Add-On Memory Card Installation Guide

HP 3000 99x Family, HP 9000 T-Class Systems

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NOTE

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This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation. The following figure shows some of the safety symbols used on the product to indicate various safety considerations.

Safety Symbols

Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.

Indicates presence of electric shock hazard.

Indicates earth (ground) terminal (sometimes used in manual to indicate circuit common connected to grounded chassis)

Indicates wiring terminal intended for connection of the protective earthing conductor associated with the supply wiring.

CAUTION	The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not done correctly or adhered to, could damage or destroy part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

WARNING	**The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not done correctly or adhered to, could result in injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understook and met**

Preface

This edition of the Add-on Memory Card Installation Guide is intended for experienced system operators.

This guide contains technical information about HP 3000 Corporate Business Servers (99x Family) and HP 9000 Corporate Business Servers (T-Class System).

At the time of publication, HP 3000 Corporate Business Systems and HP 9000 Corporate Business Servers included the following models:

HP 3000 99x Family

990/992		991/995		996[a]	997
990CX	990DX	991CX	991DX	996/80	997/100
992/100CX	992/100DX	995/100CX	995/100DX	996/100	997/200
992/200CX	992/300DX	995/200CX	995/200DX	996/200	997/300
992/300CX	992/400DX	995/300CX	995/300DX	996/300	997/400
992/400CX		995/400CX	995/400DX	996/400	997/500
		995/500CX	995/500DX	996/500	997/600
		995/600CX	995/600DX	996/600	997/800
		995/700CX	995/700DX	996/700	
		995/800CX	995/800DX	996/800	

a. A 996 System may be field upgraded to 9, 10, 11, or 12 processors. Factory integrated servers are sold with a maximum of 8 processors.

HP 9000 T-Class Systems

890	T500	T520	T600

Terminology

For ease of reference, the term "99x" is used in this manual to refer to all 990, 991, 992, 995, 996, and 997 systems (both CX and DX). The term "T-Class" is used to refer to the 890, T500, T520, and T600 systems. When referring to all systems together, the term "99x/T-Class" or "the system" is used.

Unless otherwise noted, the installation procedures in this manual apply to all systems named above. Exceptions are noted by referral to specific systems or model numbers.

Minimum Number of Memory Banks

For best performance, the memory configuration should have at least four banks of a particular size (64 MB or 256 MB). For example, consider a system that currently has only 64-MB banks. If you want to add 512-MB cards (with two 256-MB banks) or 768-MB cards (with three 256-MB cards), add sufficient cards so the resulting configuration will have at

least four 256-MB banks. This could be accomplished with two 512-MB cards (making a total of four 256-MB banks) or with one 512-MB and one 768-MB card (total of five 256-MB banks).

The reason for this guideline has to do with memory interleaving. PDC will configure memory cards with the largest bank size (256 MB) in one Memory Interleave Group (1--assigned Block_IDs 40-5n). Memory cards with a smaller bank size (64MB) are configured in another Memory Interleave Group (3--assigned Block_IDs C0-Dn).

Minimum Recommended Memory (T-Class Only)

Table 1-1 shows the recommended minimum memory for each CPU configuration. The recommended minimum is the least amount of memory necessary to achieve satisfactory performance under normal workloads. It may be necessary or desireable to increase the actual memory in the configuration to achieve optimum performance for a specific application workload.

For optional memory configurations, you may wish to consult the *HP 9000 Enterprise Servers Configuration Guide, P/N 5965-7963E*.

Table 0-1 T-Class Minimum Recommended Memory (For satisfactory performance under "normal" workloads)

# of CPUs	T600 (MB)	T520 (MB)	T500 (MB)	890 (MB)
1	512	256	256	128
2	768	384	384	128
3	768	512	512	192
4	1024	768	640	256
5	1280	896	768	N/A
6	1536	1024	896	N/A
7	1536	1152	1024	N/A
8	1792	1280	1152	N/A
9	2048	1408	1280	N/A
10	2048	1664	1408	N/A
11	2304	1792	1536	N/A
12	2304	1920	1664	N/A
13	N/A	2048		
14	N/A	2048		

NOTE The 192 MB and 256 MB memory requirements for the 890 are for powerfail/battery-backup operation.

Memory Interleaving

The 99x/T-Class systems support memory interleaving to improve system performance. The system automatically configures memory for interleaving and no special procedures are necessary.

Memory Configurations for Systems With or Without a UPS

Minimum memory for systems with a UPS: 128MB for 890, 256MB for other T-Class systems, or for 99x systems.

Minimum memory for 890/990/992 systems without a UPS: For powerfail recovery to function properly on these systems, a minimum amount of memory must be installed in the system:

- 890/990/992 systems with **one or two** processors: 128MB of memory
- 890 systems with **three** processors: 192MB of memory
- 890 systems with **four** processors: 256MB of memory
- 990/992 systems with **three or four** processors: 256MB of memory

1 Add-On Memory Card Installation

Introduction

This guide describes how to install memory cards in HP 3000 Corporate Business Systems (99x Family) and HP 9000 Corporate Business Servers (T-Class Systems). It also describes how to add Dual In-Line Memory Modules (DIMM) to carrier boards on T600 Systems.

The memory cards are located in the front and rear card cages of the SPU cabinet.

WARNING **Memory board installation should be performed only by qualified service-trained Hewlett-Packard personnel.**

High voltages are present and constitute a potential hazard.

NOTE Be sure to review all Service Notes which may pertain to the system product and its associated PCAs before performing any installation procedures in this guide.

Memory Cards

There are six versions of PMB memory cards: 64-MB, 128-MB, 256-MB, 512-MB (1/2 GB), 768-MB (3/4 GB), and 8 GB.

The different PMB memory card versions contain:

- For the 64-MB version - one 64-MB bank on the top-side of the card
- For the 128-MB version - two 64-MB banks on the top-side of the card
- For the 256-MB version - four 64-MB banks, two on the top-side and two on the bottom-side of the card.
- For the 512-MB (1/2 GB) version - two sparsely populated 256-MB banks on the both sides of the card.
- For the 768-MB (3/4 GB) version - three densely populated 256-MB banks on both sides of the card.
- (T600 HP-UX systems only) For the 8 GB version - 4 to 32, 256 MB banks, on a carrier board.

Memory Cards Supported

Table 1-1 specifies the memory cards that are supported by the HP9000, T-Class Corporate Business Servers and the HP3000 99x Corporate Enterprise Servers.

Table 1-1 Supported Memory Boards

Memory Card	890/990/ 992	T500/T520/ 991/995/996	T600/997	Single Wide Board	Double Wide Board
64 MB	X	X	X	X	
128 MB	X	X	X	X	
256 MB	X	X	X	X	
512 MB		X	X	X	
768 MB		X	X	X	
8 GB			X[a]		X

a. HP-UX systems only.

