

Maintaining and Upgrading the Router

This chapter contains information on maintenance procedures you might need to perform as your internetworking needs change.

If any upgrades requiring hardware or software replacement are necessary, a related publication called a *configuration note* will ship to you automatically with the parts.

This chapter contains the following sections:

- Opening the Chassis



Warning Network hazardous voltages are accessible in the BRI cable. If you detach the BRI cable, detach the end away from the router first to avoid possible electric shock. Network hazardous voltages also are accessible on the system card in the area of the BRI port (RJ-45 connector), even when power is off. (See Figure 1-1 and Figure 1-3.)

- Upgrading the Boot PROMs
- Installing Primary-Memory DRAM SIMMs
- Replacing System-Code SIMMs
- Upgrading Feature Sets with Flash Cards
- Replacing the Cover
- Recovering a Lost Password



Caution Before opening the chassis, ensure that you have discharged all static electricity from your body and be sure the power is off. Before performing any procedures described in this chapter, review the sections, “Safety Recommendations,” “Maintaining Safety with Electricity,” “Preventing Electrostatic Discharge Damage,” and “General Site Requirements” in the chapter, “Preparing for Installation.”

Opening the Chassis

This section explains how to open the chassis by removing the chassis cover.



Warning To prevent shock hazard and injury, do not touch the power supply and fan assemblies. These components are not user-serviceable.

Tools Required

The following tools are required to open the chassis:

- Medium-sized flat-blade screwdriver (1/4 inch [0.625 cm])
- Size M 3.5 (metric) hex-head nut driver (optional)

Cover Removal

Refer to Parts A and B in Figure 1-2 and follow these steps to remove the chassis cover:

Step 1 Turn OFF power, but to channel ESD voltages to ground, do not unplug the power cable.

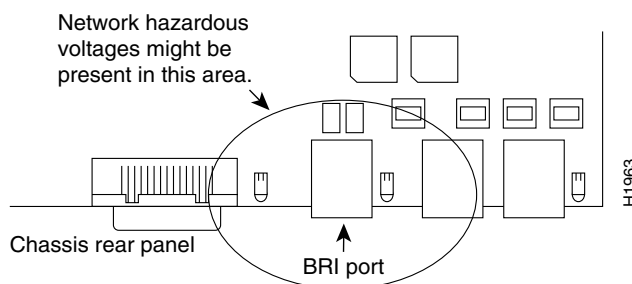
Step 2 Attach an ESD-preventative wrist strap.

Step 3 Remove all interface cables from the rear panel of the router.



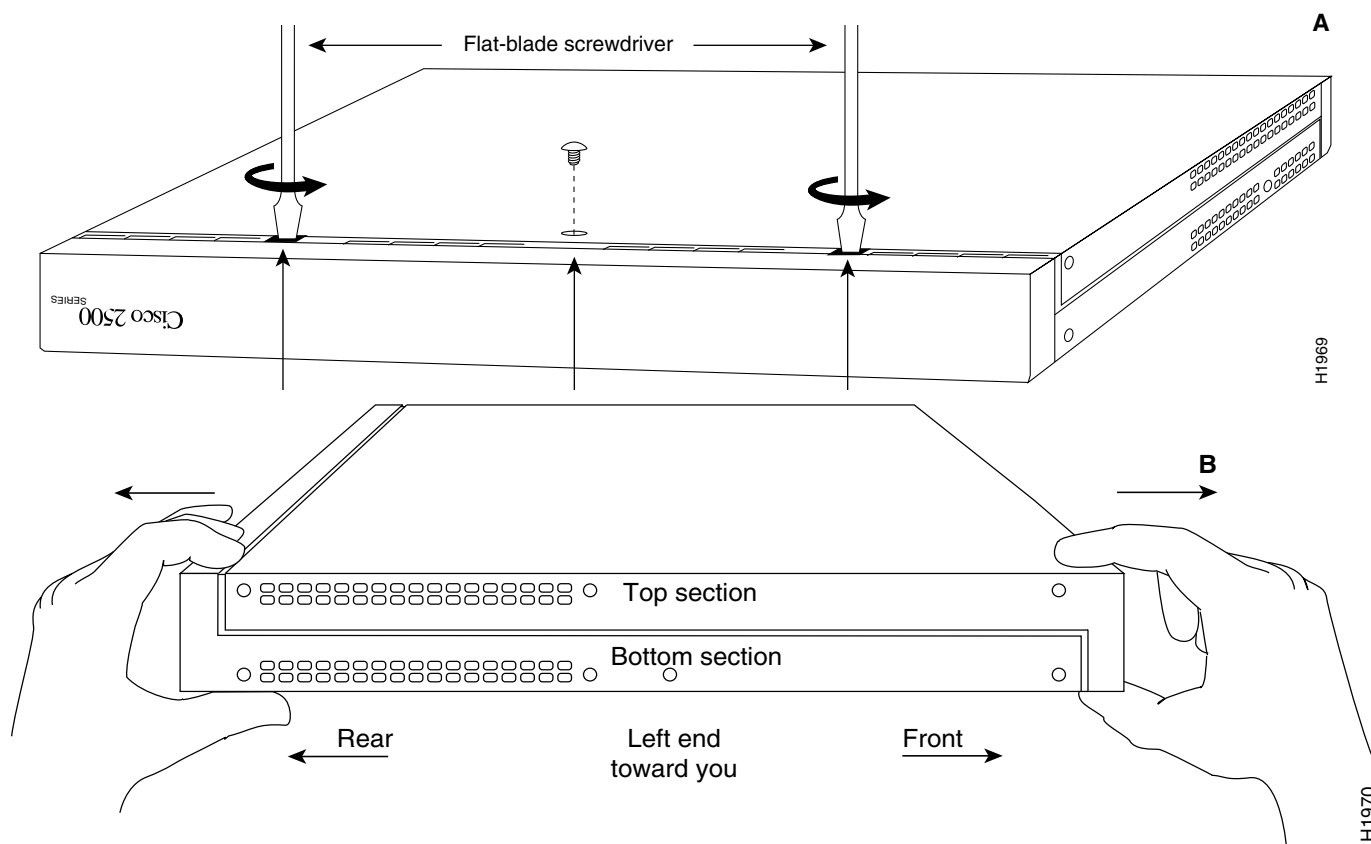
Warning Network hazardous voltages are accessible in the BRI cable. If you detach the BRI cable, *detach the end away from the router first to avoid possible electric shock*. Network hazardous voltages also are accessible on the system card in the area of the BRI port (RJ-45 connector), even when power is turned OFF. (See Figure 1-1.)

