Doc. No. 78-3323-01

Upgrading DRAM and SRAM on the Second-Generation Versatile Interface Processor (VIP2)

Product Numbers: VIP2-10/20-UPG=, VIP2-10/40-UPG=, and VIP2-20/40-UPG=

This configuration note includes the procedures required to upgrade the dynamic random-access memory (DRAM) single in-line memory modules (SIMMs) and the static random-access memory (SRAM) dual in-line memory module (DIMM) on the following two second-generation Versatile Interface Processor (VIP2) products:

- VIP2-10(=)
- VIP2-20(=)

Note Depending on your system's configuration and the VIP2 products in your system, the protocols you are running or plan to run, and the Cisco Internetwork Operating System (Cisco IOS) release your system is running, you might need to upgrade the SRAM and DRAM on your VIP2-10(=) or VIP2-20(=).

Document Contents

Following are the sections included in this configuration note:

VIP2 Upgrade Overview

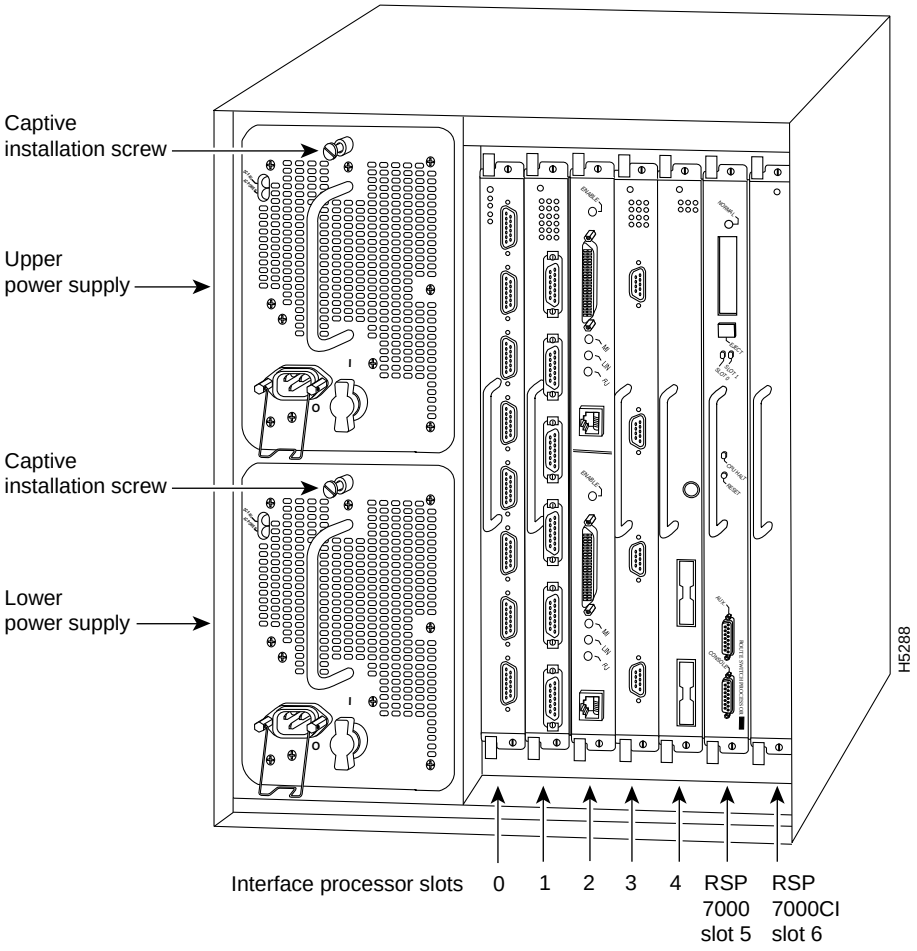
The current VIP2 products have the following SRAM and DRAM configurations and available VIP2 upgrade products (designated with *UPG*):

- VIP2-10—512 kilobytes (KB) of SRAM and 8 megabytes (MB) of DRAM
  - VIP2-10/20-UPG= includes the SRAM and DRAM required to upgrade VIP2-10 to VIP2-20
  - VIP2-10/40-UPG= includes the SRAM and DRAM required to upgrade VIP2-10 to VIP2-40
- VIP2-20—1 MB of SRAM and 16 MB of DRAM
  - VIP2-20/40-UPG= includes the SRAM and DRAM required to upgrade VIP2-20 to VIP2-40
- VIP2-40—2 MB of SRAM and 32 MB of DRAM (no upgrade is required or currently available)

Locating the VIP2 in the Cisco 7000 Series Routers

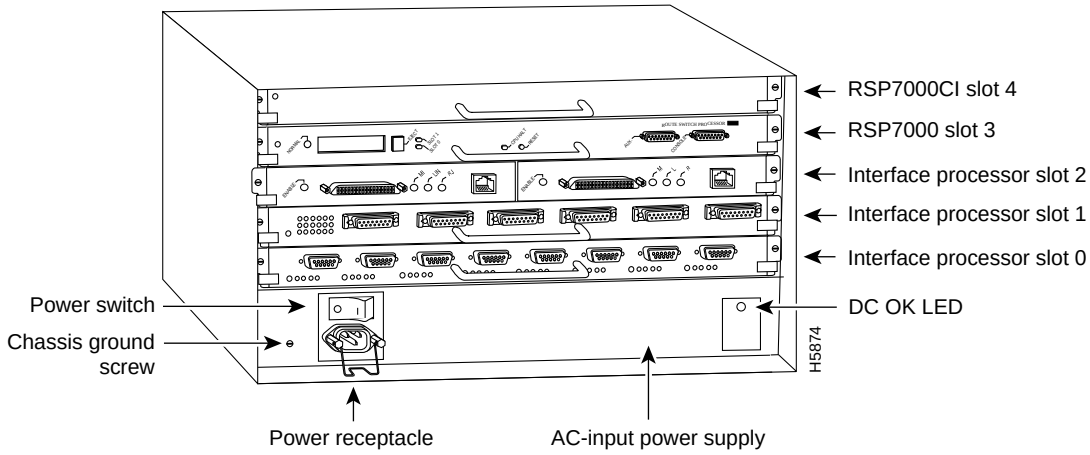
The VIP2 will operate in the Cisco 7000 series routers providing these routers have the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI) installed. In the Cisco 7000 (see Figure 1), slots 0 through 4 are reserved for interface processors. Figure 1 shows a VIP2 in interface processor slot 2.

