



Solaris™ Handbook for Sun™ Peripherals

Sun Microsystems, Inc.
4150 Network Circle
Santa Clara, CA 95054 U.S.A.
650-960-1300

Part No. 816-4468-10
May 2002, Revision A

Send comments about this document to: docfeedback@sun.com

Copyright 2002 Sun Microsystems, Inc., 4150 Network Circle, Santa Clara, CA 95054 U.S.A. All rights reserved.

This product or document is distributed under licenses restricting its use, copying, distribution, and decompilation. No part of this product or document may be reproduced in any form by any means without prior written authorization of Sun and its licensors, if any. Third-party software, including font technology, is copyrighted and licensed from Sun suppliers.

Parts of the product may be derived from Berkeley BSD systems, licensed from the University of California. UNIX is a registered trademark in the U.S. and other countries, exclusively licensed through X/Open Company, Ltd.

Sun, Sun Microsystems, the Sun logo, AnswerBook2, docs.sun.com, SunService, SPARCstorage, and Solaris are trademarks, registered trademarks, or service marks of Sun Microsystems, Inc. in the U.S. and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

The OPEN LOOK and Sun™ Graphical User Interface was developed by Sun Microsystems, Inc. for its users and licensees. Sun acknowledges the pioneering efforts of Xerox in researching and developing the concept of visual or graphical user interfaces for the computer industry. Sun holds a non-exclusive license from Xerox to the Xerox Graphical User Interface, which license also covers Sun's licensees who implement OPEN LOOK GUIs and otherwise comply with Sun's written license agreements.

Federal Acquisitions: Commercial Software—Government Users Subject to Standard License Terms and Conditions.

DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

Copyright 2002 Sun Microsystems, Inc., 4150 Network Circle, Santa Clara, CA 95054 Etats-Unis. Tous droits réservés.

Ce produit ou document est distribué avec des licences qui en restreignent l'utilisation, la copie, la distribution, et la décompilation. Aucune partie de ce produit ou document ne peut être reproduite sous aucune forme, par quelque moyen que ce soit, sans l'autorisation préalable et écrite de Sun et de ses bailleurs de licence, s'il y en a. Le logiciel détenu par des tiers, et qui comprend la technologie relative aux polices de caractères, est protégé par un copyright et licencié par des fournisseurs de Sun.

Des parties de ce produit pourront être dérivées des systèmes Berkeley BSD licenciés par l'Université de Californie. UNIX est une marque déposée aux Etats-Unis et dans d'autres pays et licenciée exclusivement par X/Open Company, Ltd.

Sun, Sun Microsystems, le logo Sun, AnswerBook2, docs.sun.com, SunService, SPARCstorage, et Solaris sont des marques de fabrique ou des marques déposées, ou marques de service, de Sun Microsystems, Inc. aux Etats-Unis et dans d'autres pays. Toutes les marques SPARC sont utilisées sous licence et sont des marques de fabrique ou des marques déposées de SPARC International, Inc. aux Etats-Unis et dans d'autres pays. Les produits portant les marques SPARC sont basés sur une architecture développée par Sun Microsystems, Inc.

L'interface d'utilisation graphique OPEN LOOK et Sun™ a été développée par Sun Microsystems, Inc. pour ses utilisateurs et licenciés. Sun reconnaît les efforts de pionniers de Xerox pour la recherche et le développement du concept des interfaces d'utilisation visuelle ou graphique pour l'industrie de l'informatique. Sun détient une licence non exclusive de Xerox sur l'interface d'utilisation graphique Xerox, cette licence couvrant également les licenciés de Sun qui mettent en place l'interface d'utilisation graphique OPEN LOOK et qui en outre se conforment aux licences écrites de Sun.

Achats fédéraux : logiciel commercial - Les utilisateurs gouvernementaux doivent respecter les conditions du contrat de licence standard.

LA DOCUMENTATION EST FOURNIE "EN L'ETAT" ET TOUTES AUTRES CONDITIONS, DECLARATIONS ET GARANTIES EXPRESSES OU TACITES SONT FORMELLEMENT EXCLUES, DANS LA MESURE AUTORISEE PAR LA LOI APPLICABLE, Y COMPRIS NOTAMMENT TOUTE GARANTIE IMPLICITE RELATIVE A LA QUALITE MARCHANDE, A L'APTITUDE A UNE UTILISATION PARTICULIERE OU A L'ABSENCE DE CONTREFAÇON.



