dedicated crystal.

TABLE C-1　　Clock Frequencies

Component	Clock	Frequency (MHz)	Source	Description
CPU	CLKA	125 ~ 350	Clock Generator	LVPECL
CPU	CLKB	125 ~ 350	Clock Generator	LVPECL
CPU	PCI_REF_CLK	66.66	Clock Generator	Core PCI clock
CPU	PCI_CLK	33.33	Clock Generator	PCI clock
SouthBridge	PCI_CLK	33.33	Clock Generator	PCI clock
SouthBridge	OSC32KI/	32.768KHz	Dedicated Crystal	Real Time Clock
SouthBridge	USB_CLK	48.00	Clock Generator	USB Clock
SouthBridge	OSC14M	14.3182	Clock Generator	Reference clock
Graphics Chip	Clk	29.499	Dedicated Crystal	Video clock
Graphics chip	PCICLK	33.33	Clock Generator	PCI Clock
PCIO-2	PCICLK	33.33	Clock Generator	PCI Clock
PCIO-2	USBCLK	48.00	Clock Generator	USB Clock
IChip2	PCICLK	33.33	Clock Generator	PCI clock
PCI Bridge	PCICLK	33.33	Clock Generator	PCI clock
AC97	XIN	24.576	Dedicated Crystal	CS4297 Clock
1394 PHY	XIN	24.576	Dedicated Crystal	FW802 Clock

C.4.2　OpenBoot PROM Jumpers: CPU Speed Selection

When the system is powered on, the CPU clock speed is determined by the default hardware settings (200MHz) of the MC12429. The OpenBoot PROM firmware will then need to know the exact CPU speed so that the OpenBoot PROM can reprogram the MC12429 accordingly through the OpenBoot PROM serial programming interface. The CPU speeds and jumper settings will be provided in the CPU release notes.

TABLE C-2　CPU Speed Jumpers Setting

Jumper Settings	CPU Speed (MHz)
All open	A (current CPU default)
1-2 closed	B
3-4 closed	C
1-2, 3-4 closed	D
5-6 closed	E
1-2, 5-6 closed	F
3-4, 5-6 closed	G
1-2, 3-4, 5-6 closed	H

TABLE C-3　Spare OpenBoot PROM configuration

EGPIO[12:11]	TBD
00	TBD
01	TBD
10	TBD
10	TBD

C.5　Power Control

C.5.1　Power Switch

The Sun Blade 100 system power on/off button is on the front panel.

When the system is off, the switch will turn the power supply on. When the system is already on, the button will send an interrupt to the system software. The software will then gracefully shut the system down (confirm shut down with user, sync hard drives, then turn off power supply). If the software is hung, the switch has a second mode. If the switch is held down for 4 seconds, the switch will turn the power supply off directly (independent of software).

C.5.1.1   Power-On

There are two conditions that will turn the system power on through the power on/off control circuitry on the Sun Blade 100 motherboard.
- The system was originally turned off and the front panel power on/off button is pushed.
- When the system was gracefully shutdown, and the alarm inside TOD M48T59 went off.

C.5.1.2   Power-Off

There are two conditions that will turn off the system power through the power on/off control circuitry on the Sun Blade 100 motherboard.
- The system shuts down through the Operating System: one general purpose output pin of the SouthBridge will be activated to shut down the power supply.
- When the system power was on, and front panel power on/off button is pressed for more than 4 seconds.

C.5.2   On-Board VRM

The CPU requires two different voltage sources, 3.3V with 5% tolerance and 1.7V with 3% tolerance. The total estimated power consumption is around 15 Watts at 500 MHz speed. The 3.3V source for the processor will be provided by the power supply and the 1.7V source of the processor will come from an on-board voltage regulator. The Raytheon RC5057 is the switcher control chip.

C.5.2.1   On-Board VRM requirements

The overall solution for the system on-board VRM should be based on the following requirements,
- Programmable output from 1.3V to 3.5V
- 5V input source
- At least 12.5 amps driving capability

- Tolerance needs to keep at +3% ~ -3% with dynamic current load of 1A to 12.5A
- 85% efficiency at typical load (7A), 82% at light load (1.3A)

The voltage sensor should be routed to the farthest CPU power pin input.

Note – Since the CPU has only four VID pins, VID4 on the regulator side needs to be tied to ground.

TABLE C-4   VRM Voltage ID Codes

VID4	VID3	VID2	VID1	VID0	VDC (output)
0	1	1	1	1	1.30
0	1	1	1	0	1.35
0	1	1	0	1	1.40
0	1	1	0	0	1.45
0	1	0	1	1	1.50
0	1	0	1	0	1.55
0	1	0	0	1	1.60
0	1	0	0	0	1.65
0	0	1	1	1	1.70
0	0	1	1	0	1.75
0	0	1	0	1	1.80
0	0	1	0	0	1.85
0	0	0	1	1	1.90
0	0	0	1	0	1.95
0	0	0	0	1	2.00
0	0	0	0	0	2.05

C.5.2.2   Power-On Beep

The M1535D SouthBridge provides a speaker output to the audio codec for output to an internal speaker. This speaker output has two different beep functions, one is write-beep function that will beep one to three beeps depending on the number of writes to the register and the other is a periodic four-beep function. This is all controlled by the software: the OpenBoot PROM must program the M1535D to send a "beep" sound at power on.