Figure 1-1 BRI Port Location



- Step 4** Turn the unit upside down so that the top of the chassis is resting on a flat surface and the front of the chassis is facing you. (See Figure 1-2, Part A.)

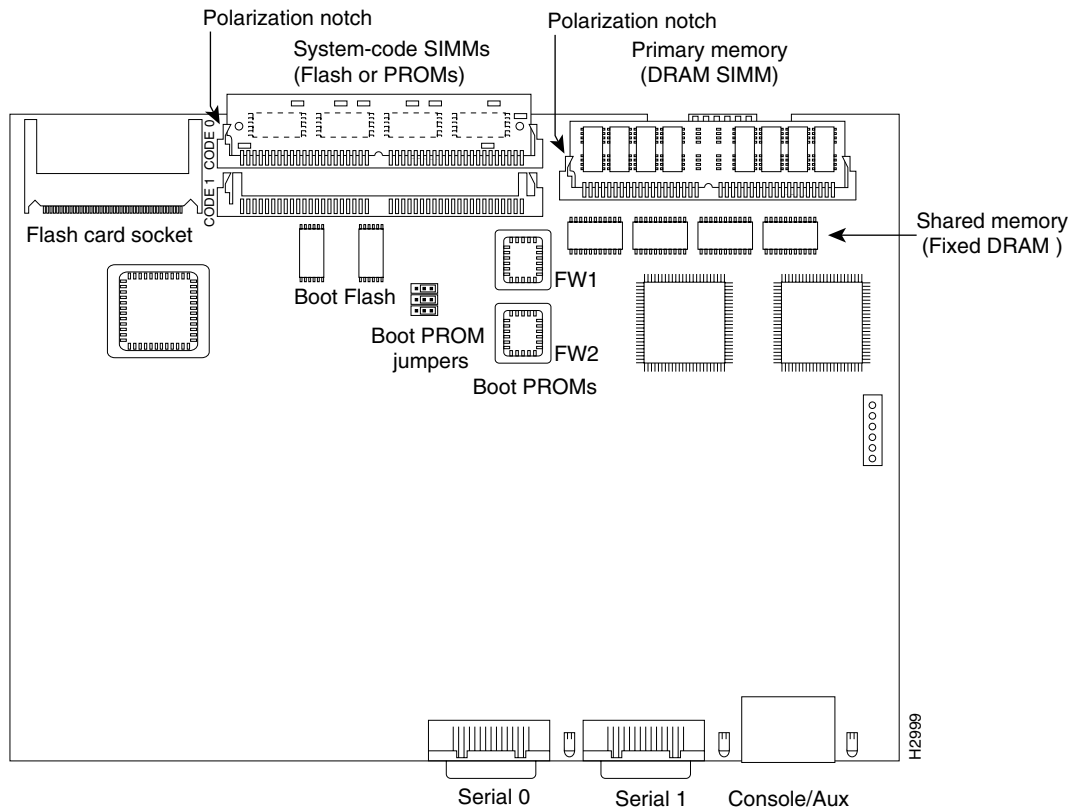
Figure 1-2 Chassis Cover Removal—Parts A (Top) and B (Bottom)



- Step 5** Remove the single screw located on the bottom of the chassis (on the chassis side closest to you). Note that the chassis is comprised of two sections: top and bottom.
- Step 6** If necessary, insert a medium flat-blade screwdriver into the slots shown in Figure 1-2, Part A, and gently rotate the blade so that the top and bottom sections separate slightly.
- Step 7** Holding the chassis with both hands, position it as shown in Figure 1-2, Part B.
- Step 8** Gently pull the top section away from the bottom section. (See Figure 1-2, Part B.) The fit is very snug. It might be necessary to work the chassis sections apart at one end and then the other until the top section is removed from the bottom section.

Step 9 When the top section is removed, set it aside. Figure 1-3 shows the layout of the system board, which is attached to the bottom section of the chassis.

