Avaya™ Call Management System (CMS)

Sun® Ultra™ 5 Computer Hardware Installation, Maintenance, and Troubleshooting

585-215-871
Issue 3.3
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Notice

Every effort was made to ensure that the information in this document was complete and accurate at the time of printing. However, information is subject to change.

Preventing Toll Fraud

“Toll fraud” is the unauthorized use of your telecommunications system by an unauthorized party (for example, a person who is not a corporate employee, agent, subcontractor, or working on your company's behalf). Be aware that there may be a risk of toll fraud associated with your system and that, if toll fraud occurs, it can result in substantial additional charges for your telecommunications services.

Avaya Fraud Intervention

If you *suspect that you are being victimized* by toll fraud and you need technical assistance or support, call Technical Service Center Toll Fraud Intervention Hotline at +1-800-643-2353 for the United States and Canada. For additional support telephone numbers, see the Avaya Web site:

http://www.avaya.com

Select **Support**, then select **Escalation Lists**. This Web site includes telephone numbers for escalation within the United States. For escalation telephone numbers outside the United States, select **Global Escalation List**.

Providing Telecommunications Security

Telecommunications security (of voice, data, and/or video communications) is the prevention of any type of intrusion to (that is, either unauthorized or malicious access to or use of) your company's telecommunications equipment by some party.

Your company's “telecommunications equipment” includes both this Avaya product and any other voice/data/video equipment that could be accessed via this Avaya product (that is, “networked equipment”).

An “outside party” is anyone who is not a corporate employee, agent, subcontractor, or working on your company's behalf. Whereas, a “malicious party” is anyone (including someone who may be otherwise authorized) who accesses your telecommunications equipment with either malicious or mischievous intent.

Such intrusions may be either to/through synchronous (time-multiplexed and/or circuit-based) or asynchronous (character-, message-, or packet-based) equipment or interfaces for reasons of:

- Utilization (of capabilities special to the accessed equipment)
- Theft (such as, of intellectual property, financial assets, or toll-facility access)
- Eavesdropping (privacy invasions to humans)
- Mischief (troubling, but apparently innocuous, tampering)
- Harm (such as harmful tampering, data loss or alteration, regardless of motive or intent)

Be aware that there may be a risk of unauthorized intrusions associated with your system and/or its networked equipment. Also realize that, if such an intrusion should occur, it could result in a variety of losses to your company (including but not limited to, human/data privacy, intellectual property, material assets, financial resources, labor costs, and/or legal costs).

Your Responsibility for Your Company’s Telecommunications Security

The final responsibility for securing both this system and its networked equipment rests with you - an Avaya customer's system administrator, your telecommunications peers, and your managers. Base the fulfillment of your responsibility on acquired knowledge and resources from a variety of sources including but not limited to:

- Installation documents
- System administration documents
- Security documents
- Hardware-/software-based security tools
- Shared information between you and your peers
- Telecommunications security experts

To prevent intrusions to your telecommunications equipment, you and your peers should carefully program and configure:

- your Avaya-provided telecommunications systems and their interfaces
- your Avaya-provided software applications, as well as their underlying hardware/software platforms and interfaces
- any other equipment networked to your Avaya products.

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Avaya Support

Avaya provides a telephone number for you to use to report problems or to ask questions about your contact center. The support telephone number is 1-800-242-2121 in the United States. For additional support telephone numbers, see the Avaya Web site:

http://www.avaya.com

Select **Support**, then select **Escalation Lists**. This Web site includes telephone numbers for escalation within the United States. For escalation telephone numbers outside the United States, select **Global Escalation List**.

Acknowledgment

This document was written by the CRM Information Development group.

Avaya Call Management System
Sun Ultra 5 Computer
Hardware Installation, Maintenance, and Troubleshooting

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Preface

Overview

Avaya™ Call Management System (CMS) Sun® Ultra™ 5 Computer Hardware Installation, Maintenance, and Troubleshooting, 585-215-871, is written for technicians who install and maintain call center applications such as Avaya CMS.

Reasons for reissue

Issue 3.3 of this document was issued for the following changes:

- To add partitioning information for the 36-GB external SCSI disk drive (see Partitioning disk drives on page 111).
- To update the tape ordering procedures (see Ordering tapes on page 135).
- To make general wording and format corrections to the document.

Issue 3.2 of this document was issued for the following changes:

- To update the disk drive maintenance procedures, including new disk partitioning for CMS R3V11 (see Maintaining disk drives on page 83).
- To make general wording and format corrections to the document.

Issue 3.1 of this document was issued for the following changes:

- To add partitioning information for a new 4-GB EIDE disk drive (see Disk partition values, R3V8 and earlier data disks on page 115).
- To remove information about installing network hubs and Network Terminal Servers (NTS). This information is now contained in *Avaya CMS Terminals, Printers, and Modems*, 585-215-874.
- To remove references to the product name CentreVu®.
- To make general wording corrections to the document.

Issue 3.0 of this document was issued for the following changes:

- To update the disk drive maintenance procedures for CMS R3V9 (see Maintaining disk drives on page 83).
- To add information about the 18-GB external SCSI disk drive (see Disk partition values on page 111).
- To make general wording corrections to the document.

Issue 2.2 of this document was issued for the following changes:

- To change references from Lucent Technologies to Avaya.
- To add information about the 20-GB disk drive (see Overview on page 19, Determining the computer model on page 29, and Disk partition values on page 111).
- To add information about disk configurations (see Overview on page 19).
- To add information about the 400 MHz CPU (see Determining the computer model on page 29).
- To add information about the new autosensing power supply (see Setting up power on page 33).
- To update the HSI card installation procedures (see Installing HSI/P cards on page 77).
- To update the disk drive maintenance procedures (see Maintaining disk drives on page 83).
- To update the remote console procedure (see Using the remote console on page 154).
- To add information about system messages (see System messages on page 163).
- To add tape drive LED status patterns (see Tape drive LED status patterns on page 174).
- To remove information about specific UPS models. A UPS is still required, but must be provided locally.
- To make the organization of this book consistent with other Sun hardware installation books.
- To make general wording corrections to the document.

Issue 2.1 of this document was issued for the following changes:

- To add information about the new Digital Data Storage (DDS) model DDS4, 4-millimeter tape drive. This tape drive replaces the SLR5 Quarter-Inch-Cartridge (QIC) tape drive.
- To move hardware maintenance and troubleshooting information to this document. This information was previously found in *CentreVu Call Management System R3V8 Hardware Maintenance and Troubleshooting,* 585-215-873.
- To make general wording corrections to the document.

Organization

This document is organized as follows:

- Introduction – Provides an overview of the Ultra 5 computer and helpline information.
- Installation – Describes how to assemble the Ultra 5 computer, connect external devices, and power-up the computer.
- Maintenance – Describes how to maintain the Ultra 5 computer.
- Troubleshooting – Describes how to troubleshoot the Ultra 5 computer.
- Factory hardware installation – Describes how to configure the Ultra 5 to factory specifications.
- Glossary
- Index

Related documents

Related documents lists sources for information related to contact center products and features. Not all documents are supported for all CMS releases or equipment.

To order Avaya documentation, call the Avaya Publications Center at 1-800-457-1235 (United States and Canada) or +1-207-866-6701 (outside the United States and Canada).

CMS software documents

Document title	Document number
Installing software on a CMS computer	
Avaya CMS R3V11 Software Installation, Maintenance, and Troubleshooting Guide	585-215-115
CentreVu Call Management System Release 3 Version 9 Software Installation, Maintenance, and Troubleshooting	585-215-956
Setting up a disk-mirrored system	
Avaya CMS R3V11 Software Installation, Maintenance, and Troubleshooting Guide	585-215-115
CentreVu Call Management System Release 3 Version 9 Software Installation, Maintenance, and Troubleshooting	585-215-956

Upgrade documents

There are several upgrade paths supported with CMS. There is a document designed to support each upgrade. Note that none of the following upgrade documents are available from the publications center.

- Base load upgrades

  Use a base load upgrade when upgrading CMS to the latest load of the same version (for example, R3V9 ak.g to R3V9 al.k). A specific set of instructions is written for the upgrade and is shipped to the customer site with the CMS software CD-ROM as part of a Quality Protection Plan Change Notice (QPPCN).

Document title
Avaya CMS R3V11 Base Load Upgrades
CentreVu Call Management System Release 3 Version 9 Base Load Upgrade Procedures

- Platform upgrades and data migration

  Use a platform upgrade when upgrading to a new hardware platform (for example, upgrading from a SPARCserver 5 to an Enterprise 3500). The new hardware platform is shipped from the factory with the latest CMS load. Therefore, as part of the upgrade you will have the latest CMS load (for example, R3V9 to R3V11 or the latest load of the same CMS version). For R3V11, a specific set of instructions is written for the upgrade and is shipped to the customer site with the new hardware.

Document title
Avaya Call Management System Release 3 Version 11 Platform Upgrade and Data Migration
CentreVu Call Management System Release 3 Version 9 Platform Upgrade and Data Migration Instructions

- Avaya Call Management System Upgrade Express (CUE)

  Use CUE in the following conditions:

  — CMS is being upgraded from an earlier version (for example, R3V5u or R3V6) to the latest version (for example, R3V9 or R3V11).

  — The hardware platform is not changing.

  A specific set of upgrade instructions is written for the upgrade and is shipped to the customer site with the CUE kit.

Document title
Avaya Call Management System Release 3 Version 11 Sun Blade 100 Workstation CMS Upgrade Express
Avaya Call Management System Release 3 Version 11 Sun Blade 100 Workstation Mirrored System CMS Upgrade Express
Avaya Call Management System Release 3 Version 11 Sun Ultra 5 Computer CMS Upgrade Express
Avaya Call Management System Release 3 Version 11 Sun Enterprise 3000 Computer CMS Upgrade Express
Avaya Call Management System Release 3 Version 11 Sun Enterprise 3000 Computer Mirrored System CMS Upgrade Express
Avaya Call Management System Release 3 Version 11 Sun Enterprise 3500 Computer CMS Upgrade Express
Avaya Call Management System Release 3 Version 11 Sun Enterprise 3500 Computer Mirrored System CMS Upgrade Express
CentreVu Call Management System Release 3 Version 9 Sun Ultra 5 Computer CVUE Instructions
CentreVu Call Management System Release 3 Version 9 Sun Enterprise 3000 Computer CVUE Instructions
CentreVu Call Management System Release 3 Version 9 Sun Enterprise 3000 Computer Mirrored System CVUE Instructions
CentreVu Call Management System Release 3 Version 9 Sun Enterprise 3500 Computer CVUE Instructions
CentreVu Call Management System Release 3 Version 9 Sun Enterprise 3500 Computer Mirrored System CVUE Instructions

Hardware documents

Document title	Document number
Avaya Call Management System Sun Fire V880 Computer Hardware Installation, Maintenance, and Troubleshooting	585-215-116
Avaya Call Management System Sun Fire V880 Computer Connectivity Diagram	585-215-612
Avaya Call Management System Sun Blade 100/150 Computer Hardware Installation, Maintenance, and Troubleshooting	585-310-783
Call Management System Sun Blade 100/150 Computer Connectivity Diagram	585-310-782
Avaya Call Management System Sun Enterprise 3500 Computer Hardware Installation, Maintenance, and Troubleshooting	585-215-873
Call Management System Sun Enterprise 3500 Computer Connectivity Diagram	585-215-877
Avaya Call Management System Sun Ultra 5 Computer Hardware Installation, Maintenance, and Troubleshooting	585-215-871
Call Management System Sun Ultra 5 Computer Connectivity Diagram	585-215-872
Avaya Call Management System Sun Enterprise 3000 and SPARCserver Computers Hardware Maintenance and Troubleshooting	585-214-016
Avaya Call Management System Terminals, Printers, and Modems	585-215-874

Switch documents

Document title	Document number
Avaya Call Management System Switch Connections, Administration, and Troubleshooting	585-215-876

Administration documents

Document title	Document number
Avaya Call Management System Release 3 Version 11 Administration	585-215-515
CentreVu Call Management System Release 3 Version 9 Administration	585-214-015

Other documents

Document title	Document number
Avaya CMS Open Database Connectivity	585-780-701
Avaya CMS R3V11 LAN Backup User Guide	585-215-715
Avaya CMS R3V11 External Call History Interface	585-780-700
CentreVu CMS Release 3 Version 9 External Call History Interface	585-215-952
Avaya CMS Custom Reports	585-215-822
Avaya CMS Forecast	585-215-825
Avaya Visual Vectors Version 11 Installation and Getting Started	585-210-706
Avaya Visual Vectors Version 11 User Guide	585-210-709
Avaya Visual Vectors Version 9 Installation and Getting Started	585-210-947
Avaya Visual Vectors Version 9 User Guide	585-210-944

Documentation Web sites

For product documentation for all Avaya products and related documentation, go to http://www.avayadocs.com.

Important:
Additional information about new software or hardware updates will be contained in future issues of this book. New issues of this book will be placed on the Web site when available.

Use the following web sites to view related support documentation:

- Information about Avaya products and service

  http://www.avaya.com

- Sun hardware documentation

  http://docs.sun.com

- Okidata printer documentation

  http://www.okidata.com

- Informix documentation

  http://www.informix.com

- Tivoli Storage Manager documentation

  http://tivoli.com

Introduction

Overview

The Sun Ultra 5 computer provides a hardware platform that supports call center software applications, and is designed to do the following:

- Increase performance with the SPARC-V9 64-bit RISC architecture (includes a 400 MHz clock and a 256 KB internal cache in the current model; older models have different clock speeds).
- Enhance system availability by using error-correcting memory. This memory protects the system and data from single-bit soft errors that can occur.
- Provide expandable performance and capabilities with a balanced architecture (all elements of the system, CPU, memory, I/O, and graphics work at full speed).
- Include a minimum internal disk storage space of 20 GB.
  - — A 20-GB EIDE primary disk drive is the current standard on Ultra 5 computers delivered from the factory. Newer models may have larger primary disk drives. Older models may have an 8.3-GB or a 4.3-GB primary disk drive.
  - — An optional 20-GB EIDE secondary disk drive may be ordered. This drive can be added as the primary or secondary internal disk drive for older models of the Ultra 5 to increase disk capacity. Older models may have a 9.1-GB secondary disk drive.
- Accommodate up to four external small computer system interface (SCSI) disk drives and two SCSI tape drives.
- Allow for cost-effective upgrades to disk storage and memory.

Support

If you need assistance with a problem, use the support information and help lines presented below.

Frequently asked questions (FAQs)

For solutions to common problems, customers and Avaya technicians can access technical support FAQs at:

http://www.avaya.com

Select **Support > Call Center/CRM** and select the product for which you need support. Please check this information before you call in a trouble ticket. Doing so could save you time and money.

Customer support for the United States

Customers can report problems and generate trouble tickets by calling:

1-800-242-2121

The customer is prompted to identify the type of problem (that is, Automatic Call Distribution, hardware, or Avaya CMS) and is then connected to the appropriate service organization.

Technician support for the United States

Avaya technicians can receive help by calling:

1-800-248-1234

Customer and technician support outside the United States

For customer and technician support outside the United States, see the Avaya Web site:

http://www.avaya.com

Select **Support > Escalation Lists US and International**. For escalation telephone numbers outside the United States, select **Global Escalation List**.

Installation

Overview

This chapter describes how to install the Ultra 5 computer and related peripheral equipment. Use the following table to check off each required procedure after completion.

Procedure	Completed
Preparing for installation on page 22	
Unpacking and inventorying the equipment on page 27	
Setting up power on page 33	
Peripheral connectivity on page 34	
Connecting the monitor and keyboard on page 37	
Connecting the remote console modem on page 38	
Connecting to external interfaces:	
— Connecting the switch link on page 39	
— Connecting the serial port expander box on page 40	
— Connecting external SCSI devices on page 41	
Turning the system on and verifying POST on page 46	
Identifying installed PCI cards on page 49	
Setting the remote console modem options on page 50	
Turning the system over for provisioning on page 57	

Preparing for installation

This section contains information that will help you prepare for the Ultra 5 computer installation.

Safety precautions

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

- Follow all cautions, warnings, and instructions that are marked on the equipment.
- Never push objects of any kind through openings in the equipment. They could touch dangerous voltage points or short out components that could result in fire or electric shock.
- Refer servicing of equipment to qualified personnel.
- To protect both yourself and the equipment, observe the following precautions.

Item	Problem	Precaution
Wrist or foot strap	ESD	Wear a conductive wrist strap or foot strap when handling printed circuit boards.
Cover panels	System damage and overheating	Reinstall all cabinet cover panels after you perform any service work on the system.
Board slot filler panels	System damage and overheating	Make sure that a filler panel is installed on all empty board slots.

System precautions

Ensure that the voltage and frequency of the power outlet used matches the electrical rating labels on the equipment.

Wear antistatic wrist straps when handling any magnetic storage devices, and printed circuit boards.

The Ultra 5 computer uses nominal input voltages of 100-240 V AC at 50-60 Hz. The Ultra 5 should be powered by a non-switched, dedicated, 15-amp circuit. Sun products are designed to work with single-phase power systems having a grounded neutral conductor under safety precautions. To reduce the risk of electrical shock, do not plug Sun products into another type of power source. Contact your facilities manager or qualified electrician if you are unsure what type of power is supplied to your building.

A UPS provides a temporary electrical supply to a computer for several minutes, depending on the number of components connected to the UPS. For a CMS computer, a 2KVA minimum UPS is required for all installations. See your UPS documentation to determine the projected amount of backup battery time for your model. If the system is without power for longer than the backup time, the system may shut down improperly, and the customer could lose data.

Each of the following items requires a separate power cord:

- Ultra 5 computer
- External peripherals
- Monitor

WARNING:

DO NOT make mechanical or electrical modifications to the computer. Sun Microsystems is not responsible for regulatory compliance of modified computers.

Required tools

You need the following tools to do the installation:

- Phillips® #2 screwdriver
- Needle-nose pliers
- ESD grounding wrist strap
- Antistatic mat

Electrical specifications

Note:

For power integrity, an Uninterruptible Power Supply (UPS) is recommended for all installations.

Parameter	Value
Input current - Voltage range - Current, frequency range - Current, maximum (120 V)	 100-240 V AC, autosensing (newer systems) 100 to 125 or 200 to 240 V AC, switch selectable (older systems) 50-60 Hz 6A@120 V
Input power rating (total continuous power)	200 W
Volt-ampere rating	300 VA
BTU rating	967 BTU
Wall plug type - United States - Non-United States	 NEMA 5-15P Power cords must be obtained locally
CPU plug type	IEC 320

Physical specifications

Parameter	English value	Metric value
Height	4.4 inches	11.2 centimeters
Width	17.1 inches	43.6 centimeters
Depth	16.9 inches	43.0 centimeters
Weight	40 pounds	18 kilograms
Power cord	6.0 feet	1.8 meters

Environmental specifications

For the most reliable system operation:

- The room must have sufficient air conditioning capacity to support the cooling needs of the entire system.
- The air conditioning system must have controls that prevent excessive temperature changes.

Follow the guidelines in the table below for temperature, humidity, and altitude limits for units in operation and for units that are not in operation (that is, units that are in transit or in storage).

Parameter	Operating	Nonoperating
Temperature	41°F to 95°F (5°C to 35°C)	-4°F to 140°F (-20°C to 60°C)
Humidity (max)	20% to 80% RH noncondensing 27°C max wb	93% RH
Altitude (max)	10,000 feet (3 kilometers)	40,000 feet (12 kilometers)

Miscellaneous specifications

Parameter	Value
Operating acoustic noise	5.2 decibels
Idling acoustic noise	5.1 decibels
Declared noise emissions in accordance with ISO 9296, measured at 23°C.	
Safety	UL 1950, CSA C22.2 No. 950, TUV EN 60950, CB Scheme with Nordic deviations, EMKO-TSE (74-SEC) 203, ZH1/618
RFI/EMI	FCC Class B, DOC Class B, VCCI Class 2, EN 5502 Class B, EN 61000-3-2
Immunity	EN 50082-1
X-ray	DHHS 21 Subchapter J; PTB German X-ray Decree
Power Management	Energy Star Compliant

Unpacking and inventorying the equipment

WARNING:

Never move the computer when the power is on. Excessive movement can cause catastrophic disk drive failure. Always power the system OFF before moving the computer.

WARNING:

Always wear an electrostatic discharge (ESD) strap when handling internal components.

Note:

Always have up-to-date system backups before turning the computer off and moving the computer.

Unpack the computer and associated peripheral equipment. Compare the contents of the carton to the shipping inventory list to verify that all equipment was delivered.

Inspect all shipping cartons for evidence of physical damage. If a shipping carton is damaged, request that the carrier representative be present before the carton is opened.

In the United States, contact the Services Support Organization (SSO) if any computer parts are defective on arrival. Contact Avaya customer service if any computer parts are missing.

Outside of the United States, contact your Avaya representative or distributor if any computer parts are missing or defective.

Parts list

Verify that you have the following components of the Ultra 5 computer:

- Ultra 5 unit (including installed cards) and power cord
- Monitor and power cord
- Monitor cable
- Keyboard and cable
- Mouse and cable
- DDS4, 4-millimeter cartridge tapes (older systems will have QIC tapes)
  - One blank tape for backups
  - One tape that contains the factory configuration CMSADM filesystem backup
  - One tape drive cleaning cartridge

In addition, other external components, disk drives and tape drives, may be part of the order. Verify that all expected parts have been delivered.

Determining the computer model

This book is written for several different models of the Ultra 5 computer. The differences between the models are few. This section describes how you can tell what model you have.

Features

Each of the different models have distinctive features that will also assist you in determining what model you have.

- Series 1
  - 270 MHz CPU
  - 4.2-GB internal boot disk (4500 RPM)
  - 24X CD-ROM
  - 8-bit graphics
- Series 2
  - 270 MHz CPU
  - 4.2-GB internal boot disk (5400 RPM)
  - 32X CD-ROM
  - 24-bit graphics
- Series 3
  - 360 MHz CPU
  - 8.4-GB internal boot disk
  - 32X CD-ROM
  - 24-bit graphics
  - 50ns RAM
  - DDS4 external tape drive on newer models
  - autosensing power supply on newer models
- Series 3, Model 400
  - 400 MHz CPU
  - 20-GB internal boot disk
  - DDS4 external tape drive on all models
  - autosensing power supply on all models

Physical labeling

Near the left-front corner of the computer, there is a label that has the serial number and other markings from the Sun factory. The models are marked as such:

- Series 1 – No special marking, just a serial number
- Series 2 – PGX24, plus the serial number
- Series 3 – Series 3, plus the serial number
- Series 3, Model 400 – BCD, Series 3, plus the serial number

Software check

Once the computer is operational, you can log in as root and enter the following command to identify the computer model:

```
prtconf -vp | grep SUNW,3
```

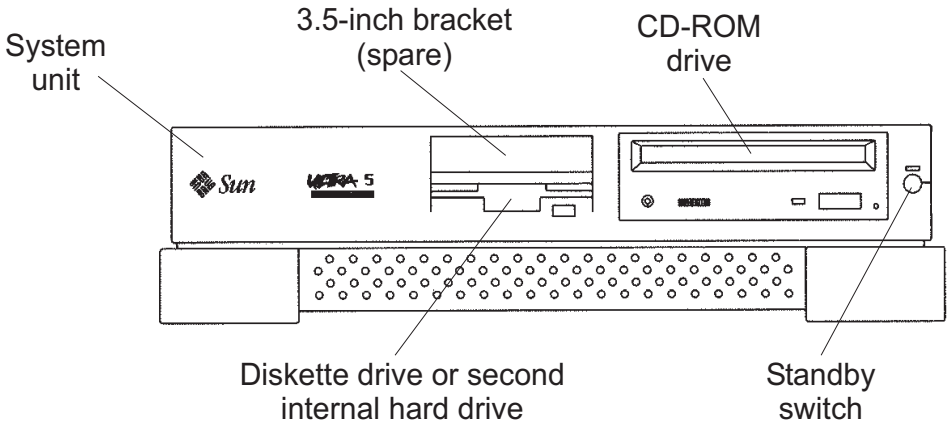
- Series 1 – `model: SUNW,3.11`
- Series 2 – `model: SUNW,3.15`
- Series 3 – `model: SUNW,3.19`
- Series 3, Model 400 – `model: SUNW,3.25`

Computer layout

Familiarize yourself with the layout of the computer.

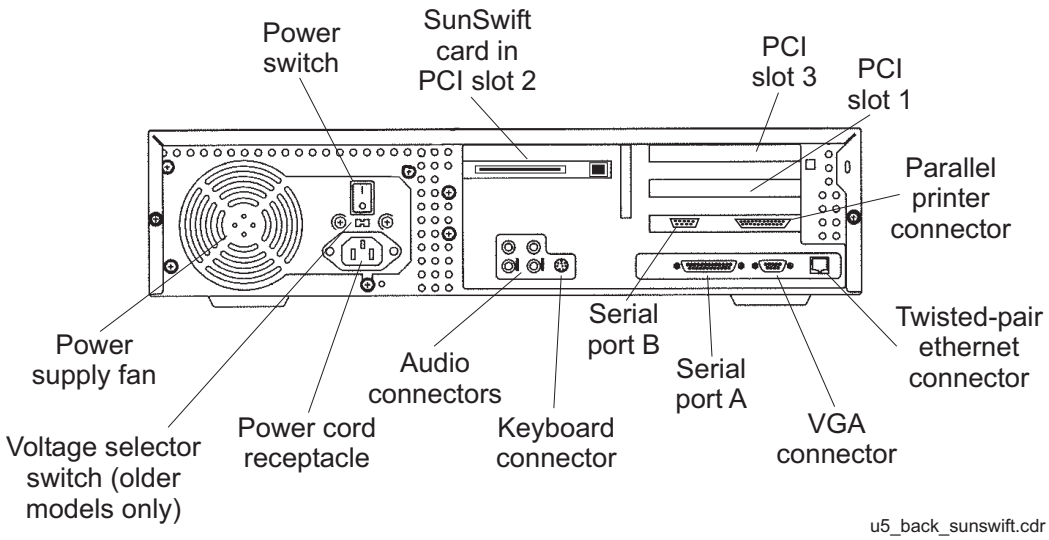
Front Panel

This figure shows the front panel of the Ultra 5. The diskette drive is not available if the optional second internal hard drive has been installed.



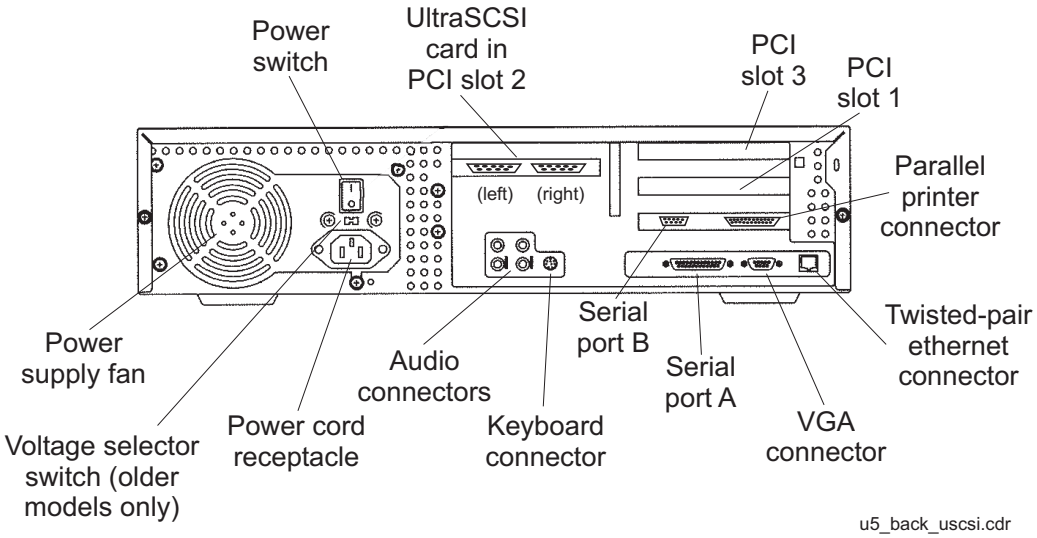
Rear Panel (with SunSwift® card)

This figure shows the rear panel when you have a SunSwift card, which is usually installed in PCI slot 2. The SunSwift card has one 68-pin SCSI connector and one ethernet RJ45 connector. Other PCI cards may be installed in slots 1 and 3.



Rear Panel (with UltraSCSI card)

This figure shows the rear panel when you have an UltraSCSI card, which is usually installed in PCI slot 2. The UltraSCSI card has two 68-pin SCSI connectors. Other PCI cards may be installed in slots 1 and 3.



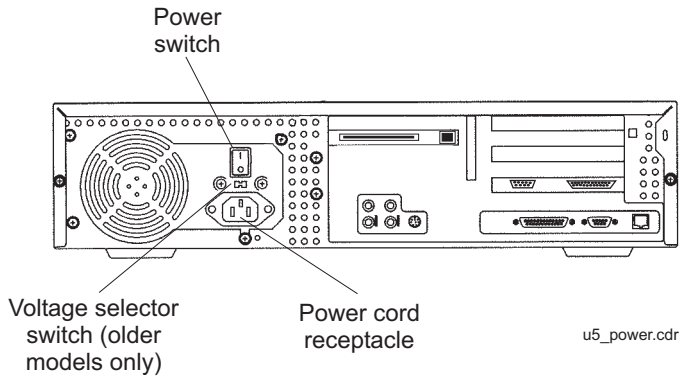
Setting up power

To set up the AC power:

WARNING:

DO NOT turn the computer on until you have verified that the input voltage selector switch has been set properly. Incorrect voltages will damage system components.

1. On the back of the computer, between the power cord receptacle and the power switch, locate the voltage selector switch. Newer models of the Ultra 5 use an autosensing power supply and do not have a voltage selector switch.



2. If your model has a voltage selector switch, set the voltage selector switch to 115 or 230 V AC depending on your installation.
3. Turn off the AC power switch on the back of the computer.
4. Plug the IEC 320 end of the power cord into the AC connector.

   For installations outside of the United States and Canada, obtain a power cord for your local configuration.

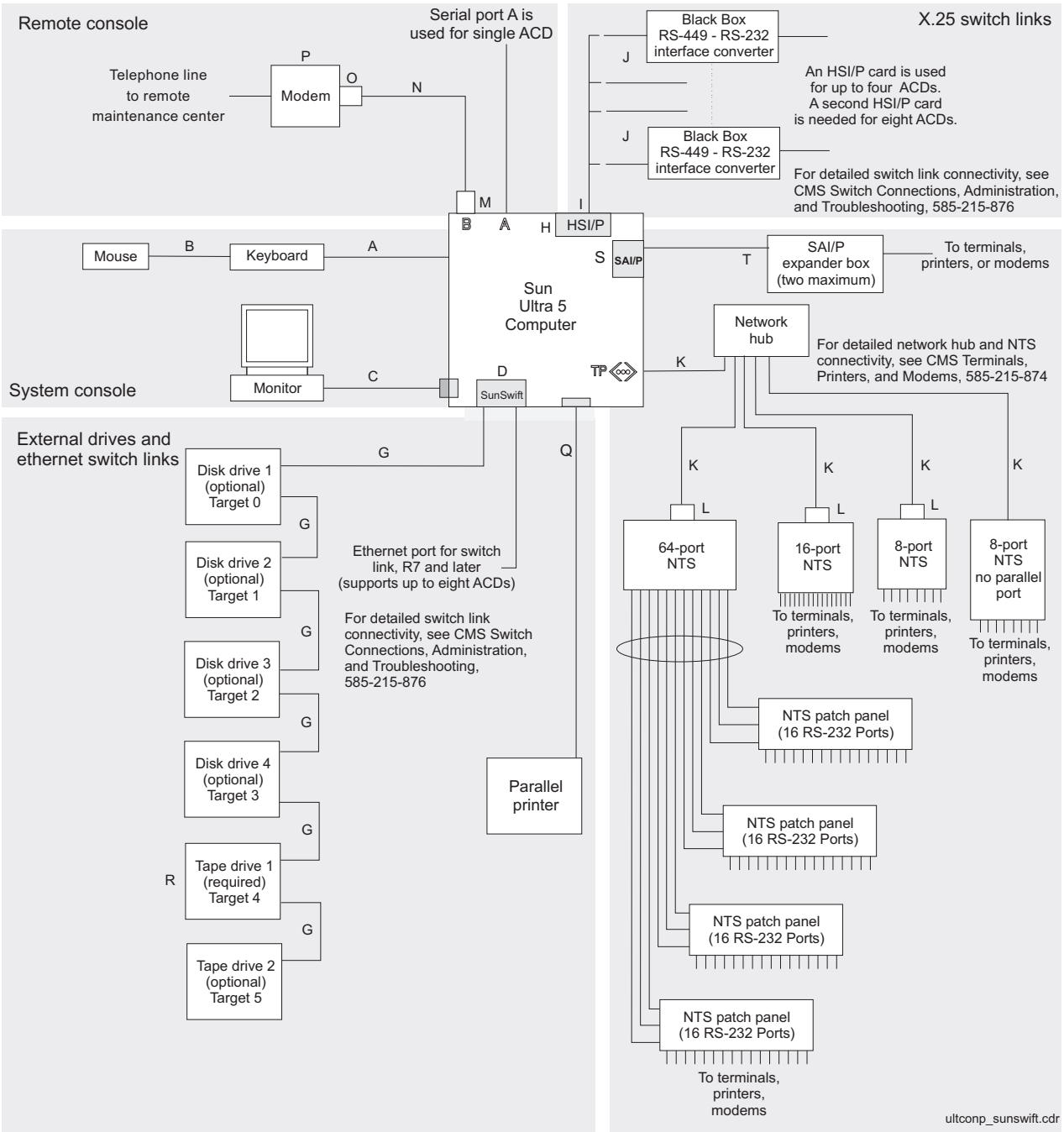
5. Plug the power cord from the computer into an outlet on the UPS.