Memory Installation Rules

Up to 8 single-wide, 4 double-wide (8 GB cards for HP-UX systems only), or a combination of single-wide and double-wide PMB memory cards may occupy PMB card slots 1-14. (PMB card slots 1 through 7 are single-wide slots. Slots 8 through 15 are double-wide slots.)

Memory cards must be installed after processor and bus converter cards, respectively and in the following sequence and according to the following rules:

1. Load 8 GB memory boards in the following sequence: 8, 12, 9, 10, 6, 4. If a slot is occupied with a processor or bus converter board, use the next available slot.

NOTE If there is a single wide memory board (64, 128, 256, 512 or 768 MB) in a double-wide slot, you will have to relocate it to another slot.

2. Load all other memory cards in the following sequence: 4, 6, 8, 9, 10, 11, 12, 13, 14, 7, 5, 3, 2, and 1. If a slot is occupied, use the next available slot.

PDC Firmware Updates and OS Patches

When you add a memory board, you may have to update the Processor Dependent Code (PDC) firmware on the system. You may also have to load operating system (OS) patches to ensure that the memory diagnostics work properly. For complete information about firmware, refer to *Firmware Update Guide* (P/N A1820-90002).

768 MB (A2589A) and 512 MB (A2588A) Boards

The 768 MB (A2589A) and 512 MB (A2588A) memory upgrades include OS patches and the latest PDC firmware installation kit.

Check the version of firmware on the system with the version in Table 1-2. If the system does not have the required firmware, update the firmware using the instructions provided with the installation kit.

Table 1-2 Required Firmware Version (A2589A and A2588A)

System	PDC Version	FUT Version
T500/991/995	FWETT291 or later	FWEUP496FUT or later
T520/996	FWETT391 or later	FWEUP496FUT or later
T600/997	Works with all released versions of the firmware.	Works with all released versions of firmware.

Patches are provided for specific versions of the OS, such as HP-UX 10.0 and MPE/XL 5.0 “Push.” If you are using one of these OS versions, then install the associated patch to ensure the memory diagnostic works properly.

8 GB (A3839A) Boards (HP-UX Only)

The 8 GB (A3839A) memory upgrade includes the latest PDC firmware installation kit. For HP-UX, the required OS patches are provided in product number B6191AA. This product should have been ordered with the memory upgrade.

NOTE At the time of publication, MPE did not support the 8 GB board.

Check the version of firmware on the system with the version in Table 1-3. If the system does not have the required firmware, then update the firmware following the instructions provided with the installation kit.

Table 1-3 Required Firmware Version (A3839A)

System	PDC Version	FUT Version
T600/997	FWEJA602 or later	FWEUP496 or later

Install the OS patches for HP-UX using the instructions provided in the product, B6191AA.

Hardware Installation Procedures

WARNING

Before installing or removing memory cards, ensure that the following steps have been performed:

1. A system backup has been performed

2. The operating sytem has been shutdown.

3. The control panel power switch has been set to "Standby."

4. Hazardous voltage and energy are still present in the cabinet with the control panel switch in the "Standby" position. To completely remove AC power to the system, switch the circuit breaker at the bottom right rear of the cabinet to the "Off" position.

Be sure to turn off both the power switch on the front AND the circuit breaker switch on the rear.

CAUTION

ESD protection requires the use of a grounded wrist strap when handling the cards. Failure to use the grounded strap may result in card component damage.

Installing DIMMs on 8 GB (A3389A) Board Only--Overview

This section contains information on how to install DIMMs on the 8 GB memory board for T600 Systems running under the HP-UX operating system only. If you are not installing a memory board on a T600 system, or the memory board is not an 8 GB Memory Board, go directly to the next section of this manual, “Gaining Access to the Card Cage”. If the customer ordered an 8 GB Memory Board, you will have to install DIMMs on a memory carrier board before installing the board in the PMB card cage.

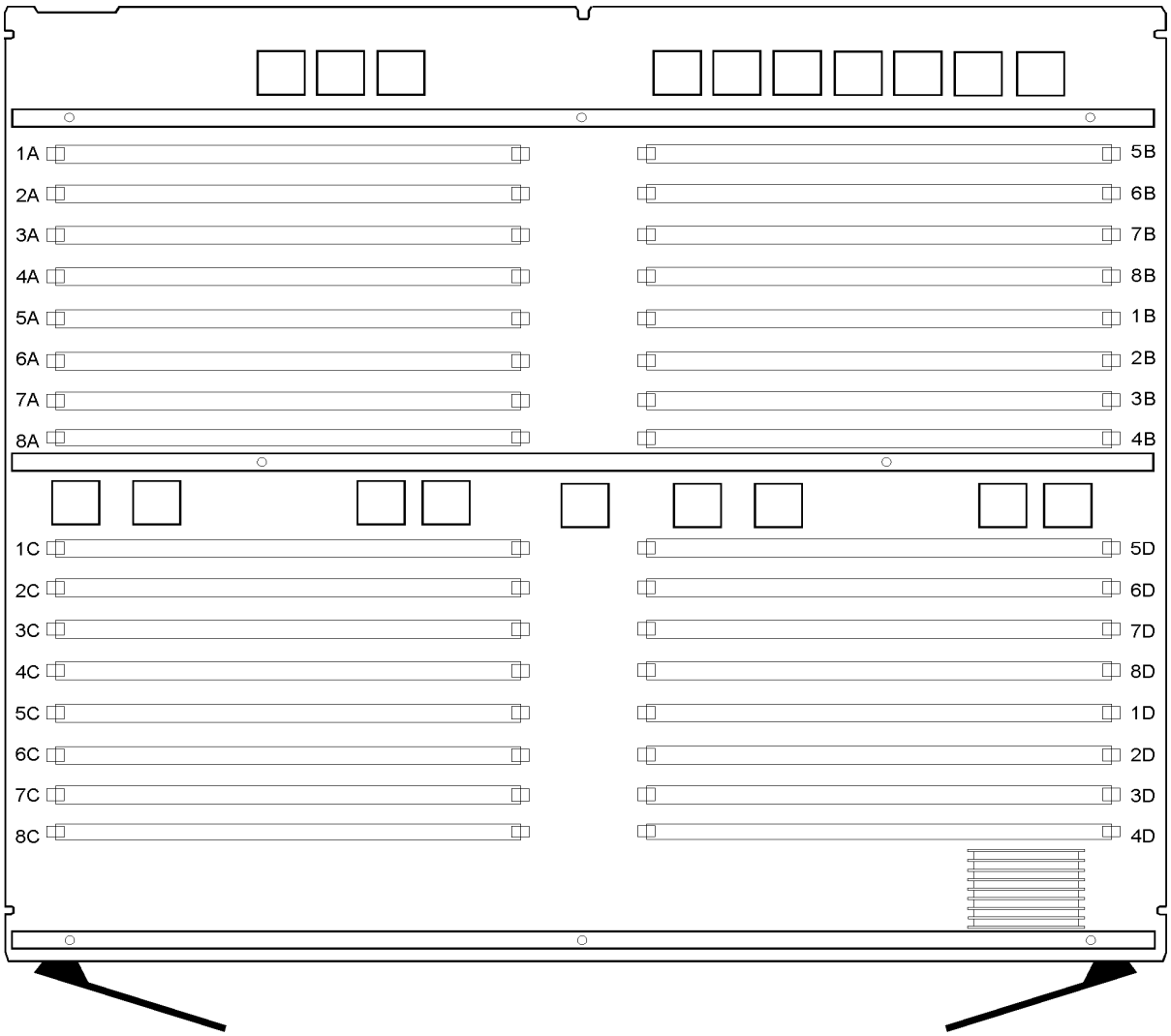
Each memory carrier board is divided into quadrants. Each quadrant comprises eight DIMM sockets. Refer to Figure 1-1. Socket locations in each quadrant are numbered. Socket location numbers for quadrants on the left side of the memory board are numbered on the left side of each socket. Socket location numbers for quadrants on the right side of the memory board are numbered on the right side of each socket.

