System Memory Upgrade Guide

HP 3000/9x9KS and HP 9000/Kxx0

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June 1996 ..... Edition 4

July 1997 ..... Edition 5

January 1998 ..... Edition 6

Change Narrative

- Edition 6 technical changes include the addition of HP9000/K380/K580 information throughout the manual.
- Minor changes and updates were also incorporated.

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Preface

This edition of the HP 3000/9x9KS and HP 9000/Kxx0 System Memory Upgrade Guide contains technical information about the following models:

Model 939KS
Model 959KS
Model 969KS
Model 979KS

Model K100
Model K200
Model K400
Model K210
Model K210
Model K410
Model K220
Model K250
Model K260
Model K370
Model K380
Model K420
Model K450
Model K460
Model K570
Model K580

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Introduction

This guide contains memory upgrade installation procedures for HP 3000/9x9KS and HP 9000/Kxx0 computers. The guide is organized as follows:

- Chapter 1: HP 3000/9x9KS and HP 9000/K2x0/K4x0/Kx70/Kx80 Memory Upgrade Installation
- Chapter 2: HP 9000/K100 Memory Upgrade Installation
- Chapter 3: Power On and Verification

If you have an HP 9000/K100 server, refer to Chapter 2 of this guide for memory upgrade installation procedures appropriate to that server.

Contents of This Chapter

This chapter describes memory upgrade installation on HP 3000/K9x9KS and HP 9000/K2x0/K4x0/Kx70/Kx80 computers:

- Verifying the current PDC
- Checking Existing System Memory
- System Shutdown
- Gaining Access to Memory
- Memory Configuration
- Memory SIMM Installation
- System Reassembly

Electrostatic Discharge (ESD) Precautions. When performing the upgrade procedures in this guide, you must observe the following antistatic precautions to prevent damage to memory boards and system components from electrostatic discharge. An ESD kit (HP P/N A3024-80004) is supplied with your memory upgrade kit. This ESD kit contains one wrist strap, one conductive sheet, and one anti-static foam pad.

- Always wear a grounded wrist strap when working on or around the system, and when handling printed circuit boards.
- Treat all assemblies, components, and interface connections as static-sensitive.
- Perform all removal and installation in a work area where potential static sources are minimized (preferably an anti-static work station).
- Avoid working in carpeted areas, and keep body movement to a minimum while removing and installing boards to minimize buildup of static charge.

Required Tools

- One #10 Torx driver (preferred tool)
- One small flat-blade screwdriver (if Torx driver is not available)

Installation Procedure (HP 3000/9x9KS and HP 9000/K2x0/K4x0/Kx70/Kx80)

Verifying the Current PDC Firmware

If you are planning to install 64MB, 128MB, 256MB, or 512 MB Memory Modules, you may need to verify your system's PDC firmware version to see if it supports that type of memory (see "OS Requirements and Diagnostic Support for 64 MB and 256 MB Modules" on page A-1). If you need to upgrade your PDC, see the section entitled "Obtaining the Correct Firmware Patch."

Using On-Line Diagnostics: (If on-line diagnostics are not present on your system, use the Boot Console Handler procedure to verify the current version.)

1. At the system prompt, enter **sysdiag**.
2. At the sysdiag prompt, enter **sysmap.**
3. At the sysmap prompt, enter **cpumap**.

The output of **cpumap** will display the current PDC revision (See Table A-1, Appendix A).

Using the Boot Console Handler:

1. Log on as root, and enter **reboot -r**. This command will shut down the operating system and reboot the system.
2. If AUTOBOOT is on, you will receive the following message:

```
Process is starting autoboot process.
To discontinue, press any key within 10 seconds.
```

3. At this point, press any key within 10 seconds to interrupt the booting process.
4. The Main Menu is displayed. A prompt will appear as

```
MAIN MENU: Enter command or menu>
```

5. Enter the command **in.**

6. A prompt will appear as:

```
Information Menu: Enter Command>
```

7. Enter the command **fv.**

The system will respond with the current firmware revision (See Table A-1, Appendix A).

Obtaining the Correct Firmware Patch

The firmware patches for all K-Class and HP3000 9x9/KS systems can obtained from the HPESC (HP Electronic Support Center) via the World Wide Web or via FTP.

Downloading the Firmware Patch via the World Wide Web

To access and download the appropriate patch, perform the following steps:

1. Connect to the HPESC World Wide Web service home page at their URL by entering the following:

   `http://us-support.external.hp.com`

2. Under **Support Line**, select the **Patch Database** option.
3. **If you are a previously registered user:**
   a. Click on “Enter as a Registered User” and select your region.
   b. Login, entering your User ID and password. This will take you to the Patch Database Main screen.

   If you are a first-time user:
   a. Click on your geographic region under “Register Now”.
   b. Review the “Terms and Conditions” page. At the bottom of the page you may accept the terms and conditions and proceed to the registration page.
   c. Complete the registration information requested.
   d. Once the registration information has been successfully transmitted, the User ID Assigned screen will appear. Write down the User ID (or print the screen) for later reference.
   e. Click on “Begin Using Patch Database Now” to proceed to the Patch Database Main screen.
4. Select the **Firmware Patches** option.
5. Select the **CPU Patches** option and click on “Show Patches”.
6. Choose the appropriate patch (for example, (PF_CKHK0022). A patch description will appear. Click on “download” to copy the patch to your system.

NOTE	The selected patch must be downloaded from HP SupportLine onto a system that has HP-UX as the operating system.

7. Follow the instructions in the **Readme** file to create a bootable tape and to update PDC.

Downloading the Firmware Patch using FTP

1. Connect to HPESC via ftp. You must initiate downloading from an open subnet system as:

```
>ftp us-support.external.hp.com
```

(If you do not have an open subnet system, try using **rftp** instead of **ftp**.)

2. Login as “anonymous”.
3. At the `Password` prompt, enter your e-mail address as the password.
4. Change to the directory containing the firmware patches:

   ```
   > cd firmware_patches/hp/cpu
   ```

   If desired, review the contents of the directory by using the **`ls`** command. For each patch, there is an accompanying text file (patchfilename.txt). The text file contains the patch description and the instructions for creating the patch tape.

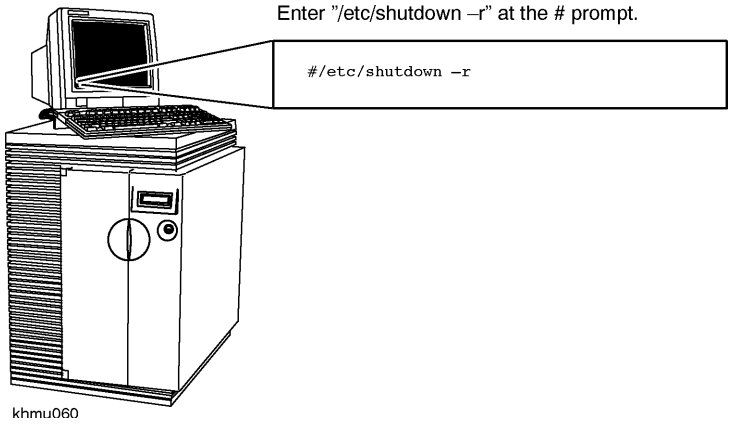
5. Download the appropriate patch file and text file:

   ```
   get <patchfilename>
   ```

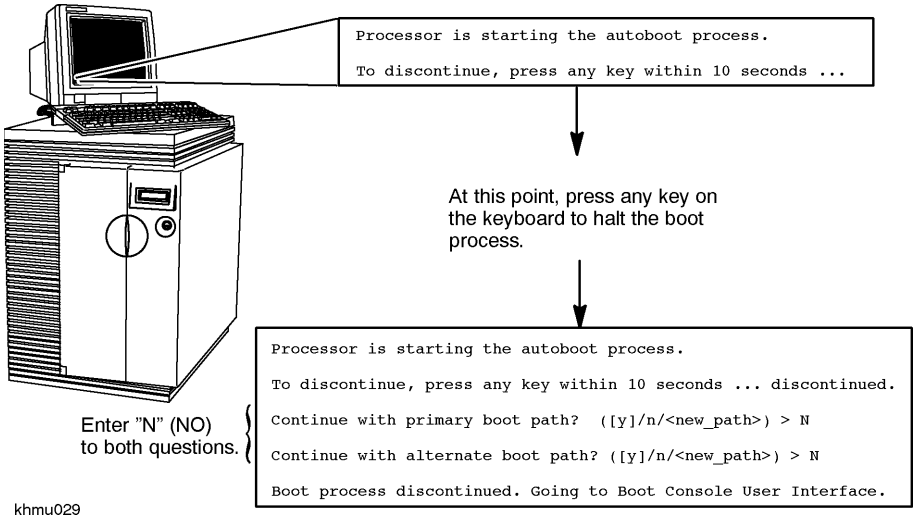
   ```
   get <patchfilename>.txt
   ```

Checking Existing System Memory

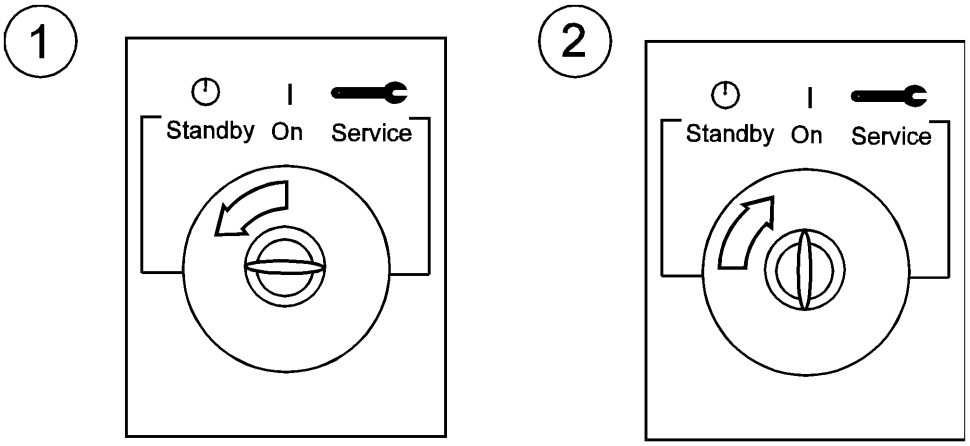
If You Have an HP 9000/K2x0/K4x0/Kx70/Kx80, Reboot the System



Then, Halt the Boot Process



If You Have an HP 3000/9x9KS, First Shut Down the Operating System. Then, After "DA00" Appears on the LCD Display, Turn key to Standby and Back On



