AlphaStation™ 500 Series

System Board Upgrade

Part Number: EK-ALPH5-UP. A01

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This book describes how to upgrade an AlphaStation 500 Series system by replacing the system board.

Revision/Update Information: This is a new document.

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[S3216]

FCC CLASSIFICATION

There are many variants of AlphaStation 500 Series systems. Your AlphaStaition 500 Series system may be classified as either a Class A or a Class B FCC/EMC device, depending upon its options and configuration.. To determine your system’s classification, look at the FCC Classification Label on the bottom of the system.

FCC NOTICE -- CLASS A DEVICE

The equipment described in this manual generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a ClassA digital devie pursuant to part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference.

Operation of this equipment in a residential area may cause interference, in which case the user at their own expense will be required to take whatever measures are required to correct the interference.

If shielded cables have been supplied or specified, they must be used on the system in order to maintain international regulatory compliance.

FCC NOTICE -- CLASS B DEVICE

This device complies with Part 15 of the FCC rules. Operation is subject to the following conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. Any changes or modifications to this equipment may void the user's authority to operate this equipment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

The keyboard and video ports should be connected only with shielded data cables with an external ferrite bead over the cable. When either of these ports is connected with cables without such a ferrite bead, the additional ferrite beads shall be clamped over these cables next to the cable connector.

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Preface

Upgrade of AlphaStation 500 Series Systems

This manual describes how to upgrade Digital AlphaStation 500 Series systems to another model by swapping the system board.

Audience

This manual is intended for those Digital services personnel and authorized self-maintenance customers who will be upgrading an AlphaStation 500 Series system.

Organization of the Information

This manual covers the following topics:

- Chapter 1, *Upgrade Overview*, contains an overview of the conversion process, lists the hardware kit components, and provides a step-by-step listing of activities.
- Chapter 2, *Installing the Kit*, describes all steps in detail.

Refer to the Table of Contents for a detailed listing of topics.

Special Notices

This guide uses three kinds of notices to emphasize specific information.

WARNING

A WARNING indicates the presence of a hazard that can cause personal injury.

CAUTION

A CAUTION indicates the presence of a hazard that can cause damage to hardware or that might corrupt software.

NOTE

A NOTE gives general information, such as compatibility with other products or pointers to other information.

1
Upgrade Overview

Introduction

Congratulations on your purchase of the AlphaStation 500 Series System Board Upgrade. This machine has been designed and tested with the utmost attention to performance and reliability. It can run OpenVMS, Digital UNIX, or Windows NT. Your machine's performance range can be extended by the addition of memory, PCI cards, video upgrades, and hard disk drives.

For more information, browse the Digital Web Page at *http://www.digital.com/*.

Overview of the Conversion Process

This manual details step-by-step procedures for upgrading the system board in an AlphaStation 500 Series system. The conversion involves opening the enclosure, removing all components and options which are attached to the system board, replacing the system board (CPU module) with a new one, and reinstalling all components and options.

AlphaStation 500 Series Overview

Internal Components

Figure 1-1 shows a breakaway view of the internal components of an AlphaStation 500 Series system. Table 1-1 lists the items.