DIMMs are installed in each quadrant according to the following rules:

- DIMMs are installed on the carrier board in sets of four.
- Each DIMM in a set must be installed in a different quadrant. (After all of the DIMMs are installed, there should always be an equal number of DIMMs in each quadrant.)
- The first DIMM in a set can be installed in any unoccupied position in any quadrant. The initial location in which a DIMM is installed determines where the remaining three DIMMs in the set must be installed in the other three quadrants. For example, if you install a DIMM in location 1A, the remaining three DIMMs in the set must be installed in locations 1B, 1C, and 1D. Likewise, if you install the first DIMM in a set in location 7A, then the remaining three DIMMs must be installed in locations 7B, 7C, and 7D.

  It is recommended that you start with 1A, 2A, 3A, and 4A and populate the board up to 8A, 8B, 8C, and 8D.

Figure 1-1 DIMM Socket Locations

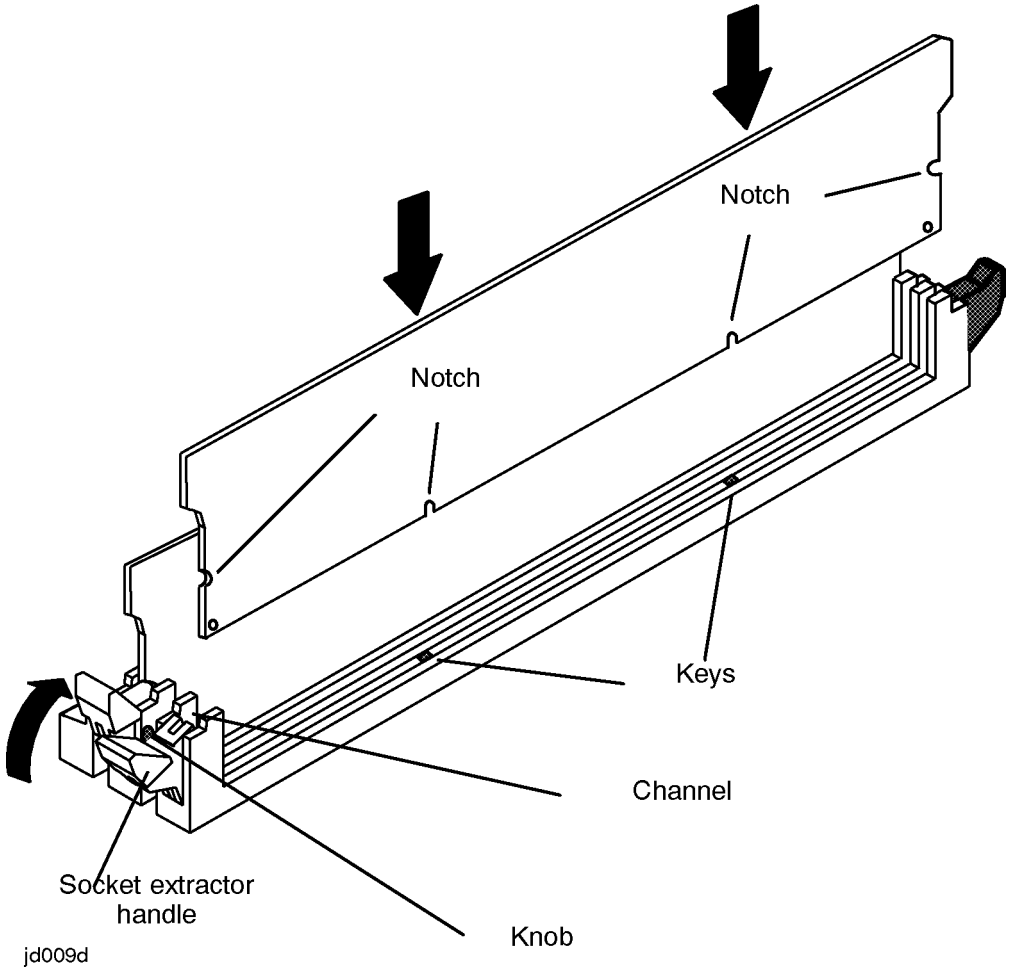


Installing DIMMs

To install DIMMs:

1. Make sure the socket extractor handles on each side of the DIMM socket are open. Refer to Figure 1-2.

Figure 1-2 Installing a DIMM



2. Position the DIMM in the socket so that the label on the DIMM faces the front of the carrier board. The DIMM is aligned properly when the notches at the bottom of the DIMM are positioned over the keys in the socket.
3. Slide the DIMM into the channel on the socket extractor handles at the sides of the socket.
4. Partially engage the socket extractor handles. This helps to ensure that the DIMM remains vertical in the socket.
5. Using the palms of your hands, gently but firmly press down on the DIMM until the DIMM is fully seated into the socket.

   Be sure to press straight down on the DIMM. Pressing it at an angle could damage the DIMM and the socket.
6. Doublecheck that the DIMM is fully seated and installed properly. The DIMM is installed correctly when the knob on the socket extractor handles interconnects with the notches on the sides of the DIMM.

7. Install the remaining three DIMMs in the set. Make sure to install the remaining DIMMs in the correct location in the other three quadrants. If you install the first DIMM in the set in socket 5A, for example, install the remaining three DIMMs in locations 5B, 5C, and 5D.
8. Install the remaining sets of DIMMs.