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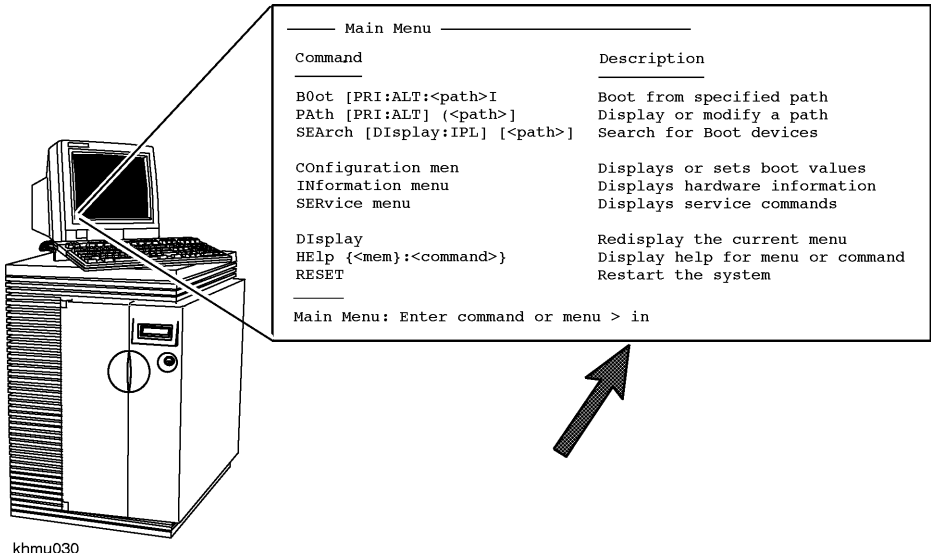
After Rebooting Your System, Type "ma" to Get the Main Menu

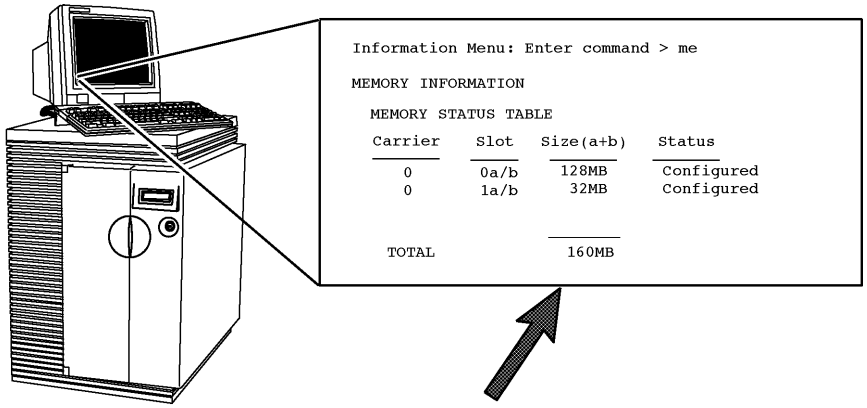
After rebooting your HP 9000/K2x0/K4x0/Kx70/Kx80 or HP 3000/9x9KS system, the Boot Console Interface prompt **(PDC>)** should appear on your console display. Type **ma** at the prompt to get to the Main menu, then proceed to the steps on the following page to check existing system memory.

Type "in" at the Main Menu to Get to the Information Menu



khmu030

Type "me" at the Information Menu to Check Memory



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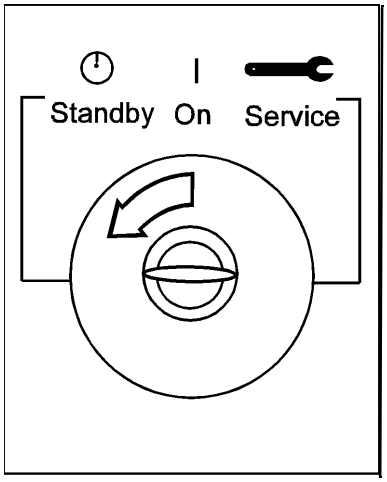
System Shutdown

Turn the system key switch to “Standby” (fully counterclockwise)



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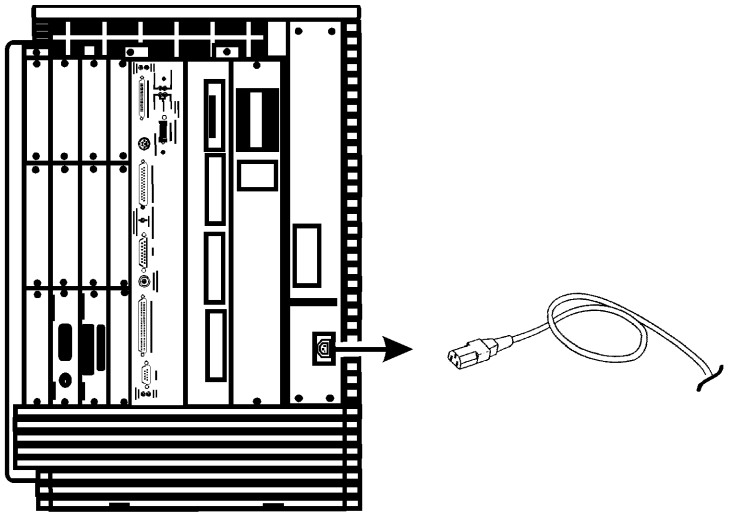
Disconnect the system power cable from the back of the system cabinet

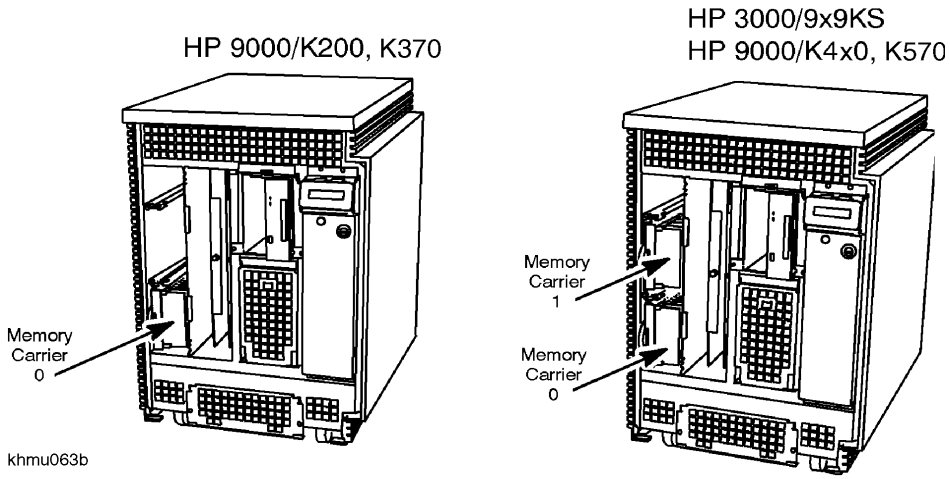


khmuc33

Gaining Access to Memory

Memory Location on HP 3000/9x9KS and HP 9000/K2x0/K4x0/Kx70/Kx80 Servers

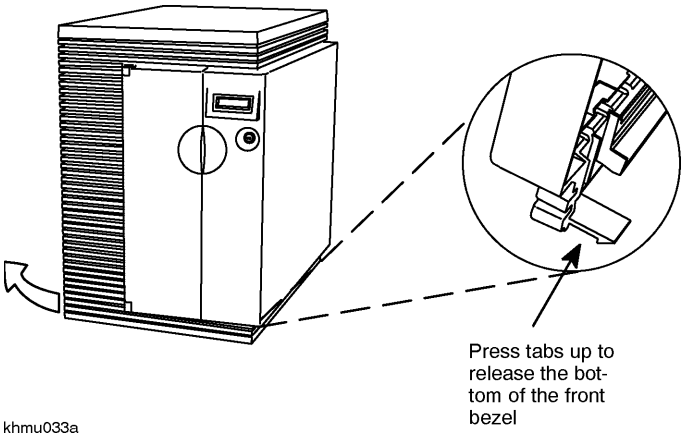
In these models, the SIMMs are inserted into memory extenders (also called *carriers*) that attach to the front of the system board, and are accessible from the front of the system. The HP 3000/9x9KS and HP 9000/K4x0 each have two memory extenders, and the HP 9000/K2x0 has one (see figure below).

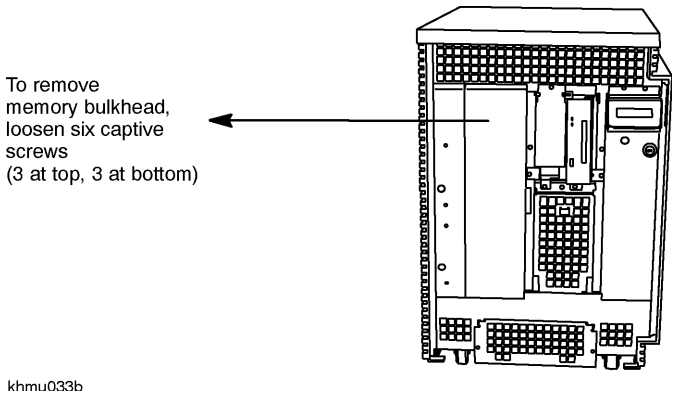


Removing the Front Bezel and Memory Bulkhead

1. Remove the front bezel by gently pulling the bottom of the bezel forward and lifting upward, then disengaging the top of the bezel from a hidden hinge. The front of the SPU is now accessible.