Figure 1 Cisco 7000 with RSP7000 and RSP7000CI Installed, Interface Processor End


Captive
installation screw
Upper
power supply
Captive
installation screw
Lower
power supply
H5288
Interface processor slots
0
1
2
3
4
RSP
7000
slot 5
RSP
7000CI
slot 6

In the Cisco 7010 (see Figure 2), slots 0 through 2 are reserved for interface processors. Figure 2 shows a VIP2 in interface processor slot 2.

Figure 2 Cisco 7010 with RSP7000 and RSP7000CI Installed, Interface Processor End

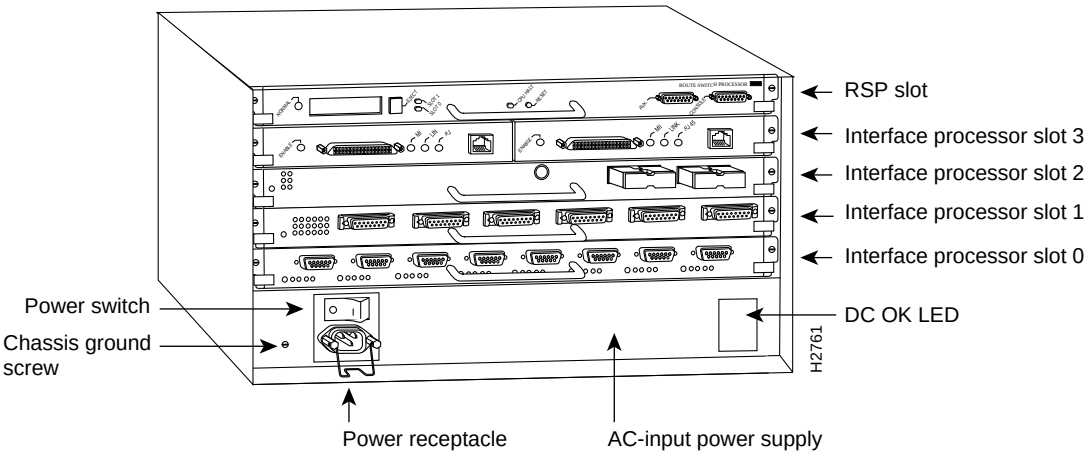


Locating the VIP2 in the Cisco 7500 Series Routers

The Cisco 7500 series consists of the Cisco 7505, Cisco 7507, and Cisco 7513 routers. The VIP2 will operate in the Cisco 7500 series routers.

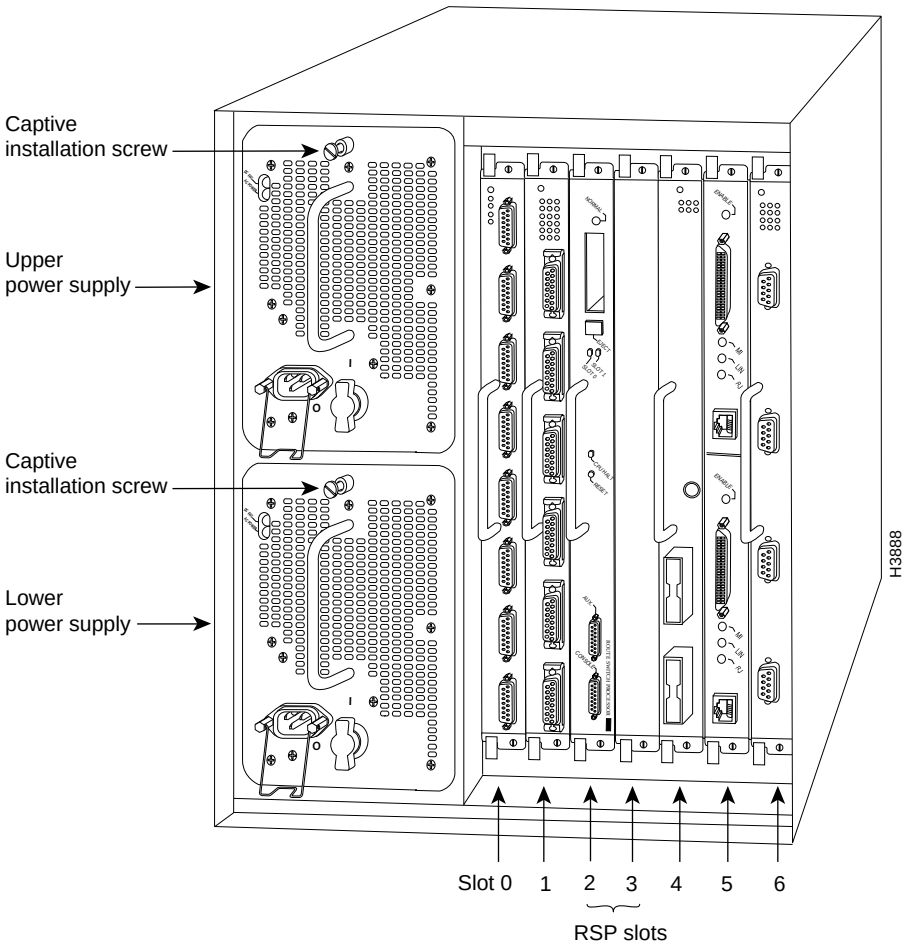
Figure 3, Figure 4, and Figure 5 show the rear of the Cisco 7500 series routers: the five-slot Cisco 7505, the seven-slot Cisco 7507, and the thirteen-slot Cisco 7513, respectively. In the Cisco 7505 (see Figure 3), slots 0 through 3 are reserved for interface processors. Figure 3 shows a VIP2 in interface processor slot 3.

