Using the Flash Disk

Product Numbers: MEM-C4K-FLD64M=, MEM-C4K-FLD128M=

Customer Order Number: DOC-7814096=

Introduction

This configuration note is a standalone publication that provides instructions for installing, removing, and using Flash Disks in Cisco products that have PC Card slots—formerly called Personal Computer Memory Card International Association (PCMCIA) slots. This document also applies to the compact Flash Disk used on the Catalyst 4000 family Supervisor Engine III.

Flash Disks and the compact Flash Disk provide from 48 MB to 128 MB of storage space for your configuration files, Cisco IOS software images, and so forth. (For a more complete discussion of Flash Disk features, see the "Product Description" section on page 6.)

Contents

This configuration note includes the following sections:

CISCO SYSTEMS

Corporate Headquarters:
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Related Documentation

Your system and the Cisco IOS software running on it contain extensive features and functionality. For information on Cisco IOS software and for general installation and maintenance information for your system, use the following resources:

- For Cisco IOS software configuration information and support, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software installed on your Cisco hardware. You can also refer to the Cisco IOS software release notes for the version of software you are using on your hardware.

Note You can access Cisco IOS software documentation and hardware installation and maintenance documentation on the World Wide Web at http://www.cisco.com, http://www-china.cisco.com, or http://www-europe.cisco.com.

If you are reading Cisco documentation on the World Wide Web, you can submit comments electronically. Click **Feedback** on the toolbar and then select **Documentation**. After you complete the form, click **Submit** to send it to Cisco. We appreciate your comments.

- To view Cisco documentation or obtain general information about documentation, refer to the following sources:
  - Documentation CD-ROM. (See the "Documentation CD-ROM" section on page 17.)
  - Cisco.com. (See the "Cisco.com" section on page 18.)
  - Customer Service at 800 553-6387 or 408 526-7208. Customer Service hours are 5:00 a.m. to 6:00 p.m. Pacific time, Monday through Friday (excluding company holidays). You can also send e-mail to cs-rep@cisco.com.

Installation Prerequisites

This section describes installation prerequisites you should observe before you can use the Flash Disk in your system, and includes the following subsections:

- Hardware and Software Requirements, page 2
- Tools and Parts Required, page 3
- Compatibility Requirements, page 3
- System Memory and Software Image Functions and Interactions, page 3
- Boot Environment Variables, page 4
- Sample Upgrade Process, page 5

Hardware and Software Requirements

The Flash Disk provides file storage for the Catalyst 4000 family Supervisor Engine III if this system is running Cisco IOS Release 12.1(8) EY or later.

Tools and Parts Required

You need some or all of the following tools and parts to install a Flash Disk:

- MEM-C4K-FLD64M or MEM-C4K-FLD128M Flash Disk kit
- 3/16-inch flat-blade screwdriver—For Flash Disk installation in Cisco 7100 series systems only
- Antistatic wrist strap
- Access to a Trivial File Transfer Protocol (TFTP) server
- Linear Flash memory card

Compatibility Requirements

This section discusses Flash Disk compatibility and use between supported systems.

Note The Flash Disk is supported as the primary boot medium for RSP8- and NPE-300-based systems *only.* In all other systems, you should use the Flash Disk side by side with a linear Flash memory card. In systems using a Flash Disk with a linear Flash memory card, it is possible to boot from a Flash Disk; however, you must maintain a bootable image on a linear Flash memory card to ensure that your system is bootable if the boot flash memory software image becomes corrupted.

The compact Flash Disk is supported by the Cisco 7401ASR router only.

The **format** command places a processor-specific library on the Flash Disk so that the ROM monitor software can read the Flash memory media. If you plan to use the **boot** or **dir** commands at the ROM monitor prompt (rommon>), you might need to reformat your Flash Disk *if* it was not already formatted on a like system processor. To ensure Flash Disk system compatibility, observe the following guidelines:

- To use a Flash Disk from an I/O controller-based system in an RSP8-based system, first reformat the Flash Disk.
- To use a Flash Disk from an RSP8-based system in an I/O controller-based system, first reformat the Flash Disk.
- For simple file storage and retrieval functions, Flash Disks can be interchanged between and used in any system listed in the "Tools and Parts Required" section on page 3.

