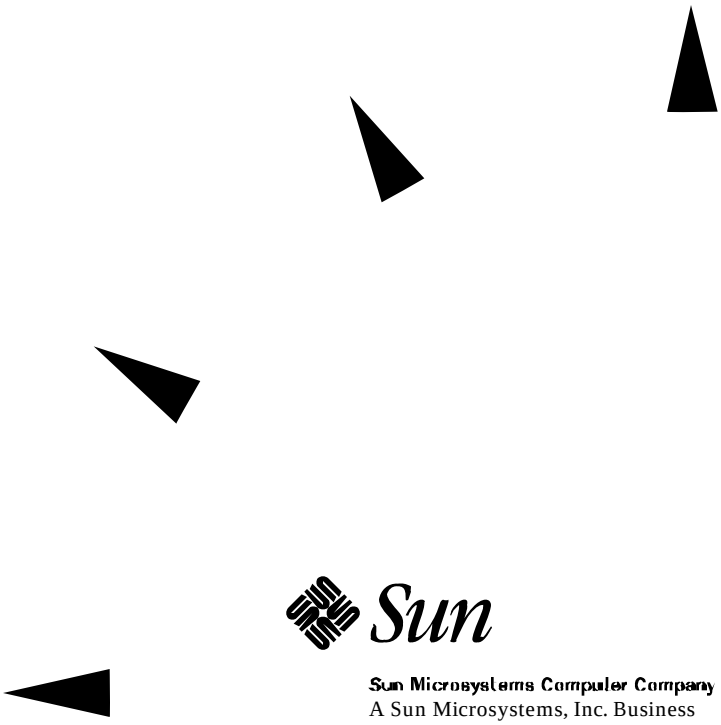
Solaris 2.4 Handbook for SMCC Peripherals



2550 Garcia Avenue
Mountain View, CA 94043
U.S.A.

Part No: 801-6990-10
Revision A, November 1994

Sun Microsystems Computer Company
A Sun Microsystems, Inc. Business

Contents

Figures

Tables

Preface

The *Solaris 2.4 Handbook for SMCC Peripherals* describes how to configure Sun Microsystems Computer Corporation (SMCC) peripheral devices, such as disk drives, tape drives, CD-ROM drives, and boards by using the Solaris® 2.4 operating environment.

Note – The Solaris 2.4 operating environment includes the SunOS™ 5.x operating system, the OpenWindows™ operating environment, and other software.

Before You Read This Book

You should have:

- Read the hardware installation guide(s) that accompanies the peripheral device(s) before you start to configure any peripheral devices.
- Installed the Solaris 2.4 operating environment on your system.

Note – If you have not yet installed the Solaris 2.4 operating environment on your system, do so now.

Related Books

The following books are related to the tasks described in this handbook:

- *SunOS 2.4 System Administration Guide*
- *Solaris 2.4 System Configuration and Installation Guide*
- *SunOS 2.4 Adding and Maintaining Devices and Drivers*
- *OpenBoot Command Reference*

What Typographic Changes and Symbols Mean

The following table describes the typeface changes and symbols used in this handbook.

Table P-1 Typographic Conventions

Typeface or Symbol	Meaning	Example
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. system% You have mail.
`AaBbCc123`	What you type, contrasted with on-screen computer output	`system% su` `Password:`
AaBbCc123	Command-line placeholder: replace with a real name or value	To delete a file, type `rm` *filename*.
AaBbCc123	Book titles, new words or terms, or words to be emphasized	Read Chapter 6 in *User's Guide*. These are called *class* options. You *must* be root to do this.
Code samples are included in boxes and may display the following:		
%	UNIX C shell prompt	system%
$	UNIX Bourne shell prompt	system$
#	Superuser prompt, either shell	system#

Before You Start 1

This chapter describes the requirements and procedures that you must perform to power off or shut down your system.

Requirements

Before you start to set up a peripheral device, you must have:

- Installed the Solaris 2.4 operating environment
- Turned on power to the system

Note – This handbook does not describe how to install the Solaris 1.x (SunOS 4.x) operating environment. Refer to the documentation accompanying your system for these instructions.

1

Verifying the System Environment

Before you start to install a peripheral device such as a disk drive or a CD-ROM drive, verify the system environment that you are using.

♦ **Type** `uname -rs` **and press Return.**
The operating system responds by displaying one of the following messages:

```
SunOS 5.1
```

or

```
SunOS 5.2
```

or

```
SunOS 5.3
```

or

```
SunOS 5.4
```

The screen displays `SunOS 5.0`, `5.1`, `5.2`, `5.3`, or 5.4 as the version of the operating system. The Solaris 2.x system environment, to which this handbook refers, includes the SunOs operating system as well as compilers and other software.

Note – If you are using an environment other than Solaris 2.x, the commands and tasks described in this handbook do not apply. If you are using SunOS 4.x, refer to the *SunOS 4.x Handbook for SMCC Peripherals.*

When you have completed this task, go to “Shutting Down the System” in the next section.

Shutting Down the System

Before you start to install a disk drive, CD-ROM drive, or any other peripheral device, you must power off or shut down your system. Powering off or shutting down a system consists of performing a number of tasks in a specific order.

Note – If you have not yet verified your system environment, do so now before you proceed.

---

1. Become superuser by typing su **and pressing Return.**

```
tutorial% su
```

2. Type your superuser password and press Return.
If you type the password correctly, the root prompt (#) is displayed.

```
Password: superuser password
#
```

3. Add a device driver if necessary.

If a new device driver is needed, use the pkgadd command and the Software Manager tool to perform this task. Refer to the *Solaris 2.4 Adding and Maintaining Peripherals* manual and the *Solaris 2.4 System Configuration and Installation Guide* for instructions to add a device driver.

Note – This task is optional; most device drivers are already part of the operating system. If a device driver has to be added, you would typically find a CD-ROM accompanying the drive as well as instructions on how to add the device driver. If you cannot find a CD-ROM or instructions on how to add a specific device driver, probably no new device driver is needed. Therefore, you can skip this step.

---

4. **Type** `touch /reconfigure` **and press Return**

```
tutorial# touch /reconfigure
```

This command ensures that the operating system checks for the presence of any newly installed peripheral devices when you power on or boot your system.

5. **Type** `cd /` **and press Return**

```
tutorial# cd /
```

6. **Type** `/usr/sbin/shutdown -y -g30 -i0` **and press Return.**

```
tutorial# /usr/sbin/shutdown -y -g30 -i0
.
.
.
.
ok
```

Note – The 0 in `i0` is a zero.

A message is sent notifying all users who are logged in that they have 30 seconds (`-g30`) before the system begins to shut down. The `ok` or > prompt is displayed once the system is shut down.

Note – Be sure that you have turned on all SCSI devices, such as disk and tape drives, before you attempt to use the `probe-scsi` or `probe-scsi-all` commands. The operating system can detect already connected SCSI devices only if you turned them on.

7. **At the** `ok` **prompt type** `reset` **and press Return. Then immediately press L1-a to interrupt the reboot and cause the** `ok` **prompt to return.**

8. **At the** `ok` **prompt, type** `probe-scsi` **to list the SCSI target IDs that are currently being used and press Return.**
   If you have more than one host bus on your system, you may want to use the `proble-scsci-all` command because it probes for SCSI devices on all busses including the host bus.

   If the > prompt is displayed instead of the `ok` prompt, type `n` at the > prompt and press Enter.

   You should now see the `ok` prompt.

9. **Choose an unused SCSI target ID for your drive.**
   Note the target IDs that are already assigned. Set the SCSI switch or jumpers on your device to an unassigned SCSI target ID. See Chapter 6, “Selecting Addresses” of this handbook.

10. **Turn off power to the system first and then to all external peripheral devices after the** `ok` **or > prompt is displayed.**
    Refer to the hardware installation guide for your system for the location of the power switch. Refer to the hardware installation guides for the location of the power switches on those peripheral devices.

You are now ready to install the peripheral device. Refer to the hardware installation guides that accompany the peripheral devices for information on how to install and connect those devices.

1

Setting Up a Disk Drive 2

Be sure to read the requirements before you start to configure the operating system for a new disk drive.

Requirements

Before you start to configure the operating environment for a new disk drive, you must have:

- Installed the Solaris 2.4 operating environment
- Shut down the system and those peripherals that are already connected as described in Chapter 1, “Before You Start”

Note – If you did not follow the procedures as described in Chapter 1, “Before You Start,” the operating system may not recognize the presence of the new disk drive.

- Installed the disk drive as described in the hardware installation manual that accompanies your disk drive. If you have not yet installed your disk drive, do so now before you proceed.

  This task includes finding the location of the address switch or jumpers on the disk drive as well as setting the SCSI target ID.

Note – When installing a fast SCSI drive, be sure to connect external drives with cables equipped with ferrite cores (for example, part number 530-1893 for desktop systems). Also, in SCSI chains with fast SCSI drives, be sure to use a regulated terminator (for example, part number 150-1785).

Information on how device addresses (or logical names) are assigned is shown in Table 2-1.