Figure 3 Cisco 7505, Interface Processor End



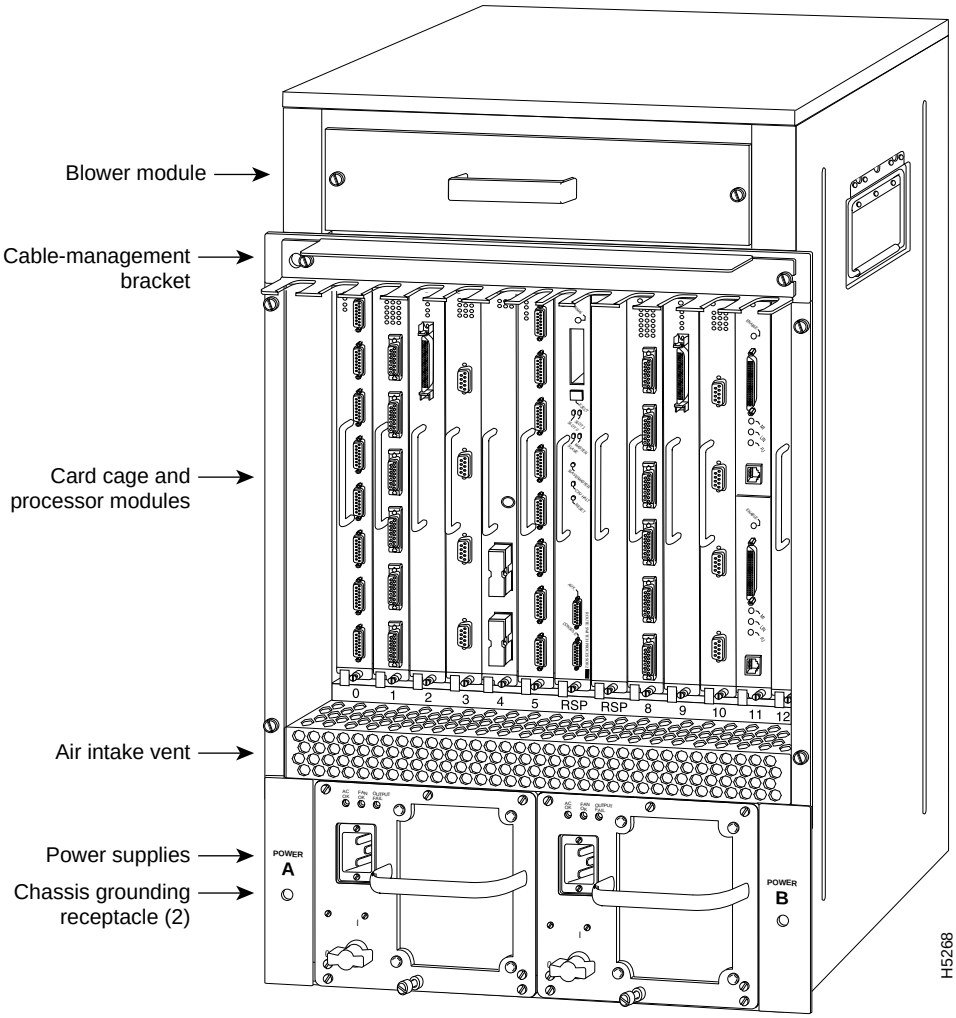
In the Cisco 7507 (see Figure 4), slots 0 and 1 and 4 through 6 are reserved for interface processors. Figure 4 shows a VIP2 in interface processor slot 5.

Figure 4 Cisco 7507, Interface Processor End



In the Cisco 7513 (see Figure 5), slots 0 through 5 and 8 through 12 are reserved for interface processors. Figure 5 shows a VIP2 in interface processor slot 11.

Figure 5 Cisco 7513, Interface Processor End



For complete hardware installation and maintenance information on the Cisco 7000 family routers, and the VIP2, refer to the following publications:

- *Cisco 7000 Hardware Installation and Maintenance*
- *Cisco 7010 Hardware Installation and Maintenance*
- *Cisco 7505 Hardware Installation and Maintenance*
- *Cisco 7507 Hardware Installation and Maintenance*
- *Cisco 7513 Hardware Installation and Maintenance*
- *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*

VIP2 Upgrade Prerequisites

This section provides guidelines for when to upgrade the SRAM and DRAM on your VIP2, a list of parts and tools you will need to perform the upgrade, and it also includes safety and ESD-prevention guidelines to help you avoid injury and damage to the equipment.

SRAM and DRAM Upgrade Guidelines

Following are recommended guidelines for understanding when to upgrade DRAM and SRAM and your VIP2. For proper operation with the VIP2, we recommend that your RSP or RSP7000 has at least 24 MB of DRAM.

Note The maximum transmission unit (MTU) sizes available for two 4R, 4T, and FDDI port adapters on a VIP2 might require additional VIP2 SRAM to ensure adequate buffers. We recommend the VIP2-20 for use with these port adapters. The minimum recommended VIP2 model is a VIP2-10, *if* you only have one 4T, one 4R, or one FDDI port adapter on a VIP2. Also, the Distributed Switching (DSW) and Distributed Services (DS) features might require additional VIP2 DRAM and SRAM. Refer to Table 1.

Table 1 VIP2 Model Minimum Recommendations for Using DSW and DS

VIP2 Models	Recommended for DSW	Recommended for DS
VIP2--10: 512 KB of SRAM and 8 MB of DRAM	No	No
VIP2-20: 1 MB of SRAM and 16 MB of DRAM	Yes	No
VIP2--40: 2 MB of SRAM and 32 MB of DRAM	Yes	Yes

Note When DSW is enabled on a VIP2-20, the routing table generated by the RSP or RSP7000 is downloaded to the VIP2 DRAM. Depending on the size of the routing table it may become necessary to upgrade to the VIP2-40. Table 2 provides a general guideline based on the number of network nodes and recommends which VIP2 model should be used.

Table 2 Recommended VIP2 Models Based on Network Size

Number of network nodes	Less than 40,000	Greater than 40,000
VIP2[1] model to use	VIP2-20	VIP2-40

1. Recommended.

Note You cannot use DRAM, which was designed for the RSP or RSP7000, on the VIP2.

List of Parts and Tools

You need the following tools and parts to upgrade a VIP2. If you need additional equipment, contact a service representative for ordering information.