C.5.2.3 Power-On LED Control

The M1535D provides an LED output which is software controllable to turn on or turn off the LED or to have LED blink at the rate of 1Hz or 2Hz.

C.5.3 Optional Secondary Hard Drive

The Sun Blade 100 has a provision for a second hard drive on the hard drive tray. FIGURE C-5 shows the configuration.

```
┌─────────────────────────┐   ┌──────────────────────────┐
│   Riser board (J503)     │───│ Optional second hard drive│
│         IDE 2            │   │      (Secondary HDD)      │
└─────────────────────────┘   └──────────────────────────┘
```
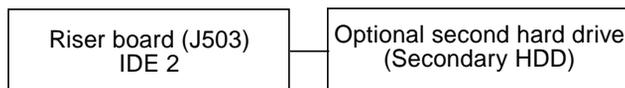
FIGURE C-5   Secondary Hard Drive Cabling Configuration

C.6 Memory Architecture

The Sun Blade 100 system uses a 168-pin, JEDEC standard, dual-in-line, 3.3V, unbuffered, synchronous DRAM module. The Memory Control Unit (MCU) is embedded within the CPU. All address, control signals and clocks are driven off of the processor and directly drive the memory sub-system on the motherboard.

The CPU L2 cache megacell reserves a 2 Gbyte region for cacheable main memory. The memory controller only supports 2 Gbytes of space. The system has four DIMM slots on the motherboard. Because the memory data bus width is equal to the DIMMs (64-bit data, plus 8-bit ECC) they can be installed one at a time and with mixed sizes. The interface between processor and memory sub-system on the motherboard consists of:

■ Two sets of multiplexed row-column address bank select address.
■ Two sets of bank address
■ Four RAS
■ Four CAS
■ Four WE
■ Eight clocks
■ Eight CS

FIGURE C-6 describes the system memory interface.
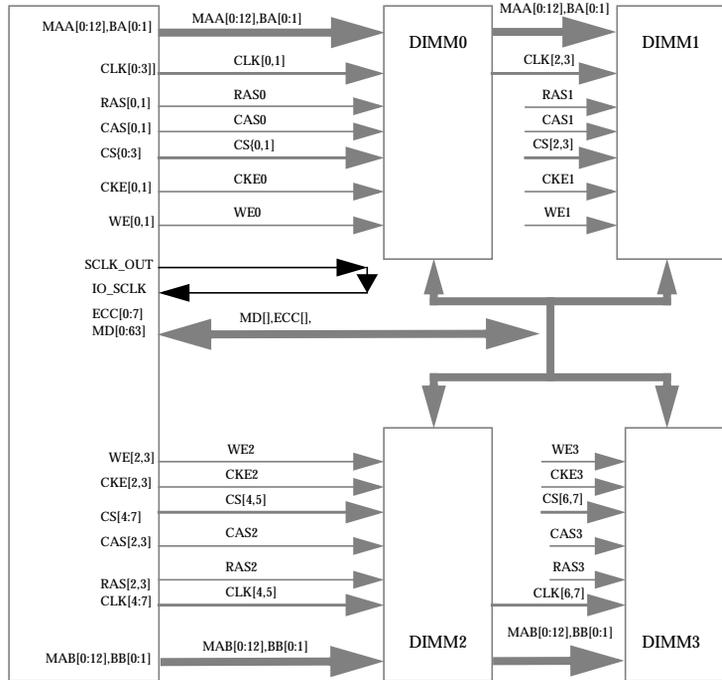
FIGURE C-6   Sun Blade 100 Memory Block Diagram