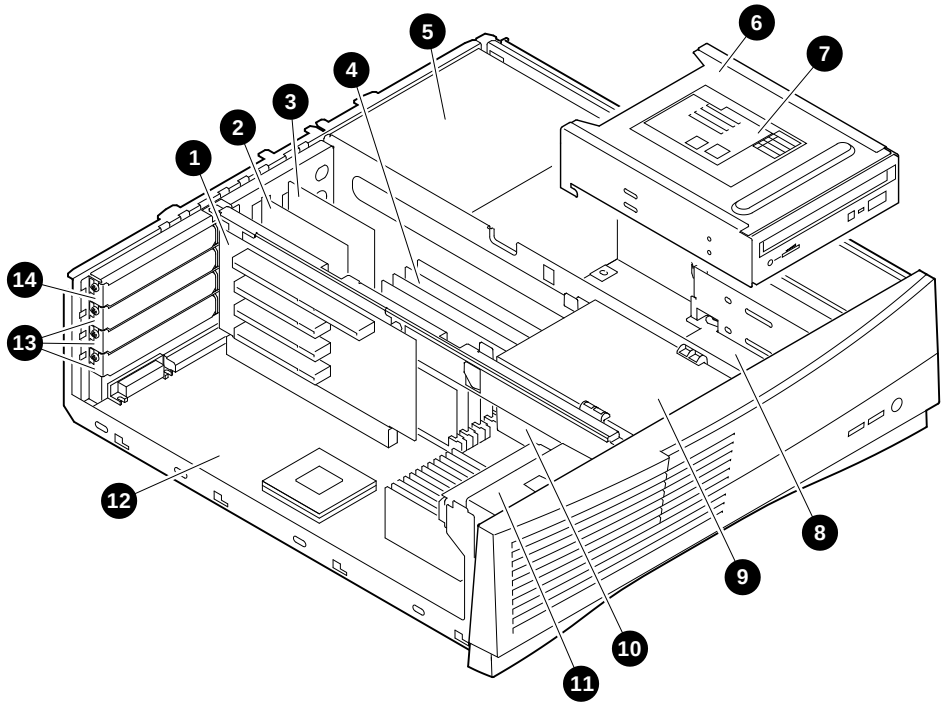

Figure 1-1 AlphaStation 500 Series Internal Components

Table 1-1 Internal Componets Locations

Figure Legend	Description
1.	PCI riser card (Peripheral Component Interconnect Option card)
2.	MAU Ethernet card (Media Adapter Unit card)
3.	Audio card
4.	Memory modules; two banks of four DIMMs
5.	Power supply
6.	CD-ROM in upper slot of the right-hand storage bay area
7.	Customer configuration label
8.	Lower right-hand storage bay area slots. May contain:
	a) only one 3.5-inch x 1.6-inch mass storage device ***or***
	b) up to two 3.5-inch x 1-inch mass storage devices
9.	Floppy diskette drive in upper slot of the left-hand storage bay area
10.	Lower left-hand storage bay area slot for one 3.5-inch x1-inch mass storage device
11.	System cooling fan
12.	System board
13.	PCI expansion slots (three 32-bit slots)
14.	PCI expansion slot (one 64-bit slot

NOTE

The cache cooling fan is under the lower left-hand storage bay area, as is the speaker; they do not show in this view.

Rear View

Figure 1-2 is a view of the rear connectors on an AlphaStation 500 Series system. Table 1-2 lists the connectors.

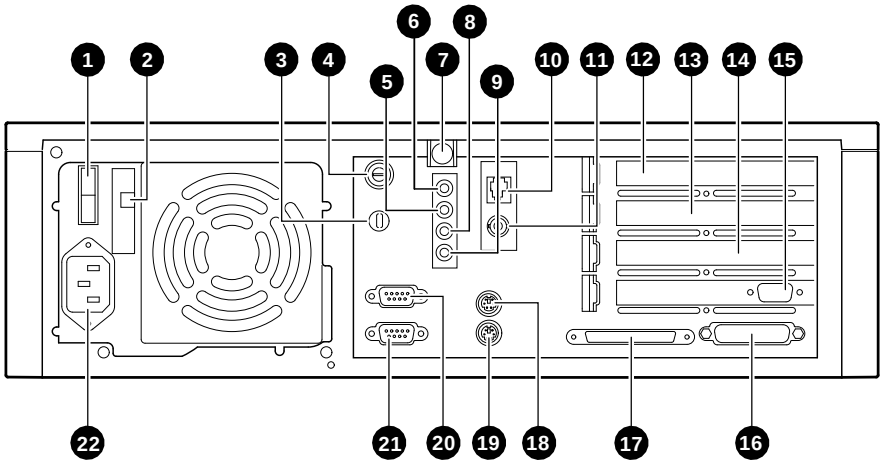

Figure 1-2 AlphaStation 500 Series Rear View

Table 1-2 Rear Connectors

Figure Legend	Description
1.	Power switch
2.	Voltage selection switch
3.	Lock slot
4.	System lock
5.	Sound card stereo LINE OUT connector
6.	Sound card stereo headphone jack
7.	Top cover screw
8.	Sound card microphone jack
9.	Sound card stereo LINE IN connector
10.	Twisted pair Ethernet connector
11.	ThinWire Ethernet connector
12.	64-bit PCI expansion slot
13.	32-bit PCI expansion slot
14.	32-bit PCI expansion slot
15.	32-bit PCI expansion slot
16.	Enhanced bi-directional parallel port
17.	68-pin (wide) SCSI connector
18.	Keyboard connector
19.	Mouse connector
20.	Serial port connector (COM1)
21.	Serial port connector (COM2)
22.	AC power connector

System Board Connectors

Figure 1-3 is a view of the system board connectors in an AlphaStation 500 Series system. Table 1-2 lists the locations.