In order to boot a Cisco IOS software image from the Flash Disk, when the system is executing from the ROM monitor software image, your ROM monitor software image and your rxboot image (which are contained in the boot ROM device on your system processor) must be Cisco IOS Release 12.1(8) EY or later. Use the **show version** or **show hardware** commands to verify that your RSP8-based system is running these software images.

System Memory and Software Image Functions and Interactions

The read-only memory (ROM) monitor image on your system performs important functions, such as running a brief set of system diagnostics, and initializing the hardware. This image gains control at reset or power on, or after a nonrecoverable event (such as a bus error). The ROM monitor software image has a rudimentary user interface that is recognizable by way of the ROM monitor prompt (rommon>). The

ROM monitor software image has console drivers and trap handlers for parity and bus errors; however, the ROM monitor does not have any network interface code and it *cannot* boot an image over the network.

By default, and as a result of a reset or power on, the ROM monitor loads the rxboot image from boot flash memory. If the ROM monitor cannot find a bootable image in boot flash memory, it searches the PC Card-based devices (such as linear Flash memory cards or Flash Disks) for the first bootable image. Normally, this would be the boot image.

The boot image, when loaded, looks in the boot environment variables—stored in nonvolatile random-access memory (NVRAM)—to determine the location of the Cisco IOS software image and the configuration to use.

The operation of the boot environment variables is described in the "Boot Environment Variables" section, which follows.

Boot Environment Variables

The contents of the boot environment variables, which are stored in the configuration file in NVRAM, determine the actions your system takes on bootup. To see the current settings of these variables, use the **show bootvar** command as follows:

```
Router> show bootvar
BOOT variable =
CONFIG_FILE variable =
Current CONFIG_FILE variable =
BOOTLDR variable does not exist
Configuration register is 0x100
```

Following are explanations for each of these boot environment variables:

- BOOT variable—Points to the Cisco IOS software image that you want to boot; you set it in configuration mode. The default software image is the CISCO*xxx* image (where *xxx* is a filename assigned by the system, if you do not enter a specific filename). The system then looks for the first image on the Flash Disk in slot 0.

  Enter configuration mode and specify a filename and PC Card slot from which to boot using the **configure terminal** and **boot system** commands as follows:

  ```
  Router# configure terminal
  Enter configuration commands, one per line. End with CTRL-Z.
  System(config)# boot system flash disk0:<image>
  ```

  The result of this configuration file entry is that the BOOT variable is disk0:rsp-p-mz.12-0.

- CONFIG_FILE (configuration file) variable—Determines where the configuration is read from on bootup; you set it in configuration mode as follows:

  ```
  Router# configure terminal
  Enter configuration commands, one per line. End with CTRL-Z.
  System(config)# boot config disk0:<image>
  ```

  The result of this configuration file entry is that the CONFIG_FILE variable is disk0:configfile.

- BOOTLDR (boot loader) variable—Determines which image is used as the boot helper (rxboot); you set it in configuration mode as follows:

  ```
  Router# configure terminal
  Enter configuration commands, one per line. End with CTRL-Z.
  System(config)# boot bootldr bootflash:<image>
  ```

The result of this configuration file entry is that the BOOTLDR variable is bootflash:c7200-boot-mz.