Please
Recycle



Adobe PostScript

Contents

Preface v

How This Book Is Organized v

Typographic Conventions vi

Accessing Sun Documentation Online vi

Sun Welcomes Your Comments vi

1. Where to Go for Peripheral Information 1

Solaris 9 Installation Guide 1

Solaris Common Desktop Environment: User's Guide 1

System Administration Guide: Basic Administration 2

Solaris 9 Sun Hardware Platform Guide 3

Solaris Handbook for Sun Frame Buffers 3

Manpages 3

2. Overview of SCSI Addressing 5

SCSI Subsystem 5

SCSI Controller 7

SCSI Address Selection Schemes 7

Addresses and Device Names 7

Target ID Addressing Methods 8

Physical Device Names 9

Logical Device Names 10

Preface

The *Solaris Handbook for Sun Peripherals* has traditionally covered information about installing and configuring peripherals on systems running the Solaris™ operating environment. Such peripherals include DVD-ROM and CD-ROM drives, disk drives, tape drives, and option cards or boards. This information is now covered more completely and currently in a few basic Solaris documents. This book now informs you about where to find the most up-to-date information on peripherals, as well as outlining some information you might not find elsewhere.

How This Book Is Organized

Chapter 1 describes the topics covered by each recommended Solaris document.

Chapter 2 gives a brief overview of SCSI addressing.

Typographic Conventions

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

Accessing Sun Documentation Online

A broad selection of Sun system documentation is located at:

<http://www.sun.com/products-n-solutions/hardware/docs>

A complete set of Solaris documentation and many other titles are located at:

<http://docs.sun.com>

Sun Welcomes Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. You can email your comments to Sun at:

docfeedback@sun.com

Please include the part number (816-4468-10) of your document in the subject line of your email.

Where to Go for Peripheral Information

In earlier editions, the *Solaris Handbook for Sun Peripherals* has presented information and procedures for installing and configuring peripherals on systems running the Solaris operating environment. Such peripherals include DVD-ROM and CD-ROM drives, disk drives, tape drives, and option cards or boards. This information is now covered more completely in a few basic Solaris documents, as outlined in this chapter.

Please see the references listed below to discover which document can now best answer your peripherals topic.

Solaris 9 Installation Guide

The *Solaris 9 Installation Guide* is found in the Solaris 9 Release and Installation Collection.

This book describes Solaris installation instructions and superuser information.

Solaris Common Desktop Environment: User's Guide

The *Solaris Common Desktop Environment: User's Guide* is found in the Solaris 9 User Collection.

This book describes how the Solaris operating environment and the Common Desktop Environment manage DVD, CD, and diskette devices, including how to use the Removable Media Manager software.

System Administration Guide: Basic Administration

The *System Administration Guide: Basic Administration* is found in the Solaris 9 System Administrator Collection.

This book describes most topics previously presented in the *Solaris Handbook for Sun Peripherals*:

- How to prepare a system for peripheral installation
- How to create a `/reconfigure` file
- Options for shutting down and booting a system—single, multiuser, and so on
- How to use the format utility
- Setting up a hard drive—adding, formatting, partitioning, and labelling
- How to create, mount, and unmount a file system
- Setting up a tape drive—adding, specifying drive names and numbers, displaying status, tensioning, rewinding, and cleaning
- How to use tape utilities—`cpio`, `dd`, `ufsdump`, `ufsrestore`, `tar` commands
- How to add a DVD-ROM or CD-ROM drive (for physical installation information, refer to the documentation that accompanies your hardware)
- How to add a diskette drive
- Volume Management features
- How to write content to CDs and DVDs—the `cdrw` command
- How to set up an option card—SCSI and IDE interfaces, communication and network boards, bus extensions, etc.
- SCSI addressing—controller information, address selection schemes, and physical and logical device names
- How to use USB devices with Solaris
- Adding a device driver

Solaris 9 Sun Hardware Platform Guide

The *Solaris 9 Sun Hardware Platform Guide* is found in the Solaris 9 on Sun Hardware Collection.

This book describes which platforms are supported by which Solaris revisions, as well as other platform information.

Solaris Handbook for Sun Frame Buffers

The *Solaris Handbook for Sun Frame Buffers* is found in the Solaris 9 on Sun Hardware Collection.

This book describes different graphics cards supported on Sun™ hardware, as well as information on setting up and configuring frame buffer option cards.

Manpages

Information about the following topics is provided in the Solaris 9 Reference Manual Collection.