   A UPS provides a temporary electrical supply to a computer for several minutes, depending on the number of components connected to the UPS. For a CMS computer, a 2KVA minimum UPS is required for all installations. See your UPS documentation to determine the projected amount of backup battery time for your model. If the system is without power for longer than the backup time, the system may shut down improperly, and the customer could lose data.

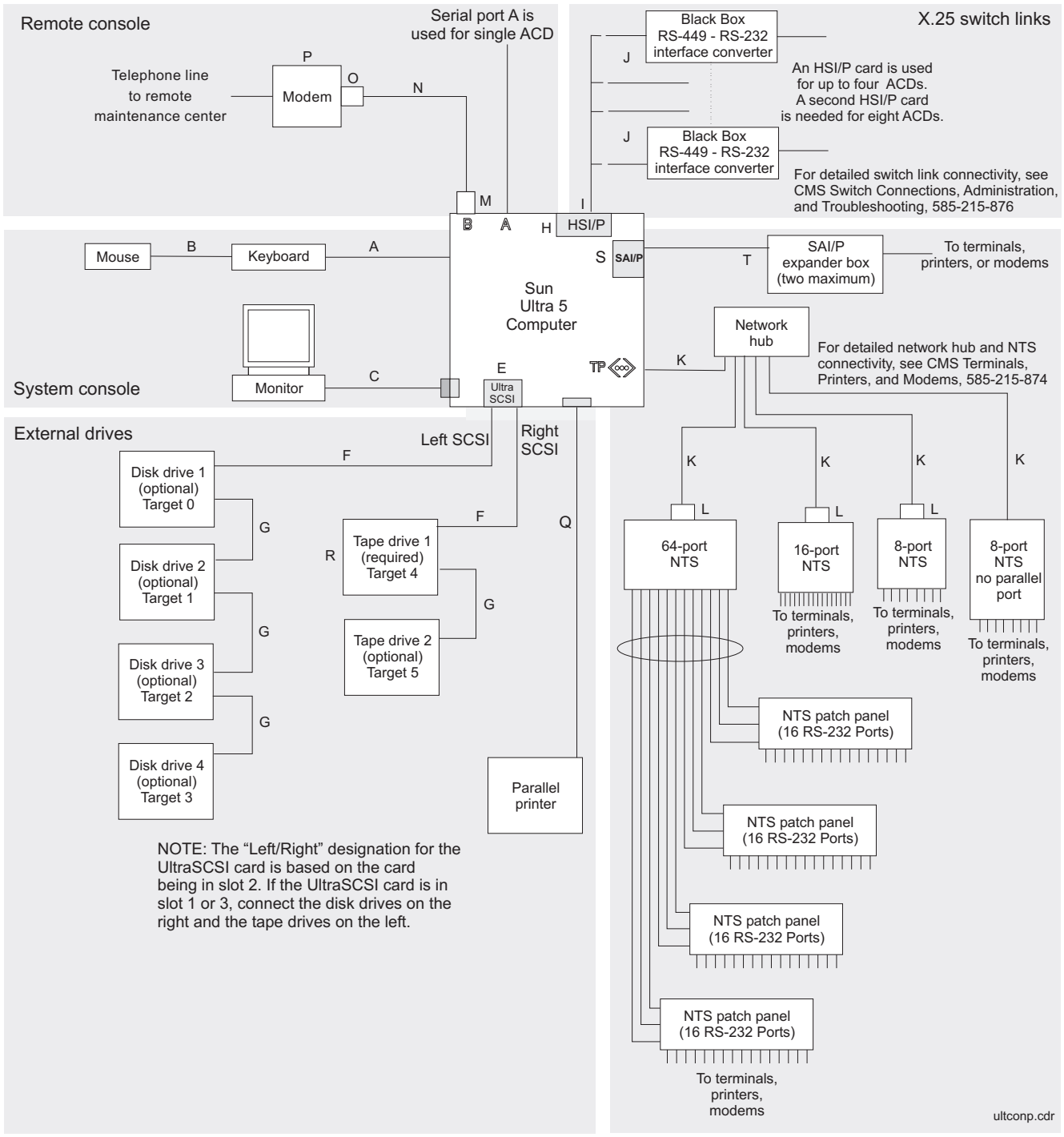
   If a UPS is not being used, you must use a grounded outlet on a dedicated 15-amp circuit.

Peripheral connectivity

The following diagram shows how equipment is connected to the Ultra 5 when a SunSwift card is installed. The callouts are described in Parts list on page 36.



The following diagram shows how equipment is connected to the Ultra 5 when an UltraSCSI card is installed. The callouts are described in Parts list on page 36.



Parts list

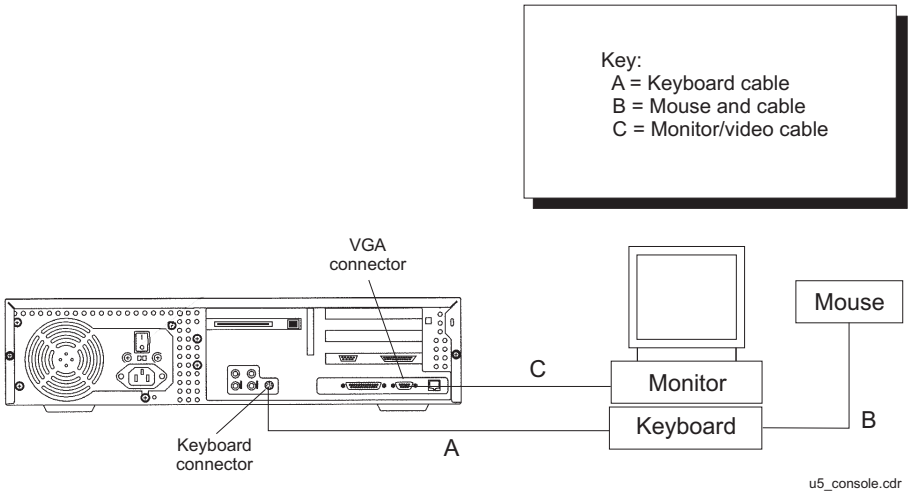
The following table lists parts that are required to connect most of the external devices to the Ultra 5 computer. For information about connecting terminals, printers, and modems to the Ultra 5 computer, see *Avaya CMS Terminals, Printers, and Modems*, 585-215-874. For information about switch connections for CMS, see *Avaya CMS Switch Connections, Administration, and Troubleshooting*, 585-215-876.

Connectivity diagram call out	Comcode, or part of comcode	Description
A[1]	N/A[2]	Keyboard cable
B[1]		Mouse with cable
C[1]		Monitor cable
D[1]	407938679	SunSwift card (10/100Mbps F/W UltraSCSI PCI Adapter)
E[1]	408106664	UltraSCSI card (Dual-port PCI Adapter)
F[1]		68-to-68 pin VHDCI cable (two provided)
G[1]	407934470	68-to-68 pin SCSI cable and AC power cord
H[1]	408128288	HSI/P card (up to two may be installed)
I[1]		Quad cable (one per HSI/P card)
J	407086818	RS-449 cable (10 feet, 3 meters)
K	407086826	Category 5 UTP cord (10 feet, 3 meters)
L	407086859	CentreCOM® transceiver
M	846373413	DB9-to-RJ45 straight-through modem adapter
N	846983039	10-wire modular cable (10 feet, 3 meters)
O	846362770	RJ45-to-DB25 remote console adapter
P	407633999 Varies	Sportster® 33.6 remote console modem Comsphere® 3910 remote console modem
Q	408045326	Parallel printer cable
R[1]	N/A[2] N/A 407925718	DDS4 4mm tape drive (20/40-GB) SLR5 QIC tape drive (4/8-GB) XL/XS/DX 8mm tape drive (7/14-GB)
S[1]	408128247	SAI/P card (up to two may be installed)
T[1]		SAI/P expander box (one per SAI/P card)

1. Sun Microsystems provides maintenance sparing for these parts.
2. The comcode for this bundle changes regularly and may not be ordered for maintenance spares, so it is not listed in the table. This bundle includes the processor, peripherals, and other equipment.

Connecting the monitor and keyboard

The following figure shows how to connect the monitor and keyboard to the Ultra 5.



To connect the monitor and keyboard:

1. Make sure the computer power switch is set to off.
2. Connect the following components:
   - Keyboard (connects to the keyboard connector)
   - Mouse (connects to the keyboard)
   - Monitor (connects to the VGA connector)
   - Power cord (connects to the UPS or wall outlet)

This basic configuration represents the system console terminal.

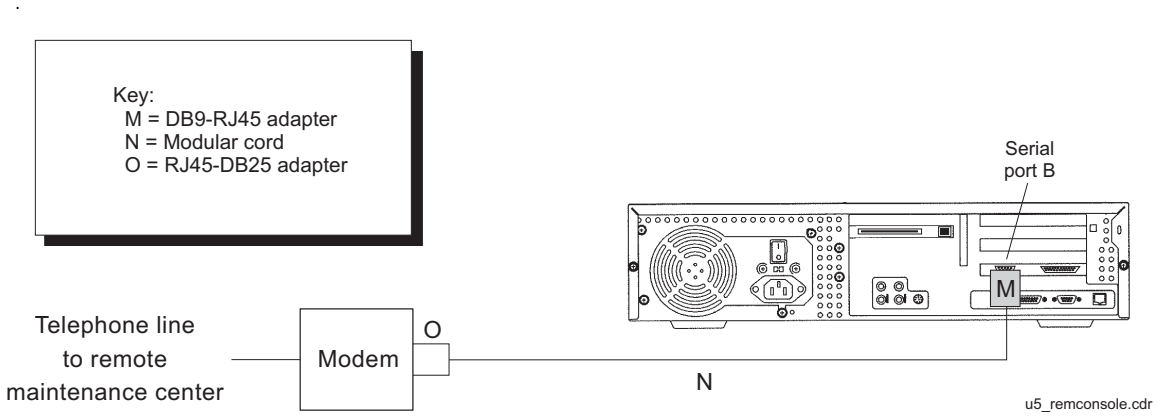
CAUTION:

Once you have connected the keyboard and power-up the system, *do not* disconnect the keyboard while the system is in operation. If the keyboard becomes unplugged, see Keyboard becomes unplugged on page 183 for recovery procedures.

Connecting the remote console modem

This section describes how to connect the remote console modem to the computer. This modem allows personnel at a remote support center to dial in and do maintenance on the computer. The modem is a U.S. Robotics Sportster 33.6 Faxmodem, a Paradyne Comsphere 3910 modem, or a modem provided locally.

The following figure shows remote console modem connectivity.



To connect the remote console modem:

1. Connect the DB9-to-RJ45 straight-through adapter (M) to serial port B on the back of the Ultra 5.
2. Connect the modular cord (N) to the RJ45 end of the adapter (M).
3. Connect the other end of the modular cord (N) to the RJ45 end of the RJ45-to-DB25 remote console adapter (O).
4. Connect the remote console adapter (O) to the RS-232C port on the modem. The RS-232C port on the Comsphere 3910 is labeled “DTE1.”
5. Connect the telephone line to the jack labeled “LINE” on the Sportster modem, or labeled “DIAL” on the Comsphere 3910 modem.
6. Connect the power cable to the modem and plug into a socket.

Do not turn the power on yet. Instructions for powering on the modem are given in Setting the remote console modem options on page 50.

Connecting to external interfaces

A variety of external I/O components and interfaces may be required depending on the configuration chosen by the customer. This section describes some of the most likely configurations.

Refer to the following subsections as appropriate for your installation:

- Connecting the switch link on page 39
- Connecting the serial port expander box on page 40
- Connecting external SCSI devices on page 41

Procedures for connecting a network hub unit and an NTS are found in *Avaya CMS Terminals, Printers, and Modems*, 585-215-874.

Connecting the switch link

There are two ways to connect the CMS computer to a switch:

- using TCP/IP over a local area network (LAN)
- using X.25 protocol over a hard-wired or switched link

Note:

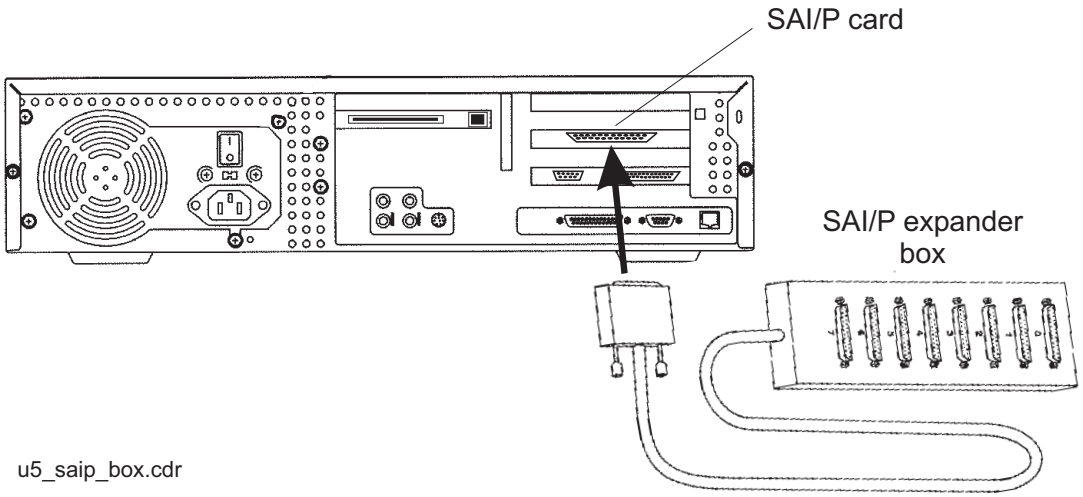
Some CMS loads do not support the X.25 protocol. Contact the National Customer Care Center or consult with your product distributor or representative to verify if the X.25 protocol is supported on your CMS system.

One CMS computer can collect data from up to eight different switches. To the CMS computer, each switch represents one ACD. Depending on the release of the switch and the release of the CMS software, you can have all switches connected using TCP/IP, all switches connected using X.25 protocol, or some combination of the two protocols.

For detailed information about how to connect and administer the switch link, see *Avaya CMS Switch Connections, Administration, and Troubleshooting*, 585-215-876.

Connecting the serial port expander box

To connect serial devices to the Ultra 5, you can use a Serial Asynchronous Interface/PCI (SAI/P) expander box. The SAI/P card is used to connect terminals, printers, and modems to the computer. Each SAI/P card is shipped with an expander box that attaches to the SAI/P card and breaks out eight RS232 serial ports (see the figure below). There can be up to two SAI/P cards and expander boxes on each Ultra 5.



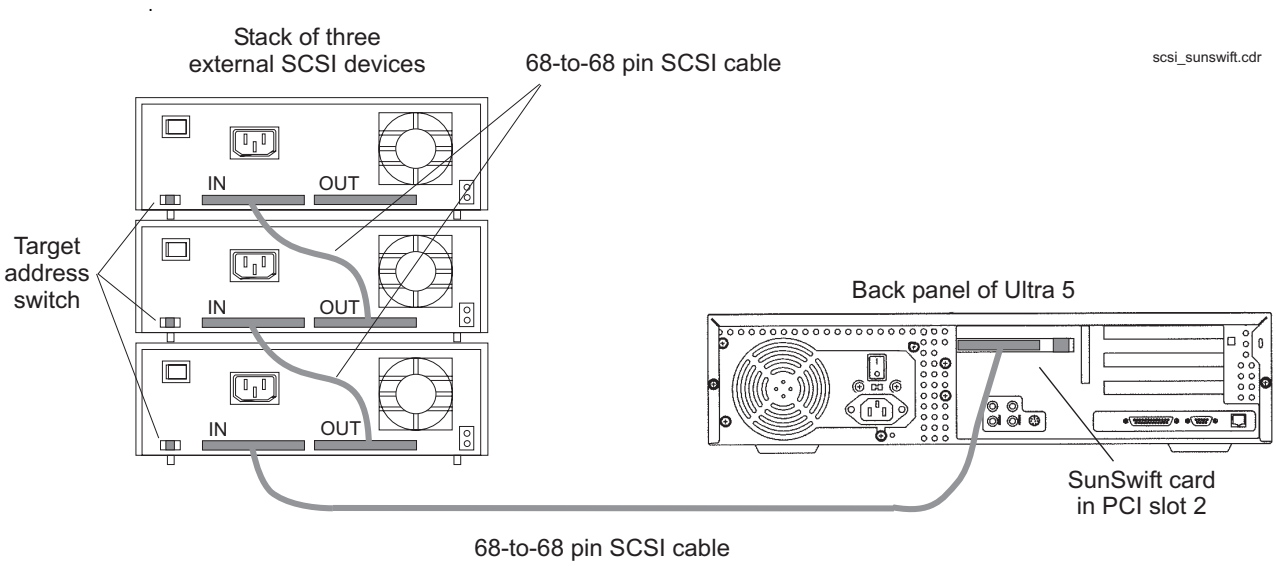
u5_saip_box.cdr

Connecting external SCSI devices

This section describes how to connect the SCSI devices (tape drives and disk drives) to the Ultra 5 computer. SCSI devices connect to either the SunSwift card or to the Dual-Channel UltraSCSI card.

SunSwift connections

The following figure shows how to connect UniPack SCSI disk drives and tape drives to a SunSwift card. A 68-to-68-pin SCSI cable connects from the SunSwift PCI card on the back of the computer to the IN connector on the back of the SCSI device that is closest to the computer. If you have more than one SunSwift card, connect the drives to the card in the lowest slot number. A 68-to-68 pin SCSI cable connects from the OUT connector of that device to the IN connector of the next device. Continue this process until all assigned devices are connected in the SCSI chain.

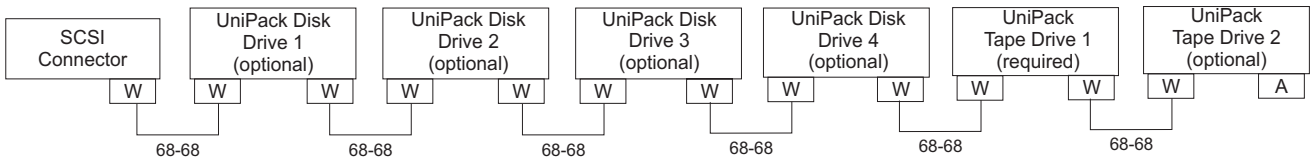


When connecting SCSI devices, the last device in the chain MUST be terminated, either via an auto-terminated device or with a manual terminator.

When using an auto-terminated SCSI device, you do not need to connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. To verify that the last device is auto-terminated, check the LEDs labeled Auto Term High and Auto Term Low on the back panel of the device. In a CMS configuration, both LEDs are lit on the last device in the SCSI chain. If a device in the SCSI chain is not the last device, neither termination LED is lit.

When using a manually-terminated device, you must connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. When you connect the SCSI terminator to the OUT connector, the LED on the terminator is lit.

The following figure shows the SCSI cabling schemes that are possible with a SunSwift card that is installed in an Ultra 5 computer.



scsicble_swift.cdr

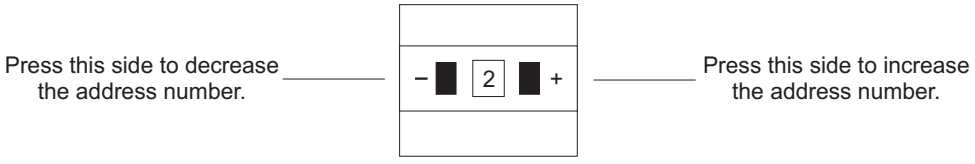
W = 68-68 pin SCSI cable
A = Auto-terminated

SCSI devices are addressed as shown in the following table.

Device	Address
Disk drive 1	0
Disk drive 2	1
Disk drive 3	2
Disk drive 4	3
Tape drive 1	4
Tape drive 2	5

Important:
Do not use a target address greater than 5.

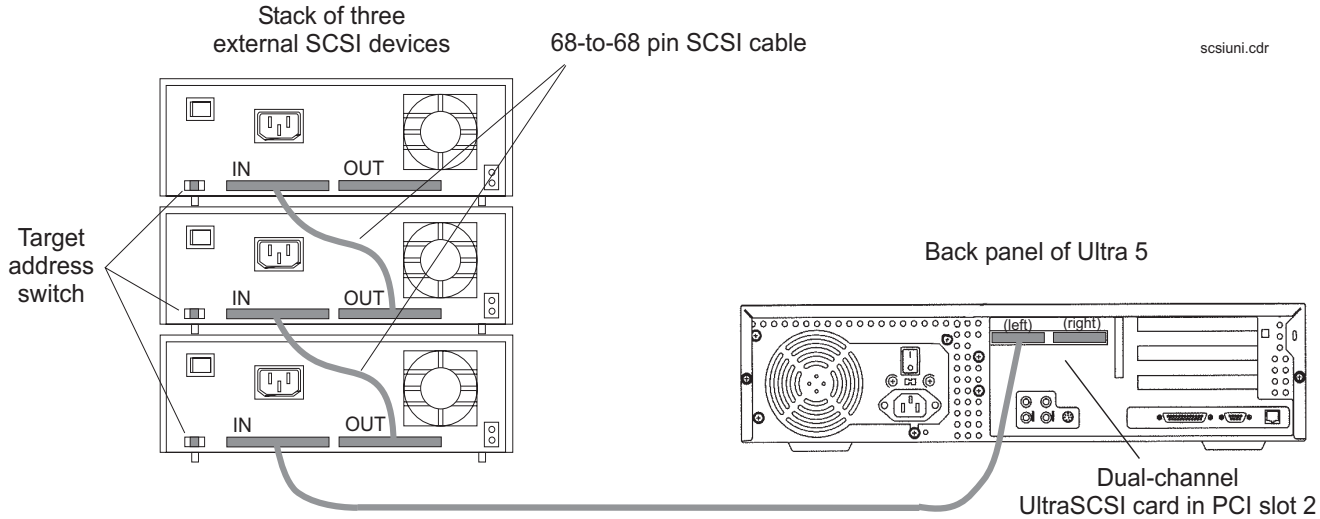
The addresses are set using the target address switches on the back of each SCSI device. Before setting the target address, make sure that the power is off on the SCSI devices.



scsiidsw.cdr

UltraSCSI connections

The following figure shows how to connect UniPack SCSI disk drives and tape drives to an UltraSCSI card. A 68-to-68-pin VHDCI SCSI cable connects from the UltraSCSI PCI card on the back of the computer to the IN connector on the back of the SCSI device that is closest to the computer. A 68-to-68 pin SCSI cable connects from the OUT connector of that device to the IN connector of the next device. Continue this process until all assigned devices are connected in the SCSI chain.

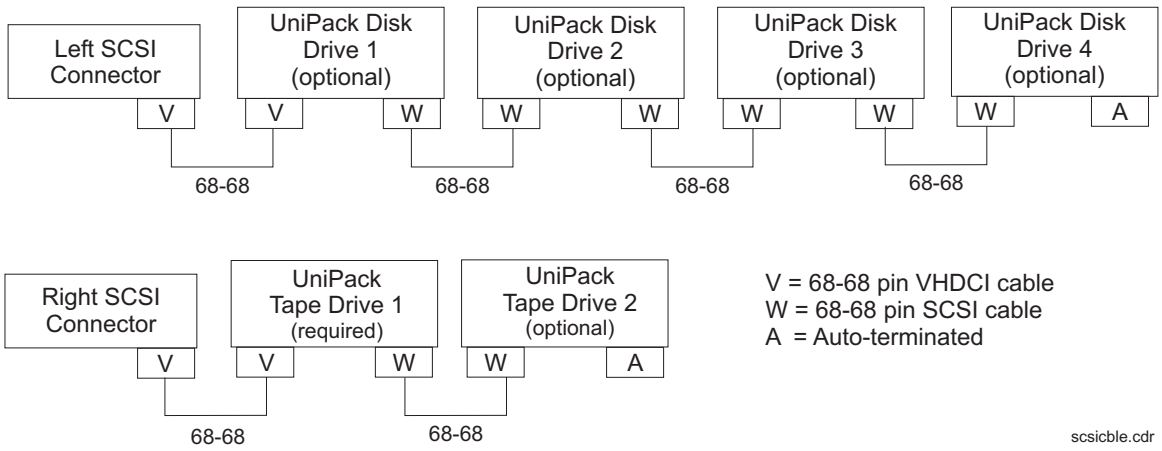


When connecting SCSI devices, the last device in the chain MUST be terminated, either via an auto-terminated device or with a manual terminator.

When using an auto-terminated SCSI device, you do not need to connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. To verify that the last device is auto-terminated, check the LEDs labeled Auto Term High and Auto Term Low on the back panel of the device. In a CMS configuration, both LEDs are lit on the last device in the SCSI chain. If a device in the SCSI chain is not the last device, neither termination LED is lit.

When using a manually-terminated device, you must connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. When you connect the SCSI terminator to the OUT connector, the LED on the terminator is lit.

The following figure shows the SCSI cabling schemes that are possible with an UltraSCSI card that is installed in slot 2 of an Ultra 5 computer.



Note:

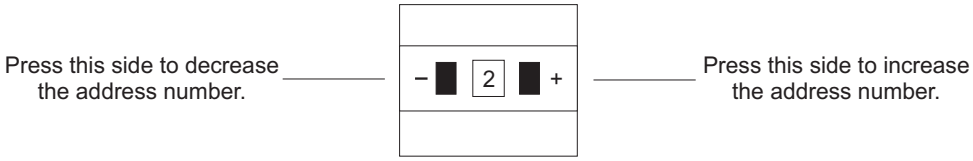
The “Left/Right” designations shown above are based on the UltraSCSI card being installed in slot 2. If the UltraSCSI card is installed in slots 1 or 3, connect the disk drives to the right connector and the tape drives to the left connector.

SCSI devices are addressed as shown in the following table.

Device	Address
Disk drive 1	0
Disk drive 2	1
Disk drive 3	2
Disk drive 4	3
Tape drive 1	4
Tape drive 2	5

Important:
Do not use a target address greater than 5.

These addresses are set using the target address switches on the back of each SCSI device. Before setting the target address, make sure that the power is off on the SCSI devices.



scsiidsw.cdr

Turning the system on and verifying POST

Once you assemble the system, including the external devices that are shipped with your system, turn the system on and verify POST (Power On Self Test).

To turn the system on and verify POST:

1. Plug the power cord of the UPS into an AC outlet.
2. Turn on the power to the UPS.
3. Turn on all external SCSI devices starting with the device farthest from the system and working toward the system.
4. Turn on the system monitor.
5. Turn on the system.

   Note:

   The POST diagnostics will occur each time you turn on the system. The POST tests the basic system components. This may take several minutes

6. While the system is booting up, press **Stop**+**A** simultaneously to put the system in the monitor mode.

   The `ok` prompt is displayed.

7. Enter the following commands:

   ```
   setenv auto-boot? false
   ```

   ```
   reset-all
   ```

   The system resets to the `ok` prompt.

8. Enter:

   probe-ide

   This verifies that the system sees all enhanced integrated drive electronics (EIDE) devices. A message similar to the following is displayed:

```
Device 0  ( Primary Master )
       ATA Model: STxxxxxx

Device 1  ( Primary Slave )
       Not Present (or) ATA Model: STxxxxxx

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

Device 3  ( Secondary Slave )
       Not Present (or) Removable ATAPI Model: xxxx
```

   In this example, the devices listed are as follows:

   - Device 0 is the primary internal hard drive.
   - Device 1 is the optional second internal hard drive, if present.
   - Device 2 is the CD-ROM drive.
   - Device 3 is the floppy drive, if present.

   Note:
   The actual devices listed depends on the devices installed on the EIDE bus.

9. Enter:

   reset-all

   The system resets to the `ok` prompt.

10. Enter:

    probe-scsi-all

    This verifies that the system sees all external SCSI devices. A message similar to the following is displayed:

```
/pci@1f,0/pci@1/pci@1/SUNW,isptwo@4
Target 0
  Unit 0  Disk      QUANTUM VK4550J SUN4.2G8610
Target 4
  Unit 0  Removeable Tape     HP     C5683A     C911
```

    In this example, the devices listed are as follows:

    - Target 0 is an external 4.2-GB hard drive.
    - Target 4 is an external DDS4 tape drive.

    Note:

    The actual devices listed depends on the devices installed on the SCSI bus.

11. When you have verified that the system recognizes all of its devices, enter the following commands:

    ⚠ CAUTION:

    If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

    setenv auto-boot? true

    boot -r

    The system reboots.

Identifying installed PCI cards

If there are problems with the PCI cards, do the following to troubleshoot the problem. If all PCI cards are operational, you can skip this section.

At the command prompt, enter:

/usr/platform/`uname -m`/sbin/prtdiag -v | pg

In the section called `IO Cards`, there is a listing of the PCI cards. The following are examples of some of the entries you may see. The display you see depends on your specific configuration.

```
    .
    .

========================= IO Cards =========================

     Bus#  Freq
Brd  Type  MHz   Slot  Name                                Model
---  ----  ----  ----  ----------------------------------  ----------------------
 0   PCI-1  33      1   ebus
 0   PCI-1  33      1   network-SUNW,hme
 0   PCI-1  33      2   SUNW,m64B                           ATY,GT-B
 0   PCI-1  33      3   ide-pci1095,646
 0   PCI-2  33      1   pci114f,1c-pci114f,1c
 0   PCI-2  33      2   pci-pci1011,24
 0   PCI-2  33      3   pci1214,334-pci1214,334
    .
    .
```

In this example:

- Slot 1 is an SAI/P card
- Slot 2 is a SunSwift card
- Slot 3 is an HSI/P card

Setting the remote console modem options

The computer supports the U.S. Robotics Sportster 33.6 Faxmodem and the Paradyne Comsphere 3910 modem for remote console access. The options for any other modems must be set based on local instructions.

For instructions for connecting the modem, see Connecting the remote console modem on page 38.

Sportster 33.6 faxmodem

The Sportster 33.6 faxmodems are optioned at the factory. Use this procedure only if the modem has lost the factory option settings.

To set the options for the Sportster 33.6 faxmodem:

1. Set DIP switches 1, 3, 7, and 8 on the back panel of the Sportster modem to the down (ON) position, and switches 2, 4, 5, and 6 to the up (OFF) position.
2. Turn on the remote console modem.
3. At the system console, log in as root.
4. Enter:

   /cms/install/bin/abcadm -r ttyb

   The following message is displayed:

   ```
   ttyb is currently set to be incoming

   Are you sure you want to change it? [y,n,?]
   ```

5. Enter: **y**

   The following message is displayed:

   ```
   ttyb administration removed
   ```

   The port monitor turns off.

6. Enter the following command:

   cu -s 9600 -b 8 -l cua/b

   The following message is displayed:

```
Connected
```

7. Enter the following commands:

   at&f1 (loads the factory default configuration into active memory)

   at&w0 (writes the current configuration to NVRAM template Y0)

   Note:
   Use numerical ones and zeros when entering the options.

8. After you enter the options, disconnect from the modem by entering a tilde and a period (~.).
9. Set DIP switches 4 and 8 on the back panel of the Sportster modem to the down (ON) position. Set all other DIP switches to the up (OFF) position.
10. Reset the modem by turning the power off and back on.
11. Enter:

    /cms/install/bin/abcadm -i -b 9600 ttya

    The Terminal Ready (TR) LED lights on the modem and the following message is displayed:

```
ttya set to incoming port 9600 baud
```

12. If the TR LED is not lit, enter:

    ps -ef | grep sac

    A message similar to the following should be displayed:

```
root   377     1  0 14:39:30 ?        0:00 /usr/lib/saf/sac -t 300
root  9723  9666  0 09:16:26 pts/9    0:00 grep sac
```

Additional references – For additional information, see the *U.S. Robotics Sportster Modems Users Guide*.

Paradyne Comsphere 3910 modem

The Paradyne Comsphere 3910 modem is used for many locations outside of the United States. These modems are *not* optioned at the factory.

Recommended options

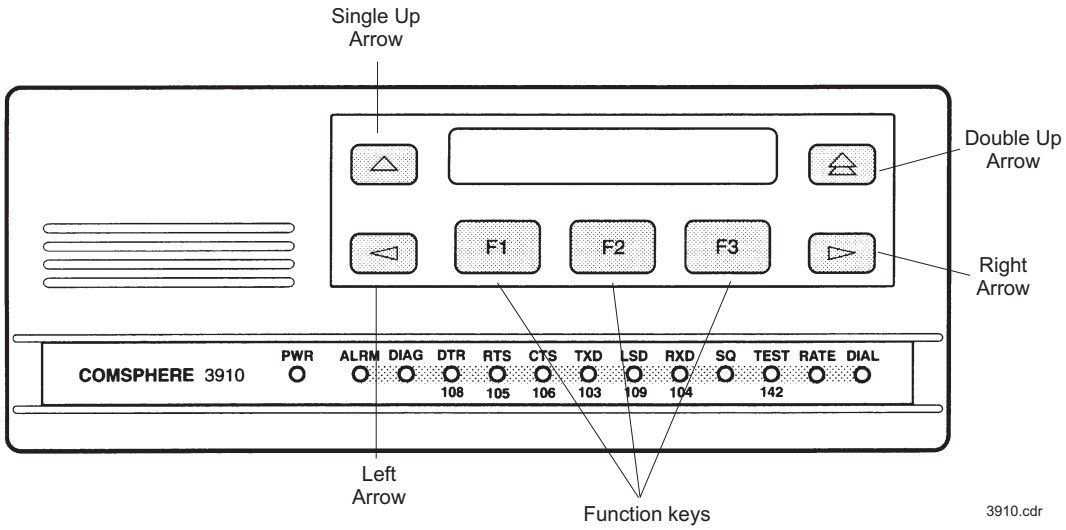
The recommended options for the Comsphere 3910 modem include selecting the factory-preset defaults for “UNIX_Dial” with the following two changes:

- Asynchronous DTE Rate is changed to 9600
- Dial Line Rate is changed to 9600 (V32b)

Option buttons

The seven buttons that are used to set the modem options include:

- Single Up Arrow. Move up one level in the menu tree
- Double Up Arrow. Move to the top-level menu
- Left Arrow. Move to the previous choice for the current level in the menu tree
- Right Arrow. Move to subsequent choice for the current level in the menu tree
- Function 1 (**F1**). Select the choice, if any, that is currently displayed above **F1**
- Function 2 (**F2**). Select the choice, if any, that is currently displayed above **F2**
- Function 3 (**F3**). Select the choice, if any, that is currently displayed above **F3**



Setting the options

To set the options on the Comsphere 3910, use the following procedures.