2. Remove the memory bulkhead by loosening the six captive screws with a Torx driver.

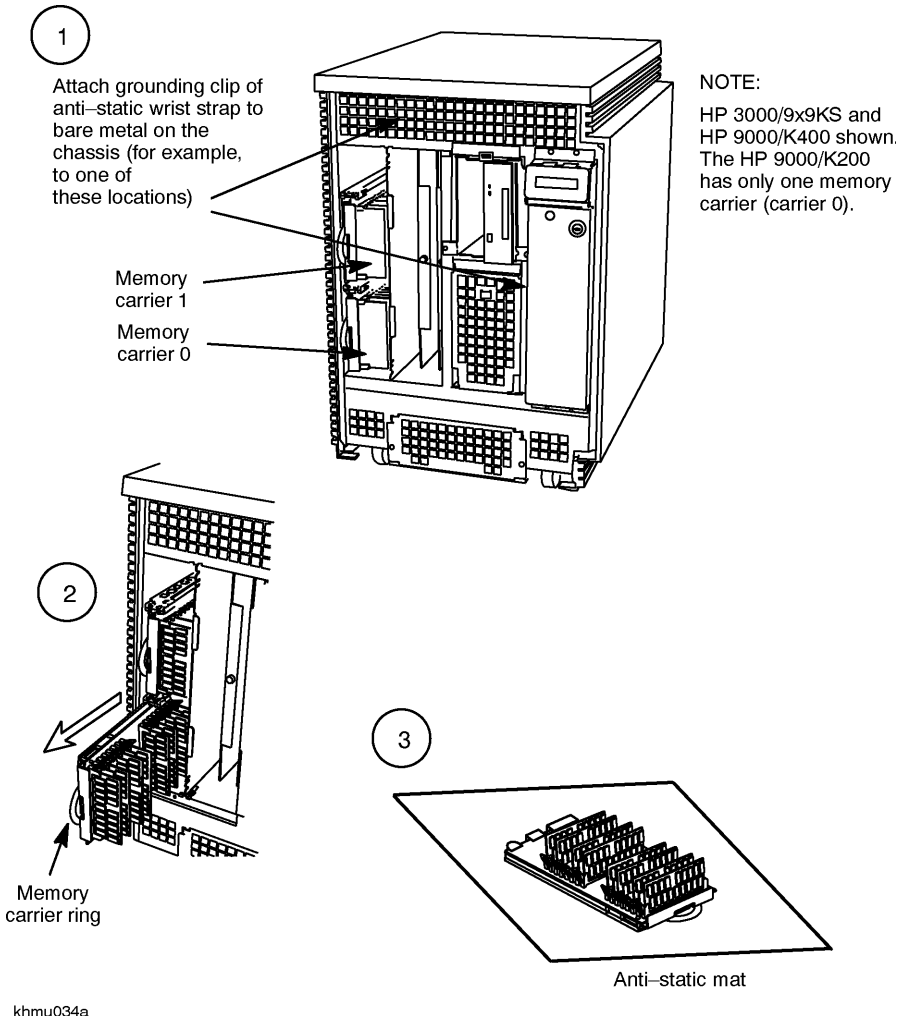




Removing Memory Extenders

NOTE To prevent damage to memory boards and system components from electrostatic discharge, always wear a grounded wrist strap when working on or around the system, and when handling printed circuit boards.

1. Attach an antistatic device to your wrist and ground it to the system chassis.
2. Pull gently on the memory extender ring to unseat the extender connector from the system board.
3. Pull the memory extender out of the system and place it on an antistatic mat.


1
Attach grounding clip of anti–static wrist strap to bare metal on the chassis (for example, to one of these locations)
Memory carrier 1
Memory carrier 0
NOTE:
HP 3000/9x9KS and HP 9000/K400 shown. The HP 9000/K200 has only one memory carrier (carrier 0).
2
Memory carrier ring
3
Anti–static mat
khmu034a

Memory Configuration and SIMM Installation

Memory in HP 3000 and HP 9000 servers can be added in many different megabyte combinations depending on your model, your use of existing memory, your memory upgrade goals, and what combination of memory modules you install.

NOTE Regardless of the availability of SIMM slots, the total amount of memory you can install is dependent on your system model and your operating system. Refer to your system Owner's Guide.

The configuration guidelines presented in this chapter will successfully optimize most combinations of memory modules. It is still possible, however, when adding memory to already-configured memory on two extenders, to meet these guidelines and still generate a warning that your memory is not optimized. If that happens, remove *all* memory modules from both extenders and re-install them following the guidelines provided below.

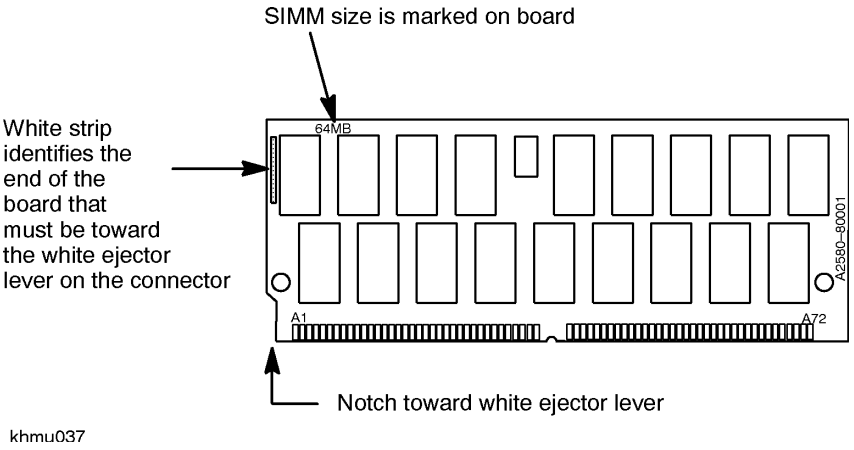
Before You Begin

Before you begin, you should understand the following definitions:

A *SIMM* is a single memory Printed Circuit Assembly (PCA) or memory board. SIMMs have memory on one side of the PCA only. All SIMMs have their size marked on the board near the upper left corner.

A *DIMM* is a single memory PCA with memory on both sides of the PCA. All DIMMs have their size marked on the board near the upper left corner, also.

NOTE The acronym SIMM is used throughout this document to indicate either SIMM or DIMM.



A *module* is a pair of SIMMs or DIMMs. Memory for your system is purchased and installed only in modules; **never install just one SIMM**.

A *pair* of modules is four SIMM cards.

256MB SIMM + 256MB SIMM	=	one 512MB module
128MB SIMM + 128MB SIMM	=	one 256MB[a] module
64MB SIMM + 64MB SIMM	=	one 128MB module
32MB SIMM + 32MB SIMM	=	one 64MB[a] module
16MB SIMM + 16MB SIMM	=	one 32MB module
A set of 2 same-size SIMMs	=	1 module
A set of 4 same-size SIMMs	=	1 pair of modules

a. See “OS Requirements and Diagnostic Support for 64MB, 256MB, and 512MB Modules” on page A-1.

Configuring Memory for Optimum Performance

For OPTIMUM memory performance, memory must be installed in a particular slot sequence. This section provides an overview and then detailed procedures for both single- and dual-extender systems.

If your memory is not configured for optimum performance, the warning, Memory not optimized for performance, appears when you boot the system. Your memory will still work, but your system’s performance may be degraded.

On HP3000/979KS and HP9000/K250/K260/K450/K460/Kx70/Kx80 systems, non-optimized memory has another impact. The firmware includes a new user-configurable flag called auto start. If the flag is set to OFF, the selftest will detect the performance degradation when you boot and will inhibit autoboot and autosearch. If you’re not sure whether a warning was displayed (i.e., warnings may have scrolled off your console), you can re-display any warning messages. From the Information menu in the user interface, use the warn command to see any warning messages that came up during the boot.

If you get the warning, Memory not optimized, use the me command in the Information Menu of the user interface (the Boot Console Handler) to check your memory configuration. This command will not directly tell you whether your memory is installed for optimum performance; it will only tell you whether the modules are seated correctly and recognized as part of your system configuration. However, you can review the sequence of memory modules in the memory extenders. The most important memory optimization rule is that all module pairs of each memory size should be installed in lower-numbered slots before any modules pairs (see the procedures and examples on pages 1-13 through 1-20). If the display of your memory configuration shows any single modules installed before module pairs , you will need to reconfigure your memory using those procedures.

If the warning **`Memory not optimized`** does not appear, your memory is at optimum configuration.

Memory Optimization Procedure for Single Memory Extenders — Overview

CAUTION To prevent damage to memory boards and system components from electrostatic discharge, always wear a grounded wrist strap when working on or around the system, and when handling printed circuit boards.

Module Installation is a 6-step process

1. Remove any currently installed memory modules.
2. Combine the removed and new memory modules and organize them into four groups:
   - 512MB modules
   - 256MB modules
   - 128MB modules and 64MB modules (combined in the same group)
   - 32MB modules
3. Divide each group into *pairs of modules* (4 SIMMs) and single modules (2 SIMMs), if any.
4. Identify each slot by its slot number and letter (0a, 0b, 1a, 1b, and so on) on the extender.
5. Install any pairs of modules as follows:
   A. Install from largest to smallest memory size.
   B. Install from lowest numbered to highest number slots.
6. When all pairs of modules have been installed, install any remaining old or new modules:
   A. Install from largest to smallest memory size.
   B. Install from lowest numbered available slots to highest number slots.

NOTE 512MB Memory Modules are only supported on Kx70/Kx80 systems.

NOTE Kx70/Kx80 systems with four to six CPUs that use the minimum 256MB memory size **REQUIRE** that the memory consist of at least four SIMMs (two modules).

Procedure for Single Memory Extenders — Detailed

Step 1. Remove any modules pairs from the memory extender.

Step 2. Combine the removed and new memory modules and organize them into four groups:

- 512MB modules
- 256MB modules
- 128MB and 64MB modules (combined in the same group)
- 32MB modules

NOTE Even though 128MB modules and 64MB modules are in the same group, the SIMMs for each module size cannot be mixed, i.e., **do not** combine a 64MB SIMM and a 32MB SIMM as one module.

Step 3. From each memory group, create as many pairs of modules (sets of 4 SIMMs) as possible. A 128MB module and a 64MB module can be used as a pair of modules since they are from the same group. Set aside any remaining modules of each size for installation last. Remember, each module consists of 2 same-size SIMMs. Any remaining single SIMMs are "unusable."

Step 4. Locate and identify each available slot by its slot number and letter (e.g., 0a, 0b) on the memory extender. Identify the sequence of available slots from lowest to highest.

Step 5. Install any *pairs of modules* (sets of 2 modules) first.

A. Install pairs of modules in decreasing size: start with the largest memory size and end with the smallest. Within a mixed-group of 128MB and 64MB modules, install the 128MB modules first.

B. Install *pairs of modules* beginning with the lowest available slot number, then the next higher slot number. In an empty extender, for example, the first pair of modules will go in slots 0a/0b and 1a/1b; the next in 2a/2b and 3a/3b, and so on.

Step 6. Install any remaining *modules*, starting with the largest memory size first.