C.6.1 SDRAM Address Multiplexing

TABLE C-5 SDRAM Address Multiplexing

	16 Mbit				64 Mbit				128 Mbit				256 Mbit			
		x16	x8	x4		x16	x8	x4		x16	x8	x4		x16	x8	x4
	Row	Col	Col	Col	Row	Col	Col	Col	Row	Col	Col	Col	Row	Col	Col	Col
BA1						A24	A25	A26		A25	A26	A27		A26	A27	A28
BA0		A22	A23	A24		A23	A24	A25		A24	A25	A26		A25	A26	A27
MA12									A23				A23			
MA11					A22				A22				A22			A26
MA10	A21	0	0	0	A21	0	0	0	A21	0	0	0	A21	0	0	0
MA9	A20			A23	A20			A24	A20			A25	A20		A25	A25
MA8	A19		A22	A22	A19		A23	A23	A19		A24	A24	A19	A24	A24	A24
MA7	A18	A10	A10	A10	A18	A10	A10	A10	A18	A10	A10	A10	A18	A10	A10	A10
MA6	A17	A9	A9	A9	A17	A9	A9	A9	A17	A9	A9	A9	A17	A9	A9	A9
MA5	A16	A8	A8	A8	A16	A8	A8	A8	A16	A8	A8	A8	A16	A8	A8	A8
MA4	A15	A7	A7	A7	A15	A7	A7	A7	A15	A7	A7	A7	A15	A7	A7	A7
MA3	A14	A6	A6	A6	A14	A6	A6	A6	A14	A6	A6	A6	A14	A6	A6	A6
MA2	A13	A5	A5	A5	A13	A5	A5	A5	A13	A5	A5	A5	A13	A5	A5	A5
MA1	A12	A4	A4	A4	A12	A4	A4	A4	A12	A4	A4	A4	A12	A4	A4	A4
MA0	A11	A3	A3	A3	A11	A3	A3	A3	A11	A3	A3	A3	A11	A3	A3	A3

C.6.2   DIMMs

C.6.2.1   Speed and Timing

The Sun Blade 100 uses PC100 compliant SDRAM DIMMs. The motherboard can support up to 2 Gbytes with four DIMM slots. The CPU can address 2 Gbytes of memory. The current maximum main memory is 512 Mbyte per slot. The DIMMs comply with the following parameters:

TABLE C-6   DIMMs Performance Range

Frequency	Clocks	tRC	tRAS	tRP
100Mhz (10ns)	4	70ns	50ns	20ns

C.6.3   SDRAM DIMM Configuration

The table below shows the different SDRAM DIMMs that can be used in the Sun Blade 100 system.

TABLE C-7   SDRAM size options (DIMMs only)

DIMM Mem Size	Configuration	Technology	# of chips on DIMM	2-DIMM Mem Size	4-DIMM Mem Size
128 Mbyte	16Mx72	128 Mbit	9	256 Mbyte	512 Mbyte
256 Mbyte	2 * 16Mx72	128 Mbit	18	512 Mbyte	1 Gbyte
512 Mbyte	2 * 32Mx72	256 Mbit	18	1 Gbyte	2 Gbyte

SDRAM DIMM Modules implement the Serial Presence Detect (SPD) mechanism. A serial EEPROM on the DIMM module contains data programmed by the DIMM manufacturers that identifies the module type and various SDRAM organization and timing parameters. This information can be accessed through the System Management bus (I2C bus).

C.7 Address Mapping

This section provides the overview of address partitioning and software-visible registers and their respective functionality. The physical address associated with each of these registers is listed, along with a brief description of the register. For further details on the description and functionality of the registers and chips, refer to the respective chip specification.

- Section C.7.1 "Port Allocations" on page C-18
- Section C.7.2 "PCI Address Assignments" on page C-19

C.7.1 Port Allocations

The following table lists the system port allocations. The CPU divides the physical address space among:

- Main memory (DRAM)
- PCI (which is further subdivided into the primary PCI bus (PCI-A) and the secondary PCI bus (PCI-B bus) when the APB ASIC is used).

TABLE C-8 Port Allocations

Address Range in PA<40:0>	Size	Port Access	Access Type
0x000.0000.0000 - 0x000.3FFF.FFFF	1 Gbyte	Main memory	Cacheable
0x000.4000.0000 - 0x1FF.FFFF.FFFF	Do not use	Undefined	Cacheable
0x1FC.0000.0000 - 0x1FD.FFFF.FFFF	8 Gbytes	UPA graphics	Non-cacheable
0x1FE.0000.0000 - 0x1FF.FFFF.FFFF	8 Gbytes	CPU IO	Non-cacheable

C.7.2 PCI Address Assignments

The following table lists the PCI address assignments.

TABLE C-9   PCI Address Assignments

Address Range in PCI Address	Size	PCI Space Addressed	Notes
0x8000.0000 - 0xBFFF.FFFF	1 Gbyte	Primary PCI DVMA space	CPU DVMA register (equals 0x30)
0x4000.0000 - 0x7FFF.FFFF	1 Gbyte	PCI bus A memory space	PCI slots APB ASIC register (equals 0xc)
0x40.0000 - 0x7f.ffff	4 Mbytes	PCI bus A I/O space	PCI slots
0x0000.0000 - 0x3FFF.FFFF 0xC000.0000 - 0xFFFF.FFFF	2 Gbytes	PCI bus B memory space	On-board PCI bus APB ASIC B register (equals 0xc3)
0x00.0000 - 0x3f.FFFF 0xC0.0000 - 0xFF.FFF	8 Mbytes	PCI bus B I/O space	

C.7.2.1 PCI Bus A Address Assignments

PCI bus A has all the PCI slots and the address is programmable by the OpenBoot PROM.