Configuring Factory/Async_Dial

1. Press **F2** to select “Configure.”

   “Ld EditArea frm” is displayed.

2. Press the **Right Arrow** four times.

   “Factory” is displayed.

3. Press **F1** to select “Factory.”

   “Ld Fact Preset:” is displayed.

4. Press **Right Arrow** four times.

5. Press **F1** to select “UNIX_Dial.”

6. Press **F3** to select “Save.”

   “Sav EditArea to” is displayed.

7. Press **F1** to save to “Active(Saved).”

   Since you are changing the active area to a new set of options (that is, “Factory/Async_Dial”), the modem automatically performs another Power-On-Self-Test (POST). Since the new options match the way the modem is connected, the ALRM LED does not turn red. “Idle: 19.2” and “Status Configure” are displayed. To return to the top-level menu, press the **Double Up Arrow**.

Setting the data rate

1. Press **F2** to select “Configure.”

   “Ld EditArea frm” is displayed.

2. Press the **Right Arrow** once.

   “Active(Saved)” is displayed.

3. Press **F1**.

   “Choose Function” is displayed.

4. Press **F1** to select “Edit.”

   “Edit StrapGroup” is displayed.

5. Press **F1** to select “DTE_Interface.”

   “Async/Sync Mode” is displayed.

6. Press **F1** to select “Nxt.”

   “Async DTE Rate” is displayed.

7. Press the **Right Arrow** five times to display “9600.”
8. Press **F2** to select “9600.”

Setting the handshake options

1. Press **F1** for “Nxt.”

   “Asyn #Data Bits (8)” is displayed.
2. Press **F1** for “Nxt.”

   “Asyn Parity Bit (None)” is displayed.
3. Press **F1** for “Nxt.”

   “Asyn #Stop Bits (1)” is displayed.
4. Press **F1** for “Nxt.”

   “DTR Action (Ignore)” is displayed.
5. Press **F1** for “Nxt.”

   “DSR Control (Forced_On)” is displayed.
6. Press **F1** for “Nxt.”

   “RTS Action (Ignore)” is displayed.
7. Press **F1** for “Nxt.”

   “CTS Control (WinkWhenDisc)” is displayed.
8. Press **F1** for “Nxt.”

   “RTS/CTS Delay (0 msec)” is displayed.
9. Press **F1** for “Nxt.”

   “LSD Control (WinkWhenDisc)” is displayed.
10. Press **F1** for “Nxt.”

    “CT111_Rate Cntl (Disable)” is displayed.
11. Press **F1** for “Nxt.”

    “DTE_Rate=VF (Disable)” is displayed.
12. Press **F1** for “Nxt.”

    “Extend Main Ch. (Disable)” is displayed.
13. Press **F1** for “End.”

    “Edit StrapGroup” is displayed.

Setting the Dial_Line strap group

1. Press the **Right Arrow** three times to get to the “Dial_Line” strap group. Nothing needs to be changed for CMS in the “DTE_Dialer” or “Line_Dialer” strap groups, so you can skip them.
2. Press **F1** to edit the “Dial_Line” strap group.

   “Dial Line Rate” is displayed.
3. Press the **Right Arrow** four times for “9600(V32b).”
4. Press **F2** to select “9600(V32b).”
5. Press **F1** for “Nxt.”

   “V32bis Automode (Enable)” is displayed.
6. Press **F1** for “Nxt.”

   “V32bis Autorate (Enable)” is displayed.
7. Press **F1** for “Nxt.”

   “Dial Tx Level (Permissv (-9))” is displayed.
8. Press **F1** for “Nxt.”

   “V22b Guard Tone (Disable)” is displayed.
9. Press **F1** for “Nxt.”

   “V32bis Train (Long)” is displayed.
10. Press **F1** for “End.”

    “Edit StrapGroup” is displayed. The other strap groups (“V42/MNP/Buffer,” “Test,” “Misc,” and “Security”) are not changed for CMS.

Saving your settings

1. Press the **Single Up Arrow** to display “Choose Function” and “Edit Save.”
2. Press **F3** to select “Save.”

   “Save EditArea to” is displayed.
3. Press **F1** to select “Active(Saved).”

   “Command Complete” is displayed.
4. Press the **Single Up Arrow** again to display “Save EditArea to.”
5. Press the **Right Arrow** once to select “Customer 1.”
6. Press **F1** to save to “Customer 1.”

   “Command Complete” is displayed.

7. Press the **Double Up Arrow**.

   “Idle: 9600” and “Status Configure” are displayed. If the modem is powered off, it should return to this state when it is powered on.

8. To check the status of the Comsphere 3910 modem, use the “Status” choice in the top level menu, or use the Right and Left Arrow buttons to view other top-level menu choices.

Turning the system over for provisioning

After completing the physical installation of the system, the installation continues with software provisioning. This is often done with the support of the Avaya CMS Provisioning group. Provisioning the system consists of the following:

- Setting up CMS
- Authorizing features
- Adding logins and passwords
- Testing the software

To continue with provisioning, see the chapter “Turning the system over to the customer” in the software installation, maintenance, and troubleshooting document appropriate for your version of CMS.

Maintenance

Overview

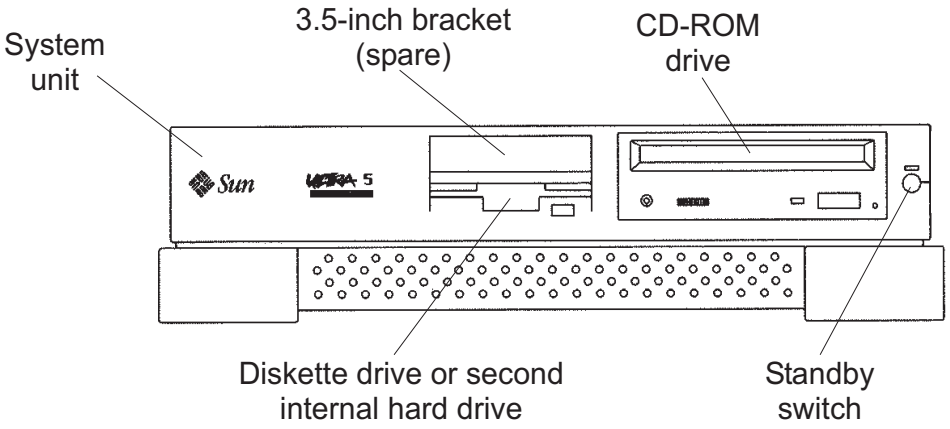
This chapter describes the following maintenance procedures:

Computer layout

Familiarize yourself with the layout of the Ultra 5.

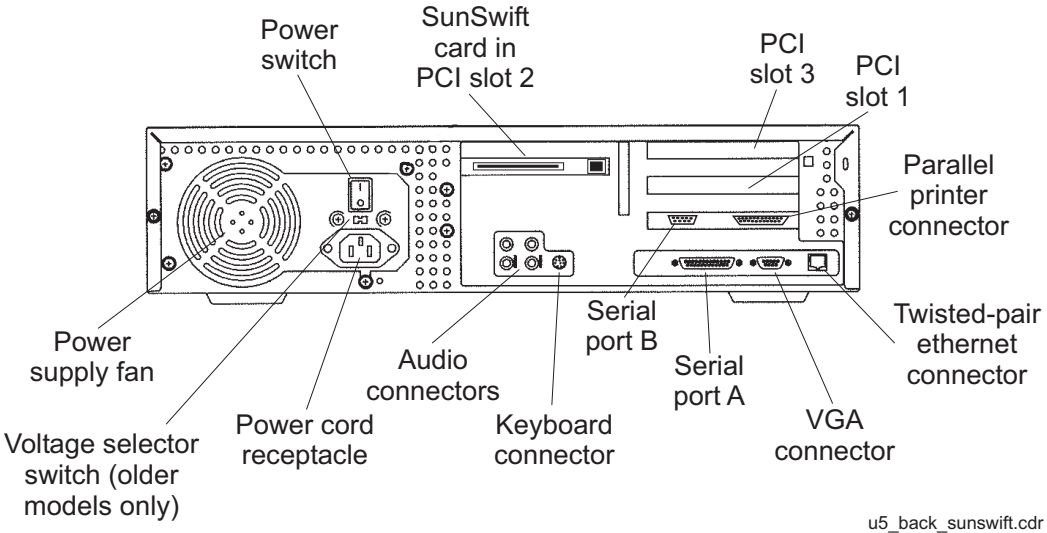
Front Panel

This figure shows the front panel of the Ultra 5. The diskette drive is not available if the optional second internal hard drive has been installed.



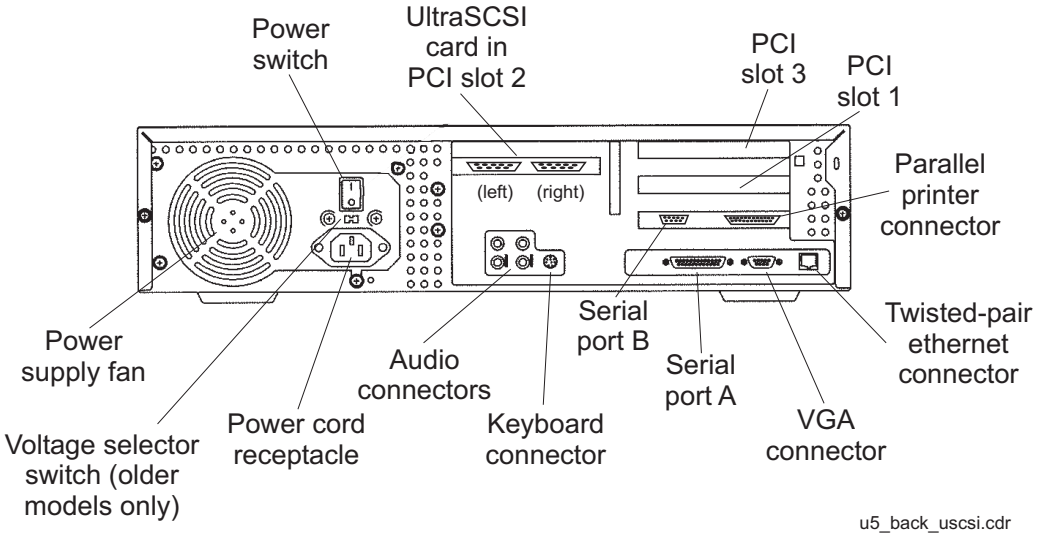
Rear Panel (with SunSwift card)

This figure shows the rear panel when you have a SunSwift card, which is usually installed in PCI slot 2. The SunSwift card has one 68-pin SCSI connector and one ethernet RJ45 connector. Other PCI cards may be installed in slots 1 and 3.



Rear Panel (with UltraSCSI card)

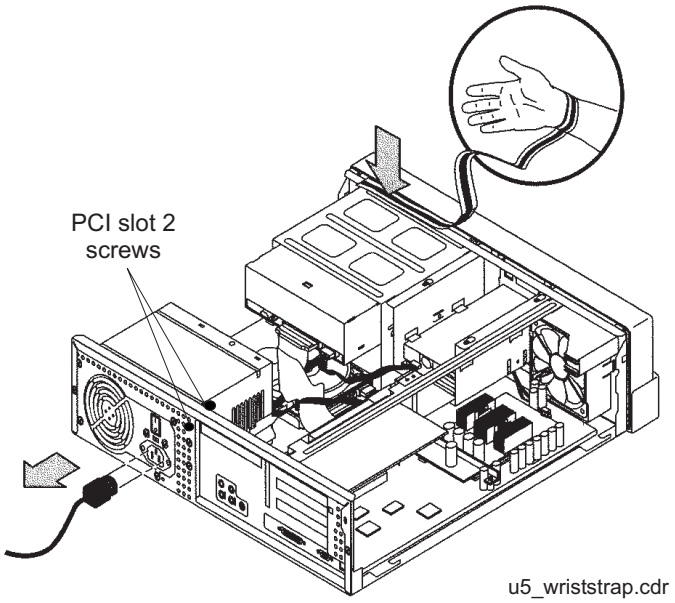
This figure shows the rear panel when you have an UltraSCSI card, which is usually installed in PCI slot 2. The UltraSCSI card has two 68-pin SCSI connectors. Other PCI cards may be installed in slots 1 and 3.



ESD precautions

Before you work on components inside the Ultra 5 computer:

1. Make sure that the computer is plugged in to AC power.
2. Make sure that the power is off.
3. Attach the Electro-Static Discharge (ESD) wrist strap to the chassis frame and to your wrist. See the following figure.



4. Unplug the AC power cord.

Maintaining PCI cards

Overview

Procedures in this section include the following:

- Identifying free card slots
- PCI card configuration on page 65
- Installing or removing PCI cards on page 66
- Replacing an UltraSCSI card with a SunSwift card on page 68
- SAI/P cards on page 71
- Installing HSI/P cards on page 77

Required references

You need access to the following documents to do procedures in this section:

- *Avaya CMS R3V11 Software Installation, Maintenance, and Troubleshooting,* 585-215-115
- *Avaya CMS R3V9 Software Installation, Maintenance, and Troubleshooting,* 585-215-956
- *Avaya CMS R3V8 Software Installation, Maintenance, and Troubleshooting,* 585-210-941
- *Avaya CMS Software Installation and Setup* (R3V5 and R3V6), 585-215-866
- *Avaya CMS Switch Connections, Administration, and Troubleshooting*, 585-215-876
- *Sun Ultra 5 Service Manual*

Identifying free card slots

There are three PCI slots on the back of the Ultra 5 computer. Empty slots are covered by filler panels. Every computer will have either a SunSwift SCSI/Ethernet or UltraSCSI card installed in Slot 2.

PCI card configuration

Depending on your configuration, the PCI cards will be installed in the slots shown below.

Card	PCI Slot	Comments
SunSwift or UltraSCSI	PCI 2, 1, or 3	Required. A SunSwift card is installed in every computer to provide a dedicated ethernet connection to the switch, and a SCSI interface to external tape and disk drives. Additional SunSwift cards can be installed in the other slots.
HSI/P	PCI 1 or PCI 3	Optional. HSI/P cards are not required when using ethernet for switch link connectivity. Use PCI 1 for the first card, which supports four ACDs. Use PCI 1 and 3 for two cards, which support eight ACDs. **Note:** Some CMS loads do not support the X.25 protocol. Contact the National Customer Care Center or consult with your product distributor or representative to verify if the X.25 protocol is supported on your CMS system.
SAI/P	PCI 1 or PCI 3	Optional. SAI/P cards provide serial port connectivity for printers and terminals. Use PCI 1 for the first card, which supports eight serial devices. Use PCI 1 and 3 for two cards, which supports 16 serial ports.
Token Ring	PCI 3	Optional. Installation and setup of this card is done by Professional Services in the United States, or by special arrangement outside of the United States.

Installing or removing PCI cards

Use the following general instructions when installing, moving, and removing PCI cards. Other sections in this chapter describe specific PCI card maintenance instructions. Use those instructions as appropriate.

Note:

If you plan to install an optional second internal hard drive, install it before you install any PCI cards.

To install or remove a card:

1. For a system currently in operation, verify that you have a recent CMSADM file system backup before you change card configurations.
2. Enter:

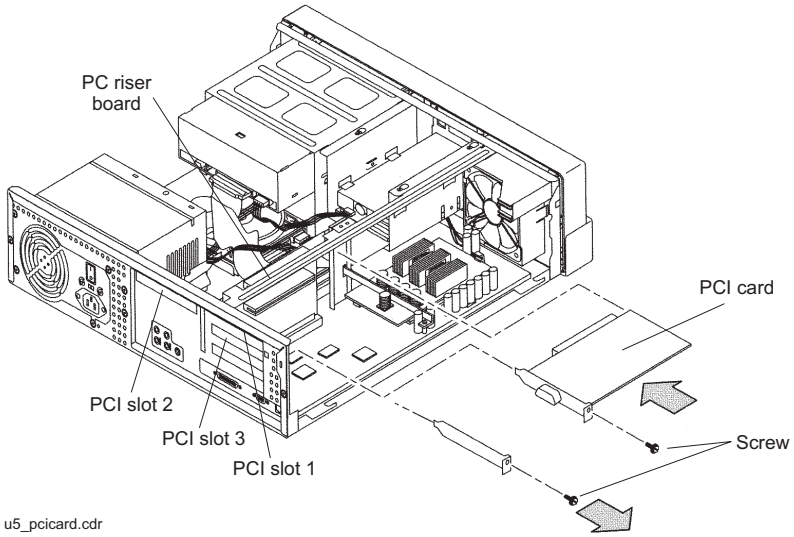
   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

   This shuts down the system.
3. Turn off the system.
4. Turn off the system monitor.
5. Turn off all external SCSI devices starting with the device closest to the system and working toward the farthest device.

   WARNING:

   You must wear an ESD wrist strap when installing or removing hardware components to prevent electrical discharge that can damage the system.
6. Remove the cover of the Ultra 5.
7. Disconnect the AC power cord.
8. Select an unused slot to add a card, or select what card you are removing.

9. Add or remove the card as shown in the following figure.



10. Remove the ESD wrist strap.
11. Reattach the cover.
12. Reconnect the AC power cord.
13. Turn on all external SCSI devices starting with the device farthest from the system and working toward the system.
14. Turn on the system monitor.
15. Turn on the system.
16. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
17. Enter:

    ```
    boot -r
    ```

    This reboots the system so that it recognizes the new configuration.
18. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.

Replacing an UltraSCSI card with a SunSwift card

This section describes how to replace an UltraSCSI card with a SunSwift card. This is done when the customer wants to add a second ethernet port.

Prerequisites

- Obtain a SunSwift PCI card.
- Obtain one or two 68-to-68 pin SCSI cables (comcode 407934470, part number 595-4851-xx).
- Do a CMSADM backup.
- Turn off CMS before beginning this procedure.

Procedure

To replace an UltraSCSI card with a SunSwift card:

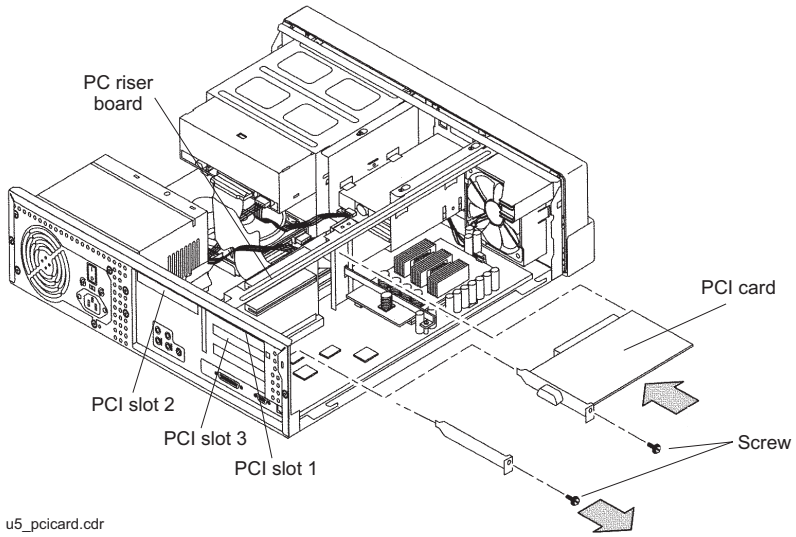
1. Enter:

   `/usr/sbin/shutdown -y -i0 -g0`

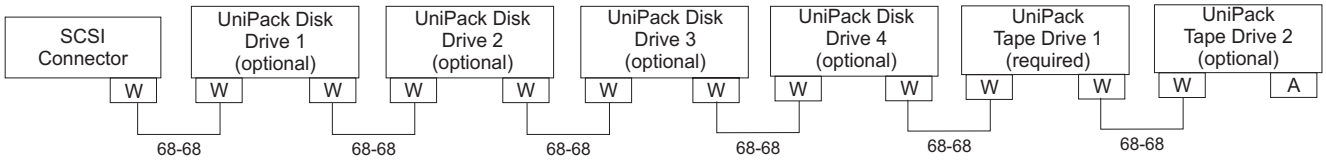
   This shuts down the system.
2. Turn off the system.
3. Turn off the system monitor.
4. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.

   WARNING:
   You must wear an ESD wrist strap when installing or removing hardware components to prevent electrical discharge that can damage the system.
5. Disconnect each 68-to-68 pin VHDCI cable from the UltraSCSI card and from the first external device in each existing SCSI chain. There may be one chain of disk drives and one chain of tape drives.
6. Remove the cover of the Ultra 5.
7. Disconnect the AC power cord.

8. Remove the UltraSCSI card. It should be located in PCI slot 2.



9. Install the SunSwift card in PCI slot 2 (or wherever the UltraSCSI card was installed).
10. Reconfigure the SCSI devices in the order shown in the following figure.



SCSI devices are addressed as shown in the table below. These addresses are set using the Target Address Switches on the back of each SCSI device.

Device	Address
Disk Drive 1	0
Disk Drive 2	1
Disk Drive 3	2
Disk Drive 4	3
Tape Drive 1	4
Tape Drive 2	5
Important: Do not use a target address greater than 5.	

11. Remove the ESD wrist strap.
12. Reattach the cover.
13. Reconnect the AC power cord.
14. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
15. Turn on the system monitor.
16. Turn on the system.
17. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
18. Enter:

    ```
    boot -r
    ```

    This reboots the system so that it recognizes the new configuration.
19. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.

SAI/P cards

The Serial Asynchronous Interface/PCI (SAI/P) card connects terminals, printers and modems to the computer. The computer can accommodate two SAI/P cards. Each SAI/P card is associated with an external, 8-port expander box.

Identifying device entry names for ports on an SAI/P card

When the SAI/P card driver is installed, device entries are created to access the physical ports on the expander box. The device name that is created is **/dev/term/*N***, where ***N*** represents SAI/P slot and expander box port entries. For example, when two SAI/P cards are installed, the card in the lowest numbered slot is associated with physical ports a000-a007, while ports for the second card are denoted by b000-b007.

To display the port designations for each SAI/P card, use the **/cms/toolsbin/display_ports** command. A response similar to the following is displayed:

```
/dev/term devices:a000 a001 a002 a003 a004 a005 a006 a007
#
```

Adding, moving, or removing an SAI/P card

This section describes how to add, remove or move an SAI/P card.

Adding an SAI/P card – To add an SAI/P card:

1. Identify the existing SAI/P cards installed in the system.
2. Verify that you have a recent CMSADM file system backup before you change card configurations.
3. Enter:

   /usr/sbin/shutdown -y -i0 -g0

   This shuts down the system.
4. Turn off the system.
5. Turn off the system monitor.
6. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.
7. Decide where you will install the new SAI/P card. Insert the SAI/P card into the Ultra 5. See Installing or removing PCI cards on page 66 for more information.
8. Connect the expander box to the new SAI/P card.

9. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
10. Turn on the system monitor.
11. Turn on the system.
12. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
13. Enter:

    boot -r

    This reboots the system so that it recognizes the new configuration.
14. Enter the following commands:

    sacadm -l

    pmadm -l

    These commands display existing administration information. Record this information for later use.
15. Enter:

    pmadm -r -p ttysaip*slot* -r tty*portdesignator*

    This removes port administration for all SAI/P cards, where ***slot*** indicates slot a or slot b, and ***portdesignator*** is the full SAI/P port designation (a000, a001, and so on).
16. Remove the SAI/P software drivers. Refer to Removing SAI/P drivers and utilities on page 75.
17. Install the SAI/P software driver. See your CMS software installation, maintenance, and troubleshooting document for details.
18. Administer all SAI/P ports cards.
19. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.

Moving an SAI/P card – When moving SAI/P cards, remember to preserve the original sequence of the cards. To do this, you many need to move more than one card. See Identifying device entry names for ports on an SAI/P card on page 71 to determine the ordering sequence.

To move an SAI/P card to a different PCI slot location.

1. Verify that you have a recent CMSADM file system backup before you change card configurations.
2. Remove the SAI/P software drivers. Refer to Removing SAI/P drivers and utilities on page 75.
3. Enter:

   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

   This shuts down the system.
4. Turn off the system.
5. Turn off the system monitor.
6. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.
7. Remove the SAI/P card from the PCI slot.
8. Install the SAI/P card into a different PCI slot. See Installing or removing PCI cards on page 66 for more information.

   CAUTION:

   Remember to preserve the original ordering sequence of the SAI/P cards.
9. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
10. Turn on the system monitor.
11. Turn on the system.
12. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
13. Enter:

    ```
    boot -r
    ```

    This reboots the system so that it recognizes the new configuration.
14. Install the SAI/P software driver. See your CMS software installation, maintenance, and troubleshooting document for details.
15. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.

Removing an SAI/P card – To remove an SAI/P card:

1. Verify that you have a recent CMSADM file system backup before you change card configurations.
2. Enter the following commands:

   `sacadm -l`

   `pmadm -l`

   These commands display existing administration information. Record this information for later use.
3. Enter:

   `pmadm -r -p ttysaip`*`slot`*` -r tty`*`portdesignator`*

   This removes port administration for all SAI/P cards, where ***`slot`*** indicates slot a or slot b, and ***`portdesignator`*** is the full SAI/P port designation (a000, a001, and so on).
4. Remove the SAI/P software drivers. Refer to Removing SAI/P drivers and utilities on page 75.
5. Enter:

   `/usr/sbin/shutdown -y -i0 -g0`

   This shuts down the system.
6. Turn off the system.
7. Turn off the system monitor.
8. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.
9. Remove the SAI/P card from the system. See Installing or removing PCI cards on page 66 for more information.
10. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
11. Turn on the system monitor.
12. Turn on the system.
13. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
14. Enter:

    `boot -r`

    This reboots the system so that it recognizes the new configuration.
15. Readminister all terminals, modems, and printers connected to the SAI/P expander box.

16. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.

Removing SAI/P drivers and utilities

To remove the SAI/P software drivers and utilities:

1. Enter:

   pkgrm SUNWsaip

   This removes the SAI/P software drivers. The following message is displayed:

```
# The following package is currently installed:
     SUNWsaip         Serial Asynchronous Interface Driver (PCI)
                    (sparc) X.0.0

Do you want to remove this package?
```

2. Enter: **y**

   This starts the removal of the SAI/P software driver. The following message is displayed:

```
## Removing installed package instance <SUNWsaip>

   This package contains scripts which will be executed with
   super-user permission during the process of removing this
   package.

Do you want to continue with the removal of this package [y,n,q,?]
```

3. Enter: **y**

   The following message is displayed:

```
## Verifying package dependencies.
## Processing package information.
## Executing preremove script.
```

   If the removal is successful, the following message is displayed:

```
Removal of <SUNWsaip> was successful.
#
```

   If removal is not successful, escalate through the normal channels.

4. Enter:

   pkgrm SUNWsaipu

   This removes the SAI/P software utilities. The following message is displayed:

```
# The following package is currently installed:
     SUNWsaipu      Serial Asynchronous Interface Utilities (PCI)
                    (sparc) X.0.0

Do you want to remove this package?
```

5. Enter: **y**

   This starts the removal of the SAI/P software utilities. The following message is displayed:

```
## Removing installed package instance <SUNWsaipu>

   This package contains scripts which will be executed with
   super-user permission during the process of removing this
   package.

Do you want to continue with the removal of this package [y,n,q,?]
```

6. Enter: **y**

   The following message is displayed:

```
## Verifying package dependencies.
## Processing package information.
## Executing preremove script.
```

   If the removal is successful, the following message is displayed:

```
Removal of <SUNWsaipu> was successful.
#
```

   If removal is not successful, escalate through the normal channels.

Installing HSI/P cards

An HSI/P card supports X.25 switch links. For eight ACDS, two HSI/P cards and quad cables are needed. If the system uses TCP/IP signaling for all ACDs, HSI/P cards are not needed.

Note:

Some CMS loads do not support the X.25 protocol. Contact the National Customer Care Center or consult with your product distributor or representative to verify if the X.25 protocol is supported on your CMS system.

Installing HSI/P cards contains the following procedures:

If you are replacing a defective HSI/P card, see Replacing an HSI/P card on page 78. If this is the initial installation of one or two HSI/P cards, start with Installing the first HSI/P card or a pair of HSI/P cards. If a second HSI/P card is being added to a system already in operation, see Adding a second HSI/P card on page 81.

Replacing an HSI/P card

To replace an HSI/P card:

1. Log in to the system as root.
2. Enter:

   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

   This shuts down the system.
3. Press and hold the front panel power switch for 5 seconds to power off the system.
4. Turn off the system monitor.
5. Turn off all external SCSI devices, starting with the device that is closest to the system and working toward the farthest device.
6. Disconnect the HSI/P quad cable connected to the card.
7. Remove and replace the defective HSI/P card. See Installing or removing PCI cards on page 66 for detailed instructions.
8. Reattach the HSI/P quad cable.
9. Turn on all external SCSI devices, starting with the device that is farthest from the system and working toward the system.
10. Turn on the system monitor.
11. Turn on the system.

Installing the first HSI/P card or a pair of HSI/P cards

To install the first HSI/P card or a pair of HSI/P cards:

1. Verify that you have a recent CMSADM file system backup before you change card configurations.
2. Log in to the system as root.
3. Enter:

   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

   This shuts down the system.
4. Turn off the system.
5. Turn off the system monitor.
6. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.
7. Install the HSI/P cards. See Installing or removing PCI cards on page 66 for more information.

8. Attach the HSI/P quad cables, and connect the switch links to the quad cables by following the instructions described in *Avaya CMS Switch Connections, Administration, and Troubleshooting*, 585-215-876.

   Note:

   Do not use serial port “A” to connect switch links when an HSI/P card is installed. Serial port “A” is used only for single ACD installations. In a multiple ACD arrangement, all switch links must be connected to an HSI/P quad cable, to an ethernet port using TCP/IP, or a combination of HSI/P and TCP/IP connections.

9. Turn on all external SCSI devices, starting with the device that is farthest from the system and working toward the system.
10. Turn on the system monitor.
11. Turn on the system.
12. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.

    The `ok` prompt is displayed.

13. Enter:

    `boot -r`

    This reboots the system so that it recognizes the new HSI/P cards.

    Note:

    Sometimes the system fails to recognize a newly installed HSI card. If this happens, the command **`show-devs`** does not show the HSI card and **`/var/adm/messages`** fails to recognize the card upon bootup. See the troubleshooting chapter of *Avaya CMS Switch Connections, Administration, and Troubleshooting*, 585-215-876, for information about troubleshooting HSI/P cards.

14. When the system comes back up, log in as root.
15. Continue with Installing HSI/P software and patches on page 79.

Installing HSI/P software and patches

Using the procedures in the CMS software installation, maintenance, and troubleshooting document:

- Install the HSI/P software
- Reinstall the Solaris patches

After installing the software and patches, continue with Setting up the switch link for each ACD on page 80.

Setting up the switch link for each ACD

To change the switch link administration for each ACD:

1. Enter:

   cmssvc

   The CMS Services menu is displayed.
2. Select the **run_cms** option.
3. Turn off CMS.
4. Enter:

   cmssvc

   The CMS Services menu is displayed.
5. Select the **swsetup** option.
6. Select the ACD that you want to set up.
7. Accept the existing defaults for the following:
   - Switch name
   - Switch model (release)
   - Vectoring
   - Expert agent
   - Central office disconnect supervision
   - Local port
   - Remote port
8. Select “X.25” and a specific link number when prompted for the link information.
9. Repeat Step 4 through 8 for each ACD that will use the HSI card.
10. Enter:

    cmssvc

    The CMS Services menu is displayed.
11. Select the **run_cms** option.
12. Turn on CMS.
13. Test and troubleshoot each switch connection using the procedures in *Avaya CMS Switch Connections, Administration, and Troubleshooting*, 585-215-876.
14. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.

Adding a second HSI/P card

Use the following procedures if you are adding a second HSI/P card to a system that is already in operation. Before you do this procedure, verify that CMS is installed.

To add a second HSI/P card:

1. Verify that you have a recent CMSADM file system backup before you change card configurations.
2. Log in to the system as root.
3. Enter:

   `/usr/sbin/shutdown -y -g0 -i0`

   This shuts down the system.
4. Turn off the system.
5. Turn off the system monitor.
6. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.
7. Install the second HSI/P card. See Installing or removing PCI cards on page 66 for more information.
8. Attach the HSI/P quad cable, and connect the switch links to the quad cable by following the instructions described in *Avaya CMS Switch Connections, Administration, and Troubleshooting*, 585-215-876.

   Note:

   Do not use serial port “A” to connect switch links when an HSI/P card is installed. Serial port “A” is used only for single ACD installations. In a multiple ACD arrangement, all switch links must be connected to an HSI/P quad cable, to an ethernet port using TCP/IP, or a combination of HSI/P and TCP/IP connections.
9. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
10. Turn on the system monitor.
11. Turn on the system.
12. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
13. Enter:

    `boot -r`

    This reboot the system so that it recognizes the new HSI/P card.

Note:

Sometimes the system fails to recognize a newly installed HSI card. If this happens, the command **`show-devs`** does not show the HSI card and **`/var/adm/messages`** fails to recognize the card upon bootup. See the troubleshooting chapter of *Avaya CMS Switch Connections, Administration, and Troubleshooting*, 585-215-876, for information about troubleshooting HSI/P cards.

14. When the system comes back up, log in as root.
15. Administer the switch links as shown in Setting up the switch link for each ACD on page 80.

