Sun Enterprise™ 420R Server Owner's Guide

Sun microsystems

THE NETWORK IS THE COMPUTER™

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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
- Bureau of Standards Metrology and Inspection (BSMI) — Taiwan

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.

DOC Class A Notice - Avis DOC, Classe A

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

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur 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。

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 ID: E420R

Sun Enterprise 420R Server

This product has been tested and complies with the following rules and requirements.

EMC

USA—FCC Class A

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—EC

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

EN55022/CISPR22 (1985)		Class A	Curtis-Straus LLC. Report No: E990550-1
EN50082-1	IEC801-2 (1991)	8 kV (Direct), 15kV (Air)	
	IEC801-3 (1984)	10 V/m, 80% AM at 1KHz	
	IEC801-4 (1988)	4.0 kV Power Lines, 1 kV Signal Lines	
	IEC801-5	2 kV Power Lines (L-L, L-G) 1 kV Signal Lines (L-G, Shield-G)	
EN61000-3-2/IEC1000-3-2 (1994)		Pass	

Safety

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

EC Type Examination Certificates:

EN60950/IEC950 (1993)	TUV Rheinland Certificate No: pending
EN60950 w/ Nordic Deviations	CB Scheme Certificate No: pending
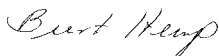
Supplementary Information

This product was tested and complies with all the requirements for the CE Mark (when connected to a Sun workstation or server).

Burt Hemp	*John J Shades*
Burt Hemp June 30th, 1999	John Shades June 30th, 1999
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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 Enterprise 420R system.

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.

On – Applies AC power to the system.

Depending on the type of power switch your device has, one of the following symbols may be used:

Off - Removes AC power from the system.

Standby – The On/Standby switch is in the standby position.

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.

The following caution applies only to devices with a Standby power switch:

Caution – The power switch of this product functions as a standby type device only. The power cord serves as the primary disconnect device for the system. Be sure to plug the power cord into a grounded power outlet 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.

Lithium Battery

Caution – On Sun CPU boards, there is a lithium battery molded into the real-time clock, SGS No. MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, or MK48T08. Batteries are not customer replaceable parts. They may explode if mishandled. Do not dispose of the battery in fire. Do not disassemble it or attempt to recharge it.

Battery Pack

Caution – There is a sealed lead acid battery in Product Name units. Portable Energy Products No. TLC02V50. There is danger of explosion if the battery pack is mishandled or incorrectly replaced. Replace only with the same type of Sun Microsystems battery pack. Do not disassemble it or attempt to recharge it outside the system. Do not dispose of the battery in fire. Dispose of the battery properly in accordance with local regulations.

System Unit Cover

Caution – Do not operate Sun products without the 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

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.

Ein – Setzt das System unter Wechselstrom.

Je nach Netzschaltertyp an Ihrem Gerät kann eines der folgenden Symbole benutzt werden:

Aus – Unterbricht die Wechselstromzufuhr zum Gerät.

Wartezustand (Stand-by-Position) - Der Ein-/Wartezustand-Schalter steht auf Wartezustand. Änderungen an Sun-Geräten.

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.

Die folgende Warnung gilt nur für Geräte mit Wartezustand-Netzschalter:

Achtung – Der Ein/Aus-Schalter dieses Geräts schaltet nur auf Wartezustand (Stand-By-Modus). Um die Stromzufuhr zum Gerät vollständig zu unterbrechen, müssen Sie das Netzkabel von der Steckdose abziehen. Schließen Sie den Stecker des Netzkabels an eine in der Nähe befindliche, frei zugängliche, geerdete Netzsteckdose an. Schließen Sie das Netzkabel nicht an, wenn das Netzteil aus der Systemeinheit entfernt wurde.

Lithiumbatterie

Achtung – CPU-Karten von Sun verfügen über eine Echtzeituhr mit integrierter Lithiumbatterie (Teile-Nr. MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, oder MK48T08). 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.

Batterien

Achtung – Die Geräte Product Name enthalten auslaufsichere Bleiakkumulatoren. Produkt-Nr. TLC02V50 für portable Stromversorgung. Werden bei der Behandlung oder beim Austausch der Batterie Fehler gemacht, besteht Explosionsgefahr. Batterie nur gegen Batterien gleichen Typs von Sun Microsystems austauschen. Nicht demontieren und nicht versuchen, die Batterie außerhalb des Geräts zu laden. Batterie nicht ins Feuer werfen. Ordnungsgemäß entsprechend den vor Ort geltenden Vorschriften entsorgen.

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.

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Class 1 Laser Product
Luokan 1 Laserlaite
Klasse 1 Laser Apparat
Laser KLasse 1
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CD-ROM

⚠️ **Warnung** – Die Verwendung von anderen Steuerungen und Einstellungen oder die Durchfhrung von Prozeduren, die von den hier beschriebenen abweichen, knnen gefhrliche 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.

| **MARCHE** – Vot re système est sous tension (courant alternatif).

Un des symboles suivants sera peut-être utilisé en fonction du type d'interrupteur de votre système:

◯ **ARRET** - Votre système est hors tension (courant alternatif).

⏻ **VEILLEUSE** – L'interrupteur Marche∕ Veilleuse est en position « Veilleuse ».

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.

L'avertissement suivant s'applique uniquement aux systèmes équipés d'un interrupteur VEILLEUSE:

Attention: – le commutateur d'alimentation de ce produit fonctionne comme un dispositif de mise en veille uniquement. C'est la prise d'alimentation qui sert à mettre le produit hors tension. Veillez donc à installer le produit à proximité d'une prise murale facilement accessible. Ne connectez pas la prise d'alimentation lorsque le châssis du système n'est plus alimenté.

Batterie au lithium

Attention: – sur les cartes CPU Sun, une batterie au lithium (référence MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, ou MK48T08.) a été moulée dans l'horloge temps réel SGS. Les batteries ne sont pas des pièces remplaçables par le client. Elles risquent d'exploser en cas de mauvais traitement. Ne pas jeter la batterie au feu. Ne pas la démonter ni tenter de la recharger.

Bloc-batterie

Attention: – Les unités Product Name contiennent une batterie étanche au plomb (produits énergétiques portatifs n˚TLC02V50). Il existe un risque d'explosion si ce bloc-batterie est manipulé de façon erronée ou mal mis en place. Ne remplacez ce bloc que par un bloc-batterie Sun Microsystems du même type. Ne le démontez pas et n'essayez pas de le recharger hors du système. Ne faites pas brûler la batterie mais mettez-la au rebut conformément aux réglementations locales en vigueur.

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
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Laser KLasse 1

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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.

Encendido – Aplica la alimentación de CA al sistema.

Según el tipo de interruptor de encendido que su equipo tenga, es posible que se utilice uno de los siguientes símbolos:

Apagado - Elimina la alimentación de CA del sistema.

En espera – El interruptor de Encendido/En espera se ha colocado en la posición de En espera.

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.

La siguiente advertencia se aplica solamente a equipos con un interruptor de encendido que tenga una posición "En espera":

Precaución – El interruptor de encendido de este producto funciona exclusivamente como un dispositivo de puesta en espera. El enchufe de la fuente de alimentación está diseñado para ser el elemento primario de desconexión del equipo. El equipo debe instalarse cerca del enchufe de forma que este último pueda ser fácil y rápidamente accesible. No conecte el cable de alimentación cuando se ha retirado la fuente de alimentación del chasis del sistema.

Batería de litio

Precaución – En las placas de CPU Sun hay una batería de litio insertada en el reloj de tiempo real, tipo SGS Núm. MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, o MK48T08. Las baterías no son elementos reemplazables por el propio cliente. Pueden explotar si se manipulan de forma errónea. No arroje las baterías al fuego. No las abra o intente recargarlas.

Paquete de pilas

Precaución – Las unidades Product Name contienen una pila de plomo sellada, Productos de energía portátil nº TLC02V50. Existe riesgo de estallido si el paquete de pilas se maneja sin cuidado o se sustituye de manera indebida. Las pilas sólo deben sustituirse por el mismo tipo de paquete de pilas de Sun Microsystems. No las desmonte ni intente recargarlas fuera del sistema. No arroje las pilas al fuego. Deséchelas siguiendo el método indicado por las disposiciones vigentes.

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.

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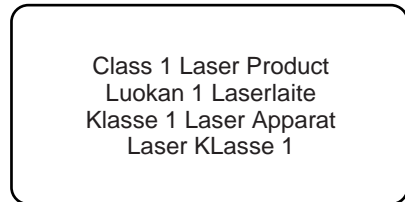
CD-ROM

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
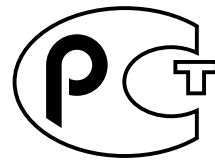
Nordic Lithium Battery Cautions

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

Preface

The *Sun Enterprise 420R Server Owner's Guide* answers your questions about setting up and running the Sun Enterprise™ 420R server. Features and options, setup and installation, troubleshooting, and network administration information for the Sun *Enterprise 420R* server are covered in this manual.

With the exception of internal disk drives in the Sun Enterprise 420R server, *all other component or part installation or replacement* is to be performed by qualified service providers.

This manual presents information in a modular format designed to answer the type of questions that you might ask while installing, configuring, and using the Sun Enterprise 420R server. Look at the module headings and you'll find the cue words that direct you to the categories of questions and answers, such as:

- How to . . . How do I do something?
- About . . . Is there more information about this topic?
- Reference for . . . Where can I find reference material for something?

You determine how much or how little of the information you need to read.

Using the table of contents, and the information or task list on the first page of each chapter, and the index you can quickly find a specific topic or task. The information modules are brief; however, they are interrelated and refer you to other modules that you may want or need to read. For instance, if you're installing a disk drive and you're already familiar with the task, you could go to "How to Install a Disk Drive" and follow the installation procedure. But if you need more background information before performing the task, you should first read "About Disk Drives."

How This Book Is Organized

Chapter <$elemparanumonly<$elemtext describes the system's features, including the front and back panel features, the system's devices, and status indicators and controls.

Chapter <$elemparanumonly<$elemtext describes how to attach the cables needed to get the Sun Enterprise 420R server hardware up and running. For information about rackmounting the server, consult the *Sun Enterprise 420R Server Setup and Rackmounting Guide* that accompanied your system. For the operating system software, the chapter explains what you need to do and points you to the appropriate software manuals for additional information.

Chapter <$elemparanumonly<$elemtext focuses on the administrative information and tasks associated with the configuring of Ethernet interfaces and on booting a PCI-based Ethernet system.

Chapter <$elemparanumonly<$elemtext describes the hardware configuration of the system.

Chapter <$elemparanumonly<$elemtext describes what you need to know, and need to do, to install, remove, or replace an internal disk drive.

Chapter <$elemparanumonly<$elemtext describes basic information about how to use the CD-ROM and tape devices.

Chapter <$elemparanumonly<$elemtext introduces the diagnostic tools available for the system and explains how to use these tools focusing only on the disk drive. It also introduces you to error indications and software commands to help determine what component of the system (if any) needs to be replaced. A more detailed treatment of diagnostics is provided in the *Sun Enterprise 420R Server Service Manual*.

The Appendices list accessible connector pinouts and system specifications.

Using UNIX Commands

This document does not contain comprehensive 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 additional information:

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

Typographic and Command Entry Conventions

Typeface or Symbol	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	What you type, when contrasted with 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 command and variable entry; replace the variable with a real name or value, and then press the Return or Enter key	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	#

Related Documentation

The following documents contain topics that relate to the information in the
Sun Enterprise 420R Server Owner's Guide.

Application	Title
Server rackmounting and setup	*Sun Enterprise 420R Server Setup and Rackmounting Guide*
Installation and removal of parts by trained Sun Microsystems™ service providers.	*Sun Enterprise 420R Server Service Manual*
Late breaking product news and information	*Sun Enterprise 420R Server Product Notes*
Performing diagnostic tests	*SunVTS User's Guide*
	SunVTS Quick Reference Card
	SunVTS Test Reference Manual
	Sun Enterprise SyMON User's Guide
System and network administration	*Solaris System Administrator AnswerBook*
	SPARC: Installing Solaris Software
Using operating system software	*Solaris User's Guide*
Miscellaneous	*Solaris on Sun Hardware AnswerBook*
	Solaris Handbook for Sun Peripherals
	Solaris 7 Sun Hardware Platform Guide