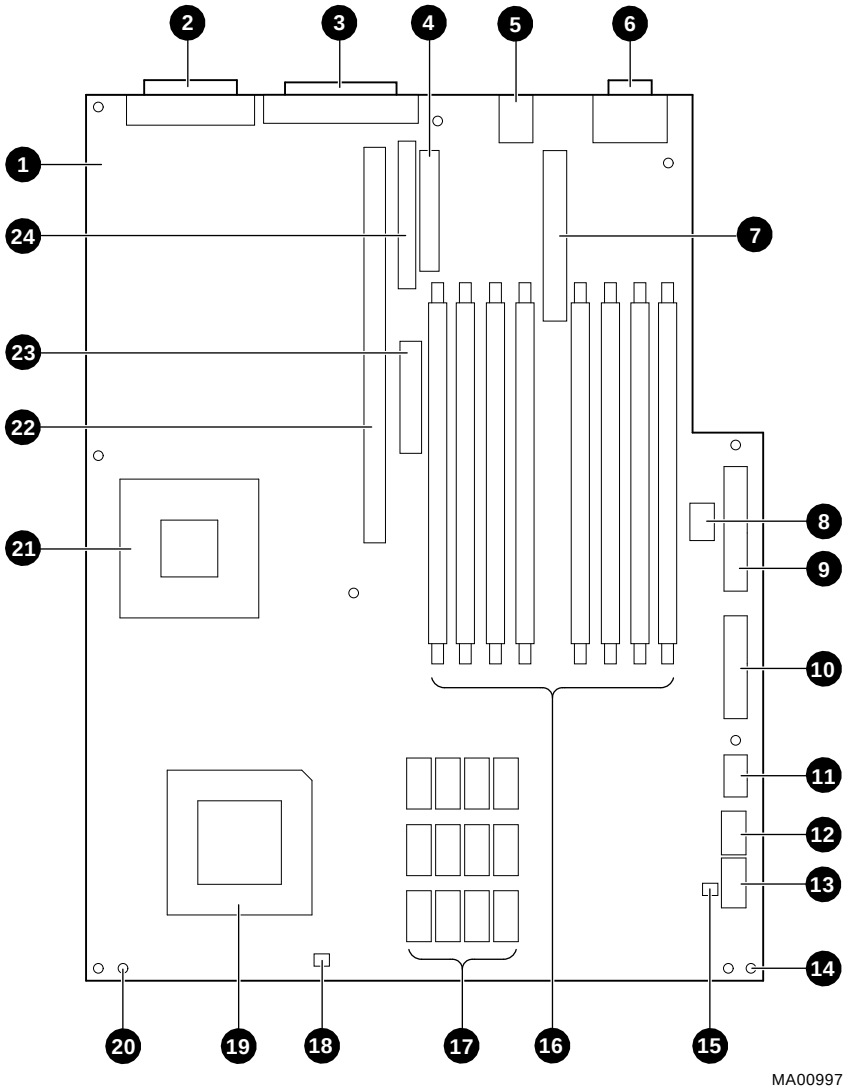

Figure 1-3 AlphaStation 500 Series System Board Connectors

Table 1-3 System Board Connectors Locations

Figure Legend	Description
1.	System board
2.	Parallel port (J41)
3.	External SCSI (J42)
4.	3.5-inch removable media interface connector (Floppy) (J38)
5.	Keyboard (top) and mouse (bottom) connectors (J39)
6.	Serial ports (COM1, top/COM2, bottom) (J40)
7.	Audio card (J36)
8.	SROM port (for Manufacturing use only, J24)
9.	Power connector (+5V sense, -5V sense) (J21)
10.	Power connector (+3.43V sense) (J8)
11.	Power connector (+12V sense) (J7)
12.	LED's Halt/Reset cable connector (J5)
13.	Diagnostic port (for Manufacturing only, J4)
14.	Locating pin holes (two positions)
15.	Cache fan connector (J3)
16.	Connectors for DIMM memory modules (J22, J23, J25, J26, J27, J28, J29, J30)
17.	Cache
18.	System fan connector (J1)
19.	Alpha CPU
20.	Mounting holes (nine locations)
21.	CIA bridge
22.	PCI riser card connector (J34)
23.	Media adapter Unit (MAU) connector (J32)
24.	Internal SCSI connector (J37)

Fan Locations

Figure 1-4 shows the location of fans in an AlphaStation 500 Series system.

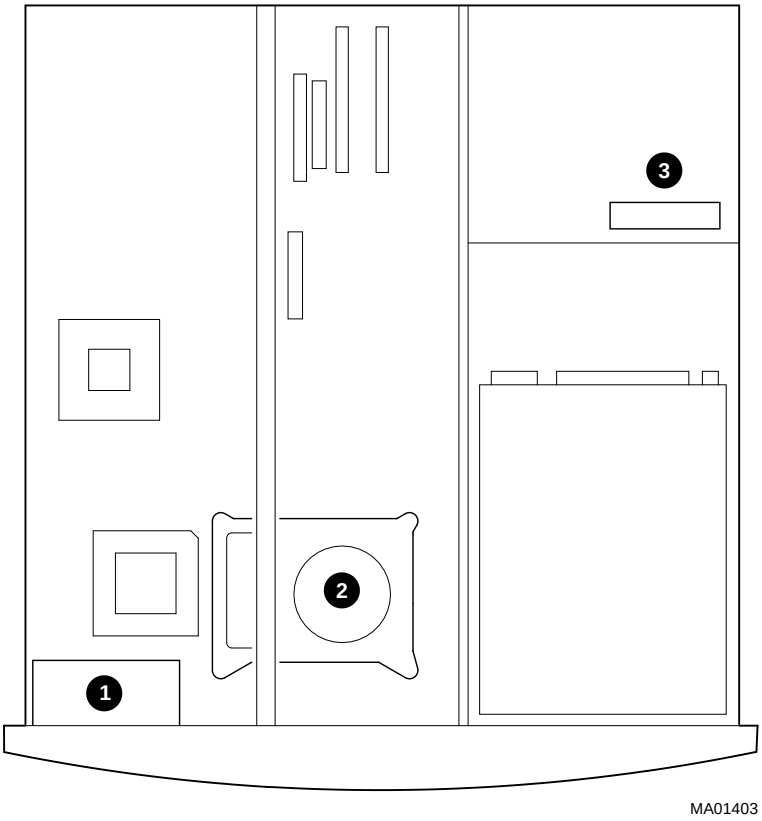

Figure 1-4 AlphaStation500 Series Fan Locations

1. System fan
2. Cache cooling fan (located under the left-hand mass storage bay)
3. Power supply fan (internal)

Summary Listing of Upgrade Activities

This is a summary of the conversion process; to begin the actual conversion, turn to Chapter 2.