You are now ready to access the card cage and install the board.

Gaining Access to the Card Cage

Opening the Cabinet Doors

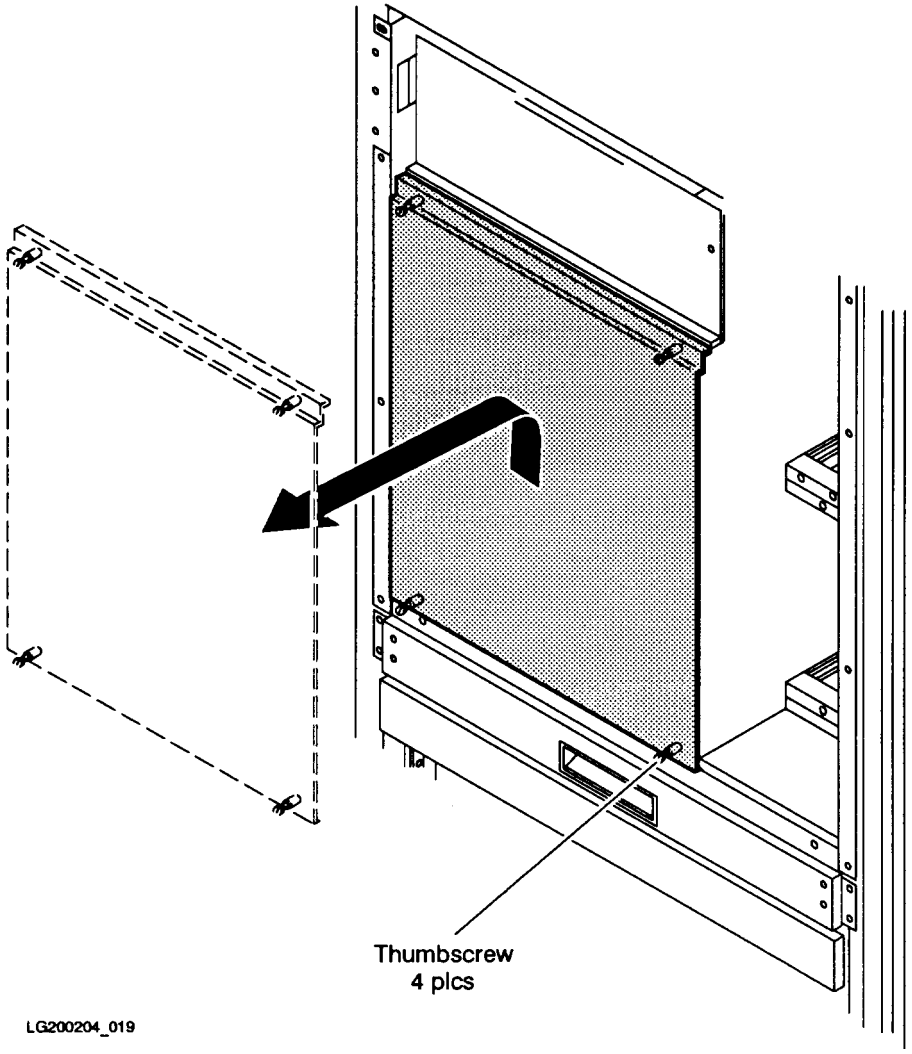
To open the front and rear cabinets:

1. Insert the hexagonal cabinet key into the black hexagonal hole on the right of the cabinet door.
2. Rotate the cabinet key about a quarter-turn counterclockwise.
3. Pull the door open.

Removing the Front Card Cage Cover Plate

A metal plate covers the PMB (Processor-Memory Bus) cards in the front card cage (see Figure 1-3).

Figure 1-3 Front Card Cage Cover Plate



To verify the presence of PMB cards, you do not have to remove the cover plate; the PMB cards can be seen through holes in the cover plate.

To install or remove PMB cards, you must remove the cover plate.

To remove the front card cage cover plate:

1. Loosen the four (4) thumbscrews (two each at the upper and lower edges).
2. Lift the cover plate up and out.

To install the cover plate:

1. Place the cover plate lip over the raised edge of the cabinet frame.
2. Tighten the four thumbscrews with a screwdriver to a torque specification of 24-28 inch-lbs.

Removing and Replacing Rear Card Cage Metal Slot Shields

The rear card cage is not protected by a cover plate. However, each individual slot (whether empty or occupied by a card) is protected by a metal slot shield secured by two thumbscrews.

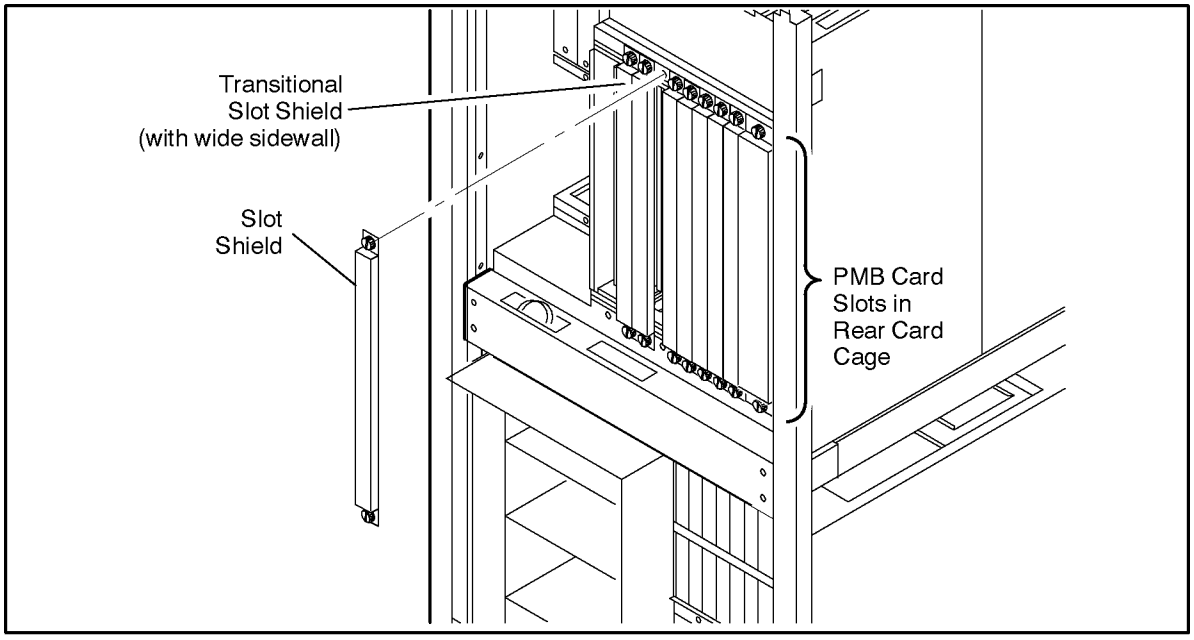
NOTE All slot shields and cover plates should be in place and securely fastened while the unit is in operation. Card cage metal slot shields and cover plates are required for EMI emissions control, and for proper cooling.