C.7.2.2 PCI Bus B Address Assignments

The PCI bus B address assignments are as follows:

- PCIO ASIC registers
- Boot PROM

PCIO ASIC Registers

The PCIO ASIC is a PCI client and the address can be reprogrammed by software during boot only. Therefore, instead of providing absolute addresses for each of the registers, only offset addresses, relative to a base address, are given.

The PCIO ASIC is a multifunction PCI device and its configuration space has three base address pointers:

- Boot PROM
- EBus2 (function 0)
- Ethernet (function 1)

Boot PROM

The PCIO ASIC is strapped so that the red mode trap address is:

- UPA: 0x1FF.F000.0000
- PCI: 0xF000.0000
- EBus2: 0x00.0000

The following table lists the boot and flash PROM address assignments.

TABLE C-10   Boot PROM/Flash PROM Address Assignments

Offset	Register Description	Type	Size
0x00.0000 - 0xFF.FFFF	Flash PROM/EPROM	R	1 or 4 bytes

C.8   Interrupts

C.8.1   Interrupt Interface

The CPU uses a 6-bit encoded interrupt vector mechanism. An IChip2 is used as an interrupt concentrator, which will receive all the system interrupts and encode the interrupts into a 6-bit interrupt vector. The interrupt vector is then registered and synchronized externally with PCI clock before sending to the processor. The difference between the IChip and IChip2 is the package: IChip is a 120p-pin MQFP and IChip2 is a 128-pin TQFP.

C.9   Power

The Sun Blade 100 is Energy Star compliant. The Sun Blade 100 uses the Tier2, Guideline B of EPA's 3.0 MOU. This means that when Sun Blade 100 is in a Power Managed state the maximum power consumption will be 24 Watts or less.

In order to achieve the goal, power-saving techniques need to be implemented on the most power hungry devices in a computer system such as CPU, memory subsystem and peripheral devices. When put into Energy Star mode, the UltraSPARC-IIe processor will reduce the core clock speed by dividing the input clock by a factor of six internally. The PCI clocks to the PCI slots will be stopped.

The peripheral compliance I/O-2 (PCIO-2) will keep running at full PCI speed to support "network awareness." The SDRAM will be put into the self-refresh mode and will only come out to complete a transaction. If the SDRAM is in self-refresh mode and there is a pending transaction, the CPU will take the SDRAM out of self-refresh mode. Upon completion of the transaction and if the software has not changed the SDRAM self-refresh bit, the CPU (hardware) will put the SDRAM back into self refresh.

C.9.1 Energy Star

The Sun Blade 100 motherboard will follow the guidelines set up by the U.S. EPA's Energy Star program. The current MOU is revision 3.0. Refer to:
`http://www.epa.gov/appdstar/esoe/moureq.html`

The current Energy Star requirement for computers with power supplies that are from 0 to 200W is 30W when in power-saving mode.

C.9.1.1 Energy Star Power Consumption Tier 1

The table below lists the Energy Star *low-power/sleep mode* power requirements.

TABLE C-11 Maximum Sleep Mode Power

Max Continuous Power rating of PS	Watts allowed in Low Power mode
≤ 200W	≤ 30W
> 200W	15% of max power

C.9.1.2 Energy Star Tier 2, Guideline A

The table below lists the *low-power/sleep mode* power requirements.

TABLE C-12 Tier 2, Guideline A

Max Continuous Power rating of PS	Watts allowed in Low Power mode
≤ 200W	≤ 15W
> 200W ≤ 300W	≤ 20W
> 300W ≤ 350W	≤ 25W
> 350W ≤ 400W	≤ 30W

C.9.1.3 Energy Star Tier 2, Guideline B

Since the system uses a 160 W power supply, the power budget for the system in sleep mode is 24 W. The following are the requirements of Guideline B:

- The computer shall enter a sleep mode after a period of inactivity.
- If the computer is shipped with the capability to be on a network, it shall have the ability to enter a sleep mode irrespective of the network technology.
- The computer shall retain in sleep mode its ability to respond to all types of network requests. There shall be no loss in network functionality available to the user (e.g., the network functionality available to the user during the sleep mode shall be the same as that was available before the computer entered the sleep mode.)
- The computer shall consume in the sleep mode, no more than 15% of the maximum continuous power rating of its power supply.

C.9.1.4 USB

USB framework power manages all USB devices. If a USB device is inactive for a period of time, USB framework puts the device into low power mode. The device is again brought into full power mode by the USB framework when a user attempts to use a device or when an application on the host starts an input or output to or from the device. All HID (Human Interface Device) hub and storage devices (example: keyboard or mouse) are power managed by default if they support wake up. Printers are power managed only between job outputs.

Note – Activity on the USB keyboard or mouse indicates user intervention, causing USB framework power to remove the system from low power mode.