1. Turn off the system and disconnect the AC power cord.
2. Disconnect all remaining external cables (video, network, audio, etc.).
3. Remove the enclosure cover and side panel.
4. Remove any PCI cards installed in the system.
5. Remove the PCI riser card.
6. Remove the bracket containing the floppy drive and the left-hand storage bay (including optional hard disk drive).
7. Remove the CD-ROM.
8. Remove the audio and MAU Ethernet cards.
9. Remove the memory DIMMs.
10. Remove the system fan.
11. Disconnect all internal cables plugged into the system board.
12. Remove the nine system board mounting screws and lift the board out of the enclosure.
13. Place the new system board into the enclosure.
14. Attach the new PCI slot adapter to the system fan and reinstall the fan and its cable.
15. Connect the new cache fan cable to the system board.
16. Reconnect or reinstall all cables, features, and options.
17. Install the new EMI gasketing and replace the enclosure cover.
18. Remove the old AlphaStation label from the front of the system and replace it with the new one.
19. Replace the FCC Classification label if necessary.
20. Return the old system board to Digital within 30 days to avoid a non-return charge.

2
Installing the Kit

Introduction

This chapter describes the actual removal of an AlphaStation 500 Series system board and replacement with another to upgrade the system. This manual has been designed generically to be applicable throughout the AlphaStation 500 Series.

Kit List

This is a listing of upgrade kit items.

- AlphaStation 500 xxx MHz label
- Upgrade manual (this document)
- Wrist strap for grounding
- 2 pieces of EMI gaketing
- System board
- Return shipping labels
- FCC reclassification label (as required)
- PCI card guide
- Return shipping label

The Step-by-Step Upgrade Process

To upgrade your AlphaStation 500 Series system, follow these steps.

1. **Turn off the system and disconnect the power cord.**
   A. Turn off the system and all external peripheral devices.
   B. Unplug the power cord from the wall outlet.

2. **Disconnect all remaining external cables (video, network, audio, etc.).**

3. **Remove the enclosure cover and side panel.**

CAUTION

Always wear a grounded wrist strap when servicing internal components of the AlphaStation 500 Series system.

WARNING

Wait at least 15 seconds after turning off the power to allow time for the power supply capacitors to fully discharge.

To open the AlphaStation 500 Series system enclosure:

CAUTION

If you have to apply an excessive amount of force to remove the cover, you are doing something wrong. Check the illustration carefully.

A. Unlock the rear panel by turning the key counterclockwise.

CAUTION

Failure to unlock the top cover will result in cover damage.

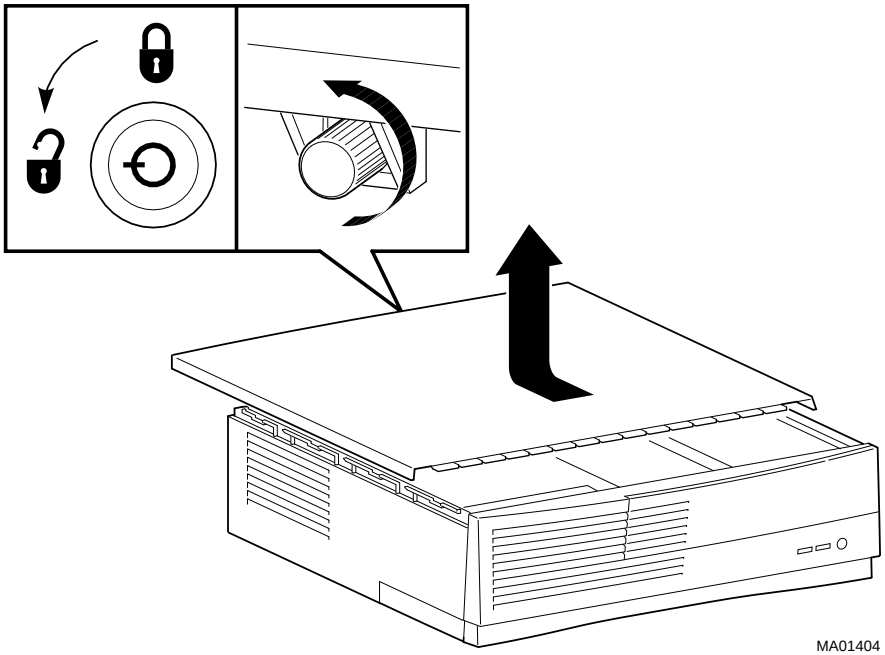

Figure 2-1 Removing the Enclosure Cover

B. Facing the rear of the system, remove the top cover thumbscrew and remove the top cover by sliding it rearward and lifting up.