Figure 1-3 System Board Layout—Model 2516 (Chassis, Fan, Power Supply Not Shown)



Note To locate components in the following procedures, refer to Figure 1-3.

Upgrading the Boot PROMs

Your system is equipped with either boot Flash or boot PROMs depending on the size of the boot image for the system. If the boot image is less than 1 MB, the system is equipped with Boot PROMs. If the boot image is greater than 1 MB, the system is equipped with boot Flash.

To upgrade the boot image, either replace the boot PROMs or download the boot image from a Flash memory card to the boot Flash installed on the system board. This section explains how to upgrade the boot PROMs. For information about how to download the boot image from a Flash memory card, refer to the *Upgrading Boot Image with Flash Memory Cards for Cisco 2500 Series Routers* publication.

Table 1-1 lists the part numbers you need to upgrade the boot PROMs and indicates their installation socket. The part number is printed on a label attached to the boot PROM.

Table 1-1 Boot PROM Part Numbers and Installation Sockets

Boot PROM Part Number	Installation Socket
17-1610-03	FW 1
17-1611-03	FW 2

Tools and Equipment Required for Replacing the Boot PROMs

The following tools and equipment are required to replace the boot PROMs:

- PROM extraction tool or a small flat-blade screwdriver
- Two boot PROMs

Replacing the Boot PROMs

Follow this procedure to replace the boot PROMs:

- Step 1** To open the chassis and expose the boot PROMs, follow the procedures in the section “Opening the Chassis” earlier in this chapter.
- Step 2** After the boot PROMs (FW1 and FW2) on the system card are exposed, perform Steps 3 through 6 to replace the PROMs.



Caution The correct placement of the boot PROMs is crucial. If the PROMs are installed in the wrong sockets they could be damaged when the system is powered on. To prevent damage to the PROMs from ESD (when handling the system and its components), follow the ESD procedures described earlier. Also, be careful not to damage or scratch the printed circuit card under the PROMs.

- Step 3** Locate the boot PROMs, FW1 and FW2 (see Figure 1-3).
- Step 4** Using an PROM extraction tool or a small flat-blade screwdriver, gently remove the boot PROMs and set them aside (on a nonconductive surface).
- Step 5** Insert the new boot PROMs in their respective sockets in the orientation show in Figure 1-3, being careful not to bend or crush any of the bottom pins. If you inadvertently bend a pin, use needle-nose pliers to straighten them. Align the notch in the new PROM with the notch in the PROM socket, ignoring the orientation of the label.
- Step 6** Replace the tray assembly and cover following the instructions in the section “Replacing the Cover.”

Installing Primary-Memory DRAM SIMMs

The router contains primary and shared memory. Primary memory stores the running configuration and routing tables. Shared memory is used for packet buffering by the router network interfaces. (See Figure Figure 1-3 for the location of primary and shared memory in your router.)

It might be necessary to expand primary memory by installing a DRAM SIMM if you are using very large routing tables or many protocols, or the router is set up as a connection device between large external networks and your internal network.

After booting your system, the system banner on the console screen displays only the amount of primary memory, in kilobytes (KB). The following example shows a system with 1 MB (1024 KB) of primary memory (shared memory is not displayed). *The system does not display shared memory until later in the boot process.*

```
System Bootstrap, Version (2.1), SOFTWARE
Copyright (c) 1986-1993 by cisco Systems
2500 processor with 1024 Kbytes of main memory
>
```

Primary Memory Configurations

The router has 2 MB of fixed DRAM memory and a DRAM SIMM socket for upgrading memory. You can upgrade primary memory by installing a 4-, 8-, or 16-MB DRAM SIMM in the DRAM SIMM socket. Table 1-2 lists the upgrade amounts and corresponding memory configurations.

Table 1-2 DRAM SIMM Memory Configurations

Upgrade DRAM	Memory Configuration
4 MB	1 MB x 36 DRAM SIMM
8 MB	2 MB x 36 DRAM SIMM
16 MB	4 MB x 36 DRAM SIMM

Approved DRAM SIMM Vendors

Order DRAM SIMMs from Cisco Systems or an approved vendor. Table 1-3 lists the upgrade amounts and corresponding Cisco Systems product numbers.

Table 1-3 Cisco Systems DRAM SIMMs

Upgrade DRAM	Cisco Systems Product Number
4 MB (1 MB x 36, 70 ns DRAM SIMM)	MEM1X4D=, MEM-6M=
8 MB (2 MB x 36, 70 ns DRAM SIMM)	MEM-1X8D=
16 MB (4 MB x 36, 70 ns DRAM SIMM)	MEM-1X16D=, MEM-18M=

Table 1-4 lists approved 70 nanosecond (ns) DRAM SIMM vendors.