Example — Installing New Memory in an Empty Extender

1. Four 128MB SIMMs = Two 256MB modules (one pair of 256MB modules)
2. Six 64MB SIMMs and two 32MB SIMMs = Three 128MB modules and one 64MB module (2 pairs of 128MB/64MB modules)
3. Two 16MB SIMMs = One 32MB module

Install. Order	Slots	Memory
First pair of modules	0a/0b	256MB module
	1a/1b	256MB module
Second pair of modules	2a/2b	128MB module
	3a/3b	128MB module
Third pair of modules	4a/4b	128MB module
	5a/5b	64MB module
Remaining module	6a/6b	32MB module
	7a/7b	empty
Shaded boxes indicate pairs of modules		

Example — Adding Memory to a Single Extender with Existing Memory

CURRENT MEMORY: (3) 128 MB and (2) 64MB pairs of modules

TO BE ADDED: (1) 256MB, (1) 128MB, and (1) 32MB pairs of modules

BEFORE			AFTER	
Slots	Memory Modules		Slots	Memory Modules
0a/0b	128MB	1. Remove the single 64MB module from slot 3a/3b. 2. Combine the removed module and the new modules into groups: one 256MB module one 128MB module and one 64MB module (one pair of modules) one 32MB module 3. Add the largest pair of modules (the only quad is the 128MB/64MB module) to the lowest available slots (4a/4b and 5a/5b. 4. Add the 256MB module to the next slot. 5. Add the 32MB modulemodule to the next slot.	0a/0b	128MB
1a/1b	128MB		1a/1b	128MB
128MB	2a/2b		2a/2b	128MB
3a/3b	64MB		3a/3b	128MB
4a/4b	64MB		4a/4b	64MB
5a/5b	empty		5a/5b	64MB
6a/6b	empty		6a/6b	256MB
7a/7b	empty		7a/7b	32MB

Shaded boxes indicate pairs of modules

Memory Optimization Procedure for Dual Memory Extenders — Overview

Module installation is a 6-step process:

1. Remove any currently installed pairs of memory modules.
2. Combine the removed and newpairs of memory modules and organize them into four groups:
   - 512MB modules
   - 256MB modules
   - 128MB and 64MB modules (combined in the same group)
   - 32MB modules
3. Divide each group into *pairs of modules* (4 SIMMs) and pairs of modules, if any.
4. Identify each available slot by its slot number and letter (e.g., 0a, 0b, 1a, 1b and so forth) on each memory extender.
5. Install any pairs of modules as follows:
   A. Install from largest to smallest memory size.
   B. Install memory by alternating *pairs of modules* between extenders.
   C. Install from lowest numbered available slots to highest number slots on the extender with the most slots available.
6. Install any remaining modules (2 SIMMs), filling in the lowest-numbered slots on the extender with the most available slots.

NOTE In the examples that follow, the extenders are labeled "first extender" and "second extender." It is also useful to refer to these as "Extender 0" and "Extender 1", corresponding to the lower and upper extender slots in the system memory bay.

NOTE **Adding A Memory Extender**
If you are adding a new memory extender at the same time you are adding memory, you will likely need to remove and re-sequence all the memory modules from your current memory extender. Review these optimization procedures for dual memory extenders to understand the need for balancing pairs of memory modules across the two extenders.

Procedure for Dual Memory Extenders — Detailed

Step 1. You must remove any modules from each memory extender.
If you have only one pair of memory modules in your system, and that pair has been split across the two memory extenders, you will get a "Memory not optimized" warning when you boot your system. Remove the module from one extender and add it to the module on the other extender (see Step 5 below).

Step 2. Combine the removed and new memory modules and organize them into four groups:

- 512MB modules
- 256MB modules
- 128MB and 64MB modules (combined in the same group)
- 32MB modules.

Step 3. From each memory group, create as many pairs of modules (sets of 2 modules, or 4 SIMMs) as possible. A 128MB and 64MB module can be used as a pair of modules since they are from the same group. Set aside any remaining modules of each size for installation last.

Remember, each module consists of 2 same-size SIMMs. Any remaining single SIMMs are "unusable."

Step 4. Locate and identify each available slot by its slot number and letter (e.g., 0a, 0b) on each memory extender. Identify the sequence of slots from lowest to highest

Step 5. Install any *pairs of modules* first as follows:

A. Install modules in decreasing size: start with the largest memory size and end with the smallest. Within a mixed-group of 128MB and 64MB modules, install the 128MB modules first.

B. Install *pairs of modules* beginning with the lowest available slot number on the extender with the most slots open.

If both extenders are empty, the first pair of module would go in slots 0a/0b and 1a/1b on the first extender; the second pair of modules would go in slots 0a/0b and 1a/1b on the second extender; the next pair of modules would go in slots 2a/2b and 3a/3b on the first extender, and so on.

Install all pairs of modules before installing modules.

Step 6. Install any remaining modules, beginning with the largest memory size, filling in the lowest available slot numbers on the extender with the most slots available.

Example - Installing new memory to two empty extenders

1.	14 128MB SIMMs	=	Seven 256MB modules (three pairs of modules and one 256MB module)
2.	6 64MB SIMMs and 2 32MB SIMMs	=	Three 128MB modules and one 64MB module (two pairs of 128MB/64MB modules)
3.	6 16MB SIMMs	=	Three 32MB modules (one pair of 32MB modules and one 32MB module)

1. Start with the pairs of largest memory (three pairs of 256MB modules):
   - First pair in first extender (Extender 0), slots 0a/0b and 1a/1b.
   - Second pair in second extender (Extender 1), slots 0a/0b and 1a/1b.
   - Third pair in first extender, slots 2a/2b and 3a/3b.
2. Now install the pairs of next-largest memory (two pairs of 128MB/64MB modules):
   - First pair in the lowest slots of the extender with the most available slots: Second extender, 2a/2b and 3a/3b.
   - Second pair in the first extender, slots 4a/4b and 5a/5b.
3. Now install the pairs of the next-largest memory (one pair of 32MB modules) in the lowest slots of the extender with the most available slots, then install the largest module (256MB) in the next slot in sequence: first extender, slots 6a/6b.
4. Now install the last module (32MB) in the next slot in sequence: second extender, slots 6a/6b.

First Extender		**Second Extender**	
Install. Order	Slots - Memory	Install. Order	Slots - Memory
1	0a/0b - 256MB modules	2	0a/0b - 256MB module
	1a/1b - 256MB module		1a/1b - 256MB module
3	2a/2b - 256MB module	4	2a/2b - 128MB module
	3a/3b - 256MB module		3a/3b - 128MB module
5	4a/4b - 128MB module	6	4a/4b -32MB module
	5a/5b - 64MB module		5a/5b - 32MB module
7	6a/6b - 256MB module	8	6a/6b - 32MB module
	7a/7b - empty slot		7a/7b - empty slot
Shaded boxes indicate pairs of modules			

Example - Adding Memory to Two Extenders with Existing Memory

Current Memory:	5 256MB modules 4 128MB modules 1 32MB module
Memory to be added:	1 256MB module 1 128MB module 1 64MB module 1 32MB module

	First Extender		Second Extender	
	Slot	Memory	Slot	Memory
BEFORE	0a/0b	256MB modules	0a/0b	256MB module
	1a/1b	256MB module	1a/1b	256MB module
	2a/2b	128MB module	2a/2b	128MB module
	3a/3b	128MB module	3a/3b	128MB module
	4a/4b	256MB module	4a/4b	32MB module
	5a/5b - 7a/7b	empty	5a/5b - 7a/7b	empty
	Shaded boxes indicate pairs of modules			

1. Remove the 128MB modules from the first extender, slots 2a/2b and 3a/3b. Remove the 32MB module from the second extender, slots 4a/4b.
2. Add the removed modules to the new modules to form the following groups:
   - (2) 256MB modules (one pair of modules)
   - (1) 128MB module and (1) 64MB module (one pair of modules)
   - (2) 32MB modules (one pair of modules)
3. Install the largest-size (256MB) pair of modules in the lowest-numbered available slots (2a/2b and 3a/3b) on the extender with the most available slots. Since both extenders have the same available slots, install them on the first extender.
4. Install the 128MB pair in slots 4a/4b and 5a/5b on the first extender.
5. Install the next-largest (mixed 128MB/64MB) pair of modules on slots 4a/4b and 5a/5b of the second extender.
6. Install the remaining (32MB) pair of modules on the first extender in the remaining slots, 6a/6b and 7a/7b.

The final configuration is shown on the page following.

	First Extender		Second Extender	
	Slot	Memory	Slot	Memory
AFTER	0a/0b	256MB modules	0a/0b	256MB module
	1a/1b	256MB module	1a/1b	256MB module
	2a/2b	256MB module	2a/2b	128MB module
	3a/3b	128MB module	3a/3b	128MB module
	4a/4b	128MB module	4a/4b	128MB module
	5a/5b	128MB module	5a/5b	64MB module
	6a/6b	32MB module	6a/6b	empty
	Shaded boxes indicate pairs of modules			

Pages 1-21 and 1-22 contain blank memory configuration tables that can be used for laying out your own memory configuration changes.

If You Still Get Warning Messages...

The configuration guidelines presented in this chapter will successfully optimize most combinations of memory modules. It is still possible, however, when adding memory to already-configured memory on two extenders, to meet these guidelines and still generate a warning that your memory is not optimized. If that happens, remove all memory modules from both extenders and re-install them following the guidelines provided.

If the **Memory not optimized** warnings persist, contact your HP Support representative if assistance is required.

Blank Memory Configuration Tables

Extender 0		Extender 1	
Slot	Memory	Slot	Memory
0a/0b 1a/1b		0a/0b 1a/1b	
2a/2b 3a/3b		2a/2b 3a/3b	
4a/4b 5a/5b		4a/4b 5a/5b	
6a/6b 7a/7b		6a/6b 7a/7b	

Extender 0		Extender 1	
Slot	Memory	Slot	Memory
0a/0b 1a/1b		0a/0b 1a/1b	
2a/2b 3a/3b		2a/2b 3a/3b	
4a/4b 5a/5b		4a/4b 5a/5b	
6a/6b 7a/7b		6a/6b 7a/7b	

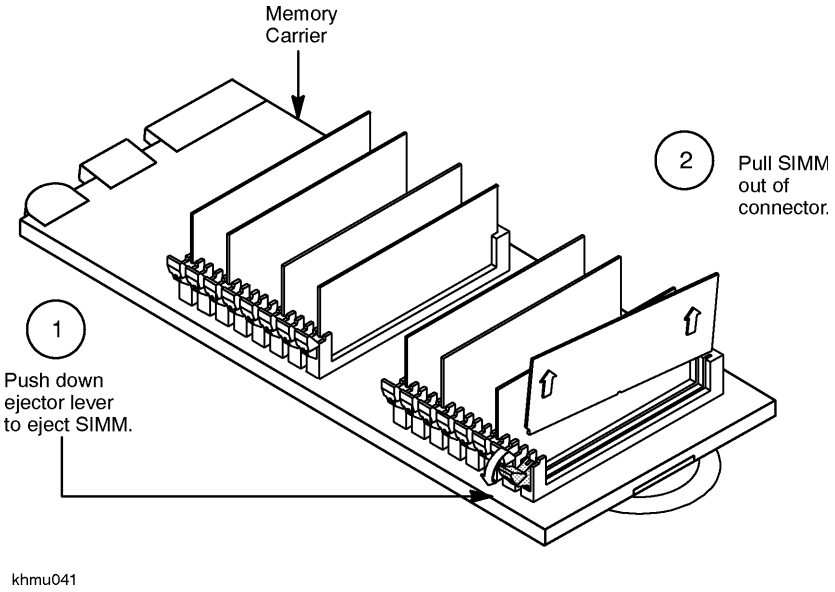
Extender 0		Extender 1	
Slot	Memory	Slot	Memory
0a/0b 1a/1b		0a/0b 1a/1b	
2a/2b 3a/3b		2a/2b 3a/3b	
4a/4b 5a/5b		4a/4b 5a/5b	
6a/6b 7a/7b		6a/6b 7a/7b	