- `fdformat(1)` manpage

Describes the `fdformat` command, used to format a PCMCIA memory card. (Check with your SunServiceSM provider or the PCMCIA card vendor to determine if a device is compatible with your SPARCstationTM.)

- `scsi_address(9S)` manpage

Describes basic SCSI addressing concerns.

Overview of SCSI Addressing

Note – More information about SCSI addressing and subsystems can be found in the *System Administration Guide: Basic Administration* and in the `scsi_address(9S)` manpage in the Solaris 9 Reference Manual Collection.

Achieving the appropriate peripheral address depends on the *type* of peripheral subsystem that you have. Sun systems support a variety of peripheral subsystems such as:

- SCSI – small computer system interface (covered in this appendix)
- IDE – integrated drive electronics
- SOC – serial optical controller
- IPI – intelligent peripheral interface

Refer to the documentation that accompanies your hardware to determine your system's type of peripheral subsystem.

This chapter describes addressing concepts for the SCSI peripheral subsystem, including:

- “SCSI Subsystem” on page 5
- “SCSI Controller” on page 7
- “SCSI Address Selection Schemes” on page 7

SCSI Subsystem

To understand how to address and access a SCSI device, you must understand how the device is connected to the system. The following section describes how SCSI subsystems are connected to a system.

The following block diagram represents a typical SCSI subsystem and how it is connected to the system.

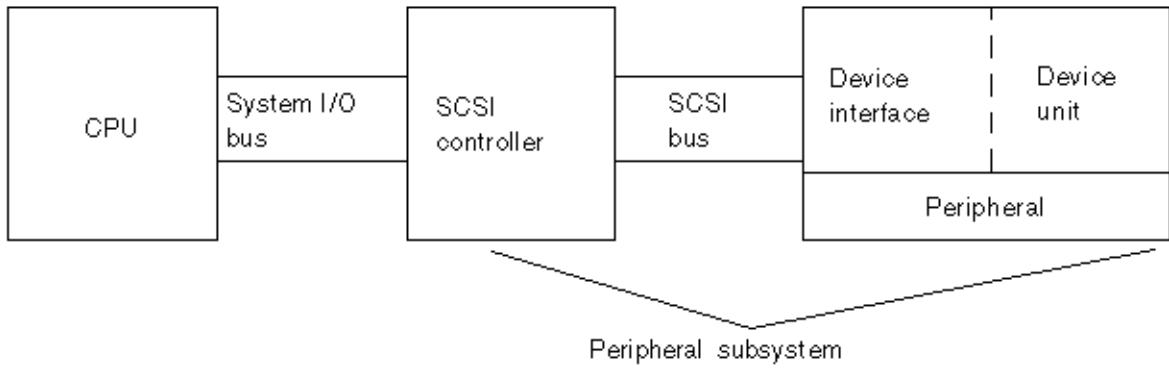


FIGURE 2-1 SCSI Subsystem Connections

- CPU – the central processing unit of the system.
- System I/O bus – inherent to the design of the system. You might have a system with a PCI, SBus, VME, or combination of these.
- SCSI controller – interprets the electrical signals between the system I/O bus and the SCSI bus. For more information, refer to the section “SCSI Controller” on page 7.
- SCSI Bus – the path from the SCSI controller to the device interface.
- Device interface – interprets the electrical signals between the SCSI bus and the device. It is usually built into the device unit.
- Device unit – the actual peripheral such as a disk, tape, CD-ROM, or DVD-ROM device. A device unit with a built-in interface makes up the whole peripheral.

Note – Also required is a device driver (not shown here), which is the software that enables the operating system to communicate with the device.

The combination of SCSI controller, SCSI bus, device interface and device unit make up the *peripheral subsystem*. All of these entities must be designed and configured to work together.

SCSI Controller

A SCSI controller (sometimes referred to as a *SCSI host*) is provided in two ways: as circuitry built into the main logic board (CPU board), often referred to as an “onboard” interface; or added to a system by way of a card plugged into the system I/O bus.

If you are adding a SCSI controller card to a system, you must add a card that corresponds to your type of system I/O bus.

Typically, your sales representative provides you with the right interface card to fit the system I/O bus and the type of interface that the peripheral device requires. Many systems have built-in SCSI support, and you would not need to install any additional cards.

If you need to install a SCSI controller card, and it is either an SBus card or a PCI card, the card will be logically addressed automatically based on the order and connector that it is plugged into.