Table 1-4 Approved DRAM SIMM Vendors

Upgrade DRAM	Vendor	Vendor Part Number
4 MB (1 MB x 36, 70 ns DRAM SIMM)	Hyundai	HYM536100AM-70
	Micron	MT9D136M-7
	Mitsubishi	MH1M36ASDJ-7
	Mitsubishi	MH1M36BNDJ-7
	NEC	MC421000A36BE-70
	OKI	MSC23136B-70BS12
	Samsung	KMM5361003C-70
8 MB (2 MB x 36, 70 ns DRAM SIMM)	Smart Modules	SM536C2000-7
16 MB (4 MB x 36, 70 ns DRAM SIMM)	Hitachi	HB56D436SBR-7AGS
	Hyundai	HYM536410M-70
	Mitsubishi	MH4M36ANXJ-7
	NEC	MC-424000A36BE-70
	Samsung	KMM5364100A-70

Memory Allocation

The type of memory installed, fixed DRAMs or a DRAM SIMM, effects the way shared and primary memory are allocated. Table 1-5 lists the types of memory (fixed DRAM or DRAM SIMM), how memory is allocated (as shared or primary memory), and the resulting total memory.

Table 1-5 Memory Allocation

Fixed DRAM Memory Installed	DRAM SIMM Memory Installed	Memory Allocated as Shared Memory	Memory Allocated as Primary Memory	Total Memory (Combined Shared and Primary Memory)
0 MB	4 MB	2 MB	2 MB	4 MB
0 MB	8 MB	2 MB	6 MB	8 MB
0 MB	16 MB	2 MB	14 MB	16 MB
2 MB	0 MB	1 MB	1 MB	2 MB
2 MB	4 MB	2 MB	4 MB	6 MB
2 MB	8 MB	2 MB	8 MB	10 MB
2 MB	16 MB	2 MB	16 MB	18 MB

Tools and Equipment Required

The following tools and equipment are required:

- Medium-sized flat-blade screwdriver (1/4 inch [0.625 cm])
- ESD-preventive wrist strap
- The appropriate DRAM SIMM for your router model

DRAM SIMM Installation

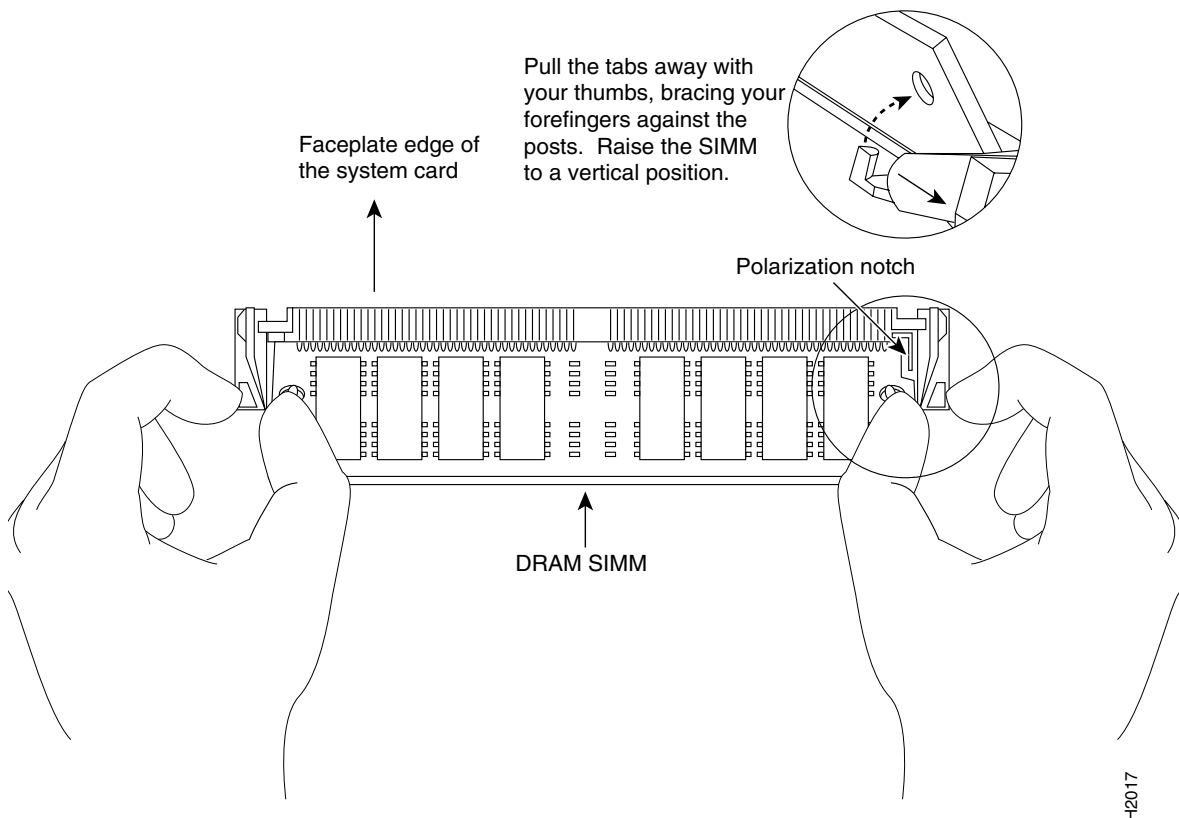
Following is the procedure for installing DRAM SIMMs:

- Step 1** Turn OFF power, but to channel ESD voltages to ground, do not unplug the power cord.
- Step 2** Attach an ESD-preventive wrist strap.
- Step 3** Open the cover according to the procedure in the section “Opening the Chassis.”
- Step 4** Turn the chassis so the system board is opposite the position shown in Figure 1-3, with the primary memory DRAM SIMM socket toward you.
- Step 5** Remove the existing DRAM SIMM (if installed) by pulling outward on the connectors to unlatch them (shown in Figure 1-4). Be careful not to break the holders on the connector.