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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```
docfeedback@sun.com
```

Please include the part number (8xx-xxxx-xx) of your document in the subject line of your email.

System Overview

This chapter introduces you to the Sun Enterprise 420R server and explains some of its features. The following information is covered in this chapter:

- "About the Sun Enterprise 420R Server" on page 1
- "Locating Front Panel Features" on page 4
- "Locating Back Panel Features" on page 6
- "About the Status and Control Panel" on page 7

About the Sun Enterprise 420R Server

The Sun Enterprise 420R server is a high-performance, shared memory, symmetric-multiprocessing system. It is designed around Sun's high-speed Ultra Port Architecture (UPA) cross-bar system interconnect and Sun's UltraSPARC™ II processors, to deliver outstanding overall system performance.

The system is housed in a standard Electronic Industries Association 310 (EIA 310) specification-compliant rackmountable enclosure. The enclosure measures 7.00 inches high, 17.25 inches wide, and 27.25 inches deep (17.8 cm x 43.8 cm x 69.2 cm). The system has a maximum weight of 65 lb (34 kg). You may rackmount up to nine systems in an empty 72-inch (182.80-cm) EIA-compliant cabinet, such as the Sun™ StorEdge Expansion Cabinet.

Processing power is provided by up to four modular UltraSPARC II CPUs, with up to 8 Mbytes of local high-speed external cache memory. The system UPA's clock rate synchronizes automatically to the clock rate of the installed CPUs, and the UPA bus operates at a clock rate that is a ratio of the speed of the CPU modules. For more information about CPU modules, see "About CPU Modules" on page 66.

System main memory is provided by up to 16 dual in-line memory modules (DIMMs), each of which is capable of storing 32, 64, or 256 Mbytes of data. Total main memory is expandable up to 4 Gbytes. To enhance memory I/O performance, the system transfers 64 bytes of data into or from memory on each memory transfer. For more information about system memory, see "About Memory" on page 64.

System I/O is handled by two separate Peripheral Component Interconnect (PCI) buses. These industry-standard buses support all main logic board I/O and up to four PCI interface cards. One PCI bus operates at a 33-MHz clock rate and supports up to three PCI cards, while the other bus can operate at either 33-MHz or 66-MHz and supports one PCI card. All PCI cards plug in to slots provided on the system's main logic board. For more information about PCI buses, see "About Peripheral Component Interconnect (PCI) Buses" on page 67.

Internal disk storage is provided by up to two 1-inch high, 3.5-inch wide (2.54-cm x 8.89-cm), Ultra-Small Computer System Interface (UltraSCSI) disk drives. Both drives are supported on the same channel with a 40-Mbyte per second wide UltraSCSI interface provided direct to the system's main logic board. Systems configured with two disk drives can provide software mirroring and full hot-pluggable boot drive capability. For more information about disk storage, see "About Internal Disk Drives" on page 73.

External multi-disk storage subsystems and Redundant Arrays of Inexpensive Disks (RAID) storage arrays can be supported by installing single-channel or multi-channel PCI host adapter cards along with the appropriate system software. Software drivers supporting UltraSCSI, and other types of devices, are included in the Solaris operating environment. For more information about RAID storage support, see "About Internal Disk Drives" on page 73.

A 5.25-inch by 1.6-inch (13.35-cm x 4.06-cm) CD-ROM drive is standard, or a 1.0-inch (2.54-cm) tape drive is optional, on the Sun Enterprise 420R server and is installed in the upper bay of the removable media assembly (RMA). The CD-ROM drive has multimedia features, which include multi-session capability and fast access for image and video data.

Up to four external tape devices can be attached to the standard 68-pin 40-Mbyte per second UltraSCSI port provided on the system's back panel. Additional external tape devices can be supported with appropriate PCI host adapter cards.

You can easily connect the Sun Enterprise 420R server to either a 10-Mbps or a 100-Mbps Ethernet by means of an auto-sensing Ethernet interface provided on the system's main logic board. Ethernet interfaces or connections to other networks, such as Fiber Distributed Data Interface (FDDI), Asynchronous Transfer Mode (ATM), or token ring, can be provided by installing the appropriate PCI interface cards. For more information, see "Administration and Network Setup" on page 45.

The system console device can be a standard ASCII character terminal or a local windowing subsystem. The ASCII terminal connects to one of the system's two serial ports, while a local windowing subsystem in a graphics console requires installation of a PCI frame buffer card, monitor, keyboard, and mouse. UPA graphics is *not* supported in the Sun Enterprise 420R server. The server can also be administered from a remote system connected to the server over an Ethernet network.

The Sun Enterprise 420R server provides two serial communications ports through a pair of DB-25 connectors located on the back panel. It also provides one external, 2-Mbyte per second, bidirectional, Centronics-compatible, enhanced parallel port (EPP) for connecting the system to a local printer or other compatible parallel device.

Power is provided by one or two 380-watt power supplies with dual internal fans. System configurations with two power supplies provide both redundancy and full hot-swap capability. For more information about the power supplies, see "About Power Supplies" on page 75.

The Sun Enterprise 420R server has a rackmounting kit for installation into standard 29-inch to 32-inch (73.6-cm to 81.3-cm) deep EIA 310-compliant 19-inch (48.26-cm) wide racks, with at least four rack units (7.0 inches, 17.78 cm) of vertical mounting space available per server, and sufficient load-bearing capacity.

System reliability, availability, and serviceability are enhanced by features that include:

- Error-correcting code (ECC) on memory and all data paths
- Parity checking on all address buses
- Front panel status indicator lights
- Hot-pluggable internal disk drives with easy front access
- Support for RAID 0, 1, 0 + 1, and 5 implementations
- Power system monitoring and fault protection
- Power supply redundancy
- Hot-swap power supplies with easy front panel access
- Four levels of system diagnostics
- Easy front, top, or back access to all internal replaceable components

For additional details, see "About Reliability, Availability, and Serviceability Features" on page 60.

Locating Front Panel Features

The illustration below shows the system control features and status indicators that are accessible from the front panel with the system front doors closed. When the key in the front panel keyswitch is in the locked position, the front doors are also locked preventing access to the disk drives and power supplies. Before you lock the door, make sure that the key is in the unlocked position and that you overlap the front doors as you close them. To lock the door, insert and turn the keyswitch to the locked position; then remove the key. This same key also controls the system cover lock on the top of the system (see page 89). If you lose the key, contact your Sun sales representative about replacing the key.

The system's Power button is beside the keyswitch and is controlled by the keyswitch settings. For more information about the keyswitch positions, see "Keyswitch Settings" on page 8.

The system's standard CD-ROM drive front panel and controls are illustrated in the figure below. An optional tape drive is available in place of the CD-ROM. For more information about using the CD-ROM drive, or the optional tape drive (if installed), see Chapter 6 "Using Storage Devices.
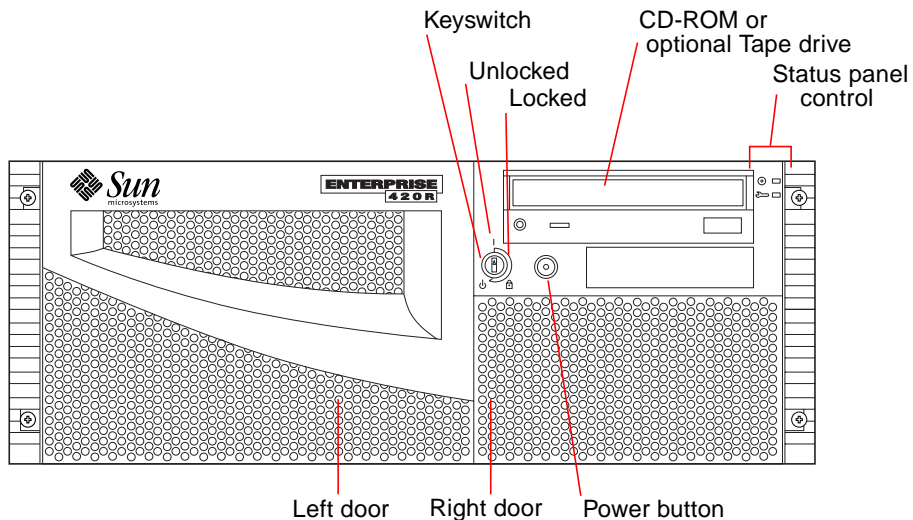
For more information about status panel controls and indicators, see "About the Status and Control Panel" on page 7.

Opening the system's front doors provides access to the system's configured hot-swappable internal disk drives or redundant power supplies.

The illustration below shows the additional accessible features with system front doors open.
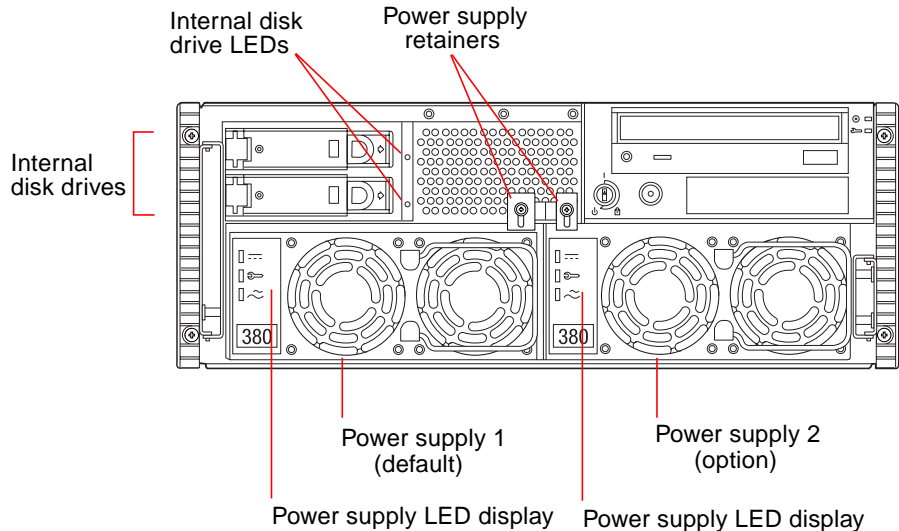
Systems may be configured with one or two power supplies, and one or two disk drives either of which is accessible when the system front doors are open. Each power supply has an LED that displays the AC power, DC power, and fault status of the supply. Power supplies are accessible only to qualified service providers. See "Power Supply LEDs" on page 139 for operational details of the LEDs.

Each disk drive has an LED indicating that power is supplied to the drive and that there is activity on the disk. For additional information see "Disk LEDs" on page 140.

Locating Back Panel Features

The illustration below shows the system features that are accessible from the back panel.

PCI slots 1–4
4 3 2 1

Serial B | Parallel

System ground screw hole

Serial A   SCSI   TPE Ethernet   Power inlet 2   Power inlet 1(default)

Keyboard / Mouse
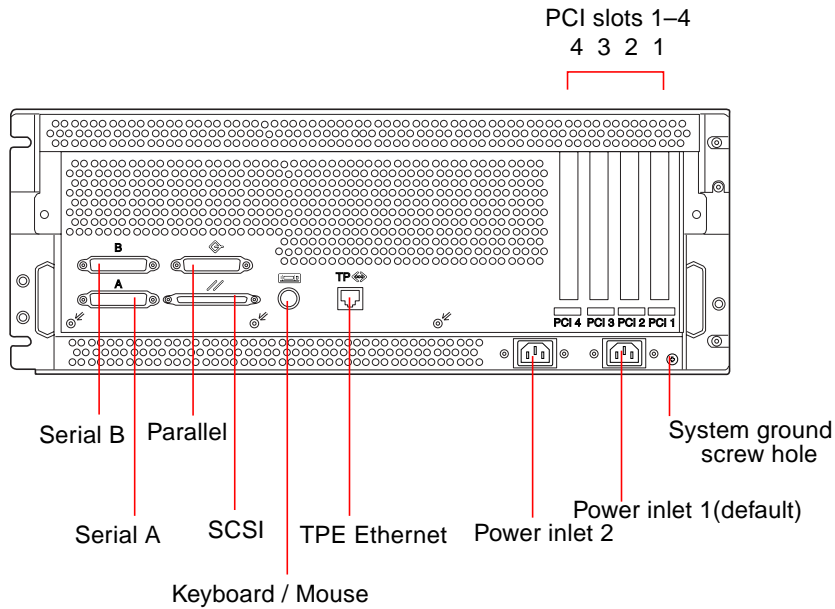
A ground screw hole 0.157 inches in diameter and 0.236 inches deep (4 mm x 6 mm) is located in the lower-right corner of the back panel. Contact your Sun sales representative, if you need a grounding strap.

About the Status and Control Panel

The status and control panel includes two LED indicators and a three-position security keyswitch.
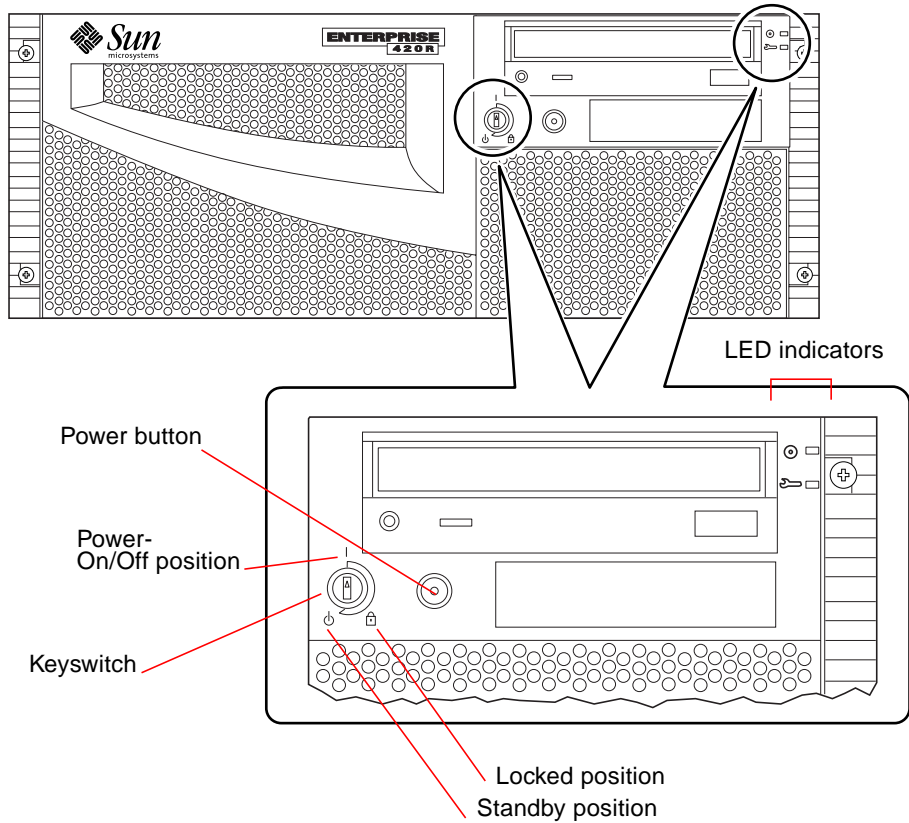
Keyswitch Settings

The front panel keyswitch controls the power-on modes of the system. The following table describes the function of each switch setting.

Keyswitch Setting	Icon	Description
Power-On/Off		This setting enables the system's Power button to power on, or to power off, the system. If Solaris is running, quickly pressing and releasing the power button initiates a software system shutdown. If the system hangs, holding the Power button down for five seconds while the keyswitch is in this positon will cause an immediate hardware power off.
Locked		This setting disables the system's Power button, and also locks the front doors preventing access to the disk drives and to the power supplies. The Locked position is the recommended setting for normal day-to-day operation of the system.
Standby		This setting places the system in Standby mode by turning off power to all internal system components and by placing the power supplies in Standby mode. When the keyswitch is in this position the server's Power button is disabled.

System LED Indicators

The two system LEDs consist of a system health indicator and a fault indicator. The system health indicator lights continuously green to show that the system is functioning normally. The fault indicator lights when a problem is detected in the system. Because it is important to know that a fault exists in the system, the fault indicator remains lit whether the system is in normal operating mode, or is switched to Standby mode using the keyswitch.

When you first power on the system, the LEDs are individually toggled on and off to verify that each one is working correctly. After that, the LEDs operate as described in the following table.

Name	Icon	Description
Power-on/ Activity		This green LED lights continuously when the system power is on.
General fault		This amber LED lights steadily when a system fault is detected (including a fault reported by a power supply LED fault).

System Setup

This chapter, used with the *Sun Enterprise 420R Server Setup and Rackmounting Guide,* describes how to rackmount a server and attach all cords and cables needed to get the Sun Enterprise 420R server up and running. Where software is involved, this chapter explains some of what you need to do, and then points you to the appropriate software manuals for the rest of the information.

The following information is covered in this chapter:

■ "About the Parts Shipped to You" on page 12

■ "About Server Rackmounting" on page 18

■ "About Communicating With the Server" on page 28

Tasks covered in this chapter include:

■ "How to Install the Sun Enterprise 420R Server" on page 13

■ "How to Place the System Into the Rack" on page 23

■ "How to Remove the System From the Rack" on page 20

■ "How to Attach an Alphanumeric (ASCII) Terminal" on page 29

■ "How to Configure a Local Graphics Console" on page 31

■ "How to Power On the System" on page 34

■ "How to Install the System Software" on page 37

■ "How to Select the Boot Device" on page 40

■ "How to Power Off the System" on page 43

About the Parts Shipped to You

Your system is "configured-to-order," which means that most internal options that you order are pre-installed at the factory. However, if you ordered options that are not factory-installed, these will be shipped to you separately.

You will receive a rackmounting kit (standard) or kits (ordered separately) to mount your system(s) in a rackmounting cabinet. You may also have separately ordered one or more rackmounting cabinets with accompanying documentation (ordered separately). Verify that you've received everything you ordered.

In addition, you should have received the media and documentation for all appropriate system software (ordered separately). Verify that you've received everything you ordered.

Note – Inspect all shipping cartons for evidence of physical damage. If a shipping carton is damaged, request that the carrier's agent be present when the carton is opened. Keep all contents and packing material for the agent's inspection.

Save the original shipping containers and packing materials in case you need to store or ship your system. If you cannot store the shipping materials, recycle or dispose of the materials properly. Consult your local recycling authority for information.

Using the Setup and Rackmounting Guide

Shipped with your system is the *Sun Enterprise 420R Server Setup and Rackmounting Guide* that describes procedures for rackmounting the server and attaching all cords and cables needed to get the server up and running. Use this owner's guide with the setup and rackmounting guide to install your server.

Tools Required for Setup and Rackmounting

The following is a list of tools that you will need to locate before you rackmount the server in a standard EIA-compliant rack.

- A Phillips #2 screwdriver and a flat-blade screwdriver
- An adjustable wrench to tighten the nuts on the slide bracket assemblies and to adjust the feet on the cabinet anti-tip legs
- Allen wrenches to remove the rackmount cabinet side panels (if necessary)
- A spirit level, for levelling the rackmount cabinet front-to-back and side-to-side (if necessary)

How to Install the Sun Enterprise 420R Server

Before You Begin

The Sun Enterprise 420R server is a general-purpose server, which you can use for many types of applications. Exactly how you set up your machine depends in some measure upon what you want it to do.

This procedure is intended to be as "generic" as possible, so as to cover the needs of most sites. Even so, you will need to make certain decisions to complete the procedure:

- On which network or networks do you intend your machine to operate?

  For background information about network support, see "About Network Interface Options" on page 46.

- How do you want to use/configure your machine's internal disks?

  For background information about internal disk use, see "About Disk Array Configurations and Concepts" on page 69.

- What software do you intend to load?

  Software included in the server media kit or other software products may impose certain disk space or disk partitioning requirements. Refer to the documentation accompanying the software to determine those requirements.

Once you've answered these questions, you're ready to begin the installation procedure.

What to Do

1. **Verify that you've received all the parts of your system.**

   See "About the Parts Shipped to You" on page 12.

2. **Install any optional drive shipped with your system.**

   Many of the options ordered with your system may have been pre-installed at the factory. For information about how to install other options, see the *Sun Enterprise 420R Server Service Manual* or contact your qualified service provider. However, if you ordered a second internal disk drive that was not factory-installed, see the section:

   ■ "How to Install a Disk Drive" on page 93

   Note – To install *any* additional options, contact your qualified service provider.

   ---

3. **Install the system into the rack.**

   The server is shipped with inner glides attached. See "About Server Rackmounting" on page 18 and the *Sun Enterprise 420R Server Setup and Rackmounting Guide* accompanying your system for installation instructions for the rack. If the system's slide assembly rails are already mounted in a rack, see "How to Place the System Into the Rack" on page 23.

4. **Ensure that the system's front panel keyswitch is in the Standby position.**

   See "About the Status and Control Panel" on page 7.

5. **Once the system is installed in the rack, connect the AC power cord to the power inlet labelled (1) at the back of the system. Use a strain relief (if necessary), and connect the other end of the cord to a grounded AC power outlet.**

   To prevent accidental or inadvertent removal of an AC power cord from its inlet use the strain relief. The strain relief is a plastic tie-wrap and pedestal that is inserted into the back panel of the system. Use these reliefs to manage the power cords after you have installed the cords into the AC inlets in the server.

   ■ To use a strain relief, wrap the loose end of the tie-wrap around the AC power cord and thread the tie-wrap through the opening in the relief pedestal. Pull the end to tighten the tie-wrap.

   ■ To release the AC power cord, lift up the tab on the relief pedestal and loosen the tie-wrap.

Note – Each outlet must connect the system to a 15A circuit for North America and Japan, and to a 10A circuit for Europe. See your local electrical codes.
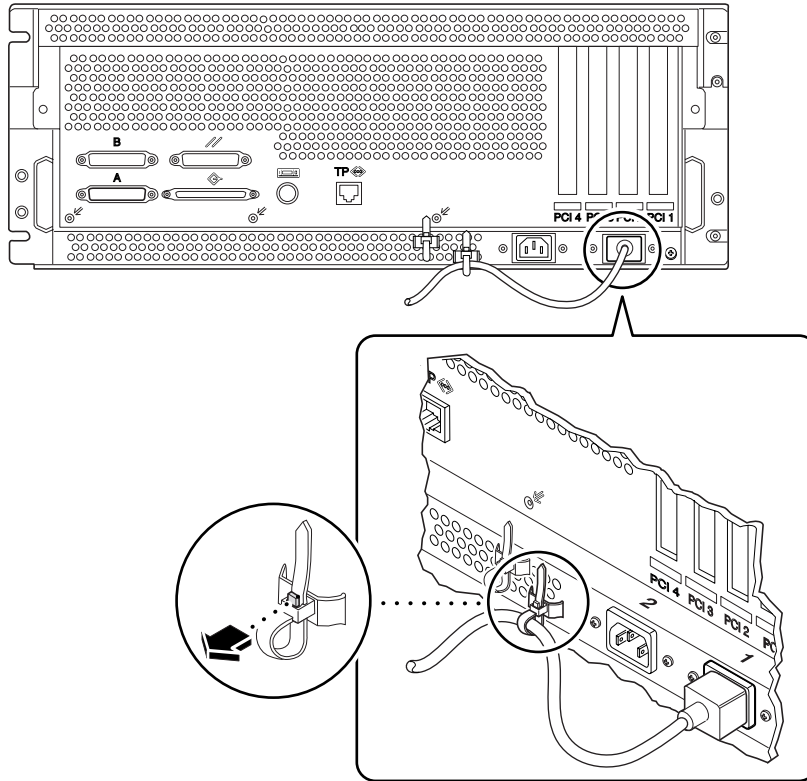
Note – If your server includes a second power supply, connect the second AC power cord to the left inlet labeled (2). You may connect the second power supply to the same AC circuit as the first supply. However, for increased system redundancy you should connect each power supply to a separate circuit.

6. **Set up a console for your server.**

   You must either attach an ASCII terminal to serial port A, establish a `tip` connection over a serial line, or else install a graphics card and attach a monitor, mouse, and keyboard. For more information, see "About Communicating With the Server" on page 28.

7. **Configure the network interface.**

   The system's standard network interface is a switchable 10BASE-T/100BASE-TX Ethernet interface conforming to the IEEE 802.3u Ethernet standard. The interface configures itself automatically for either 10-Mbps or 100-Mbps operation, depending on network characteristics.

   Supported PCI cards allow connection to additional Ethernet networks, or to token ring, FDDI, or other network types.

   - If you're using the standard Ethernet interface, see "How to Configure the Standard Ethernet Interface" on page 47.
   - If you're using a PCI network interface, see the documentation accompanying the PCI network card.

8. **Turn on power to your server.**

   See "How to Power On the System" on page 34. For information about the LED status indicators that appear during power-up, see "About the Status and Control Panel" on page 7.

9. **Install and boot the operating system software.**

   The operating system software is ordered separately from your system hardware. See "How to Install the System Software" on page 37 and "How to Select the Boot Device" on page 40.

10. **Decide on your internal disk array configuration.**

    For information about possible configurations, see "About Disk Array Configurations and Concepts" on page 69. Consult the *Solstice DiskSuite User's Guide* for information about implementing your disk configuration.

11. **Load additional software from the server media kit.**

    The server media kit (sold separately) includes several CD-ROM discs containing software to help you operate, configure, and administer your server. This software may include:

    - The Solaris™ 2.6 Hardware 5/98 or the Solaris™ 7 Hardware 8/99 operating environments
    - Updates for Solaris Operating Environment for Sun
    - Solaris Desktop
    - Solstice DiskSuite™
    - Solstice AdminSuite™
    - Solstice AutoClient™
    - Solstice Backup™

    See the appropriate documents provided in the server media kit for a complete listing of included software and detailed installation instructions.

12. **Load the Sun Enterprise 420R Server Hardware AnswerBook2 online documentation.**

    See the installation instructions that accompany the CD-ROM disc in the Sun Enterprise 420R documentation set.

About Server Rackmounting

The server may be mounted in any rack that meets the Electronic Industries Association (EIA) standard specification-310 (EIA 310). The system enclosure measures 7.00 inches high, 17.25 inches wide, and 27.25 inches deep (17.8 cm x 43.8 cm x 69.2 cm) and requires a minimum of four vertical rack units (RUs). The system has a maximum weight of 65 lb (34 kg).

Shipped with your system is the *Sun Enterprise 420R Server Setup and Rackmounting Guide* that describes the procedure for rackmounting the server. Use the guide to rackmount your server.

Rackmounting guidelines:

■ Install the slide assemblies for the first server in the lowest permissible rack position.

■ For stability, install the remaining servers from the lowest system upward into the rack, as shown in the next figure.

■ To mount the server in an EIA standard rack, allow four RUs per system to obtain the highest density in the rack. Use the supplied Rack Buddy rackmounting template to locate the correct holes for server placement in the rack.

Note – For the latest configuration information about mixing different systems or peripherals in standard EIA 310-compliant racks, and for information about Sun's rackmounting cabinets consult the *Rackmount Placement Matrix* located at the URL `http://docs.sun.com`. At the site, click on Storage and Peripherals, find *Rackmount Placement Matrix* among the AnswerBook2 collection titles, and click on the link to display the book.

You need to use the Rack Buddy to help decide at what height in the rack rail you will install the server slide assemblies (and other subsequent server slide assemblies). For example, an empty Sun cabinet might have 36 vertical RUs and could support up to nine servers. To maximize server density in a 72-inch (182.8-cm) rack, install the slide assembly brackets starting for the lowest enclosure at rail hole 3 (in an empty rack), and add subsequent brackets at rail holes 15, 27, 39, 51, 63, 75, 87, and 99.

Caution – A ground screw hole is located in the lower right corner of the chassis back panel. For more information about rackmounting peripherals, see the documentation accompanying the peripheral.
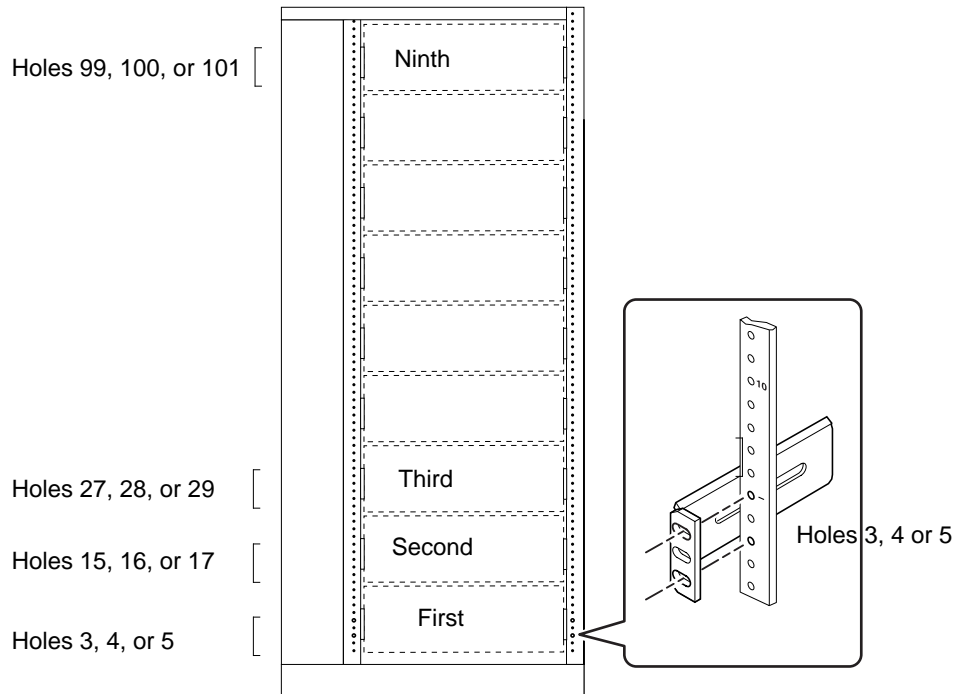
Front view representation of nine servers in a 36 RU cabinet

How to Remove the System From the Rack

With the exception of removing and replacing the main logic board, qualified service providers can perform all other service procedures while the system is extended from the rack and still attached to the rack rails. If qualified service providers want to remove the system from the rack for any other reason, they should follow the instructions in this section.

Caution – Unless the rack is bolted to the floor, you must extend the cabinet's anti-tip legs and adjust their stabilizing feet to the floor. Level and secure the cabinet to provide a safe working environment.

Caution – The chassis is heavy. Two people are required to remove the system from the rack enclosure in the following procedure.

Before You Begin

Complete this task:

- Identify a helper to assist you in removing the system

Discuss the task and verify that your helper can safely lift and carry 34 lbs (17kg), which is approximately half the weight of a fully-equipped system.

Review the steps in the next section with your helper beforehand and discuss how to coordinate your efforts to ensure your mutual safety.

Caution – When completing a two-person procedure, always communicate your intentions clearly before, during, and after each step to minimize confusion.

What to Do

1. **Extend the server from the rack, and then position one person on each side of the system, facing the system glides.**

   When you are both in position, verify that your helper understands what to do with the system after you release the server and remove it. Also agree on a route to follow, and visually inspect it for potential safety hazards (for example, cables on the floor, other people working in the vicinity, and so on).

2. **Locate the flat spring catch shown in the following figure.**

   Each person should visually locate one of the two flat spring catches that release the system from the rack glide. One catch is attached to each inner glide, as shown in the following figure:
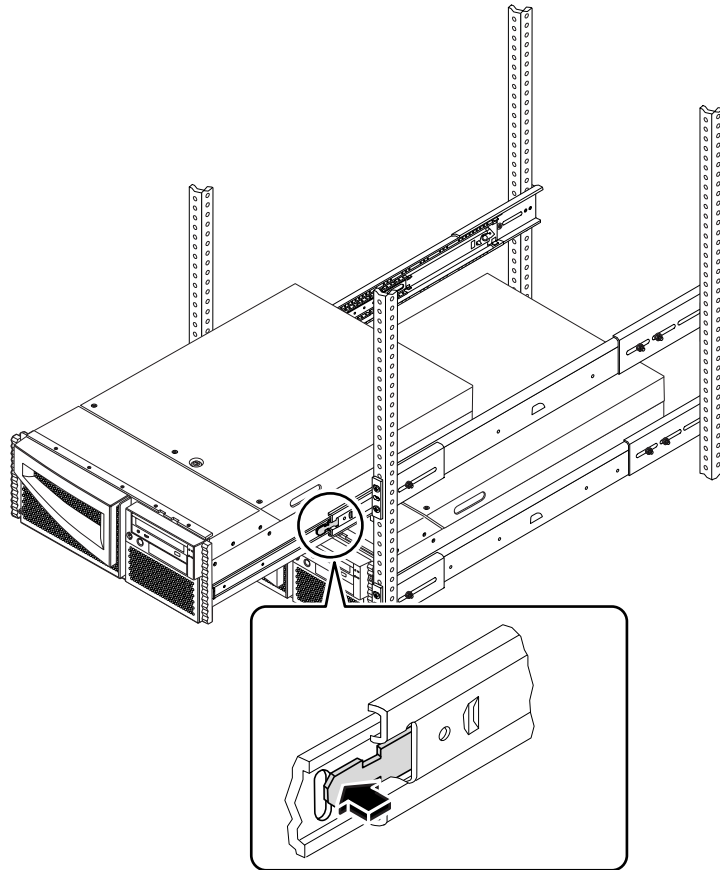
3. **Prepare to remove the system.**

   Each person should place one hand on the flat spring catch and the other hand beneath the chassis, palm up, ready to support the weight of the chassis.

4. **Simultaneously press in on both flat spring catches to release them, and then slide the system out of the glides.**

   Each person presses one spring catch and helps slide the system free of the outer glide, supporting the weight of the system with both hands as the system slides free of the rack.

5. **Set the system on a workbench or other stable surface**.

6. **Slide the empty rack slides back into their protective outer glides**.

7. **Reattach, close, and lock the rack doors as appropriate.**

What Next

For information about placing the system into the rack glides, see:

- "How to Place the System Into the Rack" on page 23

How to Place the System Into the Rack

This procedure assumes that the slide assembly is already installed in the rack. For additional information on the slide assemblies and rack enclosers, see the setup guide and the owner's guide.

Caution – The chassis is heavy, and two people are required to place the system into the rack slide assembly in the following procedure.

Before You Begin

Complete the following tasks:

- Identify a helper to assist you in removing the system.
- Verify that your helper can safely lift and carry 34 lbs (17kg), which is approximately half the weight of a fully-equipped system.
- Assemble the correct tools for the procedure. See "Tools Required for Setup and Rackmounting" on page 12.
- Open (and remove) the rack enclosure front door.
- Slide each rack assembly's inner slide back into its assembly until the slide comes to a complete stop against the interior glide tab.

Caution – When completing a two-person procedure, always communicate your intentions clearly before, during, and after each step to minimize confusion.

What to Do

1. **Extend the cabinet's anti-tip legs.**

   Caution – Unless the rack is bolted to the floor, you must extend the cabinet's anti-tip legs and adjust their stabilizing feet to the floor. Level and secure the cabinet to provide a safe working environment. See "Tools Required for Setup and Rackmounting" on page 12 for useful tools required for this procedure.

2. **Position one person on each side of the system, facing the inner glides on the system chassis.**

   When you are both in position, verify that your helper understands what to do with the system after you lift it. Also agree on a route to follow to the rack enclosure, and visually inspect it for potential safety hazards (for example, cables on the floor, other people working in the vicinity, and so on).

3. **Lift the system.**

   Each person should place both hands beneath the chassis and support half the weight of the system.

4. **Carry the system from its location to the front of the rack enclosure.**

5. Insert the system glides into the inner slides of the rack glides.

Verify that the empty rack slides are completely inside their protective outer glides. Slide the crimped end of each system glide into the corresponding inner slide within the rack glide.
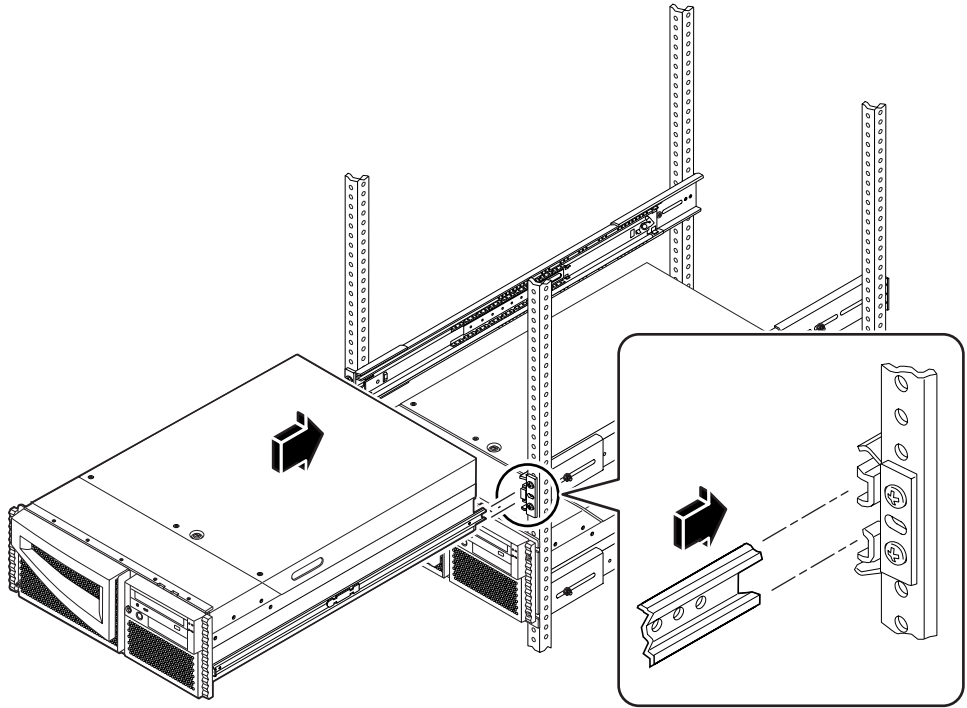
6. Slide the system smoothly into the rack slide assemblies until it stops inside the rack enclosure.

The flat spring catches on both slide assemblies stop the slide assembly as you push the server into the rack.

7. **Simultaneously press in on both flat spring catches and slide the system completely into the rack.**

   Each person presses one spring catch and helps slide the system completely into the rack enclosure.
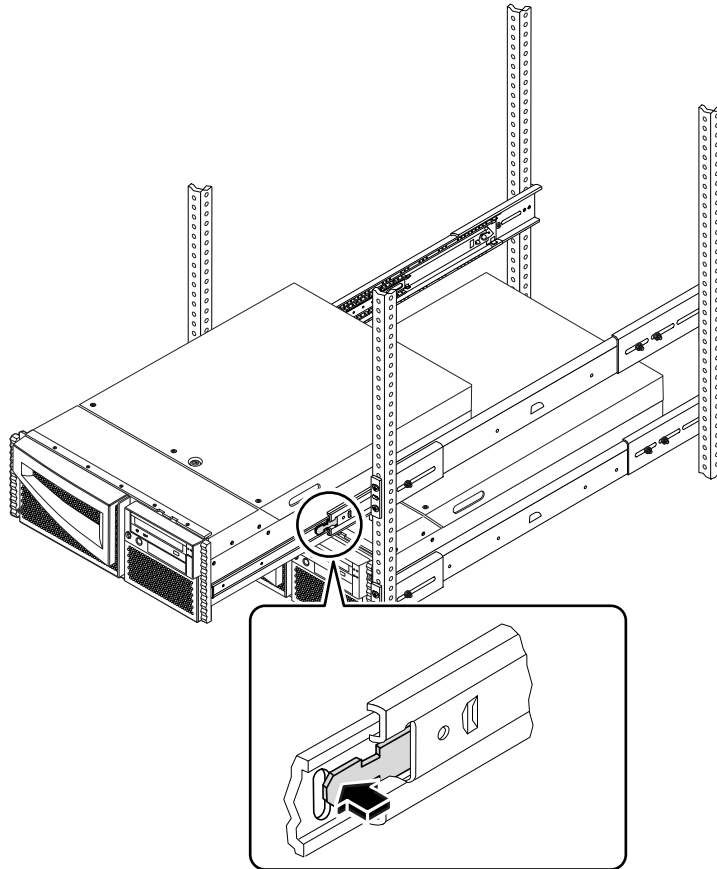
8. **Tighten the four captive screws securing the system to the left and right vertical rails at the front of the rack.**

   Use a Phillips #2 screwdriver to tighten the four captive screws, which are in recessed access holes in the filler panels affixed to the system's front panel.
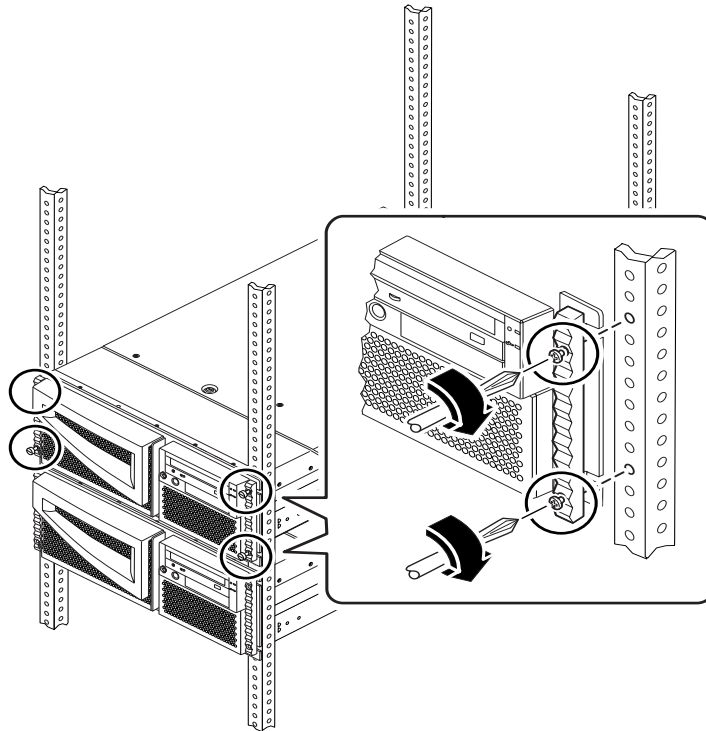
9. **Reconnect every external cable previously attached to the back panel of the system.**

   As you reconnect each cable, check it for information indicating the cable's origin and its terminating connection.

10. **Reattach, close, and lock the rack door(s) as appropriate.**

What Next

To power on the system, see:

■ "How to Power On the System" on page 34

About Communicating With the Server

To install your server software or to diagnose problems, you need some way to enter system commands and view system output. There are three ways to do this.

1. Attach an ASCII character terminal, also called an alphanumeric terminal, to serial port A.

   You can attach a simple terminal (or modem line) to serial port A. The terminal can be capable of displaying and entering alphanumeric but not graphical data. For instructions, see "How to Attach an Alphanumeric (ASCII) Terminal" on page 29.

2. Establish a `tip` connection from another Sun system.

   For information about establishing a `tip` connection, see "Setting Up a tip Connection" on page 119 or the *OpenBoot 3.x Command Reference Manual*, an online version of which is included with the *Solaris System Administrator AnswerBook* that ships with Solaris software.

3. Install a local graphics console on your server.

   The server is shipped without a mouse, keyboard, monitor, or frame buffer for the display of graphics. To install a local graphics console on a server, you must install a graphics frame buffer card into a PCI slot, and attach a monitor, mouse, and keyboard to the appropriate back panel ports. For detailed instructions, see "How to Configure a Local Graphics Console" on page 31.

How to Attach an Alphanumeric (ASCII) Terminal

Before You Begin

If your server is configured without a local graphics console, you need to attach an alphanumeric (ASCII) terminal (or establish a `tip` connection) to the server in order to install the system software and to run diagnostic tests. For background information, see "About Communicating With the Server" on page 28.

Alternatively, you can install a local graphics console on the server; see "How to Configure a Local Graphics Console" on page 31.

For information about establishing a `tip` connection, see "Setting Up a tip Connection" on page 119 or see the *OpenBoot 3.x Command Reference Manual*, an online version of which is included with the *Solaris System Administrator AnswerBook2* that ships with Solaris software.

What to Do

1. Connect the terminal's data cable to serial port A on the server's back panel.
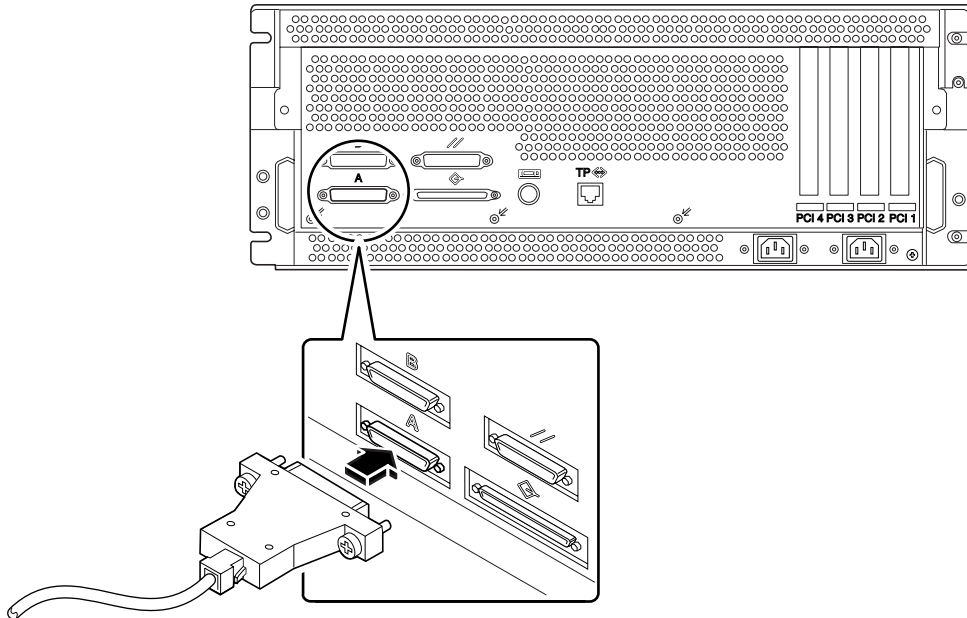
2. Connect the terminal's power cable to an AC outlet.

3. Set the terminal to receive:

- At 9600 baud
- An 8-bit signal with no parity and 1 stop bit

See the documentation accompanying your terminal for more information.

What Next

You can now issue system commands from the terminal keyboard and view system messages. Continue with your installation or diagnostic procedure as needed.

How to Configure a Local Graphics Console

Before You Begin

If your server is configured without a local graphics console, you need to install one in order to install the system and to run diagnostic tests. For background information, see "About Communicating With the Server" on page 28.

Alternatively, you can attach an alphanumeric (ASCII) terminal (or a modem serial line) to the system's serial port; see "How to Attach an Alphanumeric (ASCII) Terminal" on page 29.

To install a local graphics console, you must have:

- A supported PCI-based graphics frame buffer card
- A monitor with appropriate resolution
- A Sun-compatible keyboard
- A Sun-compatible mouse and mouse pad

What to Do

1. **Install the graphics card into a vacant PCI slot.**

   Note – Installation must be performed by a qualified service provider. For further information, see the *Sun Enterprise 420R Server Service Manual*, or contact your qualified service provider.

2. Attach the monitor video cable to the graphic card's video port.

Tighten the thumbscrews to secure the connection.
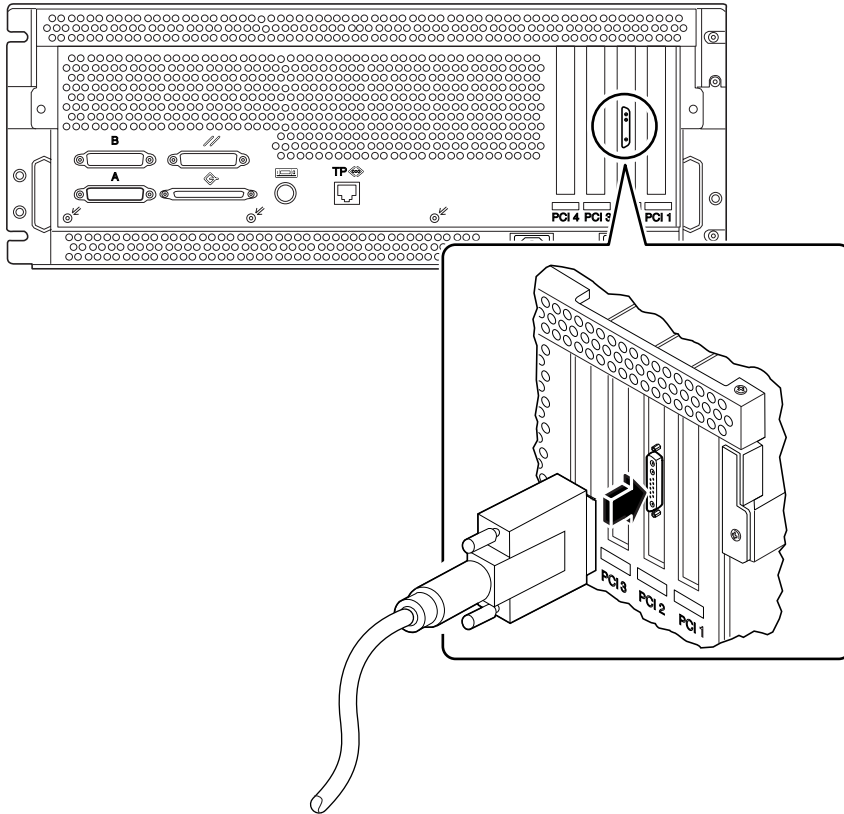
3. Connect the monitor's power cord to an appropriate AC power outlet.

4. Connect the keyboard cable to the server's keyboard/mouse port.
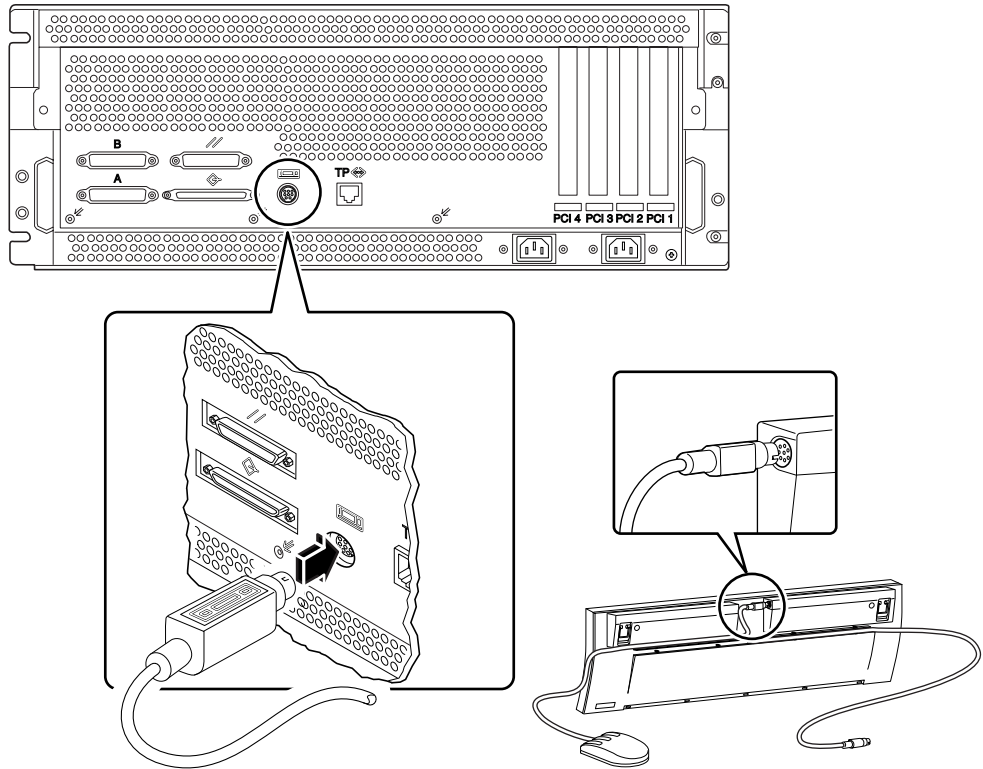
5. Connect the mouse cable to the appropriate receptacle on the keyboard.

What Next

You can now issue system commands from the keyboard and view system messages.
Continue with your installation or diagnostic procedure as needed.

How to Power On the System

Before You Begin

If a terminal or local console is not already connected to the system, you need to install one before continuing the startup procedure. For information, see:

- "About Communicating With the Server" on page 28
- "How to Configure a Local Graphics Console" on page 31

Note – If you have just installed an internal or external storage device, or any new part that plugs into the main logic board; power on the system *after* performing a reconfiguration boot. The operating system cannot recognize newly added devices or parts *until* you have performed a reconfiguration boot. The new boot will add any new devices to the factory-configured device tree. For more information see "How to Initiate a Reconfiguration Boot" on page 96.

What to Do

Caution – Never move the system when system power is on. Movement can cause catastrophic disk drive failure. Always power off the system before moving it.

Caution – Before you power on the system, make sure that the top cover is properly installed.

1. **Turn on power to any peripherals and external storage devices.**

   Read the documentation supplied with the device for specific instructions.

2. **Turn on power to the monitor or terminal.**

   A terminal or monitor is required for viewing system messages. For setup instructions, see "How to Attach an Alphanumeric (ASCII) Terminal" on page 29 or "How to Configure a Local Graphics Console" on page 31.

3. **Turn the front panel keyswitch to the Power-On/Off position.**

   See "About the Status and Control Panel" on page 7 for information about each keyswitch setting.

4. **Press the front panel Power button once.**

   See "Keyswitch Settings" on page 8 for information about each keyswitch setting.

Power-On/Off position

Power button
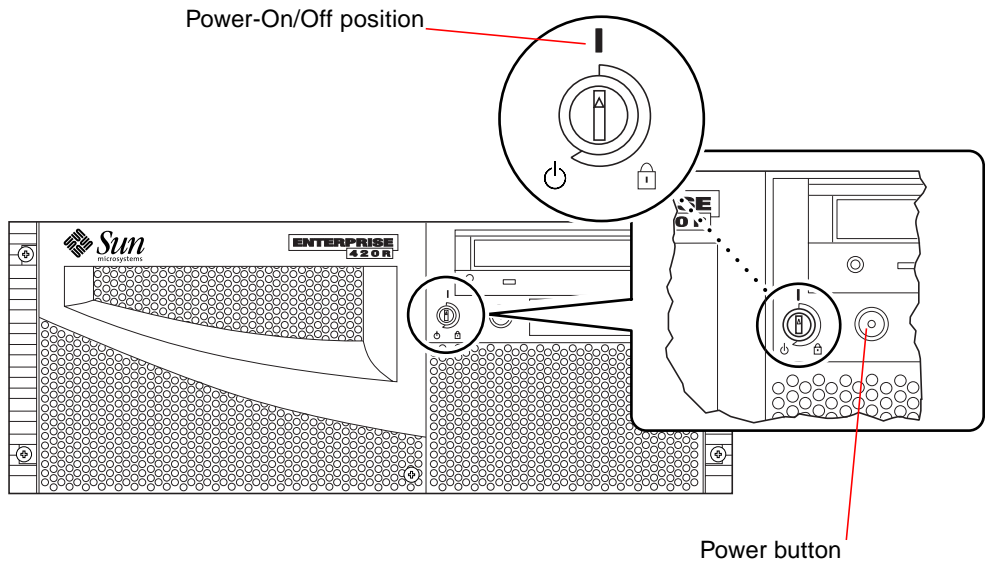
Note – The system may take anywhere from 30 seconds to two minutes before video is displayed on the system monitor or the ok prompt appears on an attached terminal. This time depends on the level of power-on self-test (POST) diagnostics being performed.

---

5. Turn the keyswitch to the Locked position.

The Locked position prevents *accidentally* powering-off the system. See "Keyswitch Settings" on page 8 for information about each keyswitch setting.

Locked position
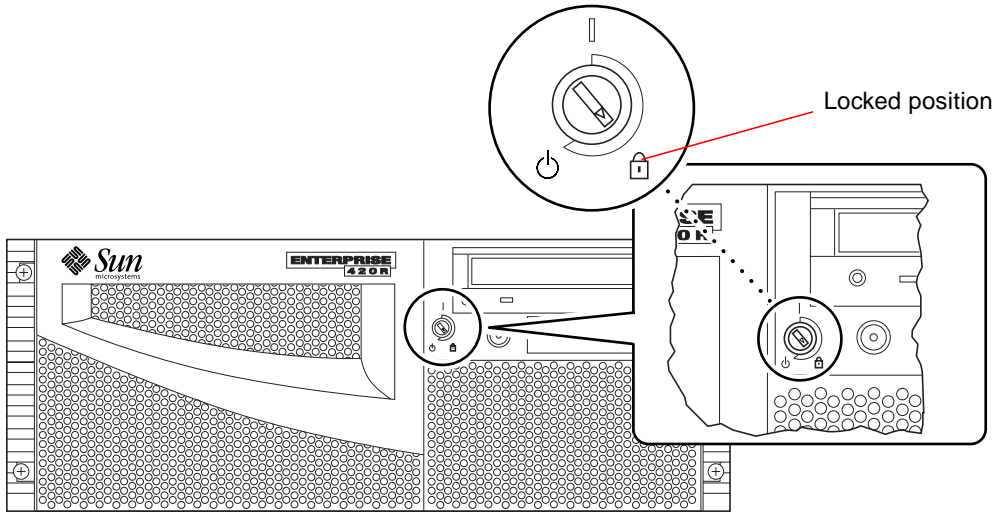
How to Install the System Software

Before You Begin

The operating environment software is ordered separately from your system hardware.

If a terminal or local console is not already connected to the system, you need to install one before continuing the startup procedure, see:

- "About Communicating With the Server" on page 28
- "How to Configure a Local Graphics Console" on page 31

Note – Do not use the power-on procedure in the previous section if you have just installed an internal or external storage device, or any new part that plugs in to the main logic board. The operating system cannot recognize newly added devices or parts *until* you have performed a reconfiguration boot. The new boot will add any new devices to the factory-configured device tree. To power on the system after adding optional devices or parts, see "How to Initiate a Reconfiguration Boot" on page 96.

The method that you will use to boot your system depends on how you will configure the system.

What to Do

The Sun Enterprise 420R server requires the Solaris 2.6 Hardware 5/98 operating environment or the Solaris 7 Hardware 8/99 operating environment, and subsequent compatible operating system releases.

Solaris 2.6 Hardware 5/98 Installation Requirement

Installing the Operating System From CD-ROM

If you are installing Solaris 2.6 Hardware 5/98 software, you will use a two CD-ROM process. First you use the *Operating Environment Installation CD* included with your system, then you will use the Solaris release CD-ROM from your media kit.

Follow the instructions in *Installing Solaris 2.5.1 or Solaris 2.6 Software on 419+Mhz Systems* (part number 806-2156). This document and the accompanying CD-ROM ships with your Sun Enterprise 420R system.

Note – This document describes a command line-based Solaris installation for headless servers via a `tip` connection or a terminal. Use this document, or its subsequent version accompanying the *Operating Environment Installation CD*, to install the system software.

The *Operating Environment Installation CD* will prompt you interactively for answers, and at the end of the process you will be prompted to insert the Solaris release CD-ROM from the Solaris media kit.

The operating environment CD-ROM installation installs certain software upgrade patches to support your new hardware, before you can use the Solaris release CD-ROM.

Installing the Operating System From a Network Boot Server

Follow the instructions in *Installing Solaris 2.5.1 or Solaris 2.6 Software on 419+Mhz Systems* (part number 806-2156). This document and the accompanying CD-ROM ships with your Sun Enterprise 420R system.

Note – This document describes a command line-based Solaris installation for headless servers via a `tip` connection or a terminal. Use this document, or the subsequent version accompanying the *Operating Environment Installation CD*, to install the system software.

Then follow the normal `boot net` or `boot net - install` procedure, depending on your desired boot device.

Solaris 7 Software Installation

Installing the Operating System From CD-ROM

Follow the installation instructions accompanying the Solaris release CD-ROM in the Solaris media kit. Also in the media kit is the *Solaris on Sun Hardware Platform Guide*, which you should read for platform specific information about the system software installation.

Installing the Operating System From a Network Boot Server

See the installation instructions accompanying your Solaris software. Also read the *Solaris on Sun Hardware Platform Guide*, which contains platform specific information about the system software installation. Then follow the normal `boot net` or `boot net - install` procedure, depending on your desired boot device.

How to Select the Boot Device

Before You Begin

Before you can select a boot device, you must complete the installation procedure; see:

- "How to Install the Sun Enterprise 420R Server" on page 13

Specifically, you must perform the following tasks:

- Set up a system console; see "About Communicating With the Server" on page 28
- Power on the system; see "How to Power On the System" on page 34

If you want to boot across a network interface, then you must also perform the following tasks:

- Configure the Ethernet port; see "How to Configure the Standard Ethernet Interface" on page 47
- Attach the Ethernet port to a network; see "How to Attach a Twisted-Pair Ethernet (TPE) Cable" on page 52

The device that is used to boot the system is determined by the setting of an OpenBoot firmware configuration parameter called `boot-device`. The default order of settings of this parameter is `disk net`. Because of this setting, the firmware first attempts to boot from the system hard drive, and if that fails, then from the main logic board Ethernet interface.

The following procedure assumes that you are familiar with the OpenBoot firmware and that you know how to enter the OpenBoot environment. For more information about the OpenBoot firmware, see the *OpenBoot 3.x Command Reference Manual* in the *Solaris System Administrator AnswerBook* collection for your specific Solaris release.

What to Do

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

   ```
   ok setenv boot-device device-specifier
   ```

   where the *device-specifier* is one of the following:
   - `cdrom` – Selects the CD-ROM drive
   - `disk` – Selects the hard disk
   - `tape` – Selects the SCSI tape drive
   - `net` – Selects the Ethernet interface on the main logic board
   - *full path name* – Selects the Ethernet interface specified by the path name

   ---

   Note – You can also specify the name of the program to be booted as well as the way the boot program operates. For more information, see the *OpenBoot 3.x Command Reference Manual* in the *Solaris System Administrator AnswerBook* collection for your specific Solaris release.

   If you want to select a network interface other than the system board Ethernet interface as the default boot device, you can determine the full path name of each interface, by typing:

   ```
   ok show-devs
   ```

   The `show-devs` command lists all the installed system devices (including any PCI network interface(s)). The output displays the full path name of each PCI device. An example of a PCI path name is shown below:

   ```
   /pci@1f,4000/ebus@1/SUNW,pll@14,504000
   ```

2. **To reboot the system from the new boot device, type:**

   ```
   ok reset
   ```

   Note – You can also power cycle the system using the front panel keyswitch and Power button. See "How to Power On the System" on page 34 for more information.

What Next

For more information about using the OpenBoot firmware, see the *OpenBoot 3.x Command Reference Manual* in the *Solaris System Administrator AnswerBook* collection for your specific Solaris release.

How to Power Off the System

Caution – Before turning off system power, halt the operating system as described below. Failure to halt the operating system properly can result in loss of disk drive data.

What to Do

1. **Notify users that the system will be powered down.**

2. **Back up the system files and data, if necessary.**

3. **Halt the operating system using the appropriate commands.**

   Refer to the *Solaris Handbook for Sun Peripherals* that corresponds to your operating system.

4. **Wait for the system halt messages and the** `ok` **prompt.**

   Note – If the system hangs, holding the Power button down for five seconds while the keyswitch is in the Power On/Off positon, will cause an immediate hardware power off.

5. **Turn the keyswitch on the front panel of the system to the Standby position.**

Standby position
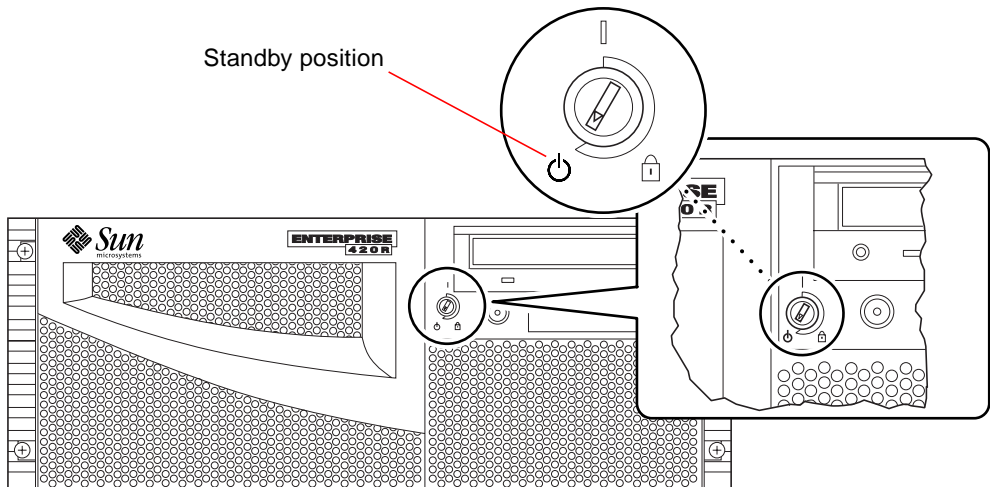
Administration and Network Setup

This chapter focuses on the administrative information and tasks associated with configuring Ethernet interfaces and on booting from a PCI-based Ethernet device installed in the server.

The following network information and associated tasks are covered in this chapter:

About Network Interface Options

The system's main logic board provides an auto-sensing, switchable 10BASE-T/100BASE-TX Ethernet interface conforming to the IEEE 802.3u Ethernet standard. The interface configures itself automatically for either 10-Mbps or 100-Mbps operation, depending on network characteristics.

A back panel connector provides access to the built-in Ethernet interface:

■ The RJ-45 connector for connecting a twisted-pair Ethernet (TPE) cable

For instructions on configuring the main logic board Ethernet interface, see "How to Configure the Standard Ethernet Interface" on page 47. For information about operating characteristics and configuration parameters for the hme Fast Ethernet device driver, see *Platform Notes: The Fast Ethernet Device Driver*. This document is available on *Solaris on Sun Hardware AnswerBook*, which is provided on the *Solaris Supplement CD* for the Solaris release you are running.

Additional network interfaces are available through PCI cards, providing connection to Ethernet, token ring, fiber distributed data interface (FDDI), and other network types. For more information, see "How to Add an Ethernet Interface" on page 49 and the documentation supplied with the PCI network interface card.

How to Configure the Standard Ethernet Interface

Before You Begin

You must perform the following tasks:

- Complete the prerequisite steps in "How to Install the Sun Enterprise 420R Server" on page 13
- Determine which Ethernet port you want to use; see "About Network Interface Options" on page 46
- Attach a cable to the Ethernet port; see "How to Attach a Twisted-Pair Ethernet (TPE) Cable" on page 52

Note – You can configure only one Ethernet interface during installation of the operating system. To configure additional interfaces, see "How to Add an Ethernet Interface" on page 49.

What to Do

1. **Assign a host name to the machine.**

   The host name must be unique within the network. It can be made up of characters and numbers. Do not use a dot in the host name. Do not begin the name with a number or a special character.

2. **Determine the IP address for the interface.**

   Your network administrator must assign an IP address. Each network device or interface must have a unique IP address.

3. **Resume the installation of the system.**

   See "How to Install the Sun Enterprise 420R Server" on page 13. When installing the operating system, you will be prompted to enter the host name and IP address of the machine.

Note – If you have installed a PCI card as a second Ethernet interface, the operating system asks you to select a primary network interface and then prompts you for its host name and IP address. You must configure the second interface separately, after the operating system is installed. See "How to Add an Ethernet Interface" on page 49.

Note – This system conforms to the Ethernet 10/100BASE-TX standard, which states that the Ethernet 10BASE-T link integrity test function should always be enabled on both the host system and the Ethernet hub. If you have problems verifying connection between this system and your hub, verify that the Ethernet hub also has the link test function enabled. See "Network Communications Failure" on page 145 and refer to the manual provided with your hub for more information about the link integrity test function.

What Next

After completing this procedure, the Ethernet harware interface is ready for operation. However, in order for other network devices to communicate with the system, your network administrator must enter the system's IP address and host name into the namespace on the network name server. For information about setting up a network name service, consult the *Solaris System Administrator AnswerBook* for your specific Solaris release.

The hme Fast Ethernet device driver for the system's standard Ethernet interface is automatically installed with the Solaris release. For information about operating characteristics and configuration parameters for the hme driver, see *Platform Notes: The hme Fast Ethernet Device Driver*. This document is available on the *Solaris on Sun Hardware AnswerBook*, which is provided on the *Solaris Supplement CD* for the Solaris release you are running.

If you want to install and configure an additional network interface by means of a PCI card, you must configure it separately, after installing the operating system; see:

■   "How to Add an Ethernet Interface" on page 49

How to Add an Ethernet Interface

Before You Begin

Follow this procedure to install a PCI card for an additional Ethernet interface.

You must perform the following tasks:

■ Install the system; see "How to Install the Sun Enterprise 420R Server" on page 13

Note – The following procedure must be performed by a qualified service provider. If you are not a qualified service provider, contact Sun Customer Service through your nearest authorized Sun sales representative.

■ Install any additional PCI Ethernet interface cards that you wish to configure; see the Sun Enterprise 420R Server Service Manual
■ Attach a cable to the new Ethernet port and to the network; see "How to Attach a Twisted-Pair Ethernet (TPE) Cable" on page 52

What to Do

1. **Assign a network host name to the interface.**

   The host name must be unique within the network. It can be made up of characters and numbers. Do not use a dot in the host name. Do not begin the name with a number or a special character.

   Usually an interface host name is based on the machine host name. For example, if the machine is assigned the host name `zardoz`, then the additional Ethernet interface could be named `zardoz-1`. The machine's host name is assigned when the operating system software is installed. For more information, see the installation instructions accompanying the Solaris software.

2. **Determine the IP address for the interface.**

   An IP address must be assigned by your network administrator. Each interface on a network must have a unique IP address.

3. **Boot the operating system and log on to the system as superuser.**

   Type the following command at the system prompt and the superuser password:

   ```
   zardoz # su
   Password:
   ```

4. **Create an appropriate** `/etc/hostname` **file for the new interface.**

   The name of the file you create should be of the form `/etc/hostname.`*typenum*, where *type* is the Ethernet type identifier (some common types are `hme`, `le`, `nf`, and `ie`) and *num* is the logical number of the interface according to the order in which it was installed in the system.

   For example, the standard interface provided on the system's main logic board is `hme0` (*type* = `hme`, *num* = 0). If you add a SunSwift™ PCI Ethernet adapter card as a second `hme` interface, the file name should be `hostname.hme1`.

   Note – The documentation accompanying the Ethernet interface should identify its type. Alternatively, you can enter the `show-devs` command from the `ok` prompt to obtain a list of all installed devices.

   The host name has an associated IP address that you enter in the `/etc/hosts` file. See Step 6.

5. **Type the host name, assigned in Step 1, to the** `/etc/hostname` **file for the new interface.**

   Following is an example of the `/etc/hostname` files required for a machine called `zardoz`, which has two Ethernet interfaces—the standard on-board Ethernet interface (`hme0`) and a second interface provided by a PCI Ethernet adapter card (`hme1`). The host name will be `zardoz` to a network connected to the standard `hme0` interface, and `zardoz-1` to a network connected to the `hme1` interface.

   ```
   zardoz # cat /etc/hostname.hme0
   zardoz
   zardoz # cat /etc/hostname.hme1
   zardoz-1
   ```

6. **Create an entry in the** `/etc/hosts` **file for each active Ethernet interface.**

An entry consists of the IP address and the host name for each interface.

The following example shows the entries in the `/etc/hosts` file for the interfaces identified in the `/etc/hostname` file created in Step 4 and Step 5.