Configuring the System

When you boot the system after adding a disk drive, the Solaris 2.x operating environment automatically configures the system by assigning a device address to a disk drive if the:

- SCSI switch or jumper settings are correctly set.
- Operating environment has been properly shut down as described in Chapter 1, “Before You Start.”

To configure the system for the addition of a disk drive:

1. **Note the address that is assigned to the disk drive.**
   Refer to Table 2-1 to see how the SCSI address switch or jumper settings determine the device address that is assigned. You should already have correctly set the physical SCSI switch or jumpers on your disk drive, as described in your disk drive installation manual and Chapter 6, “Selecting Addresses.”

   For example, the first internal disk drive usually has jumper settings that have been preset by the factory to SCSI target ID 3. If your system has a second internal disk drive, the factory usually sets the jumpers to SCSI target ID 1. External disk drives are usually preset to SCSI target ID 3 by the factory.

   Because the internal disk drive has been preset to SCSI target ID 3, you must change the default SCSI setting of your external disk drive to an unused target ID.

   Each SCSI target ID determines the device address the Solaris 2.x operating system assigns to the drive.

Note – If you have more than one SCSI device, such as a disk drive, you must set each SCSI address switch to a different address.

2. **Turn on power to all external peripheral devices, including the disk drive that you plan to configure, and then the system.**
   The system automatically boots and configures the new drive.

Caution – Since each disk drive must have a unique SCSI target ID setting, the SCSI address switches on your disk drives may need to be set to different numbers than those shown in Table 2-1. For further information on device addresses, go to Chapter 6, “Selecting Addresses” in this handbook.

Table 2-1 Example of Address Selection Scheme for Disk Drives

Disk Drives	SCSI Address Switch or Jumper Setting (Target ID)	Device Address with Built-In SCSI Support	Device Address with First SCSI Interface Card
First internal disk drive	3	c0t3d0	
Second internal disk drive; if you do not have a second internal disk drive, you can use this address for your first external disk drive.	1	c0t1d0	
First external disk drive that is connected to the built-in SCSI connector	2	c0t2d0	
Second external disk drive	0	c0t0d0	
CD-ROM player	6	c0t6d0	
First external disk drive (2nd SCSI controller)	1		c1t1d0
Second external disk drive (2nd SCSI controller)	2		c1t2d0
Third external disk drive (2nd SCSI controller)	3		c1t3d0

3. **Become superuser by typing su and pressing Return.**

```
tutorial% su
```

4. **Type your superuser password and press Return.**
   If you type the password correctly, you have superuser access to your system. The root prompt (#) is then displayed.

```
Password: superuser password
#
```

5. **Format the disk if necessary.**
   For information on how to format this disk, go to Chapter 7, “Preparing Media” in this handbook.

Note – This task is optional; many disks have already been formatted at the factory.

6. **Partition the disk if necessary.**
   For information on how to partition a disk, go to Chapter 7, “Preparing Media” in this handbook.

Note – This task is optional; many disks have already been partitioned at the factory.

7. **Label the disk.**
   For information on how to label a disk, go to Chapter 7, “Preparing Media” in this handbook.

8. **Prepare a file system for each partition.**
   For information on how to prepare a file system, go to Chapter 7, “Preparing Media” in this handbook.

9. **Mount each file system.**
   For information on how to mount each file system, go to Chapter 7, “Preparing Media” in this handbook.

Note – Be sure not to mount any partition that you intend to use as swap space or as an unmounted partition.

This completes the tasks required to set up your disk drive.

Setting Up a Tape Drive 3

Be sure to read the requirements before you start to configure the operating system for a new tape drive.

Requirements

Before you start to configure the operating environment for a new tape drive, you must have:

- Installed the Solaris 2.3.2 operating environment
- Shut down the system and those peripherals that are already connected as described in Chapter 1, “Before You Start”

Note – If you did not follow the procedures as described in Chapter 1, “Before You Start,” the operating system may not recognize the presence of the new tape drive.

- Installed the tape drive as described in the hardware installation manual that accompanies your tape drive. If you have not yet installed your tape drive, do so now before you proceed.

  This task includes finding the location of the address switch or jumpers on the tape drive as well as setting the SCSI target ID.

Note – If you are installing a third-party SCSI tape drive, refer to the *st(7)* man page for information on how to specify tape drive configuration data.

Information on how device addresses are assigned is shown in Table 3-1.

Configuring the System

When you boot the system after adding a tape drive, the Solaris 2.3.2 operating environment automatically configures the system by assigning a device address to a tape drive if:

- SCSI switch or jumper settings are correctly set
- Operating environment has been properly shut down as described in Chapter 1, “Before You Start.”

To configure the system for the addition of a tape drive:

1. **Note the address that is assigned to the tape drive.**
   Refer to Table 3-1 to see how the SCSI address switch or jumper settings determine the device address that is assigned. You should already have correctly set the physical SCSI switch or jumpers on your tape drive, as described in your tape drive installation manual and Chapter 6, “Selecting Addresses.”

   For example, the SCSI address switch for tape drives is typically preset by the factory to SCSI target ID 4. If you have more than one external tape drive, you must set the SCSI address switch of the second external tape drive to an address other than SCSI target ID 4. Set the SCSI address switch of the second external tape drive to SCSI target ID 5.

Note – If you have more than one SCSI device, such as tape drive, you must set each SCSI address switch to a different target ID.

2. **Turn on power to all external peripheral devices, including the tape drive that you plan to configure, and then the system.**
   The system automatically boots and configures the new drive.

Caution – Since each tape drive must have a unique SCSI target ID setting, the SCSI address switches on your tape drives may need to be set to different numbers than those shown in Table 3-1. For further information on device addresses, go to Chapter 6, “Selecting Addresses” in this handbook.

You can connect any number of tape drives to a single SCSI bus provided that the total cable length does not exceed 6 meter and SCSI addresses are available.

Table 3-1 Example of Address Switch Settings for Tape Drives

Tape Drives	SCSI Address Switch or Jumper Setting (Target ID)	Device Address for Built-In SCSI Support[1]
First external tape drive	4	`/dev/rmt/0u` or `/dev/rmt/0c` or `/dev/rmt/0h` or `/dev/rmt/0m` or `/dev/rmt/0l` or `/dev/rmt/0`
Second external tape drive	5	`/dev/rmt/1u` or `/dev/rmt/1c` or `/dev/rmt/1h` or `/dev/rmt/1m` or `/dev/rmt/1l` or `/dev/rmt/1`

1. You can add up to six devices.

This completes the tasks required to set up your tape drive.

You can now use the tape drive to:

- Tension a tape (applicable only to 1/4” tape cartridges)
- Back up data files and file systems or partitions

3

Tensioning a Tape Cartridge

When you insert a *blank* tape cartridge into a 1/4" tape drive, you should perform a tensioning pass. This procedure runs the tape from one end to the other and ensures an even distribution of tension throughout the new tape.

Note – Do not run a tensioning pass on a Digital Data Storage (DDS) device, such as the 5.0 Gbyte 4mm DDS tape drive.

To run a tensioning pass:

1. **Insert the new blank tape cartridge into the tape drive.**
2. **Type**

```
% mt -f /dev/rmt/unit number retension
```

and press Return.

Rewinding a Tape

To rewind a tape:

1. **Type**

```
% mt -f /dev/rmt/unit number rewind
```

Backup Tools

To back up data files and file systems or partitions on a tape cartridge, use any of the following commands:

- `cpio`
- `dd`
- `ufsdump`
- `ufsrestore`
- `tar`

For an explanation of each command, its options and arguments, refer to the sections that follow or to the on-line *man* pages. Although you can use any of these commands, you may want to use the `ufsdump` and `ufsrestore` commands because they are easy to use.

Before you can use these commands, you need to find out whether the tape is ready to receive data by displaying the status of the tape drive.

Note – If you have a 5.0 Gbyte 4mm DDS device, use a blocking factor of 96 instead of the default factor of 20 to optimize performance. The blocking factor of 96 translates to 48 Kbytes per transfer.

For the 150 Mbyte 1/4-inch tape drive, the 2.3 Gbyte 8mm tape drive, the 5.0 Gbyte 8mm tape drive, and the Front-Load 1/2-inch tape drive, use a blocking factor of 126 instead of the default factor of 20 to optimize performance

---

Displaying the Status of a Tape Drive

1. **Insert the tape into the tape drive.**
   For instructions on how to insert a tape into your tape drive, refer to the manual that accompanies the tape drive.

2. **Enter**

```
% mt -f /dev/rmt/0 status
```

   This command looks for and “finds” the tape drive whose device address or device name is `/dev/rmt/0`. It then displays the status of the tape drive.

Note – If you have more than one tape drive connected to your system, you execute the same command but change the device name from `dev/rmt/0` to `/dev/rmt/1`, `/dev/rmt/2`, etc.

If the status is displayed as follows, your system is able to access the tape.

```
Archive QIC-150 tape drive:
  sense key(0x0)= nosense     residual= 0 retries= 0
  file no= 0    block no= 0
```

`sense key= nosense` indicates that your system was able to access the tape and there were no errors. You can then use any of the backup commands described in the following sections.