Caution To prevent damage, do not push on the center of the SIMM. Handle the SIMM carefully.

Figure 1-4 Removing and Replacing the DRAM SIMM



- Step 6** Using the system board orientation shown in Figure 1-4, position the new SIMM so that the polarization notch is located at the right end of the SIMM socket. Note that the orientation of the system board is opposite of that shown in Figure 1-3.
- Step 7** Insert the new DRAM SIMM by sliding the end with the metal fingers into the SIMM connector socket at approximately a 45-degree angle to the system card. Gently rock the SIMM back into place until the latch on either side snaps into place. Do not use excessive force, or the connector could break.
- Step 8** Replace the router cover using the procedure in the section “Cover Replacement.”
- Step 9** Connect the router to a console terminal.
- Step 10** Turn ON the power to the chassis. If error messages relating to memory are displayed, repeat Steps 1 through 7, taking care to firmly seat the SIMM in its socket.

Replacing System-Code SIMMs

The system code (software) is stored on Flash or PROM SIMMs. It might be necessary to upgrade the system-code SIMM if you're upgrading to a system code that is too large for the existing system-code SIMM.

The system contains two system-code SIMM slots labeled CODE0 and CODE1. You can upgrade the system-code SIMM by replacing the existing SIMM in the CODE0 slot or installing an additional SIMM in the CODE1 slot. Table 1-6 lists the SIMM slots, CODE0 and CODE1, and the proper placement of SIMMs for the desired total SIMM memory.

Table 1-6 System-Code SIMM Memory Configurations

SIMM Slot CODE0	SIMM Slot CODE1	Total SIMM Memory
4 MB	0 MB	4 MB
4 MB	4 MB	8 MB
8 MB	0 MB	8 MB
8 MB	8 MB	16 MB

The 80-pin Flash and PROM SIMMs must be purchased from Cisco Systems. Contact a customer service representative for more information.

Note The system code for all the router models can be contained on either one or two 80-pin Flash or PROM SIMMs. If only one 80-pin SIMM socket is populated, it must be the SIMM socket indicated in Figure 1-3 (*CODE 0*).

Tools and Equipment Required

- Medium-size flat-blade screwdriver (1/4 inch [0.625 cm])
- ESD-preventive wrist strap
- The appropriate system-code SIMM(s) for your router model

Flash and PROM SIMMs for the router are available only from us. Contact a customer service representative for more information.

System-Code SIMM Replacement

Following is the procedure for upgrading the system-code Flash SIMMs:

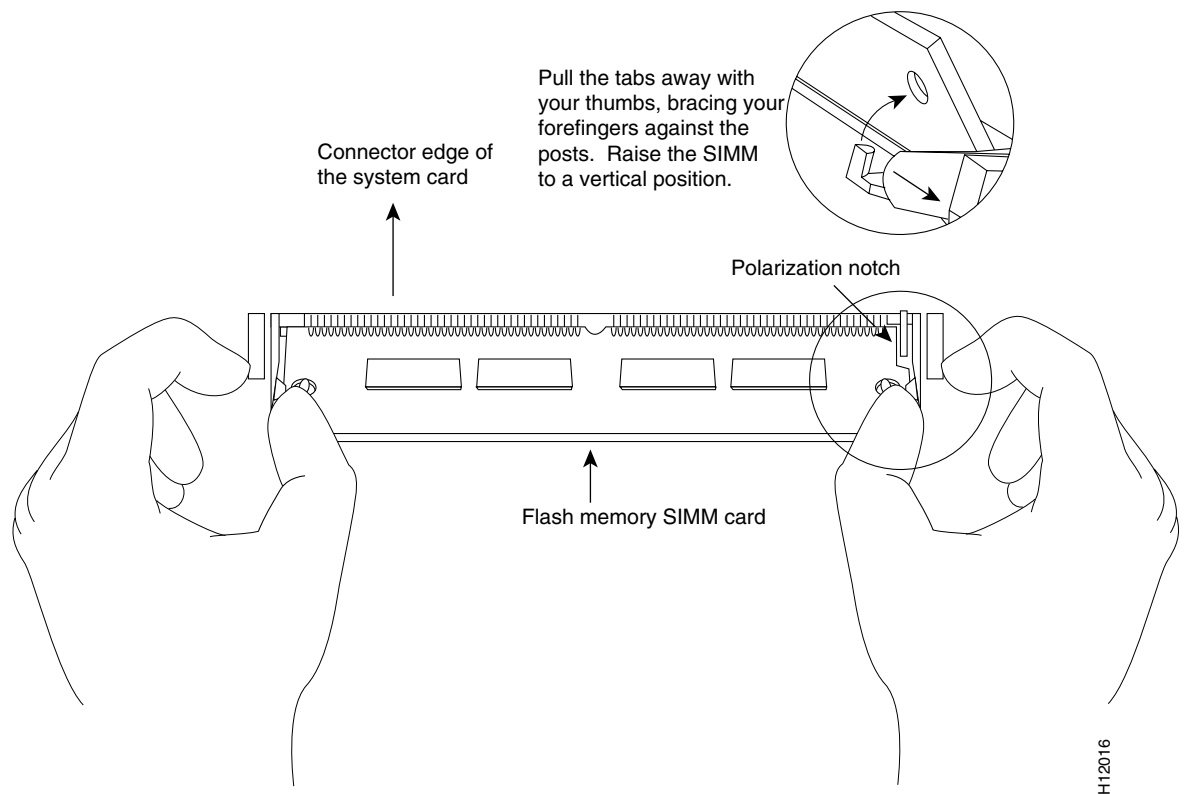
- Step 1** Turn off power, but to channel ESD voltages to ground, do not unplug the power cord.
- Step 2** Attach an ESD-preventive wrist strap.
- Step 3** Open the chassis cover using the tools and procedures in the section “Opening the Chassis.”
- Step 4** Turn the chassis so that the system board is opposite the position shown in Figure 1-3, with the system-code SIMMs toward you.
- Step 5** Locate the system-code SIMMs on the system board. The SIMM sockets are labeled *CODE 0* and *CODE 1* (shown in Figure 1-3).
- Step 6** Remove the existing system-code SIMM by pulling outward on the connectors to unlatch them. The connector holds the SIMM tightly, so be careful not to break the holders on the SIMM connector. (See Figure 1-5.)