- Configuration register variable—Instructs the system where to look for a bootable Cisco IOS software image; you set it as a hexadecimal value in configuration mode as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CTRL-Z.
System(config)# config-register 0x102
```

If there is no **boot system** command in the configuration file, the router will try to load the default file image from the Flash Disk. For more information, see "Rebooting the Router" in the *Cisco IOS Configuration Fundamentals* manual.

Sample Upgrade Process

This section applies to users who want to use Flash Disks for simple file storage.

Step 1 Format your onboard Flash memory—called boot flash memory. (See the **format** command description in Table 2 on page 10.)

Step 2 Upgrade your onboard Flash memory by copying the Cisco IOS Release 12.*x* rxboot image into onboard Flash memory. (See the "Using the copy Command" section on page 14.)

Step 3 Copy the Release 12.*x* software image from onboard Flash memory to the linear Flash memory card in your system processor's PC Card slot. (See the "Using the copy Command" section on page 14.)

Step 4 Change the boot variables in your configuration file to point to the new Cisco IOS image in your linear Flash memory card. (See the preceding section, "Boot Environment Variables.")

Step 5 Reboot your system to load the Release 12.*x* software image from the linear Flash memory card in your system processor.

Step 6 Insert a Flash Disk. (See the "Installing a Flash Disk" section on page 7.)

Step 7 With your system running Cisco IOS Release 12.*x*, format the blank Flash Disk. (See the **format** command description in Table 2 on page 10, and the "Using the format Command" section on page 13.)

You should now be able to store configuration files and Cisco IOS software images on your Flash Disk.

If you have an NPE-300 (or a later processor)-based system, you should now be able to boot from any Cisco IOS software images you store on your Flash Disk.

Safety Guidelines

Following are safety guidelines that you should follow when working with any equipment that connects to electrical power, or which might be sensitive to electrostatic discharge (ESD) damage.

Electrical Equipment Guidelines

Follow these basic guidelines when working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.

- Disconnect all power and external cables before moving a chassis

- Do not work alone when potentially hazardous conditions exist.

- Never assume that power has been disconnected from a circuit; always check.

- Do not perform any action that creates a potential hazard or makes the equipment unsafe.

- Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

Electrostatic Discharge Prevention

Electrostatic discharge (ESD) damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures.

Use the following guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact; connect the equipment end of the strap to an unfinished chassis surface.

- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.

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Warning **For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megaohms (Mohms).**

Product Description

Flash Disks are Flash memory-based devices that conform to the PC Card (formerly PCMCIA) standard, and that present an ATA (AT Attachment) interface to the system. This interface complies with the ANSI ATA Interface Document X3T13.1153 D Rev. 9 specification.

The Flash Disk is more flexible than linear Flash memory because the Flash Disk has controller circuitry that allows it to emulate a hard disk and that automatically maps out bad blocks and performs automatic block erasure. Further, the Flash Disk provides the capability to allocate noncontiguous sectors, which eliminates the need for the **squeeze** command (previously required with linear Flash memory cards).

The Flash Disk provides increased Flash-based memory space—64 to 128 MB—for storage of system configuration files, Cisco IOS software images, and other types of system-related files. Table 1 provides memory information for the Flash Disk.

Table 1   Flash Disk Memory Options

Memory Size	Product Number
64 MB	MEM-C4K-FLD64M[1]
128 MB	MEM-C4K-FLD128M

1. These products are also available as Flash Disk upgrades. To order an upgrade, add an equal sign (=) after the Product Number, for example, MEM-C4K-FLD64M=.

> **Note** The Flash Disk is only supported on systems with the Cisco IOS File System feature, and the Cisco IOS File System feature is supported in Cisco IOS Release 12.0(1) or later releases of 12.0. In general, Flash Disk functionality requires Cisco IOS Release 12.0(2) or a later release of 12.0.

The Cisco IOS File System feature provides a single interface to all file systems your system uses:

- Flash memory file systems—Flash Disks, onboard Flash memory, linear Flash memory cards
- Network file systems—File Transfer Protocol (FTP), Remote Copy Protocol (rcp), and TFTP
- Any other endpoint for reading or writing data—NVRAM, the running configuration, ROM, raw system memory, system bundled microcode, Xmodem, Flash load helper log, modems, and BRI MUX interfaces

> **Note** A complete discussion of the Cisco IOS File System feature is beyond the scope of this publication. For information about this feature, refer to the *Configuration Fundamentals Configuration Guide* and *Configuration Fundamentals Command Reference* publications for Cisco IOS Release 12.*x*. These publications are available on the Documentation CD-ROM and through Cisco.com. (To obtain the Documentation CD-ROM, see the "Documentation CD-ROM" section on page 17. For information on how to access Cisco.com, see the "Cisco.com" section on page 18.)

Installing a Flash Disk

This section provides the Flash Disk installation procedures.

Use the **show version** command to verify that a Flash Disk-compatible version of Cisco IOS software is running on your system:

```
System> show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-J-M), Released Version 12.0(2)
Copyright (c) 1986-1998 by cisco Systems, Inc.
```
If a Flash Disk-compatible version of Cisco IOS software is running on your system, proceed with the installation procedure. If a Flash Disk-compatible version of Cisco IOS software is not running on your system, install an appropriate software image before proceeding with the installation procedure.

Use the following procedure to install and eject a Flash Disk:

Step 1 Face the front panel of the system processor that has the PC Card slots, which appear as shown in a of Figure 1.

Figure 1   Installing and Ejecting a Flash Disk
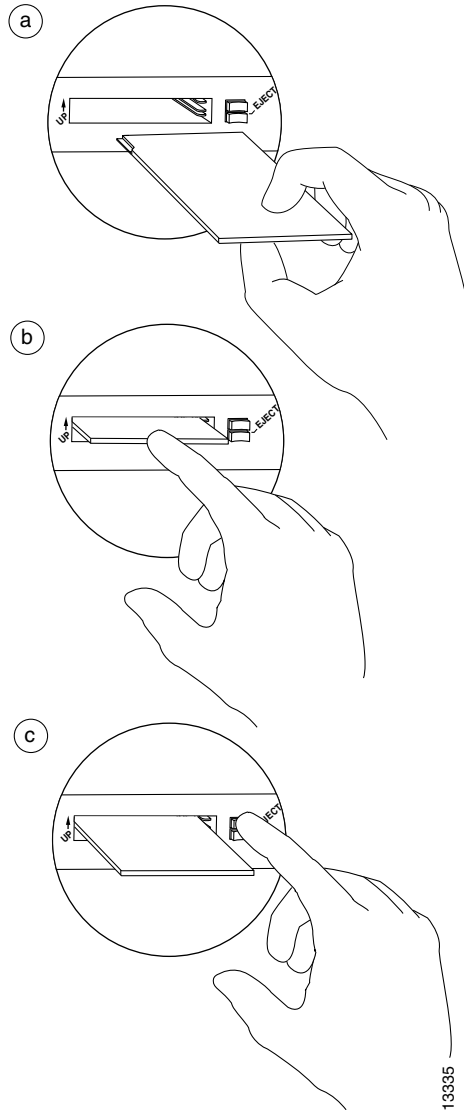
Step 2   Hold the Flash Disk with its connector end toward the PC Card slot and its front label facing up.

The Flash Disk is keyed and cannot be seated the wrong way. The ejector button does not pop out if the Flash Disk is not completely inserted.

Step 3   Insert the Flash Disk into the PC Card slot until the Flash Disk completely seats in the connector at the rear of the slot, and the ejector button pops out toward you.
(See b in Figure 1).

The Flash Disk does not insert all the way inside the PC Card slot; a portion of the Flash Disk remains outside the slot. *Do not attempt to force the Flash Disk past this point.*

Step 4   To eject a Flash Disk, press the appropriate ejector button—located to the right of the slot— until the Flash Disk is free of the connector at the rear of the PC Card slot.
(See c in Figure 1.)

Step 5   Remove the Flash Disk from the slot and place it in an antistatic bag.

This completes the procedure for installing and removing a Flash Disk. Proceed to the .

Working with a Flash Disk

This section provides basic instructions for working with a Flash Disk in your system. Detailed descriptions of more complex Flash Disk options and the Cisco IOS File System feature are beyond the scope of this publication and can be found in the following Cisco IOS Release 12.*x* publications:

- *Configuration Fundamentals Configuration Guide*, in the chapter "File Management"
- *Configuration Fundamentals Command Reference*, in the chapter "File Management Commands"

Note These and all publications are available on the Documentation CD-ROM and Cisco.com. To obtain the Documentation CD-ROM, see the . For information on how to access Cisco.com, see the .

This section includes the following subsections:

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Software Command Overview

This section lists some of the basic software commands you can use with the Flash Disk. Examples of these commands are included in the sections that follow.

The Flash Disk and other memory devices and locations in your system are defined as *file systems*, which are locations where you can store, use, or retrieve files and software images. (See the brief discussion about the Cisco IOS File System feature in the .

You can use Flash Disks in either one or both of the PC Card slots on your system processor, or you can use one Flash Disk in one PC Card slot and a linear Flash memory card in the adjacent PC Card slot. Flash Disks in PC Card slots 0 and 1 are referred to as *disk0:* and *disk1:*, respectively, whereas linear Flash memory cards in PC Card slots 0 and 1 are referred to as *slot0:* and *slot1:*, respectively.

The following partial output of the **show file systems** command shows a sample system with a Flash Disk—called *disk0:*—installed in PC Card slot 0 and a linear Flash memory card—called *slot1:*—installed in PC Card slot 1:

```
System# show file systems
File Systems:

    Size(b)     Free(b)      Type  Flags  Prefixes

(Additional displayed text omitted from this example.)

   48755200    48747008     flash    rw   disk0:
    7995392     4717276     flash    rw   slot1:
```

Table 2 lists the software commands that you can use with the Flash Disk.

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Note You can use other arguments with some of the commands listed in Table 2; however, in Table 2 and throughout this document, command arguments are limited to those that apply to the Flash Disk and related file systems.

For a discussion of additional command arguments, refer to the *Configuration Fundamentals Command Reference* document, in the chapter "File Management Commands."

Table 2   Flash Disk-Related Software Commands

Command and Arguments	Description
`cd [`**disk0:** | **disk1:**`]`*directory-name*	Changes current directory. Allows you to move between directories on a Flash Disk, where *directory-name* is the directory to which you want to move.
`copy [`**disk0:** | **disk1:**`]`*source-filename* `[`**disk0:** | **disk1:**`]`*destination-filename*	Copies from one file to another. Allows you to make a copy of a file (*source-filename*) located on a source file system (**disk0:**, **disk1:**, and so forth) and place it with either the same filename or a different filename (*destination-filename*) on a destination file system. Along with **disk0:** and **disk1:**, the source and destination file system arguments include, but are not limited to: • **bootflash:** (onboard Flash memory) • **nvram:** (onboard nonvolatile random-access memory) • **running-config** (the running system configuration file) • **startup-config** (the startup system configuration file) • **tftp:** (a TFTP server to which you have access)
`delete [`**disk0:** | **disk1:**`]`*filename*	Deletes a file. Allows you to delete any file you designate, where *filename* designates the name of the file.
`dir [`**/all** | **disk0:** | **disk1:**`]`	Lists files on a file system. Allows you to list the contents of the Flash Disks in PC Card slots 0 and 1. The **/all** argument lists all files on all file systems in your system.
`format [`**flash:** | **bootflash:** | **disk0:** | **disk1:**`]`	Formats a file system. Allows you to format a linear Flash memory card (**flash:**), onboard Flash memory (**bootflash:**), or a new Flash Disk (**disk0:** or **disk1:**). This command also allows you to reformat a linear Flash memory card or Flash Disk that was formatted on another type of system. **Note** This command destroys all data currently in Flash memory; therefore, we strongly recommend that you use the **format** command with caution to prevent irretrievable loss of data.
`mkdir [`**disk0:** | **disk1:**`]`*directory-name*	Creates a new directory. Allows you to create directories on a Flash Disk, where *directory-name* is the name you assign to this directory.

Table 2   **Flash Disk-Related Software Commands (continued)**

Command and Arguments	Description
pwd	Displays current working directory. Allows you to display the name of the Flash Disk directory in which you are currently working.
rename [**disk0:** | **disk1:**]*filename* [**disk0:** | **disk1:**]*filename*	Renames a file. Allows you to rename a file that is located on one Flash Disk and assign to that file another (or the same) file system path and filename. The first group of arguments defines the source (current) file system path and filename, and the second set of arguments defines the destination file system path and filename.
rmdir [**disk0:** | **disk1:**]*directory-name*	Removes an existing directory. Allows you to remove a directory that currently exists on a Flash Disk, where *directory-name* is the name of the directory you want to remove.
show [**disk0:** | **disk1:**]	Lists information about Flash Disk format and geometry.

Using Software Commands

This section provides examples of some of the basic software commands you can use with the Flash Disk. See Table 2 for optional arguments you can use with some of the following commands:

Using the show Command

To display information about Flash Disk format and geometry, use the **show** [**disk0:** | **disk1:**]command:

```
System# show disk0:
******** ATA Flash Card Geometry/Format Info ********

ATA CARD GEOMETRY
    Number of Heads:       16
    Number of Cylinders    840
    Sectors per Cylinder   32
    Sector Size            512
    Total Sectors          430080

ATA CARD FORMAT
    Number of FAT Sectors  105
    Sectors Per Cluster    16
```

```
            Number of Clusters     26822
            Number of Data Sectors 429536
            Base Root Sector       338
            Base FAT Sector        128
            Base Data Sector       370

Router#
```

In this example:

- Number of Heads is the number of heads on the Flash Disk.

- Number of Cylinders is the number of cylinders on the Flash Disk.

- Sectors per Cylinder is the number of sectors in each cylinder.

- Sector Size is the number of bytes in each sector.

- Total Sectors is the total number of sectors on the Flash Disk.

- Number of FAT Sectors is the number of sectors used to track allocation of clusters to files.

- Sectors Per Cluster is the number of sectors contained in each cluster. (Files grow by a minimum of one cluster.)

- Number of Clusters is the total number of clusters available for use by files.

- Number of Data Sectors is the number of sectors available for files.

- Base Root Sector is the logical address of the first sector of the root directory.

- Base FAT Sector is the first sector in the File Allocation Table (FAT).

- Base Data Sector is the first sector available for use by files.

Using the pwd Command

To determine which PC Card slot you are accessing, use the **pwd** command:

```
System# pwd
disk0:/
System#
```

The preceding example indicates that you are currently in the working directory called *disk0:*, which is the Flash Disk in PC Card slot 0.

Using the cd Command

To move back and forth between installed Flash Disks, use the **cd** command by defining a specific path name. Then to verify your working directory, use the **pwd** command:

```
System# cd disk1:
System# pwd
disk1:/
System# cd disk0:
System# pwd
disk0:/
```

You can also move up (or back) one level in the Flash Disk directory hierarchy using the **cd ..** command, and then verify your working directory with the **pwd** command:

```
System# pwd
disk1:daily_dir/
System# cd ..
```

```
System# pwd
disk1:/
System#
```

Using the dir Command

To list the directory structure and contents of the Flash Disk from which you are currently working, use the **dir** command with no arguments:

```
System# dir
Directory of disk1:/

  1 drw-          0   Jul 25 1998 10:23:11  daily_dir
  2 drw-          0   Jul 25 1998 10:28:37  access_lists