NOTE The leftmost slot shield is a "transitional" shield; this shield has a sidewall for EMI emissions control (see Figure 1-4). This transitional shield must always be placed between the last bus converter card and the first vacant slot, or slot occupied by a memory board, to its right.

To remove a rear card cage metal slot shield:

1. Loosen the two (2) thumbscrews (one at the top edge and one at the bottom edge) that secure the metal slot shield.
2. Remove the metal slot shield from the card cage (see Figure 1-4).

Figure 1-4 Rear Card Cage Metal Slot Shields



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To install a metal slot shield:

1. Set the metal slot shield over the slot so that the thumbscrews are aligned with the holes in the card cage frame.

2. Tighten the two (2) thumbscrews with a screwdriver to a torque specification of 24-28 inch-lbs.

NOTE	If a slot shield does not fit easily into place when you are installing it, do not force it. Instead, lever the shield into place from the bottom, from the top, or from the left side. Forcing the shield into place may damage the EMI contacts on the right side if the board.

Installing and Removing Memory Cards

This section describes the memory card installation and removal procedures.

To install a memory card:

1. Using the memory configuration guidelines described in "Memory Installation Rules" on page 11, decide whether the new memory cards will go in the front or rear PMB card cage and whether they should be installed in single- or double-wide slots.
   - Slots 1 to 9 are in the rear.
   - Slots 10 to 14 are in the front.
   - Slots 1, 2, 3, 4, 5, 6, and 7 are single-wide slots.
   - Slots 8, 9, 10, 11, 12, 13, 14, and 15 are double-wide slots.
2. If installing a card in the front card cage, remove the front cover plate.

CAUTION	Before handling cards, be sure to follow ESD precautions by grounding yourself to the cabinet chassis using a wriststrap. (The cabinet chassis has wriststraps permanently attached at both the front and the rear.)

3. If installing a card in the rear card cage, remove the appropriate metal slot shield(s).
4. Install the memory card, holding the card by its metal extractor handles.
5. Slide the memory card in along the metal cardguides.

   Make sure it is seated snugly.
6. Verify that the card is installed correctly before replacing metal slot shields or the cover plate.
7. After installing cards in the front card cage, re-install the PMB card cage cover plate (tighten the thumbscrews finger tight).
8. After installing cards in the rear card cage, re-install the metal slot shields (tighten the thumbscrews finger tight).
9. Close the front or rear cabinet door.

To remove a memory card:

1. If removing a card from the front card cage, remove the front cover plate.

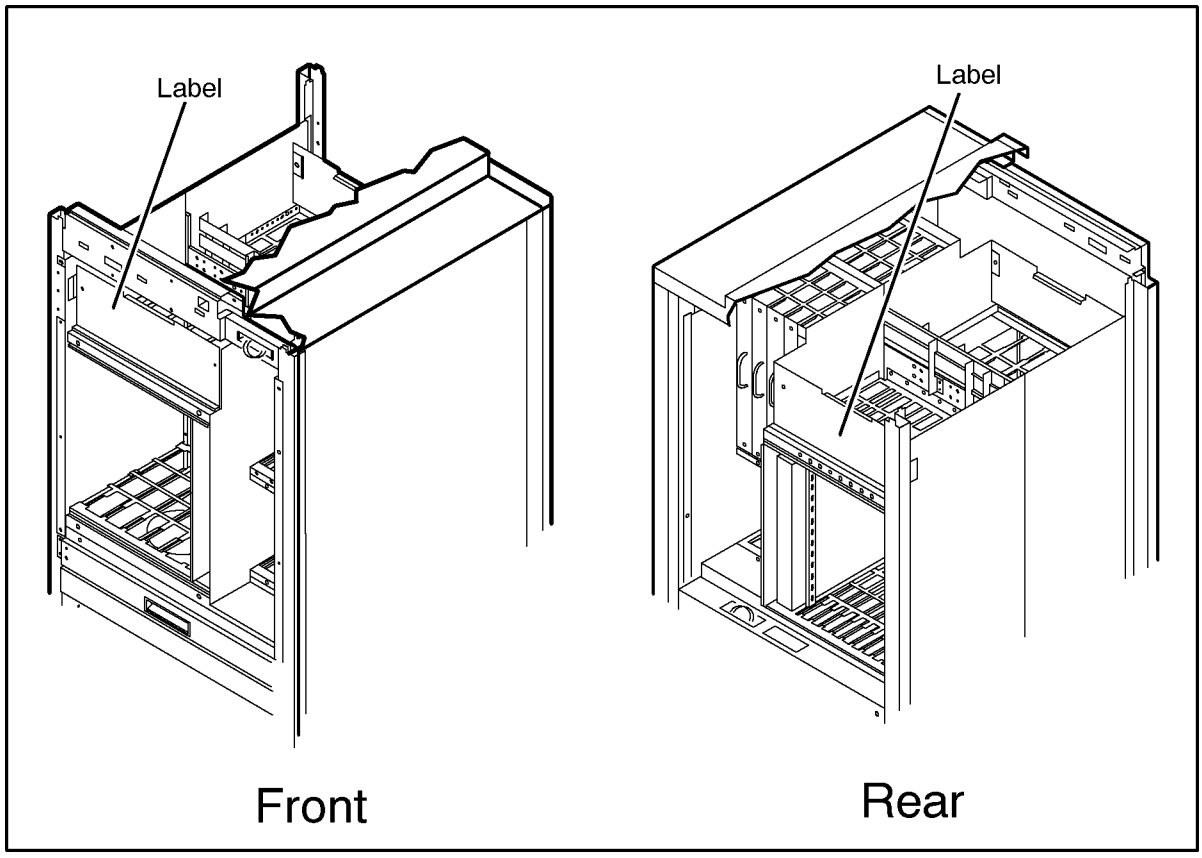
CAUTION	Before handling cards, be sure to follow ESD precautions by grounding yourself to the cabinet chassis using a wriststrap. (The cabinet chassis has wriststraps permanently attached at both the front and the rear.)

2. If removing a card in the rear card cage, remove the appropriate metal slot shield(s).
3. Remove the memory card, holding the card by its metal extractor handles.
4. Slide the memory card out along the metal cardguides.
5. After removing cards in the front card cage, re-install the PMB card cage cover plate (tighten the thumbscrews finger tight).
6. After removing cards in the rear card cage, re-install the metal slot shields (tighten the thumbscrews finger tight).
7. Close the front or rear cabinet door.