- The appropriate upgrade kit for your VIP2; two 60-nanosecond (ns) SIMMs and one 12-ns DIMM are included with each kit (see also the sections “VIP2 Upgrade Overview” on page 2, “SRAM and DRAM Upgrade Guidelines," on page 7, and “Installing the VIP2 Memory Upgrade Kits” on page 12)
- Number 1 Phillips and a 3/16-inch, flat-blade screwdriver
- Your own ESD-prevention equipment or the disposable grounding wrist strap included with all upgrade kits

Safety Guidelines

Following are safety guidelines that you should follow when working with any equipment that connects to electrical power or telephone wiring.

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 to people 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.

Telephone Wiring Guidelines

Use the following guidelines when working with any equipment that is connected to telephone wiring or to other network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. Port adapters and processor modules comprise printed circuit boards that are fixed in metal carriers. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the board from ESD, use a preventive antistatic strap during handling.

Following are 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.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use any available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.
- Handle carriers by available handles or edges only; avoid touching the printed circuit boards or connectors.
- Place a removed component board-side-up on an antistatic surface or in a static shielding container. If you plan to return the component to the factory, immediately place it in a static shielding container.
- 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.
- Never attempt to remove the printed circuit board from the metal carrier.

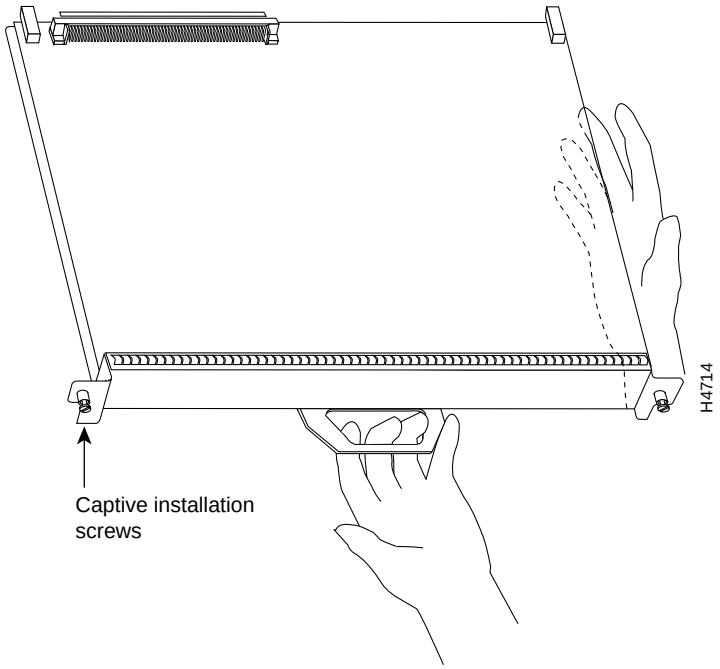
Caution For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megohms.

Removing a VIP2

Remember, the VIP2 supports online insertion and removal (OIR); therefore, you need not shut down the interface or the system power when removing a VIP2.

Figure 6 shows proper handling of an interface processor during installation.

Figure 6 Handling Processor Modules for Installation and Removal (Horizontal Orientation Shown)



To remove a VIP2, follow these steps:

Step 1 If you are replacing a failed VIP2, disconnect all cables from the VIP2 ports; however, if you are only moving a VIP2 to another slot, this step is not necessary.

Step 2 Use a screwdriver to loosen the captive installation screws on the VIP2. (See Figure 7.)

Caution Always use the ejector levers to remove or install the VIP2. Failure to do so can cause erroneous system error messages indicating a board failure.

Step 3 Place your thumbs on the ejector levers and simultaneously pull both of the ejectors outward (in the opposite direction from that show in Figure 7c) to release the VIP2 from the backplane connector.

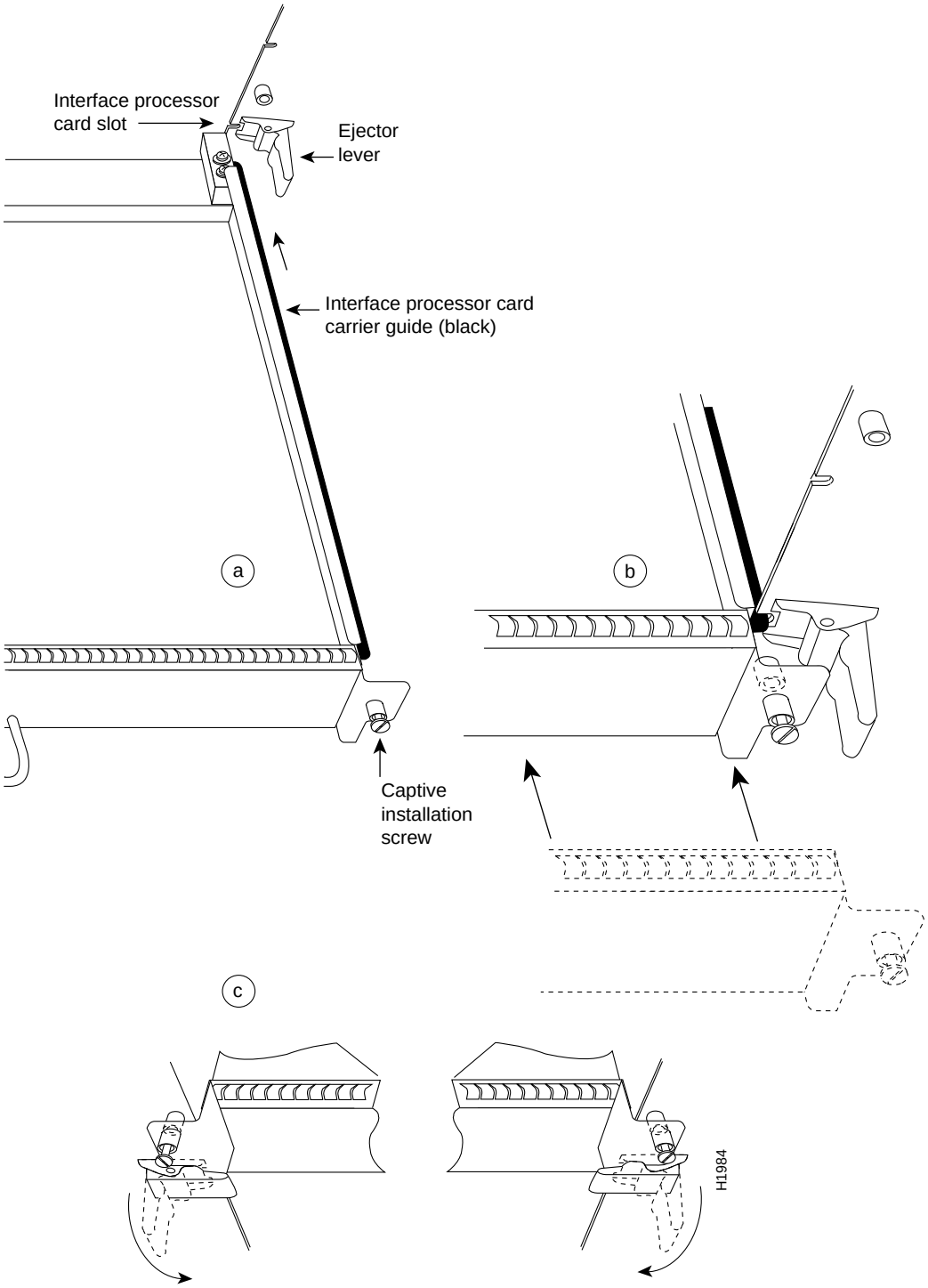
Step 4 Use the VIP2 handle to carefully pull the VIP2 straight out of the slot, keeping your other hand under the carrier to guide it. (See Figure 6.) Keep the VIP2 parallel to the backplane.