```
zardoz # cat /etc/hosts
...
127.0.0.1      localhost
129.144.10.57 zardoz     loghost
129.144.11.83 zardoz-1
```

7. **Reboot the system; type:**

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

This command rebuilds the device trees so that the system will recognize the newly installed PCI Ethernet adapter card.

What Next

After completing this procedure, the Ethernet interface is ready for operation. However, in order for other network devices to communicate with the system through this interface, the interface information (its IP address and host name) must be entered into the namespace on the network name server. For information about setting up a network name service, consult the *Solaris System Administrator AnswerBook* for your specific Solaris release.

How to Attach a Twisted-Pair Ethernet (TPE) Cable

Before You Begin

If you are attaching a twisted-pair Ethernet (TPE) cable to the system's standard Ethernet interface, you must perform the following task:

- Complete prerequisite steps in "How to Install the Sun Enterprise 420R Server" on page 13

If you are installing an additional Ethernet interface, you must perform the following tasks:

- Install the system; see "How to Install the Sun Enterprise 420R Server" on page 13
- Install a PCI Ethernet interface card; see the Sun Enterprise 420R Server Service Manual

What to Do

1. **Locate the RJ-45 connector for the appropriate Ethernet interface.**

   The system comes with one TPE connector on the back panel. Your system may also include one or more additional TPE connectors provided via PCI Ethernet interface cards.

2. **Plug in the TPE cable to the appropriate RJ-45 connector.**

   You should hear the connector tab snap into place.
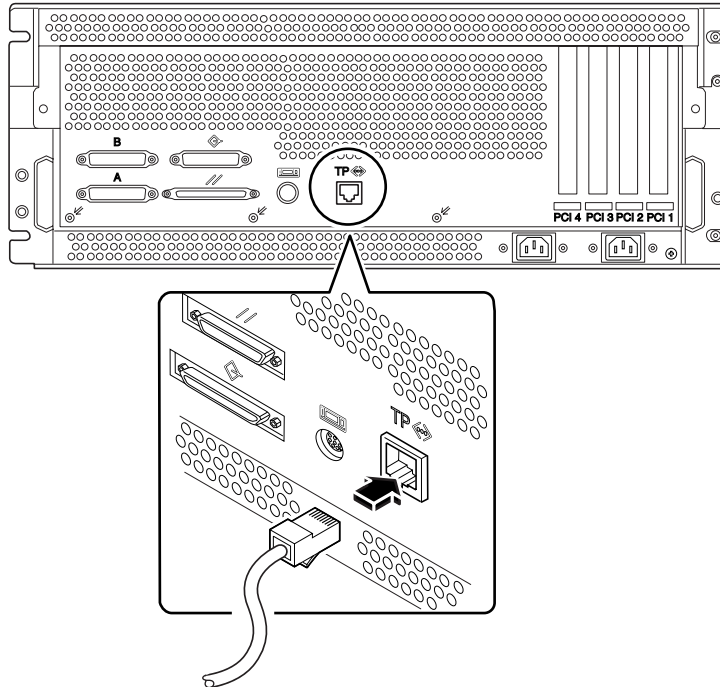
3. Plug in the other end of the cable to the TPE outlet in the wall or the floor.

You should hear the connector tab snap into place.

See your network administrator if you need more information about how to connect to your network.

What Next

If you are installing your system, complete the installation procedure. Return to:

■ "How to Install the Sun Enterprise 420R Server" on page 13

If you are adding additional interfaces to the system, then you need to configure those interfaces; see:

■ "How to Add an Ethernet Interface" on page 49

How to Boot the System Using the Standard Ethernet Interface

Before You Begin

Before you can boot the system over a network interface, you must complete the installation procedure; see:

■ "How to Install the Sun Enterprise 420R Server" on page 13

Specifically, you must perform the following tasks:

■ Set up a system console; see "About Communicating With the Server" on page 28
■ Configure the Ethernet port; see "How to Configure the Standard Ethernet Interface" on page 47
■ Attach the Ethernet port to a network; see "How to Attach a Twisted-Pair Ethernet (TPE) Cable" on page 52
■ Power on the system; see "How to Power On the System" on page 34

Note – To boot the system over an Ethernet network, it is necessary that there be a bootable image for Sun4u architecture somewhere on the network. For details, see the installation instructions accompanying your Solaris software.

What to Do

● **At the** ok **prompt, type either of the two following commands:**

a. **To load the operating system into the server's volatile memory, type:**