Caution To prevent damage, do not push on the center of the SIMMs. Handle each SIMM carefully.

- Step 7** Repeat this procedure for all the system-code SIMMs to be replaced.

Figure 1-5 Removing and Replacing the System-Code SIMM—Flash SIMM Shown



Step 8 Using the system board orientation shown in Figure 1-5, position the new SIMM so that the polarization notch is located at the right end of the SIMM socket. Note that the orientation of the system board is opposite of that shown in Figure 1-3.



Caution To prevent damage, note that some Flash SIMMs have the components mounted on the rear side; therefore, when inserting the SIMM, always use the polarization notch as a reference and *not* the position of the components on the SIMM.

Step 9 Insert the new SIMM by sliding the end with the metal fingers into the appropriate SIMM connector socket (*CODE 0* or *CODE 1*) at approximately a 45-degree angle to the system card. Gently rock the SIMM back into place until the latch on either side snaps into place. Do not use excessive force because the connector could break.

Step 10 Replace the router cover using the procedure in the section “Replacing the Cover.”

Step 11 Connect the router to a console terminal.

Step 12 Turn on the power to the chassis.

If error messages relating to memory display, repeat Steps 1 through 9, taking care to firmly seat the SIMM in the socket.

Upgrading Feature Sets with Flash Cards

The 2500 series router provides a Flash (PCMCIA) card slot permitting the upgrade of the feature set on your 2500 series router. The available feature sets are:

- IP only
- Desktop
- Enterprise

Tools and Equipment Required

- Medium-size flat-blade screwdriver (1/4-inch [0.625 cm])
- ESD-preventive wrist strap
- The appropriate Flash card for the selected feature set

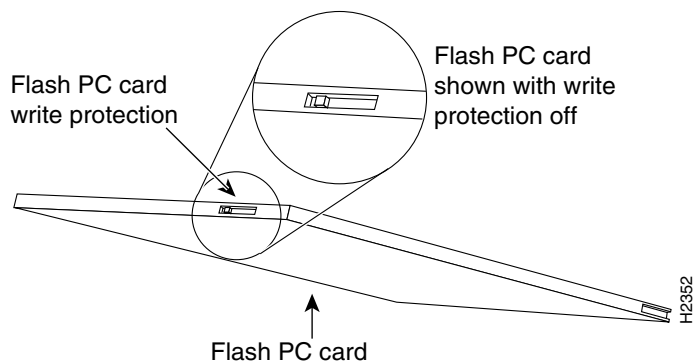
Flash card feature upgrades are available only from us. Contact a customer service representative for more information.

Flash Card Upgrade

To upgrade the feature set using a Flash memory card, follow these steps:

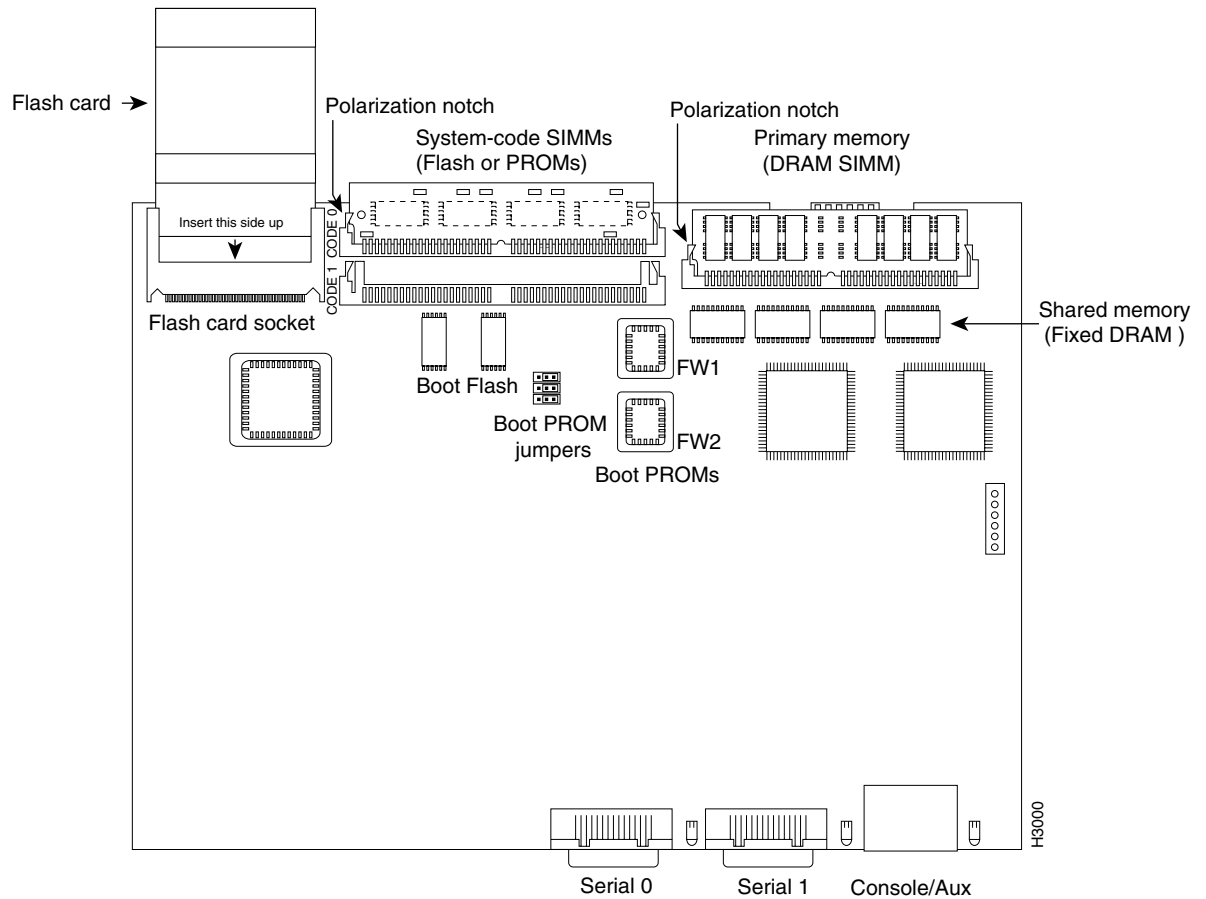
- Step 1** Turn off the power, but to channel ESD voltages to ground, do not unplug the power cable.
- Step 2** Remove all interface cables from the rear panel of the router.
- Step 3** Attach an ESD-preventive wrist strap.
- Step 4** Open the chassis cover following the instructions in the section “Opening the Chassis.”
- Step 5** Turn the chassis so the system board is in the position shown in Figure 1-7, with the primary memory DRAM SIMM socket away from you.
- Step 6** Verify that the Flash memory card is set with write protection off. The write protect switch is located on the top edge of the card when oriented with the printing side up (see Figure 1-6).

Figure 1-6 Locating the Flash Memory Card Write Protection Switch



Step 7 Locate the Flash memory card socket at the upper left corner of the system board, and insert the card into the socket (see Figure 1-7).

Figure 1-7 Inserting the Flash Memory Card



Note The example board layout in Figure 5-7 shows a model 2516. The location of your PCMCIA Flash card socket may differ slightly from that shown in the illustration, depending on the model of your equipment.

Step 8 Reconnect the system console to the unit.

Step 9 Turn the power switch to the ON position. The system automatically starts the upgrade procedure. The upgrade screen will display on the system console (see Figure 1-8).

Figure 1-8 Example of a Flash Memory Card Upgrade Screen

```
*****
THIS SOFTWARE CAN BE USED TO UPGRADE 2500 FROM IP_ONLY TO DESKTOP FEATURE SET
THIS UPGRADE CAN TAKE UP TO 3 MINUTES
*****

*****
DO YOU WANT TO UPGRADE YOUR 2500?
PLEASE ENTER 'Y' OR 'N': (Enter '?' for help)
*****

*****
PLEASE WAIT ....

UPGRADING SOFTWARE FEATURE SET FOR 2500

THE UNIT WILL BE UPGRADED FROM IP_ONLY TO DESKTOP FEATURE SET

THIS CAN TAKE UP TO 3 MINUTES

PLEASE DO NOT REMOVE THE CARD OR POWER CYCLE DURING THIS TIME

*****

*****
THE UNIT HAS BEEN UPGRADED FROM IP_ONLY TO DESKTOP FEATURE SET
*****

*****
PLEASE TURN OFF THE UNIT AND REMOVE THE CARD
*****
```

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Step 10 Enter “Y” when the upgrade screen displays the following message:

```
DO YOU WANT TO UPGRADE YOUR 2500?
PLEASE ENTER 'Y' OR 'N' : (Enter '?' for help)
```

The following message appears on the screen:

```
Please Wait....
UPGRADING SOFTWARE FEATURE SET FOR 2500
THE UNIT WILL BE UPGRADED FROM IP-ONLY TO DESKTOP FEATURE SET
THIS CAN TAKE UP TO 3 MINUTES
PLEASE DO NOT REMOVE THE CARD OR POWER CYCLE DURING THIS TIME
```

When the upgrade is complete the following message appears on the console screen:

```
THE UNIT HAS BEEN UPGRADED FROM IP-ONLY TO DESKTOP FEATURE SET
PLEASE TURN OFF THE UNIT AND REMOVE THE CARD
```

Step 11 Turn the power switch to the OFF position and then remove the Flash memory card from its socket.