If he status is displayed as follows after you have just inserted a tape cartridge, your system is not able to access the tape.

```
Archive QIC-150 tape drive:
  sense key(0x6)= unit attention     residual= 0 retries= 0
  file no= 0    block no= 0
```

In this case, execute the `mt -f /dev/rmt/0 status` command again until the `sense key(0x6)= unit attention` advisory message is replaced with the `sense key(0x0)= nosense` message.

If the status is displayed as follows, your system is unable to access the tape.

```
/dev/rmt/0: no tape loaded or drive offline
```

In this case, turn on your tape drive, insert a tape, and then execute the `mt -f /dev/rmt/0 status` command again.

`cpio` *Command*

The `cpio` command copies files from a hard disk to a tape as well as from a tape to a hard disk.

If you need more than one tape to back up files that are resident on your hard disk, use this command. This feature of the `cpio` command is referred to as *multiple-volume interchange.*

If you need to back up only a few files, you can use the `tar` command or the `ufsdump` command. The `tar` command supports only *single-volume interchange*.

The following example shows how to copy the files in your working directory called `/work` and all directories “below” your working directory to a tape drive whose device address or device name is `/dev/rmt/0`.

```
example# cd /work
example# ls -R | cpio -ocB > /dev/rmt/0
```

The next example explains how to copy the files that are located on your tape back to your hard disk.

```
example# cd /work
example# cpio -icdB < /dev/rmt/0
```

- The `c` option indicates that header information has been written in ASCII format for portability.
- The `d` option indicates that as many directories as needed will be created.
- The `B` option, which you must use whenever you copy files or files systems to and from a tape drive, indicates that the input has a blocking factor of 5120 bytes to the record.

Note – You must use the same blocking factor when you retrieve or copy files from the tape to the hard disk as you did when you copied files from the hard disk to the tape. Therefore, you must specify the `B` option.

dd *Command*

This command converts and copies files that have different data formats. The most common usage of this command is to transfer a file system or partition from your hard disk to a tape. You can also use it to copy files from one hard disk to another. If you use a device with a variable block size, you need to make sure that you use the same block size for copying the files from a hard disk to a tape and from a tape to a hard disk.

The following example shows how to write the file system or partition `/user/sunsystem` to a 4mm tape drive whose device address or device name is `/dev/rmt/0`. The blocking factor is 96 in this example. This example has been optimized for a 5.0 Gbyte 4mm DDS device.

```
example# dd if=/user/sunsystem of=/dev/rmt/0 bs=96b
```

`ufsdump` *Command*

The `ufsdump` command copies a file system that is resident on a hard disk to a tape.

Note – This command does not allow you to copy files from different file systems or partitions. All files have to be part of one file system or one partition. If you wish to copy files from different file systems or partitions, use the `ufsdump` command or the `tar` command.

The following example explains how to copy all files that are located on a disk drive in partition `/dev/rdsk/c0t3d0s2` to a file (often referred to as a *dump file*) called `/dev/rmt/2c` in compressed mode. Compressed mode is supported only by the Digital Audio Tape.

```
example# ufsdump 0ubf 96 /dev/rmt/2c /dev/rdsk/c0t3d0s2
```

- The `0` option represents the dump level. A level 0 dump copies the entire file system to a dump file, which in this case is called `/dev/rmt/2`. You can specify any number between 0 and 9.
- The `u` option updates the dump record by adding an entry to the file `/etc/dumpdates` for each file system that has been successfully copied. It updates the `/etc/dumpdates` file by adding the name of every file system, the date the file system was copied, and the dump level that was specified at that time.
- The *b* option specifies the blocking factor that is to be used when the files are copied to the tape. The default blocking factor is 20. The blocking factor is 96 in this example. This example has been optimized for a 5.0 Gbyte 4mm DDS device.

- The `f` option specifies the device address or device name of the tape drive, which is `/dev/rmt/2` in this example.
- `/dev/rdsk/c0t3d0s2` is the device name or address of the source device where files are located that you want to copy. In this example it is the second partition on the third hard disk that is connected to your system.

`ufsrestore` *Command*

The `ufsrestore` command copies file systems from a tape to a hard disk. It can only copy file systems that were previously copied from a hard disk to a tape with the `ufsdump` command.

The following example explains how to copy all files that are located on a tape drive in the `/man` directory and whose device address or device name is `/dev/rmt/0` to a hard disk. However, you must first go to the directory into which you wish to copy the file systems or partitions before you attempt to retrieve or extract any files. In this example, the directory into which all files systems or partitions will be copied is `disk2`, and the blocking factor is 96. This example has been optimized for a 5.0Gbyte 4mm DDS device.

```
example# cd /disk2
example# ufsrestore ibf 96 /dev/rmt/0
```

Note – You must use the same blocking factor when you retrieve or copy files from the tape to the hard disk as you did when you copied files from the hard disk to the tape. Therefore, you must specify the `b` option.

The system responds with a `ufsrestore` prompt. If you enter a question mark, a list of available arguments is displayed.

```
Available commands are:
  ls [arg] - list directory
  cd arg - change directory
  pwd - print current directory
  add [arg] - add ‘arg’ to list of files to be extracted
  delete [arg] - delete ‘arg’ from list of files to be extracted
  extract - extract requested files
  setmodes - set modes of requested directories
  quit - immediately exit program
  what - list dump header information
  verbose - toggle verbose flag (useful with “ls”)
  help or ‘?’ - print this list
IF no ‘arg’ is supplied, the current directory is used
```

You can now list the directories that are resident on the tape by entering `ls`.

```
ufsrestore > ls
4lib/      dict        mail     openwin      spool
5bin       games       man/     preserve     src
adm        include/    net      pub          tmp
```

You are now ready to select the directories or files by using the `add` argument.

```
ufsrestore > add man
```

You can copy the `man/` directory from the tape to the hard disk. An asterisk is displayed next to the `man/` directory.

```
ufsrestore > ls
4lib/      dict        mail     openwin      spool
5bin       games      *man/     preserve     src
adm        include/    net      pub          tmp
```

Now you can extract or copy the files located in the `man/` directory on the tape.

```
ufsrestore > extract
```

This completes the extraction or copying of the files in the `man/` directory located on the tape.

`tar` *Command*

The `tar` command copies file systems or individual files from a hard disk to a tape (writing to tape) or from a tape to a hard disk (reading from tape). If you need more than one tape to back up files that are resident on your hard disk, use the `cpio` command or the `ufsdump` command. The `tar` command only supports *single-volume interchange*.

The following example explains how to copy files from a hard disk to a tape.

```
example# tar cvbf 96 /dev/rmt/1 filename
```

- In this example the `tar` command copies files to a tape drive whose device name or address is `/dev/rmt/1` by using the `c` option.
  - The `f` option allows you to designate the device name or address of the source drive, which is the tape drive in this example.
  - The `v` option allows the system to display information about each file it copies.
  - The `b` option allows you to designate the blocking factor, which in this example is 96. This example has been optimized for a 5.0 Gbyte 4mm DDS device.

The next example explains how to copy files from a tape to the current working directory located on a hard disk.

```
example# tar xvbf 96 /dev/rmt/1
```

- In this example the `tar` command copies files to your current working directory located on the hard disk by using the `x` option.

- The `f` option allows you to designate the device name or address of the destination drive, which are all the files on the tape cartridge in this example.
- The `v` option allows the system to display information about each file it copies.
- The `b` option allows you to designate the blocking factor, which in this example is 96. This example has been optimized for a 5.0 Gbyte 4mm DDS device.

Note – You must use the same blocking factor when you retrieve or copy files from the tape to the hard disk as you did when you copied files from the hard disk to the tape.

Setting Up a CD-ROM or Floppy Disk Drive

4

Be sure to read the requirements that you must have completed before you start to configure the operating system for a new CD-ROM or floppy disk drive.

CD-ROMs provide large data capacity and have quickly become today's medium of choice for software distribution. CD-ROM drives allow you to add both operating system and application packages quickly and easily to the workstations you administer.

Floppies provide small amounts of data storage and are typically used to transfer files to a non-networked personal computer or to store individual user files.

For important information about how the Solaris 2.4 or higher operating environment manages CD-ROM and floppy devices, read the "How Solaris Manages CD-ROM and Floppy Devices" in this chapter.

4

Requirements

Before you start to configure the operating environment for a new CD-ROM or floppy disk drive, you must have:

- Installed the Solaris 2.4 operating environment
- Shut down the system and those peripherals that are already connected as described in Chapter 1, “Before You Start”

Note – If you did not follow the procedures as described in Chapter 1, “Before You Start,” the operating system may not recognize the presence of the new CD-ROM or floppy disk drive.

- Installed the CD-ROM or floppy disk drive as described in the hardware installation manual that accompanies your disk drive. If you have not yet installed and set the SCSI address of your CD-ROM or floppy disk drive, do so now before you proceed.