Step 5 Place the removed VIP2 on an antistatic mat or foam pad, or place it in an antistatic bag if you plan to return it to the factory.

Step 6 If the interface processor slot is to remain empty, install a filler (MAS7K-BLANK) to keep dust out of the chassis and to maintain proper air flow inside the chassis. *Do not* leave the interface processor slot open.

Note The VIP2 is oriented horizontally in the Cisco 7010 and Cisco 7505 and vertically in the Cisco 7000, Cisco 7507, and Cisco 7513. After you remove the VIP2, proceed to the section "Installing the VIP2 Memory Upgrade Kits," on page 12, then to the section "Installing a VIP2."

Figure 7 Ejector Levers and Captive Installation Screws on the VIP2 (Horizontal Orientation Shown)



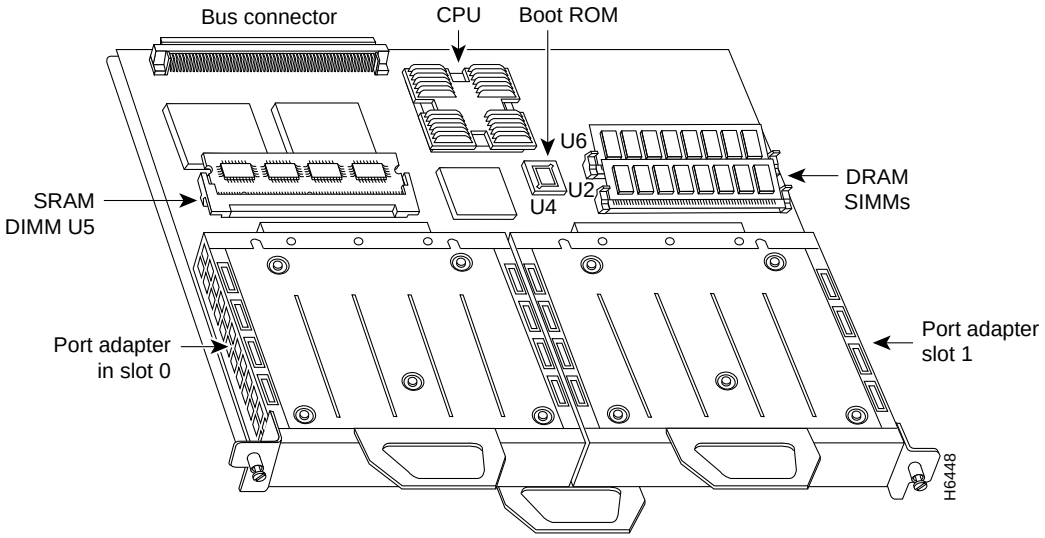
Installing the VIP2 Memory Upgrade Kits

To upgrade your VIP2's memory, you must replace both the SRAM and DRAM on your VIP2. In the following procedures, refer to Figure 8 for the locations of the DRAM SIMMs and the SRAM DIMM.

The following memory kits are compatible with the VIP2-10 and VIP20:

- VIP2-10/20-UPG=: upgrades a VIP2-10 to a VIP2-20, with one 1-MB SRAM DIMM and two 8-MB DRAM SIMMs
- VIP2-10/40-UPG= and VIP2-20/40-UPG: upgrades a VIP2-10 or VIP2-20 to a VIP2-40, with one 2-MB SRAM DIMM and two 16-MB DRAM SIMMs

Figure 8 Location of DRAM SIMMs and SRAM DIMM on the VIP2-10 or VIP2-20



Note Only DRAM and SRAM from the Cisco Systems approved vendor list (AVL) should be used. Only 60-nanosecond (ns) DRAM SIMMs and a 12-ns SRAM DIMM should be used. A Cisco manufacturing part number appears on the SIMMs and DIMM.

Replacing VIP2 DRAM SIMMs

The DRAM on the VIP2 is contained in two single in-line memory modules (SIMMs) located in sockets U1 and U2. (See Figure 8 on page 12.) Depending on your system configuration, a memory upgrade might be required. Also, if a system problem is determined to be caused by a SIMM, a SIMM replacement might be required. Use the following procedures to replace the DRAM SIMMs on your VIP2.

Caution To prevent ESD damage, handle SIMMs by the card edges only. Place removed SIMMs on an antistatic mat and store them in an antistatic bag.