Adding Board Loading Sequence Labels (8 GB Board Only)

If you installed an 8 GB board, Board Loading Sequence labels must be applied on the cabinet at the top of the front and rear PMB card cage. Apply each label over the existing label in the positions shown in Figure 1-5.

Figure 1-5 Board Loading Sequence Label Locations



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2 Memory Verification

Memory Verification Procedure

1. Power up the system and set the "Standby-Ready" switch at the top front of the computer to "Ready."
2. When you see the prompt, `Press ANY key within 10 SECONDS to cancel boot with this configuration`, press a key.
3. At the SP prompt, type `HC`.

   A screen similar to the following will appear:

```
Host Hardware Configuration:     (D = deconfigure; - = non-existent port)
-------------------------------------------------------------------
|      |                  | Deconfigured        | Ports to be decnf |
| PMB  |                  | Ports               | at next boot      |
| Slot | Board Type       |  0 |  1 |  2  |  3  | 0  |  1 |  2 |  3 |
|-----------------------------------------------------------------|
|   0  | NIO Bus Conv.    |    |  - |     |  -  |    |  - |    |  - |
|   7  | Memory (768 meg) |  D |  D |     |  -  | D  |  D |    |  - |
|  10  | Memory (8 gig)   | Type slot number to view configuration  |
|  15  | PCX_U Processor  |    |    |  -  |  -  |    |    |  - |  - |
-------------------------------------------------------------------

Enter the slot # of the module whose configuration is to be changed
(CR = exit): 10
```

   This screen shows that the new 8 GB board is recognized by the system.

4. Type the slot number for the 8 GB board.

   A screen similar to the following appears:

```
              +=============================================================+
              |             Slot 10 Memory Board Configuration              |
              +======================+==============================+=======|
Set #: Banks  |  Current Bank Config  | stat |  Banks at next boot    | stat  |
=====  =====  +======================+======+========================+=======+
  1    01-04  |  ?  |  ?  |  ?  |  ?  |  ?   |  ?  |  ?  |  ?  |  ?  |  ?    |
  2    05-08  |  ?  |  ?  |  ?  |  ?  |  ?   |  ?  |  ?  |  ?  |  ?  |  ?    |
  3    09-12  |  ?  |  ?  |  ?  |  ?  |  ?   |  ?  |  ?  |  ?  |  ?  |  ?    |
  4    13-16  |  ?  |  ?  |  ?  |  ?  |  ?   |  ?  |  ?  |  ?  |  ?  |  ?    |
  5    17-20  |  ?  |  ?  |  ?  |  ?  |  ?   |  ?  |  ?  |  ?  |  ?  |  ?    |
  6    21-24  |  ?  |  ?  |  ?  |  ?  |  ?   |  ?  |  ?  |  ?  |  ?  |  ?    |
  7    25-28  |  ?  |  ?  |  ?  |  ?  |  ?   |  ?  |  ?  |  ?  |  ?  |  ?    |
  8    29-32  |  ?  |  ?  |  ?  |  ?  |  ?   |  ?  |  ?  |  ?  |  ?  |  ?    |
              +=====+=====+=====+=====+======+=====+=====+=====+=====+=======+
              |  Current Slot 10 Mem  |  ?   | Slot 10 Mem Next Boot |  ?    |
              +=====+=====+=====+=====+======+=====+=====+=====+=====+=======+

Configuration and status information:

       -  =  Empty         x  = x Mbytes configured
       D  =  Deconfigured [x] = x Mbytes deconfigured


To change the configuration, type (+)or(-) to configure or deconfigure banks,
followed by either (A) for all, or a range.  The range starts with (number)
and an optional (-number).

      +A     Configure all banks
      -9-26  Deconfigure banks 9 through 26
```

```
      +20    Configure bank 20

Your choice (CR = exit):
```

Because the system has not performed a memory test, it recognizes only the presence of a carrier board, not the DIMMs on the board. Once you verify that the system has detected the carrier board, continue by pressing <CR> to exit memboard, and press <CR> to exit the HC command. If the HC shows that the carrier board is not detected, perform the steps to shutdown the system and remove the memory board, check that the DIMMs are seated properly, reinstall the board (making sure that it is also seated properly), and repeat steps 1-4, above.

5. At the SP prompt, type go.
6. When you see the message, Memory test starting, type CRTL-B.
7. Type SP and press [Enter] twice.
8. At the SP prompt, type HC

   A screen similar to that which is represented in step 3 will be displayed.

9. Type the slot number for the 8 GB board.

   A screen similar to the following appears:

```
             +=============================================================+
             |            Slot 10 Memory Board Configuration               |
             +======================+==============================+=======|
Set #: Banks |  Current Bank Config  | stat |  Banks at next boot   | stat  |
=====  ===== +======================+======+======================+=======+
  1    01-04 | 256 | 256 | 256 | 256 | 1024 | 256 | 256 | 256 | 256 | 1024  |
  2    05-08 | 256 | 256 | 256 | 256 | 1024 | 256 | 256 | 256 | 256 | 1024  |
  3    09-12 | 256 | 256 | 256 | 256 | 1024 | 256 | 256 | 256 | 256 | 1024  |
  4    13-16 | 256 | 256 | 256 | 256 | 1024 | 256 | 256 | 256 | 256 | 1024  |
  5    17-20 |  -  |  -  |  -  |  -  |  -   |  -  |  -  |  -  |  -  |  -    |
  6    21-24 | ERROR: Mismatched DIMM sets ********************************|
  7    25-28 | ERROR: Partially loaded DIMM sets **************************|
  8    29-32 | ERROR: Mismatched and partially loaded DIMM sets ************|
             +=====+=====+=====+=====+======+=====+=====+=====+=====+=======+
             |  Current Slot 10 Mem  | 4096 | Slot 10 Mem Next Boot | 4096  |
             +=====+=====+=====+=====+======+=====+=====+=====+=====+=======+

Configuration and status information:

       -  =  Empty         x  = x Mbytes configured
       D  =  Deconfigured [x] = x Mbytes deconfigured


To change the configuration, type (+)or(-) to configure or deconfigure banks,
followed by either (A) for all, or a range.  The range starts with (number)
and an optional (-number).

      +A     Configure all banks
      -9-26  Deconfigure banks 9 through 26
      +20    Configure bank 20

Your choice (CR = exit):
```

The screen above demonstrates a board that has 4 DIMM sets correctly loaded for a total of 4 GB of memory.