Note – The floppy disk drive is not a SCSI device.

This task includes finding the location of the address switch or jumpers on the CD-ROM or floppy disk drive as well as setting the SCSI target ID.

For information on how to select device addresses, go to Chapter 6, “Selecting Addresses,” in this handbook.

How Solaris Manages CD-ROM and Floppy Devices

Volume Management automates the interaction between you and your CD-ROMs and floppies. For example, in previous Solaris releases (Solaris 2.1 or any releases preceding Solaris 2.1), to mount and access data on a CD-ROM you had to follow these steps.

```
# cd /
# mkdir /cdrom
# mount -F ufs -o ro /dev/dsk/c0t6d0s2 /cdrom
```

If you attempt to follow these instructions while using the Solaris 2.3.2 or higher system software, you may see one or both of these messages.

```
# mkdir /cdrom
mkdir:  Failed to make directory "/cdrom"; File exists
# mount -F ufs -o ro /dev/dsk/c0t6d0s0 /cdrom
mount: /dev/dsk/c0t6d0s0 is already mounted, /cdrom is busy,
        or allowable number of mount points exceeded
```

You will also see the following messages when you attempt to use the `/dev/diskette` path to access or eject floppies.

```
% tar cvf /dev/diskette proposal status reviewers
tar: cannot open /dev/diskette.
% eject /dev/diskette
/dev/rdiskette is busy (try /vol name?)
```

In the Solaris 2.2 or higher version of the system, Volume Management automatically mounts CD-ROMs and floppies with file systems at `/cdrom/`*cdrom_name* and `/floppy/`*floppy_name* respectively. It also keeps track of CD-ROM and floppy file systems during a workstation session (rebooting will clear the in-memory database). To view the media that has been inserted during a workstation session, list `/vol/dsk`.

```
% ls /vol/dsk
solaris_2_1/   unnamed_cdrom#1
unnamed_cdrom  unnamed_floppy
```

Volume Management uses the configuration file `/etc/vold.conf` to determine which devices it manages. The default `/etc/vold.conf` file contains the following information.

```
# @(#)vold.conf 1.13     92/10/28 SMI
#
# Volume Daemon Configuration file
#

# Database to use (must be first)
db db_mem.so

# Labels supported
label dos label_dos.so floppy
label cdrom label_cdrom.so cdrom
label sun label_sun.so floppy

# Devices to use
use cdrom drive /dev/dsk/c0t6 dev_cdrom.so cdrom0
use floppy drive /dev/fd0 dev_floppy.so floppy0

# Actions
insert /vol*/dev/fd[0-9]/* user=root /usr/sbin/rmm
insert /vol*/dev/dsk/* user=root /usr/sbin/rmm
eject /vol*/dev/fd[0-9]/* user=root /usr/sbin/rmm
eject /vol*/dev/dsk/* user=root /usr/sbin/rmm
notify /vol*/rdsk/* group=tty /usr/lib/vold/volmissing -c

# List of file system types unsafe to eject
unsafe ufs hsfs pcfs
```

Before you add secondary CD-ROM and floppy drives to a system, update this file by adding the new devices to the “Devices to use” list. The syntax for a “Devices to use” entry

`use` *device type special shared_object symname options*

Here are the explanations of each variable item in the device control line.

Table 4-1 Device Control Syntax Descriptions

Syntax item	Description	Supported and default values
device	The type of removable media device to be used.	`cdrom`, `floppy`
type	The class of device—multiple or single media support	`drive`
special	Pathname of the device to be used. Path usually begins with /dev.	Default support is for the devices `/dev/dsk/c0t6` and `/dev/diskette`
shared object	The location of the code that manages this device.	The default location is `/usr/lib/vold/`*name_ of_shared_object*
symname	The symbolic name that refers to this device. The symname is placed in the device directory (either /cdrom or /floppy)	Default values are `cdrom0`, `floppy0`
options	The user, group, and mode permissions for the media inserted.	Default values are `user=nobody`, `group=nobody`, `mode=0666`

After updating the `/etc/vold.conf` file, you attach the drive and reboot your system with a reconfiguration boot. To do so enter either `boot -r` or `touch /reconfigure`.

Note – Volume Management controls the `/dev/dsk/c0t6d0s0` path to a CD-ROM drive and the `/dev/diskette` path to a floppy drive. An attempt to access a CD-ROM or floppy using these paths will result in an error message.

For more information about volume management, see the man page for *vold.conf(4)* and the *Solaris 2.4 Driver Developer AnswerBook* manual.

Configuring the System

Most CD-ROM drives conform to the Small Computer Systems Interface (SCSI) protocol. This means getting a CD-ROM drive up and running on your workstation usually involves little more than plugging in the cables and, if applicable, setting the jumpers or SCSI target switch to 6 (or another number if it is a secondary drive). Consult the documentation accompanying your CD-ROM drive for information about physical connections.

When you boot the system after adding a CD-ROM or floppy disk drive, Solaris 2.4 automatically configures the system by assigning a device address to the CD-ROM or floppy disk drive if:

- SCSI switch or jumper settings are correctly set
- Operating environment has been properly shut down as described in Chapter 1, “Before You Start”

To configure the system for the addition of a CD-ROM or floppy disk drive:

1. **Check that the address switch for the CD-ROM or floppy disk drive has been correctly set.**
   You should already have correctly set the physical SCSI switch or jumpers on your CD-ROM or floppy disk drive, as described in your CD-ROM or floppy disk drive installation manual and Chapter 6, “Selecting Addresses.”

   For example, the SCSI address switch for CD-ROM drives has typically been preset by the factory to SCSI target ID 6.

Note – If you have more than one SCSI device, such as a CD-ROM drive, you must set each SCSI address switch to a different target ID.

2. **Turn on power to all external peripheral devices, including the CD-ROM drive that you plan to configure, and then the system.**
   The system automatically boots and configures the new drive.

   You are now ready to mount the CD-ROM or floppy disk drive.

Adding an Additional CD-ROM Drive

Note – Be sure that the target number you select is not already used by a peripheral attached to your system. Use `ls /dev/dsk` to list the existing devices and their addresses.

To add an additional CD-ROM drive for the Solaris operating system version 2.2 or greater:

Note – You can connect no more than seven CD-ROM drives to a single SCSI bus provided that the total cable length does not exceed 6 meter.

---

1. **Edit the `/etc/vold.conf` file to add the CD-ROM drive to the list of devices managed by Volume Management.**

Copy the default CD-ROM line under “Devices to use” and change the device address and mount location.

```
# Devices to use
use cdrom drive /dev/dsk/c0t6 dev_cdrom.so cdrom0
use cdrom drive /dev/dsk/c0t5 dev_cdrom.so cdrom1
```

In this example, a new entry was added for a CD-ROM drive with a target number of *5*. When a CD-ROM containing a file system is inserted into this secondary CD-ROM drive, it will automatically be mounted as `/cdrom/cdrom1`. If the CD-ROM does not contain a file system, it can be accessed at `/vol/dev/dsk/ct05/unnamed_cdrom` as a block device.

2. **Shut down the operating environment as described in Chapter 1, “Before You Start.”**

3. **Turn on power to all external peripheral devices, including the second CD-ROM drive that you plan to configure, and then the system.**
   The system automatically boots and configures the new drive.

4

Reference Material for CD-ROM and Floppy Devices

CD-ROM and floppy file systems are automatically mounted in default locations by Volume Management when the media is inserted. See Table 4-2 for more information.

These mount points are only created and mounted if a file system is already resident on the floppy disk.

Table 4-2 CD-ROM and Floppy File System Mount Points

Media type	Mount location	State of media
Floppy	`/floppy/floppy0`	Symbolic link to mounted floppy in local floppy drive
Floppy	`/floppy/`*floppy_name*	Mounted named floppy
Floppy	`/floppy/unnamed_floppy`	Mounted unnamed floppy
CD-ROM	`/cdrom/cdrom0`	Symbolic link to mounted CD-ROM in local CD-ROM drive
CD-ROM	`/cdrom/`*CD-ROM_name*	Mounted named CD-ROM
CD-ROM	`/cdrom/`*CD-ROM_name*`/`*partition*	Mounted named CD-ROM with partitioned file system
CD-ROM	`/cdrom/unnamed_cdrom`	Mounted unnamed CD-ROM

To inform Volume Management that a floppy with a file system has been inserted into the drive, use `volcheck`(1). You do not need to use this command if you are going to use the commands `fdformat`(1) or `eject`(1). For more information on how to use floppies, see the *AnswerBook Administrator's Guide*.

If there is no file system on the media, Volume Management provides block and character devices in the `/vol` file system. See Table 4-3 for the location of floppy and cdrom media in the `/vol` file system.

Note – All releases provide a symbolic link in `/vol/dev/aliases`.