C.10 Motherboard

The following figure illustrates a layout diagram of the system motherboard.
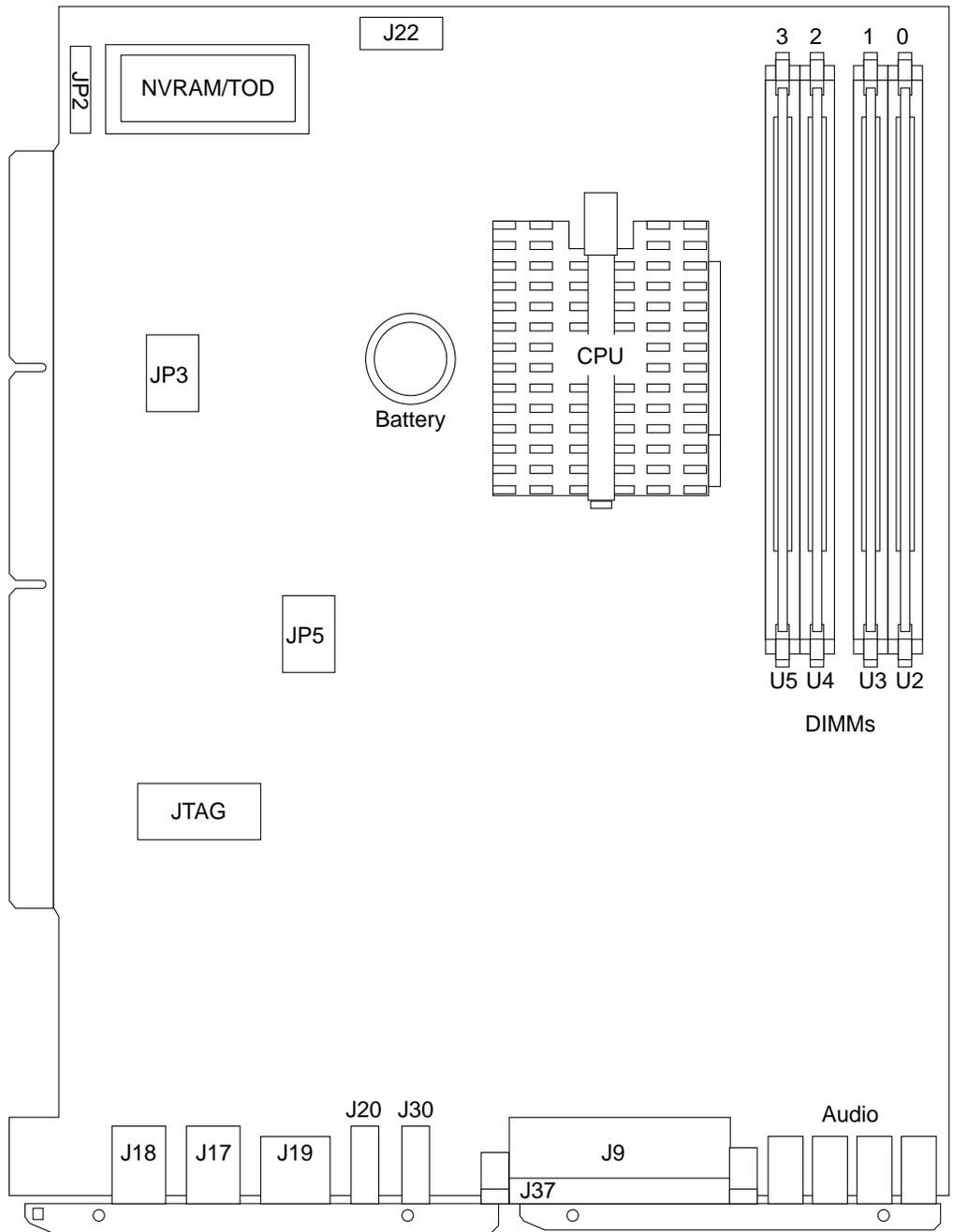
FIGURE C-7 Motherboard Layout Diagram

C.11 Riser Board

The following figures illustrate the layout diagram of the riser board.