Extender 0		Extender 1	
Slot	Memory	Slot	Memory
0a/0b 1a/1b		0a/0b 1a/1b	
2a/2b 3a/3b		2a/2b 3a/3b	
4a/4b 5a/5b		4a/4b 5a/5b	
6a/6b 7a/7b		6a/6b 7a/7b	

SIMM Removal and Installation

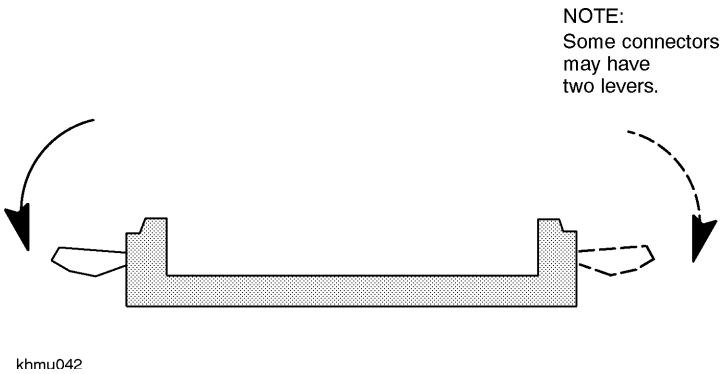
Removing SIMMs

You may find it necessary to remove existing SIMMs before installing the upgrade SIMMs. Remember that the final configuration of all the SIMMs (existing plus upgrade) must conform to the memory configuration rules described previously. To remove SIMMs, follow these guidelines:

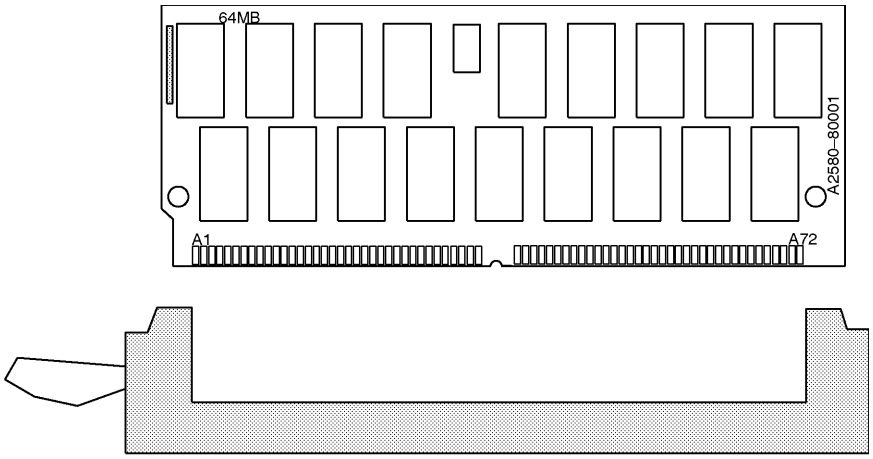


Installing SIMMs

Open the ejector lever (down position)

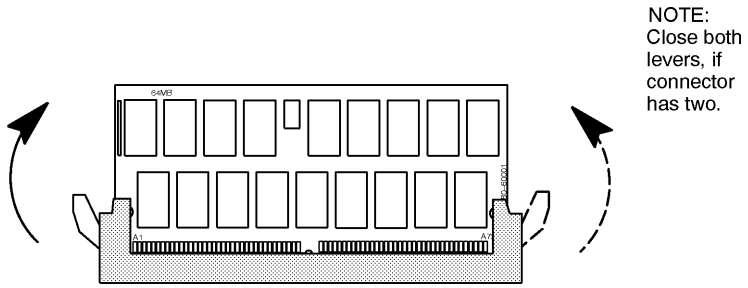


Orient the SIMMs correctly. The SIMM must be inserted only one way, with the white stripe and notch toward the white ejector lever.



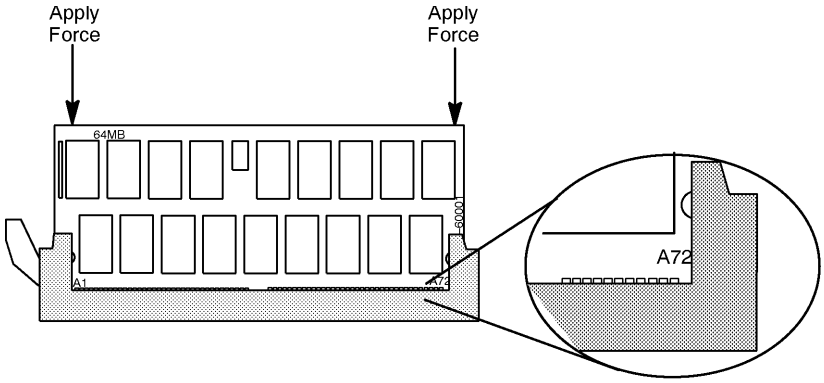
khmu043

Insert the SIMM into the connector until the fingers on the card edge just touch the connector



khmu045

Push the SIMM card firmly and evenly into the connector



khmu046

NOTE **Do not "rocker" the SIMM into the connector! Apply force evenly.**

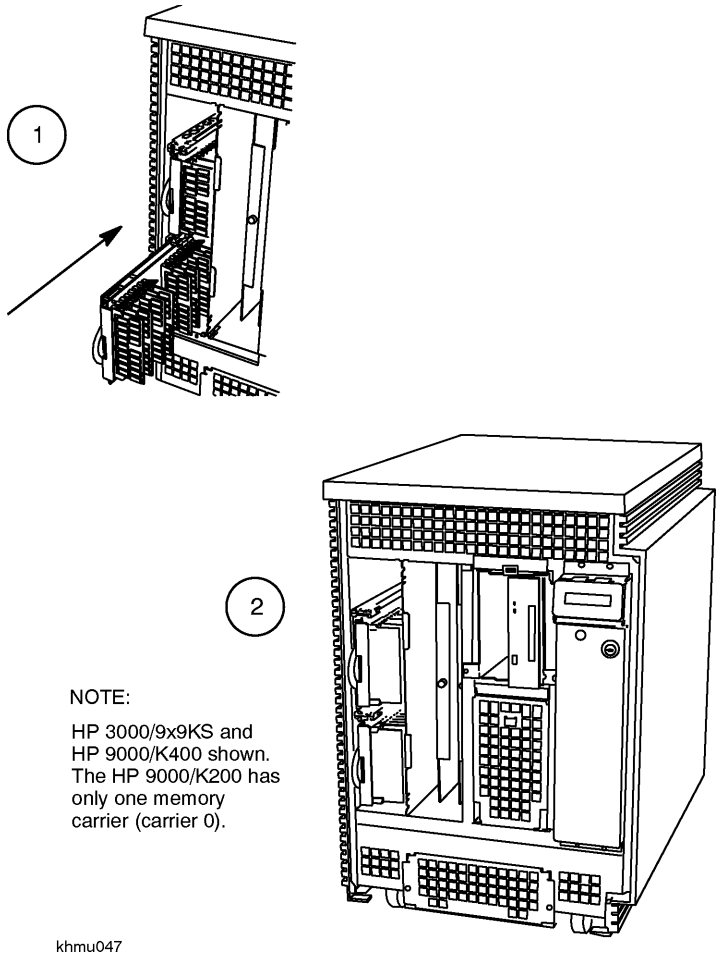
After All SIMMs Are Installed

After all SIMMs have been inserted, check them to ensure that they are seated evenly and that all SIMMS are the same height (an incorrectly seated SIMM may stick out above the others). Also verify that all SIMM pairs are configured correctly according to the SIMM rules described previously in this guide.

System Reassembly

Reinstalling Memory Extender(s)

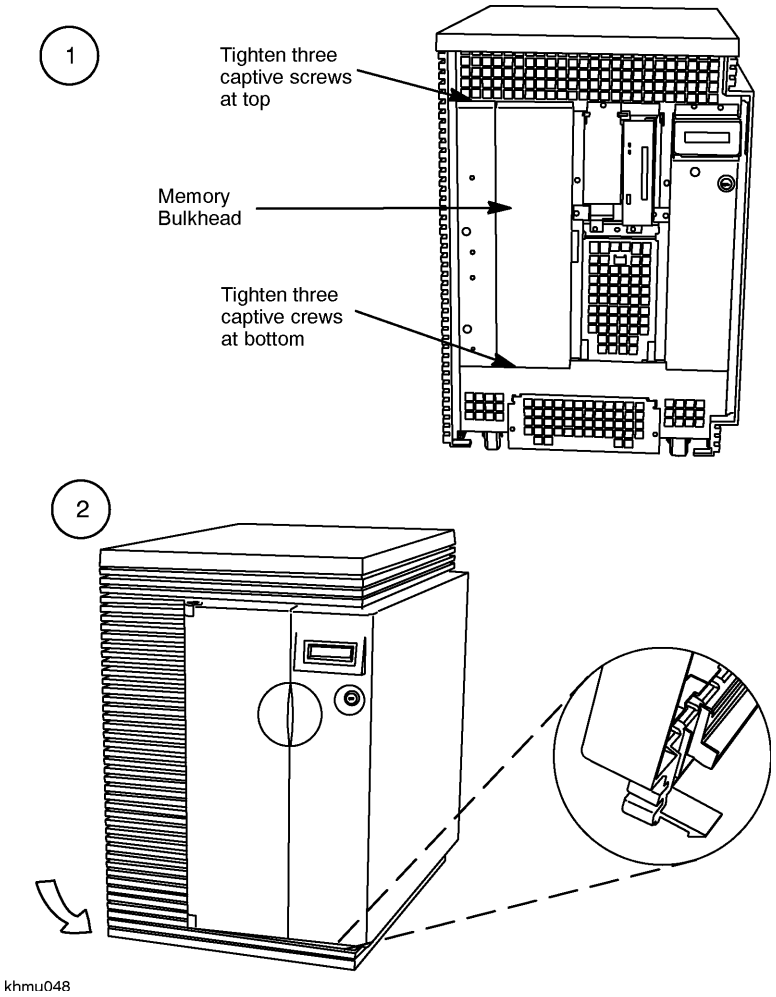
1. Push the memory extender into the memory extender bay while aligning the extender with the top and bottom metal rails
2. When the connectors meet the system board, push the extender gently into the mating connector on the system board.



Reattaching the Memory Bulkhead and Front Bezel

CAUTION DO NOT turn on the system with the memory bulkhead removed. The memory bulkhead permits proper airflow for cooling the system during normal operation.

1. Attach the memory/processor bulkhead, and tighten the six captive screws.
2. Attach the front bezel by sliding the top of the bezel under the hidden top hinge. Drop the bezel down at the bottom and push it against the SPU until the two bottom tabs click into place.