Table 4-3 CD-ROM and Floppy Device Locations in `/vol` with No File System Present

Solaris 2.2		
Media type	**Device location**	**State of media**
Floppy	`/vol/dev/fd0/unnamed_floppy`	Formatted unnamed floppy—block device access
Floppy	`/vol/dev/rfd0/unnamed_floppy`	Formatted unnamed floppy—raw device access
Floppy	`/vol/dev/fd0/unlabeled`	Unlabeled floppy—block device access
Floppy	`/vol/dev/rfd0/unlabeled`	Unlabeled floppy—raw device accesss
CD-ROM	`/vol/dev/dsk/c0t6/unnamed_cdrom`	CD-ROM—block device access
CD-ROM	`/vol/dev/rdsk/c0t6/unnamed_cdrom`	CD-ROM—raw device access
Solaris 2.3 or higher		
Media type	**Device location**	**State of media**
Floppy	`/vol/dev/diskette0/unnamed_floppy`	Formatted unnamed floppy—block device access
Floppy	`/vol/dev/rdiskette0/unnamed_floppy`	Formatted unnamed floppy—raw device access
Floppy	`/vol/dev/diskette0/unlabeled`	Unlabeled floppy—block device access
Floppy	`/vol/dev/rdiskette0/unlabeled`	Unlabeled floppy—raw device accesss
CD-ROM	`/vol/dev/dsk/c0t6/unnamed_cdrom`	CD-ROM—block device access
CD-ROM	`/vol/dev/rdsk/c0t6/unnamed_cdrom`	CD-ROM—raw device access

Ejecting a CD-ROM

1. **Type**

```
% eject cd
```

or

```
% eject cdrom
```

This command applies only to a CD-ROM disk drive that has been connected to the on-board SCSI bus. If your CD-ROM disk drive is connected to a SCSI bus other than the on-board SCSI bus, you may need to manually eject the CD-ROM disk.

Setting Up a Board 5

Be sure to read the requirements that you must have completed before you start to configure the operating system for a new board.

Requirements

Before you start to configure the operating environment for a new board, you must have already done the following:

- Installed the Solaris 2.4 operating environment
- Shut down the system and those peripherals that are already connected as described in Chapter 1, “Before You Start”

Note – If you did not follow the procedures as described in Chapter 1, “Before You Start,” the operating system may not recognize the presence of the new board.

- Installed the board that you plan to configure as described in the installation manual that accompanies your board. If you have not yet installed your board, do so now before you proceed.

  This task includes finding the location of the address jumpers on the board as well as figuring out how to select a device address.

For information on how to select device addresses, go to Chapter 6, “Selecting Addresses” in this handbook.

5

Configuring the System

1. **Determine the address selection scheme of the system and board.**
   In many cases jumpers and switches on a board are preset appropriately in the factory.

2. **Set any jumpers or switches that require different settings.**
   For example, if your system has an SBus and if you are adding an Ethernet card, you may need to change one jumper on that card related to the Link Integrity Test.

3. **Turn on power to all external peripheral devices and then the system.**
   The system automatically boots and configures the new board.

If you want to display a list of all the devices on your system, use the `show-devs` OpenBoot command.

```
ok show-devs
/fd@1,f7200000
/virtual-memory@0,0
/memory@0,0
/sbus@1,f8000000
/auxiliary-io@1,f7400003
/interrupt-enable@1,f5000000
/memory-error@1,f4000000
/counter-timer@1,f3000000
/eeprom@1,f2000000
/audio@1,f7201000
/zs@1,f0000000
/zs@1,f1000000
/openprom
/aliases
/options
/packages
/sbus@1,f8000000/cgsix@3,0
/sbus@1,f8000000/le@0,c00000
/sbus@1,f8000000/esp@0,800000
```

Selecting Addresses 6

This chapter describes how to determine the names and addresses of internal and external peripheral devices. Internal peripheral devices can be disk drives and interface cards. External peripheral devices can be disk drives, printers, modems, and plotters that are cabled to connectors on the rear panel of a Sun system.

Before you can use these peripheral devices, your system must have information that these devices are present, a process that is often referred to as *configuring a peripheral device*.

Before you configure a peripheral device, you must determine:

- Type of interface that the peripheral device uses
- Type of interface and peripheral bus that the Sun system uses
- Address selection scheme that the Sun system and the peripheral devices use

Determining Interfaces of Peripheral Devices

Look in the hardware installation guide that accompanies the peripheral device and determine the interface of the device. Peripheral devices typically use one of the following interfaces:

- Small Computer System Interface (SCSI)
- Intelligent Peripheral Interface (IPI)

6

In many cases, an external device is cabled to a connector that is part of a SCSI card. However, in some cases an external peripheral device is cabled to an onboard (built-in) SCSI connector. An onboard SCSI connector is usually part of the main logic board.

Determining Peripheral Buses of a Sun System

You must determine the type of peripheral bus that your Sun™ system supports. As shown in Table 6-1, there are two types of peripheral buses:

Table 6-1 Supported Interfaces and Peripheral Buses

Peripheral Bus	SCSI	IPI
SBus	Built-in and cards	Not supported
VMEbus	Boards	Boards

Your Sun system may have one or both types of peripheral buses. For information on the type of peripheral bus that your system has, refer to the hardware installation guide that accompanies your Sun system.

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

Determining Interfaces of a Sun System

You must determine the type of interface that your peripheral device requires before you can continue. If you have a peripheral device, such as a disk drive, that requires a SCSI interface, then your Sun system must also have a SCSI interface.

Sun systems support the following interfaces:

- Small Computer System Interface (SCSI)
- Intelligent Peripheral Interface (IPI)

Note – Your Sun system may not support these interfaces unless you install additional SCSI or Interface Controller boards. The hardware installation guide that accompanies your Sun system provides information on the types of interfaces that your system can support.

If the particular interface that your peripheral device needs requires you to install a card in your Sun system, make sure that you use a SCSI, IPI, serial, or parallel interface card that is designed for the peripheral bus of your Sun system.

Determining Address Selection Schemes

To configure disk drives, tape drives, CD-ROM drives, printers, and modems, you need to understand the *address selection scheme* that your system uses for the specific peripheral device that you want to configure. Address selection schemes for disk drives differ from address selection schemes for tape drives. This section discusses the address selection schemes for different types of peripheral devices.

Determining the Address Selection Scheme for Disk Drives

Sun systems support the following interfaces for disk drives:

- Small Computer System Interface (SCSI)
- Intelligent Peripheral Interface (IPI)

Make sure that your Sun system supports the interface that your drive requires. As most external drives require a SCSI interface, you may be able to connect them to the built-in SCSI connector of your Sun system. If your Sun system does not have built-in SCSI support, you have to install an additional SCSI card in your SBus or VMEbus. If you plan to connect a drive that requires IPI support, you must install an Interface Controller board in the VMEbus.

Note – The Solaris 2.4 operating environment supports up to seven disk drives or CD-ROM drives on one SCSI bus, provided the cable does not exceed 6 meter. However, the Solaris 2.4 operating environment supports up to fifteen drives or CD-ROM drive on one wide SCSI bus provided the cable does not exceed 25 meters and has a differential interface.

6

Your Sun system uses logical controller ID Numbers, logical bus target ID numbers, logical disk ID numbers, and logical slice (often referred to as “partition”) numbers to access specific areas on a given disk drive. A combination of all these ID numbers make up a *device address* for the drive. (This is sometimes called a *logical name*.)

A typical device address for a disk drive assigned by the Solaris 2.4 operating system would be:

```
c0t1d0s0
```

A typical device address for a CD-ROM drive assigned by the Solaris 2.4 system would be:

```
c0t6d0s0
```

The address selection scheme for disk drives that the Solaris 2.4 system uses is shown in Figure 6-1.

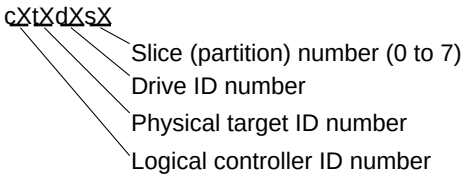


Figure 6-1 Address Selection Scheme for Disk Drives

The Solaris 2.4 operating environment automatically assigns a device address to each internal and external disk drive connected to your Sun system based on the target ID number of the device and the controller board to which it is connected.

Caution – Before the Solaris 2.3.2 system can assign a device address to an external disk drive, the disk drive must have been connected to your Sun system and powered on. If you have connected the external disk drive to your Sun system but have not powered it on, the Solaris 2.3.2 operating system

cannot detect the presence of this disk drive. Therefore, the operating system is unable to assign a device address to that external disk drive. Internal disk drives are automatically detected.

Logical Controller ID Number

Logical controller ID numbers, such as `c0`, `c1`, `c2`, etc., are automatically assigned in sequential order to each interface card to which disk drives are connected. The interface cards can be located in either an SBus or a VMEbus.

The operating system probes and polls the interface cards one by one. If your Sun system has built-in SCSI support, the operating system automatically assigns 0 to that "card." Therefore, any disk drives that are connected to the built-in SCSI "card" have a device address that starts with `c0`. To change the probing order, refer to the *Open PROM Toolkit User's Guide*.