Maintaining disk drives

Overview

Procedures in this section include the following:

Disk drive compatibility with CMS loads

When a new or replacement disk drive is installed in an older system, the CMS load may not be compatible with the disk drive if the CMS configuration files have not been updated. These configuration files (**`/olds/disk.conf`** and **`/olds/olds-funcs`**) must be edited or replaced with the correct information. Contact the Avaya technical support organization for assistance.

Prerequisites

Do a CMSADM backup, if possible, before you add or replace a disk drive. See your CMS software installation, maintenance, and troubleshooting document for this procedure.

Before you attempt to replace defective data (nonboot) disks, try to print the current setup for all ACDs. This information must be readministered after you install replacement disks.

Required references

The following references are required when doing procedures in this section:

- *Avaya CMS R3V11 Software Installation, Maintenance, and Troubleshooting,* 585-215-115
- *Avaya CMS R3V9 Software Installation, Maintenance, and Troubleshooting,* 585-215-956
- *Avaya CMS R3V8 Software Installation, Maintenance, and Troubleshooting,* 585-210-941
- *Avaya CMS Software Installation and Setup* (R3V5 and R3V6), 585-215-866
- *Sun Ultra 5 Service Manual*

Replacing the primary internal EIDE boot disk drive

This procedure describes how to replace the primary internal EIDE boot disk drive. If you are also adding or replacing the secondary data disk drive, use these procedures in concert with Adding or replacing the internal EIDE data disk drive on page 93 while you have the computer open.

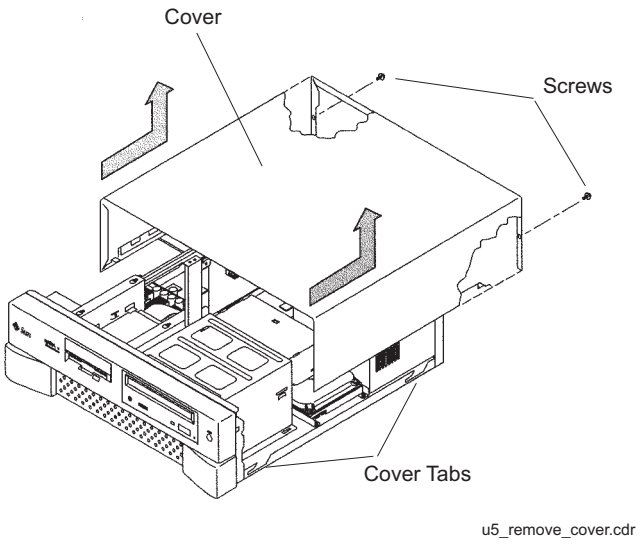
Opening the computer

To open the computer:

1. If you have not already done so, use the following command to shut down the computer:

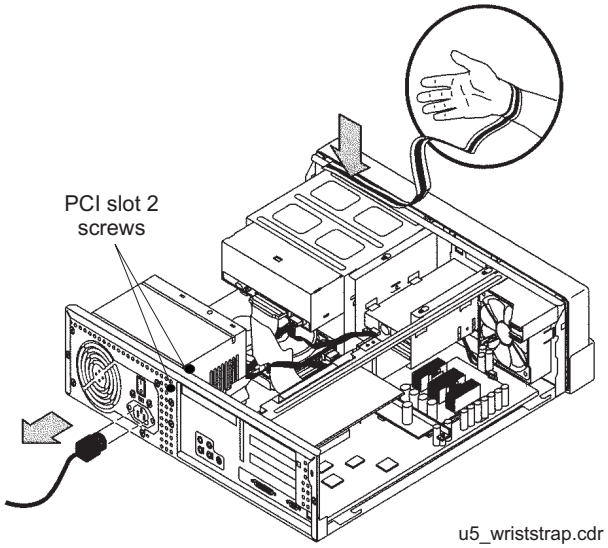
   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

2. Turn off the power to the computer.
3. Remove the two screws on the back of the unit that secure the cover to the chassis. See the following figure.



4. Slide the cover back 1 or 2 inches and lift it up away from the chassis.
5. Place the cover in a convenient location so that it does not interfere with your work.

6. Attach an antistatic wrist strap to the metal chassis of the computer and to your wrist. See the following figure.



7. Disconnect the AC power cord.

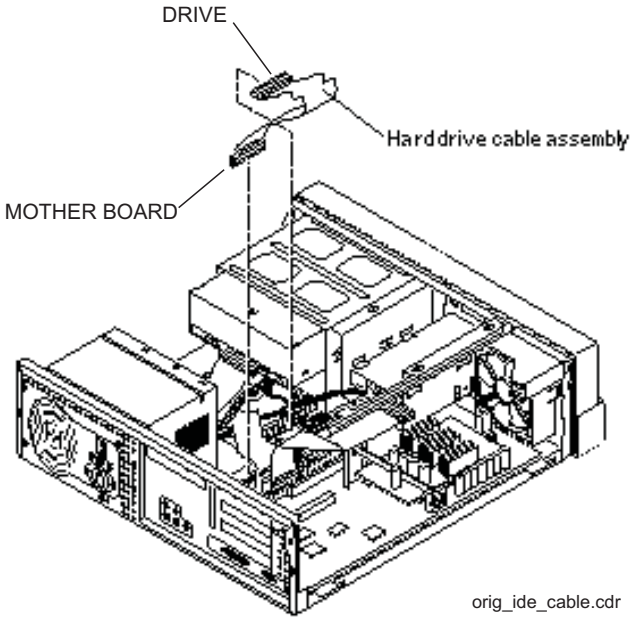
Important:

If the computer has a PCI card in slot position 2, you must remove that card during this procedure to make it easier to reach the components. To remove PCI card 2, you must first remove the PCI card 2 screw. On the Series 1 computers, this screw is on the back of the computer. On Series 2 and later computers, this screw is on the top of the frame above the PCI card.

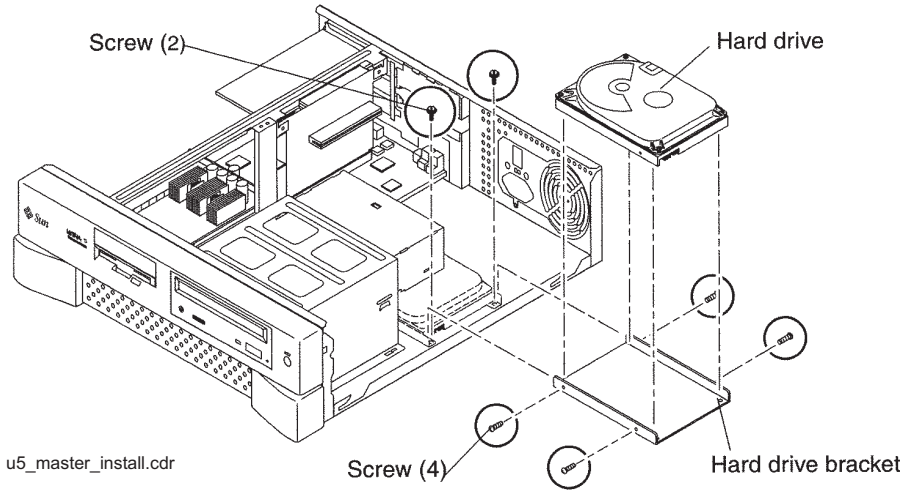
Removing the primary internal boot disk drive

To remove the primary internal boot disk drive:

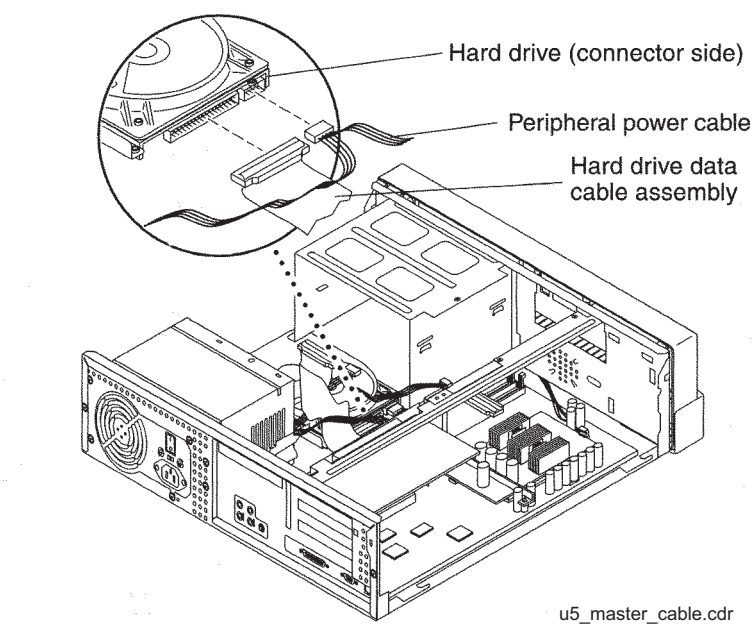
1. Disconnect the EIDE ribbon cable from the motherboard. Remember where the EIDE ribbon cable connects to the motherboard. The following figure shows an EIDE cable when there is only one internal disk drive.



2. If the computer has a secondary data disk drive installed, disconnect the EIDE ribbon cable from the secondary disk drive. If no secondary disk is installed, skip this step.
3. Remove the two screws that secure the primary disk drive mounting bracket assembly to the chassis. See the following figure.



4. Disconnect the power cable from the primary disk drive. See the following figure.

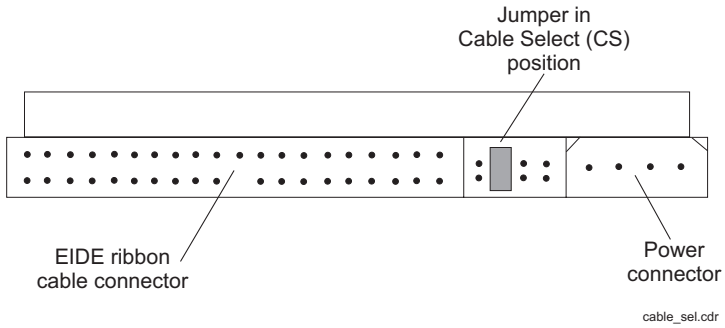


5. Remove the primary disk drive and mounting bracket assembly from the computer.
6. Disconnect the EIDE ribbon cable from the primary disk drive. Save this EIDE cable in case you have to reinstall the old disk drive.
7. Remove the four screws that hold the primary disk drive to the mounting bracket. Save the screws and mounting bracket for the new primary disk drive. Label the disk drive “Original Master Disk,” and save it in case you have to reinstall the original configuration.

Installing the new primary internal disk drive

To install the new primary internal disk drive:

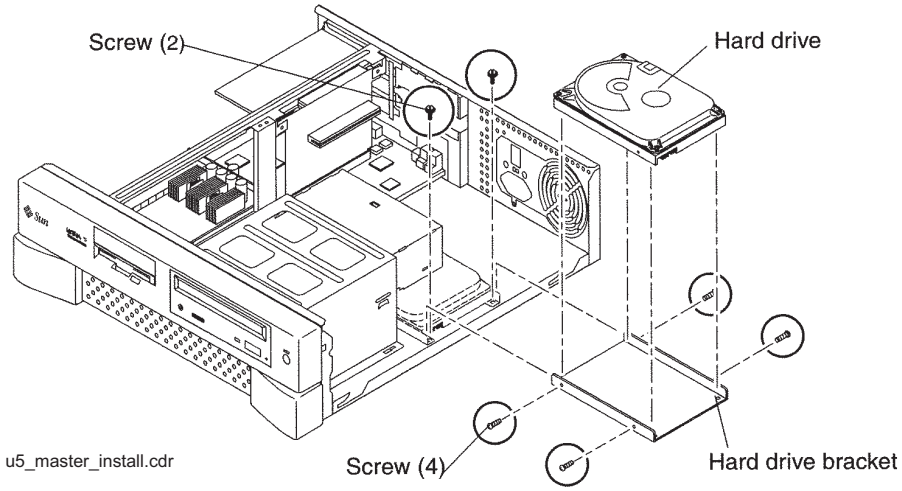
1. Ensure that the jumpers on the primary internal hard drive are set to the Cable Select (CS) setting. See the following figure.



2. Using the original mounting bracket, attach the new primary disk drive labeled “Master Disk” to the mounting bracket using the four screws from the new disk drive kit. The mounting bracket that came with the new primary disk drive can be discarded.

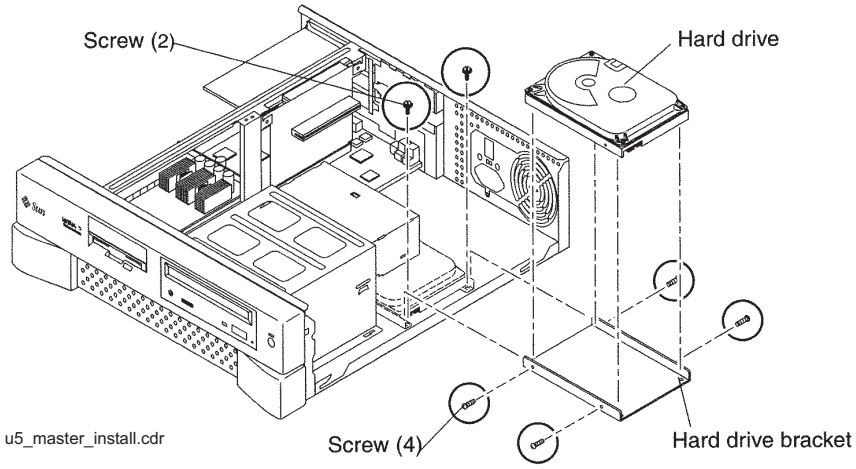
   Tip:

   Install each screw with just a few turns before you tighten all four screws.



3. With the new primary internal disk drive you will receive new EIDE ribbon cables. Use the cable that has three connectors (SLAVE, MASTER, and MOTHERBOARD). Connect the end labeled MASTER to the connector on the rear of the new primary internal disk drive.
4. Connect the power cable to the primary internal disk drive.

5. Slide the mounting bracket into place, routing the EIDE ribbon cable so that the MOTHER BOARD connector can reach the connector on the motherboard, and the SLAVE connector can reach the secondary internal disk drive.
6. Attach the mounting bracket to the chassis using the two screws saved earlier. See the following figure.



7. Connect the EIDE ribbon cable end labeled MOTHER BOARD to the EIDE connector on the mother board.

   Tip:

   If you are also replacing the secondary internal data disk drive, wait and attach the EIDE ribbon cable to the mother board after you install that drive.

8. Do one of the following:
   - If you are adding or replacing the secondary data disk drive, continue with Adding or replacing the internal EIDE data disk drive on page 93.
   - If you are not adding or replacing the secondary data disk drive, continue with Closing the computer on page 91.

Closing the computer

If you are also replacing the secondary internal data disk drive, do not close the computer. Continue with Adding or replacing the internal EIDE data disk drive on page 93.

To close the computer:

1. If you removed the PCI card from Slot 2 earlier, reinstall it now.
2. Reconnect the AC power cord to the computer.
3. Detach the ESD wrist strap.
4. Replace the cover on the computer. Slide the cover forward until it fits snugly around the chassis.
5. Replace the two cover screws.

   Tip:

   Install each screw with just a few turns before you tighten both screws.
6. Do one of the following:
   - If you are adding or replacing external SCSI disk drives, continue with Adding or replacing external SCSI disk drives on page 102.
   - If you are not adding or replacing external SCSI disk drives, continue with Turning on the system on page 92.

Turning on the system

To turn on the system:

1. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
2. Turn on the system monitor.
3. Turn on the system.
4. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
5. Enter the following commands:

   ```
   setenv auto-boot? false
   ```

   ```
   reset-all
   ```

   This resets the system and the `ok` prompt is displayed.
6. Enter:

   ```
   probe-ide
   ```

   This checks to see that the system recognizes the new disk drive. If the new drive is not listed, check for a secure connection between the motherboard and the new drive.
7. Reboot the system by entering the following commands:

   CAUTION:

   If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

   ```
   setenv auto-boot? true
   ```

   ```
   boot -r
   ```
8. Continue with Setting up the disk drives on page 110.

Adding or replacing the internal EIDE data disk drive

This section describes how to add or replace the internal EIDE data disk drive in the Ultra 5 computer. The optional drive, together with hardware and a new ribbon cable, is packaged separately from the Ultra 5 computer.

Note:

In the following procedures, the disk drive that is already installed in the Ultra 5 computer is referred to as the *primary* drive, and the new drive that you install is referred to as the *secondary* drive.

Unpacking the disk drive

Remove the following items from the box that contains the secondary data disk drive and place them in a convenient location:

- EIDE disk drive
- Mounting bracket
- Four pan head screws
- New EIDE ribbon cable

  The new disk drive comes with two ribbon cables. The cable used with the Ultra 5 has three connectors labeled SLAVE, MASTER, and MOTHERBOARD. The other cable may be discarded.

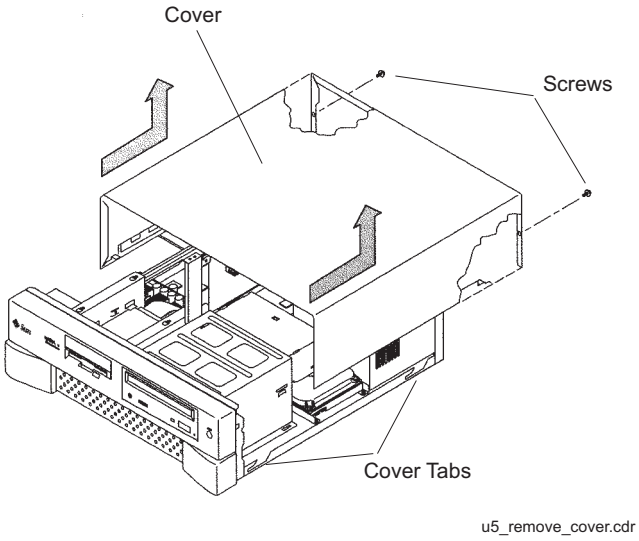
Opening the computer

To open the computer:

1. If you have not already done so, use the following command to shut down the computer:

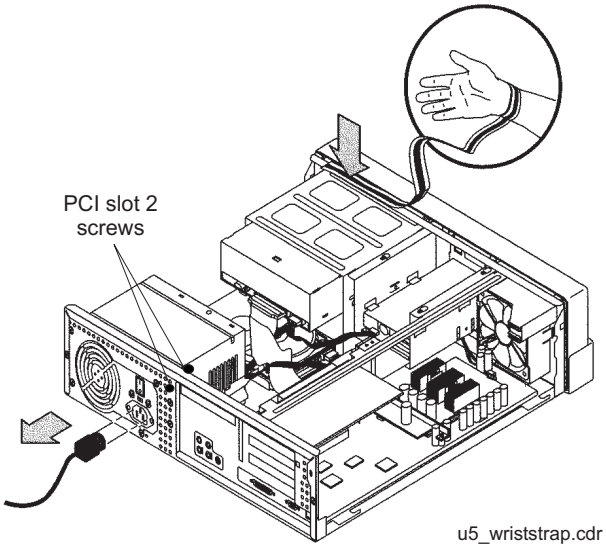
   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

2. Turn off the power to the computer.
3. Remove the two screws on the back of the unit that secure the cover to the chassis. See the following figure.



4. Slide the cover back 1 or 2 inches and lift it up away from the chassis.
5. Place the cover in a convenient location so that it does not interfere with your work.

6. Attach an antistatic wrist strap to the metal chassis of the computer and to your wrist.See the following figure.



7. Disconnect the AC power cord.

Important:

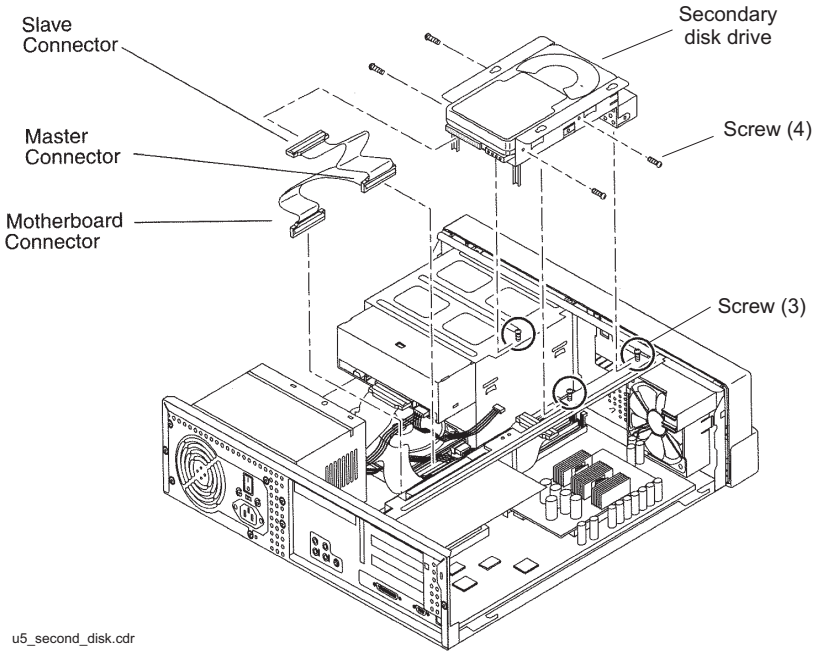
If the computer has a PCI card in slot position 2, you may want to remove that card during this procedure to make it easier to reach the components. To remove PCI card 2, you must first remove the PCI card 2 screw. On the Series 1 computers, this screw is on the back of the computer. On Series 2 and later computers, this screw is on the top of the frame above the PCI card.

Removing the secondary internal disk drive

If there is no secondary internal disk drive, continue with Removing the diskette drive on page 97.

To remove the secondary internal data disk drive:

1. Loosen, but do not remove, the three screws that secure the mounting bracket for the secondary internal disk drive to the top of the chassis frame. See the following figure.



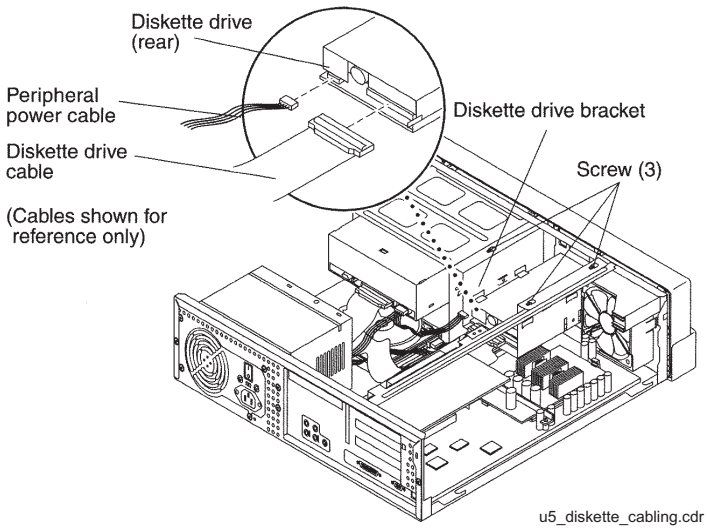
2. Remove the disk drive bracket from the chassis by sliding it back and lifting it free of the three screws.
3. Disconnect the power cable from the secondary disk drive.
4. Lift out the mounting bracket and the attached disk drive.
5. Remove the four screws that hold the secondary internal disk drive to the mounting bracket. Save the screws and mounting bracket for the new secondary internal disk drive. Label the disk drive “Slave Disk,” and save it in case you have to reinstall the original configuration.

Removing the diskette drive

If there is no 3.5-inch internal diskette drive, continue with Installing new cabling on page 98.

To remove the diskette drive:

1. Disconnect the power cable and diskette drive cable from the rear of the diskette drive. See the following figure.



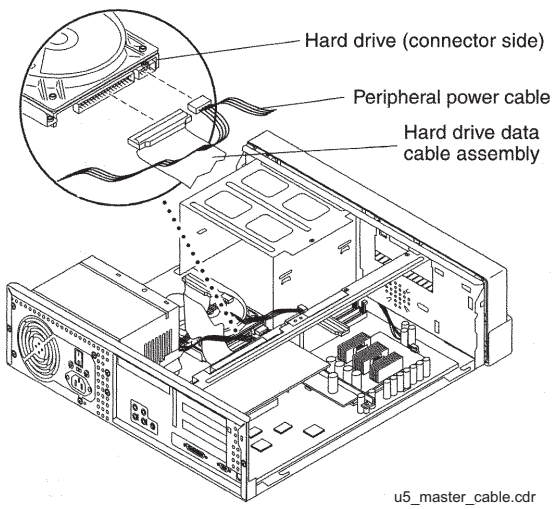
2. Loosen but do not remove the three screws that secure the diskette drive mounting bracket to the top of the chassis frame.
3. Remove the diskette drive bracket from the chassis by sliding it back and lifting it free of the three screws.
4. Lift out the mounting bracket and attached diskette drive.
5. At the motherboard, disconnect the diskette drive cable that comes from the diskette drive.
6. Save the diskette drive and diskette drive cable in case you have to reinstall the original configuration.

Installing new cabling

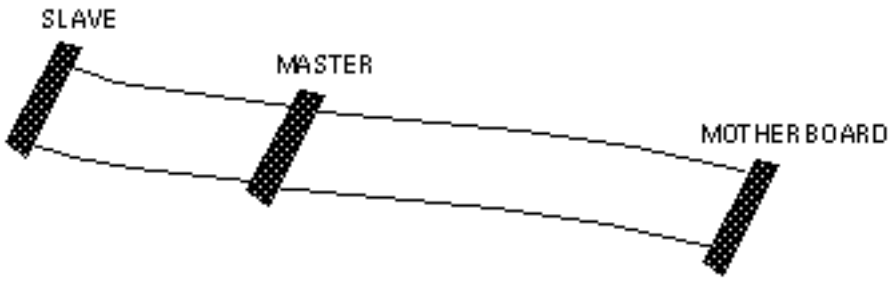
If the primary boot disk drive already has a new EIDE ribbon cable, continue with Installing the secondary disk drive on page 99.

To install new cabling:

1. Remove the ribbon cable from the back of the primary disk drive. You may need to remove the primary disk drive by removing the two screws securing the primary disk drive bracket and lifting out the drive. See the following figure.



2. Remove the other end of this cable from the motherboard. Remember the slot in the motherboard from which you remove this connector. You will install another connector in this slot in the next step.
3. On the new ribbon cable that was supplied with the secondary disk drive, there are three connectors labeled MOTHERBOARD, MASTER, and SLAVE. Insert the connector labeled MOTHERBOARD into the slot in the motherboard from which you removed a connector in the previous step. See the following figure.

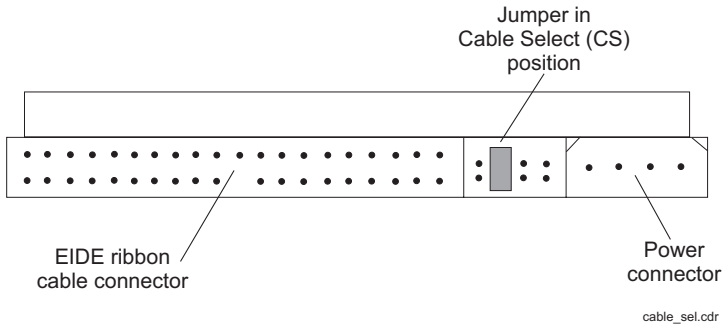


4. Connect the connector labeled MASTER to the primary disk drive.
5. If you previously removed the primary disk drive, reinstall it on the chassis.

Installing the secondary disk drive

To install the new secondary internal disk drive:

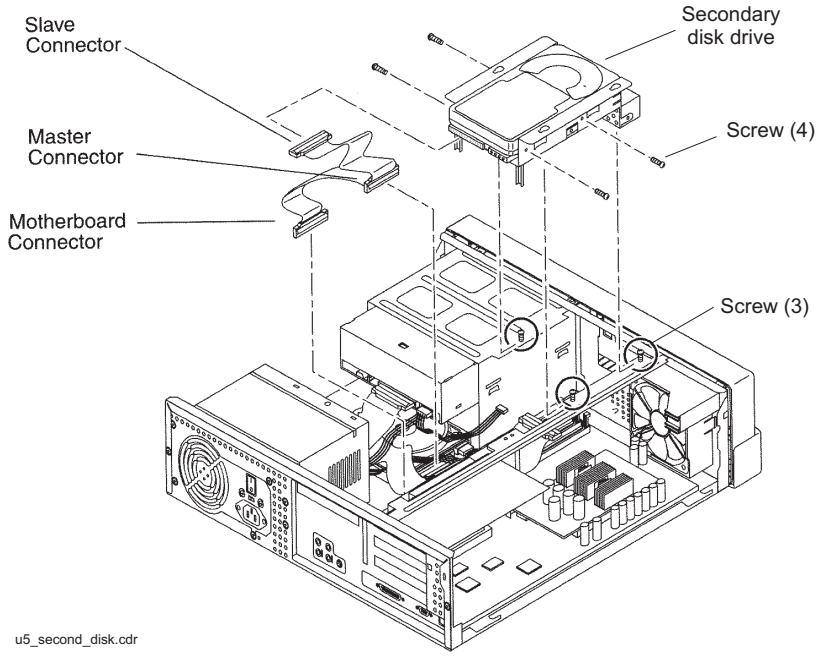
1. Ensure that the jumpers on the secondary internal hard drive are set to the Cable Select (CS) setting. See the following figure.



2. Attach the secondary internal disk drive to the new mounting bracket with the four screws from the old disk drive or from the new disk drive kit. Arrange the drive so that the connectors point to the back of the computer.

   Tip:

   Install each screw with just a few turns before you tighten all four screws.



3. Connect the EIDE ribbon cable connector labeled SLAVE to the secondary internal disk drive.

4. Connect the power cable to the secondary internal disk drive.
5. Install the mounting bracket for the secondary internal disk drive to the frame of the chassis, slipping the three holes in the mounting bracket over the three screws in the chassis frame.
6. Slide the mounting bracket forward as far as possible.
7. Tighten the three screws.
8. Route the cables to provide clearance.

Closing the computer

To close the computer:

1. If you removed the PCI card from Slot 2 earlier, reinstall it now.
2. Reconnect the AC power cord to the computer.
3. Detach the ESD wrist strap.
4. Replace the cover on the computer. Slide the cover forward until it fits snugly around the chassis.
5. Replace the two cover screws.

   Tip:

   Install each screw with just a few turns before you tighten both screws.
6. Do one of the following:
   - If you are adding or replacing any external SCSI disk drives, continue with Adding or replacing external SCSI disk drives on page 102.
   - If you are not adding or replacing any external SCSI disk drives, continue with Turning on the system on page 101.

Turning on the system

If you are also adding or replacing secondary external disk drives, do not power-up the system. Continue with Adding or replacing external SCSI disk drives on page 102.

To turn on the system:

1. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
2. Turn on the system monitor.
3. Turn on the system.
4. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
5. Enter the following commands:

   ```
   setenv auto-boot? false
   ```

   ```
   reset-all
   ```

   This resets the system and the `ok` prompt is displayed.
6. Enter:

   ```
   probe-ide
   ```

   This checks to see that the system recognizes the new disk drives. If the new drives are not listed, make sure there is a secure connection between the motherboard and the new drives.
7. Reboot the system by entering the following commands:

   CAUTION:

   If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

   ```
   setenv auto-boot? true
   ```

   ```
   boot -r
   ```

   The system reboots.
8. Continue with Setting up the disk drives on page 110.

Adding or replacing external SCSI disk drives

This section describes how to add or replace an external SCSI disk drive on an existing system.

Adding or replacing a disk drive

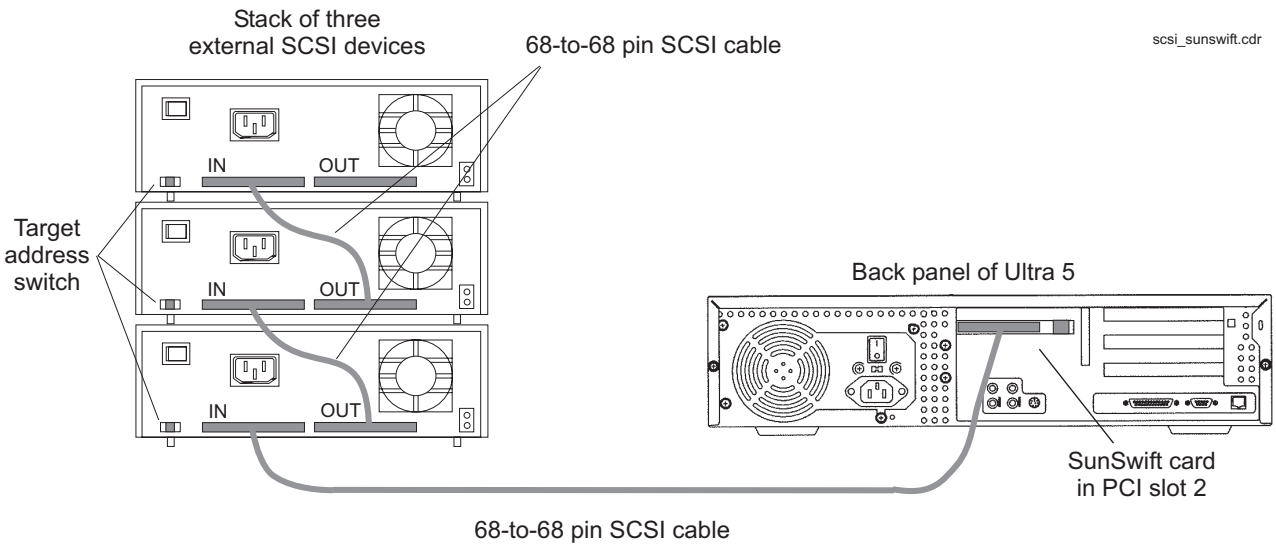
To add or replace an external disk drive:

1. Log in to the system as root.
2. Enter:

   /usr/sbin/shutdown -y -i0 -g0

   The system shuts down and displays the `ok` prompt.
3. Turn off the system.
4. Turn off the system monitor.
5. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.
6. Connect the disk drive to the other SCSI devices. See SunSwift connections on page 103 or UltraSCSI connections on page 105.