Proceed to the power on and verification procedures in Chapter 3.

2 HP 9000/K100 Memory Upgrade Installation

Introduction

This chapter describes the steps required to install a memory upgrade on HP 9000/K100 servers.

If you have an HP 3000/9x9KS or HP 9000/K2x0/K4x0/Kx70/Kx80 server, refer to Chapter 1 of this guide for memory upgrade installation procedures appropriate to those servers.

Contents of This Chapter

This chapter describes the steps required to install a memory upgrade on HP 9000/K100 servers, including:

- Checking Existing System Memory
- System Shutdown
- Gaining Access to Memory
- Memory Configuration
- Memory SIMM Installation
- System Reassembly

Electrostatic Discharge (ESD) Precautions

When performing the upgrade procedures in this guide, you must observe the following antistatic precautions to prevent damage to memory boards and system components from electrostatic discharge. An **ESD kit** (HP P/N A3024-80004) is supplied with your memory upgrade kit. This ESD kit contains one wrist strap, one conductive sheet, and one anti-static foam pad.

- Always wear a grounded wrist strap when working on or around the system, and when handling printed circuit boards.
- Treat all assemblies, components, and interface connections as static-sensitive.
- Perform all removal and installation in a work area where potential static sources are minimized (preferably an anti-static work station).
- Avoid working in carpeted areas, and keep body movement to a minimum while removing and installing boards to minimize buildup of static charge.

Required Tools

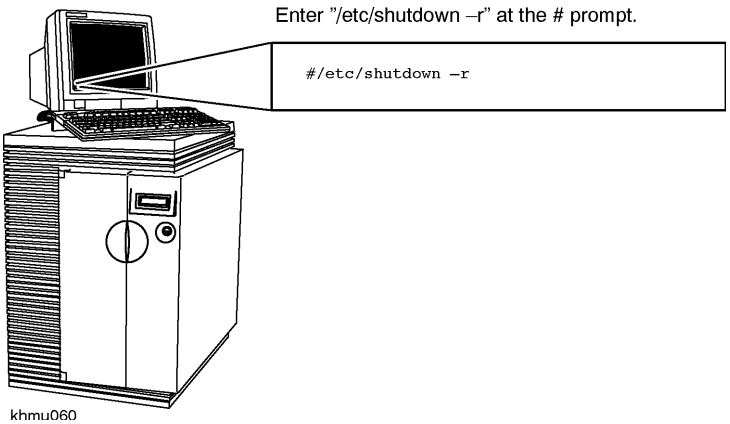
To perform the procedures in this guide, you will need the following tools:

- One #10 Torx driver (preferred tool)
- One small flat-blade screwdriver (if Torx driver is not available)

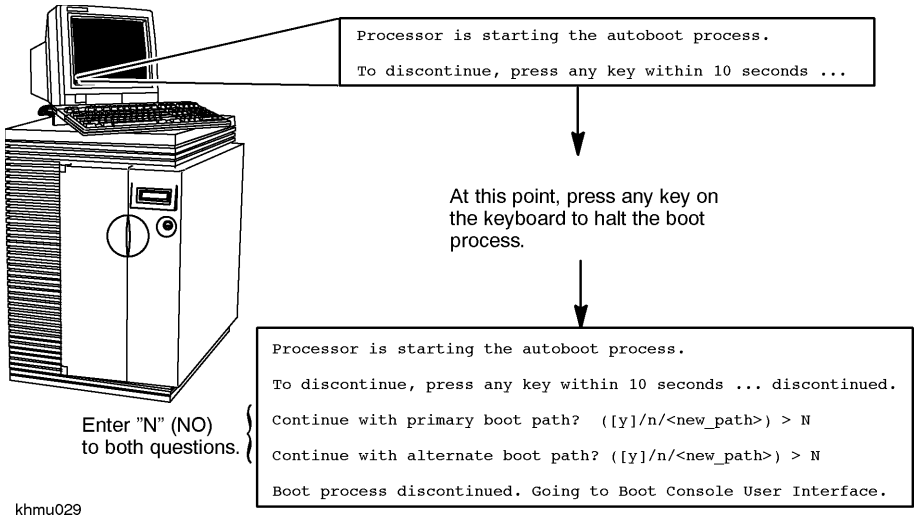
Installation Procedure (HP 9000/K100)

Checking Existing System Memory

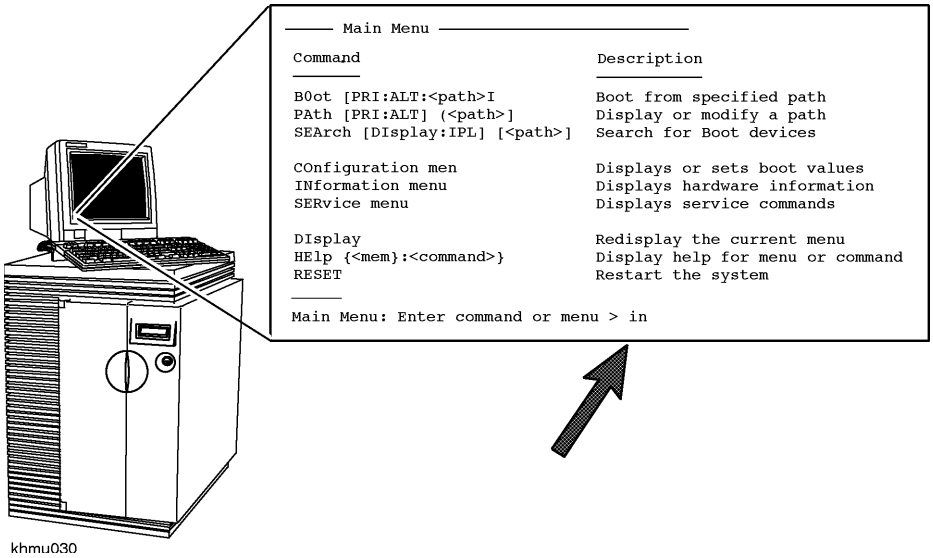
Reboot the System



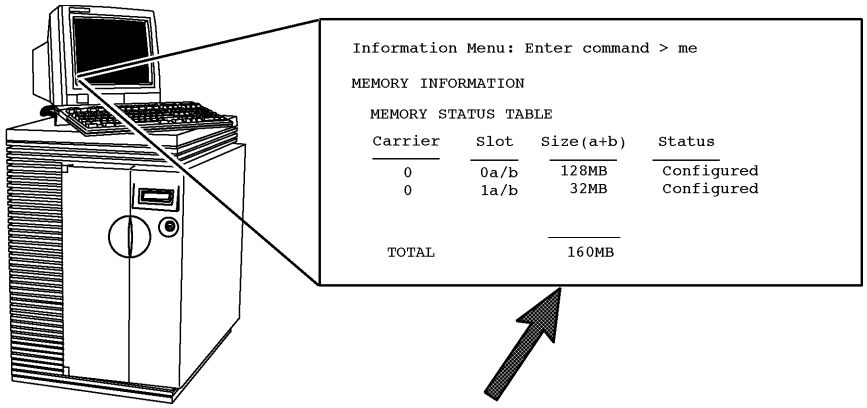
Halt the Boot Process



Type "ma" at the Boot Console Interface Prompt (PDC>) to Get to the Main Menu, then Type "in" to get to the Information Menu

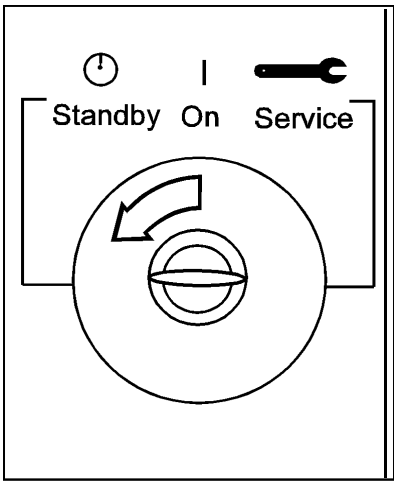


Type "me" to Check Memory



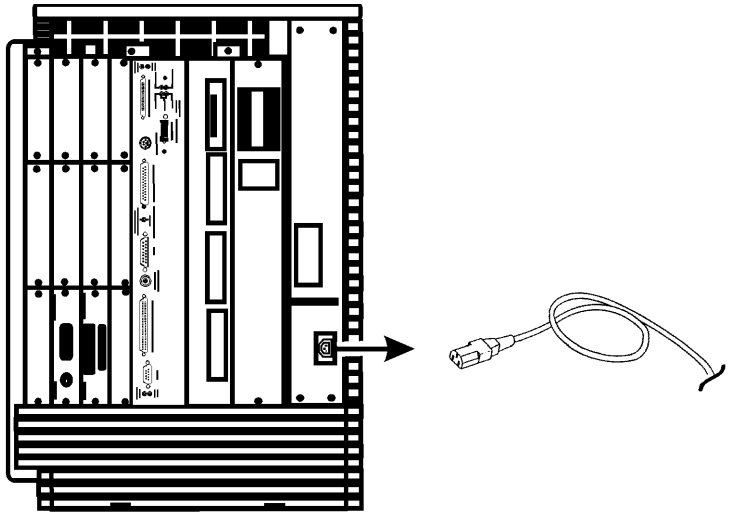
khmu031

Turn the system key switch to “standby” (fully counterclockwise)



khmuc32a

Disconnect the system power cable from the back of the system cabinet



khmuc33

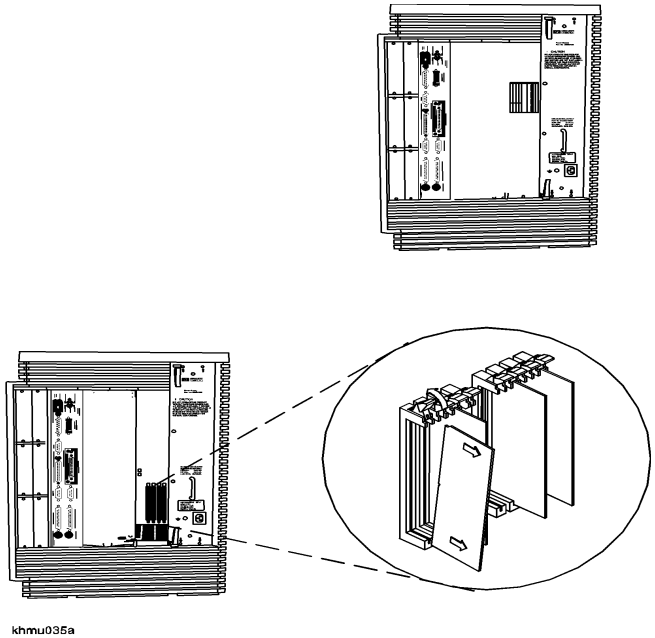
Gaining Access to System Memory

Memory Location in HP 9000/K100 Servers

In the HP 9000/K100 server, memory SIMMs are inserted directly into the system board from the rear of the system cabinet.