Note – If you move an SBus card to another slot or replace a card with a different type of card at the same location, the logical controller ID number might not be as you expected. A number that was in use earlier might be skipped when ID numbers are assigned to controllers in their new locations. (This situation is sometimes called *persistent instance numbering*.)

Because of the persistence of old logical controller ID numbers, you must update the `/etc/vfstab` file after changing the location or type of cards in SBus slots. For more about editing the `/etc/vfstab` file, see "Creating a File System" on page 56.

Logical Target ID Number

Logical target ID numbers, such as `t0`, `t1`, `t3`, correspond to the address switch setting that you select for each disk drive. All external disk drives have an address switch that is located on the rear panel. The default switch setting for Sun CD-ROM drives is 6. Internal SCSI disk drives usually have jumper settings that have been preset by the factory to 3, as shown in Table 6-2. If your system has a second internal SCSI disk drive, it is usually set to 1 by the factory.

Note – Jumper settings serve the same purpose as address switch settings. They provide a unique address for a disk drive.

If you want to find out the current switch or jumper settings, you can use the `probe-scsi` or the `probe-ipi` commands at the `ok` prompt. The `probe-scsi` command returns the drive's logical target number and device type (name). The `probe-ipi` command returns similar information about disk drives that have an IPI interface.

The `probe-scsi-all` command provides information on devices that are connected to any SBus located on a server other than the on-board SBus, provided this command is supported by the boot PROM on your system.

You must set the address switch on all external disk drives. As you can have up to seven devices daisy-chained to each SCSI or Interface Controller board, you must assign and set a unique address (number) for each disk drive.

Caution – The logical controller ID numbers are automatically assigned by the Solaris 2.4 system. However, you set the logical target ID numbers. They are detected or polled on each disk drive by the operating system.

You *must* have unique addresses selected for each device in each daisy chain. If you accidentally select the same address on two different disk drives that are connected to the same interface card, the Solaris 2.4 system will *not* be able to poll correctly. Therefore, you will not have access to that drive and may not be able to load the system. If this happens, reset the address switch on one of the disk drives.

Table 6-2 provides an example of how the Solaris 2.4 system assigns device names to internal and external disk drives in a Sun system that has both an SBus and a VMEbus. In the example shown in Table 6-2, the Sun system has built-in SCSI support for three attached hard disk drives and one CD-ROM player; it also has two additional SCSI interface cards that are located in the SBus. Each of the SCSI cards has three external disk drives attached. In addition, this system has two IPI cards that are located in the VMEbus. Each of the IPI cards has three external disk drives attached.

Table 6-2 provides the information on how the Solaris 2.4 system assigns device names of controller cards in a system based on the address switch settings selected for each disk drive.

Table 6-2 Sample Layout of Address Switch Settings for Disk Drives

Disk Drives	Built-In SCSI Support	First SCSI Interface Card	Second SCSI Interface Card	First IPI Interface Card	Second IPI Interface Card
First internal disk drive	c0t3				
Second internal disk drive; if you do not have a second internal disk drive, you can use this address for your first external disk drive.	c0t1				
First external disk drive that is connected to the built-in SCSI connector	c0t2				
Second external disk drive	c0t0				
CD-ROM player	c0t6				
First external disk drive		c1t1			
Second external disk drive		c1t2			
Third external disk drive		c1t3			
First external disk drive			c2t1		
Second external disk drive			c2t2		
Third external disk drive			c2t3		
First external disk drive				c3t1	
Second external disk drive				c3t2	
Third external disk drive				c3t3	
First external disk drive					c4t1
Second external disk drive					c4t2
Third external disk drive					c4t3

Note – If you have an SBus-based Sun system, only the SCSI information applies.

Logical Disk ID Number

Logical disk ID numbers, such as `d0,` are assigned by the Solaris 2.4 system as follows:

- The logical disk ID number is set to 0 for any disk drive that is attached to a target controller that doesn't support multiple logical units.
- A target controller that supports multiple logical units assigns the logical disk ID numbers as d0, d1, etc.

Logical Slice (Partition) Number

Logical slice, or partition, numbers range from 0 to 7. To specify an entire disk, use slice 2. If you have a disk drive that has a logical bus target number of 1 and is supported by the built-in SCSI interface, the Solaris 2.4 system assigns logical slice or partition numbers as follows:

```
c0t1d0s0
c0t1d0s1
c0t1d0s2
c0t1d0s3
c0t1d0s4
c0t1d0s5
c0t1d0s6
c0t1d0s7
```

Displaying Addresses of Connected Disk Drives

Use the `format` utility to display addresses of connected disk drives. This section provides two examples:

- Addresses in an SBus system
- Addresses in a system that has both types of peripheral buses:
  - SBus
  - VMEbus

Displaying Addresses of Disk Drives in an SBus

To display addresses of connected and powered-on disk drives in an SBus system:

♦ **Type**

```
# format
Searching for disks...done
```

If you only want to display the disks that are connected to a specific controller, for example, `c2`, type

```
# format /dev/rdsk/c2*
Searching for disks...done
```

The following display is based on an SBus-based system with built-in SCSI support. No additional SCSI cards have been installed. The system has one internal and one external hard disk drive.

Note – Device addresses for CD-ROM drives are not displayed by the `format` utility because the CD-ROM disk drive is a read-only device.

The Solaris 2.4 system has assigned `c0` as the logical controller ID number to all SCSI disks because they are supported by the built-in SCSI interface. The jumpers on the first internal hard disk have been set to 3 by the factory, resulting in a logical bus target ID number of 3 (`t3`).

The address switch on the first external hard disk has been set to 0, resulting in a logical bus target ID number of 0 (`t0`). The address switch on the CD-ROM drive has been set to 6 by the factory and was not changed resulting in a logical bus target ID number of 6 (`t6`).

The following information is displayed.

```
AVAILABLE DISK SELECTIONS:
    0.      c0t3d0 <SUN0207 cyl  1214 alt 2 hd 9 sec 36>
            /sbus@1,f8000000/esp@0,8000000/sd@3,0
    1.      c0t0d0 <SUN0207 cyl  1214 alt 2 hd 9 sec 36>
            /sbus@1,f8000000/esp@0,8000000/sd@0,0
Specify disk (enter its number):
```

Table 6-3 shows the device name and path for each disk drive and the CD-ROM drive in this example.

Table 6-3 Device Name and Path for SCSI Disk Drives

Type of Device	Device Name	Device Path
First internal disk (built-in SCSI support)	`c0t3d0s0...7`	`/devices/sbus@1,f8000000/esp@0,8000000/sd@3,0:..`
First external disk (built-in SCSI support)	`c0t0d0s0...7`	`/devices/sbus@1,f8000000/esp@0,8000000/sd@0,0:..`
CD-ROM player (built-in SCSI support)	`c0t6d0s0...7`	`./devices/sbus@1,f8000000/esp@0,8000000/sd@6,0:..`

Displaying Addresses in an SBus and in a VME Bus

To display the current setup of connected and powered-on disk drives in a Sun system with an SBus and a VMEbus:

♦ **Type**

```
# format
Searching for disks...done
```

The following display provides an example of a system with an SBus and a VMEbus:

```
AVAILABLE DISK SELECTIONS:
    0.      c0t1d0 <SUN0669 cyl 1614 alt 2 hd 15 sec 54>
            /iommu@f,e0000000/sbus@f,e0001000/dma@f,81000/esp@f,800000/sd@1,0
    1.      c0t2d0 <SUN0669 cyl 1614 alt 2 hd 15 sec 54>
            /iommu@f,e0000000/sbus@f,e0001000/dma@f,81000/esp@f,800000/sd@2,0
    2.      c1t0d0 <Seagate IPI ZBR Elite cyl 1893 alt 1 hd 17 sec 78>
            /iommu@f,e0000000/vme@f,df010000/SUNW,pn@4,d,1080000/ipi3sc@0,0/id@0,0
    3.      c1t1d0 <Seagate IPI ZBR Elite cyl 1893 alt 1 hd 17 sec 78>
            /iommu@f,e0000000/vme@f,df010000/SUNW,pn@4,d,1080000/ipi3sc@0,0/id@1,0
    4.      c2t0d0 <Seagate IPI ZBR Elite cyl 1893 alt 1 hd 17 sec 78>
            /iommu@f,e0000000/vme@f,df010000/SUNW,pn@4,d,1080000/ipi3sc@1,0/id@0,0
    5.      c2t1d0 <Seagate IPI ZBR Elite cyl 1893 alt 1 hd 17 sec 78>
            /iommu@f,e0000000/vme@f,df010000/SUNW,pn@4,d,1080000/ipi3sc@1,0/id@1,0
    6.      c2t2d0 <Seagate IPI ZBR Elite cyl 1893 alt 1 hd 17 sec 78>
            /iommu@f,e0000000/vme@f,df010000/SUNW,pn@4,d,1080000/ipi3sc@1,0/id@2,0
    7.      c2t3d0 <Seagate IPI ZBR Elite cyl 1893 alt 1 hd 17 sec 78>
            /iommu@f,e0000000/vme@f,df010000/SUNW,pn@4,d,1080000/ipi3sc@1,0/id@3,0
Specify disk (enter its number):
```

This example shows a server with built-in SCSI support (`c0`) to which two internal hard disk drives (`sd@1,0` and `sd@2,0`) are connected. This system has two additional IPI cards (`c1` and `c2`). The SCSI jumper switches on the disk drives have been set to 1 and 2 (`t1` and `t2`).