SunSwift connections – The following figure shows how to connect UniPack SCSI disk drives and tape drives to a SunSwift card. A 68-to-68-pin SCSI cable connects from the SunSwift PCI card on the back of the computer to the IN connector on the back of the SCSI device that is closest to the computer. If you have more than one SunSwift card, connect the drives to the card in the lowest slot number. A 68-to-68 pin SCSI cable connects from the OUT connector of that device to the IN connector of the next device. Continue this process until all assigned devices are connected in the SCSI chain.

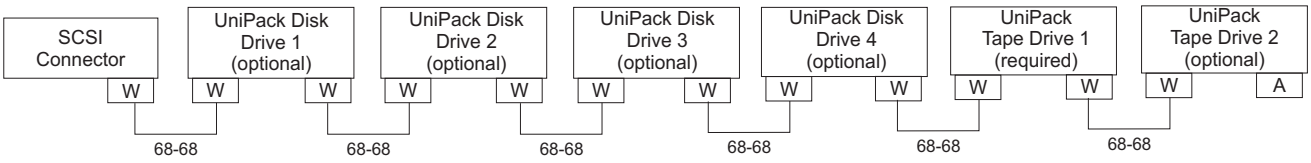


When connecting SCSI devices, the last device in the chain MUST be terminated, either via an auto-terminated device or with a manual terminator.

When using an auto-terminated SCSI device, you do not need to connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. To verify that the last device is auto-terminated, check the LEDs labeled Auto Term High and Auto Term Low on the back panel of the device. In a CMS configuration, both LEDs are lit on the last device in the SCSI chain. If a device in the SCSI chain is not the last device, neither termination LED is lit.

When using a manually-terminated device, you must connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. When you connect the SCSI terminator to the OUT connector, the LED on the terminator is lit.

The following figure shows the SCSI cabling for a SunSwift card.



scsicble_swift.cdr

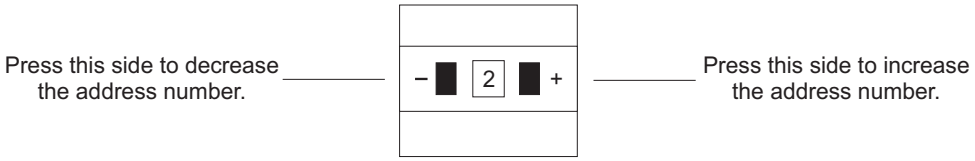
W = 68-68 pin SCSI cable
A = Auto-terminated

SCSI devices are addressed as shown in the following table.

Device	Address
Disk drive 1	0
Disk drive 2	1
Disk drive 3	2
Disk drive 4	3
Tape drive 1	4
Tape drive 2	5

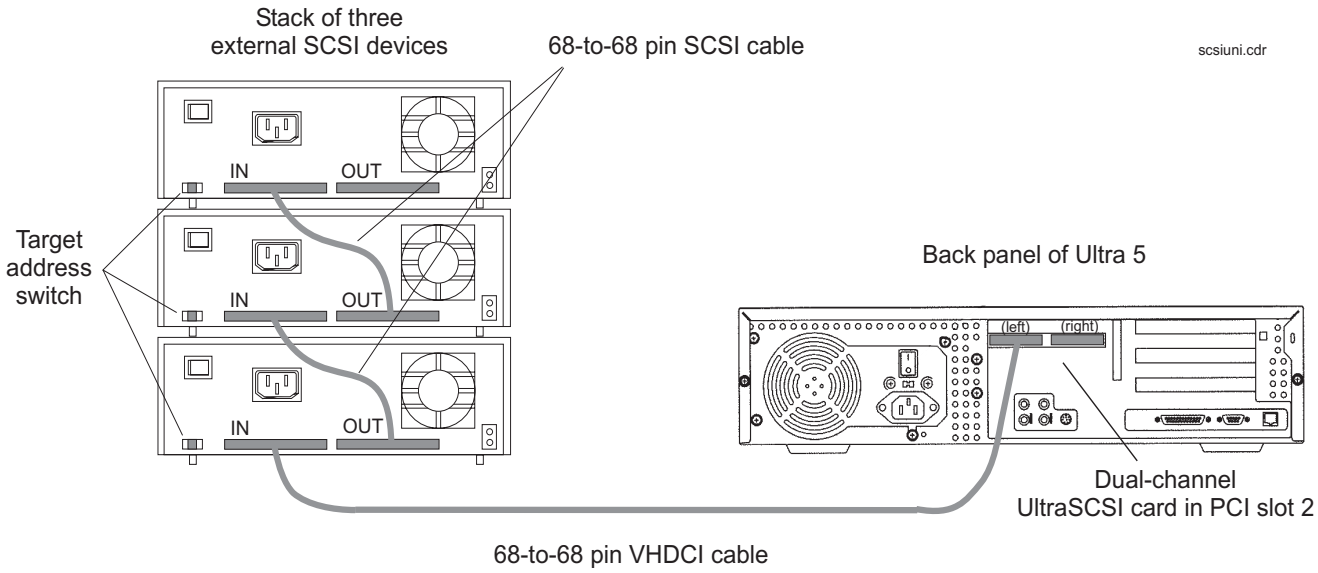
Important:
Do not use a target address greater than 5.

The addresses are set using the target address switches on the back of each SCSI device. Before setting the target address, make sure that the power is off on the SCSI devices.



scsiidsw.cdr

UltraSCSI connections – The following figure shows how to connect UniPack SCSI disk drives and tape drives to an UltraSCSI card. A 68-to-68-pin VHDCI SCSI cable connects from the UltraSCSI PCI card on the back of the computer to the IN connector on the back of the SCSI device that is closest to the computer. A 68-to-68 pin SCSI cable connects from the OUT connector of that device to the IN connector of the next device. Continue this process until all assigned devices are connected in the SCSI chain.

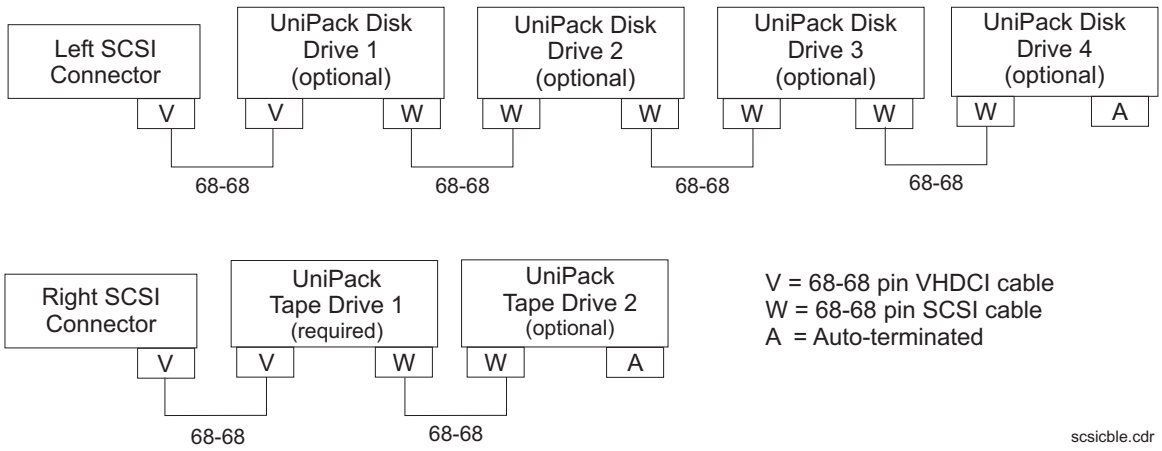


When connecting SCSI devices, the last device in the chain MUST be terminated, either via an auto-terminated device or with a manual terminator.

When using an auto-terminated SCSI device, you do not need to connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. To verify that the last device is auto-terminated, check the LEDs labeled Auto Term High and Auto Term Low on the back panel of the device. In a CMS configuration, both LEDs are lit on the last device in the SCSI chain. If a device in the SCSI chain is not the last device, neither termination LED is lit.

When using a manually-terminated device, you must connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. When you connect the SCSI terminator to the OUT connector, the LED on the terminator is lit.

The following figure shows the SCSI cabling schemes that are possible with an UltraSCSI card that is installed in slot 2 of an Ultra 5 computer.



Note:

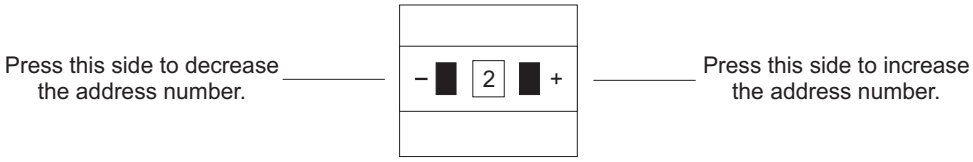
The “Left/Right” designations shown above are based on the UltraSCSI card being installed in slot 2. If the UltraSCSI card is installed in slots 1 or 3, connect the disk drives to the right connector and the tape drives to the left connector.

SCSI devices are addressed as shown in the following table.

Device	Address
Disk drive 1	0
Disk drive 2	1
Disk drive 3	2
Disk drive 4	3
Tape drive 1	4
Tape drive 2	5

Important:
Do not use a target address greater than 5.

The addresses are set using the target address switches on the back of each SCSI device. Before setting the target address, make sure that the power is off on the SCSI devices.



scsiidsw.cdr

Turning on the system

To turn on the system:

1. Connect the power cord from the disk drive to a power source.
2. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.

   Note:

   For most SCSI devices, the power LED will light as soon as you power-on the device. For some disk drives, the power LED will not light until the system begins POST.
3. Turn on the system monitor.
4. Turn on the system.
5. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
6. Enter the following commands:

   `setenv auto-boot? false`

   `reset-all`

   This resets the system and the `ok` prompt is displayed.
7. Enter:

   `probe-scsi-all`

   This checks to see that the system recognizes the new external disk drives. The resulting display should list the new drives as Target 0-3. If the new drives are not listed, make sure there is a secure connection between the SCSI port and the new drives.
8. Enter:

   `reset-all`

   This resets the system and the `ok` prompt is displayed.
9. Enter:

   `probe-ide`

   This checks to see that the system recognizes the new internal EIDE disk drives. If the new drives are not listed, make sure there is a secure connection between the motherboard and the new drives.

10. Reboot the system by entering the following commands:

    CAUTION:

    If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

    ```
    setenv auto-boot? true
    ```

    ```
    boot -r
    ```

    The system reboots.

11. Continue with Setting up the disk drives on page 110.

Setting up the disk drives

After you replace defective disk drives, do one of the following:

Drive replaced	Procedure
Boot disk	Continue with the procedures in “Performing a CMSADM restore procedure of a mirrored or non mirrored system” in the maintenance chapter of the software installation, maintenance, and troubleshooting document for your version of CMS.
Data disk	Partition and administer the drive so that it works with the existing disk drives (see Partitioning disk drives on page 111 and Administering data disk drives on page 121). Continue with the procedures in “Recovering a nonmirrored system after data disk failure” in the Maintenance chapter of the software installation, maintenance, and troubleshooting document for your version of CMS.

After you add new disk drives, do the following:

Drive added	Procedure
Data disk	Partition and administer the drive so that it works with the existing disk drives (see Partitioning disk drives on page 111 and Administering data disk drives on page 121).

Partitioning disk drives

Requirements for partitioning data disk drives differs for the releases of CMS.

R3V9 and later

If you are adding new disk drives to a system where CMS is operational, partitioning is done automatically using CMS commands. Skip manual partitioning and continue with Administering data disk drives on page 121.

If you are replacing a defective disk drive in a system and CMS is not operational or if you are replacing a defective boot disk, you must manually partition the disk drive. Use the following information:

- Disk partition values, R3V11 boot disks on page 112, R3V9 boot disks on page 112, or R3V9 and later data disks on page 113
- Partitioning and formatting a disk on page 117

R3V8 and earlier

For R3V8 and earlier systems, you must partition and format the new or replacement disk drives. Use the following information:

- Disk partition values, R3V8 and earlier data disks on page 115
- Partitioning and formatting a disk on page 117

Disk partition values

During the disk partitioning procedure, you must enter the size of each partition. Since disk models change often, see the software installation, maintenance, and troubleshooting document for your current CMS release to verify the correct disk partitioning values.

R3V11 boot disks – The following table lists the boot disk drives that are currently supported for R3V11. These partition sizes are entered in Gigabytes (gb).

Disk	Partition	ID tag	Permission flag	Starting cylinder	Value
20-GB IDE	0	root	wm	0	4gb
	1	swap	wu	8323	1gb
	2	backup	wm	Use the default values for partition 2.	
	3	un	wm	10404	3gb
	4	un	wm	16646	2gb
	5-7	un	wm	Do not enter a value for partitions 5 through 7. These values are populated automatically when the boot disks resynchronize during the restore procedure.	

R3V9 boot disks – The following table lists the boot disk drives that are currently supported for R3V9. These partition sizes are entered in gigabytes (gb) and cylinders (c).

Disk	Partition	ID tag	Permission flag	Starting cylinder	Value
20-GB IDE	0	root	wm	0	4gb
	1	swap	wu	8323	1gb
	2	backup	wm	Use the default values for partition 2.	
	3	un	wm	10404	3gb
	4	un	wm	16646	2gb
	5	un	wm	20808	2gb
	6	un	wm	24970	2gb
	7	un	wm	29132	9658c

R3V9 and later data disks – The following table lists the data disk drives that are currently supported for R3V9 and later. These partition sizes are entered in gigabytes (gb) and cylinders (c).

Disk	Partition	ID tag	Permission flag	Starting cylinder	Value
36-GB SCSI	0	un	wm	0	2gb
	1	un	wm	1452	2gb
	2[1]	backup	wm	Do not enter a value for partition 2.	
	3	un	wm	2904	2gb
	4	un	wm	4356	2gb
	5	un	wm	5808	2gb
	6	un	wm	7260	2gb
	7	un	wm	8712	15908c
20-GB IDE	0	un	wm	0	2gb
	1	un	wm	4162	2gb
	2[1]	backup	wm	Do not enter a value for partition 2.	
	3	un	wm	8324	2gb
	4	un	wm	12486	2gb
	5	un	wm	16648	2gb
	6	un	wm	20810	2gb
	7	un	wm	24972	13818c
18-GB SCSI	0	un	wm	0	2gb
	1	un	wm	891	2gb
	2[1]	backup	wm	Do not enter a value for partition 2.	
	3	un	wm	1782	2gb
	4	un	wm	2673	2gb
	5	un	wm	3564	2gb
	6	un	wm	4455	2gb
	7	un	wm	5346	2160c

Disk	Partition	ID tag	Permission flag	Starting cylinder	Value
9.1-GB IDE	0	un	wm	0	2gb
	1	un	wm	4162	2gb
	2[1]	backup	wm	Do not enter a value for partition 2.	
	3	un	wm	8324	2gb
	4	un	wm	12486	2gb
	5	un	wm	16648	1012c
	6	un	wm	0	0c
	7	un	wm	0	0c
9.1-GB SCSI	0	un	wm	0	2gb
	1	un	wm	1169	2gb
	2[1]	backup	wm	Do not enter a value for partition 2.	
	3	un	wm	2338	2gb
	4	un	wm	3507	2gb
	5	un	wm	4676	248c
	6	un	wm	0	0c
	7	un	wm	0	0c
4.2-GB SCSI	0	un	wm	0	2gb
	1	un	wm	1942	2gb
	2[1]	backup	wm	Do not enter a value for partition 2.	
	3	un	wm	0	0c
	4	un	wm	0	0c
	5	un	wm	0	0c
	6	un	wm	0	0c
	7	un	wm	0	0c

1. The backup value indicates the size of the data disk drive models used with the workstation. If the disk drive you are partitioning does not closely match the size of the disk you are partitioning, you have a nonstandard disk. Escalate the issue to Avaya technical support.

R3V8 and earlier data disks – The following table lists the data disk drives that are currently supported with R3V8 and earlier. These partition sizes are entered in number of cylinders (c).

Disk	Partition	ID tag	Permission flag	Starting cylinder	Value
20-GB[1] IDE	0	un	wm	0	2c
	1	un	wm	2	38788c
	2[2]	backup	wm	0	38790c
	3-7	un	wm	0	0c
18-GB SCSI[3]	0	un	wm	0	2c
	1	un	wm	2	7504c
	2[2]	backup	wm	0	7506c
	3-7	un	wm	0	0c
9.1-GB IDE[4]	0	un	wm	0	2c
	1	un	wm	2	17658c
	2[2]	backup	wm	0	17660c
	3-7	un	wm	0	0c
9.1-GB SCSI[5]	0	un	wm	0	2c
	1	un	wm	2	4922c
	2[2]	backup	wm	0	4924c
	3-7	un	wm	0	0c
4.01-GB IDE[6] (Model ST34321A)	0	un	wm	0	2c
	1	un	wm	2	8890c
	2[2]	backup	wm	0	8892c
	3-7	un	wm	0	0c
4.01-GB IDE[7] (Model ST34312A)	0	un	wm	0	2c
	1	un	wm	2	8350c
	2[2]	backup	wm	0	8352c
	3-7	un	wm	0	0c

Disk	Partition	ID tag	Permission flag	Starting cylinder	Value
4.2-GB SCSI	0	un	wm	0	2c
	1	un	wm	2	3878c
	2[2]	backup	wm	0	3880c
	3-7	un	wm	0	0c

1. The 20-GB disk is compatible with loads r3v6be.h or later, and r3v8ak.g (with CMS patch 5) or later. For older systems, see Disk drive compatibility with CMS loads on page 83 for more information.
2. The backup value indicates the size of the data disk drives. If the disk drive you are partitioning does not closely match the size of the disk you are partitioning, you have a nonstandard disk. Escalate the issue to Avaya technical support.
3. The 18-GB disk is compatible with loads r3v6be.f or later, and r3v8ai.g or later. For older systems, see Disk drive compatibility with CMS loads on page 83 for more information.
4. The 9.1-GB EIDE disk is compatible with loads r3v6at.i or later, and all R3V8 loads. For older systems, see Disk drive compatibility with CMS loads on page 83 for more information.
5. The 9.1-GB SCSI disk is compatible with loads r3v6ac.e or later, and r3v8aa.i or later. For older systems, see Disk drive compatibility with CMS loads on page 83 for more information.
6. This is the original 4.01 EIDE disk drive. It is identified by model number ST34321A and has 8894 cylinders.
7. This is the new 4.01 EIDE disk drive. It is identified by model number ST34312A and has 8354 cylinders. A new version of the **`disk.conf`** and **`olds-funcs`** files must be downloaded. See Disk drive compatibility with CMS loads on page 83 for more information.

Partitioning and formatting a disk

To partition and format a disk:

1. At the system prompt, enter:

   format

   A message similar to the following example is displayed:

```
AVAILABLE DISK SELECTIONS:
       0. c0t0d0 <ST320420A cyl 39533 alt 2 hd 16 sec 63>
          /pci@1f,0/pci@1,1/ide@3/dad@0,0
       1. c0t1d0 <ST320420A cyl 39533 alt 2 hd 16 sec 63>
          /pci@1f,0/pci@1,1/ide@3/dad@1,0
       2. c1t0d0 <SUN4.2G cyl 3880 alt 2 hd 16 sec 135>
          /pci@1f,0/pci@1/scsi@2/sd@0,0
       3. c1t1d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
          /pci@1f,0/pci@1/scsi@2/sd@1,0
Specify disk (enter its number):
```

2. Enter the disk number that corresponds to the disk that you added. Be sure to specify the number that *exactly* matches the disk added.

```
Specify disk (enter its number): 1
```

   The device number of the disk that you are partitioning is displayed, for example, `c0t1d0`, and the Format Menu is displayed:

```
selecting c0t1d0
[disk formatted]
FORMAT MENU:
        disk       - select a disk
        type       - select (define) a disk type
        partition  - select (define) a partition table
        current    - describe the current disk
        format     - format and analyze the disk
        repair     - repair a defective sector
        label      - write label to the disk
        analyze    - surface analysis
        defect     - defect list management
        backup     - search for backup labels
        verify     - read and display labels
        save       - save new disk/partition definitions
        inquiry    - show vendor, product and revision
        volname    - set 8-character volume name
        !<cmd>     - execute <cmd>, then return
        quit
format>
```

3. Enter:

   partition

   The partition menu is displayed:

```
PARTITION MENU:
        0      - change '0' partition
        1      - change '1' partition
        2      - change '2' partition
        3      - change '3' partition
        4      - change '4' partition
        5      - change '5' partition
        6      - change '6' partition
        7      - change '7' partition
        select - select a predefined table
        modify - modify a predefined partition table
        name   - name the current table
        print  - display the current table
        label  - write partition map and label to the disk
        !<cmd> - execute <cmd>, then return
        quit
partition>
```

4. At the `partition>` prompt, enter:

   print

   The default partition table is displayed. The table for a 4.2-GB SCSI disk might look like the following example:

```
Current partition table (original):
Total disk cylinders available: 3880 + 2 (reserved cylinders)

Part      Tag    Flag     Cylinders        Size            Blocks
  0 unassigned    wm       0 -    1        2.11MB    (2/0/0)       4320
  1 unassigned    wm       2 - 3879        3.99GB    (3878/0/0) 8376480
  2     backup    wm       0 - 3879        4.00GB    (3880/0/0) 8380800
  3 unassigned    wm       0               0         (0/0/0)          0
  4 unassigned    wm       0               0         (0/0/0)          0
  5 unassigned    wm       0               0         (0/0/0)          0
  6 unassigned    wm       0               0         (0/0/0)          0
  7 unassigned    wm       0               0         (0/0/0)          0

partition>
```

5. Partition the disk by completing the following Steps a through e for all partitions as specified in the Disk partition values on page 111.

   a. At the `partition>` prompt, enter the partition number from the table. For example, for partition 0, enter **`0`**.

      The system prompts for the partition ID tag.

```
Enter partition id tag [unassigned]:
```

   b. Enter the partition ID tag from the table. For all partitions except 2, press **Enter** to accept the default of unassigned. Partition 2 is set to `backup`.

      The system prompts for permission flags.

```
Enter permission flags [wm]:
```

   c. Press **Enter** to accept the default (`wm`). That indicates that the partition is writable and mountable.

      The system prompts for the starting cylinder.

```
Enter new starting cyl [0]:
```

   d. Enter the number of the starting cylinder from the table. For example, for partition 0, enter **`0`**.

      The system prompts for the partition size.

```
Enter partition size [0b, 0c, 0mb]:
```

   e. Enter the partition size from the table. For example, for partition 0 on an 18-GB SCSI disk on R3V9, enter **`2gb`**.

      The `partition>` prompt is displayed.

6. When you have sized all of the partitions, enter:

   `print`

7. Compare the displayed partition table to the Disk partition values on page 111. If there are any discrepancies, correct them by repeating the disk partitioning.

8. When you determine that the disk partitioning is correct, enter:

   label

   Important:
   Do *not* forget to label the disk drive.

   The system prompts you to continue.

9. Enter: **y**

   The partition> prompt is displayed.

10. Enter: **q**

    The format> prompt is displayed.

11. Enter:

    format

    The following message is displayed:

```
Ready to format. Formatting cannot be interrupted
and takes XX minutes (estimated). Continue? (y or n)
```

12. Enter: **y**

    A message similar to the following is displayed:

```
Begin format. The current time is <timestamp>

Formatting...
done

Verifying media...
        pass 0 - pattern = 0xc6dec6de
   4923/26/7

        pass 1 - pattern = 0x6db6db6d
   4923/26/7

Total of 0 defective blocks repaired.
format>
```

13. If you added more than one disk drive, enter **disk**, and repeat Step 2 through Step 12 for each drive.
14. After you have partitioned each drive, enter: **q**
15. Continue with Administering data disk drives on page 121.

Administering data disk drives

After the data disk drives have been installed, partitioned, and formatted, you must administer the disk drives.

The procedures in this section include:

- Administering new data disks, R3V9 and later
- Administering replacement data disks, R3V9 and later
- Administering a new data disk, R3V8 and earlier on page 122
- Administering a replacement data disk, R3V8 and earlier on page 126

Administering new data disks, R3V9 and later

Administration of new disks in R3V9 and later has been automated using commands on the CMS Services menu.

To administer one or more new disks to a nonmirrored system, or to administer one or more pairs of disks to a mirrored system:

1. Enter:

   cmssvc

   The CMS Services menu is displayed.

   Note:

   If the following message is displayed, you must first turn on IDS before continuing with Step 2.

   ```
   cmssvc: Warning IDS off-line. It will take approx 30 seconds to start
   cmssvc. IDS can be turned on with the run_ids command on the cmssvc menu.
   ```

2. Enter the number that corresponds to the `disk_space` option.
3. Enter the number that corresponds to the `Add new disks` option.

   The disks to be added are displayed.

4. Enter the number that corresponds to the disks you want to add.

   The system administers the new disks, which may take several minutes depending on the number and size of the disks. The following message is displayed:

   ```
   added new disk cXtXd0
   disk_space command completed.
   ```

Note:

Depending on the size of the disks, the system may run slowly until all disks are synchronized.

Administering replacement data disks, R3V9 and later

If a data disk drives fails, you must follow the recovery procedures as outlined in "Recovering a non-mirrored system after data disk failure" in the Maintenance chapter of the software installation, maintenance, and troubleshooting document for your version of CMS.

Administering a new data disk, R3V8 and earlier

To administer a new data disk that you have added to the system:

1. Turn off CMS. It is important that CMS remain off while you perform this procedure.
2. Verify that the disk has been partitioned.
3. Enter:

   df -k /cms

   The percentage of total space that CMS is currently occupying is displayed, as in the following example:

```
# df -k /cms
Filesystem            kbytes    used   avail capacity  Mounted on
/dev/md/dsk/d19      6569538   670411 5899127     11%    /cms
#
```

   Note the capacity percentage (in this example, 11%). The capacity used by **/cms** will be smaller after a new disk is added.

4. Enter the following commands to set the path variables:

   PATH=$PATH:/usr/opt/SUNWmd/sbin:/olds

   export PATH

5. Check the disk partitioning by entering the following commands:

   olds -check_disks cxtydz

   where ***cxtydz*** is the device name of the disk that you added (for example, c0t1d0).

6. Create a new **md.tab** file by entering the following command:

   olds -metadbs

   Ignore any error messages about failures while activating new replicas.

7. Enter:

   olds -mk_files cxtydz

8. Enter:

   pg /olds/md.tab.new

   This verifies that all the disk drives on your system have been recognized.

   A message similar to the following example is displayed, which shows three disk drives on the system:

```
   .
   .
   .
#/cms
d19 3 1 /dev/dsk/c0t1d0s1 1 /dev/dsk/c0t3d0s3 1 /dev/dsk/c0t2d0s2
```

9. Depending on what is displayed, perform one of the following actions:

   - If the file shows the correct number of drives that are installed on the system, continue with Step 10.
   - If the file does not show the correct number of drives that are installed on the system, complete the following steps:

     i. Enter:

        /usr/sbin/shutdown -y -i0 -g0

        The system shuts down and displays the `ok` prompt.

     ii. Turn off the system.

     iii. Turn off the system monitor.

     iv. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.

     v. Check all disk drive connections to make sure that they are secure.

     vi. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.

     vii. Turn on the system monitor.

     viii. Turn on the system.

     ix. The system begins to boot. Interrupt the boot by pressing **Stop**+**A**.

        The `ok` prompt displays.

x. Enter the following commands:

```
setenv auto-boot? false
```

```
reset-all
```

The system reboots to the `ok` prompt.

xi. To verify that the system recognizes all the disk devices, including the newly installed ones, enter the following commands:

```
probe-scsi-all
```

```
reset-all
```

```
probe-ide
```

A message that shows the recognized disk drives is displayed. The devices that are listed depends on the number of disk drives that are installed in the system. Check to make certain that all of the disk drives are listed.

xii. Enter the following commands:

CAUTION:

If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

```
setenv auto-boot? true
```

```
boot -r
```

The system reboots and the login window is displayed.

xiii. Log in as root.

xiv. Enter the following commands to set the path variables:

```
PATH=$PATH:/usr/opt/SUNWmd/sbin:/olds
```

```
export PATH
```

10. Enter:

    olds -setup *cxtydz*

    This attaches the new disk and grow the **/cms** file system, where ***cxtydz*** is the device name of the disk that you added.

    A series of messages similar to the following are displayed that reflect the disk drive setup process. The system eventually reports success.

```
valid disks are <device>
    .
    .
super-block backups (for fsck -F ufs -o b=#) at:
32, 16240, 32448, 48656, 64864, 81072, 97280, 113488,
     .
     .
1854992, 1871200, 1887408, 1903616, 1919824, 1936032

re-adding swap files

Success, activating or growing /cms metadevice.
#
```

11. Enter:

    df -k /cms

    The percentage of total space that CMS is currently occupying is displayed, as in the following example:

```
# df -k /cms
Filesystem            kbytes    used   avail capacity  Mounted on
/dev/md/dsk/d19      15271904  670412 14601492     5%    /cms
#
```

    Compare the capacity figure now with what was displayed in Step 3. In this example, the capacity percentage went down from 11% to 5% because the system has more disk space. This shows that the new disk drive was indeed added successfully to the system.

12. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.
13. Turn on CMS when finished adding disks.

Administering a replacement data disk, R3V8 and earlier

To administer a new data disk drive that is a replacement for a defective data disk drive:

1. Verify that the disk has been partitioned.
2. Enter the following commands to set the path variables:

   PATH=$PATH:/usr/opt/SUNWmd/sbin:/olds

   export PATH
3. Enter:

   olds -check_disks

   This checks the disk partitioning.

   A message similar to the following is displayed:

```
disk:cot0d0 is partitioned ok
disk:cot1d0 is partitioned ok
disk:cot2d0 is partitioned ok
Warning: Current Disk has mounted partitions
disk:cot0d0 is partitioned ok
Success, checking disks
#
```

4. Enter:

   olds -mk_files

   The following message is displayed:

```
Success, creating md.tab.new and/or vfstab.new
#
```

5. Enter:

   olds -metadbs

   This sets up the metadevices. Ignore any error messages about failures while activating new replicas.

6. Enter:

   nohup olds -setup | tee

   This sets up the **/cms** metadevice.

   The following message is displayed:

```
     .  .  .
prtvtoc:  c0t6d0s0:  device busy
device:  c0t0d0 will not be used
valid disks are c0t0d0  c0t1d0  c0t2d0  c0t3d0
     .  .  .
super-block backups (for fsck -F ufs -o b=#) at:
32, 16240, 32448, 48656, 64864, 81072, 97280, 113488,
     .  .  .
10532656, 10548864, 10565072, 10580000, 10596208
ufs fsck: sanity check: /dev/md/rdsk/d19 okay
Success, activating or growing /cms metadevice
#
```

7. Enter:

   mount /cms

   This mounts the **/cms** file system.

8. Enter:

   df -k /cms

   The file system information for **/cms** is displayed. For example:

```
# df -k /cms
Filesystem            kbytes    used   avail capacity  Mounted on
/dev/md/dsk/d19      15271904  670412 14601492     5%    /cms
#
```

   The kbytes figure should be somewhat smaller than the total disk space on the entire system. In this example, the filesystem space is 15-GB for a system that has four 4.2-GB disk drives. This implies that the replacement disk drive has been successfully administered.

9. For an R3V6 or earlier system, install the swap file by entering:

   olds -addswapfile /cms

10. Enter:

    /usr/sbin/shutdown -y -i6 -g0

    The system reboots.

11. Continue with one of the following:
    - Restoring the /cms filesystem (R3V8) on page 128
    - Restoring the /cms filesystem (R3V6 and earlier) on page 129

Restoring the /cms filesystem (R3V8) – After administering the replacement disk, you must now restore the **/cms** filesystem. This procedure is for CMS R3V8.

To restore the **/cms** filesystem on the replacement disk drive:

1. Restore the most recent CMSADM backup by loading the backup tape into the tape drive and entering the following command on a single line at the command prompt:

   ```
   nohup cpio -icmudv -C 10240 -I /dev/rmt/<dev#> -M "Insert
     tape number %d" "cms" "cms/*" | tee
   ```

   The device number (***<dev#>***) is usually 0c, but could be 0, 1, or 1c.

   Note:

   You may get four error messages concerning the **/home** directory. These errors are displayed when the directory is already present, so you can ignore them.

2. You must run CMS setup to reinstall the data tables before you do a maintenance restore. Use the information you collected before you installed the replacement disk. See the software installation, maintenance, and troubleshooting document for CMS setup procedures.
3. Turn on CMS.
4. Restore any CMS maintenance backups you have that are dated *after* the latest CMSADM backup. See the CMS Administration document for more information.
5. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.

Restoring the /cms filesystem (R3V6 and earlier) – After administering the replacement disk, you must now restore the **/cms** filesystem. This procedure is for CMS R3V6 and earlier.

To restore the **/cms** filesystem on the replacement disk drive:

1. Enter:

   ```
   ulimit unlimited
   ```

2. Restore the most recent CMSADM backup by loading the backup tape into the tape drive and entering the following command on a single line at the command prompt:

   ```
   nohup cpio -icmudv -C 10240 -I /dev/rmt/<dev#> -M "Insert
     tape number %d" "/cms" "/cms/*" | tee
   ```

   The device number (***<dev#>***) is usually 0c, but could be 0, 1, or 1c.

   Note:

   You may get four error messages concerning the **/home** directory. These errors are displayed when the directory is already present, so you can ignore them.

3. Turn on CMS.

4. Restore any CMS maintenance backups you have that are dated *after* the latest CMSADM backup. See the CMS Administration document for more information.

5. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.