PCI	J1
	J2
PCI	J3
	J4
PCI	J5
J6	
J7	J10
	J9
J8	J12

Motherboard connector
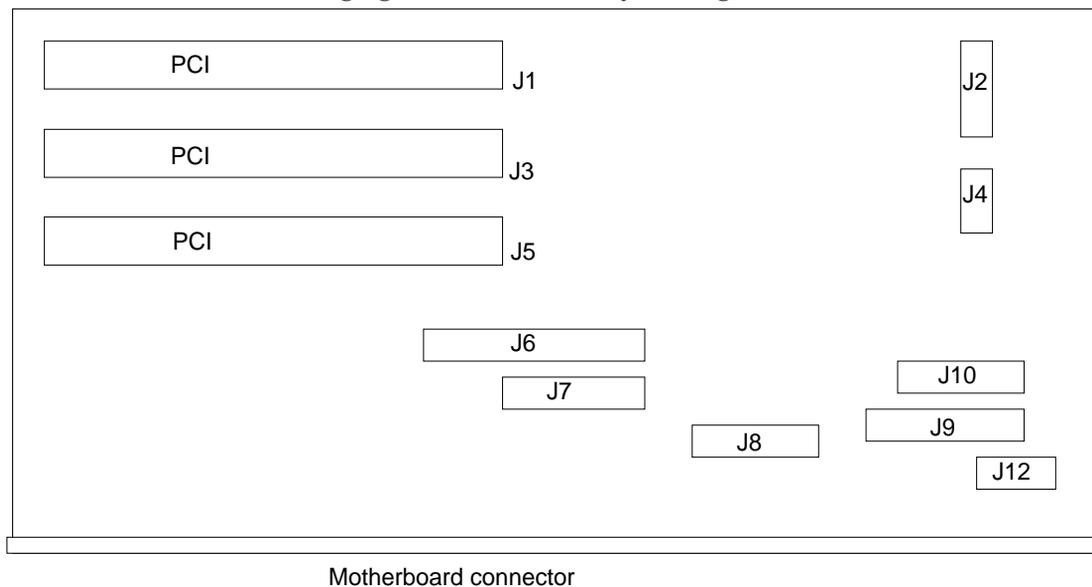
FIGURE C-8 Riser Board Layout Diagram, Side 1

TABLE C-13 Riser Board Connectors, Side 1

Connector	Description
J1	PCI connector
J2	Power/LED connector
J3	PCI connector
J4	Fan connector
J5	PCI connector
J6	Debug connector
J7	Debug connector
J8	Smart card connector
J9	Diskette drive data connector
J10	Diskette drive power connector
J12	Speaker connector
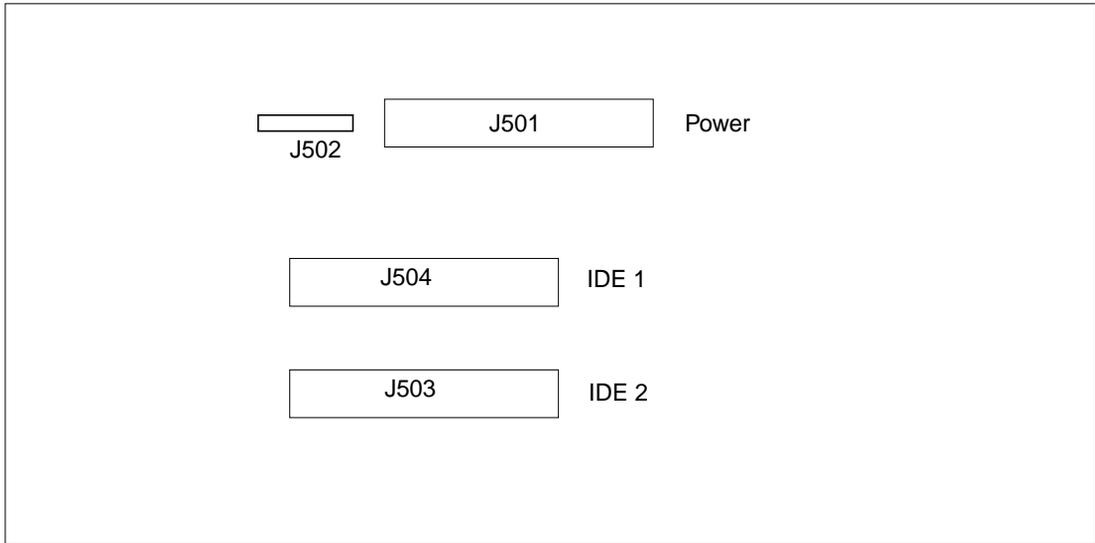
FIGURE C-9 Riser Board Layout Diagram, Side 2

TABLE C-14 Riser Board Connectors, Side 2

Connector	Description
J501	Power supply connector
J502	IDE drive power connector
J503	Secondary IDE channel connector
J504	Primary IDE channel connector

C.12   Jumper Descriptions

There are two jumpers that can be configured, the CPU speed jumper J3, and the PROM jumper J2. See Section 8.5.2 "Replacing the Motherboard" on page 8-17.

Jumper configurations can be changed by setting jumper switches on the motherboard. The motherboard jumpers are preset at the factory. For more information on CPU jumper settings, see Section 8.1.2 "Replacing the CPU" on page 8-3.

A jumper switch is *closed* (sometimes referred to as shorted) with the plastic cap inserted over two pins of the jumper. A jumper is *open* with the plastic cap inserted over one or no pin(s) of the jumper.

C.13 Enclosure

The system uses an enclosure that reflects style, ergonomics, serviceability, functionality, versatility, and quality. Physical orientation allows for a rack-mount, desktop, or under-desk installation. The enclosure design complies with all necessary environmental and regulatory specifications.