There are two external disk drives (`id@0,`0 and `id@1,0`) connected to the first IPI card (`c1`). The IPI address switches on the disk drives have been set to 0 and 1 (`t0` and `t1`).

There are four external disk drives (`id@0,0` , `id1@1,0` , `id@2,0` , and `id@3,0`) connected to the second IPI card (`c2`). The IPI address switches on the disk drives have been set to 0, 1, 2, and 3 (`t0`, `t1`, `t2`, and `t3`).

Table 6-3 shows the device name and path for each disk drive.

Table 6-4 Device Name and Path for SCSI and IPI Disk Drives

Type of Device	Device Name	Device Path
First internal disk (built-in SCSI support)	`c0t1d0s0...7`	`/iommu@f,e0000000/sbus@f,e0001000/dma@f,81000/esp@f,800000/sd@1,0:a...h`
Second external disk (built-in SCSI support)	`c0t2d0s0...7`	`/iommu@f,e0000000/sbus@f,e0001000/dma@f,81000/esp@f,800000/sd@2,0:a...h`
First external disk attached to first IPI card in VMEbus	`c1t0d0s0...7`	`/iommu@f,e0000000/vme@f,df010000/SUNW,pn@4d,1080000/ipi3sc@0,0/id@0,0:a...h`
Second external disk attached to first IPI card in VMEbus	`c1t1d0s0...7`	`/iommu@f,e0000000/vme@f,df010000/SUNW,pn@4d,1080000/ipi3sc@0,0/id@1,0:a...h`
First external disk attached to second IPI card in VMEbus	`c2t0d0s0...7`	`/iommu@f,e0000000/vme@f,df010000/SUNW,pn@4d,1080000/ipi3sc@1,0/id@0,0:a...h`
Second external disk attached to second IPI card in VMEbus	`c2t1d0s0...7`	`/iommu@f,e0000000/vme@f,df010000/SUNW,pn@4d,1080000/ipi3sc@1,0/id@1,0:a...h`
Third external disk attached to second IPI card in VMEbus	`c2t2d0s0...7`	`/iommu@f,e0000000/vme@f,df010000/SUNW,pn@4d,1080000/ipi3sc@1,0/id@2,0:a...h`
Fourth external disk attached to second IPI card in VMEbus	`c2t3d0s0...7`	`/iommu@f,e0000000/vme@f,df010000/SUNW,pn@4d,1080000/ipi3sc@1,0/id@3,0:a...h`

Preparing Media 7

To prepare a disk drive, you must:

1. Format a disk
2. Partition a disk
3. Label a disk
4. Create a file system
5. Mount a file system

These tasks are described in the following sections.

7

Autoconfiguration and the `format` Utility

With the `format` utility you can format, partition, and label a disk. You can also detect and repair bad blocks on a disk.

If Solaris 2.3.2 system software (or a higher release) is resident on your system, the `format` utility can automatically configure SCSI disk drives and label them, even if that specific type of drive was not previously described in the `/etc/format.dat` file. This enables you to format, partition, and label any disk drive compliant with SCSI-2 without having to edit the `/etc/format.dat` file.

The `format` utility performs autoconfiguration by first checking if there is a `/etc/format.dat` entry that matches the product name it detects for the drive. If the file lacks that information, `format` will determine the disk's geometry and capacity by issuing SCSI commands to the disk.

Autoconfiguration will take place at start-up time for a SCSI disk that is not already labeled. You will be prompted for permission to write that label to the disk.

Also, you can use the format utility to autoconfigure a disk at any time. In that case, when you enter `type` at the `format>` prompt, you can enter `0` as the disk type value to specify autoconfiguration.

In short, if you have Solaris 2.3.2 or a later version of the system software, you can use the procedure in the following section even if your SCSI drive is not already listed in the `/etc/format.dat` file.

Formatting a Disk

Formatting your disk drive is optional, because many hard disks have already been formatted at the factory.

Note – You must be in superuser mode to use the `format` utility.

1. Type `format` at the root prompt.

2. **Select the disk that you want to format from the list displayed on your screen.**
   If the disks have already been labeled, the system displays the following information.

```
Searching for disks...done
AVAILABLE DISK SELECTIONS:
    0.  c0t3d0 <SUN0207 cyl  1214 alt 2 hd 9 sec 36>
        /sbus@1,f8000000/esp@0,8000000/sd@3,0
    1.  c0t0d0 <SUN0207 cyl  1214 alt 2 hd 9 sec 36>
        /sbus@1,f8000000/esp@0,8000000/sd@0,0
    2.  c1t1d0 <SUN0207 cyl  1214 alt 2 hd 9 sec 36>
        /sbus@1,f8000000/esp@0,8000000/sd@1,0
    3.  c1t2d0 <SUN0207 cyl  1214 alt 2 hd 9 sec 36>
        /sbus@1,f8000000/esp@0,8000000/sd@2,0
Specify disk (enter its number):2
```

In this example disk drives 2 and 3 have been added. Drive 2 with address `c1t1d0` is the first external hard disk that is connected to a SCSI card. Drive 3, with address `c1t2d0`, is the second external hard disk that is connected to a SCSI card. After you have completed formatting the first external hard disk, you can format the second external hard disk that is connected to the SCSI card.

Caution – Do not select item 0, the system disk. Formatting your system disk deletes your operating system and any data that you may have on this disk.

If the Solaris operating system is unable to find a valid label on drive 2 with address `c1t1d0`, the following is displayed:

```
Searching for disks...done

c1t1d0:  configured with capacity of 198 MB

AVAILABLE DISK SELECTIONS:
    0.  c0t3d0 <SUN0207 cyl  1214 alt 2 hd 9 sec 36>
        /sbus@1,f8000000/esp@0,8000000/sd@3,0
    1.  c0t0d0 <SUN0207 cyl  1214 alt 2 hd 9 sec 36>
        /sbus@1,f8000000/esp@0,8000000/sd@0,0
    2.  c1t1d0 <SUN0207 cyl  1214 alt 2 hd 9 sec 36>
        /sbus@1,f8000000/esp@0,8000000/sd@1,0
    3.  c1t2d0 <SUN0207 cyl  1214 alt 2 hd 9 sec 36>
        /sbus@1,f8000000/esp@0,8000000/sd@2,0
Specify disk (enter its number):2

Selecting c1t1d0
[disk formatted]
Disk not labeled. Label it now? y
```

The `configured with capacity` message and the `Label it now?` prompt are displayed for a disk without a valid label or for a new, unlabeled disk.

If you already know that the disk drive you are adding has a SCSI interface, go to Step 8.

3. **Type** `defect` **at the** `format>` **prompt.**
   The Defect menu entries that are displayed depend on the type of disk drive that you are trying to format. The menu that your system displays can differ from the one below.

```
format> defect

DEFECT MENU:

   primary - extract manufacturer's defect list
   print   - display working list
   dump    - dump working list to file
   commit  - set current list = working list
   quit

defect>
```

4. **Read the Defect menu.**
   If your disk drive has a SCSI interface, the commit option is not displayed. If this is the case, go to Step 7.

5. **At the** `defect>` **prompt, type** `primary`**.**

```
defect> primary

Extracting manufacturer's defect list ... Extraction complete.
Current Defect List updated, total of 20 defects.
```

6. **Type** `commit` **and confirm your choice by typing** `y`**.**

```
defect> commit
Ready to update Current Defect List, continue? y
Current Defect List updated, total of 20 defects.
Disk must be reformatted for changes to take effect.
```

7. **Type** `quit` **to leave the Defect menu.**

```
defect> quit
```

8. **At the** `format>` **prompt, type** `format`**, and confirm the command by typing** `y`**.**

```
format> format

Ready to format. Formatting cannot be interrupted.
Continue? y
Beginning format. The current time is Fri Sept 11 14:56:51 1993
Formatting ...
done

Verifying media ...
pass 0 - pattern = 0xc6dec6de
pass 1 - pattern = 0x6db6db6d
total of 0 defective blocks repaired.
format>
```

Partitioning a Disk

1. **Type** `partition` **at the** `format` **prompt.**
   The following 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
       quit
partition>
```

2. Select `modify`**.**
The following menu is displayed.