Replacing the CD-ROM drive

This section describes how to replace the internal CD-ROM drive.

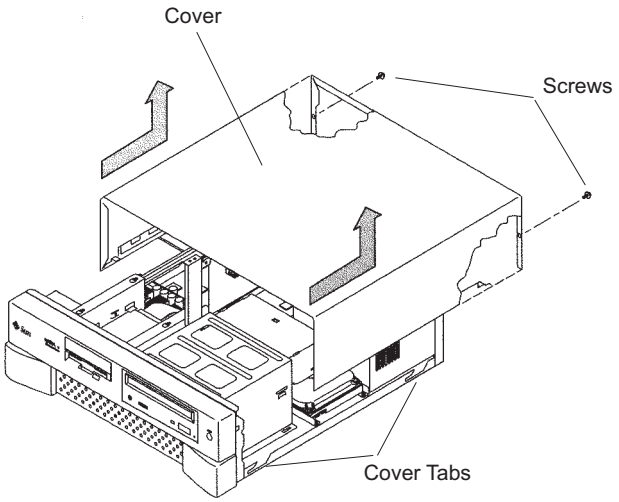
Opening the computer

To open the computer:

1. Remove any CD-ROM disk from the drive.
2. If you have not already done so, use the following command to shut down the computer:

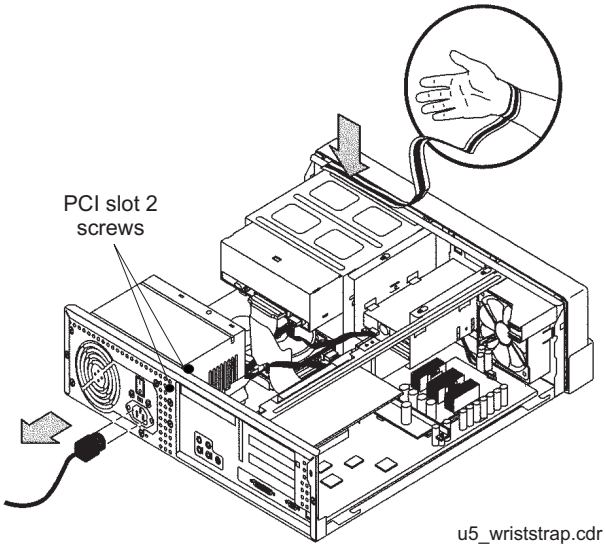
   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

3. Turn off the power to the computer.
4. Remove the two screws on the back of the unit that secure the cover to the chassis. See the following figure.



5. Slide the cover back 1 or 2 inches and lift it up away from the chassis.
6. Place the cover in a convenient location so that it does not interfere with your work.

7. Attach an antistatic wrist strap to the metal chassis of the computer and to your wrist. See the following figure.



8. Disconnect the AC power cord.

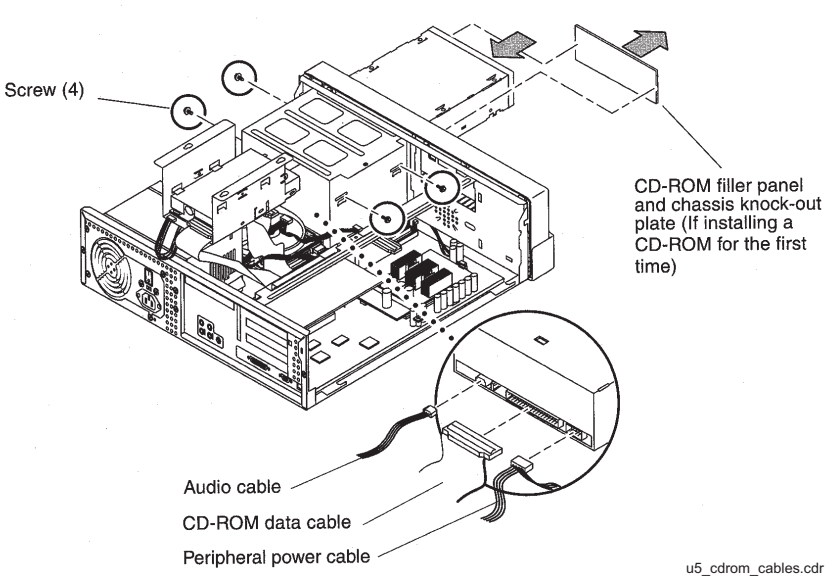
Important:

If the computer has a PCI card in slot position 2, you may want to remove that card during this procedure to make it easier to reach the components. To remove PCI card 2, you must first remove the PCI card 2 screw. On the Series 1 computers, this screw is on the back of the computer. On Series 2 and later computers, this screw is on the top of the frame above the PCI card.

Removing and replacing the CD-ROM drive

To remove and replace the CD-ROM drive:

1. Loosen, but do not remove the three screws that secure the diskette drive or hard drive mounting bracket to the top of the chassis frame. See the following figure.



2. Remove the drive bracket from the chassis by sliding it back and lifting it free of the three screws.
3. Set the drive bracket on top of the power supply.
4. Disconnect the following cables from the back of the CD-ROM drive:
   - Audio cable
   - CD-ROM data ribbon cable
   - Power cable.
5. Remove the four screws that hold the CD-ROM drive in the CD-ROM drive bracket.
6. Push the CD-ROM drive toward the chassis front and remove.
7. Place the CD-ROM drive on an antistatic mat.
8. On the new CD-ROM drive, verify that the jumper is set to the Master (MA) position.
9. Slide the new CD-ROM drive into the CD-ROM drive bracket.
10. Attach the CD-ROM drive to the CD-ROM drive bracket using the four screws that were removed earlier.

Tip:

Install each screw with just a few turns before you tighten all four screws.

11. Reconnect the following cables to the back of the CD-ROM drive:
    - Audio cable
    - CD-ROM data ribbon cable
    - Power cable.
12. Reinstall the diskette drive or hard drive that you moved earlier. Tighten the three screws that secure the drive bracket.

Closing the computer

To close the computer:

1. If you removed the PCI card from Slot 2 earlier, reinstall it now.
2. Reconnect the AC power cord to the computer.
3. Detach the ESD wrist strap.
4. Replace the cover on the computer. Slide the cover forward until it fits snugly around the chassis.
5. Replace the two cover screws.

Tip:

Install each screw with just a few turns before you tighten both screws.

Turning on the system

To turn on the system:

1. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
2. Turn on the system monitor.
3. Turn on the system.
4. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
5. Enter the following commands:

   ```
   setenv auto-boot? false
   ```

   ```
   reset-all
   ```

   This resets the system.
6. Enter:

   ```
   probe-ide
   ```

   This checks to see that the system recognizes the new CD-ROM drive. If the new CD-ROM is not listed, make sure there is a secure connection between the motherboard and the CD-ROM drive.
7. Reboot the system by entering the following commands:

   CAUTION:

   If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

   ```
   setenv auto-boot? true
   ```

   ```
   boot
   ```

   The system reboots.

Maintaining tape drives

Overview

Procedures in this section include the following:

- Required references on page 135
- Ordering tapes on page 135
- Cleaning the tape drive
- Adding, removing, or replacing tape drives on page 138

Required references

The following references are required when doing procedures in this section:

- *Sun StorEdge™ DDS4 Tape Drive Installation and Users Guide*
- *Sun 4.0 Gbyte 1/4-Inch Tape Drive Specifications (SLR5)*
- *14 Gbyte 8mm Tape Drive Users Guide and Installation Manual*

Ordering tapes

Use the following information to order replacement tapes:

Description	Tape drive	OEM
DDS4 20/40-GB, 4mm	DDS4	Imation
DDS4 cleaning cartridge	DDS4	Imation
SLR5, 4/8-GB QIC	SLR5	Imation or Sony
SLR5 cleaning cartridge	SLR5	Imation
14-GB, 8mm	DX, XL, XS 8mm	Exabyte
8mm cleaning cartridge	DX, XL, XS 8mm	Exabyte

Cleaning the tape drive

This section describes how you clean the following tape drives:

- DDS4, 4-millimeter, 20/40-GB
- SLR5, QIC, 4/8-GB
- XL/XS/DX 8-millimeter, 7/14-GB

The LEDs on the tape drives will indicate when the tape drives need cleaning. See Tape drive LED status patterns on page 174.

DDS4 tape drive

The DDS4 tape drive uses a dry cleaning cartridge. Each cartridge is good for about 50 cleaning cycles. Regular cleaning is recommended to maximize tape drive performance. The cleaning schedule depends on the number of DDS tape cartridges used each day for backups. Use the following table to determine a cleaning schedule.

Number of cartridges used each day	Cleaning interval
1 or less	8 weeks
2	4 weeks
3	3 weeks
4 or more	Weekly

In addition, if the Clean LED flashes, either the tape drive heads need cleaning, or the backup tape needs replacing.

To clean the tape drive:

1. Load the cleaning cartridge into the tape drive.

   The cleaning cycle begins automatically, and the Tape LED flashes. When the cleaning cycle is complete, the cleaning cartridge is ejected automatically.

2. The first time you use the cleaning cartridge, record the date on the cleaning cartridge. Each time you clean the tape drive, mark an X in the box. After all boxes are filled, replace the cleaning cartridge.

3. Return the cleaning cartridge to the plastic protection box.

If the Clean LED continues to flash, repeat the cleaning procedure using a different cleaning cartridge. If the Clean LED is still flashing, repeat the backup operation with a

different tape. If this clears the signal, the first backup tape is nearing the end of its life. Discard the old tape.

SLR5 tape drive

The SLR5 tape drive uses a dry cleaning cartridge. Each cartridge is good for about 50 cleaning cycles. Regular cleaning (weekly or daily) is recommended to maximize tape drive performance. Minimally, the tape drive should be cleaned after 8 hours of tape movement.

To clean the tape drive:

1. Load the cleaning cartridge into the tape drive.

   The cleaning cycle begins automatically, and the LED on the tape drive will flash green. If the LED immediately lights steady green, use a new cleaning cartridge. If the LED flashes red, remove the cleaning tape and reinsert it.

2. Remove the cleaning tape when the LED lights steady green.
3. The first time you use the cleaning cartridge, record the date on the cleaning cartridge. Each time you clean the tape drive, mark an X in the box. After all boxes are filled, replace the cleaning cartridge.
4. Return the cleaning cartridge to the plastic protection box.

XL/XS/DX tape drive

The XL/XS/DX 8mm tape drive uses a dry cleaning cartridge. Each cartridge is good for about 20 cleaning cycles. Regular cleaning (weekly or daily) is recommended to maximize tape drive performance. Minimally, the tape drive should be cleaned after 30 hours of tape movement.

In addition, when 30 tape motion hours elapse, the top amber LED will light if the tape drive heads need cleaning.

To clean the tape drive:

1. Load the cleaning cartridge into the tape drive.

   The cleaning cycle begins automatically. The top LED flashes rapidly and turns off, and the bottom LED flashes slowly. When the cleaning cycle is complete, the cleaning cartridge is ejected automatically.

2. The first time you use the cleaning cartridge, record the date on the cleaning cartridge. Each time you clean the tape drive, mark an X in the box. After all boxes are filled, replace the cleaning cartridge.
3. Verify that the top amber LED turns off after the cleaning.
4. Return the cleaning cartridge to the plastic protection box.

Adding, removing, or replacing tape drives

This section describes how to add, remove, or replace an external tape drive on an existing system.

Note:

External tape drives are pre-installed and required at all times. Adding a second tape drive is usually only a temporary measure during the migration process.

Adding or replacing a tape drive

When adding a newer model tape drive to a system, you may have to edit the **`/kernel/drv/st.conf`** file to add information about the new tape drive. If editing the file is required, you will receive a Design Change Letter (DCL) instructing you how to change the file.

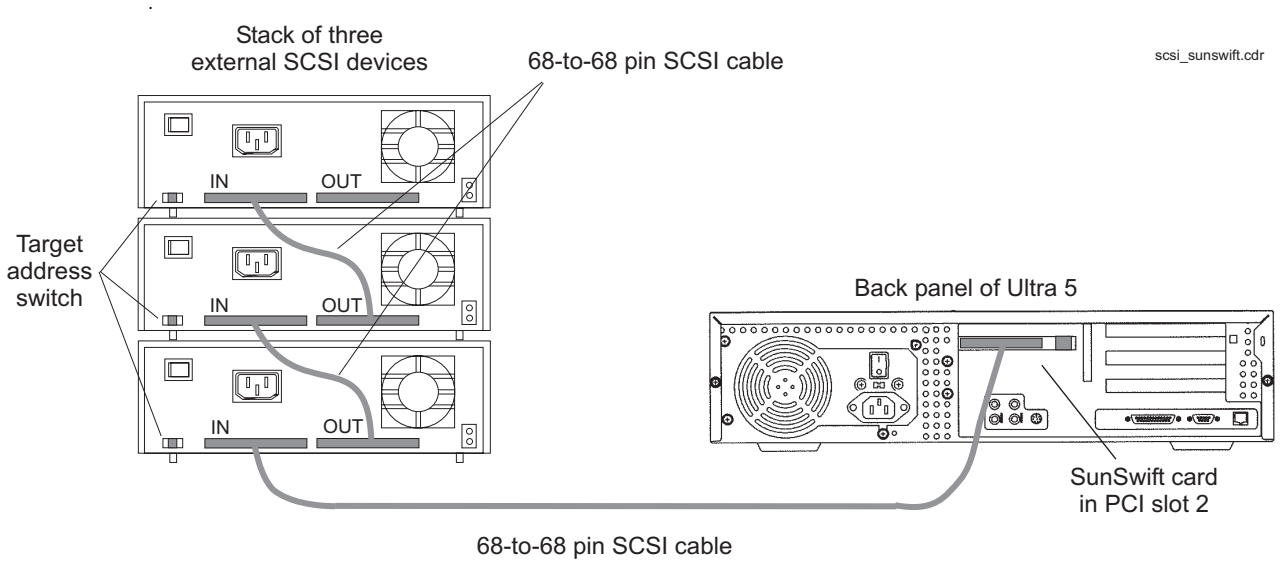
To add or replace a tape drive:

1. Remove any tapes from the tape drive.
2. Log in to the system as root.
3. Enter:

   `/usr/sbin/shutdown -y -i0 -g0`

   This shuts down the system.
4. Turn off the system.
5. Turn off the system monitor.
6. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.
7. If replacing a defective tape drive, disconnect the SCSI cables and AC power cable.
8. Connect the tape drive to the other SCSI devices. See SunSwift connections on page 139 or UltraSCSI connections on page 141.

SunSwift connections – The following figure shows how to connect UniPack SCSI disk drives and tape drives to a SunSwift card. A 68-to-68-pin SCSI cable connects from the SunSwift PCI card on the back of the computer to the IN connector on the back of the SCSI device that is closest to the computer. If you have more than one SunSwift card, connect the drives to the card in the lowest slot number. A 68-to-68 pin SCSI cable connects from the OUT connector of that device to the IN connector of the next device. Continue this process until all assigned devices are connected in the SCSI chain.

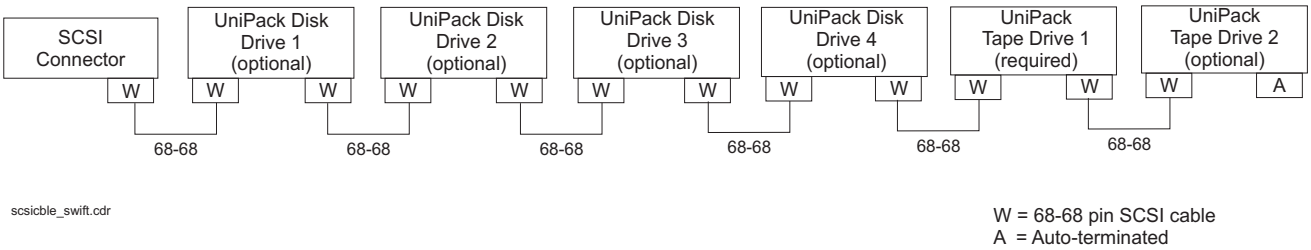


When connecting SCSI devices, the last device in the chain MUST be terminated, either via an auto-terminated device or with a manual terminator.

When using an auto-terminated SCSI device, you do not need to connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. To verify that the last device is auto-terminated, check the LEDs labeled Auto Term High and Auto Term Low on the back panel of the device. In a CMS configuration, both LEDs are lit on the last device in the SCSI chain. If a device in the SCSI chain is not the last device, neither termination LED is lit.

When using a manually-terminated device, you must connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. When you connect the SCSI terminator to the OUT connector, the LED on the terminator is lit.

The following figure shows the SCSI cabling for a SunSwift card.

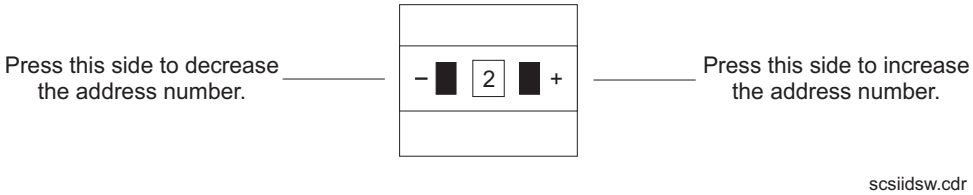


SCSI devices are addressed as shown in the following table.

Device	Address
Disk drive 1	0
Disk drive 2	1
Disk drive 3	2
Disk drive 4	3
Tape drive 1	4
Tape drive 2	5

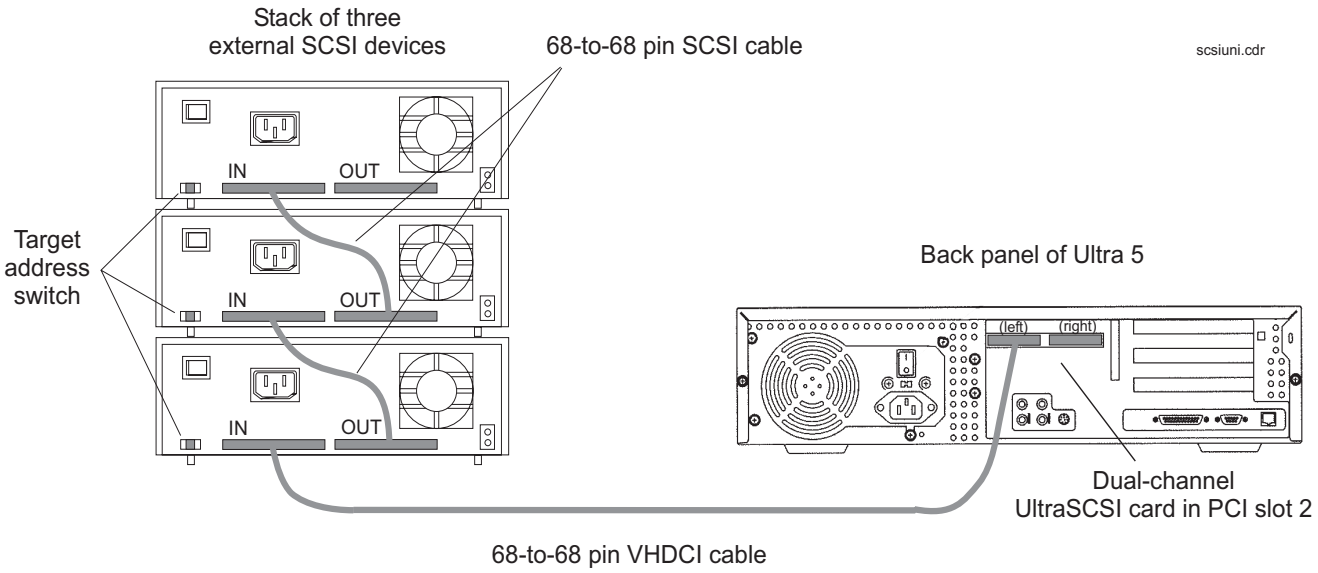
Important:
Do not use a target address greater than 5.

These addresses are set using the target address switches on the back of each SCSI device. Before setting the target address, make sure that the power is off on the SCSI devices.



Continue with Turning on the system on page 144.

UltraSCSI connections – The following figure shows how to connect UniPack SCSI disk drives and tape drives to an UltraSCSI card. A 68-to-68-pin VHDCI SCSI cable connects from the UltraSCSI PCI card on the back of the computer to the IN connector on the back of the SCSI device that is closest to the computer. A 68-to-68 pin SCSI cable connects from the OUT connector of that device to the IN connector of the next device. Continue this process until all assigned devices are connected in the SCSI chain.

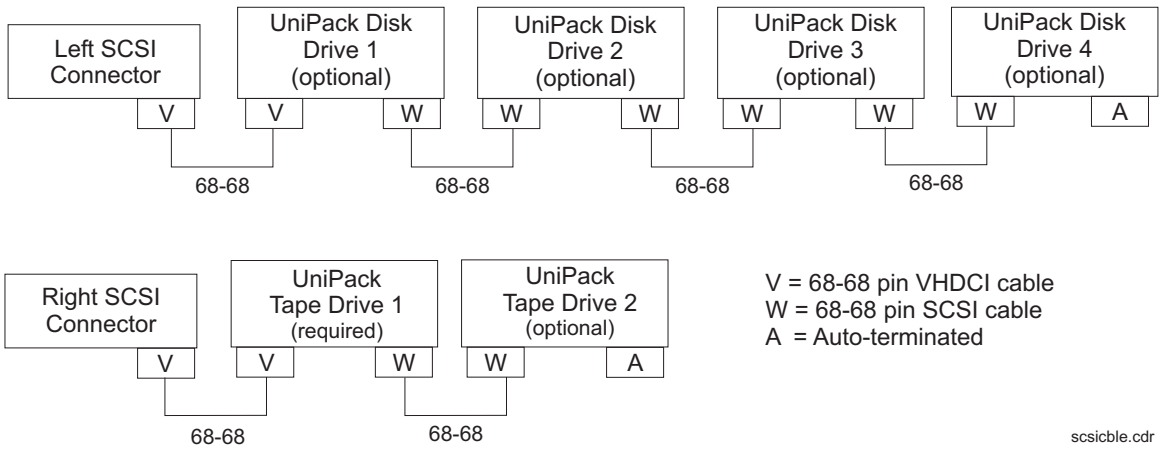


When connecting SCSI devices, the last device in the chain MUST be terminated, either via an auto-terminated device or with a manual terminator.

When using an auto-terminated SCSI device, you do not need to connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. To verify that the last device is auto-terminated, check the LEDs labeled Auto Term High and Auto Term Low on the back panel of the device. In a CMS configuration, both LEDs are lit on the last device in the SCSI chain. If a device in the SCSI chain is not the last device, neither termination LED is lit.

When using a manually-terminated device, you must connect a SCSI terminator to the OUT connector of the last SCSI device in the chain. When you connect the SCSI terminator to the OUT connector, the LED on the terminator is lit.

The following figure shows the SCSI cabling schemes that are possible with an UltraSCSI card that is installed in slot 2 of an Ultra 5 computer.



Note:

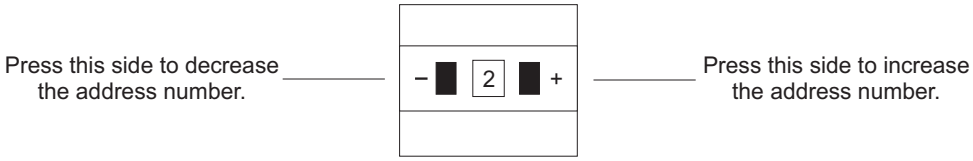
The “Left/Right” designations shown above are based on the UltraSCSI card being installed in slot 2. If the UltraSCSI card is installed in slots 1 or 3, connect the disk drives to the right connector and the tape drives to the left connector.

SCSI devices are addressed as shown in the following table.

Device	Address
Disk drive 1	0
Disk drive 2	1
Disk drive 3	2
Disk drive 4	3
Tape drive 1	4
Tape drive 2	5

Important:
Do not use a target address greater than 5.

These addresses are set using the target address switches on the back of each SCSI device. Before setting the target address, make sure that the power is off on the SCSI devices.



scsiidsw.cdr

Continue with Turning on the system on page 144.

Turning on the system – To turn the system on:

1. Connect the power cord from the tape drive to a power source.
2. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
3. Turn on the system monitor.
4. Turn on the system.
5. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
6. Enter the following commands:

   ```
   setenv auto-boot? false
   ```

   ```
   reset-all
   ```

   This resets the system.
7. Enter:

   ```
   probe-scsi-all
   ```

   This checks to see that the system recognizes the new tape drive. The resulting display should list the new drive as Target 4 or Target 5. If the new drive is not listed, check for a secure connection between the SCSI port and the new drive.
8. Reboot the system by entering the following commands:

   CAUTION:

   If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

   ```
   setenv auto-boot? true
   ```

   ```
   boot -r
   ```

   The system reboots.
9. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.

Removing a tape drive

To remove a tape drive:

1. Log in to the system as root.
2. Enter the following commands:

   cd /dev/rmt

   pwd

   The **pwd** command verifies that you are in the **/dev/rmt** directory.
3. Enter:

   rm *

   This removes SCSI tape drive device files. If you do not remove the tape drive device files before rebooting the system, the SCSI tape drive device files may not match the hardware configuration.
4. Enter:

   /usr/sbin/shutdown -y -i0 -g0

   This shuts down the system.
5. Turn off the system.
6. Turn off the system monitor.
7. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.
8. Disconnect the tape drive from the SCSI port or SCSI chain.
9. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
10. Turn on the system monitor.
11. Turn on the system.
12. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
13. Enter the following commands:

    setenv auto-boot? false

    reset-all

    This resets the system.
14. Enter:

    probe-scsi-all

    This displays the current SCSI devices. The removed tape drive should not be listed.

15. Reboot the system by entering the following commands:

    CAUTION:

    If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

    ```
    setenv auto-boot? true
    ```

    ```
    boot -r
    ```

    The system reboots.

16. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.

Adding memory and replacing the CPU

Overview

The Ultra 5 comes equipped with one bank of dual inline memory modules (DIMMs) (256 MB) installed. If you need to install additional DIMMs, they must be installed in full banks (pairs).

The computer comes equipped with one CPU. If the CPU fails, it should be replaced by a qualified Sun technician. Contact your Avaya representative for more information.

Installing memory

This section describes the procedures used to add more memory to an Ultra 5 system that is currently in operation.

WARNING:
You must wear an ESD wrist strap when installing or removing hardware components to prevent electrical discharge that can damage the system.

Checking the current memory size

To check the current memory size:

1. Enter:

   `prtconf | grep Memory`

   This displays the current memory size.

   ```
   Memory size: xxx Megabytes
   ```

2. Record the current memory size.

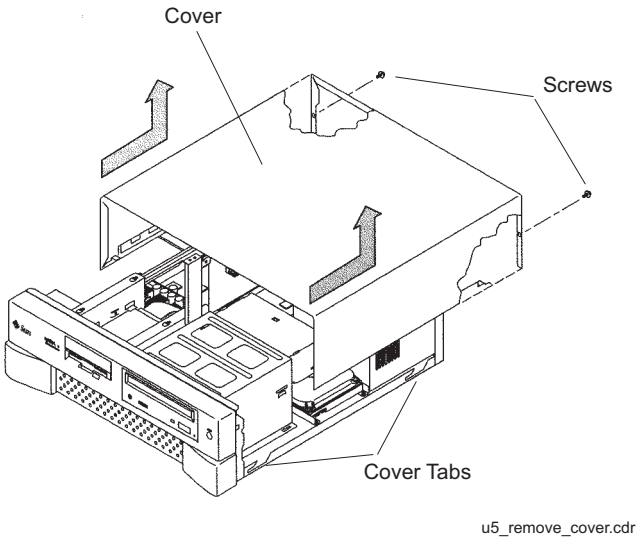
Opening the computer

To open the computer:

1. If you have not already done so, use the following command to shut down the computer:

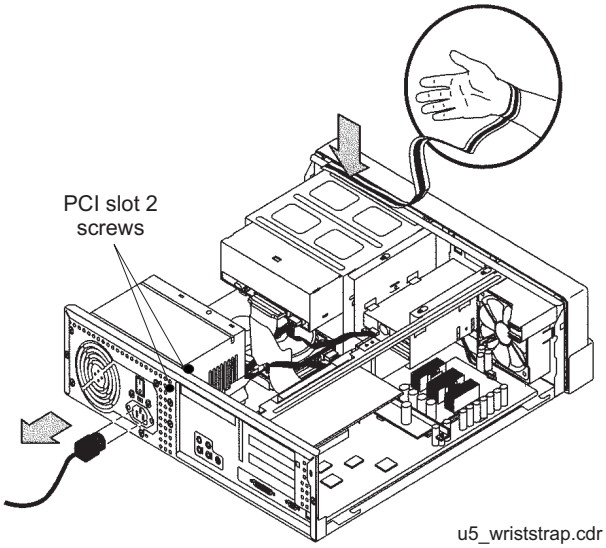
   `/usr/sbin/shutdown -y -i0 -g0`

2. Turn off the system.
3. Turn off the system monitor.
4. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.
5. Remove the two screws on the back of the unit that secure the cover to the chassis. See the following figure.



6. Slide the cover back 1 or 2 inches and lift it up away from the chassis.
7. Place the cover in a convenient location so that it does not interfere with your work.

8. Attach an antistatic wrist strap to the metal chassis of the computer and to your wrist. See the following figure.



9. Disconnect the AC power cord.

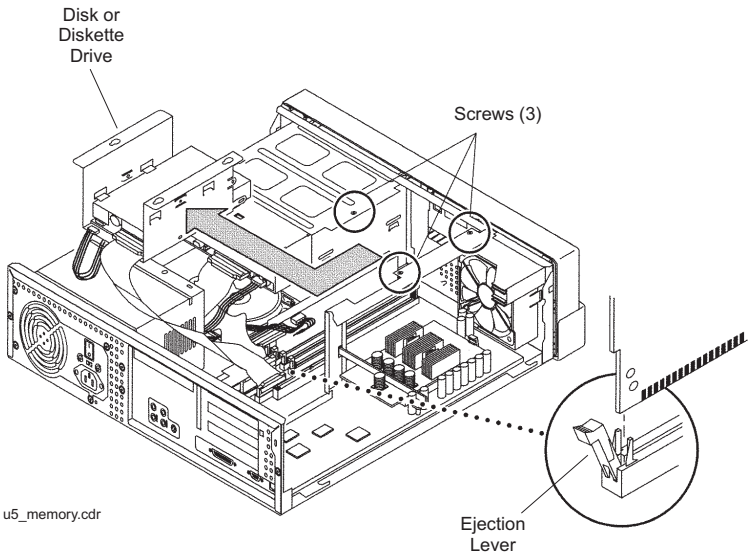
Important:

If the computer has a PCI card in slot position 2, you may want to remove that card during this procedure to make it easier to reach the components. To remove PCI card 2, you must first remove the PCI card 2 screw. On the Series 1 computers, this screw is on the back of the computer. On Series 2 and later computers, this screw is on the top of the frame above the PCI card.

Adding the DIMMs

To add the DIMMs:

1. Loosen the three screws that hold the diskette or second hard disk drive bracket and move the disk drive out of the way. See the following figure.



   The computer must have at least two identical DIMMs installed in paired sockets of any DIMM bank. For best system performance, install four identical DIMMs. Install the DIMMs as shown in the table below.

DIMM bank	Slot pairs
0	DIMM1 and DIMM2
1	DIMM3 and DIMM4

2. Remove the DIMM from the antistatic container.
3. Starting with the first empty slot, unlock (press down) the ejector levers at both ends of the connectors.
4. Position the DIMM in the connector, ensuring that the notches on the bottom of the DIMM are aligned with the connector alignment keys.
5. Press firmly on both of the top ends of the DIMM at the same time until the DIMM is properly seated.
6. Verify that the ejection levers are closed toward the DIMM.

7. Repeat this procedure for each DIMM.
8. Replace the diskette/disk drive bracket and tighten the screws that hold the bracket.

Closing the computer

To close the computer:

1. If you removed the PCI card from Slot 2 earlier, reinstall it now.
2. Reconnect the AC power cord to the computer.
3. Detach the ESD wrist strap.
4. Replace the cover on the computer. Slide the cover forward until it fits snugly around the chassis.
5. Replace the two cover screws.

   Tip:

   Install each screw with just a few turns before you tighten both screws.

Checking the new memory size

To check the new memory size:

1. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
2. Turn on the system monitor.
3. Turn on the system.
4. When the system comes up, log in as root.
5. Enter:

   prtconf | grep Memory

   This displays the new memory size.

   ```
   Memory size: xxx Megabytes
   ```

6. Verify that the displayed memory size is correct, comparing it to the value recorded before you added the new memory. If the new figure is not correct, power down the system and check that all memory modules are properly seated.

Adding swap space (R3V6 or earlier only)

After adding memory to a system that is running CMS R3V6 or earlier, the system must be administered to allow the swap function to use the additional memory.

To add swap space:

1. Enter:

   ```
   swap -a /cms/swap
   ```

2. Enter:

   ```
   swap -l
   ```

Troubleshooting

Overview

This chapter describes the following troubleshooting procedures:

References

See the *Sun Ultra 5 Service Manual* for additional troubleshooting procedures.

Using the remote console

Overview

If your system does not boot, or the system cannot be diagnosed locally, remote support personnel might want to redirect control of the console port from the local console to a dialed-in remote console. Redirecting the console allows support personnel to do remote maintenance as if they were at the local console. You can redirect the console using *either*:

- The Solaris operating system
- OpenBoot diagnostics

This section consists of the following procedures:

- Redirecting the console using Solaris on page 154. Use this procedure when the system will boot up to the Solaris operating system.
- Redirecting the console using OpenBoot mode on page 157. Use this procedure when the system will not boot up to the Solaris operating system.

Redirecting the console using Solaris

This procedure describes how to use the Solaris operating system to redirect the local console to serial port B. This procedure is usually done from the remote console that has dialed in to the system. Should you encounter any problems setting up the remote console, see Remote console port problems on page 186.