```
ok boot net
```

Note – Because the operating system is only in volatile memory, it is not retained across power cycles.

---

b. To install the operating system onto the server's internal system disk, type:

```
ok boot net - install
```

Both commands boot the system, and the system console displays the system prompt.

What Next

If you want to use the main logic board Ethernet interface as the default boot device, you must change the value of certain OpenBoot parameters. For more information, see the *OpenBoot 3.x Command Reference Manual* in the *Solaris System Administrator AnswerBook* for your specific Solaris release.

How to Boot the System Using a PCI-Based Ethernet Interface

Before You Begin

Before you can boot the system over a network interface, you must complete the installation procedure; see:

■ "How to Install the Sun Enterprise 420R Server" on page 13

Specifically, you must perform the following tasks:

■ Set up a system console; see "About Communicating With the Server" on page 28
■ Configure the PCI-based Ethernet port; see "How to Add an Ethernet Interface" on page 49
■ Connect the Ethernet port to a network; see "How to Attach a Twisted-Pair Ethernet (TPE) Cable" on page 52
■ Power on the system; see "How to Power On the System" on page 34

Note – To boot the system over an Ethernet network, it is necessary that there be a bootable image for Sun4u architecture somewhere on the network. For details, see the installation instructions accompanying your Solaris software.

What to Do

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

```
ok show-devs
```

The show-devs command lists the system devices. It displays the full path name of the hme device, similar to the example below:

```
/pci@1f,4000/pci@5/SUNW,hme@0,1
```

2. **Change the default net device. At the** `ok` **prompt, type:**

```
ok nvalias net hme_path
ok nvstore
```

where *hme_path* is the full path name of the `hme` device—in this example, `/pci@1f,4000/pci@5/SUNW,hme@0,1`.

3. **Load and boot the operating system over the network interface. Enter either of the following commands:**

   a. **To load the operating system into the server's volatile memory, type:**

```
ok boot net
```

Note – Because the operating system is only in volatile memory, it is not retained across power cycles.

---

   b. **To install the operating system onto the server's internal system disk drive, type:**