The Sun Blade 100 enclosure houses:

- One 3.5-inch (8.89-cm) diskette drive
- One 1.6-inch (4.064-cm) CD-ROM drive or DVD-ROM drive
- One hard drive bay holding the primary hard drive and an optional secondary hard drive (both drives are 3.5-inch (8.89-cm)
- Four DIMMs
- Three PCI slots
- Removable motherboard
- Riser board

USB Supplement

This appendix contains information on the following topics:
- Section D.1 "USB Keyboard and Mouse" on page D-1.
- Section D.2 "USB Power Management" on page D-2.

D.1   USB Keyboard and Mouse

The following USB keyboard and mouse information is provided for your Type-6 USB keyboard and USB mouse:

- The Sleep key on the USB keyboard behaves differently than the power key on Type-5 or Type-6 keyboards. On a USB keyboard, you can SUSPEND/ SHUTDOWN the system using the sleep key, but you cannot power-on the system.
- If you are using a USB keyboard that is not from Sun, the functionality that you get with a left-side keypad is unavailable.

Note – The keys for the left-side keyboard are not present on the USB keyboard.

- Multiple keyboards are not supported. The keyboards enumerate and are usable but are not plumbed as a console keyboard.
- Multiple mice are not supported. The mice enumerate and are usable, but are not plumbed as console mouse.
- The first keyboard that gets probed at boot time becomes the console keyboard. This can potentially cause confusion to customers if there are multiple keyboards plugged in at boot time.
- The first mouse probed at boot time becomes console mouse. This can potentially cause confusion to customers if there are multiple mouse plugged in at boot time.

- If you have a third-party composite keyboard with PS/2 mouse, and it is the first one to be probed, it will become the console keyboard/mouse even if the PS/2 mouse is not plugged in.

Note – If another USB mouse is plugged into the system, it will not work because the second mouse is not configured as the console mouse.

- On a system with multiple USB keyboards, if you unplug the console keyboard, the next available USB keyboard does not become the console keyboard. The next hot plugged keyboard will become the console keyboard.
- On a system with more than one USB mouse, if you unplug the console mouse, the next available USB mouse doesn't become the console mouse. The next hot plugged mouse will become the console mouse.
- Only a 2- or 3-button mouse is supported. A wheel-on-wheel mouse acts like a plain button mouse. A mouse with more than 3 button functions like a 3-button mouse.

D.2 USB Power Management

USB power management is "leaf" first and then "bottoms-up." This means that all leaf devices go into low-power mode first. Following that, the lowest hub goes into low-power mode first, followed by hubs in the next upper level. This follows all the way to the top root hub.

Note – As a rule of thumb, the deeper the USB device tree, the poorer USB power management becomes.

D.2.1 Storage Devices

- Use `pcfs`(7fs) and `udfs`(7fs) with USB mass storage devices. These file systems are platform neutral and data can be easily shared between platforms. UFS is also supported, but requires syncing on panic. The driver currently supports syncing.
- Each mass storage device has a device node called `disk`. Each node receives a unique controller number. A device with multiple LUNs will get the same controller number but different d number (`/dev/[r]dsk/cXtYdZsN`)
- On hot remove mass storage drives, `/dev/[r]dsk` links remain persistent. Type `devfsadm -C` to remove stale links.
- System Checkpoint/Resume will fail if a file system is mounted.

D.2.2   Printer Devices

■ After plugging in the printer, type `lpadmin` or `printmgr` to configure printer
■ To find out which of `/dev/printers/N` is a USB printer,
  ■ type `ls -l` on `/dev/printers` and find out which symbolic links point to the `usbprn` device.
■ For Lexmark™ printers choose HP as the printer type in printmgr

D.2.3   Hot Plug

■ OpenBoot PROM at present doesn't support hot plugging of USB devices. If a user removes the USB keyboard when the system is at the OK prompt, the system will become wedged. If the USB keyboard is plugged into the system again OpenBoot PROM will not recognize the keyboard. You will have to power cycle the system.

■ As a general rule, no USB device should be hotplugged when the system is at the OK prompt in OpenBoot PROM and during booting of the system until a UNIX login prompt is displayed.

■ Unplugging open or busy device will not remove the entries in the `prtconf` file. The system prompts to plug in the original device. To clear the `prtconf` entries, the original device needs to be plugged into the same port, the application terminated, and then the device removed. Until then, the port remains unusable.

■ After plugging in a device, check `prtconf` or `/dev/usb` before hot removing.

D.2.4   Cabling

■ Never use USB cable extenders that are available on the market. Always use a hub with longer cables to connect devices.
■ Always use fully rated (12 Mbps) 20/28 AWG cables for connecting devices.

D.2.5   Devices Supported

■ USB keyboard and mouse. Composite keyboards with PS/2 mouse.
■ Hubs: 4 & 7 port, either Bus or Self powered
■ Printers:
  ■ Lexmark Optra E310, M410, T616, W810, Color45
  ■ Xerox DocuPrint N2125
■ Storage:
  ■ Iomega Zip 100, Zip 250. See man page for `scsa2usb` for a complete list of devices supported

D.2.6   Man Pages Available

- `ohci`(7D),
- `uhci`(7D),
- `hubd`(7D),
- `usb_mid`(7D),
- `hid`(7D),
- `scsa2usb`(7D),
- `usbprn`(7D),
- `usbkb`(7M),
- `usbms`(7M)

Glossary

address A unique location within computer or peripheral memory. Reference made to an address is usually for retrieving or storing data.