Removing the Memory Bulkhead

To gain access to memory, remove the memory bulkhead from the rear of the system chassis.



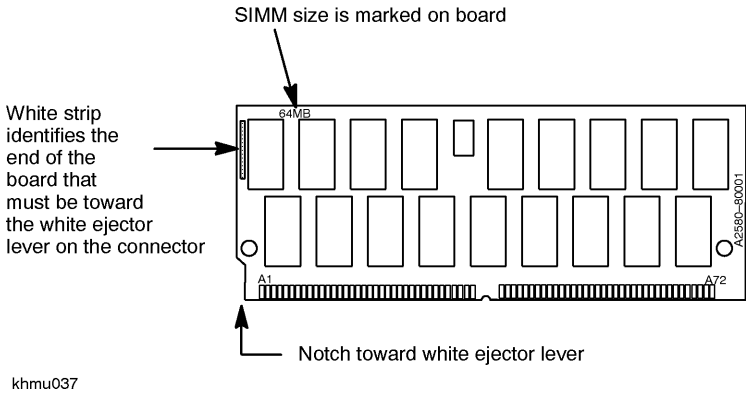
khmu035a

Memory Configuration and SIMM Installation

NOTE To prevent damage to memory boards and system components from electrostatic discharge, always wear a grounded wrist strap when working on or around the system, and when handling printed circuit boards.

Configuring Memory

Memory in HP 9000/K100 servers can be added in many different megabyte combinations depending on your use of existing memory, your memory upgrade goals, and the memory size you use. Memory for your system is purchased and installed only in *modules*, which are pairs of SIMMs of the same size. SIMM sizes are 16MB, 32MB, 64MB, and 128MB, which can be combined to form pairs of modules of 32MB, 64MB, 128MB, and 256MB, correspondingly. The SIMMs each have their size marked on the board near the upper left corner.

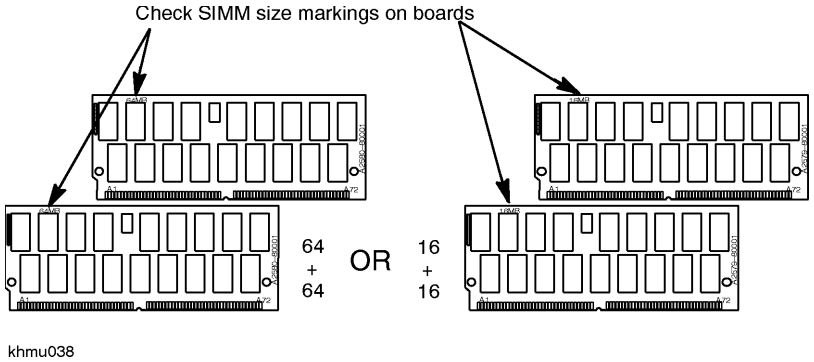


See “Configuring Memory for Optimum Performance” on page 1-13 for guidelines on optimizing memory

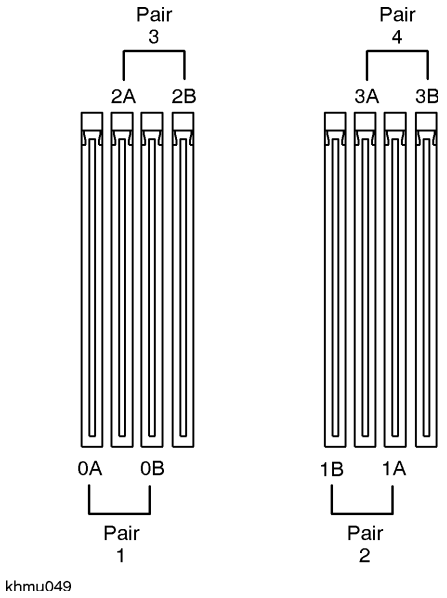
Memory SIMM Rules

Memory SIMM rules for HP 9000/K100 servers are similar to those for HP 9000/K2x0/K4x0/Kx70 systems, except that only four pairs of SIMMs can be installed.

SIMMs must be installed in pairs of identical size (i.e. two 64MB or two 16MB)



SIMM pairs must be installed in the slot sequence (0a+0b, then 1a+1b, and so on).

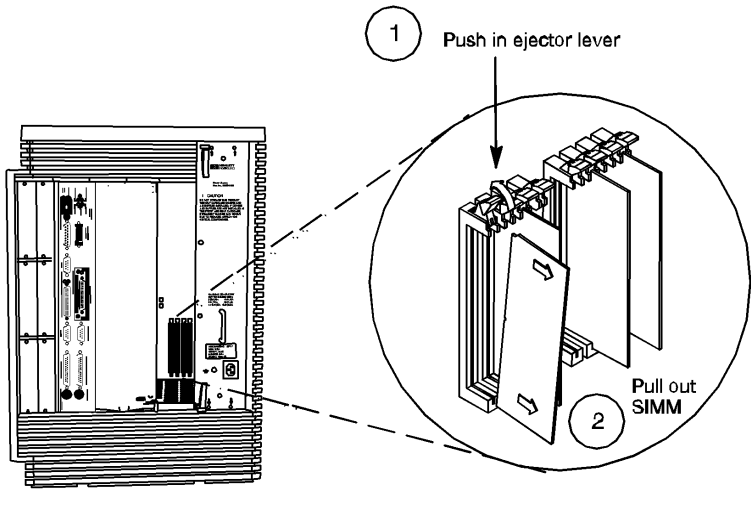


The largest-sized modules (SIMM pairs) are installed in the lower number slots, followed by smaller-sized modules.

NOTE To prevent damage to memory boards and system components from electrostatic discharge, always wear a grounded wrist strap when working on or around the system, and when handling printed circuit boards.

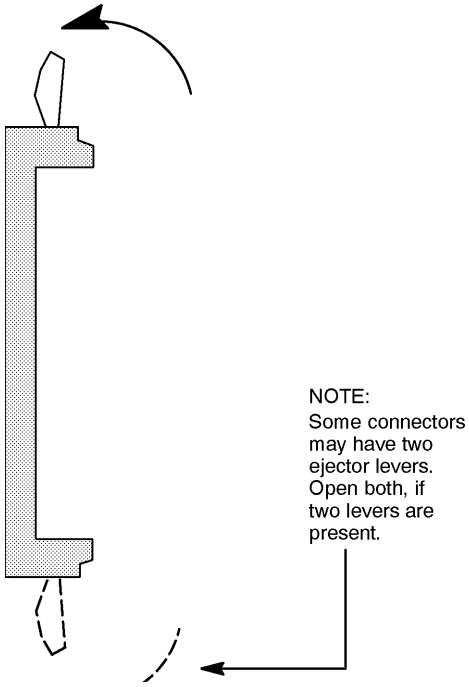
Removing SIMMs

After removing the Memory Bulkhead as previously described, the SIMMs can be removed. You may find it necessary to remove existing SIMMs before installing the upgrade SIMMs. Remember that the final configuration of all the SIMMs (existing plus upgrade) must conform to the memory configuration rules described previously. To remove SIMMs, follow these guidelines:



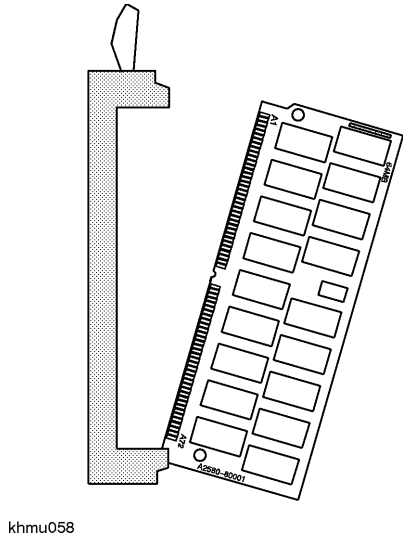
Installing SIMMs (HP 9000/K100)

Open the Ejector Lever (Down Position)



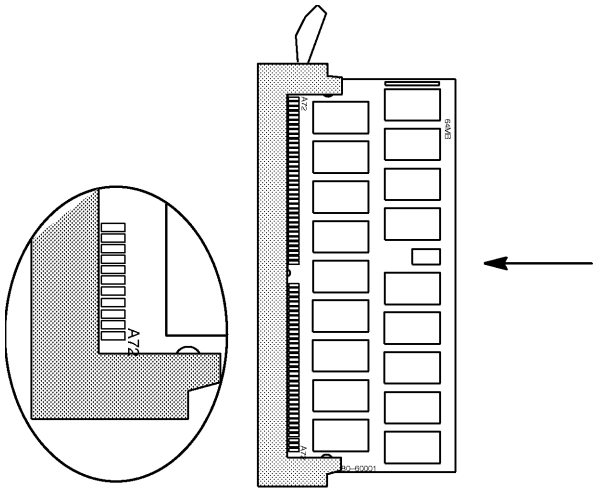
Orient the SIMMs Correctly

Each SIMM must be inserted only one way. The white stripe and notch on the end of the SIMM must be toward the upper ejector lever. Orienting the SIMM is done in two steps:
First, insert the lower corner into the connector slot at the bottom to align the SIMM



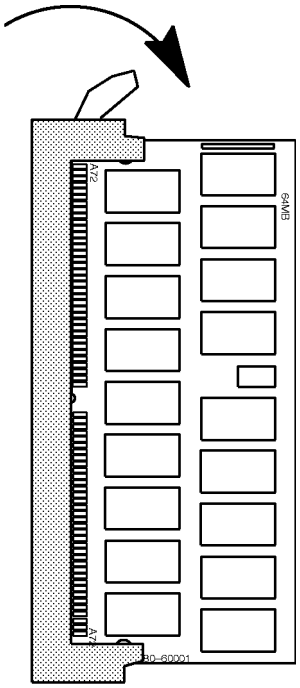
khmu058

Insert the SIMM Card Partway Until the Fingers On the Card Edge Just Touch the Connector



khmu053

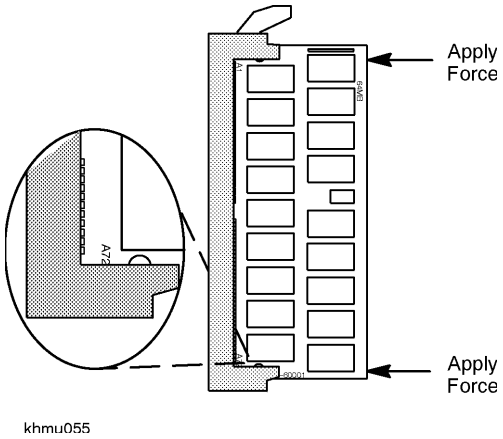
Close the Ejector Lever (Up Position)



khmu054

Push the SIMM Card Firmly and Evenly Into the Connector

NOTE Do not "rocker" the SIMM into the connector! Apply force evenly.