Step 12 Remove your ESD-preventive wrist strap and replace the router cover using the procedure in the section “Replacing the Cover.”

Replacing the Cover

Following is the procedure for replacing the cover.

Tools Required

Following are the tools required for replacing the cover:

- Medium-size flat-blade screwdriver (1/4 inch [0.625 cm])
- Size M 3.5 hex-head nut driver (optional)

Cover Replacement

After you perform the maintenance for your system, replace the cover by following these steps:

Step 1 Position the two chassis sections as shown in Figure 1-9.

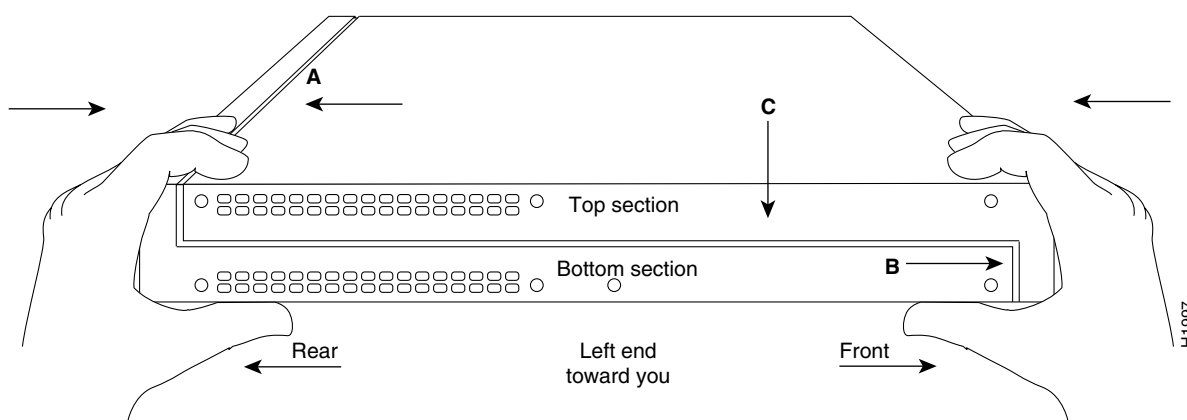
Step 2 Referring to Figure 1-9, press the two chassis sections together and ensure the following:

- The top section fits *into* the rear of the bottom section. (See Part A in Figure 1-9.)
- The bottom section fits *into* the front of the top section. (See Part B in Figure 1-9.)
- Each side of the top and bottom sections fits together. (See Part C in Figure 1-9.)



Caution To fit the two sections together, it may be necessary to work them together at one end and then the other, working back and forth; however, use care to prevent bending of the chassis edges.

Figure 1-9 Replacing the Chassis Cover



Step 3 When the two sections fit together snugly, turn the chassis so that the bottom is facing up, with the front panel toward you.

Step 4 Replace the cover screw. Tighten the screw to no more than 8 or 9 inch/pounds of torque.

Step 5 Reinstall the chassis on the wall, rack, desktop, or table.

Step 6 Replace all cables.

Recovering a Lost Password

To recover a lost password, follow these steps:

- Step 1** Attach an ASCII terminal to the router console port, which is located on the rear panel.
- Step 2** Configure the terminal to operate at 9600 baud, 8 data bits, no parity, 2 stop bits.
- Step 3** Enter the command **show version** to display the existing configuration register value. Note this value for later use in Step 13.
- Step 4** If Break is disabled, power cycle the router. (Turn the router off, wait 5 seconds, and then turn it on again.) If Break is enabled on the router, send a Break and then proceed to Step 5.
- Step 5** Within 60 seconds of turning on the router, press the Break key. This action causes the terminal to display the bootstrap program prompt (>).
- Step 6** To reset the configuration register to boot from the boot ROMs and ignore NVRAM, enter **o/r** at the bootstrap prompt as follows:

```
> o/r 0x041
```

Note A key to recovering a lost password is to set the configuration register so that the NVRAM contents are ignored (0x0040), allowing you to see your password.

- Step 7** Initialize the router by entering the **i** command as follows:

```
> i
```

The router will power cycle; the configuration register will be set to 0x141 (ignore break; ignore NVRAM; boot from ROM); and the router will boot the boot ROM system image and prompt you with the system configuration dialog as follows:

```
--- System Configuration Dialog ---
```

- Step 8** Enter **no** in response to the system configuration dialog prompts until the following system message appears:

```
Press RETURN to get started!
```

- Step 9** Press Return. The boot ROM prompt appears as follows:

```
Router (boot) >
```

- Step 10** Enter the **enable** command to enter the EXEC mode in the boot ROM image. The prompt changes to the following:

```
Router (boot) #
```

- Step 11** Enter the **show configuration EXEC** command to display the enable password in the configuration file and to display any **boot system** commands.

- Step 12** Exit configuration mode by entering Ctrl-Z.

- Step 13** Reboot the router and enable using the recovered password.