C. From inside the front left-hand corner of the enclosure, push out on the retaining tab and slide the left-hand side panel rearward to remove it from the enclosure. It is not necessary to remove the right-hand side panel.

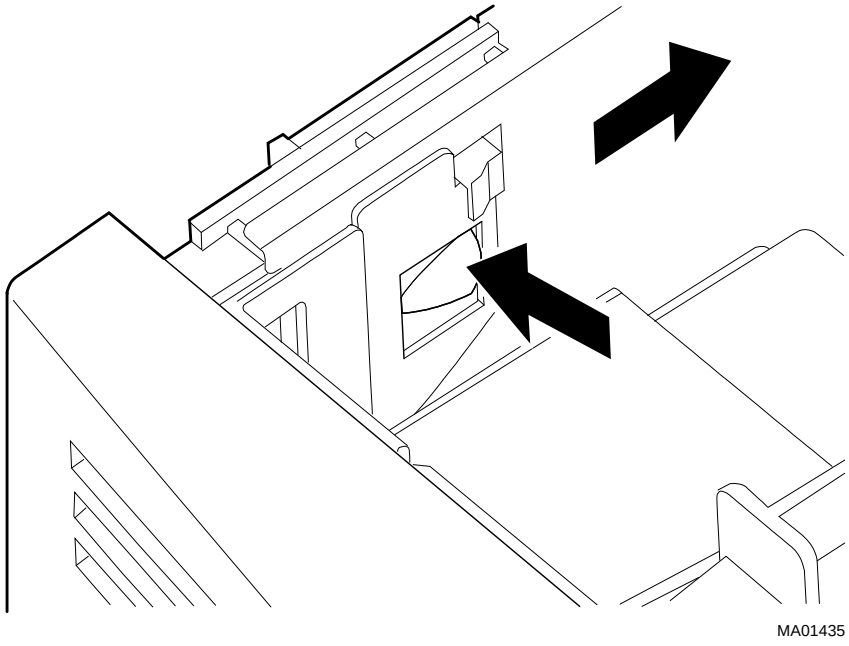

Figure 2-2 Removing the Side Panel

4. Remove any PCI cards installed in the system.

NOTE

Adding or moving PCI modules may require reconfiguration of your operating system.

To remove a PCI card:

A. Disconnect any cables connected to the module you are removing.

B. Remove the screw **(1)** at the front of the module.

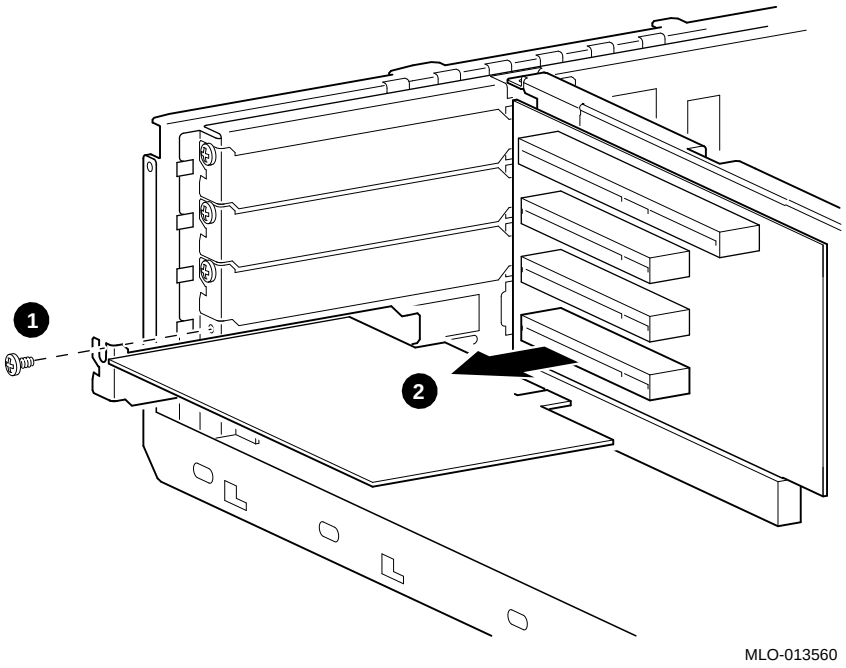

Figure 2-3 Removing a PCI Card

C. Gently pull the expansion module outward to release it from its slot **(2)** on the PCI riser card.

5. Remove the PCI riser card.

To remove the PCI riser card:

A. Remove the screws **(1)** holding the PCI riser card to the cross member at the top and lift it **(2)** out of its connector on the system board.