After All SIMMs Are Installed

After all SIMMs have been inserted, check them to ensure that they are seated evenly and that all SIMMS are the same height (an incorrectly seated SIMM may stick out above the others). Also verify that all SIMM pairs are configured correctly according to the SIMM rules described previously in this guide. You will probably need to use a small flashlight to visually check the SIMMs.

Reattach the Memory Bulkhead

The memory cover plate has to be replaced before normal system operation resumes. The cover plate is required for system cooling and RFI/EMI noise suppression. Once the cover plate is in place, proceed to the power on and verification procedures in Chapter 3.

3 Power On and Verification

Power On

After completely reassembling the system cabinet:

1. Reattach the system power cables.
2. Turn on all peripherals first, then turn on the system. The system memory is automatically configured to the system by software.
3. If error messages appear, refer to the following "If There Is a Problem at Power On" section. If the system boots completely with no error messages, proceed to the "Installation Verification" procedure.

If There Is a Problem at Power On

Incorrect memory extender installation may result in the following types of problems at power on:

- The boot process could be stopped.
- Log warning and display hex codes.
- Console warning messages.

If any of these problems appear, the probable cause is that the memory extenders are incorrectly seated. To correct the problem:

1. Turn off power to the system.
2. Halt the boot process by pressing any key within the 10 second period provided by the system software.
3. Type "ma" at the boot interface console prompt to get to the Main menu.
4. Repeat the power on procedure above.

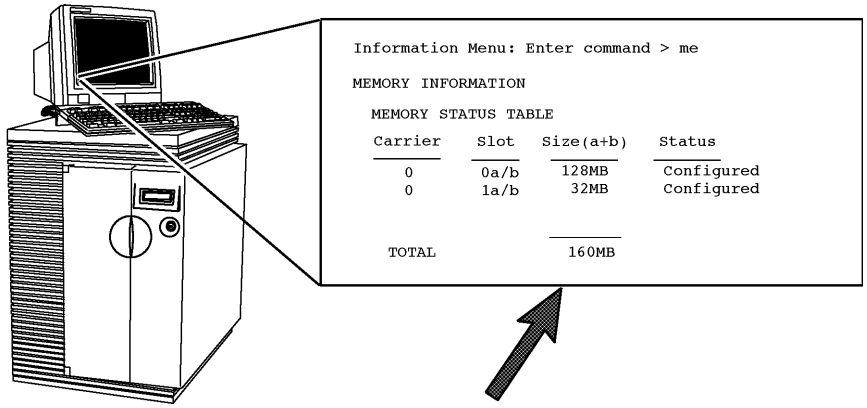
Repeat the above four steps until the memory extenders are seated correctly (indicated by the system booting successfully to the operating system prompt). Proceed to the "Installation Verification" procedure.

Installation Verification

To verify memory installation after a successful power on:

1. Reboot the system by typing "/etc/shutdown -r" at the operating system prompt.
2. Halt the boot process by pressing any key within the 10 second period provided by the system software.
3. Type "ma" at the boot interface console prompt to get to the Main menu.
4. Type "in" at the Main menu prompt to get to the Information menu.
5. Type "me" at the Information menu prompt to verify that the amount of memory displayed conforms to the amount of memory you have installed (see Figure 3-1).

Figure 3-1 Verifying Installation of System Memory Upgrade with the ME Command



If There Is a Problem Verifying the Installation

Incorrectly installed SIMMs or configuration violations may result in the following types of problems when trying to verify the memory installation after power on:

- Performance degradation.
- Log warning and display hex code.
- Boot command is disabled
- Console warning messages.

Possible Causes

- SIMMS not seated properly
- SIMMs not sequenced correctly
- SIMMs not paired
- Incorrect value matching of paired SIMM

Repeat the SIMM installation procedures in Chapters 1 or 2, taking special care to seat the SIMMs properly and in the correct pair sizes and sequence.

Memory Error Codes and Warning Messages

If memory is incorrectly installed, certain memory error codes may appear on the front panel LCD display. In addition, warning messages may appear on the console display after the system is booted.

Memory Error Codes

Memory error codes are displayed on the front panel liquid crystal display (LCD). The memory error codes listed in Table 3-1 on page 4are those that indicate the possibility that memory extenders or SIMMs have been incorrectly installed.

NOTE **Other memory error codes not listed in Table 3-1 on page 4may appear on the front panel LCD. If an unlisted code appears, call your nearest HP Service Center for assistance.**

NOTE For Table 3-1:
Failure codes 7301-7308 appear as a sequence of two codes on the front panel LCD; the first code displayed is the fault code, and the second code displayed identifies the memory extender and SIMM pair.

Table 3-1 LCD Memory Error Codes That May Indicate Incorrectly Installed Memory

Code	Description	Possible Cause	Action
7301	SIMM 0 bytes are not equal	SIMM pair not same size (see Note 1)	For these codes, the action to take is: 1. Verify memory configuration using PDC *ME* command 2. Verify equal SIMM pair sizes 3. Verify proper SIMM sequence 4. Reseat SIMMs 5. Call HP Service Center if problem still not resolved.
7302	SIMM 1 bytes are not equal	SIMM pair not same size (see Note 1)	
7303	SIMM 0 data <> SIMM 1 data	SIMM pair not same size (see Note 1)	
7304	Unknown sizing compare fault	SIMM pair not same size (see Note 1)	
7305	Multi-bit error occurred during sizing	Failed SIMM pair (see Note 1)	
7306	Address test failed on bank	Failed SIMM pair (see Note 1)	
7307	ECC test failed on bank	Failed SIMM pair (see Note 1)	
7308	Single bit memory error caused HPMC	Failed SIMM pair (see Note 1)	
7401	No memory SIMMs installed	Poor seating of SIMM pair	
7500	No RAM found	No SIMM pairs installed or they are not seated	
7501	Not enough good memory to run Operating System	Incorrect memory configuration or insufficient amount of memory.	
7502	Not enough good memory to run Boot Console Handler	Incorrect memory configuration or insufficient amount of memory.	
7702	Memory not tested, initialized only	Fast Boot is Enabled.	Turn FastBoot off
7703	SIMM loading warning		Contact HP Service Center.
7704	RAM bus warning	Incorrect memory configuration.	For these codes, the action to take is: 1. Verify memory configuration using PDC *ME* command 2. Verify equal SIMM pair sizes 3. Verify proper SIMM sequence 4. Reseat SIMMs 5. Call HP Service Center if problem still not resolved.
7705	Good memory required to run Operating System is greater than memory size	Incorrect memory configuration or insufficient amount of memory.	
7FXY	X = Extender Card number, Y = SIMM pair number		Contact HP Service Center.

Console Warning Messages

NOTE The action you are required to take for each warning messages is described in the last line of text in each message. If the required action does not solve the problem, call your nearest HP Service Center for assistance.

```
WARNING: Not enough error-free contiguous memory (GoodMem).  Refer to the ME
         command in the INFORMATION menu and the PDT command in the SERVICE menu
         for error information.

WARNING: Memory page deallocation has been disabled because the Page Deallocation
         Table (PDT) is full.  If the Boot command is disabled, a memory error was
         detected after the table was full.  Refer to the PDT command in the
         SERVICE menu for error information.

WARNING: Memory has been initialized, but not tested as a result of FASTBOOT
         being enabled.  To test memory, disable the FASTBOOT command in the MAIN
         menu and reboot the system.

WARNING: Memory configuration is not optimiZed for performance. refer to the
         System Installation or Memory Installation manuals for memory
         configuration guidelines.

WARNING: Memory SIMMs are not installed in the proper sequence.  The BOOT command
         has been disabled to prevent thermal damage.  Refer to the Memory
         configuration label for the proper sequence.

WARNING: Memory has been reconfigured due to a physical change or because the
         Page Deallocation Table (PDT) was cleared.  This is for information
         only.  No action is required.

WARNING: Memory banks deallocated due to a SIMM size mismatch or a SIMM failure.
         Refer to the ME command in the INFORMATION menu for error information.
```

A OS Requirements and Diagnostic Support for Memory Modules

OS Requirements for 64MB, 256MB, and 512 MB Modules

Table A-1 OS Support Matrix

Module Size	Models	HP-UX 10.01	HP-UX 10.10	HP-UX 10.20
64MB, 128MB, 256MB, and 512MB	K100, K200, K210, K220, K400, K410, K420	Requires PDC Rev 2.2 or later to run. Requires Patch PHSS 6795 for on-line diagnostic support.	Requires PDC Rev 2.2 or later to run. Requires Patch PHSS 6797 for on-line diagnostic support.	Requires PDC Rev 2.2 or later to run. On-line diagnostic support provided on the OS.
	K250, K260, K450, K460	Os not supported.	OS not supported	Requires PDC Rev 36.25 or later to run. On-line diagnostic support provided on the OS.
	K370, K570	OS not supported.	OS not supported.	Kx70 PDC Rev. 37.49 supports all modules
	K380, K580	OS not supported.	OS not supported.	Kx80 PDC Rev 37.52 supports all modules
64MB modules and 256MB modules are supported on HP3000/9x9KS systems beginning with MPE/iX Release 5.5 Power Patch 1 (C.55.01)				

Refer to “Verifying the PDC Firmware Revision” at the beginning of Chapter 1 for directions on identifying the current PDC revision on your system.

Obtaining Software Patches for HP-UX Operating Systems

Hewlett-Packard routinely responds to defect reports by creating HP-UX software "patches." Access to these HP-UX patches is available via free subscription to a special e-mail address on the Internet called, "HP Electronic Support Center." This service is also accessible via the World Wide Web, CompuServe, direct Internet access, or via dial-up modem in the U.S. and Canada. Subscribing to the HP SupportLine patch service offers you:

- Patch notification digests sent automatically when they are published.
- An archive list of patches issued prior to subscription.
- Copies of the HP SupportLine User's Guide.

How to subscribe to HP SupportLine Patch notifications:

Electronic Mail.

To automatically receive future NEW patch notifications from the HP SupportLine, send an e-mail message (no SUBJECT line required) to :

support@support.mayfield.hp.com

The TEXT portion of the message should contain instructions for the type of service wanted:

- To ADD your name to the subscription list for NEW Patches, type the following text on a single line:
  subscribe hpux_800_patch
- To get a copy of the HP SupportLine User's Guide, type the following (on a single line):
  send guide.txt

World Wide Web

Use a World Wide Web browser to access the following URL:

http://us-support.external.hp.com

Click on the Browse Patches button to see the available patch topics.

To subscribe to patch digests, click on the word, "subscribe" and follow the instructions indicated.