Removing SIMMs

Follow these steps to remove the existing DRAM SIMMs:

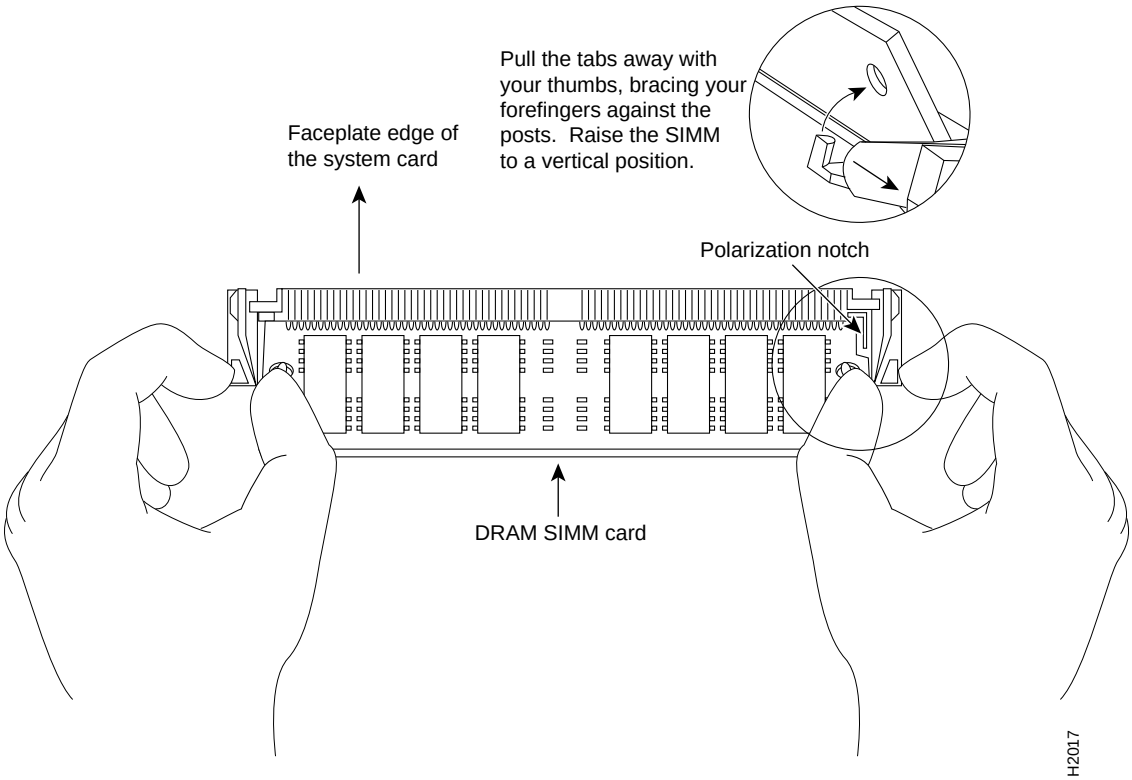
Step 1 Turn OFF the system power and follow the steps in the section “Removing a VIP2” on page 10.

Step 2 Place the VIP2 on an antistatic mat or pad, and ensure that you are wearing an antistatic device, such as a wrist strap. Position the VIP2 so that the handle is away from you, and the bus connector is toward you—opposite of the position shown in Figure 8.

Step 3 Locate the SIMMs. The DRAM SIMMs occupy sockets U1 and U2. (See Figure 8.)

Step 4 Release the spring clips from the SIMM that you want to remove and release the SIMM from the socket. (See Figure 9.)

Figure 9 Releasing the SIMM Spring Clips



Step 5 When both ends of the SIMM are released from the socket, grasp the ends of the SIMM with your thumb and forefinger and pull the SIMM completely out of the socket. Handle the edges of the SIMM only; avoid touching the memory module or pins, and the metal traces, or fingers, along the socket edge.

Step 6 Place the SIMM in an antistatic bag to protect it from ESD damage.

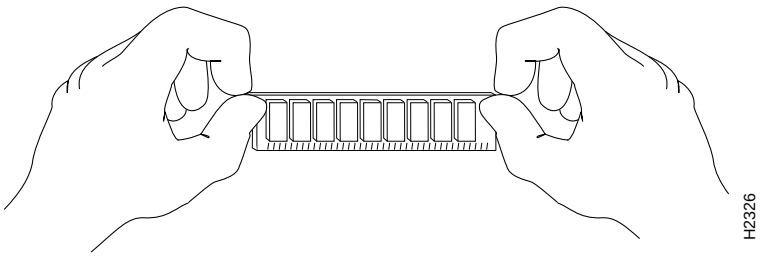
Step 7 Repeat steps 4 through 6 for the remaining SIMM, as required for this replacement.

This completes the SIMM removal procedure. Proceed to the next section to install the new SIMMs.

Installing New SIMMs

SIMMs are sensitive components that are susceptible to ESD damage. Handle SIMMs by the edges only; avoid touching the memory modules, pins, or traces (the metal *fingers* along the connector edge of the SIMM). (See Figure 10.)

Figure 10 Handling a SIMM



Caution To prevent ESD damage, handle SIMMs as shown in Figure 10.

Follow these steps to install the new SIMMs:

Step 1 With the VIP2 in the same orientation as the previous procedure (with the handle away from you and the bus connector toward you), install the first SIMM in the socket farthest from you. Then install the last SIMM in the socket closest to you.

Step 2 Remove a new SIMM from the antistatic bag.

Step 3 Hold the SIMM component side up, with the connector edge (the metal fingers) away from you.

Step 4 Hold the sides of the SIMM between your thumb and middle finger.

Step 5 Tilt the SIMM to approximately the same an angle as the socket and insert the connector edge into the socket.

Caution When inserting SIMMs, use firm but not excessive pressure. If you damage a socket, you will have to return the VIP2 to the factory for repair.

Step 6 Gently push the SIMM into the socket until the spring clips snap over the ends of the SIMM. If necessary, rock the SIMM gently back and forth to seat it properly.

Step 7 Repeat steps 2 through 6 for the remaining SIMMs.

Step 8 When both SIMMs are installed, check all four alignment holes (two on each SIMM) and ensure that the spring retainer is visible. If it is not, the SIMM is not seated properly. If any SIMM appears misaligned, carefully remove it and reseat it in the socket. Push the SIMM firmly back into the socket until the retainer springs snap into place.

This completes the SIMM replacement procedure. Proceed to the section “Installing a VIP2” on page 17, to replace the VIP2 in the chassis. Refer to the section “Checking the VIP2 Upgrade,” on page 18, as required

Replacing the VIP2 SRAM DIMM

The SRAM on the VIP2 is contained in one dual in-line memory module (DIMM) located in socket U5. (See Figure 8 on page 12.) Depending on your system configuration, a memory upgrade might be required. Also, if a system problem is determined to be caused by the DIMM, a DIMM replacement might be required. Use the following procedures to replace the SRAM DIMM on your VIP2.