```
ok boot net - install
```

Both commands boot the system, and the system console displays the system prompt.

What Next

If you want to use this Ethernet interface as the default boot device, you must permanently change the value of the `boot-device` parameter. For more information, see:

■ "How to Select the Boot Device" on page 40

■ *OpenBoot 3.x Command Reference Manual* in the *Solaris System Administrator AnswerBook* for your specific Solaris release

Hardware Configuration

This chapter describes the hardware configuration of the system. Topics covered in this chapter include:

About Reliability, Availability, and Serviceability Features

Reliability, availability, and serviceability are three aspects of a system's design contributing to continuous operation and minimizing system downtime for service. Reliability refers to a system's ability to operate continuously without failures and to maintain data integrity. System availability refers to the percentage of time that a system remains accessible and usable. Serviceability relates to the time it takes to restore a system to service following a system failure. Together, reliability, availability, and serviceability provide for near continuous system operation.

To deliver high levels of reliability, availability, and serviceability, the system offers the following features:

- Error correction and parity checking for improved data integrity
- Easily accessible status indicators
- Hot-pluggable disk drives
- Support for RAID 0, 1 storage configurations on internal drives
- Support for RAID 0, 1, 0 +1, and 5 storage configurations on external disk drives
- Redundant power supply support
- Hot-swappable power supplies
- Four different levels of system diagnostics

Error Correction and Parity Checking

Error-correcting code (ECC) is used on all internal system data paths to ensure high levels of data integrity. All data that moves between processors, I/O, and memory have end-to-end ECC protection.

The system reports and logs correctable ECC errors. A correctable ECC error is any single-bit error in a 64-bit field. Such errors are corrected as soon as they are detected. The ECC implementation can also detect double-bit errors in the same 64-bit field and multiple-bit errors in the same nibble (4 bits).

In addition to providing ECC protection for data, the system offers parity protection on all system address buses. Parity protection is also used on the PCI and SCSI buses, and in the UltraSPARC CPU's internal and external cache.

Status LEDs

The system provides easily accessible light-emitting diode (LED) indicators on the system front panel, internal disk bays, and power supplies to provide a visual indication of system and component status. These status LEDs eliminate guesswork and simplify problem diagnosis for enhanced serviceability.

The system status LEDs are described in the section "About the Status and Control Panel" on page 7. Disk drive and power supply LEDs are described in "Error Indications" on page 136.

Hot-Pluggable Disk Drives

The *hot-plug* feature of the system's internal disk drives permits the removal and installation of drives while the system is operational. All drives are easily accessed from the front of the system. Hot-plug technology significantly increases the system's serviceability and availability, by providing the ability to:

- Increase storage capacity dynamically to handle larger work loads and improve system performance
- Replace disk drives without service disruption

For more information about hot-pluggable disk drives, see "About Internal Disk Drives" on page 73 and "About Disk Array Configurations and Concepts" on page 69.

Support for RAID 0, RAID 1, RAID 0 + 1, and RAID 5 Disk Configurations

The Solstice DiskSuite software designed for use with the system provides the ability to configure system disk storage in a variety of different RAID levels. You choose the appropriate RAID configuration based on the price, performance, reliability, and availability goals for your system.

RAID 0 (striping), RAID 1 (mirroring), RAID 0+1 (striping plus mirroring— sometimes called RAID 10), and RAID 5 configurations (striping with interleaved parity) can all be implemented using Solstice DiskSuite. You can also configure one or more drives to serve as a *hot spare* to fill in automatically for a defective drive in the event of a disk failure.

For more information about RAID configurations, see "About Disk Array Configurations and Concepts" on page 69.

Power Supply Redundancy

The system can accommodate one or two power supplies. All system configurations can operate with only one power supply installed. A second supply can be used to provide redundancy, allowing the system to continue operating should one of the power supplies fail.

For more information about power supplies, redundancy, and configuration rules, see "About Power Supplies" on page 75.

Hot-Swappable Power Supplies

Power supplies in a redundant configuration feature a *hot-swap* capability. A qualified service provider can remove and replace a faulty power supply without turning off the system power, or even shutting down the operating system. The power supplies are easily accessed from the front of the system. For information about removing and installing a power supply, see the Sun Enterprise 420R Server Service Manual.

Four Levels of Diagnostics

For enhanced serviceability and availability, the system provides four different levels of diagnostic testing: power-on self-test (POST), OpenBoot diagnostics (OBDiag), SunVTS™, and Sun Enterprise SyMON™.

POST and OBDiag are firmware-resident diagnostics that can run even if the server is unable to boot the operating system. Application-level diagnostics, such as SunVTS and Sun Enterprise SyMON, offer additional troubleshooting capabilities once the operating system is running.

POST diagnostics provide a quick but thorough check of the most basic hardware functions of the system. For more information about POST, see "About Power-On Self-Test (POST) Diagnostics" on page 118 and "How to Use POST Diagnostics" on page 119.

OBDiag diagnostics provide a more comprehensive test of the system, including external interfaces. OBDiag is described in "About OpenBoot Diagnostics (OBDiag)" on page 124 and "How to Use OpenBoot Diagnostics (OBDiag)" on page 127.

At the application level, you have access to SunVTS diagnostics. Like OBDiag, SunVTS provides a comprehensive test of the system, including its external interfaces. SunVTS also allows you to run tests remotely over a network connection. You can only use SunVTS if the operating system is running. For more information about SunVTS, see "About SunVTS Software" on page 130, "How to Use SunVTS Software" on page 133, and "How to Check Whether SunVTS Software Is Installed" on page 132.

Another application-level program, called Sun Enterprise SyMON, provides you with a variety of continuous system monitoring capabilities. It allows you to monitor system hardware status and operating system performance of your server. For more information about Sun Enterprise SyMON software, see "About Sun Enterprise SyMON Software" on page 135.

About Memory

The system's main logic board provides 16 slots for high-capacity dual inline memory modules (DIMMs). The system supports Sun standard 200-pin, 5-volt, 60-nanosecond memory modules. Modules of 32-, 64-, or 256-Mbyte capacities can be installed in the system. Total main memory is expandable up to 4 Gbytes.

Memory slots are organized into four banks (banks 0 through 3), with each bank comprising four slots.

The system reads from, or writes to, all four DIMMs in a bank at the same time. DIMMs, therefore, must be added four at a time in the same bank. For the DIMM bank organization and numbering scheme see "DIMM Failure" on page 150.

Memory modules are delicate. Ensure that you take appropriate precautions to avoid damaging them through electrostatic discharge. The memory modules must be replaced or installed by a qualified service provider; for information about removing and installing DIMMs, see the *Sun Enterprise 420R Server Service Manual*.

Configuration Rules

The following memory configuration rules apply to your system:

- At least one memory bank (all four bank slots) must be filled for the system to boot
- Each bank used must have four identical capacity DIMMs installed (for example, four 64-Mbyte DIMMs or four 256-Mbyte DIMMs)
- DIMMs must be added four at a time within the same bank

Note – In the Sun Enterprise 420R server, each memory bank comprises two slots on the main logic board, and two slots on the memory riser card. As you add memory, fully populate each bank by inserting DIMMs into the two slots comprising each bank on *both* the main logic board and on the memory riser card. For information about removing and installing DIMMs, see the *Sun Enterprise 420R Server Service Manual*.

DIMM capacities can differ from one bank to the next—for example, four 64-Mbyte DIMMs installed in bank 0 and four 256-Mbyte DIMMs installed in bank 2 is permissible

Caution – DIMMs are made of electronic components that are extremely sensitive to static electricity. Static from your clothes or work environment can destroy the modules. Do not remove any DIMM from its antistatic packaging until you are ready to install it on the system board. Handle the modules only by their edges. Do not touch the components or any metal parts. Always wear a grounding strap when you handle the modules.

Sun Enterprise 420R System Memory Interleaving

Whenever memory banks 0 and 1 are populated with identical capacity DIMMs, memory reads and writes are automatically interleaved between the two banks. This is called *two-way interleaving*. Two-way interleaving significantly reduces the average memory latency, thus improving overall system performance. When all four banks contain identical capacity DIMMs, the system interleaves across all four banks (called *four-way interleaving*), to further reduce average memory latency.

For maximum performance, install identical capacity DIMMs in all four memory banks. The following table lists how to best populate the memory banks when configuring a server for 512 Mbytes of memory.

Memory Performance Level	Memory Bank Population
Good	Banks 0 and 3 each have four, 64-Mbyte DIMMs (no interleaving)
Better	Banks 0 and 1 each have four 64-Mbyte DIMMs (2-way interleaving)
Best	Banks 0, 1, 2, and 3 all have four 64-Mbyte DIMMs (4-way interleaving)

About CPU Modules

The UltraSPARC II CPU module is a high-performance, highly-integrated superscalar processor implementing the SPARC-V9 64-bit reduced instruction set computer (RISC) architecture. The UltraSPARC II processor supports both 2-D and 3-D graphics, as well as image processing, video compression and decompression, and video effects through the sophisticated visual instruction set (VIS). VIS provides high levels of multimedia performance, including real-time video compression/ decompression and two streams of MPEG-2 decompression at full broadcast quality with no additional hardware support.

The system's main logic board provides slots for four UltraSPARC II CPU modules. Each processor module includes one CPU chip with integrated cache memory for data and instructions, as well as 1 Mbyte or more of external static random access memory (SRAM) cache memory.

Processor modules communicate with the system's main memory and I/O subsystem via the system's high-speed Ultra Port Architecture (UPA) data bus. The UPA's clock rate is automatically synchronized with the clock speed of the CPU modules. The UPA's clock rate operates at a ratio of the CPU's clock speed. For example, if the CPUs operate at 450 MHz, the UPA data bus could operate at one fourth the clock speed at 112.5 MHz.

A qualified service provider must remove and replace CPU modules in your system. For information about installing and removing CPU modules, see the *Sun Enterprise 420R Server Service Manual.*

Configuration Rules

The following rules apply for your system:

- You can install up to four UltraSPARC II CPU modules into the server.
- The first CPU module is inserted into CPU slot 2 (J0301); two CPU modules are installed into CPU slot 2 (J0301) and into CPU slot 1 (J0201); three CPU modules are installed into CPU slot 2 (J0301), into CPU slot 1 (J0201), and into CPU slot 3 (J0401); while four CPU modules occupy all the CPU module slots.
- If you install more than one CPU module, the modules must operate at identical clock speeds (450 MHz, for example) and they must have the same size cache memory. This generally means the CPU modules must have the same part number.

For information about the CPU slot locations on the main logic board, see the *Sun Enterprise 420R Server Service Manual.*

About Peripheral Component Interconnect (PCI) Buses

All system communication with storage peripherals and network interface devices is mediated by a Ultra Port Architecture-to-Peripheral Component Inter-connect (UPA-to-PCI) bridge chip, located on the system's main logic board. This bridge chip manages communication between the UPA bus and the system's two PCI buses. These PCI buses support slots for up to four PCI interface cards. One PCI bus (bus 0) also handles communication between the system and devices connected to the main logic board's SCSI, FastEthernet, serial, parallel, and keyboard/mouse ports.

PCI cards come in a variety of configurations. Not all cards will fit or operate in all PCI slots, so it is important to know the specifications of your PCI cards and the types of cards supported by each PCI slot in the system.

Some PCI cards are as short as 6.875 inches (17.46 cm) in length (called "short" cards), while the maximum length of PCI cards is 12.28 inches (31.19 cm, called "long" cards). Each slot in the system can accommodate either a long or a short card.

Older PCI cards communicate over 32-bit PCI buses, while many newer cards communicate over wider 64-bit buses. Three of the PCI slots will accept either 32-bit or 64-bit wide cards, while the fourth is 32-bits wide.

Older PCI cards operate at 5 VDC, while newer cards are designed to operate on 3.3 VDC. Cards that require 5 volts will not operate in 3.3-volt slots, and 3.3-volt cards will not operate in 5-volt slots. "Universal" PCI cards are designed to operate on either 3.3 volts or 5 volts, so these cards can be inserted into either type of slot. The system provides three slots for 5-volt cards and one slot for a 3.3-volt card. All four PCI slots accept universal cards.

Most PCI cards operate at clock speeds of 33 MHz, while some newer cards operate at 66 MHz. All four PCI slots can accept 33-MHz cards. 66-MHz cards are restricted to the slot labeled PCI 4.

The table below shows the mapping of the PCI slots to the two PCI buses, and the type of PCI cards supported in each slot.

Back Panel Slot Label	Board Address	PCI Bus	Slot Width (bits)/ Card Type (bits)	Clock Rates (MHz)	DC Voltage/ Card Type
PCI 1	J1801	1	64 / 32 or 64	33 or 66	3.3 V or Universal
PCI 2	J2001	0	64 / 32 or 64	33	5 V or Universal
PCI 3	J1901	0	64 / 32 or 64	33	5 V or Universal
PCI 4	J4701	0	32 / 32	33	5 V 32-bit or Universal

For the board addresses of the PCI slots on the main logic board, see the *Sun Enterprise 420R Server Service Manual.*

Configuration Rules

The following rules apply for your system:

- All slots support PCI universal cards.
- All slots support PCI long or short cards.
- Each slot can supply up to 15 watts of power. The total power used for all four slots must not exceed 60 watts.

You can install PCI cards into any compatible PCI slots. Slots need not be filled in any particular order. In most cases, the system's I/O performance will be unaffected by placement of PCI cards in the slots. Heavily loaded systems, however, will deliver better overall performance by installing high-throughput interface cards on separate buses. Examples of high-throughput interfaces are dual-channel UltraSCSI host adapters and ATM-622 interfaces.

You can also improve overall system availability by installing redundant storage or network interfaces on separate PCI buses.

About Disk Array Configurations and Concepts

The Solstice DiskSuite software is designed for use with the Sun Enterprise 420R server's internal and external disk drives. The software supports a variety of configurations called *disk arrays*, which improve storage performance, capacity, and availability.

Note – Solstice DiskSuite and other software must be ordered separately.

This section describes some of the most popular and useful of those configurations, including:

- Disk concatenation
- Disk mirroring (RAID 1)
- Disk striping (RAID 0)
- Disk striping with parity (RAID 5)
- Hot spares
- Hot plug

The DiskSuite software creates *metadevices*—logical disk devices consisting of one or more physical disks or partitions from several disks. Once you use Solstice DiskSuite to create a metadevice, the operating system uses and maintains the metadevice as if it were a single device.

For instance, you can combine the two disks `c1t2d0s2` and `c1t3d0s2` into the metadevice `/dev/md/rdsk/d0`.

The Sun Enterprise 420R server's internal disks support RAID 1, RAID 0, and RAID 1 + RAID 0. More complicated configurations, including RAID 5, are supported using external disk arrays and one or more PCI host adapter cards.

Disk Concatenation

Disk concatenation is a method for increasing logical volume size beyond the capacity of one disk drive by creating one large metadevice from two or more smaller drives. This lets you create arbitrarily large partitions.
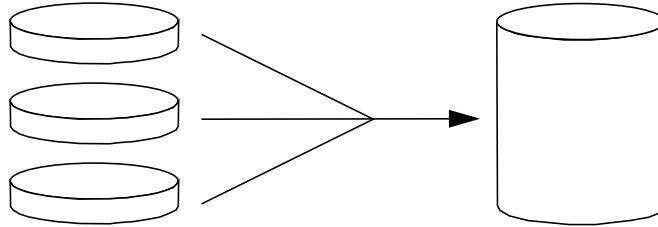
Using this method, the concatenated disks are filled with data sequentially, with the second disk being written to when no space remains on the first, the third when no room remains on the second, and so on.

Disk Mirroring: RAID 1

Disk mirroring is a technique that uses data redundancy—two complete copies of all data stored on two separate disks—to protect against loss of data due to disk failure. One metadevice is created from two disks.
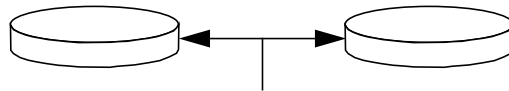
Whenever the operating system needs to write to the mirrored metadevice, both disks are updated. The disks are maintained at all times with exactly the same information. When the operating system needs to read from the mirrored metadevice, it reads from whichever disk is more readily accessible at the moment. The scheme is sometimes called RAID 1, where RAID stands for redundant arrays of inexpensive disks.

RAID 1 offers the highest level of data protection, but storage costs are high, since all data is stored twice.

Disk Striping: RAID 0

Disk striping (sometimes called RAID 0) is a technique for increasing system throughput by using several disk drives in parallel. Whereas in non-striped disks the operating system writes a single block to a single disk, in a striped arrangement each block is divided and portions of the data are written to different disks.
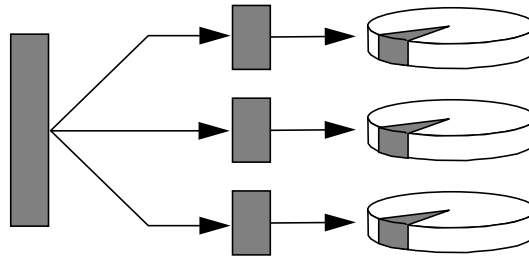
System performance using RAID 0 will be better than using RAID 1 or 5, but the possibility of data loss is greater because there is no way to retrieve or reconstruct data stored on a failed drive.

Disk Striping With Parity: RAID 5

RAID 5 is an implementation of disk striping in which parity information is included with each disk write. The advantage of the technique is that if any one disk in a RAID 5 array fails, all the information on the failed drive can be reconstructed from the data and parity on the remaining disks.

System performance using RAID 5 will fall between that of RAID 0 and RAID 1, and all data loss is fully protected.

Hot Spares

In a *hot-spares* arrangement, one or more disk drives are installed in the system but are unused during normal operation. Should one of the active drives fail, disk write operations are automatically redirected to a hot-spare disk and the failed disk drive is retired from operation.

Hot Plug

The system's disk bays are designed to permit disk drive removal and insertion while the system is powered on. *Hot-plug* technology significantly increases the system's serviceability and availability, by providing the ability to:

- Add hardware dynamically to enable the system to handle an increasingly larger work load, perform load balancing, and improve performance of a running system

- Remove/replace faulty hardware with minimal system service disruption

For more information about hot-pluggable disk drives, see "About Internal Disk Drives" on page 73.

For More Information

See the documentation supplied with the Solstice DiskSuite software.

About Internal Disk Drives

The Sun Enterprise 420R server supports up to two internal, hot-pluggable UltraSCSI disk drives. Drives are 3.5-inches wide and 1-inch high (8.89-cm x 2.54-cm).

The drives are supported by the 40-Mbyte per second UltraSCSI interface on the system's main logic board. Both drives plug in to the two-disk backplane, which mounts to the back of the system's disk cage.

On the right side of each installed disk drive is a green indicator LED. These LEDs indicate the operating status associated with each disk drive. For additional information about disk drive LEDs, see "Disk LEDs" on page 140.

The following figure shows the system's two internal disk drives and LEDs. Disk drives are numbered 0 and 1, with the 0 drive the default system disk.
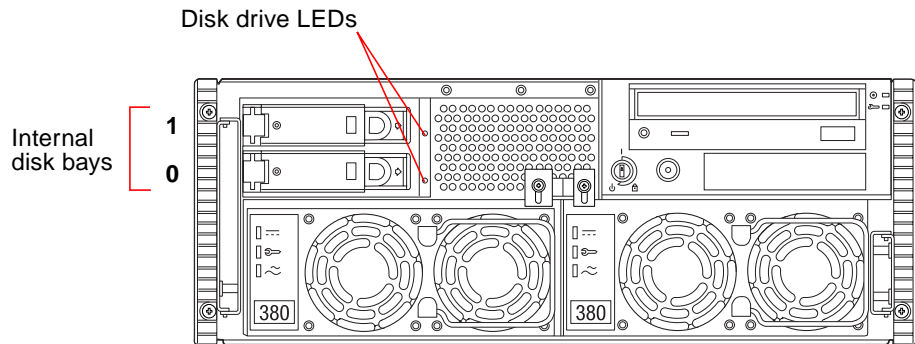
The Solstice DiskSuite software supplied with the Solaris server media kit lets you use *internal* disk drives in three RAID configurations: RAID 0 (striping), RAID 1 (mirroring), and RAID 0+1 (striping plus mirroring). You can also configure drives as "hot-spares." For more information on all supported RAID configurations, see "About Disk Array Configurations and Concepts" on page 69.

The *hot-plug* feature of the system's internal disk drives allows the removal and installation of drives while the system is operational. This capability significantly reduces system down-time associated with disk drive replacement.

The hot-plug procedure involves software commands for preparing the system prior to removing a disk drive and for reconfiguring the operating environment after installing the replacement drive. The exact hot-plug procedure depends on which version of the Solaris operating environment you are using. For the complete procedure, refer to *Platform Notes: Sun Enterprise 420R Server*, available on the *Solaris on Sun Hardware AnswerBook*. This AnswerBook documentation is provided on the Solaris Supplement CD for the Solaris release you are running.

In order to perform a disk hot-plug procedure, you must know the physical or logical device name for the drive that you want to install or remove. If your system encounters a disk error, often you can find messages about failing or failed disks in your system console. This information is also logged in the `/var/adm/messages` file(s). These error messages typically refer to a failed disk drive by its physical device name (such as `/devices/pci@1f,4000/scsi@3/sd@b,0`) or by its logical device name (such as `c0t11d0`). In addition, some applications may report a disk slot number (0 through 1).

You can use the following table to associate internal disk slot numbers with the logical and physical device names for each disk drive.

Disk Slot Number	Logical Device Name	Physical Device Name
Slot 0	c0t0d0	`/devices/pci@1f,4000/scsi@3/sd@0,0`
Slot 1	c0t1d0	`/devices/pci@1f,4000/scsi@3/sd@1,0`

Configuration Rules

The following rules apply for your system:

- You must use Sun standard 3.5-inch wide and 1-inch high (8.89-cm x 2.5-cm) disk drives that are UltraSCSI-compatible and run at 10,000 revolutions per minute (rpm).
- The SCSI IDs for the disks are hardwired on the disk backplanes. There is no need to set any SCSI ID jumpers on the disk drives themselves. The SCSI target address (SCSI ID) of each disk drive is determined by the slot location where the drive is connected to its UltraSCSI backplane.
- The disk drives share the internal SCSI bus with the SCSI removable media devices in the removable media assembly (RMA). The removable media SCSI cable provides the termination for the internal SCSI bus.

For information about implementing RAID configurations, see "About Disk Array Configurations and Concepts" on page 69.

About Power Supplies

A power distribution board delivers DC power for all internal system components. The system's power supplies plug in to connectors on this board, and when both supplies are installed, they share equally in satisfying the power demands of the system.

Power supplies are modular units, designed for fast, easy installation or removal, even while the system is fully operational. Supplies are installed in bays at the front of the system, as shown in the following figure.
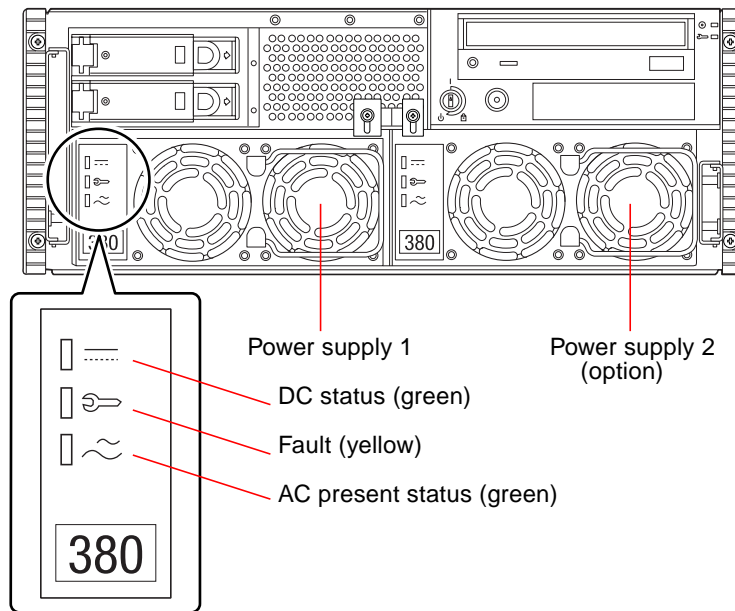
The system can accommodate one or two power supplies. Each power supply provides up to 380 watts of DC power. All system configurations can operate with only one power supply installed.

You can use a second supply to provide redundancy, allowing the system to continue operating should one of the power supplies fail. If your server includes a second power supply, connect the second AC power cord to the left inlet (labeled 2 on the back panel). You may connect the second power supply to the same AC circuit as the first supply. However, for increased system redundancy you should connect each power supply to a separate circuit.

Removing and replacing a power supply can only be performed by a qualified service provider. For information about removing and installing power supplies, see the *Sun Enterprise 420R Server Service Manual.*

Power supplies in a redundant configuration feature a *hot-swap* capability. This means that you can remove and replace a faulty power supply without turning off the system power or even shutting down the operating system.

Caution – When removing a hot-swappable power supply, do not disengage and reengage the supply in rapid succession. Always remove a supply completely before reinserting the same supply or a replacement supply. Rapid seating and unseating of power supplies may result in false error conditions.

Three LED indicators on the front of the power supply display AC and DC status, and fault conditions. For additional details, see "Power Supply LEDs" on page 139.

Note – Sun Enterprise 420R power supplies will shut down automatically in response to certain over-temperature and power fault conditions. To recover from an automatic shutdown, you must disconnect the AC power cord, wait roughly 10 seconds, and then reconnect the power cord.

About the Standard Ethernet Port

The system's main logic board provides an auto-sensing, switchable 10BASE-T/100BASE-TX Ethernet interface conforming to the IEEE 802.3u Ethernet standard. The interface configures itself automatically for either 10-Mbps or 100-Mbps operation, depending on network characteristics.

One preconfigured back panel connector provides access to the Ethernet interface:

■ One RJ-45 connector for connecting a Category-5 twisted-pair Ethernet (TPE) cable

For instructions on configuring the main logic board Ethernet interface, see "How to Configure the Standard Ethernet Interface" on page 47.

For connector diagrams and pin assignments, see "Reference for the Twisted-Pair Ethernet (TPE) Connector" on page 157.

For information about operating characteristics and configuration parameters for the `hme` Fast Ethernet device driver, see *Platform Notes: The hme Fast Ethernet Device Driver.* This document is available on the *Solaris on Sun Hardware AnswerBook*, which is provided on the *Solaris Supplement CD* for the Solaris release you are running.

About the Serial Ports

The system provides two serial communication ports through a pair of DB-25 connectors located on the back panel. Both ports are capable of synchronous and asynchronous communication.

In synchronous mode, each port operates at any rate from 50 Kbaud to 256 Kbaud when the clock is generated internally. When the clock is generated from an external source, synchronous communication occurs at rates up to 384 Kbaud.

In asynchronous mode, either port supports baud rates of 50, 75, 110, 200, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200, 153600, 230400, 307200, and 460800 baud.

Both serial ports can be configured to provide EIA-423 or EIA-232D signal levels. Signal levels are controlled by jumpers located on the system's main logic board. The default setting is EIA-423. For more information about configuring the serial port jumpers, see the *Sun Enterprise 420R Server Service Manual*.

See "Reference for the Serial Port A and B Connectors" on page 155 for the connector diagram, back panel icon, and pin assignments.

About the Parallel Port

The system provides one IEEE 1284-compatible, bidirectional parallel port for connecting the system to a local printer or other compatible parallel device. Connectivity is provided by a standard 25-pin DB-25 connector on the back panel of the system.

The parallel port operates at a 2-Mbytes per second data transfer rate and supports the enhanced parallel port (EPP) protocol modes as well as standard Centronics, Nibble, and Byte modes.

See "Reference for the Parallel Port Connector" on page 163 for the connector diagram, back panel icon, and pin assignments.

About the Main Logic Board Jumpers

The jumpers on the main logic board have the following functions:

- To configure the serial ports for either EIA-423 or EIA-232D operation. For information about the EIA-423/232D jumper settings, and about configuring them, see "About Serial Port Jumpers" on page 81.

- To affect the operation of the flash PROM located on the main logic board. For information about the flash PROM jumper settings, see "About Flash PROM Jumpers" on page 82.

Modifying jumper settings can only be performed by a qualified service provider. For more information about changing jumper settings, see the *Sun Enterprise 420R Server Service Manual.*

Jumpers are marked on the main logic board with jumper addresses. For example, the serial port jumpers are marked J2805 and J2804. Jumper pins are located immediately adjacent to the jumper address. Pin 1 is marked with an asterisk (*) in one of the positions shown below.

About Serial Port Jumpers

The serial port jumpers on the main logic board (J2805 and J2804) permit the configuration of the system's two serial ports for either EIA-423 or EIA-232D signal levels. EIA-423 levels are the default standard for North American users. EIA-232D levels are required for digital telecommunication in nations of the European Community.

Configuring jumpers can only be performed by a qualified service provider. For information about configuring the jumpers, about the locations of the serial port jumpers on the main logic board, and about configuration instructions, see the *Sun Enterprise 420R Server Service Manual*.

For information about how jumpers are marked on the main logic board with jumper addresses, see "About the Main Logic Board Jumpers" on page 80.

About Flash PROM Jumpers

The system uses flash PROMs to permit the reprogramming and use of specific boot code blocks that are held in non-volatile system memory, and to permit remote reprogramming of that code by an authorized system administrator over a local area network.

Two jumpers on the main logic board affect flash PROM operation. The table below describes their function.

Jumper	Shunt on Pins 1 + 2 Selects	Shunt on Pins 2 + 3 Selects	Default Shunt on Pins	Signal Controlled
J3001	Write protect	Write enable	1 + 2	FLASH PROM PROG ENABLE
J3002	High-half booting	Normal (Low-half) booting	1 + 2	XOR LOGIC SET

For more information about flash PROM programming, see the documentation supplied with the flash PROM update CD-ROM.

For information about how jumpers are marked on the main logic board with jumper addresses, see "About the Main Logic Board Jumpers" on page 80.

Modifying jumper settings can only be performed by a qualified service provider. For the locations of the flash PROM jumpers on the main logic board, and for configuration instructions, see the *Sun Enterprise 420R Server Service Manual*.

About the External SCSI Port

External SCSI devices are supported via a 68-pin SCSI connector located on the system's back panel. This bus is UltraSCSI-capable (40 Mbytes per second) and can support additional external, single-ended, wide or narrow SCSI devices. The external SCSI bus is separate from the internal SCSI bus for removable media devices and internal disk drives. See "Reference for the UltraSCSI Connector" on page 159 for a diagram and pinout of the external SCSI connector.

The external SCSI bus will support up to four external SCSI tape devices if the bus is used exclusively for tape devices. When other types of SCSI devices are present on the bus, a maximum of two SCSI tape devices are supported on the external SCSI bus. Additional external tape devices can be supported by installing appropriate PCI host adapter cards.

Target Devices

Up to 12 Sun compensated devices can operate on the external SCSI bus at 20 Mbytes per second. For UltraSCSI performance of 40 Mbytes per second, no more than seven devices may be connected. Target addresses for the external SCSI bus (also known as SCSI IDs) are available in a range of 0 through 15. Target address 7 is reserved for the SCSI host adapter located on the main logic board. All devices on the bus must have unique target addresses.

The addresses for the internal CD-ROM (6) and tape drive (4 or 5) are determined by jumpers located on the drives. If the CD-ROM and tape drives have been factory-installed, they are configured with the correct addresses for the system. Internal disk drives use 0 and 1.

Bus Length

For UltraSCSI performance on the external SCSI bus, you must adhere to the following bus length restrictions for daisy-chained SCSI devices:

- For 1 to 3 devices, the maximum bus length is 9.84 feet (3 meters)
- For 4 to 7 devices, the maximum bus length is 4.92 feet (1.5 meters)

You must include the Sun Enterprise 420R server internal bus length of 2.952 feet (0.9 meter) in your bus length calculations.

If you exceed these bus length restrictions, UltraSCSI devices may operate at less than 40 Mbytes per second. Under such conditions, an UltraSCSI device may experience errors that eventually cause it to reset and operate at 20 Mbytes per second.

For fast/wide performance on the external SCSI bus, the maximum SCSI bus length for daisy-chained SCSI devices is 19.7 feet (6 meters), including the Sun Enterprise 420R server internal bus length 2.952 feet (0.9 meter).

External UltraSCSI-compliant SCSI cables have an impedance of 90 ohm (+/- 6 ohm) and are required for UltraSCSI interface. Sun's implementation of UltraSCSI requires that the total SCSI bus length be limited to no more than approximately 20 feet (6 meters) with up to 12 Sun compensated devices.

Due to the short bus length, an approximately 31.5-inch (0.8-meter) UltraSCSI-compliant external cable is supported (part number 530-2883) in addition to a 2.2-yard (2-meter) UltraSCSI-compliant external cable (part number 530-2884).

External SCSI Cabling and Termination

Use the following cabling guidelines to ensure proper device cabling and termination on the external SCSI bus:

- In order to maintain UltraSCSI performance, all cables used must be UltraSCSI-compliant.
- The external SCSI bus must be correctly terminated. Most Sun devices use autotermination. See the documentation supplied with the device.
- If all external mass storage devices use 68-pin connectors, connect all non-Sun devices to the system first and connect a Sun autoterminating device to the end of the chain.
- If external mass storage devices consist of 68-pin devices and 50-pin devices, connect the Sun 68-pin devices to the system first and terminate the chain with a 50-pin device and its terminator. The 68-pin device connected to the 68-50 pin adapter cable must be autoterminating in order to terminate the high-order bits.

Caution – Do not connect 68-pin devices after 50-pin devices; SCSI bus errors will occur.

The following figures provide a summary of the cabling guidelines.

System	Non-Sun device	Sun device	Autoterminating Sun device

    68 - 68   68 - 68   68 - 68

System	Sun device	Autoterminating Sun device	50-pin device

                                                            | T |

    68 - 68   68 - 68   68 -50   Terminator
                                   Adapter cable
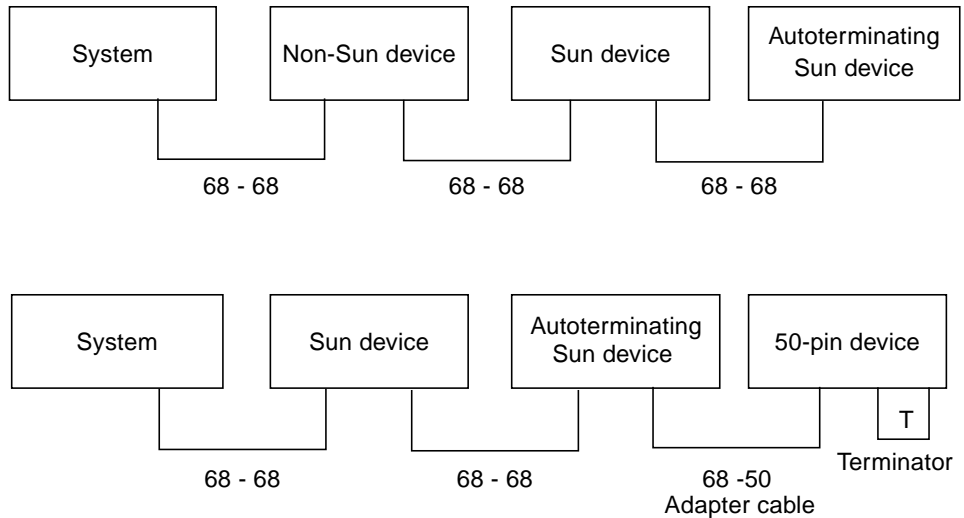
Multi-initiator Support

The SCSI implementation of the system includes multi-initiator support: any external host adapter on the bus can drive Termpower. This means that if the system should lose power, the devices on the SCSI bus (except those powered by the system) can continue to operate.

Configuration Rules

For fast/wide performance, you can connect up to 12 devices to the external SCSI bus. For UltraSCSI performance, no more than seven devices may be connected. Each device must have a unique target address (SCSI ID) in the range from 0 to 15.

You cannot assign target address 7 to any device; it is reserved for the host adapter on the main logic board.

For UltraSCSI performance on the external SCSI bus, all cables used must be UltraSCSI-compliant, and you must adhere to the following bus length restrictions:

- For 1 to 3 devices, the maximum bus length is 3 meters (9.84 feet)
- For 4 to 7 devices, the maximum bus length is 1.5 meters (4.92 feet)

You must include the Sun Enterprise 420R server internal bus length of 2.952 feet (0.9 meter) in your bus length calculations.

For fast/wide performance on the external SCSI bus, the maximum Sun-supported SCSI bus length for daisy-chained SCSI devices is 6 meters (19.7 feet), including the Sun Enterprise 420R internal bus length.

UltraSCSI devices can be mixed with non-UltraSCSI devices on the same bus. The UltraSCSI devices will still operate at UltraSCSI speeds (40 Mbytes/sec), provided that the rules for UltraSCSI cabling, bus length, termination, and target devices are followed.

If all external SCSI devices use 68-pin connectors, connect all non-Sun devices to the system first and connect a Sun autoterminating device to the end the chain.

If external mass storage devices consist of 68-pin devices and 50-pin devices, connect the Sun 68-pin devices to the system first and terminate the chain with a 50-pin device and its terminator. The 68-pin device connected to the 68-50 pin adapter cable must be autoterminating in order to terminate the high-order bits.

If you install an internal tape drive into the system, you should assign it target address 4 or 5. If you install an internal CD-ROM into the system, you should assign it target address 6. If these drives have been factory-installed, they are configured with the correct addresses for the system.

The removable media SCSI cable provides the termination for the internal SCSI bus.

CHAPTER **5**

Replacing a Disk Drive

This chapter tells you what you need to know, and need to do, to install, remove, or replace the internal disk drives.

With the exception of internal disk drives in the Sun Enterprise 420R server, *all other component or part installation or replacement* must be performed by a qualified service provider.

The following tasks are covered in this chapter:

■ "How to Avoid Electrostatic Discharge" on page 88

■ "How to Remove a Disk Drive" on page 90

■ "How to Install a Disk Drive" on page 93

■ "How to Initiate a Reconfiguration Boot" on page 96

How to Avoid Electrostatic Discharge

Use the following procedure to prevent static damage whenever you are accessing the system internal drives.

Before You Begin

Complete this task:

- "How to Power Off the System" on page 43

You must have the following items:

- Antistatic wrist or foot strap
- Antistatic mat (or the equivalent)

What to Do

⚠️ **Caution –** Printed circuit boards and hard disk drives contain electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or the work environment can destroy components. Do not touch the components themselves or any metal parts without taking proper antistatic precautions.

1. **Disconnect the AC power cord from the wall power outlet** *only if you will be handling the power distribution board.*

   The AC power cord provides a discharge path for static electricity, so you generally want to leave it plugged in during installation and repair procedures. The only time you should unplug the cord is when you service the power distribution board.

2. **Use an antistatic mat or similar surface.**

    When performing any option installation or service procedure, place static-sensitive parts, such as disk drives, on an antistatic surface. The following items can be used as an antistatic surface:

    - The bag used to wrap a Sun replacement part
    - The shipping container used to package a Sun replacement part
    - Sun electrostatic discharge (ESD) mat, part number 250-1088 (available through your Sun sales representatives)
    - Disposable ESD mat, shipped with replacement parts or options

3. **Use an antistatic wrist strap.**

    Attach the appropriate end to the system chassis sheet metal and attach the other end of the strap to your wrist. Refer to the instructions that come with the strap.

System cover and lock
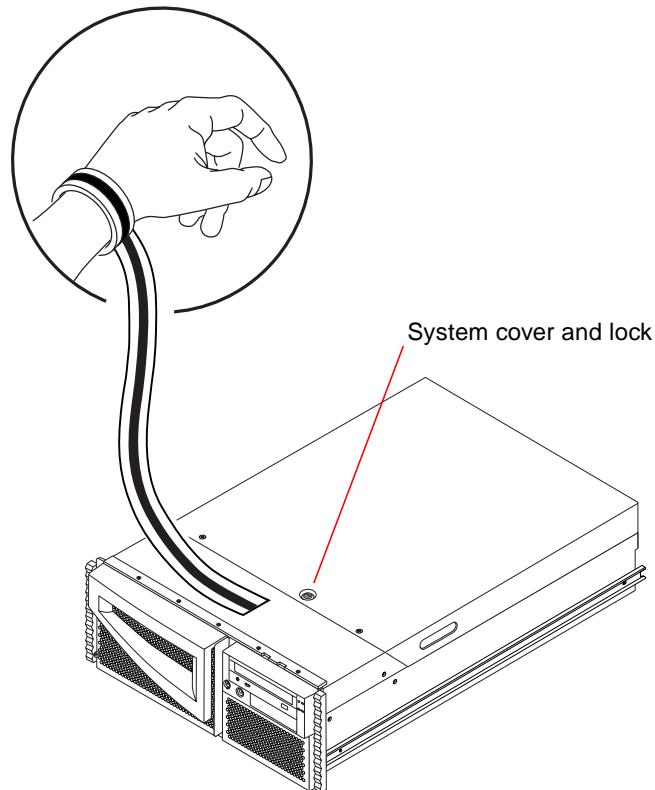
4. **Detach both ends of the strap after you have completed the installation or service procedure.**

How to Remove a Disk Drive

The system's disk *hot-plug* feature lets you remove a disk drive without shutting down the operating system or turning off the system power. For more information, see:

- "About Disk Array Configurations and Concepts" on page 69
- "About Internal Disk Drives" on page 73

Before You Begin

You must follow antistatic precautions when handling a disk drive. For more information, see:

- "How to Avoid Electrostatic Discharge" on page 88

If the server is set up without a local graphics console, terminal, or monitor, you need to set up one of these options in order to issue software commands. See "How to Attach an Alphanumeric (ASCII) Terminal" on page 29, "How to Configure a Local Graphics Console" on page 31, or "About Communicating With the Server" on page 28.

What to Do

1. **Prepare the system for disk removal.**

   The hot-plug removal procedure involves software commands for preparing the system prior to removing the disk drive. See "About Internal Disk Drives" on page 73.

2. **If you are not hot-plugging the disk drive, halt the operating system and turn off the system power.**

   See "How to Power Off the System" on page 43.

3. **Unlock the front doors and swing them open.**

   Turn the keyswitch to the Power-On/Off position. This unlocks the system front doors.

4. **Identify the disk drive to be removed and note the bay in which it is installed.**

   The lower bay is the default system disk location. For information about disk status LEDs, see "About Internal Disk Drives" on page 73.

5. **Using your thumb and forefinger, pinch the disk drive latch sideways to release the drive handle.**

   Pull the handle away from the drive until you feel the drive connector disengage from the backplane connector.
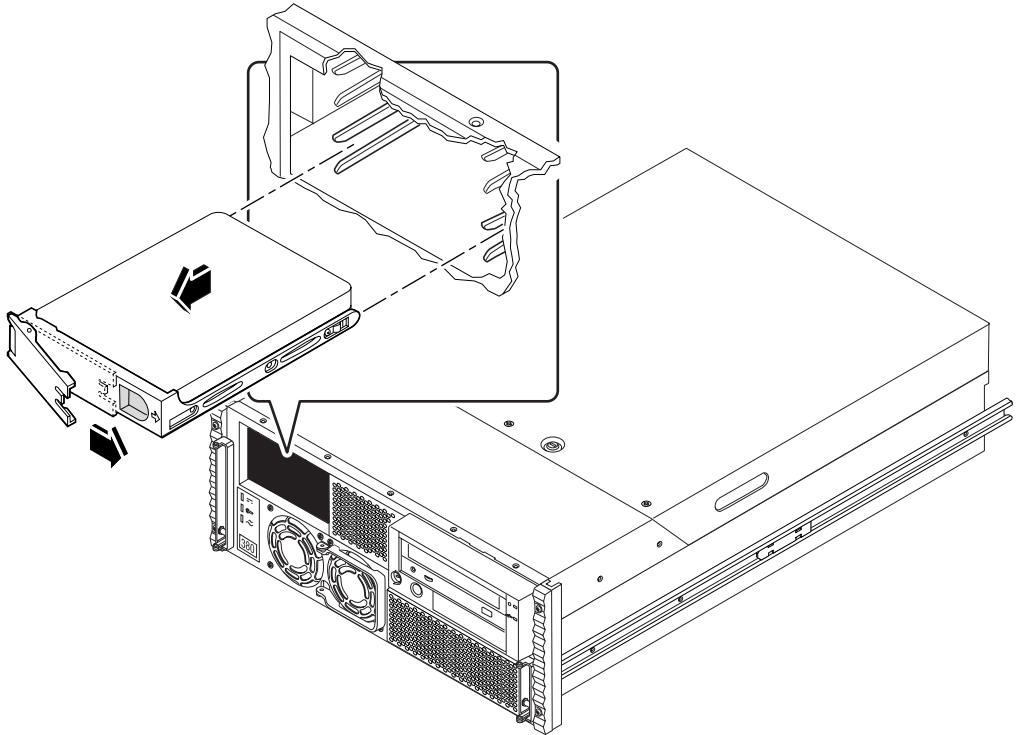
6. **Holding the disk drive by the handle, slide it out of the drive bay.**

   Note – When you reinstall the drive (or a replacement drive), be sure to install it into the same drive bay as the one from which it was just removed.

7. **Place the disk drive on an antistatic mat.**

8. **Repeat the procedure for the other drive (if necessary).**

   If you have finished removing and installing disk drives, remove the antistatic strap.

What Next

To replace the disk drive, complete this task:

■ "How to Install a Disk Drive" on page 93

How to Install a Disk Drive

The system's disk *hot-plug* feature lets you install a disk drive without shutting down the operating system or turning off the system power. For more information, see:

■ "About Disk Array Configurations and Concepts" on page 69
■ "About Internal Disk Drives" on page 73

Before You Begin

You must follow antistatic precautions when handling a disk drive. For more information, see:

■ "How to Avoid Electrostatic Discharge" on page 88

If the server is set up without a local graphics console, terminal, or monitor, you need to set up one of these options in order to issue software commands. See "How to Attach an Alphanumeric (ASCII) Terminal" on page 29, "How to Configure a Local Graphics Console" on page 31, or "About Communicating With the Server" on page 28.

What to Do

1. **Prepare the system to receive the new disk drive.**

   The hot-plug installation procedure involves software commands for preparing the system prior to installing the disk drive. See "About Internal Disk Drives" on page 73.

2. **If you are not hot-plugging the disk drive, halt the operating system and turn off system power.**

   See "How to Power Off the System" on page 43.

3. **Unlock the front doors and swing them open.**

   Turn the keyswitch to the Power-On/Off position. This unlocks the system front doors.

4. **Release the drive handle on the disk drive.**

   Use your thumb and forefinger to pinch the drive latch sideways to open it.

5. **Align the disk drive to its drive bay.**

   Orient the drive so that the drive handle's hinge faces the outside of the drive bay.

Note – If you are replacing a drive that you removed previously, be sure to install the drive in the same drive bay as the one you removed.

---
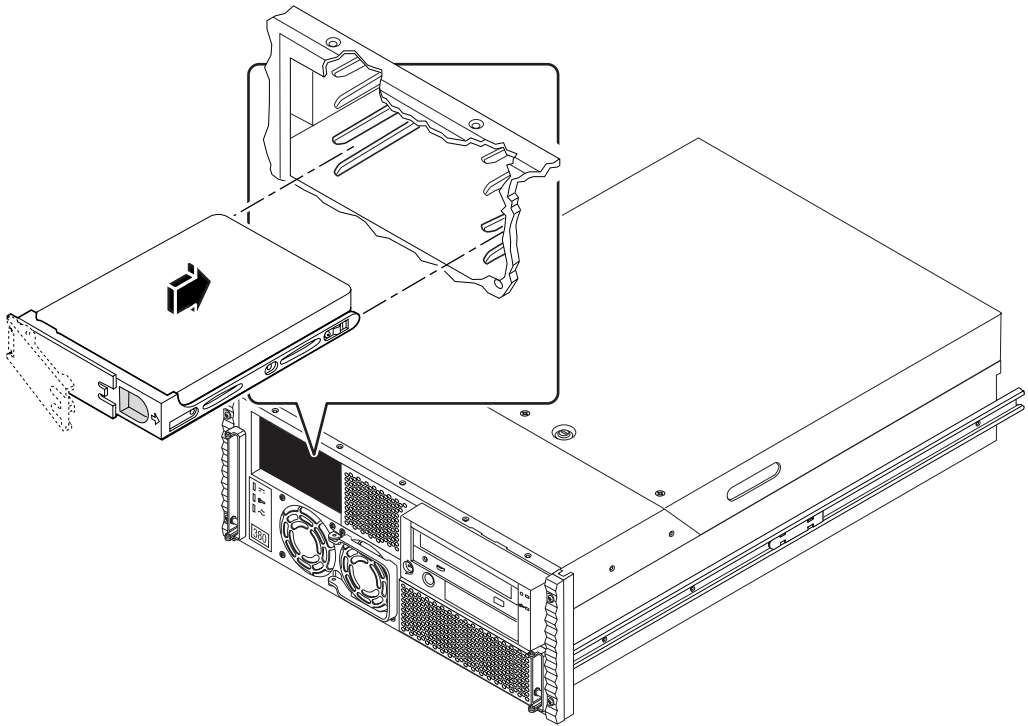
6. **Holding the drive by its handle, fit the drive into the drive bay guide rails.**

7. **Slide the drive into the bay until it barely contacts the backplane.**

8. **Press carefully on the center of the drive and watch as the handle begins to close.**

   The drive handle begins to close as the drive engages its backplane connector.

9. **Press the handle toward the drive until the latch closes, securing the drive in place.**

10. **Repeat the procedure for the other drive (if necessary).**

If you have finished removing and installing disk drives, remove the antistatic strap.

11. **Close and then lock the system front doors.**

Turn the keyswitch to the Locked position. This locks the system front doors preventing access to the power supply(s) and to the disk drive(s) installed in the system.

12. **If you are performing a hot-plug installation, complete the software part of the installation procedure.**

See "About Internal Disk Drives" on page 73.

What Next

When you are ready to restart the system, be sure to run power-on self-test (POST) and OpenBoot Diagnostic (OBDiag) tests to verify that the system functions correctly with the new parts you have just installed. You must also perform a reconfiguration boot so that your system is able to recognize the new device(s). For additional information, see:

- "How to Initiate a Reconfiguration Boot" on page 96
- "How to Use POST Diagnostics" on page 119
- "How to Use OpenBoot Diagnostics (OBDiag)" on page 127

How to Initiate a Reconfiguration Boot

Before You Begin

After you have installed the operating system, and after you have installed any new part that plugs in to the main logic board or any internal or external storage device, you must perform a reconfiguration boot so that your system is able to recognize the newly installed option(s). Performing a reconfiguration boot is *not* necessary after *hot-plugging* a disk drive.

Caution – Before you power on the system, make sure that the system cover and doors are properly installed.

What to Do

1. **Turn on power to any peripherals and external storage devices.**

   Read the documentation supplied with the device for specific instructions.

2. **Turn on power to the monitor or terminal, and open your console.**

   A terminal or monitor is required for viewing system messages. For setup instructions, see "How to Attach an Alphanumeric (ASCII) Terminal" on page 29 or "How to Configure a Local Graphics Console" on page 31.

3. **Turn the front panel keyswitch to the Power-On/Off position, and press the Power button once.**

   See "About the Status and Control Panel" on page 7.

   To run power-on self-test (POST) and OpenBoot Diagnostic tests to verify that the system functions correctly with the new part(s) you have just installed, see "Diagnostics and Troubleshooting" on page 115.

4. **When the system banner is displayed on the monitor or terminal, immediately enter the Stop-a sequence on the Sun keyboard or press the Break key on the terminal keyboard.**

   The system banner contains the Ethernet address and host ID. To enter the Stop-a sequence, hold down the Stop key and press the a key. The keyswitch must be in the Power-On/Off position.

Note – The system may take anywhere from 30 seconds to two minutes before the system banner appears. This time depends on the level of POST diagnostics being performed.

---

5. **When the** ok **prompt is displayed, type the following command:**