It also demonstrates that set #5 is empty; set #6 has 64 KB DIMMs mixed with 256 KB DIMMs; set #7 has some, but not all of the 4 DIMM slots occupied; and set #8 demonstrates the error message shown with a mixed and partially loaded DIMM set.

If the screen *does not show* that all of the DIMMs have been installed properly, stop, remove the board, reseat the DIMMs, and check that they are configured properly, reinstall the board, and perform the following steps:

a. Power up the system and set the "Standby-Ready" switch at the top front of the computer to the "Ready" position.

b. When you see the prompt, `Press ANY key within 10 SECONDS to cancel boot with this configuration`, press a key, then type go; or allow the firmware to start booting the machine by allowing the 10 seconds to expire without taking any action.

c. After you see the message, `Memory test starting`, the hardware configuration (HC) data has been updated with 8 GB DIMM information; now type CRTL-B.

d. At the SP prompt, type `HC`.

e. Type the slot number for the 8 GB board.

f. Check that all of the DIMMs installed appear on the display.

   If they do, type `co`, to continue.

g. After several minutes--the exact time depends on the amount of memory and number of processors--the initial PDC screen will be displayed on the system console:

Figure 2-1. PDC Screen

```
            PDC - Processor Dependent Code
                    Version x.xx
              (c) Copyright 1990-1998
             The Hewlett-Packard Company
                 All rights reserved

Total Memory:          5376 MB
Total Bus Converters:  2
Total Processors:      2

Primary Boot Path:     0/28/52.0.0.0.0.0.0
                        0 means IOA 0 in PMB slot 0.
                       28 means PBBC in GSC slot 7
                       52 means I/O card in HP-PB slot 13
                        0 means device ID of 0

Alternate Boot Path:   0/28/36.1.0.0.0.0.0
Console/Keyboard Path:  0/28/44.0.0.0.0.0.0
```

Look at the "Total Memory" field to see if the system recognizes the memory you added.

If the value in the “Total Memory” field is what you expect, you may choose to end the verification process.

If the value in the “Total Memory” field is not what you expect, run the off-line diagnostic, MEMTEST.

The screen below shows that the user deconfigured four banks, to take effect on the next boot.

```
              +=============================================================+
              |            Slot 10 Memory Board Configuration               |
              +======================+============================+=======|
Set #: Banks |  Current Bank Config  | stat |  Banks at next boot   | stat  |
=====  ===== +======================+======+=======================+=======+
  1    01-04 | 256 | 256 | 256 | 256 | 1024 | 256 | 256 | 256 | 256 | 1024  |
  2    05-08 | 256 | 256 | 256 | 256 | 1024 |[256]|[256]|[256]|[256]|   D   |
  3    09-12 | 256 | 256 | 256 | 256 | 1024 | 256 | 256 | 256 | 256 | 1024  |
  4    13-16 | 256 | 256 | 256 | 256 | 1024 | 256 | 256 | 256 | 256 | 1024  |
  5    17-20 |  -  |  -  |  -  |  -  |  -   |  -  |  -  |  -  |  -  |  -    |
  6    21-24 |  -  |  -  |  -  |  -  |  -   |  -  |  -  |  -  |  -  |  -    |
  7    25-28 |  -  |  -  |  -  |  -  |  -   |  -  |  -  |  -  |  -  |  -    |
  8    29-32 |  -  |  -  |  -  |  -  |  -   |  -  |  -  |  -  |  -  |  -    |
              +=====+=====+=====+=====+======+=====+=====+=====+=====+=======+
              |  Current Slot 10 Mem  | 4096 | Slot 10 Mem Next Boot | 3072  |
              +=====+=====+=====+=====+======+=====+=====+=====+=====+=======+

Configuration and status information:

       -  =  Empty         x  = x Mbytes configured
       D  =  Deconfigured [x] = x Mbytes deconfigured


To change the configuration, type (+) or (-) to configure or deconfigure banks,
followed by either (A) for all, or a range.  The range starts with (number)
and an optional (-number).

      +A     Configure all banks
      -9-26  Deconfigure banks 9 through 26
      +20    Configure bank 20

Your choice (CR = exit):
```

Running MEMTEST

To further troubleshoot an 8-GB memory board or to verify the integrity of memory you can use the “run” command in the off-line diagnostic MEMTEST.

NOTE MEMTEST will only run on a T600 System.

1. If the value in the “Total Memory” field is not what you expect, run the MEMTEST “Map” command.
   a. Boot to the path containing the off-line diagnostics.
   b. Run the off-line diagnostic by entering the data shown:
      1. `Interact with ISL: Y`
      2. `ISL> ode`
      3. `ODE> memtest`
      4. Enter the password.
      5. `MEMTEST> map`

A screen similar to the following appears:

```
11 Carrier Board
      Dimm    Dimm Size (MB)          Bank Configuration          Configured
      Set     A    B    C    D        BlockID  :   IntGroup      Total (MB)
       1      256  256  256  256      c0:3   c1:3   c2:3   c3:3    1024
       2      0    0    0    0        0 :0   0 :0   0 :0   0 :0
       3      0    0    0    0        0 :0   0 :0   0 :0   0 :0
       4      0    0    0    0        0 :0   0 :0   0 :0   0 :0
       5      0    0    0    0        0 :0   0 :0   0 :0   0 :0
       6      0    0    0    0        0 :0   0 :0   0 :0   0 :0
       7      0    0    0    0        0 :0   0 :0   0 :0   0 :0
       8      0    0    0    0        0 :0   0 :0   0 :0   0 :0
       Total memory configured on carrier in slot 11              1024 MB
```

2. If the value in the column marked “Total (MB)” does not show the value you expect, run the memory diagnostic. Depending on the number of processors and the amount of memory you want to test, the diagnostic may take a long time (up to 30 minutes) to run.

   To execute the memory test, type the following commands at the MEMTEST prompt.

   a. `MEMTEST> sect 3 6 7`

   b. `MEMTEST> range`

      Test Range 0x0 04000000 - 0x0 14000000

   c. `MEMTEST> run`

   If there are memory errors, they will appear on a listing similar to the following:

```
ERROR 0020 IN SECTION 003 WHILE TESTING Memory at address 0x00 12fcd2c0
Multiple Cycle

Logged by Processor at hpa 0xfffa4000:
   Address 0x00 12fcd2c0
   Block ID 0xc3     Slot 11
   Summit Bitnumber 46       Pbus Bitnumber 37
   Jolt registers:
     STATUS_0    0xc1000000    SYNL_03_LOG  0x0000000   SYNL_47_LOG  0x000032cd
                               SYNH_03_LOG  0x00000000  SYNH_47_LOG  0x0000ffcd
     SUM_SADD_LOG 0x12fcd2c0   SUM_VADD_LOG 0x820d5000  SUM_MADD_LOG 0xffa44800
     SUM_MISC_LOG 0xd6000000   L2_ADDR_LOG  0x003cc10   L2_OP_LOG    0x00000200
Logged by Carrier board:
     IO STATUS 0x00006540
     Address 0x00 12fcc100
     Slot 11   Dimm 1D   (FRU isolation)
     SLICE 3   ShockWave 3 Dimm Bit Number 6
     IO ERR_RESP  0x12fcc100 IO_ERR_INFO  0x00000000  IO_ERR_REQ  0x0ffaa40ad
     ERR_SYN01    0x00000000  ERR_SYN23   0x000032cd
          .
          .
          .
```