CAUTION:

Use this procedure only when absolutely necessary. If the console redirects and the modem line drops, you may not be able to get back into the system.

Redirecting the local console to the remote console

To redirect control of the console port from the local console to a dialed-in remote console:

1. Dial in from the remote console to the remote console modem, and log in as root.

2. At the remote console, enter:

   /cms/install/bin/abcadm -r ttyb

   The following message is displayed at the remote console:

```
ttyb is currently set to be incoming
Are you sure you want to change it? [y,n,?]
```

3. At the remote console, enter: **y**

   The following message is displayed at the remote console:

```
ttyb administration removed
```

4. At the remote console, enter:

   /cms/install/bin/abcadm -c -b 9600 ttyb

   The following message is displayed at the remote console:

```
This change requires a reboot to take affect
Are you ready to reboot? [y,n,?]
```

5. At the remote console, enter: **y**

   The following message is displayed at the remote console:

```
done
desktop auto-start disabled
Proceeding to reboot.
```

   The following occurs:

   - The system begins to shut down.
   - Shutdown, reset, and reboot messages are displayed on the local console.
   - When the system starts to come back up, the local console goes blank.
   - The system boot diagnostics are displayed on the remote console.
   - After the system reboots, a `console login:` prompt is displayed on the remote console.

6. Log in to the remote console as root.

   CAUTION:

   Do not enter **Ctrl+D** from the remote console to exit the system without first redirecting control back to the local console. If you do, you may lock yourself from using the console locally or remotely.

Redirecting the remote console back to the local console

To redirect control of the console port from the remote console back to the local console:

1. At the remote console, enter:

   /cms/install/bin/abcadm -c local

   The following message is displayed at the remote console:

   ```
   Console set to local

   This change requires a reboot to take affect

   Are you ready to reboot? [y,n,?]
   ```

2. At the remote console, enter: **y**

   The following occurs:

   - The system begins to shut down.
   - Shutdown, reset, and reboot messages are displayed on the remote console.
   - When the system starts to come back up, the system boot diagnostics are displayed on the local console.
   - After the system reboots, the `console login:` prompt is displayed on the remote console.
   - The login screen is displayed on the local console.

3. Log in to the local console as root.
4. Log in to the remote console as root.

   Control of the console port is redirected from the remote console back to the local console.

Redirecting the console using OpenBoot mode

This procedure describes how to use the OpenBoot mode to redirect the local console to serial port A. Use the OpenBoot mode to redirect the remote console port when the Solaris method does not work. This typically occurs when the system will not boot.

Redirecting the local console to the remote console

To redirect control of the console port from the local console to a dialed-in remote console:

1. If the system is not already at the `ok` prompt, enter:

   `/usr/sbin/shutdown -y -i0 -g0`

   The system shuts down to the `ok` prompt.

   CAUTION:

   If the shutdown command fails, press **Stop**+**A** simultaneously after the console banner is displayed, but before the operating system starts booting.

2. At the local console, enter the following commands to set the remote console configuration parameters:

   `setenv input-device ttyb`

   `setenv output-device ttyb`

   `setenv ttyb-rts-dtr-off true`

   `setenv ttyb-ignore-cd true`

   `setenv ttyb-mode 9600,8,n,1,-`

3. To verify the parameter changes, enter:

   `printenv`

   The following message is displayed:

```
Parameter Name        Value          Default Value
output-device         ttyb           screen
input-device          ttyb           keyboard
   .
   .
   .
```

4. If not already dialed in, dial in to the system from the remote console.
5. Log in to the system as root.

6. At the local console, enter:

   boot

   The following occurs:

   - The system begins to shut down.
   - Shutdown, reset, and reboot messages are displayed on the local console.
   - When the system starts to come back up, the local console goes blank.
   - The system boot diagnostics are displayed on the remote console.
   - After the system reboots, a `console login:` prompt is displayed on the remote console.

7. Log in to the remote console as root.

   CAUTION:

   Do not enter **Ctrl+D** from the remote console to exit the system without first redirecting control back to the local console. If you do, you may lock yourself from using the console locally or remotely.

Redirecting the remote console back to the local console

Using OpenBoot mode, there are two ways to redirect control of the console port from the remote console back to the local console:

- From the remote console (recommended)
- From the local site (not recommended)

Method 1: from the remote console – To redirect control of the console port from the remote console back to the local console:

1. Do one of the following:
   - At the remote console, if the system is in UNIX, enter the following commands:

     ```
     eeprom output-device=screen
     eeprom input-device=keyboard
     eeprom ttyb-rts-dtr-off=true
     eeprom ttyb-ignore-cd=false
     /usr/sbin/shutdown -y -i6 -g0
     ```

   - At the remote console, if the system is in OpenBoot mode, enter the following commands:

     ```
     setenv output-device screen
     setenv input-device keyboard
     setenv ttyb-rts-dtr-off true
     setenv ttyb-ignore-cd false
     reset
     ```

     The following occurs:

     - The system begins to shut down.
     - Shutdown, reset, and reboot messages are displayed on the remote console.
     - When the system starts to come back up, the system boot diagnostics are displayed on the local console.
     - The login screen is displayed on the local console.
2. At the remote console, hang up the modem connection.
3. Log in to the system as root at the local console.
4. To see what is on the ttyb port, enter:

   ```
   /cms/install/bin/abcadm -k
   ```

5. To start a port monitor on ttyb, enter:

   ```
   /cms/install/bin/abcadm -i -b 9600 ttyb
   ```

Method 2: from the local site – The onsite technician will use this procedure from the local site**.** Use this method only when Method 1 will not work.

CAUTION:

This method of redirecting the console port should only be done as a last resort. This procedure resets the NVRAM defaults to the Sun factory settings.

To redirect control of the console port from the remote console back to the local console:

1. Turn the power off and back on for the CMS computer.
2. As the computer begins to boot up, press **Stop**+**N** simultaneously. Continue to press **Stop**+**N** until a prompt displays on the local console.
3. At the `ok` prompt, enter:

   boot
4. When the system boots up, log in to the system as root at the local console.
5. To see what is on the ttyb port, enter:

   /cms/install/bin/abcadm -k
6. To start a port monitor on ttyb, enter:

   /cms/install/bin/abcadm -i -b 9600 ttyb

   The following message is displayed:

```
ttyb set to incoming port 9600 baud
```

Tools

There are several tools available to help diagnose hardware problems:

Using the prtdiag command

The **prtdiag** command displays system diagnostic information.

To display this diagnostic information, enter:

/usr/platform/`uname -m`/sbin/prtdiag -v | pg

The following is an example of the results for an Ultra 5 computer.

```
System Configuration:  Sun Microsystems  sun4u Sun Ultra 5/10 UPA/PCI
(UltraSPARC-IIi 360MHz)
System clock frequency: 90 MHz
Memory size: 320 Megabytes

========================= CPUs =========================

                    Run   Ecache   CPU    CPU
Brd  CPU   Module   MHz     MB    Impl.   Mask
---  ---  -------  -----  ------  ------  ----
 0     0     0      360     0.2   12       9.1


========================= IO Cards =====================

     Bus#  Freq
Brd  Type  MHz   Slot  Name                      Model
---  ----  ----  ----  ----------------------    ---------
 0   PCI-1  33     1   ebus
 0   PCI-1  33     1   network-SUNW,hme
 0   PCI-1  33     2   SUNW,m64B                  ATY,GT-C
 0   PCI-1  33     3   ide-pci1095,646
 0   PCI-2  33     1   scsi-glm                   Symbios,53C875
 0   PCI-2  33     1   scsi-glm                   Symbios,53C875
 0   PCI-2  33     2   token-ring-pci10b6,7
 0   PCI-2  33     3   pci1214,334-pci1214,334

No failures found in System
===========================

========================= HW Revisions =========================

ASIC Revisions:
---------------
Cheerio: ebus Rev 1

System PROM revisions:
----------------------
  OBP 3.19.4 1999/04/28 15:05   POST 3.0.7 1999/04/28 14:24
#
```

System messages

System messages can alert you to system problems, such as a device that is about to fail. By default, many of the messages are displayed on the system console and are stored in **/var/adm**.

You can display system messages with the **dmesg** command. Here are some factors to keep in mind:

- A list of the most recent messages is displayed.
- The **/var/adm** directory contains several message files. The most recent messages are in **/var/adm/messages** and in **/var/adm/messages.0**. The oldest are in **/var/adm/messages.3**.
- Periodically, a new file is created, and the **/var/adm/messages.3** file is deleted, **/var/adm/messages.2** is renamed **/var/adm/messages.3**, **/var/adm/messages.1** is renamed **/var/adm/messages.2**, and **/var/adm/messages.0** is renamed **/var/adm/messages.1**.

The message files may contain not only system messages, but also core dumps and other data, which can cause **/var/adm** to grow quite large. To keep the directory to a reasonable size and ensure that future core dumps can be saved, you should remove unneeded files periodically. You can automate the task by using **crontab**. See your Sun system documentation for information on **crontab**.

OpenBoot PROM firmware tests

The OpenBoot PROM (OBP) On-Board firmware performs a routine set of firmware and hardware tests.

Note:

Different versions of Solaris have different versions of the OpenBoot commands. Not all commands are available with every version.

Using the OpenBoot PROM tests

To use the OpenBoot PROM tests:

1. From the root login, turn off CMS.
2. Enter:

   `/usr/sbin/shutdown -y -i0 -g0`

   The system shuts down.
3. At the `ok` prompt, enter the following commands:

   `setenv auto-boot? false`

   `reset-all`

   The system resets and displays the `ok` prompt.
4. Use the commands that are shown in Test descriptions on page 165.
5. When you finish testing, enter the following commands:

   CAUTION:

   If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

   `setenv auto-boot? true`

   `boot -r`

   The system reboots.

Test descriptions

The following table lists some of the OpenBoot PROM On-Board firmware test commands. Note that some commands give responses for the tests. Other tests just display the `ok` prompt when the test passes.

<table>
<tr><th>Command</th><th colspan="2">Description</th></tr>
<tr><td>probe-ide-all</td><td colspan="2">This command identifies the devices attached to the IDE bus.</td></tr>
<tr><td>probe-scsi-all</td><td colspan="2">This command identifies the devices attached to the SCSI bus.</td></tr>
<tr><td>probe-fcal-all</td><td colspan="2">This command identifies the devices attached to the FC-AL bus.</td></tr>
<tr><td>test-all</td><td colspan="2">This command runs a series of tests on the network and on hardware components. It may take several minutes to complete.</td></tr>
<tr><td rowspan="9">test [alias]</td><td colspan="2">This command executes the specified device self-test method. Possible values for device-specifier are listed in the Alias column:</td></tr>
<tr><td>Alias</td><td>Description</td></tr>
<tr><td>memory</td><td>memory</td></tr>
<tr><td>cdrom</td><td>cdrom</td></tr>
<tr><td>tape0-1</td><td>tape drives</td></tr>
<tr><td>disk0-5</td><td>SCSI drives</td></tr>
<tr><td>floppy</td><td>floppy</td></tr>
<tr><td>screen</td><td>video</td></tr>
<tr><td>keyboard</td><td>keyboard</td></tr>
<tr><td>watch-clock</td><td colspan="2">This command tests the clock function.</td></tr>
<tr><td>watch-net
watch-net-all</td><td colspan="2">This command runs a loopback test, a transceiver test, and a packet transmission test.</td></tr>
</table>

Additional references – See the *Sun OpenBoot 3.x Command Reference Manual* for more information.

Probing IDE devices

Symptom – The internal IDE disk drives are reporting errors.

Solution – Check the status of the IDE disk drives.

1. Enter:

   /usr/sbin/shutdown -y -i0 -g0

   This shuts down the system.

2. At the ok prompt, enter the following commands:

   setenv auto-boot? false

   reset-all

   The system resets and the ok prompt displays.

3. Enter:

   probe-ide

   The program responds similar to the following:

```
Device 0  ( Primary Master )
        ATA Model: ST34342A

Device 1  ( Primary Slave )
       Not present

Device 2  ( Secondary Master )
       Removeable ATAPI Model: CRD-8240B

Device 3  ( Secondary Slave )
       Removeable ATAPI Model:
```

   Note:

   The actual response (devices listed) depends on the devices installed on the IDE controller. This example shows the primary internal disk drive, the CD-ROM drive, and the diskette drive.

4. If there are disk drives other than what was shown in the display, shut down the system and check the disk drive cabling.

5. When finished with testing, enter the following commands:

CAUTION:

If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

```
setenv auto-boot? true
```

```
boot -r
```

The system reboots.

Probing SCSI devices

Symptom – The SCSI tape, CD-ROM, or external disk drives are reporting errors.

Solution – To check the status of the SCSI devices:

1. Enter:

   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

   This shuts down the system.

2. At the `ok` prompt, enter the following commands:

   ```
   setenv auto-boot? false
   ```

   ```
   reset-all
   ```

   The system resets.

3. Enter:

   ```
   probe-scsi-all
   ```

   The program displays a message that is similar to the following:

```
/pci@1f,0/pci@1/pci@1/SUNW,isptwo@4
Target 0
  Unit 0  Disk      QUANTUM VK4550J SUN4.2G8610
Target 4
  Unit 0  Removeable Tape     HP     C5683A     C911
```

Note:

The actual response (devices listed) depends on the devices installed on the SCSI bus. This example shows an external 4.2-GB disk drive and an external DDS4 tape drive.

4. If there are drives other than what was shown in the display, shut down the system and check the drive cabling.
5. When finished with testing, enter the following commands:

CAUTION:

If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

```
setenv auto-boot? true
```

```
boot -r
```

The system reboots.

Symptom – The SCSI tape, CD-ROM, or external disk drives are reporting errors.

Solution – The system might have duplicate SCSI target addresses on one bus.

Note:

Two targets may have the same target number if they are on different SCSI busses.

To check for duplicate SCSI target addresses:

1. Unplug all but one of the disks.
2. Enter:

   ```
   probe-scsi-all
   ```

   Record the target number and its corresponding unit number.
3. Plug in another disk, and perform Step 2 again.
4. If you get an error, change the target number of this disk to one of the unused target numbers.
5. Repeat Steps 2 through 4 until all the disks are plugged back in.
6. When you finish testing, enter the following commands:

   CAUTION:

   If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

   ```
   setenv auto-boot? true
   ```

   ```
   boot -r
   ```

   The system reboots.

OpenBoot diagnostic tests

OpenBoot Diagnostics (OBDiag) is a menu-driven tool that diagnoses system hardware. OBDiag performs root-cause failure analysis on the referenced devices by testing internal registers, confirming subsystem integrity, and verifying device functionality.

To use the OpenBoot diagnostic tests:

1. From the root login, turn off CMS.
2. Enter:

   `/usr/sbin/shutdown -y -i0 -g0`

   The system shuts down.
3. Enter:

   `obdiag`

   This loads the test program.
4. Enter:

   `obtest <command number>`

   See the following table for a summary of OpenBoot Diagnostic test commands.

Command number	Command name	Description
0	PCI/PCIO	This command: • Verifies the PCIO ASIC vender ID and the PCIO ASIC device ID • Verifies that the PCI configuration space is accessible as half-word bytes • Verifies the address class code • Performs a walking ones bit test on the status register, latency timer, and interrupt line • Verifies that the interrupt pin is logic-level high (1) after reset
1	EBUS DMA/TCR Registers	This command: • Performs a walking ones bit test • Verifies that the status register is properly set • Validates the DMA capabilities and FIFOs

Command number	Command name	Description
2	Ethernet	This command: • Resets the ethernet channel • Performs ethernet channel engine internal loopback • Enables the LAN data to be routed back to the receive MII data outputs • Enables MII transmit data to be routed to the MII receive data path • Forces the twisted-pair transceiver into loopback mode
3	Keyboard	This command performs an external and internal loopback.
4	Mouse	This command performs a keyboard-to-mouse loopback.
5	Floppy	This command verifies the diskette drive controller initialization. You must have a formatted floppy in the diskette drive.
6	Parallel Port	This command: • Sets up the SuperIO configuration register to enable extended/compatible parallel port select • Enables ECP mode and ECP DMA configuration, and FIFO test mode.
7	Serial Port A	This command invokes the uart_loopback test for serial port A. **Note:** The serial port A diagnostic will stall if the TIP line is installed on serial port A.
8	Serial Port B	This command invokes the uart_loopback test for serial port B. **Note:** The serial port B diagnostic will stall if the TIP line is installed on serial port B.
9	NVRAM	This command verifies the NVRAM operation by performing a write and read to the NVRAM.

Command number	Command name	Description
10	Audio	This command: • Verifies the cs4231 internal registers • Performs a line-in to line-out external loopback • Performs a microphone-to-headphone external loopback
11	EIDE	This command validates both the EIDE chip and EIDE bus subsystem. This takes several minutes.
12	Video	This command tests the video monitor port.
13	All Above	This command validates the system unit. **Note:** The “All Above” diagnostic will stall if the TIP line is installed on serial port A or serial port B.
14	Quit	This command exits from the OpenBoot diagnostics.
15	Display this Menu	This command displays the command options.
16	Toggle script-debug	This command moves you in and out of the debug area.
17	Enable External Loopback Tests	This command enables the external loopback tests.
18	Disable External Loopback Tests	This command disables the external loopback tests.

Additional references – See the *Sun OpenBoot 3.x Command Reference Manual* for more information.

POST diagnostic messages

To use the Power On Self Test (POST) messages (during a reboot) to diagnose remote hardware problems:

1. At the `ok` prompt, enter:

   `boot`

2. Scan the displayed messages on the screen. Watch for error messages.

You can identify problems more accurately if you are familiar with the system power-on initialization messages. These messages show you the types of functions the system performs at various stages of system start-up. These messages can also show the transfer of control from OpenBoot firmware to POST.

Memory failure

The operating system, diagnostic program, or POST may not display a DIMM location (U number) as part of a memory error message. In this situation, the only available information is a physical memory address and failing byte. The following table lists physical memory addresses to locate a defective DIMM.

DIMM slot	DIMM pair (non-interleave)
DIMM(0)	00000000 - 0fffffff
DIMM1	
DIMM2	10000000 - 1fffffff
DIMM3	

OpenBoot initialization commands

The following table describes the OpenBoot initialization command sequences that are provided by the system. These commands are useful in some situations in which the system fails to boot. To use the commands, hold down the keys after turning on the power to your system. Keep the keys pressed until the keyboard lights flash and the screen displays the `ok` prompt.

Command	Description
Stop	Bypass POST. This command does not depend on the security mode. **Note:** Some systems bypass POST as a default. In such cases, use **Stop**+**A** to start POST.
Stop+**A**	Abort.
Stop+**D**	Enter diagnostic mode (set `diag-switch?` to `true`).
Stop+**F**	Enter Forth on TTYB instead of probing. Use `exit` to continue with the initialization sequence. This is useful if hardware is broken.
Stop+**N**	Reset NVRAM contents to default values. If this is done, you must readminister the NVRAM options. **CAUTION:** Do not use this command under normal operation. Running this command causes a system to lose the factory NVRAM settings and the system will not boot properly.

Diagnosing LED patterns

Many hardware components of the computer have LEDs that can be used to diagnose problems. This section describes those LED patterns.

Keyboard LED patterns

During POST, LEDs on the keyboard light in patterns that show the progress of the tests and if any failures have been detected. The following table describes these patterns.

Caps lock	Compose	Scroll lock	Num lock	Meaning
Blink	Off	Off	Off	POST in progress
Off	Off	Off	Off	POST successfully completed
On	Off	Off	On	System board failed
On	Off	On	Off	No memory found
On	On	On	Off	Faulty CPU

Tape drive LED status patterns

This section describes the LED status patterns for the following tape drives:

- DDS4, 4-millimeter, 20/40-GB
- SLR5, QIC, 4/8-GB
- XL/XS/DX, 8-millimeter, 7/14-GB

DDS4 tape drive – The tape drive LEDs show the following status:

- Tape LED (green) — The LED flashes to show activity (loading, unloading, reading, and writing). The LED is steady when a cartridge is loaded and the tape drive is ready to begin operation.
- Clean LED (amber) — The LED flashes to indicate that a cartridge is near the end of its life, or that the heads need cleaning.

The following table describes the LED combinations that occur during normal tape drive operation.

	Tape drive state					
	Activity (load or unload)	**Activity (read or write)**	**Cartridge loaded**	**Media Caution Signal**	**Fault**	**Power-on (starts with two steady lights)**
Tape LED (green)	Flashing	Flashing Fast	On	Any	Any	Flashing
Clean LED (amber)	Off	Off	Off	Flashing	On	Off

The tape drive monitors the number of correctable errors that occur during reading and writing. If the number of errors becomes excessive, the tape may be nearing the end of its useful life, or the tape heads may need cleaning.

- If the media caution signal displays (flashing amber), clean the tape drive.
- If the signal still displays after cleaning the heads, repeat the operation with a different tape. If this clears the signal, the first tape is nearing the end of its life. Copy the data onto a new tape and discard the old one.

The media caution signal is cleared when a new tape is loaded or when the drive is power-cycled.

SLR5 tape drive – The SLR5 tape drive has a single LED that displays both green and red. The tape drive LED shows the following status:

- Steady green when a tape is in the tape drive. If this occurs when you first insert a cleaning cartridge, use a new cleaning cartridge.
- Flashing green when tape drive activity is occurring.
- Flashing red when a fault occurs. When this happens, eject the tape and reinsert the tape. If this continues to occur, the tape is faulty and should be replaced.

XL/XS/DX tape drive – The tape drive LEDs show the following status:

- Top LED (amber) — When this LED is on or flashing, the tape drive has an error or needs cleaning (see Cleaning the tape drive on page 136).
- Middle LED (green) — When this LED is on or flashing, SCSI bus activity is occurring.
- Bottom LED (green) — When this LED is on, a tape is loaded. When this LED is flashing, it indicates that tape motion is occurring or the tape drive needs cleaning.

Sun Validation Test Suite (VTS)

The SunVTS™ supports diagnostics in the following areas:

- Connection test. Minimal access of device to verify its accessibility and availability.
- Functional test (default). Detailed tests to thoroughly test the device or system when offline the system is offline (CMS must be turned off). A stress mode in the system or test option can be set only within the offline mode. The stress mode is an extension of offline.
- Functional test (from system monitor). Safe tests that can be executed on the device or system when it is online (CMS can be on, but testing is safer when it is turned off).

There are two ways to run SunVTS. We recommend that you use either local access through the Common Desktop Environment (CDE) interface, or remote access using an ASCII interface.

Prerequisites

CMS must be turned off.

Using SunVTS

To use SunVTS:

1. Enter:

   `BYPASS_FS_PROBE=1; export BYPASS_FS_PROBE`

   This bypasses the file system probe.

2. Do one of the following:

   - Enter:

     `/opt/SUNWvts/bin/sunvts`

     This accesses the CDE interface.

   - Enter:

     `/opt/SUNWvts/bin/sunvts -t`

     This accesses the TTY mode (ASCII interface).

Additional references – For more information about using VTS, see the files **`/opt/SUNWvts/README`** and **`/opt/SUNWvts/bin/vtstty.help`**.

Troubleshooting disk drives and CD-ROM drives

This section provides hard drive and CD-ROM drive failure symptoms and suggested actions.

Symptom – A hard drive read, write, or parity error is reported by the operating system. A CD-ROM drive read error or parity error is reported by the operating system.

Solution – Replace the drive indicated by the failure message. The operating system identifies the internal drives as indicated in the following table.

Operating system address	Drive physical location and target
c0t<*X*>d0s0, or c1t<*X*>d0s0	Hard drive, target <*X*> (<*X*> represents the target number 0 to 7)
c0t6d0s0	CD-ROM drive, target 6

Symptom – The hard drive or CD-ROM drive fails to respond to commands.

Solution – When the hard drive or CD-ROM drive fails to respond to commands:

1. Enter:

   /usr/sbin/shutdown -y -i0 -g0

   This shuts down the system.

2. At the `ok` prompt, enter the following commands:

   setenv auto-boot? false

   reset-all

   The system resets.

3. Enter:

   probe-ide

   The program responds similar to the following:

```
Device 0  ( Primary Master )
        ATA Model: ST34342A

Device 1  ( Primary Slave )
       Not present

Device 2  ( Secondary Master )
       Removeable ATAPI Model: CRD-8240B

Device 3  ( Secondary Slave )
       Removeable ATAPI Model:
```

4. Verify that all the disk drives are recognized. This example indicates that the system primary disk is on Device 0, and the CD-ROM is on Device 2.

   If the **probe-ide** test fails to show all installed disk drives, you may have to replace the disk drive.

5. When finished with testing, enter the following commands:

   ⚠ CAUTION:

   If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

   setenv auto-boot? true

   boot -r

   The system reboots.

Troubleshooting tape drives

Overview

Use the following procedures to troubleshoot tape drives:

- Checking tape status
- Rebuilding tape device drivers on page 181

Checking tape status

For many procedures, you must identify what tape drive, by device path, you will use for the procedure. Tape drives are assigned to particular device paths, usually one of the following:

- **/dev/rmt/0**
- **/dev/rmt/0c**
- **/dev/rmt/1**
- **/dev/rmt/1c**

Note:

The “c” at the end of the device name indicates that the tape device can operate in compressed mode. We recommend that you use compressed mode at all times.

To determine what device paths are available on your system:

1. Insert a tape into the tape drive.
2. Enter the following commands:

   mt -f /dev/rmt/0 status

   mt -f /dev/rmt/1 status

   If the device path is correct, a message similar to the following is displayed:

```
Vendor 'HP      ' Product 'C5683A      ' tape drive:
   sense key(0x6)= Unit Attention       residual= 0   retries= 0
   file no= 0   block no= 0
```

   If the device path is incorrect, a message similar to the following is displayed:

```
/dev/rmt/1c: No such file or directory
```

   If there is no tape in the tape drive, a message similar to the following is displayed:

```
/dev/rmt/1c: No tape loaded or drive offline
```

Rebuilding tape device drivers

As tape drives are added to and removed from a system, the device instance numbers can get out of sequence with the number of tape drives. For example, if a system has two tape drives, and one is removed, the system may accidentally try to use a tape drive that no longer exists.

To reassign device instance numbers for tape devices:

1. Log in to the system as root.
2. Make sure that the target addresses for any SCSI tape drives are set correctly.

   Typically, the internal tape drive is SCSI address 5, and an external tape drive is SCSI address 4. If you change the SCSI address, you must turn the tape drive power off and back on.
3. Insert the Solaris CD-ROM into the CD-ROM drive.
4. After about 15 seconds, enter the following commands:

   ```
   boot cdrom -sw
   fsck -y /dev/dsk/c1t0d0s0
   mount /dev/dsk/c1t0d0s0 /a
   devfsadm -vCc tape -r /a -p /a/etc/path_to_inst
   ```

   This reassigns the device instance numbers for the tape devices.
5. Enter:

   ```
   eject cdrom
   ```
6. Remove the Solaris CD-ROM.

Recovery procedures

This section contains procedures to follow when certain conditions or errors occur.

Preserving data after a system failure

Enter the **sync** command at the ok prompt to force any information on its way to the hard disk to be written out immediately. This is useful if the operating system fails or is interrupted before preserving all data.

The **sync** command returns control to the operating system and performs the data-saving operations. After the disk data is synchronized, the operating system begins to save a core image of itself. If you do not need this core dump, you can interrupt the operation by pressing **Stop**+**A**.

Loss of power

If the system loses power, it is recommended (but not required) that you empty the CD-ROM or DVD-ROM and tape drives. The system boots from the disk by default.

Power-on sequence – To turn the power back on:

1. Turn on all external SCSI devices starting with the device that is farthest from the system and working toward the system.
2. Turn on the system monitor.
3. Turn on the system.

   If the system is operating properly, a banner screen is displayed up to 3 minutes after it is powered on.

```
|------| <Product Name>, Keyboard Present
|      | OpenBoot 3.xx, XXX MB memory installed, Serial #XXXXXXXXX
|      | Copyright 2000 Sun Microsystems, Inc. All rights reserved.
|------| Ethernet address X:X:XX:XX:XX:XX, Host ID: XXXXXXXX
```

Power-off sequence – To turn off the power:

1. Log in to the system as root.
2. Enter:

   /usr/sbin/shutdown -y -i0 -g0

   This shuts down the system.
3. Turn off the system.
4. Turn off the system monitor.
5. Turn off all external SCSI devices starting with the device that is closest to the system and working toward the farthest device.

Keyboard becomes unplugged

If the console keyboard cable becomes unplugged during normal operation, the system continues to operate until you plug in the keyboard cable.

CAUTION:

When you plug in the keyboard cable, the system stops running and no ACD data is collected from the switch. Do this only when there is no traffic on the system or when there is low traffic on the system.

To recover from this problem:

1. Plug in the keyboard cable.

   The system beeps and the current display “freezes” on the monitor. A small window that shows the following is displayed:

   ```
   Type ‘go’ to resume
   ok
   ```

2. Enter:

   go

   The system resumes normal operation.
3. Refresh the terminal screen.

Note:

If the system is rebooted, instead of entering **go**, you may be prompted to use the **fsck** command to repair the Solaris file systems.

Probe command warnings

Symptom – When using any of the probe commands, the following message is displayed:

```
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].
```

CAUTION:

Do not continue. Answer **n**. Do not answer **y**.

Solution – To recover from this condition:

1. Enter: **n**

   This stops the probe command.

2. Enter the following commands:

   setenv auto-boot? false

   reset-all

3. Now it is acceptable to execute any of the probe commands and perform any other boot PROM-level diagnostics.

4. After you finish probing the system devices, enter the following commands:

   CAUTION:

   If you fail to enter these commands, any reboots that you do in the future will stop at the boot prompt instead of proceeding through the normal boot-up process.

   setenv auto-boot? true

   boot -r

   The system reboots.

Reseating HSI/P cards

The HSI/P cards may appear to be faulty when they just need to be reseated in the PCI slot. Before you replace the card, try reseating the card.

To reseat an HSI/P card:

1. Log in to the system as root.
2. Enter:

   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

   This shuts down the system.
3. Turn off the system.
4. Turn off the system monitor.
5. Turn off all external SCSI devices, starting with the device that is closest to the system and working toward the farthest device.
6. Disconnect the HSI/P quad cable connected to the card.
7. Remove and replace the suspect HSI/P card. See Installing or removing PCI cards on page 66 for detailed instructions.
8. Reattach the HSI/P quad cable.
9. Turn on any external SCSI devices, starting with the device that is farthest from the system and working toward the system.
10. Turn on the system monitor.
11. Turn on the system.
12. When the system comes back up, log in as root.
13. Test the card to see if it is now working. If the card is still not working, see Replacing an HSI/P card on page 78.

Remote console port problems

This section contains problems you may encounter with the remote console port.

Symptom – The remote console port will not initialize for dialing in or dialing out.

Solution – To correct this problem:

1. Enter:

   sacadm -l

   If the system status reports NO_SAC, the port is not working properly.

2. Enter:

   /cms/install/bin/abcadm -i -b 9600 ttyb

   This should initialize the port. If the port does not initialize, continue with Step 3.

3. Enter:

   /cms/install/bin/abcadm -r ttyb

   This removes the port administration.

4. Enter:

   ps -ef | grep sac

   This finds any SAC processes that are running. If any processes are found, continue with Step 5. Otherwise, continue with Step 6.

5. Enter:

   kill -9 *<pid>*

   Use this command to kill any SAC processes still running. Process numbers are represented by ***<pid>***.

6. Enter:

   /usr/lib/saf/sac -t 300

   This restarts SAC.

7. Enter:

   sacadm -l

   Confirm that SAC is running. The system should show ENABLED.

8. Enter:

   /cms/install/bin/abcadm -i -b 9600 ttyb

   This should initialize the port.

Symptom – The system cannot dial out to report alarms using the Alarm Origination Manager (AOM).

Solution – To correct this problem:

1. Enter:

   tail /etc/uucp/Devices

   The system should display the following:

   ```
   ACU cua/b - Any Hayes
   Direct cua/a - Any Direct
   Direct cua/b - Any Direct
   ```

2. Check the settings on the remote console modem. For the U.S. Robotics modem, make sure that DIP switches 1 and 8 are down (ON). If these switches are not set correctly, you may still be able to dial in, but it may not dial out.
3. Enter:

   /opt/cc/install/aot/r1v*Xxx.x*/bin/setup

   This restarts AOM. The release number ***Xxx.x*** depends on your installation.

To send a test alarm:

1. Enter the following commands to set up the test environment:

   . /opt/cc/aot/bin/aom_env

   cd /opt/cc/aot/bin

   aom start

   export PRODUCT_TYPE=TEST

2. Enter:

   ./log_error -e 30001 -d "test alarm"

   This sends a test alarm.

3. Enter:

   ./alarm_view -p TEST -a TEST_ALARM

   This will display the test alarm.

4. Enter:

   ./alarm_resolve -p TEST -a TEST_ALARM

   This resolves the test alarm.

5. Enter:

   tail -f aom_log

   This displays the AOM log file.

6. If you change an AOM parameter, such as the product ID or the telephone number, you must turn AOM off and back on again to recognize the new parameters. These parameters are in **/opt/cc/aot/data/admin/sysSetup.cfg** file. Be sure to set the port to value 1 for ttya.

7. If the **/opt/cc/aom/data/log** file has the message "aom cms alarm is disabled", enter:

   export PRODUCT_TYPE=TEST

   This enables the alarm.

Appendix A: Factory hardware installation

Overview

This appendix describes the hardware installation procedures that are done at the factory for an Ultra 5 computer. You can use these procedures to configure an Ultra 5 computer to factory specifications.

Factory hardware installation procedures you may perform include:

- Preparing for factory hardware installation on page 190
- Installing an optional second internal hard drive on page 193
- Installing memory on page 201
- Installing PCI cards on page 205

After you have completed these factory hardware installation procedures, you must continue with Chapter 2 to finish assembling the Ultra 5 computer. After you have assembled all of the parts on the computer, you must install the software using the appropriate software installation, maintenance, and troubleshooting document.