SCSI Address Selection Schemes

To configure disk, tape, and CD-ROM drives, you must understand the *address selection scheme* that your system uses. Address selection schemes for disk drives differ from address selection schemes for tape drives. This section discusses the SCSI address selection schemes for different types of peripheral devices.

Addresses and Device Names

The Solaris software identifies a peripheral through a series of addresses and device names:

- Target ID address – an address that is set on the interface of the device by you or by the installer.
- Physical device name – assigned by the system firmware based on its physical connection to the system.
- Logical device name – assigned by the operating system when the peripheral is installed.

Target ID Addressing Methods

The target ID is an address set on the interface of the device (disk, tape, or CD-ROM). There are three methods to set this address:

- Jumpers – an address is achieved by placing jumpers on shunts. This is how internal CD-ROM devices are addressed. If your device requires jumper installation, consult the documentation that shipped with your device.
- Switch – used when a device is in an external enclosure (an enclosure other than the system chassis). The enclosure provides a switch that you set to your desired target ID address.
- Single-connector – a device with a single connector receives data, power, and address information through the same connector. This sort of device is automatically addressed when you install it. This is the most common method of addressing Sun disk drives.

Determining the correct target ID for your device depends on several conditions:

- The target addressing method (described above) used by your device.
- Existing addresses on the interface – all devices must have a unique target ID.
- Device type – some device types, such as CD-ROM and tape drives, are most easily identified by the operating system when they use certain addresses. See the table below:

TABLE 2-1 SCSI Target Addresses

Device Order	CD-ROM Targets	Tape Target	Disk Target	Disk Target (for Pre-Ultra sun4m systems)
1st	6	4	0	3
2nd		5	1	1
3rd			2	2
4th			3	0
5th			4	4
6th			5	5
7th			6	6

Note – Some SCSI controllers support 7 devices, others support up to 15 devices (although you should take into account the effect on I/O). If 15 devices are connected, valid disk target IDs are 0-14.

Note – You cannot have two devices with the same Target ID on the same SCSI controller. However, target IDs can be reused across different SCSI controllers.

Physical Device Names

The physical device name is assigned by the system firmware. This name is expressed in the form of a path name. The path name describes the location of the device in relation to the CPU. For SCSI devices, the target ID is part of this address name.

After the firmware assigns the physical device names, special files are copied to the `/devices` directory that reflect the physical device names. This occurs when the system is booted with the reconfiguration option (when you type `boot -r` or when a `/reconfigure` file exists and the system is booted).

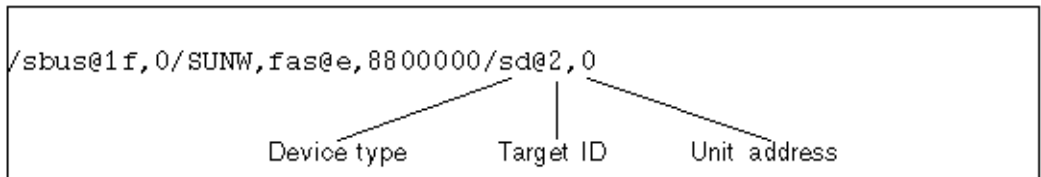


FIGURE 2-2 Disk Device Name Example

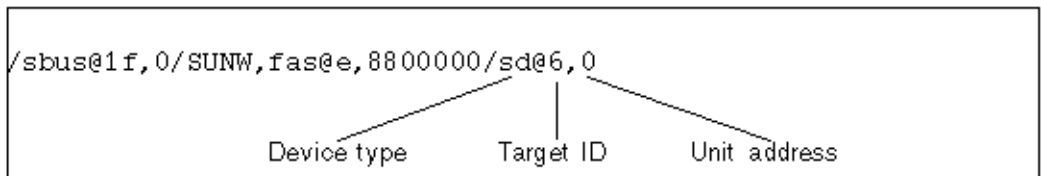


FIGURE 2-3 CD-ROM Device Name Example

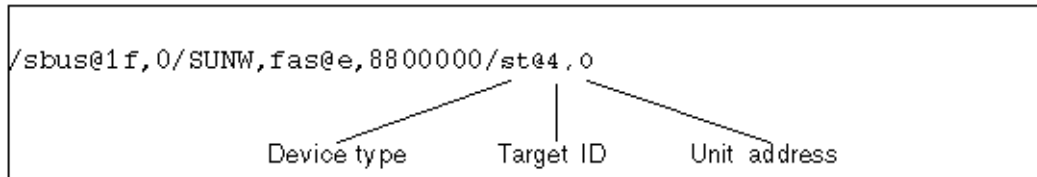


FIGURE 2-4 Tape Device Name Example

Logical Device Names

The logical device name is created by the operating system when the peripheral is first installed and booted with the reconfiguration option. Logical device names are located in the `/dev` directory. A logical device name is a file that is symbolically linked to the physical device name (names in the `/devices` directory). The file name reflects the address and physical connection of the device to the system. The logical device name is the address you use when you work with the device.