```
Select partitioning base:
 0. Default partition for selected drive
 1. Current partition table (original sd3)
 2. All Free Hog
Choose base (enter number) [0]?
```

3. Select `0`**.**
The following message is displayed:

```
Part      Tag    Flag     Cylinders       Size      Blocks
 0        -      -        0 - 505        80.05MB   (506/0/0)
 1        -      -        506 - 568      9.97MB    (63/0/0)
 2        -      -        0 - 1253       198.39MB  (1254/0/0)
 3        -      -        0              0         (0/0/0)
 4        -      -        0              0         (0/0/0)
 5        -      -        0              0         (0/0/0)
 6        -      -        569 - 937      58.38MB   (369/0/0)
 7        -      -        938 - 1253     49.99MB   (316/0/0)
Do you wish to continue creating a new partition
table based on above table[yes]?
```

4. Type `y` **if you wish to change the size of any of the partitions.**
The following message is displayed:

```
Free Hog partition[6]?
```

5. **Select one of the 8 partitions as a “free hog” partition.**
   This partition cannot be set to 0. In this example, you can use partition 6 as the free hog partition. Do not use partition 2.

   The following menu is displayed:

```
Enter size of partition ‘0‘  [163944b, 506c, 80.05mb]: 0
Enter size of partition ‘1‘  [20412b, 63c, 9.97mb]: 0
Enter size of partition ‘3‘  [0b, 0c, 0.00mb]: 0
Enter size of partition ‘4‘  [0b, 0c, 0.00mb]: 0
Enter size of partition ‘5‘  [0b, 0c, 0.00mb]: 0
Enter size of partition ‘7‘  [102384b, 316c, 49.99mb]: 80mb
```

   When you use the `format` utility to change the size of one or more disk partitions, you must designate a temporary partition that can expand and shrink to accommodate the resizing operations. This partition donates or frees space when you expand a partition, and receives or hogs the discarded space when you shrink a partition.

   For this reason, the donor partition is sometimes called the *free hog*. The donor partition exists only during installation or whenever you execute the `format` utility. There is no permanent donor partition during day-to-day operations.

6. **Specify the size of each partition in megabytes by changing any of the displayed sizes.**
   In this example, the sizes have been changed as displayed:

```
Part      Tag    Flag     Cylinders      Size      Blocks
 0        -      -        0              0         (0/0/0)
 1        -      -        0              0         (0/0/0)
 2        -      -        0 - 1253       198.39MB  (1254/0/0)
 3        -      -        0              0         (0/0/0)
 4        -      -        0              0         (0/0/0)
 5        -      -        0              0         (0/0/0)
 6        -      -        0 - 747        118.34MB  (748/0/0)
 7        -      -        748 - 1253     80.05MB   (506/0/0)

Okay to make this the current partition table [yes]?
```

Caution – Partition 2 should never be changed. Reducing the size of partition 2 decreases available disk space.

7. **Type** `y` **to confirm.**
   The following message is displayed.

```
Enter table name (remember quotes):
```

8. **Assign a name to this newly created table.**

9. **Type the new name of the partition table and press Return.**

You are now ready to label your disk.

Labeling a Disk

To label a disk means to write back to disk the information in the partition table that you have just finished modifying.

Note – If you fail to label a disk after you finish partitioning, the operating system will be unable to "know" anything about the partitions that you just created or any changes that you have made.

1. **Type** `label` **at the** `partition>` **or** `format>` **prompt.**
   The following menu is displayed:

```
Ready to label disk?
```

2. **Type** `y` **and press Return.**

3. **Type** `q`**.**

4. **Type** `q` **again.**

7

Creating a File System

You need to create a file system for a partition only when you have:

- Added or replaced a disk drive
- Changed the existing partitioning structure

You must know the device address of the disk drive and partition for which you want to create a file system.

Note – The disk for which you plan to create a file system must have already been formatted and partitioned. Be sure that you are in superuser mode before you start to create a file system.

---

1. Type

```
# newfs /dev/rdsk/cxtxdxsx
```

Caution – Make sure that you have specified the correct device name for the partition before you create a file system for the next partition. If you specify the wrong partition, you erase the contents of the partition that you specified.

---

2. Press Return.
The operating system asks for confirmation.

```
newfs: construct a new file system /dev/rdsk/cxtxdxsx (y/n)?
```

3. Type `y` **to confirm.**

Mounting a File System

1. **Edit the `/etc/vfstab` file with `vi` or any text editor.**

   a. **Add the entry by separating each field with a space or a tab. If a field has no entry, enter a dash (-).**

   b. **Save the `/etc/vfstab` file with the modifications.**

Note – For more information about writing entries in the `/etc/vfstab` file, see the man page for *vfstab(4)* and the *File System Administration* manual.

---

2. **Verify that a mount point directory has been created.**
   If it does not exist, create it now with the `mkdir` command.

```
# mkdir /mount_point_directory
```

Note – The mount point directory must have been created before you can mount any file system on it.

---

3. **Type**

```
# mount /dev/dsk/cxtxdxsx /mount_point_directory
```

   Or, if the entry for this file system has already been made in the `/etc/vfstab` file, type

```
# mount /mount_point_directory
```

   You also can use the `mountall`(1M) command at this point.

Displaying Already Mounted File Systems

It often is helpful to display file systems that have already been mounted.

♦ **Type** `mount` **and press Return.**
A list of the currently mounted file systems is displayed.

You will probably use the `ufsdump` command to perform periodic backups of either individual files or entire file systems. For a complete explanation of each command, options, and arguments, refer to the *Routine System Administration Guide* and to the specific *man* pages for each command.

Booting

A

This appendix describes how to boot your system in different modes. Table A-1 lists the different boot procedures that are used to enter the different modes.

Table A-1 Booting Up in Different Modes

To Boot Up in this Mode	Do This	Result
Boot after connecting new peripheral device[1]	At the `ok` PROM prompt, type `boot -r` and press Return after shutting down the operating system, or after powering on the system, or interrupting the boot process, or when the open boot process has not been set for automatic boot.[2]	Adds the new device if you neglected to perform the `touch/reconfigure` command before shutting down the system when you added the peripheral device.[3]
Automatic boot	Power on system.	System automatically loads the operating environment, recognizes all connected devices, and boots to multi-user mode.[4] [5]

Table A-1 Booting Up in Different Modes (Continued)

To Boot Up in this Mode	Do This	Result
Multi-user boot from the PROM prompt	At the `ok` PROM prompt, type `boot` and press Return.	Boots to multi-user mode.
Single-user boot from the PROM prompt	At the `ok` PROM prompt, type `boot -s` and press Return.	Boots to single-user mode. You are then prompted for the superuser password. Type the password and press Return to enter single-user mode.[6]

1. If you used the `touch /reconfigure` command before you shut down your system and peripheral devices, you do not need to use the `boot -r` command.
2. If the PROM prompt is >, type `n` to display the `ok` PROM prompt before you type `boot`.
3. The `touch /reconfigure` command performs the same function as the `boot -r` command. It allows the operating system to recognize the presence of peripheral devices.
4. If you do not turn on power to your peripheral devices before you turn on power to your system, the operating system has no access to those peripheral devices because it cannot recognize those devices.
5. The open boot PROM must be set for automatic boot.
6. To change the system to multi-user mode, press `CTRL-d`.

What's Next

To start the configuration process just after you boot your system, go to:

- "Configuring the System" in Chapter 2, "Setting Up a Disk Drive" in this handbook to add a disk drive
- "Configuring the System" in Chapter 3, "Setting Up a Tape Drive" in this handbook to add a tape drive
- "Configuring the System" in Chapter 4, "Setting Up a CD-ROM or Floppy Disk Drive" in this handbook to add a CD-ROM drive
- The on-line version of *AnswerBook* to configure the system for the addition of a board

If you are not configuring the operating system for the addition of a peripheral device, return to the hardware manual that referred you here.

Aborting a Booting Process

If you have to abort the booting process, you need to press a combination of key sequences, which varies with the system or monitor that you have.

Note – Use this procedure only in emergency situations. The system disks are not “synced” when the booting process is aborted.

♦ **Press the combination of keys as described in the User’s Guide or Operating System Guide that accompanies your system.**

Usually one of the following combination of key sequences is applicable to your system:

- Stop-a (for type 5 keyboards)
- L1-a (for type 4 keyboards)
- Break (for tty terminals only)

Pressing the combination of keys puts the system into the PROM (Programmable Read Only Memory) monitor mode. The monitor mode command prompt is then displayed on the screen. The prompt can be a “greater than” (>) symbol or the letters ok.

A

Index

T

U

V

Revision History

Revision	Dash	Date	Comments
801-2425 Rev. A	10	August 1992	Final Customer Shipment for Solaris 2.1
801-4332 Rev. 50	05	February 1993	Beta Draft for Solaris 2.2
801-4332 Rev. A	10	May 1993	FCS Draft for Solaris 2.2 and AnswerBook
801-5488 Rev. 50	01	June 1993	Early Access for Solaris 2.3
801-5488 Rev. 51	05	September 1993	Beta Draft for Solaris 2.3 and AnswerBook
801-5488 Rev. A	10	October 1993	FCS Draft for Solaris 2.3 and AnswerBook
801-6990 Rev. 1	01	July 1994	Early Access for Solaris 2.4 and AnswerBook
801-6990 Rev. 2	02	August 1994	Alpha Draft for Solaris 2.4 and AnswerBook
801-6990 Rev. A	10	November 1994	Final Draft for Solaris 2.4 and AnswerBook