Preparing for factory hardware installation

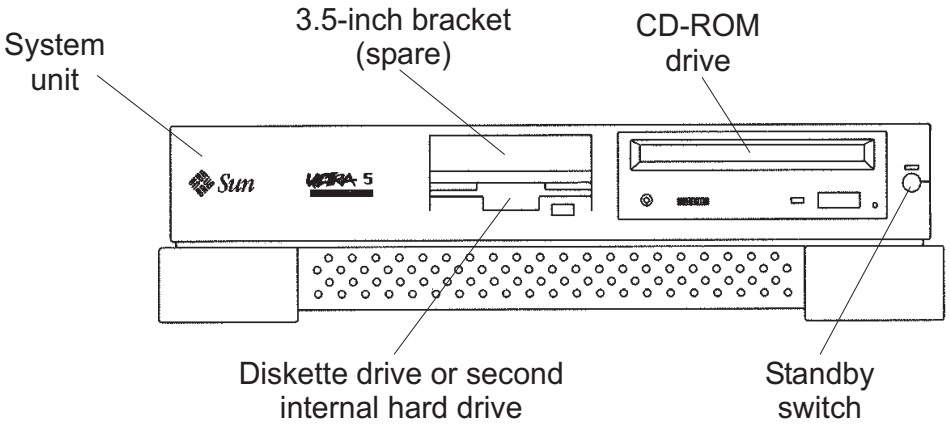
This section includes the following:

Computer layout

Familiarize yourself with the layout of the Ultra 5.

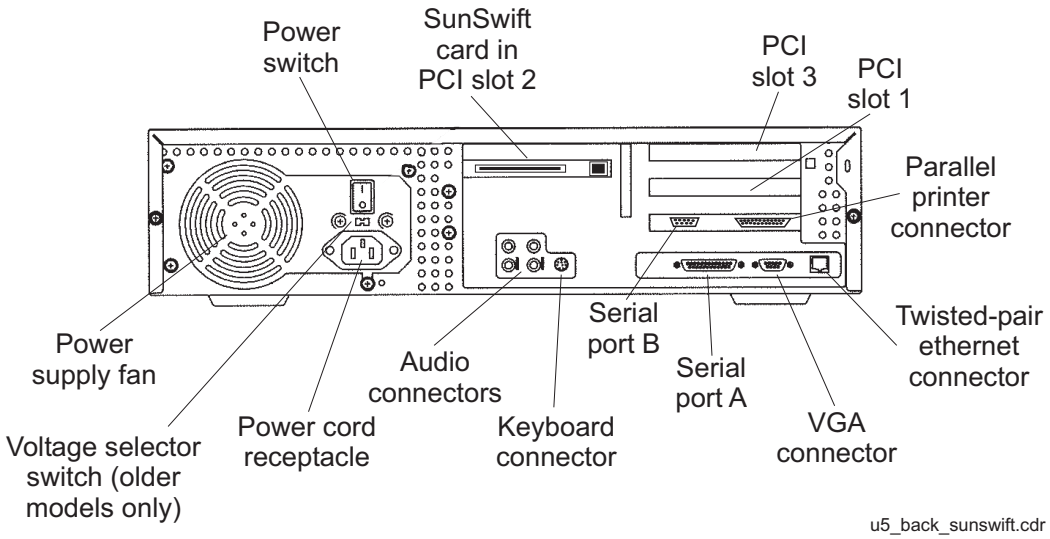
Front Panel

This figure shows the front panel of the Ultra 5. The diskette drive is not available if the optional second internal hard drive has been installed.



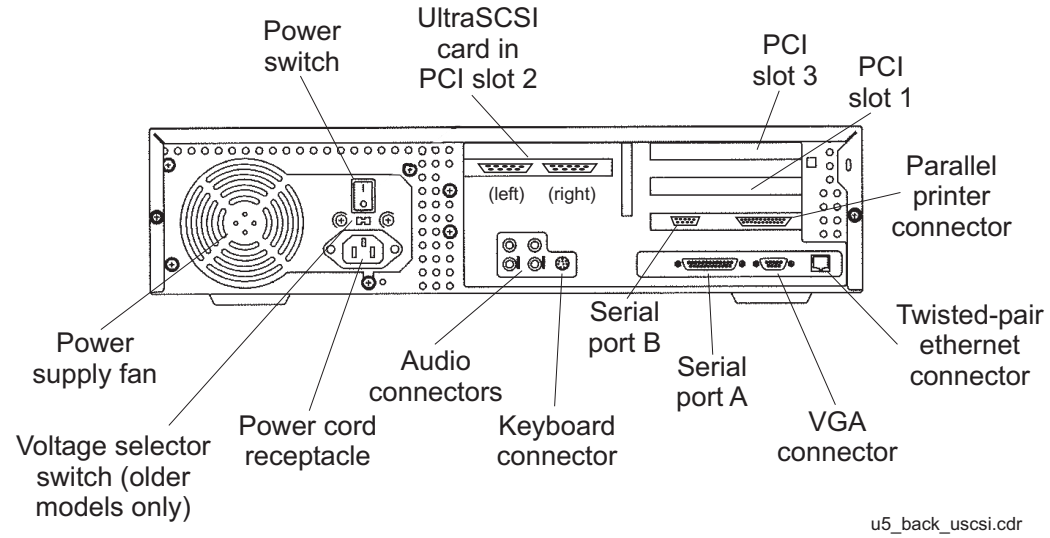
Rear Panel (with SunSwift card)

This figure shows the rear panel when you have a SunSwift card, which is usually installed in PCI slot 2. The SunSwift card has one 68-pin SCSI connector and one ethernet RJ45 connector. Other PCI cards may be installed in slots 1 and 3.



Rear Panel (with UltraSCSI card)

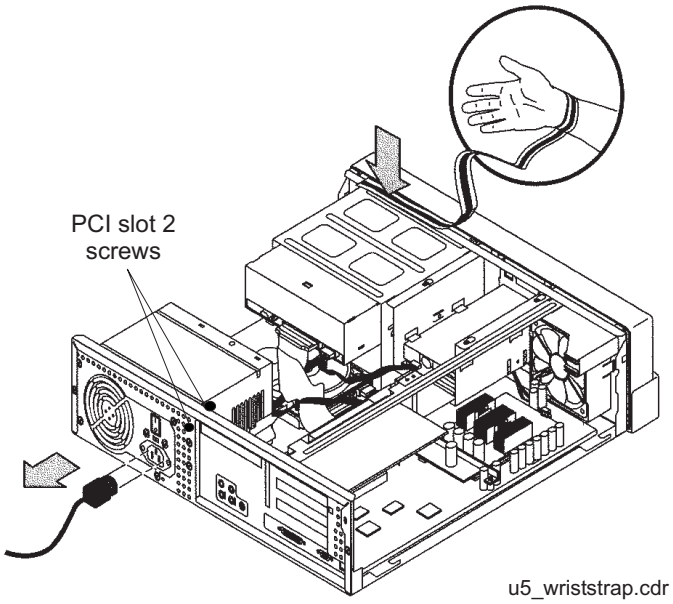
This figure shows the rear panel when you have an UltraSCSI card, which is usually installed in PCI slot 2. The UltraSCSI card has two 68-pin SCSI connectors. Other PCI cards may be installed in slots 1 and 3.



ESD precautions

Before you work on components inside the Ultra 5 computer:

1. Make sure that the computer is plugged in to AC power.
2. Make sure that the power is off.
3. Attach the Electro-Static Discharge (ESD) wrist strap to the chassis frame and to your wrist. See the following figure.



4. Unplug the AC power cord.

Installing an optional second internal hard drive

This section describes how to add or replace the internal EIDE data disk drive in the Ultra 5 computer. The optional drive, together with hardware and a new ribbon cable, is packaged separately from the Ultra 5 computer.

Note:

In the following procedures, the disk drive that is already installed in the Ultra 5 computer is referred to as the *primary* drive, and the new drive that you install is referred to as the *secondary* drive.

Unpacking the disk drive

Remove the following items from the box that contains the secondary data disk drive and place them in a convenient location:

- EIDE disk drive
- Mounting bracket
- Four pan head screws
- New EIDE ribbon cable

  The new disk drive comes with two ribbon cables. The cable used with the Ultra 5 has three connectors labeled SLAVE, MASTER, and MOTHERBOARD. The other cable may be discarded.

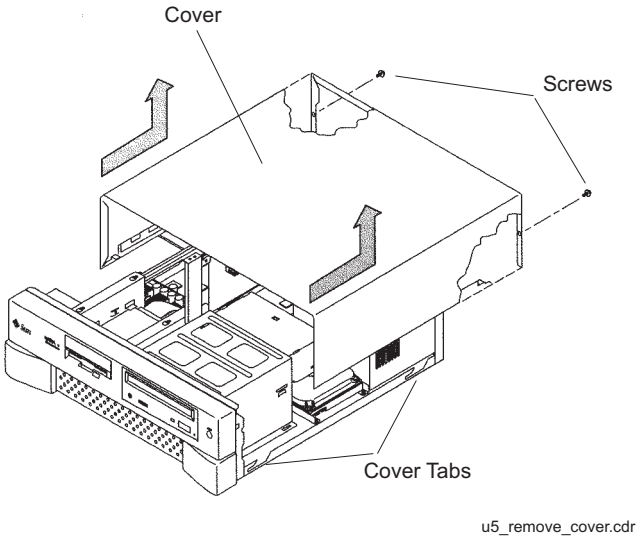
Opening the computer

To open the computer:

1. If you have not already done so, use the following command to shut down the computer:

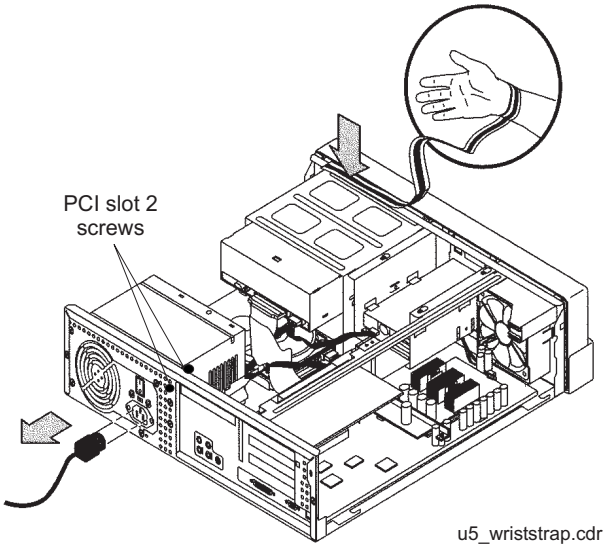
   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

2. Turn off the power to the computer.
3. Remove the two screws on the back of the unit that secure the cover to the chassis. See the following figure.



4. Slide the cover back 1 or 2 inches and lift it up away from the chassis.
5. Place the cover in a convenient location so that it does not interfere with your work.

6. Attach an antistatic wrist strap to the metal chassis of the computer and to your wrist.See the following figure.



7. Disconnect the AC power cord.

Important:

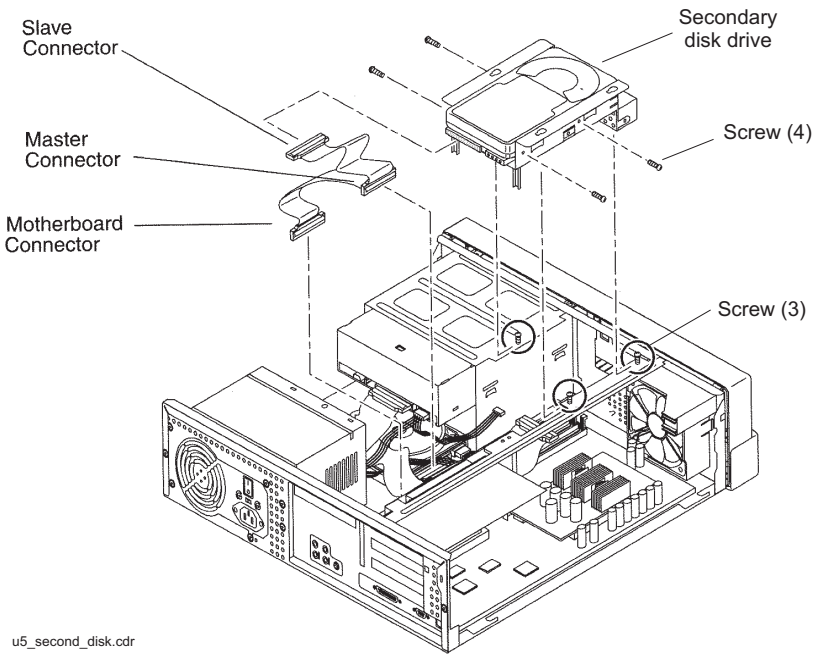
If the computer has a PCI card in slot position 2, you may want to remove that card during this procedure to make it easier to reach the components. To remove PCI card 2, you must first remove the PCI card 2 screw. On the Series 1 computers, this screw is on the back of the computer. On Series 2 and later computers, this screw is on the top of the frame above the PCI card.

Removing the secondary internal disk drive

If there is no secondary internal disk drive, continue with Removing the diskette drive on page 197.

To remove the secondary internal data disk drive:

1. Loosen but do not remove the three screws that secure the mounting bracket for the secondary internal disk drive to the top of the chassis frame. See the following figure.



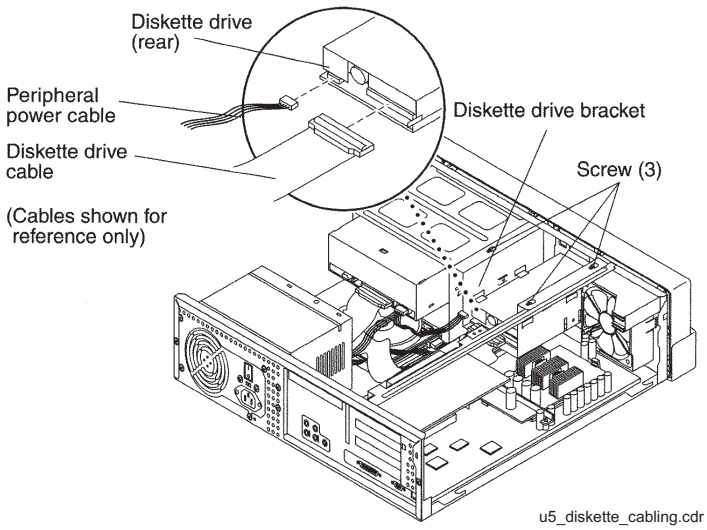
2. Remove the disk drive bracket from the chassis by sliding it back and lifting it free of the three screws.
3. Disconnect the power cable from the secondary disk drive.
4. Lift out the mounting bracket and the attached disk drive.
5. Remove the four screws that hold the secondary internal disk drive to the mounting bracket. Save the screws and mounting bracket for the new secondary internal disk drive. Label the disk drive as the “Slave Disk,” and save it in case you have to reinstall the original configuration.

Removing the diskette drive

If there is no 3.5-inch internal diskette drive, continue with Installing new cabling on page 198.

To remove the diskette drive:

1. Disconnect the power cable and diskette drive cable from the rear of the diskette drive. See the following figure.



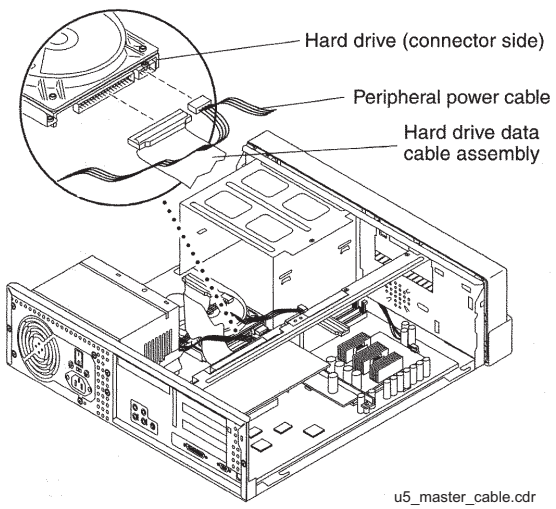
2. Loosen but do not remove the three screws that secure the diskette drive mounting bracket to the top of the chassis frame.
3. Remove the diskette drive bracket from the chassis by sliding it back and lifting it free of the three screws.
4. Lift out the mounting bracket and attached diskette drive.
5. At the motherboard, disconnect the diskette drive cable that comes from the diskette drive.
6. Save the diskette drive and diskette drive cable in case you have to reinstall the original configuration.

Installing new cabling

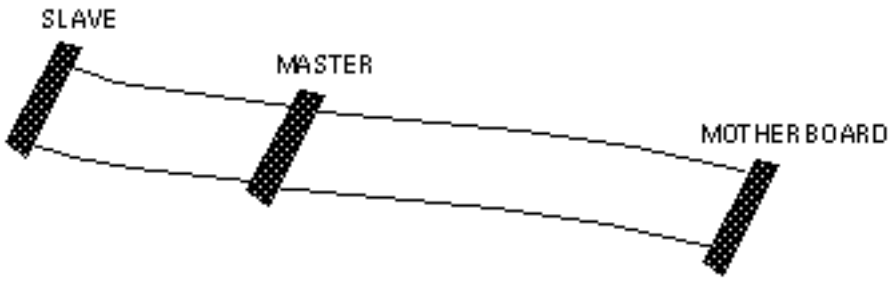
If the primary boot disk drive already has a new EIDE ribbon cable, continue with Installing the secondary disk drive on page 199.

To install new cabling:

1. Remove the ribbon cable from the back of the primary disk drive. You may need to remove the primary disk drive by removing the two screws securing the primary disk drive bracket and lifting out the drive. See the following figure.



2. Remove the other end of this cable from the motherboard. Remember the slot in the motherboard from which you remove this connector. You will install another connector in this slot in the next step.
3. On the new ribbon cable that was supplied with the secondary disk drive, there are three connectors labeled MOTHERBOARD, MASTER, and SLAVE. Insert the connector labeled MOTHERBOARD into the slot in the motherboard from which you removed a connector in the previous step. See the following figure.

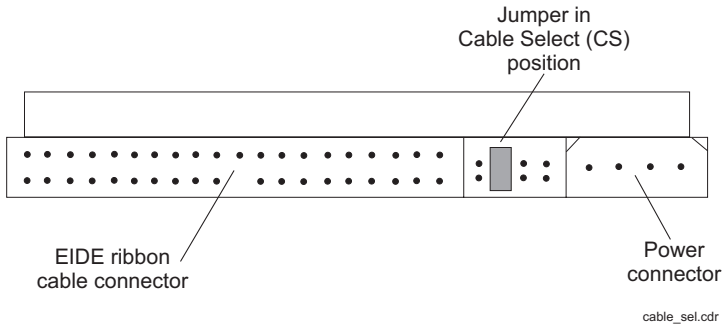


4. Connect the connector labeled MASTER to the primary disk drive.
5. If you previously removed the primary disk drive, reinstall it on the chassis.

Installing the secondary disk drive

To install the new secondary internal disk drive:

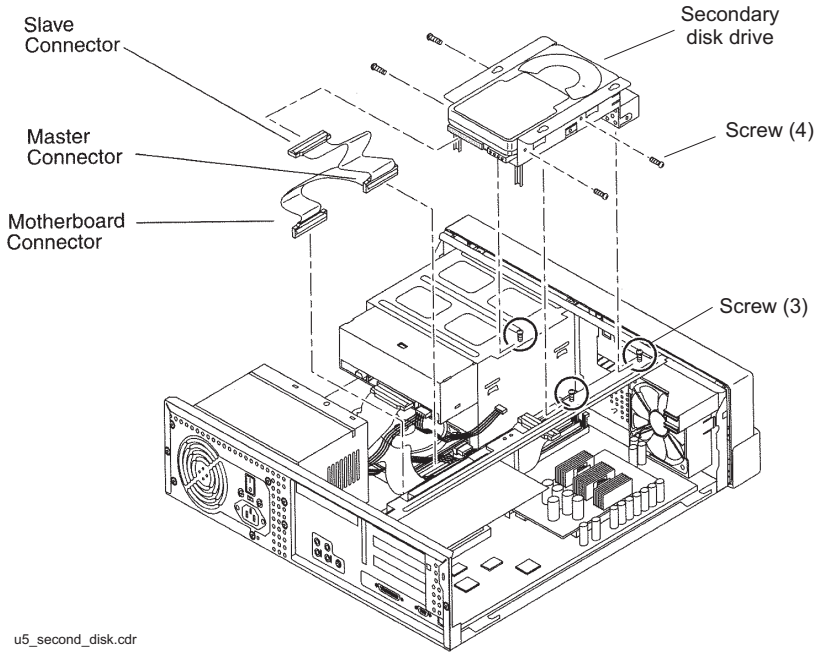
1. Ensure that the jumpers on the secondary internal hard drive are set to the Cable Select (CS) setting. See the following figure.



2. Attach the secondary internal disk drive to the new mounting bracket with the four screws from the old disk drive or from the new disk drive kit. Arrange the drive so that the connectors point to the back of the computer.

   Tip:

   Install each screw with just a few turns before you tighten all four screws.



3. Connect the EIDE ribbon cable connector labeled SLAVE to the secondary internal disk drive.

4. Connect the power cable to the secondary internal disk drive.
5. Install the mounting bracket for the secondary internal disk drive to the frame of the chassis, slipping the three holes in the mounting bracket over the three screws in the chassis frame.
6. Slide the mounting bracket forward as far as possible.
7. Tighten the three screws.
8. Route the cables to provide clearance.

Closing the computer

To close the computer:

1. If you removed the PCI card from Slot 2 earlier, reinstall it now.
2. Reconnect the AC power cord to the computer.
3. Detach the ESD wrist strap.
4. Replace the cover on the computer. Slide the cover forward until it fits snugly around the chassis.
5. Replace the two cover screws.

Tip:

Install each screw with just a few turns before you tighten both screws.

Installing memory

Overview

The Ultra 5 comes equipped with one bank of dual inline memory modules (DIMMs) (256 MB) installed. If you need to install additional DIMMs, they must be installed in full banks (pairs).

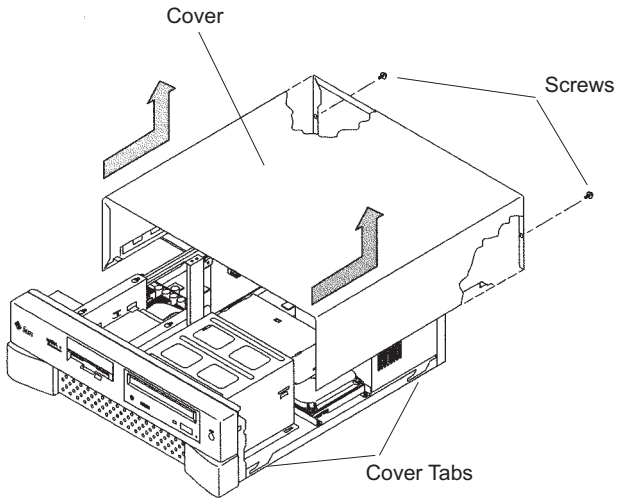
Opening the computer

To open the Ultra 5 computer:

1. If you have not already done so, enter the following command to shut down the computer:

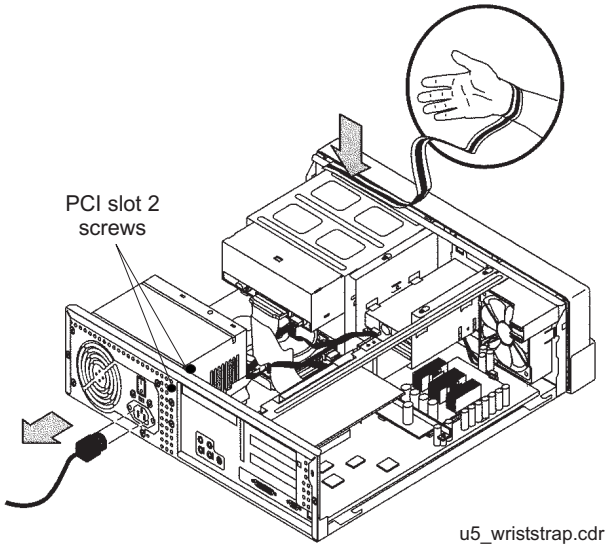
   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

2. Turn off the power to the computer.
3. Remove the two screws on the back of the unit that secure the cover to the chassis. See the following figure.



4. Slide the cover back 1 or 2 inches and lift it up away from the chassis.
5. Place the cover in a convenient location so that it does not interfere with your work.

6. Attach an antistatic wrist strap to the metal chassis of the computer and to your wrist. See the following figure.



7. Disconnect the AC power cord.

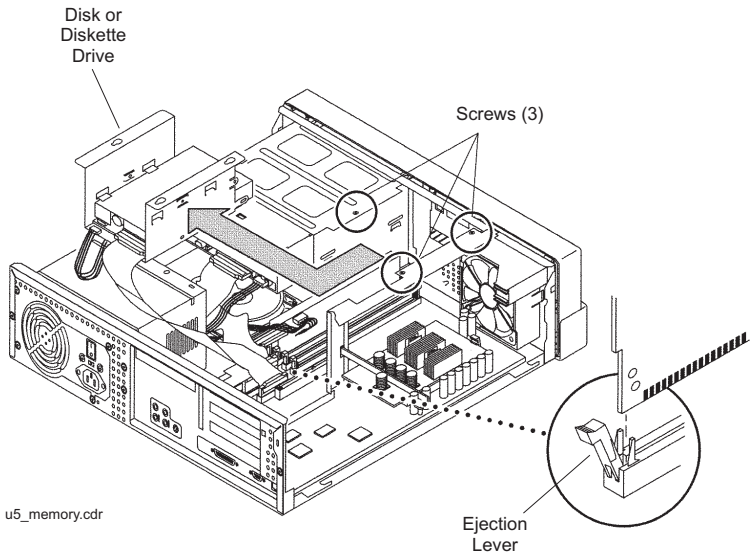
Important:

If the computer has a PCI card in slot position 2, you must remove that card during this procedure to make it easier to reach the components. To remove PCI card 2, you must first remove the PCI card 2 screw. On the Series 1 computers, this screw is on the back of the computer. On Series 2 and later, this screw is on top of the frame above the PCI card.

Adding the memory modules

To add the memory modules:

1. Loosen the three screws that hold the diskette or second hard disk drive bracket and move the disk drive out of the way.



The computer must have at least two identical DIMMs installed in paired sockets of any DIMM bank. For best system performance, install four identical DIMMs. Install the DIMMs as shown in the table below.

DIMM bank	Slot pairs
0	DIMM1 and DIMM2
1	DIMM3 and DIMM4

2. Remove the DIMM from the antistatic container.
3. Starting with the first empty slot, unlock (press down) the ejector levers at both ends of the connectors.
4. Position the DIMM in the connector, ensuring that the notches on the bottom of the DIMM are aligned with the connector alignment keys.
5. Press firmly on both of the top ends of the DIMM at the same time until the DIMM is properly seated.
6. Verify that the ejection levers are closed toward the DIMM.

7. Repeat this procedure for each DIMM.
8. Replace the diskette/disk drive bracket and tighten the screws that hold the bracket.

Closing the computer

To close the computer:

1. If you removed the PCI card from Slot 2 earlier, reinstall it now.
2. Reconnect the AC power cord to the computer.
3. Detach the ESD wrist strap.
4. Replace the cover on the computer. Slide the cover forward until it fits snugly around the chassis.
5. Replace the two cover screws.

   Tip:

   Install each screw with just a few turns before you tighten both screws.

Installing PCI cards

This section consists of the following:

PCI card configuration

Depending on your configuration, the PCI cards will be installed in the slots shown below.

Card	PCI Slot	Comments
SunSwift or UltraSCSI	PCI 2, 1, or 3	Required. A SunSwift card is installed in every computer to provide a dedicated ethernet connection to the switch, and a SCSI interface to external tape and disk drives. Additional SunSwift cards can be installed in the other slots.
HSI/P	PCI 1 or PCI 3	Optional. HSI/P cards are not required when using ethernet for switch link connectivity. Use PCI 1 for the first card, which supports four ACDs. Use PCI 1 and 3 for two cards, which support eight ACDs. **Note:** Some CMS loads do not support the X.25 protocol. Contact the National Customer Care Center or consult with your product distributor or representative to verify if the X.25 protocol is supported on your CMS system.
SAI/P	PCI 1 or PCI 3	Optional. SAI/P cards provide serial port connectivity for printers and terminals. Use PCI 1 for the first card, which supports eight serial devices. Use PCI 1 and 3 for two cards, which supports 16 serial ports.
Token Ring	PCI 3	Optional. Installation and setup of this card is done by Professional Services in the United States, or by special arrangement outside of the United States.

Installing PCI cards

Use the following general instructions when installing, moving, and removing PCI cards. Other sections in this chapter describe specific PCI card maintenance instructions. Use those instructions as appropriate.

Note:

If you plan to install an optional second internal hard drive, install it before you install any PCI cards.

To install or remove a card:

1. For a system currently in operation, verify that you have a recent CMSADM file system backup before you change card configurations.
2. Enter:

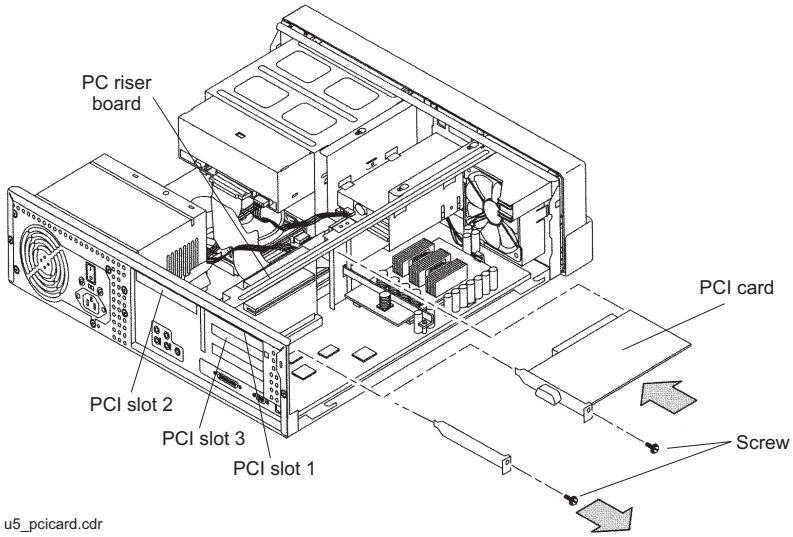
   ```
   /usr/sbin/shutdown -y -i0 -g0
   ```

   This shuts down the system.
3. Turn off the system.
4. Turn off the system monitor.
5. Turn off all external SCSI devices starting with the device closest to the system and working toward the farthest device.

   WARNING:

   You must wear an ESD wrist strap when installing or removing hardware components to prevent electrical discharge that can damage the system.
6. Remove the cover of the Ultra 5.
7. Disconnect the AC power cord.
8. Select an unused slot to add a card, or select what card you are removing.

9. Add or remove the card as shown in the following figure.



10. Remove the ESD wrist strap.
11. Reattach the cover.
12. Reconnect the AC power cord.
13. Turn on all external SCSI devices starting with the device farthest from the system and working toward the system.
14. Turn on the system monitor.
15. Turn on the system.
16. Press **Stop**+**A** simultaneously after the console banner is displayed, but before the system starts booting.
17. Enter:

    ```
    boot -r
    ```

    This reboots the system so that it recognizes the new configuration.
18. Perform a CMSADM file system backup to back up the updated system configuration. See your CMS software installation, maintenance, and troubleshooting document for details.

Glossary

Automatic Call Distribution (ACD)	A switch feature. ACD is software that channels high-volume incoming call traffic to agent groups (splits or skills). Also an agent state where the extension is engaged in an ACD call (with the agent either talking to the caller or the call waiting on hold).
Boot	To load the system software into memory and start it running.
CMS	Call Management System (CMS). A software product used by business customers that have an Avaya telecommunications switch and receive a large volume of telephone calls that are processed through the Automatic Call Distribution (ACD) feature of the switch.
Data disk	A nonboot disk.
DIMM	Dual In-line Memory Module. A narrow printed circuit board that holds memory chips. It plugs into a DIMM socket on the motherboard or memory board.
EIDE	Enhanced Integrated Drive Electronics
High Speed Serial Interface/PCI (HSI/P)	The HSI/P controller card is a 4-port serial communications PCI card. Each of the four ports is used for a single physical X.25 link. It is an add-on package that is needed by CMS for multiple ACDs.
Non-Volatile Random Access Memory (NVRAM)	A random access memory (RAM) system that holds its contents when external power is lost.
PCI Bus	The interface bus for the Sun Ultra 5 computer. Provides slots for additional cards (for example, HSI Controller Card).
SCSI	See Small Computer System Interface (SCSI).
SCSI Bus	An industry standard peripheral bus that is used to connect intelligent peripherals to a computer. It uses a daisy-chained cabling arrangement that originates at the Host Adapter to interconnect up to seven intelligent peripheral controllers on the bus. The Sun computer uses a fast SCSI-2 implementation.

SCSI ID	Each tap on the SCSI bus is required to have a unique identification or address, which is the SCSI ID. The ID is set by a target address switch located on each device.
SCSI Single-Ended Bus	A version of the SCSI bus designed to minimize cost and space. Cable lengths up to 6 meters are supported. A SCSI single-ended bus is not compatible with the differential version of the SCSI bus.
SSO	Services Support Organization. The Avaya organization that provides technical support for Avaya products.
Slot	An electronic connection designed to receive a module or a printed circuit board (such as a SIMM or a frame buffer board).
Small Computer System Interface (SCSI)	A hardware interface that allows the connection of peripheral devices (such as hard disks, tape drives and CD-ROM drives) to a computer system.

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