APB Advanced PCI bridge. A PCI-to-PCI bridge ASIC that features a connection path between a 32-bit bus operating at speeds up to 66 MHz on the primary interface and two 32-bit, 5 VDC or 3.3 VDC, PCI buses (each operating at 33 MHz), on the secondary interface.

ASIC Application-specific integrated circuit.

ASP Authorized service provider.

AUXIO Auxiliary I/O. General purpose lines used to control miscellaneous system functions.

BGA Ball grid array

boot A term used to identify the process of reading initial software into the computer.

boot PROM In Sun workstations, contains the PROM monitor program, a command interpreter used for booting, resetting, low-level configuration, and simple test procedures.

CAS Column address select.

CDE Common Desktop Environment.

CD-ROM Compact disc read-only memory.

DBZ Double buffer with Z.

DCE Data communication equipment. An external modem.

default A preset value that is assumed to be correct unless changed by the user.

DIMM Dual in-line memory module. A small printed circuit card that contains dynamic random access memory chips.

DMA	Direct memory address.
DOC	Department of Communications.
dpi	Dots per inch.
DRAM	Dynamic random-access memory. A read/write dynamic memory in which the data can be read or written in approximately the same amount of time for any memory location.
DTAG	Dual tag or data tag.
DTE	Data terminal equipment.
EBus	Extension bus.
ECC	Error checking code.
EDO	Extended data out.
EIDE	Enhanced integrated drive electronics.
EMI	Electrostatic magnetic interference. Electrical phenomena that directly or indirectly contribute to a degradation in performance of an electronic system.
Ethernet	A type of network hardware that provides communication between systems connected directly together by transceiver taps, transceiver cables, and various cable types such as coaxial, twisted-pair, and fiber-optic.
FBC	Frame buffer controller. An ASIC responsible for the interface between the UPA and the 3DRAM. Also controls graphic draw acceleration.
FCC	Federal Communications Commission.
FIFO	First-in-first-out.
flash PROM	Flash programmable read-only memory.
Gbyte	Gigabyte.
GUI	Graphical user interface.
IDC	Insulation displacement connector.
IDE	Integrated drive electronics.
I/O	Input/output.
JTAG	IEEE standard 1149.1.
Kbyte	Kilobyte.
LAN	Local area network.
LED	Light-emitting diode.

MAC	Media access controller.
Mbyte	Megabyte.
MBps	Megabytes per second.
Mbps	Megabits per second.
MCU	Memory controller unit.
MHz	Megahertz.
MII	Media independent interface.
MQFP	Metric quad flat package
ns	Nanosecond.
NVRAM	Non-volatile random access memory. Stores system variables used by the boot PROM. Contains the system hostID number and Ethernet address.
OpenBoot PROM	A routine that tests the network controller, diskette drive system, memory, cache, system clock, network monitoring, and control registers.
PCI	Peripheral component interconnect. A high-performance 32- or 64-bit-wide bus with multiplexed address and data lines.
PCIO	PCI-to-EBus/Ethernet controller. An ASIC that bridges the PCI bus to the EBus, enabling communication between the PCI bus and all miscellaneous I/O functions, as well as the connection to slower on-board functions.
PCMCIA	Personal Computer Memory Card International Association.
PID	Process ID.
POR	Power-on reset.
POST	Power-on self-test. A series of tests that verify motherboard components are operating properly. Initialized at system power-on or when the system is rebooted.
RAMDAC	RAM digital-to-analog converter. An ASIC responsible for direct interface to 3DRAM. Also provides on-board phase-lock loop (PLL) and clock generator circuitry for the pixel clock.
RAS	Row address select.
RC	Resistive-capacitive.
RISC	Reset, interrupt, scan, and clock. An ASIC responsible for reset, interrupt, scan, and clock.
SB	Single buffer.
SDRAM	Synchronous DRAM.

SGRAM	Synchronous graphics RAM.
SRAM	Static random access memory.
Standby switch	Controls the standby state of the system.
STP	Shielded twisted-pair.
SunVTS	A diagnostic application designed to test hardware.
TIP connection	A connection that enables a remote shell window to be used as a terminal to display test data from a system.
TPE	Twisted-pair Ethernet.
TOD	Time of day. A timekeeping integrated circuit.
TQFP	Thin quad flat package
TTL	Transistor-transistor logic.
UPA	UltraSPARC port architecture. Provides processor-to-memory interconnection.
UTP	Unshielded twisted-pair.
VCCI	Voluntary Control Council for Interference.
VIS	Visual instruction set.
Vrms	Volts root-mean-square.

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