```
ok boot -r
```

This command rebuilds the device trees for the system, incorporating any newly installed options. After a device has been added to a device tree, it can be recognized by the system. After the reconfiguration reboot has successfully completed, the system prompt is displayed.

Caution – Never move the system when system power is on. Movement can cause catastrophic disk drive failure. Always power off the system before moving it.

What Next

The system's front panel LED indicators provide power-on status information. For more information about the system LEDs, see:

- "System LED Indicators" on page 9.

Using Storage Devices

Your system accommodates one internally mounted CD-ROM (standard) or tape drive (optional). This chapter contains basic information about how to use the CD-ROM and tape devices.

The tasks covered in this chapter include:

The following information is also included:

How to Insert a Compact Disc Into the Drive

What to Do

1. Push the Eject button on the CD-ROM drive to release the drive tray.

2. Place a CD into the drive tray, label side up.

A compact disc is a single-sided storage medium. Place it into the tray with the label side up, as shown.

Label side up

Eject button
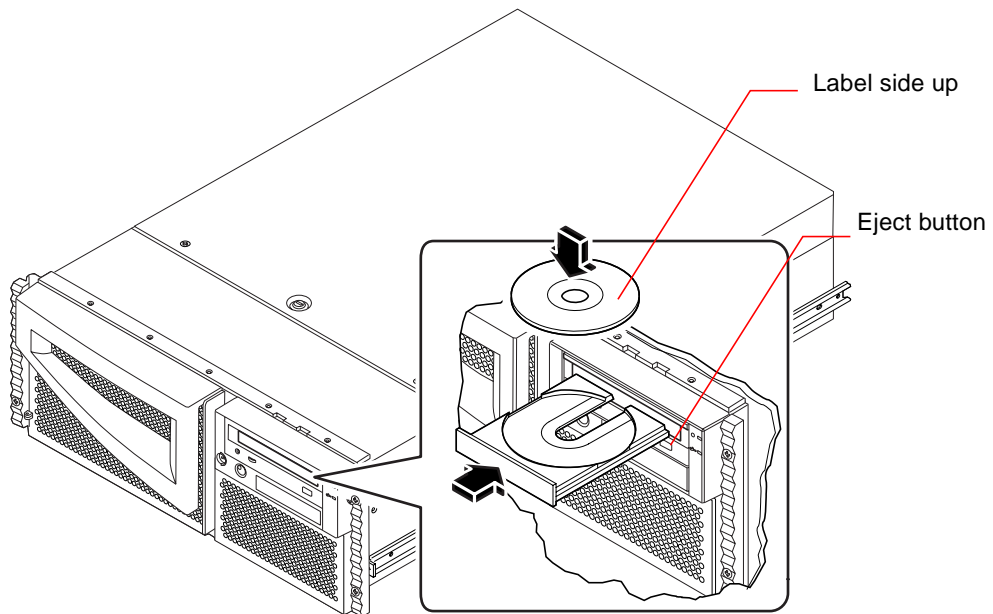
3. Gently push the tray back into the drive.

The CD drive has an automated closing mechanism that retracts the tray into the drive.

What Next

You can eject a compact disc from the drive by using one of three methods:

- With software commands; see "How to Eject a Compact Disc With Software Commands" on page 102
- Manually; see "How to Eject a Compact Disc Manually" on page 104
- Using an emergency procedure; see "How to Eject a Compact Disc in an Emergency" on page 106
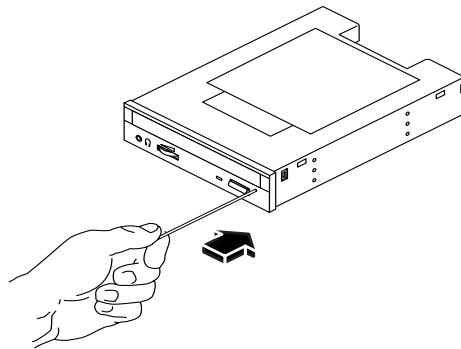
How to Eject a Compact Disc With Software Commands

Before You Begin

If the server is set up without a local console, you need to set up a console on it in order to issue software commands; see:

■ "About Communicating With the Server" on page 28

What to Do

1. **Kill processes accessing the CD-ROM drive, if necessary.**

   The disc will not eject while the drive is in use. To kill any processes accessing the CD-ROM drive, become superuser and type the following:

   ```
   % su
   Password:
   # fuser -k /cdrom/cdrom0
   ```

   Note – You should warn users before abruptly halting processes. The command `fuser -u /cdrom/cdrom0` helps you identify who's accessing the CD-ROM drive. Refer to the *Solaris System Administrator's Guide* for more information about the `fuser` command.

   ---

2. **From the console device, type:**

   ```
   % eject cdrom0
   ```

   The CD-ROM disc should eject.

What Next

You can also eject a compact disc by using one of these methods:

- Manually; see "How to Eject a Compact Disc Manually" on page 104
- Using an emergency procedure; see "How to Eject a Compact Disc in an Emergency" on page 106

How to Eject a Compact Disc Manually

What to Do

1. **Kill processes accessing the CD-ROM drive, if necessary.**

   The front panel Eject button will not eject a disc while the disc is in use. To kill any processes accessing the CD-ROM drive, become superuser and type the following:

   ```
   % su
   Password:
   # fuser -k /cdrom/cdrom0
   ```

   Note – You should warn users before abruptly halting processes. The command `fuser -u /cdrom/cdrom0` helps you identify who's accessing the CD-ROM drive. Refer to the *Solaris System Administrator's Guide* for more information about the `fuser` command.

   ---

2. **Press the Eject button on the front panel.**

   The drive ejects the CD tray and you can remove the disc.
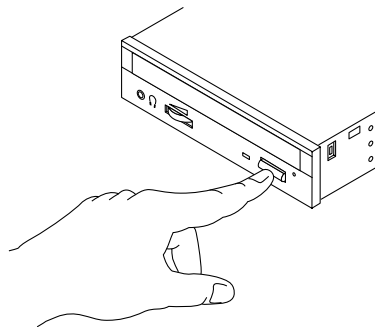
What Next

You can also eject a compact disc by using one of these methods:

- With software commands; see "How to Eject a Compact Disc With Software Commands" on page 102
- Using an emergency procedure; see "How to Eject a Compact Disc in an Emergency" on page 106

How to Eject a Compact Disc in an Emergency

Before You Begin

Use the emergency ejection procedure *only in emergency situations*, for instance, if you unmounted the disc and the Eject button does not function.

What to Do

Caution – If this procedure is used while a disc is mounted, you can degrade or destroy data in your system.

1. **Turn off the power to your system.**

   See "How to Power Off the System" on page 43.

2. **Unfold and straighten one end of a large wire paper clip.**

3. **Insert the straightened end of the clip into the emergency eject hole and press firmly.**

   Pull the tray from the drive after the clip is inserted into the hole.

What Next

You can also eject a compact disc by using one of these methods:

- With software commands; see "How to Eject a Compact Disc With Software Commands" on page 102
- Manually; see "How to Eject a Compact Disc Manually" on page 104

About the Tape Drive and Tape Cartridges

There are a number of different tape drives offered by Sun Microsystems for your system. Each tape drive is shipped with a specification sheet that contains the following information:

- Type of cartridges that can be used with the drive
- Cartridge storage capacity
- Handling and storage information
- Physical characteristics
- Power requirements
- Cleaning instructions
- Description of controls, indicators, and jumper setting

Handling and Storing Tape Cartridges

The following general handling and storage information applies to cartridges for any of the tape drives offered for your system:

- Keep cartridges away from anything magnetic.
- Store cartridges in a dust-free environment.
- Keep cartridges away from direct sunlight and sources of heat, cold, or humidity. Constant room temperature and 50% humidity is recommended.
- Do not touch the surface of the tape.

Thermal Conditioning

To ensure proper thermal conditioning, keep the tape cartridge at the same temperature as the drive for 24 hours. (This applies to cartridges for any of the tape drives offered for your system.)

How to Insert a Tape Cartridge

What to Do

1. **Verify that the tape cartridge write-protect switch is set correctly.**

   If the lock window is open, the tape is write-protected.

Write-protect switch
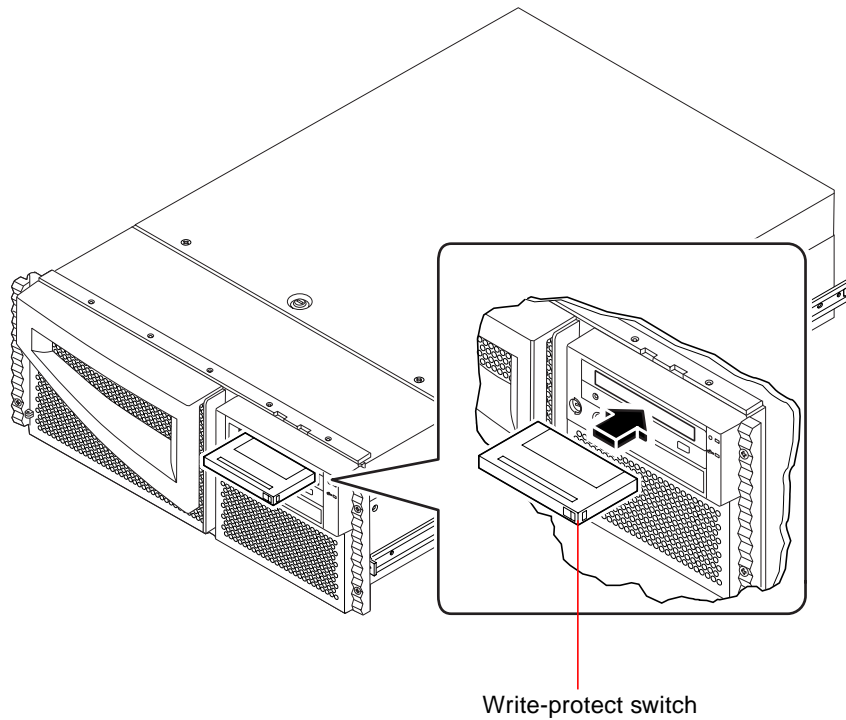
2. **Insert the cartridge into the drive, label side up.**

3. **Push gently on the cartridge until it is pulled into the drive.**

What Next

To remove a tape cartridge from the drive, see:

- "How to Remove a Tape Cartridge" on page 111.

How to Remove a Tape Cartridge

Before You Begin

Note – The information in this section applies to a DDS-3 tape drive. If you have a different type of tape drive installed, see the specifications shipped with the drive for information.

What to Do

1. **Check that there is no drive activity.**

   The green activity LED should be unlit. A flashing LED indicates drive activity.

Caution – Do not eject the tape cartridge when the drive is active, or you may incur data loss or equipment damage.

Activity LED   Attention LED   Eject button
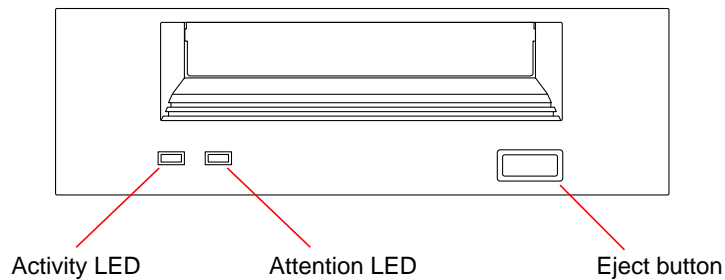
2. **Push the Eject button and remove the tape cartridge.**

What Next

To insert a cartridge into the drive, see:

- "How to Insert a Tape Cartridge" on page 109

How to Control the Tape Drive

What to Do

For information about software commands needed to read and write data with your tape drive, refer to the *Solaris Handbook for Sun Peripherals* or the *Solaris User's Guide*.

How to Clean the Tape Drive

Before You Begin

Observe these rules about *when* to clean a tape drive:

1. Clean the drive after the first four hours of use with a new tape.

2. After that, clean the tape drive after every 25 hours of use to maintain reliable operation.

3. Clean the drive twice as often if you use it in a dusty environment or operate it infrequently.

What to Do

● **Insert a cleaning cartridge into the drive.**

The tape should play for a short while, and then eject automatically.
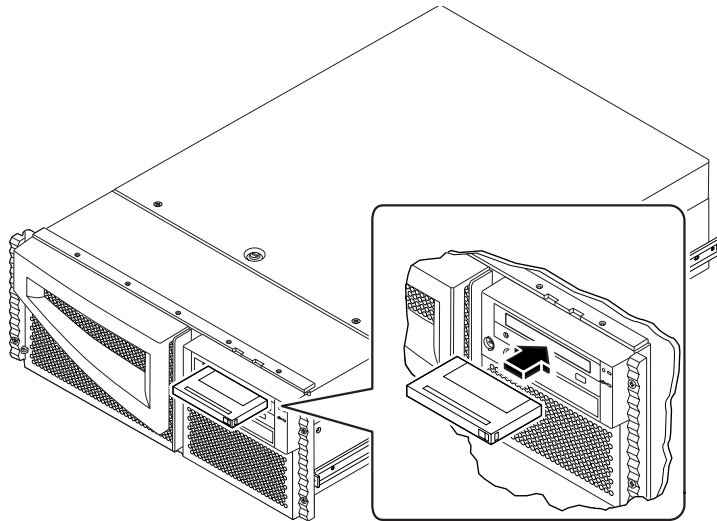
Do not use any cartridge other than a DDS-approved cleaning tape cartridge to clean your tape drive.

How to Clean a Compact Disc

Before You Begin

Eject the compact disc and remove it from the tray; see "How to Eject a Compact Disc With Software Commands" on page 102.

Note – If the drive cannot read a disc, you may have a dusty or dirty disc.

What to Do

1. **Clean the disc with compressed air.**

   Compressed air can remove most accumulations of dust and large dirt particles. If you have access to the compact disk read-head, verify it is dust free also.

2. **If spraying with compressed air** *fails* **to remove the dirt on a disc, wipe the disc using a soft, clean, lint-free,** *dry* **cloth.**

   - Wipe the non-labeled side of the disc *radially* from the center to the outside.
   - Do *not* wipe in a circular motion.
   - Wipe only the affected areas of the disc.

   The figure below shows the correct and incorrect ways to clean a compact disc.
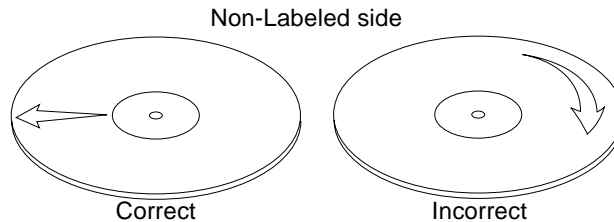
What Next

To insert the compact disc into the drive, see:

- "How to Insert a Compact Disc Into the Drive" on page 100.

Diagnostics and Troubleshooting

This chapter describes the diagnostic tools available for the system and provides an introduction to using these tools. The chapter also provides some information about error indications and software commands to help you determine and report to your qualified service provider, what component of the system needs to be replaced. For a more complete treatment of diagnostic tools, see the *Sun Enterprise 420R Server Service Manual*

With the exception of internal disk drives in the Sun Enterprise 420R server, *all other component installation or replacement* must performed by a qualified service provider.

The following tasks are covered in this chapter:

- "How to Use POST Diagnostics" on page 119
- "How to Use OpenBoot Diagnostics (OBDiag)" on page 127
- "How to Set the Diagnostic Level for POST and OBDiag" on page 129
- "How to Check Whether SunVTS Software Is Installed" on page 132
- "How to Use SunVTS Software" on page 133

The following information is also included:

- "About Diagnostic Tools" on page 116
- "About Power-On Self-Test (POST) Diagnostics" on page 118
- "About OpenBoot Diagnostics (OBDiag)" on page 124
- "About SunVTS Software" on page 130
- "About Sun Enterprise SyMON Software" on page 135
- "About Troubleshooting Your System" on page 136
- "About Diagnosing Specific Problems" on page 145

About Diagnostic Tools

The system provides both firmware-based and software-based diagnostic tools to help you identify and isolate hardware problems. These tools are:

- Power-on self-test (POST) diagnostics
- OpenBoot Diagnostics (OBDiag)
- SunVTS software
- Sun Enterprise SyMON software

POST diagnostics verify the core functionality of the system, including the main logic board, system memory, and any on-board I/O devices. You can run POST even if the system is unable to boot. For more information about POST, see "About Power-On Self-Test (POST) Diagnostics" on page 118 and "How to Use POST Diagnostics" on page 119.

OBDiag tests focus on system I/O and peripheral devices. Like POST, you can run OBDiag even if the system is unable to boot. For more information about OBDiag, see "About OpenBoot Diagnostics (OBDiag)" on page 124 and "How to Use OpenBoot Diagnostics (OBDiag)" on page 127.

The SunVTS system exerciser is a graphics-oriented UNIX application that permits the continuous exercising of system resources and internal and external peripheral equipment. For more information about SunVTS software, see "About SunVTS Software" on page 130.

UNIX-based Sun Enterprise SyMON software allows you to monitor the system hardware status and operating system performance of your server. For information about Sun Enterprise SyMON software, see "About Sun Enterprise SyMON Software" on page 135.

Which method or tool you use to diagnose system problems depends on the nature of those problems:

- If your machine isn't able to boot its operating system software, you need to run POST and OBDiag tests.
- If your machine is "healthy" enough to start up and load its operating system software, you can use Sun Enterprise SyMON software and SunVTS software to diagnose system problems.

■ The following chart provides an overview of when to use the various diagnostic tools to diagnose hardware problems.
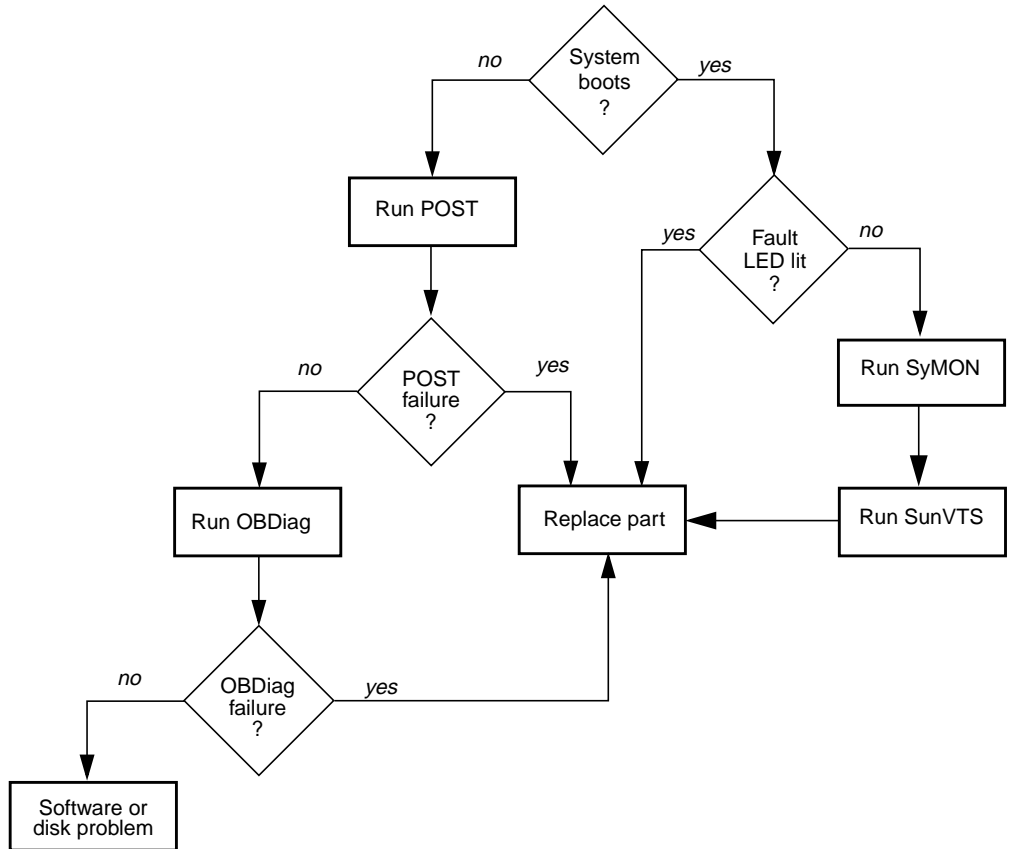
About Power-On Self-Test (POST) Diagnostics

The POST diagnostic code resides in flash PROM on the main logic board. It runs whenever the system is turned on or when a system reset is issued. POST tests the following system components:

- CPU modules
- Memory modules
- NVRAM
- Main logic board

POST reports its test results via LEDs located on the system keyboard and on the system front panel. See "Error Indications" on page 136 for more information about LEDs and error messages.

By default POST displays detailed diagnostic and error messages on a local terminal, if one is attached to the system's serial port A. For information about running POST, see "How to Use POST Diagnostics" on page 119.

How to Use POST Diagnostics

When you turn on the system power, POST diagnostics run automatically if any of the following conditions apply:

- The OpenBoot PROM (OBP) variable `diag-switch?` is set to `true` when you power on the system.
- You hold down the keyboard's Stop and D (`Shift-d`) keys as you power on the system.

For information about the various keyswitch positions, see "About the Status and Control Panel" on page 7.

Before You Begin

You can view POST diagnostic and error messages locally on an attached terminal.

To view POST diagnostic and error messages on the local system, you need to connect an alphanumeric terminal or establish a `tip` connection to another Sun system. For more information, see "About Communicating With the Server" on page 28, or if you already have a console setup see "Setting Up a tip Connection" on page 119. You must also verify baud rates between a system and a monitor or a system and a terminal. See "Verifying the Baud Rate" on page 121.

You can choose to run an abbreviated POST with concise error and status reporting or run an extensive POST with more detailed messages. For more information, see "How to Set the Diagnostic Level for POST and OBDiag" on page 129.

If a console or a monitor is not connected to serial port A (default port) of a system or server to be tested, the keyboard LEDs are used to determine error conditions. See "Error Indications" on page 136.

Setting Up a `tip` Connection

A `tip` connection enables you to use a remote shell window on a terminal to display test data from a system. Serial port A (or serial port B of a tested system) is used to establish the `tip` connection between the system being tested and another Sun system monitor or TTY-type terminal. The `tip` connection is used in a terminal window and provides features to help with the OBP commands and messages.

To set up a `tip` connection:

1. Connect serial port A of the system being tested to serial port B of another Sun system using a serial null modem cable (connect cable pins 2-3, 3-2, 7-20, and 20-7).
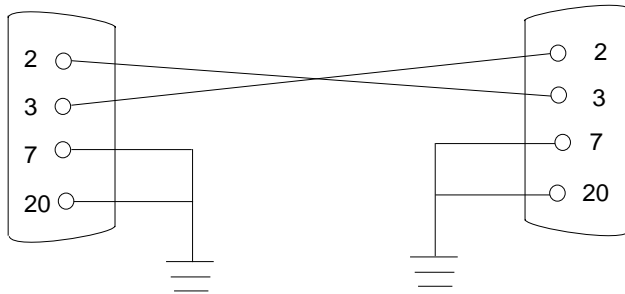
2. At the other Sun system, update the `/etc/remote` file by changing to the `/etc` directory and then adding the following line to the `remote` file as shown below:

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

Note – The example shows connection to serial port B.

3. To use serial port A:

a. Copy and paste the serial port B `remote` file.

b. Modify the serial port B system `remote` file as follows:

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

4. In a shell window on the Sun system, type:

```
hostname% tip hardwire
connected
```

Note – The shell window is now a `tip` window directed to the serial port of the system being tested. When power is applied to the system being tested, POST messages will be displayed in this window.

5. **When POST is completed, disconnect the** `tip` **window as follows:**

   a. **Open a shell window.**

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

   c. **Type the following to kill the** `tip` **hardwire process.**

   ```
   % kill -9 <Process ID (PID) Number>
   ```

Verifying the Baud Rate

To verify the baud rate between the Sun Enterprise 420R server and a terminal or another Sun system monitor:

1. **Open a shell window.**

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

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

   ```
   ttyb-mode = 9600,8,n,1
   ttya-mode = 9600,8,n,1
   ```

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

What to Do

Ensure that the front panel keyswitch is in the Standby position.

For descriptions of the keyswitch settings, see "About the Status and Control Panel" on page 7.

You can initialize POST one of two ways.

- By setting the `diag-switch?` to `true` and the `diag-level` to `max` or `min`, followed by power cycling the system unit.
- By simultaneously pressing the keyboard Stop and D keys while power is applied to the system unit.

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

1. **When the `ok` prompt is displayed, type the following command:**

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

2. **At the Sun Type-6 keyboard, power cycle the system by simultaneously pressing the Shift key and the Power-On key. After a few seconds, press the Power-On key again, or press the On/Off button on the system once.**

Note – The keyswitch must be set to the Power-On/Off position.

The system runs the POST diagnostics. POST displays status and error messages in the system console. For more information, see the "Results" section below.

Upon successful completion of POST, the system will run OBDiag. For more information about OBDiag, see "About OpenBoot Diagnostics (OBDiag)" on page 124 and "How to Use OpenBoot Diagnostics (OBDiag)" on page 127.

Results

While POST is running, you can observe its progress and any error indications in the following locations:

- System console or through a `tip` connection
- Front panel fault LEDs
- Keyboard LEDs (if a keyboard is present)

Observing POST in Progress

As POST runs, it displays detailed diagnostic status messages in the system console. If POST detects an error, it displays an error message in the system console that indicates the failing part. A sample error message is provided below:

```
Power On Self Test Failed. Cause: DIMM U0702 or System Board
ok
```

POST status and error conditions are indicated by the general fault LED on the system front panel. The LED blinks slowly to indicate that POST is running. It remains lit if POST detects a fault.

If a Sun Type-5 or Type-6 keyboard is attached to the system, POST status and error indications are also displayed via the four LEDs on the keyboard. When POST starts, all four keyboard LEDs blink on and off simultaneously. After that, the Caps Lock LED blinks slowly to indicate POST is running. If an error is detected, the pattern of the lit LEDs provides an error indication. See "Error Indications" on page 136 for more information.

If POST detects an error condition that prevents the system from booting, it will halt operation and display the `ok` prompt. The last message displayed by POST prior to the `ok` prompt indicates which part you need to replace.

About OpenBoot Diagnostics (OBDiag)

OpenBoot Diagnostics (OBDiag) software resides in flash PROM on the main logic board. OBDiag can isolate errors in the following system components:

- Main logic board
- Diskette drive (if applicable)
- CD-ROM drive
- Tape drive
- Disk drives
- Any option card that contains an on-board self-test

On the main logic board, OBDiag tests not only the main logic board but also its interfaces:

- PCI
- SCSI
- TPE Ethernet
- Serial port
- Parallel port
- Keyboard/mouse

OBDiag reports some test results via the LEDs located on the system front panel. See "Error Indications" on page 136 for more information about LEDs and error messages.

OBDiag displays detailed diagnostic and error messages on a local console or terminal, if one is attached to the system.

OBDiag tests run automatically under certain conditions. You can also run OBDiag interactively from the system ok prompt. For information about running OBDiag, see "How to Use OpenBoot Diagnostics (OBDiag)" on page 127.

When you run OBDiag interactively from the ok prompt, you invoke the OBDiag menu, which lets you select the tests you want to perform. For information about the OBDiag menu, see "OBDiag Menu" on page 125.

The system also provides configuration variables that you can set to affect the operation of the OBDiag tests. For information about the configuration variables, see "OBDiag Configuration Variable Settings" on page 126.

OBDiag Menu

The OBDiag menu is created dynamically whenever you invoke OBDiag in interactive mode. Therefore, the menu entries may vary from system to system, depending on the system configuration. OBDiag also determines whether any optional devices are installed in the system. If the device has an on-board self-test, OBDiag incorporates the device test name into the list of menu entries. It also may sort the menu entries in alphabetical order and number them accordingly.

The OBDiag menu displays the core tests that exercise parts of the basic system. These tests can be seen in the OBDiag menu displayed below. For complete information about each test, see the *Sun Enterprise 420R Server Service Manual*.

Once you invoke OBDiag as described, the system's OBDiag menu is displayed.

```
 OBDiag Menu

  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 ..... SCSI
 12 ..... All Above
 13 ..... Quit
 14 ..... Display this Menu

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

OBDiag Configuration Variable Settings

The following table provides information about OpenBoot PROM configuration
variables that affect the operation of OBDiag. Use the `printenvs` command to show
current values and the `setenv` command to set or change a value.

Variable	Setting	Description	Default
`diag-level`	`off`	No tests are run at power up	
	`min`	Performs minimal testing of core functionality	`min`
	`max`	Runs exhaustive tests for all functions except external loopbacks. External loopback tests are run only if `diag-targets` is set to `loopback`, `loopback3`, `device&loopback`, or `device&loopback,3`	

How to Use OpenBoot Diagnostics (OBDiag)

When you turn on the system power, OBDiag runs automatically if any of the following conditions apply:

- The OpenBoot PROM (OBP) variable `diag-switch?` is set to `true`.
- You hold down the keyboard's Stop and D (`Shift-d`) keys as you power on the system, and then the systems's `ok` prompt will appear. See "How to Power On the System" on page 34.

You can also run OBDiag in an interactive mode and select which tests you want to perform. The following procedure describes how to run OBDiag interactively from the system `ok` prompt.

What to Do

Note – Perform this procedure with the power *on* and the keyswitch in the Power-On/Off position.

1. **With the keyswitch in the Power-On/Off position, press the Break key on your alphanumeric terminal's keyboard, or enter the Stop-a sequence on a Sun keyboard.**

   To enter the `Stop-a` sequence, press the `Stop` key and the `a` key simultaneously. The `ok` prompt is displayed.

2. **(*Optional*) Select a diagnostic level.**

   Three different levels of diagnostic testing are available for OBDiag; see "How to Set the Diagnostic Level for POST and OBDiag" on page 129.

3. **Then type:**

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

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

```
ok obdiag
```

The OBDiag menu is displayed.

```
OBDiag Menu

 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 ..... SCSI
12 ..... All Above
13 ..... Quit
14 ..... Display this Menu
15 ..... Toggle script-debug
16 ..... Enable External Loopback Tests
17 ..... Disable External Loopback Tests

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

5. **When the OBDiag menu appears, type the appropriate test number at the** `Enter` **prompt.**

Note – For more information about OBDiag tests, see "About OpenBoot Diagnostics (OBDiag)" on page 124.

How to Set the Diagnostic Level for POST and OBDiag

Before You Begin

Three different levels of diagnostic testing are available for power-on self-test (POST) and OpenBoot Diagnostics (OBDiag): max (maximum level), min (minimum level), and off (no testing). The system runs the appropriate level of diagnostics based on the setting of the OpenBoot PROM (OBP) variable called diag-level.

The default setting for diag-level is min.

If your server is set up without a local console or terminal, you'll need to set up a monitor, console, or terminal before setting the diagnostic level. See "About Communicating With the Server" on page 28.

What to Do

Note – Perform this procedure with the power on and the keyswitch set to the Power-On/Off position.

---

1. **With the keyswitch in the Power-On/Off position, press the Break key on your alphanumeric terminal's keyboard, or type the Stop-a sequence on a Sun keyboard.**

   To enter the Stop-a sequence, press the Stop key and the a key simultaneously. The ok prompt is displayed.

2. **To set the diag-level variable, type the following:**

   ```
   ok setenv diag-level value
   ```

   The *value* can be off, min, or max. See "OBDiag Configuration Variable Settings" on page 126 for information about each setting.

About SunVTS Software

SunVTS, the Sun Validation and Test Suite, is an online diagnostics tool and system exerciser for verifying the configuration and functionality of hardware controllers, devices, and platforms. You can run SunVTS using any of these interfaces: a command-line interface, a TTY interface, or a graphical interface that runs within a windowed desktop environment.

SunVTS software lets you view and control a testing session over modem lines or over a network. Using a remote system, you can view the progress of a SunVTS testing session, change testing options, and control all testing features of another system on the network.

Useful tests to run on your system are listed below.

SunVTS Test	Description
ecpptest	Verifies the ECP1284 parallel port printer functionality
cdtest	Tests the CD-ROM drive by reading the disc and verifying the CD table of contents (TOC), if it exists
disktest	Verifies local disk drives
fputest	Checks the floating-point unit
fstest	Tests the integrity of the software's file systems
m64test	Tests the PGX frame buffer card
mptest	Verifies multiprocessor features (for systems with more than one processor)
nettest	Checks all the hardware associated with networking (for example, Ethernet, token ring, quad Ethernet, fiber optic, 100-Mbit per second Ethernet devices)
pmem	Tests the physical memory (read only)
sptest	Tests the system's on-board serial ports
tapetest	Tests the various Sun tape devices
vmem	Tests the virtual memory (a combination of the swap partition and the physical memory)

For More Information

The following documents provide information about SunVTS software. They are available on *Solaris on Sun Hardware AnswerBook*. This AnswerBook documentation is provided on the *Sun Updates CD* for the Solaris release you are running.

■ *SunVTS User's Guide*

This document describes the SunVTS environment, including how to start and control the various user interfaces. SunVTS features are described in this document.

■ *SunVTS Test Reference Manual*

This document contains descriptions of each test that SunVTS software runs in the SunVTS environment. Each test description explains the various test options and gives command-line arguments.

■ *SunVTS Quick Reference Card*

This card gives an overview of the main features of the SunVTS Open Look interface.

How to Check Whether SunVTS Software Is Installed

Before You Begin

SunVTS software is an optional package that may or may not have been loaded when your system software was installed.

To check whether SunVTS software is installed, you must access your system either from a console window or from a terminal (see "About Communicating With the Server" on page 28), or from a remote machine logged in to the system.

What to Do

1. **Type the following:**

```
% pkginfo -l SUNWvts
```

- If SunVTS software is loaded, information about the package will be displayed.
- If SunVTS software is not loaded, you'll see an error message:

```
ERROR: information for "SUNWvts" was not found
```

2. **If necessary, use the** `pkgadd` **utility to load the** `SUNWvts` **package onto your system from the** *Sun Update CD.*

   Note that `/opt/SUNWvts` is the default directory for installing SunVTS software.

What Next

For more information, refer to the appropriate Solaris documentation, as well as the `pkgadd` reference manual page.

How to Use SunVTS Software

Before You Begin

If your system passes the firmware-based diagnostics and boots the operating system, yet does not function correctly, you can use SunVTS, the Sun Validation and Test Suite, to run additional tests. These tests verify the configuration and functionality of most hardware controllers and devices.

You'll need root or superuser access to run SunVTS tests.

What to Do

This procedure assumes you'll test your Sun Enterprise 420R server remotely by running a SunVTS session from a workstation using the SunVTS graphical interface. For information about other SunVTS interfaces and options, see "About Diagnostic Tools" on page 116.

1. **Use the** `xhost` **command to give the remote server access to the local display. Type:**

```
% /usr/openwin/bin/xhost + remote_hostname
```

Substitute the name of the Sun Enterprise 420R server for *remote_hostname*. Among other things, this command gives the server display permissions to run the SunVTS graphical interface in the OpenWindows™ environment of the workstation.

2. **Remotely log in to the server as superuser or root.**

3. **Check whether SunVTS software is loaded on the server.**

SunVTS software is an optional package that may or may not have been loaded when the server software was installed. For more information, see "How to Check Whether SunVTS Software Is Installed" on page 132.

4. **To start the SunVTS software, type:**

```
# cd /opt/SUNWvts/bin
# ./sunvts -display local_hostname:0
```

Substitute the name of the workstation you are using for *local_hostname*. Note that `/opt/SUNWvts/bin` is the default `/bin` directory for SunVTS software. If you've installed SunVTS software in a different directory, use the appropriate path instead.

When you start SunVTS software, the SunVTS kernel probes the test system devices. The results of this probe are displayed on the Test Selection panel. For each hardware device on your system, there is an associated SunVTS test.

5. **Fine-tune your testing session by selecting only the tests you want to run.**

Click to select and deselect tests. (A check mark in the box indicates the item is selected.)

To select or deselect all the tests in the Memory group

☑ (Memory...)

☑ (kmem(vmem) ▽)   ☐ (mem(pmem) ▽)
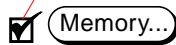
To select or deselect individual memory tests

Results

If SunVTS tests indicate an impaired or defective part, see the appropriate procedures in the *Sun Enterprise 420R Server Service Manual*, or contact your qualified service provider to replace the defective part.

About Sun Enterprise SyMON Software

Sun Enterprise SyMON software is a GUI-based or ASCII-based diagnostic tool designed to monitor system hardware status and UNIX operating system performance. It offers simple, yet powerful monitoring capabilities that allow you to:

- Diagnose and address potential problems such as capacity problems or bottlenecks.
- Display physical and logical views of your exact server configuration.
- Monitor your server remotely from any location in the network.
- Isolate potential problems or failed components.

For instructions about installing and using Sun Enterprise SyMON software, see the *Sun Enterprise SyMON User's Guide.*

Sun Enterprise SyMON software is supported on the Sun Enterprise 420R server. To download the current Sun Enterprise 420R SyMON software packages, and to obtain information about the software documentation, go to the web site `www.sun.com/symon`.

About Troubleshooting Your System

The system provides the following features to help you identify and isolate hardware problems:

- Error indications
- Software commands
- Diagnostic tools

This section describes the error indications and software commands provided to help you troubleshoot your system. Diagnostic tools are covered in "About Diagnostic Tools" on page 116.

Error Indications

The system provides error indications via LEDs and error messages. Using the two in combination gives one a high degree of confidence that you can isolate a problem with a particular field-replaceable unit (FRU).

The system provides fault LEDs in the following places:

- Front panel
- Keyboard
- Power supplies

Error messages are logged in the `/var/adm/messages` file and are also displayed on the system console by the diagnostic tools.

Front Panel LEDs

System front panel LEDs provide your first indication if there is a problem with your system. Usually, a front panel LED is not the sole indicator of a problem. Error messages and even other LEDs can help to isolate the problem further.

The front panel has a general fault indicator that lights to indicate a problem with the power supply subsystem. See "About the Status and Control Panel" on page 7 for more information about the two LEDs and their meanings.

Keyboard LEDs

Four LEDs on the Sun Type-6 keyboard are used to indicate the progress and results of POST diagnostics. These LEDs are on the Caps Lock, Compose, Scroll Lock, and Num Lock keys, as shown below.
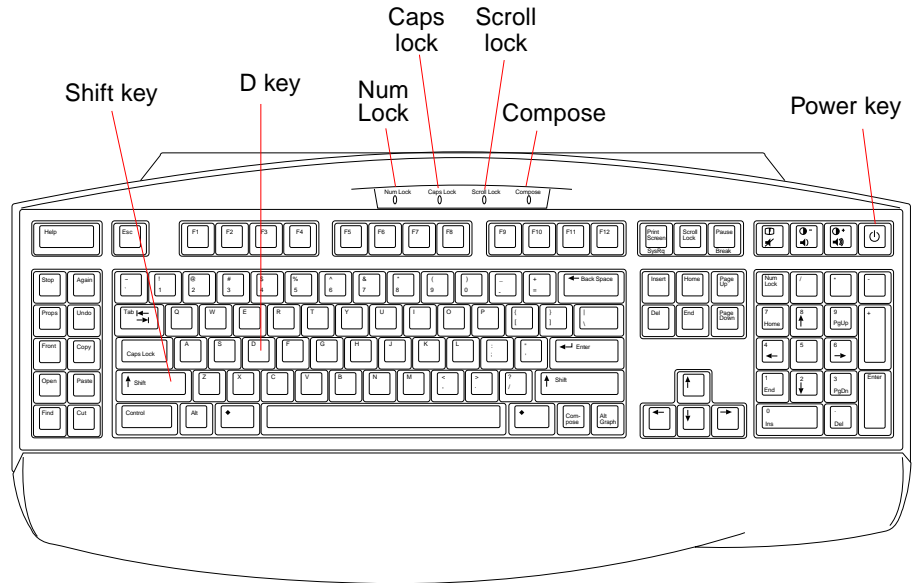
To indicate the beginning of POST diagnostics, the four LEDs briefly light all at once. The monitor screen remains blank, and the Caps Lock LED blinks for the duration of the testing.

If the system passes all POST diagnostic tests, all four LEDs light again and then go off. Once the system banner appears on the monitor screen, the keyboard LEDs assume their normal functions and should no longer be interpreted as diagnostic error indicators.

If the system fails any test, one or more LEDs will light to form an error code that indicates the nature of the problem.

Note – The LED error code may be lit continuously, or for just a few seconds, so it is important to observe the LEDs closely while POST is running.

The following table provides error code definitions.

Caps Lock	Compose	Scroll Lock	Num Lock	Failing FRU
On	Off	Off	Off	Main logic board
Off	On	Off	Off	CPU module 0
Off	On	Off	On	CPU module 1
Off	On	On	Off	CPU module 2
Off	On	On	On	CPU module 3
On	Off	On	On	No memory detected
Off	Off	On	On	Memory bank 0
Off	On	On	On	Memory bank 1
On	Off	On	On	Memory bank 2
On	On	On	On	Memory bank 3
Off	Off	Off	On	NVRAM

Note – The Caps Lock LED blinks on and off to indicate that the POST diagnostics are running; all other keys are off. When the LED lights steadily, it indicates an error.

Power Supply LEDs

Power supply LEDs are visible from the front of the system with the doors open. The following figure shows the LEDs on the power supply in bay 0.

Power supply 1   Power supply 2

DC status (Green)

Fault (Yellow)

AC present status (Green)
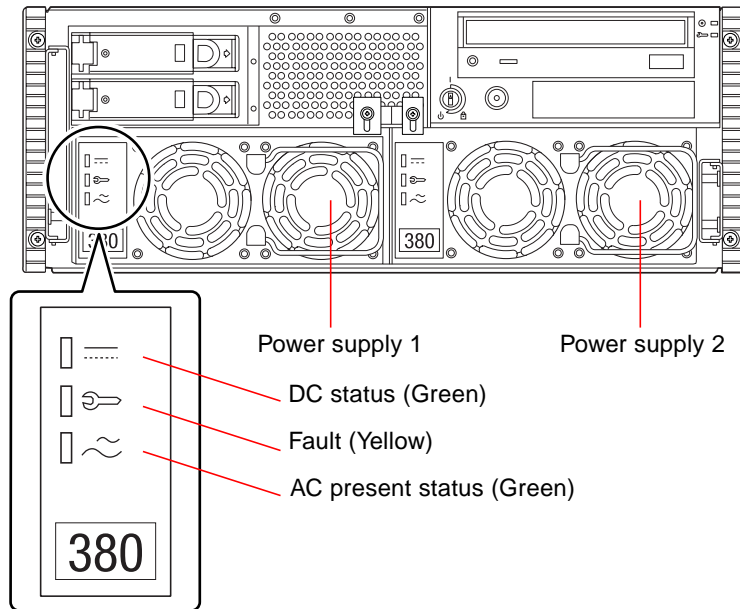
The following table provides a description of each LED.

LED Name	Icon	Description
DC Status		This green LED is lit to indicate that all DC outputs from the power supply are functional.
Fault		This yellow LED is lit to indicate a fault in the power supply. The supply is non-functional, and there is no DC output to the system. The amber LED on the system front panel also lights if this LED is lit.
AC present		This green LED is lit to indicate that the primary circuit has power. When this LED is lit, the power supply is providing Standby power to the system.

Disk LEDs

The disk LEDs are visible from the front of the system when the left door is open, as shown in the following figure.

Internal disk drive LEDs
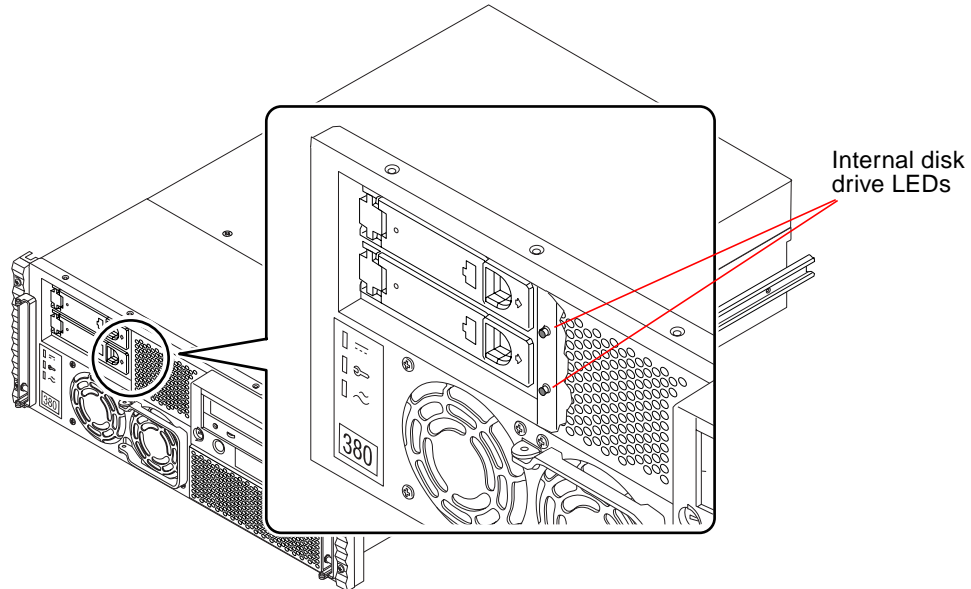
When a disk LED lights steadily and is green, it indicates that the slot is populated and that the drive is receiving power. When an LED is green and blinking, it indicates that there is activity on the disk.

Error Messages

Error messages and other system messages are saved in the file `/var/adm/messages`.

The two firmware-based diagnostic tools, POST and OBDiag, provide error messages either locally on the system console or terminal, or in a remote console window through a `tip` connection. These error messages can help to further refine your problem diagnosis. See "OBDiag Configuration Variable Settings" on page 126 for additional details.

Software Commands

The system software provides Solaris operating environment commands, and OpenBoot PROM (OBP) commands that you can use to diagnose problems. For more information about Solaris commands, see the appropriate man pages. For additional information about OBP commands, see the *OpenBoot 3.x Command Reference Manual*. (An online version of the manual is included with the *Solaris System Administrator AnswerBook* that ships with Solaris software.)

Solaris `prtdiag` Command

The `prtdiag` command is a UNIX shell command used to display system configuration and diagnostic information. You can use the `prtdiag` command to display:

- System configuration, including information about clock frequencies, CPUs, memory, and I/O card types
- Diagnostic information
- Failed field-replaceable units (FRUs)

To run `prtdiag`, type:

```
% /usr/platform/sun4u/sbin/prtdiag
```

To isolate an intermittent failure, it may be helpful to maintain a `prtdiag` history log. Use `prtdiag` with the `-l` (log) option to send output to a log file in `/var/adm`.

Note – Refer to the `prtdiag` man page for additional information.

An example of `prtdiag` output follows. The exact format of `prtdiag` output depends on which version of the Solaris operating environment is running on your system.

`prtdiag` output:

```
ok /usr/platform/sun4u/sbin/prtdiag -v
System Configuration:  Sun Microsystems  sun4u Sun Enterprise 420R
(4 X UltraSPARC-II 450MHz)
System clock frequency: 113 MHz
Memory size: 256 Megabytes
======================= CPUs =======================
                     Run    Ecache   CPU     CPU
Brd     CPU    Module   MHz     MB     Impl.   Mask
---     ---    -------  -----  ------  ------  ----
 0       0      0        450    4.0    US-II   10.0
 0       1      1        450    4.0    US-II   10.0
 0       2      2        450    4.0    US-II   10.0
 0       3      3        450    4.0    US-II   10.0
======================= IO Cards =========================
     Bus
Brd  Type  MHz   Slot  Name                             Model
---  ----  ----  ----  -----------------  ---------------------
 0   PCI    33    1    network-SUNW,hme
 0   PCI    33    3    scsi-glm/disk (block)       Symbios,53C875
 0   PCI    33    3    scsi-glm/disk (block)       Symbios,53C875
No failures found in System
==========================

==================== HW Revisions =====================
ASIC Revisions:
PCI: pci Rev 4
Cheerio: ebus Rev 1

System PROM revisions:
----------------------
  OBP 3.23.0 1999/06/30 13:53   POST 1.2.7 1999/05/24 17:33

ok
```

OBP `show-devs` Command

If you are working from the OBP prompt (`ok`), you can use the OBP `show-devs` command to list the devices in the system configuration.

OBP `printenv` Command

Use the OBP `printenv` command to display the OpenBoot PROM configuration variables stored in the system NVRAM. The display includes the current values for these variables as well as the default values.

OBP `probe-scsi` and `probe-scsi-all` Commands

To diagnose problems with the SCSI subsystem, you can use the OBP `probe-scsi` and `probe-scsi-all` commands. Both commands require that you halt the system.

Note – When it is not practical to halt the system, you can use SunVTS as an alternative method of testing the SCSI interfaces. See "About Diagnostic Tools" on page 116 for more information.

The `probe-scsi` command transmits an inquiry command to all SCSI devices connected to the main logic board SCSI interfaces. This includes any tape or CD-ROM drive in the removable media assembly (RMA), any internal disk drive, and any device connected to the external SCSI connector on the system back panel. For any SCSI device that is connected and active, its target address, unit number, device type, and manufacturer name are displayed.

The `probe-scsi-all` command transmits an inquiry command to all SCSI devices connected to the system SCSI host adapters, including any host adapters installed in PCI slots. The first identifier listed in the display is the SCSI host adapter address in the system device tree followed by the SCSI device identification data.

The first example that follows shows a `probe-scsi` output message. The second example shows a `probe-scsi-all` output message.

`probe-scsi` output:

```
ok probe-scsi
This command may hang the system if a Stop-A or halt command
has been executed. Please type reset-all to reset the system
before executing this command.
Do you wish to continue? (y/n) n
ok reset-all

ok probe-scsi
Primary UltraSCSI bus:
Target 0
  Unit 0   Disk     SEAGATE ST34371W SUN4.2G3862
Target 4
  Unit 0   Removable Tape     ARCHIVE Python 02635-XXX5962
Target 6
  Unit 0   Removable Read Only device TOSHIBA XM5701TASUN12XCD0997
Target 9
  Unit 0   Disk     SEAGATE ST34371W SUN4.2G7462
Target b
  Unit 0   Disk     SEAGATE ST34371W SUN4.2G7462
ok
```

`probe-scsi-all` output:

```
ok probe-scsi-all
This command may hang the system if a Stop-A or halt command
has been executed. Please type reset-all to reset the system
before executing this command.
Do you wish to continue? (y/n) y

/pci@1f,4000/scsi@4,1
Target 0
  Unit 0 Disk     SEAGATE ST39102LC SUN9.0G0828
Target 1
  Unit 0 Disk     SEAGATE ST39102LC SUN9.0G0828
Target 6
  Unit 0 Removable Read Only deviceTOSHIBA XM6201TA SUN32XCD1103
ok
```

About Diagnosing Specific Problems

Network Communications Failure

Symptom

The system is unable to communicate over the network.

Action

Your system conforms to the Ethernet 10BASE-T/100BASE-TX standard, which states that the Ethernet 10BASE-T link integrity test function should always be enabled on both the host system and the Ethernet hub. The system cannot communicate with a network if this function is not set identically for both the system and the network hub (either enabled for both or disabled for both). This problem applies only to 10BASE-T network hubs, where the Ethernet link integrity test is optional. This is not a problem for 100BASE-TX networks, where the test is enabled by default. Refer to the documentation provided with your Ethernet hub for more information about the link integrity test function.

If you connect the system to a network and the network does not respond, use the OpenBoot PROM command `watch-net-all` to display conditions for all network connections:

```
ok watch-net-all
```

For most PCI Ethernet cards, the link integrity test function can be enabled or disabled with a hardware jumper on the PCI card, which you must set manually. (See the documentation supplied with the card.) For the standard TPE main logic board port, the link test is enabled or disabled through software, as shown below.

Note – Some hub designs permanently enable (or disable) the link integrity test through a hardware jumper. In this case, refer to the hub installation or user manual for details of how the test is implemented.

Determining the Device Name of the Ethernet Interface

To enable or disable the link integrity test for the standard Ethernet interface, or for a PCI-based Ethernet interface, you must first know the device name of the desired Ethernet interface. To list the device name use either solution described below.

Solution 1

Use this method while the operating system is running:

1. **Become superuser.**

2. **Type:**

```
# eeprom nvramrc="probe-all install-console banner apply
disable-link-pulse device-name"
  (Repeat for any additional device names.)
# eeprom "use-nvramrc?"=true
```

3. **Reboot the system to make the changes effective.**

Solution 2

Use this alternate method when the system is already at the OpenBoot prompt:

1. **Shut down the operating system and take the system to the** ok **prompt.**

2. **Determine the device name for the desired Ethernet interface.**

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

```
ok nvedit
0: probe-all install-console banner
1: apply disable-link-pulse device-name
(Repeat this step for other device names as needed.)
(Press CONTROL-C to exit nvedit.)
ok nvstore
ok setenv use-nvramrc? true
```

4. **Reboot the system to make the changes effective.**

Power-On Failure

Symptom

The system attempts to power on but does not boot or initialize the terminal or monitor.

Action

1. **Run POST diagnostics.**

   See "How to Use POST Diagnostics" on page 119.

2. **Observe POST results.**

   The front panel general fault LED should blink slowly to indicate that POST is running. Check the POST output using a locally attached terminal, or a `tip` connection.

3. **If you see no front panel LED activity, a power supply may be defective.**

   See "Power Supply LEDs" on page 139.

4. **If the POST output contains an error message, then POST has failed.**

   The most probable cause for this type of failure is the main logic board. However, before replacing the main logic board you should:

   a. **Remove optional PCI cards.**

   b. **Remove optional DIMMs.**

      Leave only the four DIMMs in Bank A.

   c. **Repeat POST to determine if any of these modules caused the failure.**

   d. **If POST still fails, then replace the main logic board.**

Video Output Failure

Symptom

No video at the system monitor.

Action

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

2. **Verify with a volt-ohmmeter that the wall outlet is supplying AC power.**

3. **Verify that the video cable connection is secure between the monitor and the video output port.**

   Use a volt-ohmmeter to perform the continuity test on the video cable.

4. **If the cables and their connections are okay, then troubleshoot the monitor and the graphics card.**

Disk or CD-ROM Drive Failure

Symptom

A disk drive read, write, or parity error is reported by the operating system or a software application.

A CD-ROM drive read error or parity error is reported by the operating system or a software application.

Action

● **Replace the drive indicated by the failure message.**

Symptom

Disk drive or CD-ROM drive fails to boot or is not responding to commands.

Action

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

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

```
ok reset-all
ok probe-scsi-all
```

2. **If the SCSI device responds correctly to** `probe-scsi-all`, **a message similar to the "probe-scsi-all output:" on page 144 is printed out.**

If the device responds and a message is displayed, the system SCSI controller has successfully probed the device. This indicates that the main logic board is operating correctly.

a. **If one drive does not respond to the SCSI controller probe but the others do, replace the unresponsive drive.**

b. **If only one internal disk drive is configured with the system and the** `probe-scsi-all` **test fails to show the device in the message, replace the drive.**

c. **If the problem is still evident after replacing the drive, replace the main logic board.**

d. **If replacing both the disk drive and the main logic board does not correct the problem, replace the associated UltraSCSI data cable and UltraSCSI backplane.**

SCSI Controller Failure

To check whether the main logic board SCSI controllers are defective, test the drive response to the `probe-scsi` command. To test additional SCSI host adapters added to the system, use the `probe-scsi-all` command. You can use the OBP `printenv` command to display the OpenBoot PROM configuration variables stored in the system NVRAM. The display includes the current values for these variables as well as the default values. See "OBP printenv Command" on page 143 for more information.

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

```
ok probe-scsi
```

If a message is displayed for each installed disk, the system SCSI controllers have successfully probed the devices. This indicates that the main logic board is working correctly.

2. **If a disk doesn't respond, replace the unresponsive drive.**

3. **If the problem remains after replacing the drive, contact your qualified service provider to replace the associated SCSI cable and backplane.**

Power Supply Failure

If there is a problem with a power supply, the system fault indicator lights on the front panel. If you have more than one power supply, then you can use the LEDs located on the power supplies themselves to identify the faulty supply. The power supply LEDs will indicate any problem with the AC input or DC output. See "Power Supply LEDs" on page 139 for more information about the LEDs. To replace a power supply, contact a qualified service provider.

DIMM Failure

SunVTS and POST diagnostics can report memory errors encountered during program execution. Memory error messages typically indicate the DIMM location number ("U" number) of the failing module. To replace a DIMM, contact a qualified service provider.

Use the following diagramsto identify the location of a failing memory module from its U number:

DIMM mapping—main logic board

Main logic board—Side

J4105   J4108   J4107

J4106

Bank 3   U1404
          U1403

Bank 1   U1402
          U1401

Bank 2   U1304
          U1303

Bank 0   U1302
          U1301

J4112

Main logic
board—Front

J1501   J1601

CPU module J0101
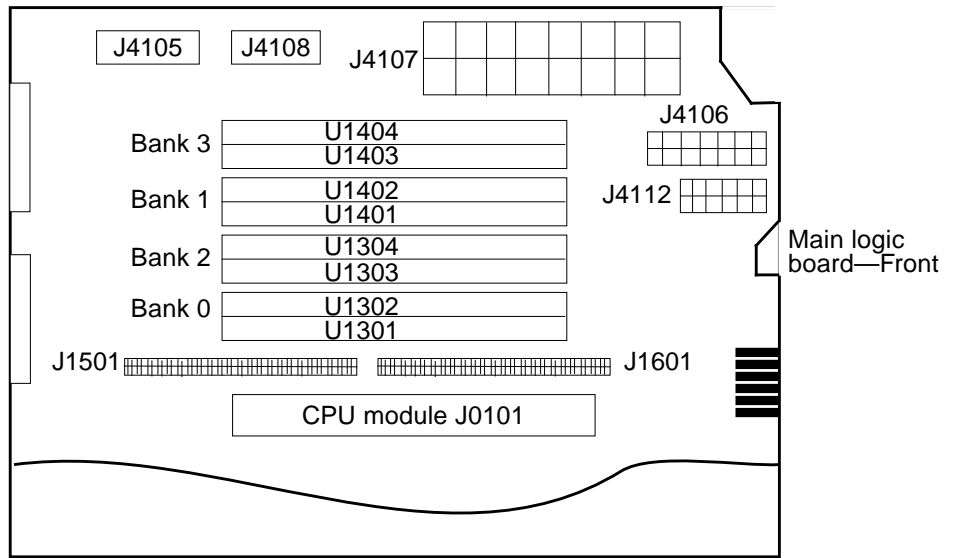
DIMM mapping—memory riser

BANK 3 (U0403, U0404)

BANK 2 (U0401, U0402)

BANK 1 (U0303, U0304)

BANK 0 (U0301, U0302)
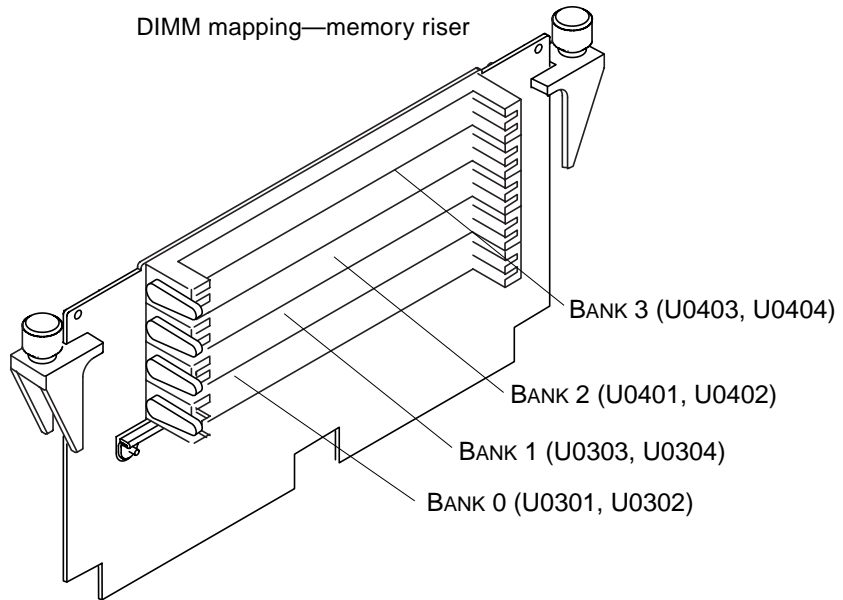
After you have identified the defective DIMM, for more information see the Sun Enterprise 420R Server Service Manual; to replace any defective part(s) contact your qualified service provider.

Connector Signal Descriptions

This appendix describes the Sun Enterprise 420 system main logic board connector signals and pin assignments that are accessible from the back panel.

The following topics covered in this appendix:

Reference for the Keyboard/Mouse Connector

Keyboard/Mouse Connector Diagram

The keyboard/mouse connector (J2701) is a DIN-8 type connector located on the main logic board back panel.
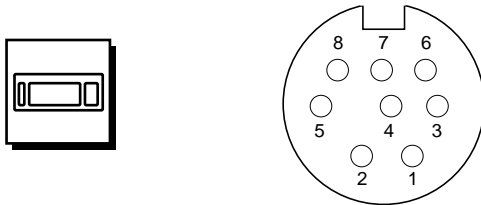
Keyboard/Mouse Connector Signals

Pin	Signal Name	Signal Description
1	Gnd	Ground
2	Gnd	Ground
3	+5 Vdc	+5 Vdc
4	MOUSE_IN_CONN	Mouse receive data
5	KBD_OUT_L	Keyboard out
6	KBD_IN_CONN	Keyboard in
7	KPOWERON_L	Keyboard power on
8	+5 Vdc	+5 Vdc

Reference for the Serial Port A and B Connectors

The serial port A and B connectors (J2902 and J2903, respectively) are DB-25 type connectors located on the main logic board back panel. Both serial ports conform to RS-423/RS-232 specifications.

Serial Port A and B Connector Diagram

Serial port B

13 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ 1
25 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ 14

Serial port A

13 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ 1
25 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ 14
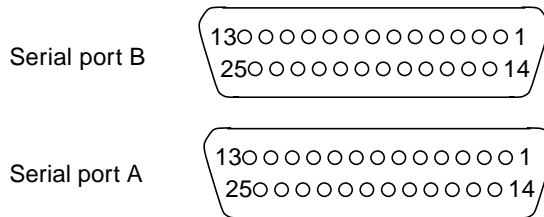
Serial Port Signals

Pin	Signal	Description
1	NC	Not connected
2	SER_TDX_A_CONN	Transmit Data
3	SER_RXD_A_CONN	Receive Data
4	SER_RTS_A_L_CONN	Ready To Send
5	SER_CTS_A_L_CONN	Clear To Send
6	SER_DSR_A_L_CONN	Data Set Ready
7	Gnd	Signal Ground
8	SER_DCD_A_L-CONN	Data Carrier Detect

Pin	Signal	Description
9	BUTTON_POR	TBD
10	BUTTON_XIR_L	TBD
11	+5Vdc	+5 VDC
12	NC	Not connected
13	NC	Not connected
14	NC	Not connected
15	SER_TRXC_A_L_CONN	Transmit Clock
16	NC	Not connected
17	SER_RXC_A_L_CONN	Receive Clock
18	NC	Not connected
19	NC	Not connected
20	SER_DTR_A_L_CONN	Data Terminal Ready
21	NC	Not connected
22	NC	Not connected
23	NC	Not connected
24	SER_TXC_A_L_CONN	Terminal Clock
25		None.

Reference for the Twisted-Pair Ethernet (TPE) Connector

The twisted-pair Ethernet (TPE) connector is a RJ-45 type connector located on the main logic board back panel.

Caution – Connect only TPE cables into the TPE connector.

TPE Connector Diagram

TPE Connector Signals

Pin	Signal Name	Description
1	Common mode termination	Termination
2	Common mode termination	Termination
3	TX+	Transmit data +
4	+5VDC	+5VDC
5	TX-	Transmit data -

Pin	Signal Name	Description
6	RX+	Receive data +
7	RX_	Receive data -
8	Common mode termination	Termination

TPE Cable-Type Connectivity

You can connect the following types of TPE cables 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

External UTP-5 Cable Lengths

The following list describes the TPE UTP-5 cable applications and maximum lengths.

- Cable type–UPT-5, data grade
- Applications–10BASE-T or 100BASE-T
- Maximum Length (metric)–100 meters
- Maximum Length (US)–109 yards

Reference for the UltraSCSI Connector

The Ultra small computer system interface (UltraSCSI) connector is located on the main logic board back panel.

UltraSCSI Connector Diagram
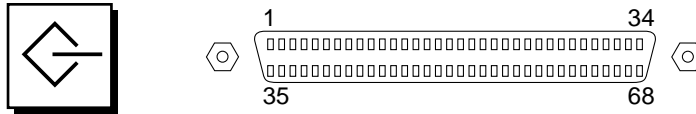
UltraSCSI Connector Signals

Pin	Signal Name	Description
1	Gnd	Ground
2	Gnd	Ground
3	NC	Not connected
4	Gnd	Ground
5	Gnd	Ground
6	Gnd	Ground
7	Gnd	Ground
8	Gnd	Ground
9	Gnd	Ground
10	Gnd	Ground
11	Gnd	Ground
12	Gnd	Ground
13	Gnd	Ground
14	Gnd	Ground
15	Gnd	Ground

Pin	Signal Name	Description
16	Gnd	Ground
17	TERMPOWER	Termpower
18	TERMPOWER	Termpower
19	NC	Not connected
20	Gnd	Ground
21	Gnd	Ground
22	Gnd	Ground
23	Gnd	Ground
24	Gnd	Ground
25	Gnd	Ground
26	Gnd	Ground
27	Gnd	Ground
28	Gnd	Ground
29	Gnd	Ground
30	Gnd	Ground
31	Gnd	Ground
32	Gnd	Ground
33	Gnd	Ground
34	Gnd	Ground
35	SCSI_B_DAT<12>	Data 12
36	SCSI_B_DAT<13>_	Data 13
37	SCSI_B_DAT<14>_	Data 14
38	SCSI_B_DAT<15>_	Data 15
39	SCSI_B_PAR<l>	Parity 1
40	SCSI_B_DAT<0>_	Data 0
41	SCSI_B_DAT<1>_	Data 1
42	SCSI_B_DAT<2>_	Data 2
43	SCSI_B_DAT<3>_	Data 3

Pin	Signal Name	Description
44	SCSI_B_DAT<4>_	Data 4
45	SCSI_B_DAT<5>_	Data 5
46	SCSI_B_DAT<6>_	Data 6
47	SCSI_B_DAT<7>_	Data 7
48	SCSI_B_PAR<0>	Parity 0
49	Gnd	Ground
50	NC	Not connected
51	TERMPOWER_B	Terminal B power
52	TERMPOWER_B	Terminal B power
53	NC	Not connected
54	Gnd	Ground
55	SCSI_B_ATN_L	Attention
56	Gnd	Ground
57	SCSI_B-BSY_L	Busy
58	SCSI_B_ACK_L	Acknowledge
59	SCSI_B_RESET_L	Reset
60	SCSI_B_MSG_L	Message
61	SCSI_B_SEL_L	Select
62	SCSI_B-CD_L	Command
63	SCSI_B_REQ_L	Request
64	SCSI_B_IO_L	In/out
65	SCSI_B_DAT<8>_	Data 8

Pin	Signal Name	Description
66	SCSI_B_DAT<9>_	Data 9
67	SCSI_B_DAT<10>_	Data 10
68	SCSI_B_DAT<11>_	Data 11

Note – _ (underscore) signifies active low.

Reference for the Parallel Port Connector

The parallel port connector is a DB-25 type connector located on the main logic board back panel.

Parallel Port Connector Diagram
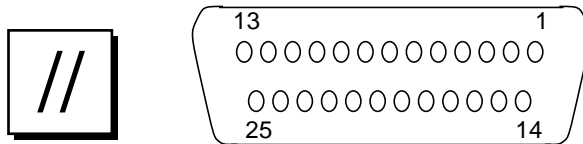
Parallel Port Signals

Pin	Signal	Description
1	PAR_DS_L_CONN	Data Strobe Low
2 to 9	PP_DAT[0..7]_CONN	Data0 Through Data7
10	PAR_ACK_L_CONN	Acknowledge Low
11	PAR_BUSY_CONN	Busy
12	PAR_PE_CONN	Parity Error
13	PAR_SELECT_L_CONN	Select Low
14	PAR_AFXN_L_CONN	Auto Feed Low
15	PAR_ERROR_L_CONN	Error Low
16	PAR_INIT_L_CONN	Initialize Low
17	PAR_IN_L_CONN	Peripheral Input Low
18	Gnd	Chassis ground

Pin	Signal	Description
19	Gnd	Chassisl ground
20	Gnd	Chassis ground
21	Gnd	Chassis ground
22	Gnd	Chassis ground
23	Gnd	Signal ground
24	Gnd	Signal ground
25	Gnd	Signal ground

System Specifications

This appendix provides product specifications for the Sun Enterprise 420R server.

- "Physical Specifications" on page 166
- "Electrical Specifications" on page 166
- "System Specifications" on page 165

Reference for System Specifications

Physical Specifications

The dimensions and weight of the system are as follows.

Specification	U.S.A.	Metric
Height	7.00 inches	17.8 centimeters
Width	17.25 inches	43.8 centimeters
Depth	27.25 inches	69.2 centimeters
Weight (approximate)	65 pounds	34 kilograms

Electrical Specifications

The electrical specifications of the system are as follows.

Parameter	Value
Input	
Nominal Frequencies	50 Hz or 60 Hz nominal
Nominal Voltage Range	100 to 240 VAC
Maximum Current AC RMS	6.3 A @ 100 VAC
AC Operating Range	90 to 264 Vrms, 47 to 63Hz
Outputs	
5.1 VDC[1]	0.1 to 1 A
+3.3 VDC[2]	3 to 50 A
+5 VDC[3]	3 to 40 A
+12 VDC	0.5 to 5 A
-12 VDC	0 to 0.5 A
Maximum DC Power Output	380 Watts
Maximum AC Power Consumption	610 Watts
Maximum Heat Dissipation	2080 BTUs/hr
Volt-Ampere Rating	630 VA with 380 Watt load

1. Standby output.
2. Combined output power of the +3.3 VDC and +5 VDC outputs must not exceed 320 Watts.
3. Combined output power of the +3.3 VDC and +5 VDC outputs must not exceed 320 Watts.

Environmental Specifications

The environmental requirements for the system are as follows:

.

Parameter	Value
Operating	
Temperature	5˚C to 35˚C (41˚F to 95˚F)—IEC 68-2-1, 68-2-2
Humidity	20% to 80% RH, noncondensing; 27 ˚C max wet bulb—IEC 68-2-2, 68-2-3
Altitude	0 to 3000 meters (0 to 10,000 feet)—IEC 68-2-40, 68-2-41
Vibration	0.2 gravity (g) peak, 5–500 Hz (swept sine); 0.0002 g^2/Hz, 5–500 Hz (random); vertical axis only (castered configuration); vertical and horizontal axes (foot glide configuration)—IEC 68-2-6
Shock	4g peak, 11 milliseconds half-sine pulse—IEC 68-2-27
Non-Operating	
Temperature	-20˚C to 60˚C (-4˚F to 140˚F)—IEC 68-2-1, 68-2-2
Humidity	93% RH, noncondensing at 35˚C—IEC 68-2-2, 68-2-3
Altitude	0 to 12,000 meters (0 to 40,000 feet)—IEC 68-2-40, 68-2-41
Vibration	1g peak, 5–500 Hz (swept sine); 0.002 g^2/Hz, 5–500 Hz (random); 3 perpendicular axes—IEC 68-2-6
Shock	15g peak, 11 milliseconds half-sine pulse—IEC 68-2-27e
Threshold Times-Roman	1 m/s—SUN 900-1813

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