48755200 bytes total (48742912 bytes free)
System#
```

Note that the size of the Flash Disk is shown in the output of the **dir** command. (A 48-MB Flash Disk is shown in this example.) You can also view the contents of other directories and file systems using specific optional arguments with the **dir** command. (See Table 2.)

Using the format Command

To format a new Flash Disk, use the **format** [**disk0:** | **disk1:**] command.

Note You must format a new Flash Disk before you can use it. If you plan to use a Flash Disk that was formatted and used on another type of system, see the "Compatibility Requirements" section on page 3 to determine if you need to reformat the Flash Disk first.

Caution The formatting procedure erases all information on the Flash Disk. To prevent the loss of important data that might be stored on a Flash Disk, proceed carefully. If you want to save data that is currently on your Flash Disk, copy the data to a TFTP server or to another Flash Disk *before* you format the new Flash Disk. A Flash Disk that was shipped as part of a configured system contains a Flash Disk-compatible Cisco IOS software image; therefore, you do not need to format it to use it in the system in which it was shipped.

Note A spare Flash Disk is shipped blank; therefore, you must format it before you can use it.

Use the following procedure to format a new Flash Disk using the **format** command. (The procedure assumes you have already booted your system.)

Step 1 Insert the Flash Disk into PC Card slot 0 using the procedures in the "Installing a Flash Disk" section on page 7.

If slot 0 is not available, use slot 1, but in the following step use the **format disk1:** command, not the **format disk0:** command, or you will format the Flash Disk that is being used in slot 0.

Step 2 Use the **format disk0:** command to format the Flash Disk in PC Card slot 0 as follows:

```
System# format disk0:
Format operation may take a while. Continue? [confirm]
```

```
Format operation will destroy all data in 'disk0:'.  Continue? [confirm]
Format:Drive communication & 1st Sector Write OK...
Writing Monlib
sectors...................................................................
......................
Monlib write complete

Format:All system sectors written. OK...

Format:Total sectors in formatted partition:81760
Format:Total bytes in formatted partition:49861120
Format:Operation completed successfully.

Format of disk0:complete
```

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Note   A 48-MB Flash Disk was formatted in this example.

The new Flash Disk is now formatted and ready to use in the system on which you formatted it. (For specific formatting and compatibility requirements, see the "Compatibility Requirements" section on page 3.)

Using the copy Command

To copy an image from a Flash Disk to another file system or from another file system to the Flash Disk, use the **copy** command:

copy [**tftp:** | **bootflash:** | **disk0:** | **disk1:**]*source-filename* [**tftp:** | **bootflash:** | **disk0:** | **disk1:**]*destination-filename*

In this example:

*   The file you want to copy is located in a file system (**tftp:**, **bootflash:**, and so forth).

*   The variable *source-filename* is the name of the file you want to copy to another file system (**tftp:**, **bootflash:**, and so forth).

*   The variable *destination-filename* is the name you want to apply to this file after it is copied.

    You do not need to change the filename; this is an option.

The following assumptions are made for this command:

*   You have a system processor with a Flash Disk-compatible Cisco IOS software image in the onboard Flash memory—called *boot flash memory*—so you can start the system.

*   Your system is running Cisco IOS Release 12.0(2) or later.

*   The bootable image you want to copy to the Flash Disk exists in another file system or on a TFTP server to which you have access (meaning you know its name and have connectivity to it), and at least one interface is available over which you can access this server through Telnet. To ensure access to a TFTP server, you need to configure at least one interface. To configure an interface, you can use the **setup** command or use the configuration editor.

    An Ethernet interface is used in the examples that follow.

*   You know the filename of the image you want to copy to the Flash Disk.

Note   You might need to copy a new image to a Flash Disk whenever a new Cisco IOS software release or a new Cisco IOS software maintenance release becomes available. You can use the **copy** command for this purpose.

Use the following procedure to copy a file (called *new.image* in this example) located on a Flash Disk—called *disk1:*—in PC Card slot 1 to the Flash Disk—called *disk0:*—in PC Card slot 0:

Step 1   If the Flash Disk is unformatted or has been formatted on another, possibly incompatible system, format it now using the procedure in the "Using the format Command" section on page 13, as appropriate.

Step 2   To copy the image *new.image* to Flash Disk *disk0:*, use the following series of commands:

```
System> enable
Password:
System# copy disk1:new.image disk0:new.image
3393 bytes copied in 0.548 secs#
System#
```

In the preceding example, the 3393-byte file *new.image* was copied to the Flash Disk in PC Card slot 0 in approximately one-half second.

Step 3   Verify that the file *new.image* is now on the Flash Disk in PC Card slot 0:

```
System# pwd
disk0:/
System# dir
Directory of disk0:/

  1  -rw-       3393    Jul 26 1998 17:44:47 new.image

48755200 bytes total (48747008 bytes free)
System#
```

Using the mkdir Command

To create a directory on the Flash Disk, use the **mkdir** command. The following example shows how to create a directory called *daily_dir* on the Flash Disk in PC Card slot 1, and then verify that it was created:

```
System# mkdir disk1:daily_dir
Created dir disk1:daily_dir
System# dir
Directory of disk1:/

  1  drw-         0   Jul 25 1998 10:15:43  daily_dir

48755200 bytes total (48751104 bytes free)
System#
```

Note   If you create a directory and place a file in it that you plan to access or use later on, be sure to define the entire directory path to the file as you enter the appropriate software commands.

For example, if you placed the file *itsa.file* into the directory *daily_dir* on the Flash Disk in PC Card slot 1, you must designate the entire directory path as follows: *disk1:daily_dir/itsa.file*. Otherwise, the system might not be able to locate this file.

Using the rmdir Command

To remove a directory from the Flash Disk, use the **rmdir** command. The following example shows how to remove the directory *daily_dir* from the Flash Disk in PC Card slot 1, and then verify that it was removed:

```
System# rmdir disk1:daily_dir
Delete disk1:daily_dir? [confirm] y
Removed dir disk1:daily_dir
System# dir
Directory of disk1:/

  No files in directory.

48755200 bytes total (48751104 bytes free)
System#
```

Using the delete Command

To delete a file from a Flash Disk, use the **delete** command. Use the **dir** command to find the file you want to delete, and then use the **delete** command to delete it.

The following example shows how to find a file (called *fun1)* on the Flash Disk in PC Card slot 0, delete the file, and then verify that it is deleted:

Step 1   Find the file you want to delete:

```
System# dir
Directory of disk0:/

  1  drw-         0   May 10 1998 09:54:53 fun1

48755200 bytes total (48742912 bytes free)
```

Step 2   Delete the file *fun1*:

```
System# delete disk0:fun1
```

Step 3   Verify that the file *fun1* is deleted:

```
System# dir
Directory of disk0:/

  No files in directory.

48755200 bytes total (48742912 bytes free)
System#
```

Obtaining Documentation

The following sections provide sources for obtaining documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following sites:

- http://www.cisco.com
- http://www-china.cisco.com
- http://www-europe.cisco.com

Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or as an annual subscription.

Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco Product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/cgi-bin/order/order_root.pl

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

  http://www.cisco.com/go/subscription

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, in North America, by calling 800 553-NETS (6387).

Documentation Feedback

If you are reading Cisco product documentation on the World Wide Web, you can submit technical comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco.

You can e-mail your comments to bug-doc@cisco.com.

To submit your comments by mail, use the response card behind the front cover of your document, or write to the following address:

Attn Document Resource Connection
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools. For Cisco.com registered users, additional troubleshooting tools are available from the TAC website.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information and resources at anytime, from anywhere in the world. This highly integrated Internet application is a powerful, easy-to-use tool for doing business with Cisco.

Cisco.com provides a broad range of features and services to help customers and partners streamline business processes and improve productivity. Through Cisco.com, you can find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online technical support, download and test software packages, and order Cisco learning materials and merchandise. Valuable online skill assessment, training, and certification programs are also available.

Customers and partners can self-register on Cisco.com to obtain additional personalized information and services. Registered users can order products, check on the status of an order, access technical support, and view benefits specific to their relationships with Cisco.

To access Cisco.com, go to the following website:

http://www.cisco.com

Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

http://www.cisco.com/tac

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

http://www.cisco.com/register/

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

http://www.cisco.com/tac/caseopen

Contacting TAC by Telephone

If you have a priority level 1 (P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.

- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

This document is to be used in conjunction with the documents listed in the "Related Documentation" section on page 2 .