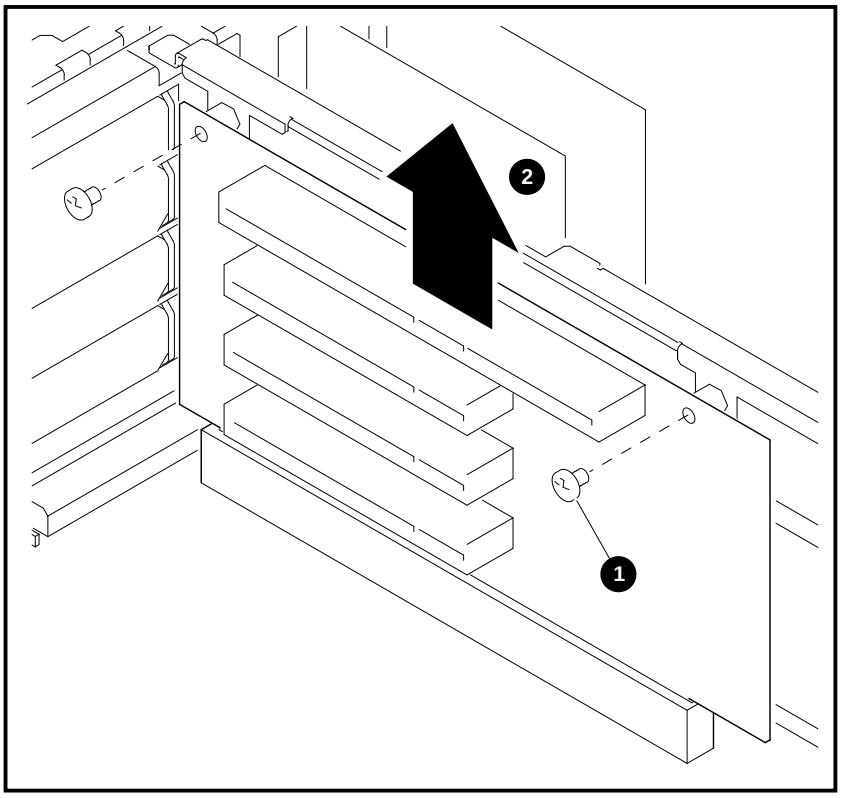

Figure 2-4 Removing the PCI Riser Card

6. Remove the floppy drive and the left-hand storage bay.

The bracket containing the floppy drive and the left-hand storage bay (including an optional hard disk drive) can be removed as a single unit. To remove the floppy drive and the left-hand mass storage bay:

A. Snap out the bracket containing the left-hand mass storage bay **(2)** (inclusive of the floppy drive and mass storage drive (if installed) by pushing in on the plastic tabs **(1)** on either side of the rear of the bracket.

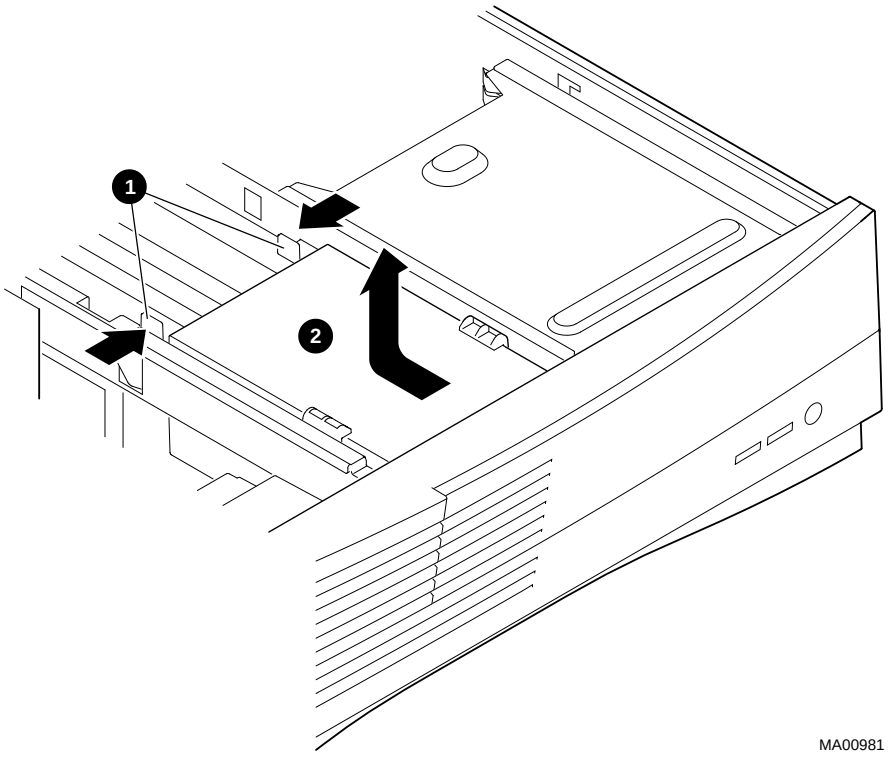

Figure 2-5 Removing the Floppy Drive and Left-Hand Mass Storage Bay

B. Remove the data and power cables from the floppy drive and the mass storage drive. Note the position of the cables so you can reconnect them to the correct devices later.