Logical Device Names for Disk Drives

Logical device names for a disk drive are created as follows:

```
/dev/[r]dsk/cntndnsn
```

Where:

- **cn** – the controller (or interface) number, such as `c0`, `c1`, `c2`, and so on. Controller numbers are logically assigned in sequential order. `c0` often represents a built-in SCSI controller.
- **tn** – the target ID of the device, such as `t0`, `t1`, `t2`, `t3`, and so on.
- **dn** – the device number (often called a LUN). It reflects the actual address of the device unit. This is usually `d0` for most SCSI disks because there is only one disk attached to the target controller (device interface).
- **sn** – the slice number that represents a partition, or *slice*, of a disk. Valid numbers are 0 through 7.

Note – Do not apply the above explanation to disks that are part of a SPARCstorage™ Array (a device connected to a SOC card). Disks in a SPARCstorage Array have logical device names with the same `/dev/[r]dsk/cnt6dnsn`; however, the names are interpreted differently.

Logical device names for disk drives are created in two subdirectories in the `/dev` directory; `rdsk` and `dsk`. As you use disk logical device names with various commands, you must use the appropriate name from either `/dev/rdsk` or `/dev/dsk`, depending on whether the command uses a raw (or character) device interface or a block device interface. The distinction is made based on how data is read from the device:

- **Raw device interface** – A *raw* device transfers data character by character in the exact amount of data needed for a given task. Use the logical device name from the `/dev/rdsk` directory.
- **Block device interface** – A *block* device transfers data in a predetermined amount, often from a buffer from which large blocks of data are read at once. Use the logical device name from the `/dev/dsk` directory

In general, three commands require a block device:

- `mount`
- `umount`
- `df`

Most other commands function best when you use the raw device. When you are not sure whether a command requires use of `/dev/dsk` or `/dev/rdsk`, check the man page for that command.

Logical Device Names for CD-ROM Drives

CD-ROM logical device names are created following the same scheme as disk drives (see “Logical Device Names for Disk Drives” on page 10). The following is an example of a CD-ROM logical device name:

```
/dev/rdsk/cnt6dnsn
```

Logical Device Names for Tape Drives

The following is an example of a SCSI tape logical device name:

```
/dev/rmt/0
```

TABLE 2-2 Tape Drive Logical Device Names

Tape Drive	Target ID	Primary Logical Device Name	Additional Logical Device Names
First tape drive	4	/dev/rmt/0	/dev/rmt/0l /dev/rmt/0m /dev/rmt/0h /dev/rmt/0u
Second tape drive	5	/dev/rmt/1	/dev/rmt/1l /dev/rmt/1m /dev/rmt/1h /dev/rmt/1u

For most tape operations, use the *primary* logical device name, because the tape drive will use its optimum default characteristics. However, if you want to specify a particular tape drive behavior, append up to three letters to the appropriate logical device name as follows:

- Append a letter to the drive number to specify a *tape density* where h is high, m is medium, l is low, and u is ultra. Not all tape drives support all densities. If you are in doubt, specify the highest density.
- Append a b to the drive number to specify *BSD behavior*. This means that when reading past an end-of-file mark, it returns the first record of the next file. This is desirable if the tape is going to be read on a BSD UNIX® system.
- Append an n to the drive number to specify *no rewind* operation. Otherwise, the tape will rewind when the tape operation is complete.
- Append a c to specify *compression* mode. For some drives, the compression mode is incorporated in some of the data density codes and adding the c is redundant.

Valid tape name combinations are shown in the table below. If you are working with the second tape drive, use 1 instead of 0.

0l	0c	0h	0m	0l	0u
0b	0cb	0hb	0mb	0lb	0ub
0bn	0cbn	0hbn	0mbn	0lbn	0ubn
	0cn	0hcn	0mnc	0lcn	0ucn