Caution To prevent ESD damage, handle the DIMM by the edges only. Place a removed DIMM on an antistatic mat and store it in an antistatic bag.

Removing the DIMM

Follow these steps to remove the existing DIMM:

Step 1 Turn OFF the system power and follow the steps in the section “Removing a VIP2” on page 10.

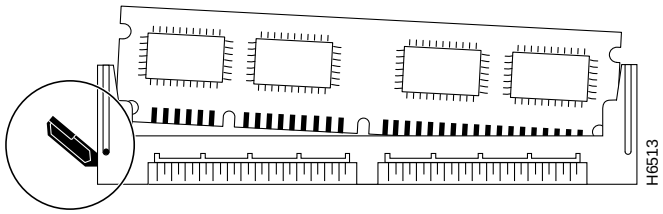
Step 2 Place the VIP2 on an antistatic mat or pad, and ensure that you are wearing an antistatic device, such as a wrist strap. Position the VIP2 so that the handle is toward you, and the bus connector is facing away from you, approximately as shown in Figure 8.

Step 3 Locate the DIMM. The SRAM DIMM occupies socket U5. (See Figure 8.)

Step 4 Locate the release lever on the DIMM socket (see circle in Figure 11) and release the DIMM from the socket as shown.

Step 5 When one end of the DIMM is released from the socket (see Figure 11), grasp the ends of the DIMM with your thumb and forefinger and pull the DIMM completely out of the socket. Handle the edges of the DIMM only. (See Figure 12.)

Figure 11 Releasing the SRAM DIMM



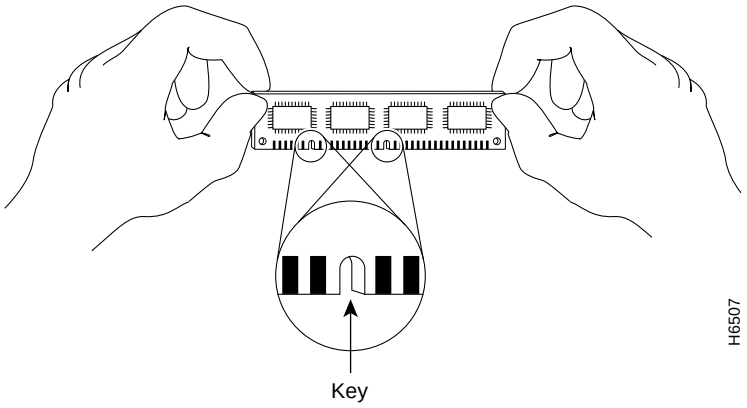
Step 6 Place the DIMM in an antistatic bag to protect it from ESD damage.

This completes the DIMM removal procedure. Proceed to the next section to install the new DIMM.

Installing a New DIMM

The DIMM is sensitive component that is susceptible to ESD damage. Handle the DIMM by the edges only; avoid touching the memory modules, pins, or traces (the metal *fingers* along the connector edge of the DIMM). (See Figure 12.)

Figure 12 Handling an SRAM DIMM



Caution To prevent ESD damage, handle the DIMM as shown in Figure 12.

Follow these steps to install the new DIMM:

Step 1 With the VIP2 in the same orientation as the previous procedure (with the handle toward you and the bus connector away from you), you will install the DIMM in socket U5.

Step 2 Remove the new DIMM from the antistatic bag.

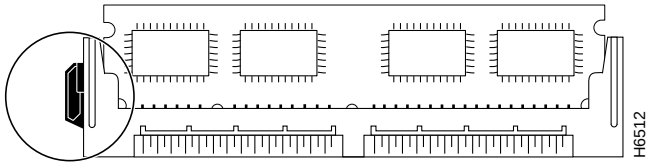
Step 3 Hold the DIMM component side up, with the connector edge (the metal fingers) down. (See Figure 12.) Hold the sides of the DIMM between your thumb and middle finger.

Step 4 Tilt the DIMM to approximately the same an angle as the socket and insert the connector edge into the socket. Note the two notches (keys) on the connector edge of the DIMM. (See Figure 12.) These keys are intended to assure correct orientation of the DIMM in the socket.

Caution When inserting the DIMM, use firm but not excessive pressure. If you damage a socket, you will have to return the VIP2 to the factory for repair.

Step 5 Note the orientation of the socket key on the SRAM DIMM and the DIMM socket and gently push the DIMM into the socket until the release lever is flush against the side of the DIMM socket (see Figure 13) and the DIMM's edge connector is fully inserted. If necessary, rock the DIMM gently back and forth to seat it properly.

Figure 13 Installing and SRAM DIMM in the Socket



Step 6 When the DIMM is installed, check that the release lever is flush against the side of the DIMM socket. (See Figure 13.) If it is not, the DIMM might not be seated properly. If the DIMM appears misaligned, carefully remove it according to the removal procedure, and reseat it in the socket. Push the DIMM firmly back into the socket until release lever is flush against the side of the DIMM socket.

This completes the DIMM replacement procedure.

Proceed to the section "Installing a VIP2" to replace the VIP2 in the chassis; then restart the system for an installation check. Refer to the section "Checking the VIP2 Upgrade," on page 18, as required.

Installing a VIP2

The VIP2 slides into the open interface processor slot and connects directly to the backplane. The interface processors are keyed to guide pins on the backplane, so the VIP2 can be installed only in an interface processor slot. Figure 7 shows the functional details of inserting an interface processor and using the ejector levers. Figure 6 shows proper handling of an interface processor during installation.

Caution Remove or insert only one interface processor at a time. Allow at least 15 seconds for the system to complete its discovery and initialization before removing or inserting another interface processor. Disrupting the sequence before the system has completed verification can cause the system to interpret hardware failures.

Follow these steps to install a VIP2:

Step 1 Ensure that a console terminal is connected to the console port (on the RSP or RSP7000) and that your console is turned ON.