7. Remove the CD-ROM Drive.

To remove the CD-ROM drive:

A. Remove the SCSI cable from the CD-ROM.

B. Remove the power cable from the CD-ROM.

C. Remove the audio cable from the CD-ROM (the other end is connected to the audio card at the rear of the enclosure).

D. Remove the pin which is inserted down through the four holding tabs on the right-hand side of the system enclosure **(1)**.

E. Snap out the bracket containing the CD-ROM by pushing in on the button latch built into the right-hand side panel of the system enclosure **(2)**.

F. Slide the CD-ROM and bracket toward the rear of the system unit and remove them **(3)**.

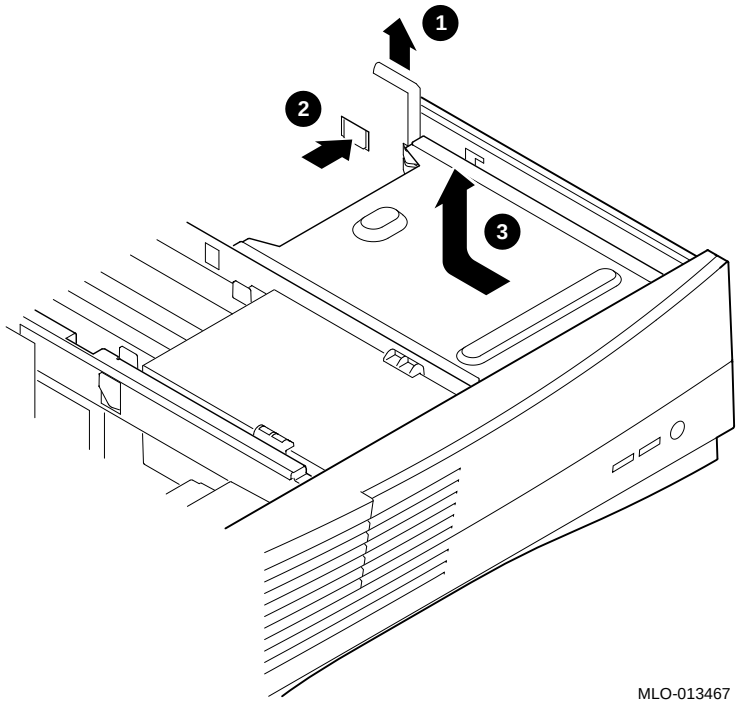

Figure 2-6 Removing the CD-ROM Drive

8. Remove the audio and MAU Ethernet cards.

To remove the audio card:

A. Disconnect any external devices connected to the audio card through the rear of the enclosure.

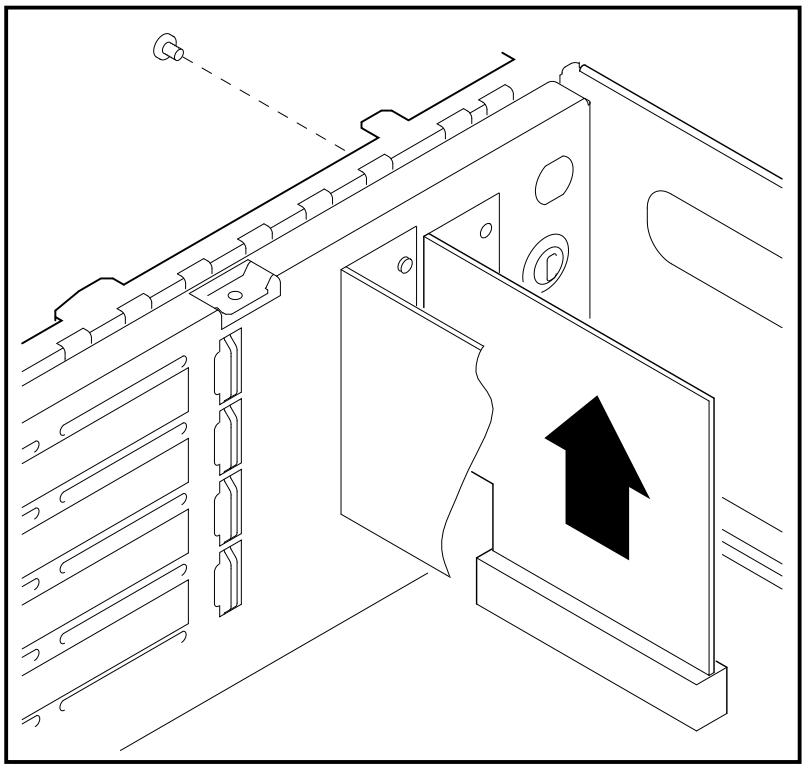

Figure 2-7 Removing the Audio Card

B. Disconnect the speaker cable from the J5 connector on the audio card.

C. Disconnect the CD-ROM cable from the J6 connector on the audio card.

D. From the rear of the enclosure, remove the audio card screw.

E. Slide the audio card upward and out of the enclosure.

Note

The audio card screw is a different size than other module's screws. Be sure to keep this screw with the audio card so as not to mix it up with other screws.