3. Review the information presented by the “run” command and determine if the problem is with a memory board or with a DIMM on a memory board. The output of the run command will not specify whether the error is with a board or a DIMM on a board. In

the example output shown in Step 5 above, the MEMTEST diagnostic has discovered an error with the DIMM in slot 1D on the memory board in slot 11. This is specified in the line:

```
Slot 11    Dimm 1D     (FRU isolation)
```

If the diagnostic reports a potentially defective DIMM:

a. Remove the board containing the defective DIMM.

b. Check if the DIMM is seated properly. If it is not, reseat it.

c. Reinstall the memory board.

d. Rerun MEMTEST.

   If the problem disappears, the installation is complete. If the error reoccurs, remove the memory board, replace the DIMM with a new DIMM using the procedure “Removing and Replacing a Faulty DIMM (T600 Only)” on page 29, and rerun MEMTEST using the run command.

   If the problem disappears, the DIMM is defective and should be returned to Hewlett-Packard.

NOTE A defective DIMM must be returned to Hewlett-Packard. It is considered the property of Hewlett-Packard and is no longer the property of the customer.

If the problem reoccurs at the same DIMM location, the problem may be the socket on the carrier board into which the DIMM has been installed. To determine if the socket is defective, move the set of (4) DIMMs containing the suspected defective DIMM to another available location on the carrier board. For example if MEMTEST indicates that the DIMM in socket 1D if defective, move the set of DIMMS (those in socket locations 1A, 1B, 1C and 1D) to a new location (for example, socket locations 8A, 8B, 8C, and 8D). Then, reinstall the memory board and rerun MEMTEST.

If the problem disappears, the problem is likely a defective socket. Moving the DIMMS to a new location will temporarily resolve the problem until a new carrier board can be installed at a time when the customer can schedule down time. (If the board is fully populated, and you can therefore not move DIMMs to new locations, the board can still remain installed. The defective socket reduces by 1 GB the total amount of memory on the board, but otherwise the board would function properly until a replacement is installed.)

To install a new carrier board, remove the 8 GB Memory Board, remove the DIMMs, replace the carrier board, reinstall the DIMMs using the procedures in “Installing DIMMs on 8 GB (A3389A) Board Only--Overview” on page 14, and repeat the verification procedure at Step 1. Then return the carrier board to Hewlett-Packard.

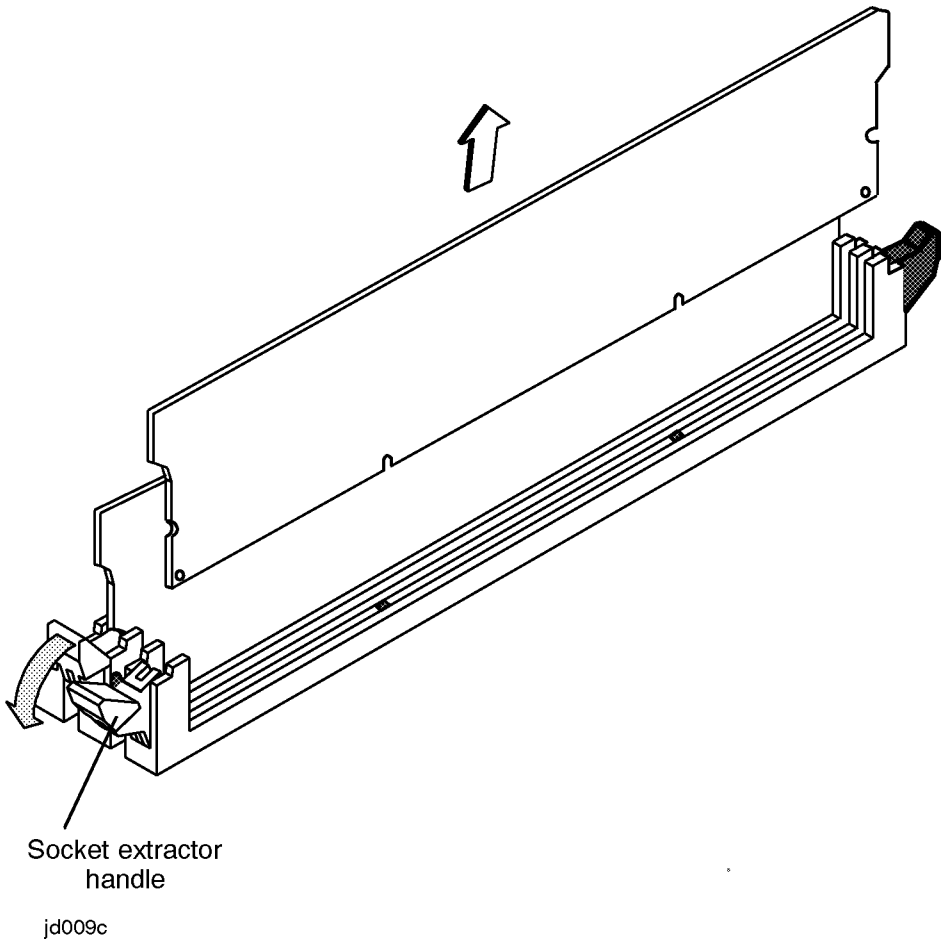
Removing and Replacing a Faulty DIMM (T600 Only)

After identifying which DIMM is faulty, you should order the following Field Replaceable Unit (FRU) to replace it: P/N A3832AX

To remove and replace a DIMM:

1. Remove the memory board containing the faulty DIMM.
2. Locate the faulty DIMM on the memory board.
3. Release the module by pressing down on the socket extractor handles on each side of the socket. Refer to Figure 2-2

Figure 2-2 Removing a DIMM



4. Pull the DIMM from the socket.
5. Use the procedure in “Installing DIMMs” on page 15 to install the new DIMM.
6. Install the memory board in the PMB card cage.

Configuration

No interactive configuration utility needs to be performed to accommodate the addition of memory to the SPU. The configuration of memory into the system is accomplished during the SPU selftest process.

Tell the System Administrator/System Manager that the system is back on line so that he or she can inform the system users.