Step 2 Hold the VIP2 handle with one hand and place your other hand under the carrier to support the VIP2 and guide it into the slot. (See Figure 6.) Avoid touching the card or any connector pins.

Caution To prevent ESD damage, handle interface processors by the handles and carrier edges only.

Step 3 Place the back of the VIP2 in the slot and align the notch on the carrier with the groove in the slot. (See Figure 7.)

Step 4 While keeping the VIP2 parallel to the backplane, carefully slide it into the slot until the back of the faceplate makes contact with the ejector levers, then *stop*. (See Figure 7b.)

Caution Always use the ejector levers when installing or removing processor modules. A module that is partially seated in the backplane will cause the system to hang and subsequently crash, and shoving or slamming the interface processor into the slot can damage the backplane pins and board.

Step 5 Using your thumbs, simultaneously push both ejector levers inward until the VIP2 is pushed entirely into its slot. (See Figure 7c.)

Step 6 Tighten both of the captive installation screws.

Caution To ensure proper electro-magnetic interference (EMI) isolation for the chassis, make certain to tighten the captive installation screws on each VIP2 immediately after you install it and *before* proceeding with the installation of each remaining VIP2.

The VIP2 is now properly installed in the chassis.

Checking the VIP2 Upgrade

After you upgrade the VIP2 and reconnect cables, verify the upgrade by observing the LED states and the console display. When the system has reinitialized all interfaces, the enabled LED on the VIP2 and on all interface processors should go on. Port adapter LEDs should be on, depending on your connection. The console screen will also display a message as the system discovers each interface during its reinitialization.

If, after you have replaced SIMMs and the DIMM, the system fails to boot properly, or if the console terminal displays a checksum or memory error, check the following:

- Ensure that all SIMMs and DIMM are installed correctly. If necessary, shut down the system and remove the VIP2. Check the SIMMs and DIMM by looking straight down on them and then at eye level. The SIMMs and DIMM should be aligned at the same angle and the same height when properly installed. If a SIMM or DIMM appears to stick out or rest in the socket at a different angle from the others, remove the SIMM or DIMM and reinsert it. Then replace the VIP2 and reboot the system for another installation check.
- Each SIMM or DIMM socket must contain SIMMs or a DIMM of the same size and speed or the system will not operate. SIMMs and the DIMM must be 70 ns or faster. The speed is silkscreened along one edge of the device.

If after several attempts the system fails to restart properly, contact a service representative for assistance. Before you call, make note of any error messages, unusual LED states, or any other indications that might help solve the problem.

Verify that the VIP2 is operating properly as follows:

Step 1 While the system reinitializes each interface, observe the console display messages and verify that the system discovers the VIP2 and recognizes each interface and places it in the same state (*up* or *down*) it was in when you removed the VIP2.

Step 2 When the reinitialization is complete, verify that the enabled LED on each port adapter goes on and remains on. If it does, proceed to step 5. If it does not, proceed to the next step.

Step 3 If the enabled LED on a port adapter fails to go on, suspect that the VIP2 board connector is not fully seated in the backplane. Loosen the captive installation screws, then firmly push both ejector levers into place until they are approximately in the same orientation as the VIP2 faceplate. Tighten the captive installation screws. After the system reinitializes the interfaces, the enabled LED on the port adapter should go on. If it does, proceed to Step 5. If it does not, proceed to Step 4.

Step 4 If the enabled LED still fails to go on, remove the VIP2 and try installing it in another available interface processor slot.

- If the enabled LED goes on when the VIP2 is installed in the new slot, suspect a failed backplane port in the original interface processor slot.
- If the enabled LED still fails to go on, but other LEDs on the VIP2 go on to indicate activity, proceed to Step 5 to resume the upgrade verification and suspect that the enabled LED on the port adapter has failed.
- If no LEDs on the VIP2 go on, suspect that the VIP2 is faulty.
- If the enabled LED still does not go on, contact a service representative to report the problem and obtain further instructions.

Step 5 When the VIP2's interfaces are up, check the activity of each interface by observing the status LEDs, which are described in the appropriate LED section for your port adapter type.

Note In general, if an interface's LEDs fail to go on and a cable is connected to the port, check the cable connection and make certain it is properly seated in the connector.

If an error message is displayed on the console terminal, refer to the *System Error Messages* publication for error message definitions. If you experience other problems that you are unable to solve, contact a service representative for assistance.

This completes the VIP2 SRAM and DRAM upgrade.

Cisco Connection Online

Cisco Connection Online (CCO), formerly Cisco Information Online (CIO), is Cisco Systems' primary, real-time support channel. Maintenance customers and partners can self-register on CCO to obtain additional content and services.

Available 24 hours a day, 7 days a week, CCO provides a wealth of standard and value-added services to Cisco's customers and business partners. CCO services include product information, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

CCO serves a wide variety of users through two interfaces that are updated and enhanced simultaneously—a character-based version and a multimedia version that resides on the World Wide Web (WWW). The character-based CCO supports Zmodem, Kermit, Xmodem, FTP, Internet e-mail, and fax download options, and is excellent for quick access to information over lower bandwidths. The WWW version of CCO provides richly formatted documents with photographs, figures, graphics, and video, as well as hyperlinks to related information.

You can access CCO in the following ways:

- WWW: `http://www.cisco.com`.
- Telnet: `cco.cisco.com`.
- Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and baud rates up to 14.4 kbps.

For a copy of CCO's Frequently Asked Questions (FAQ), contact `cco-help@cisco.com`. For additional information, contact `cco-team@cisco.com`.

Note If you are a network administrator and need personal technical assistance with a Cisco product that is under warranty or covered by a maintenance contract, contact Cisco's Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or `tac@cisco.com`. To obtain general information about Cisco Systems, Cisco products, or upgrades, contact 800 553-6387, 408 526-7208, or `cs-rep@cisco.com`.

This document is to be used in conjunction with the *Cisco 7000 Hardware Installation and Maintenance*, *Cisco 7010 Hardware Installation and Maintenance*, *Cisco 7505 Hardware Installation and Maintenance*, *Cisco 7507 Hardware Installation and Maintenance*, *Cisco 7513 Hardware Installation and Maintenance*, and *Versatile Interface Processor (VIP2) Installation, Configuration, and Maintenance* publications. (3323v2up.fm)

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