To remove the MAU Ethernet card:

A. Disconnect the external Ethernet cable attached to the card through the rear of the enclosure.

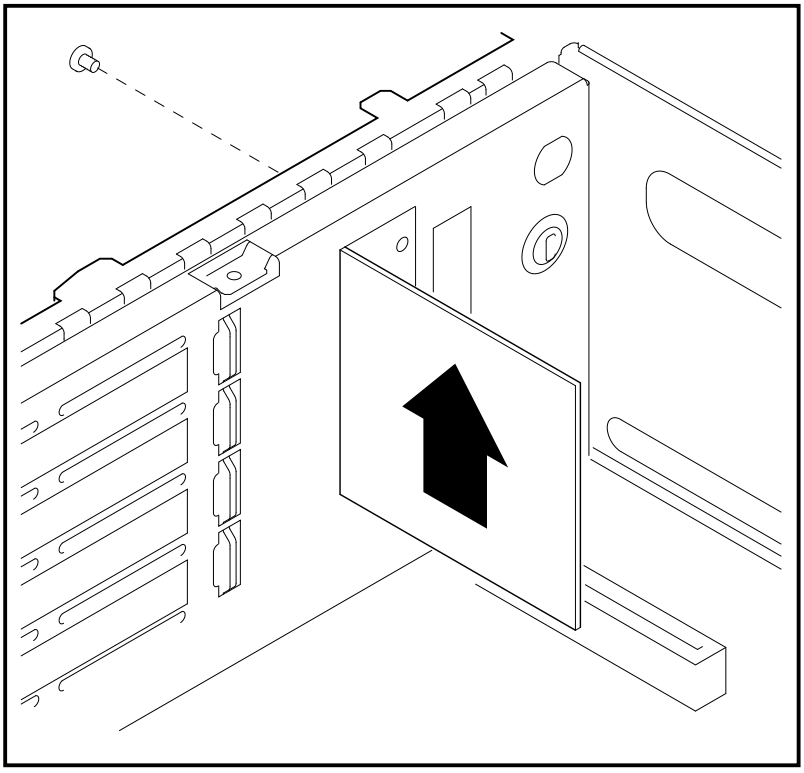

Figure 2-8 Removing the MAU Ethernet Card

B. Disconnect the internal MAU Ethernet cable from J2 on the card.

C. From the rear of the enclosure, remove the MAU Ethernet card screw.

D. Slide the card upward and out of the enclosure.

9. Remove the memory DIMMs.

NOTE

Use the following DIMM Configuration rule:
Always fill at least one bank of DIMMs completely (either Bank A or Bank B). Use the same DIMMs within the same bank; they must be the same memory size, and it is recommended that they be from the same vendor.

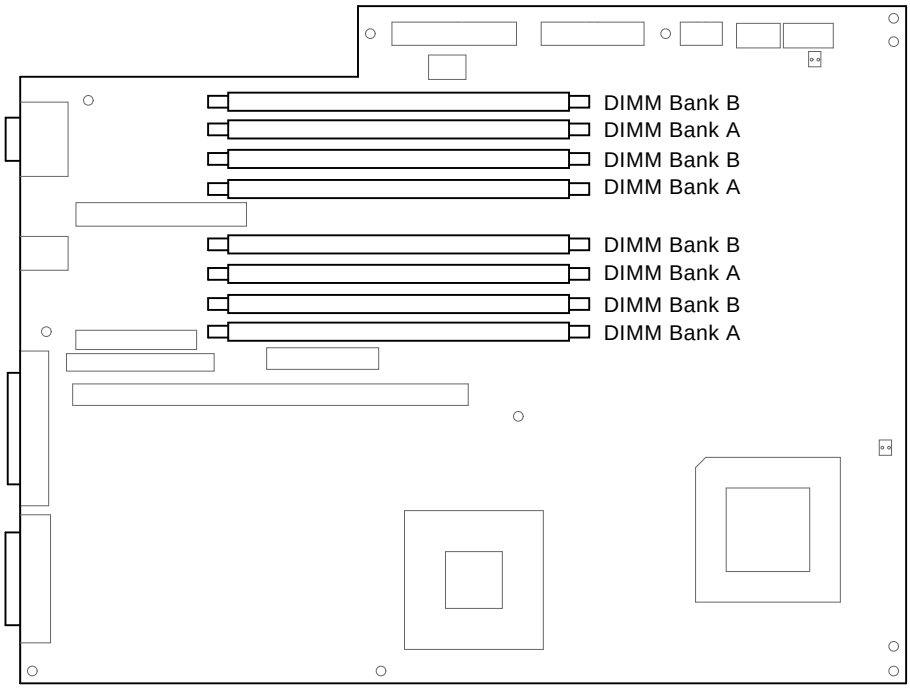

Figure 2-9 Memory Banks

NOTE

So that you can return DIMMs to their sockets properly, remember where the DIMMs were placed.

To remove the memory DIMMs:

A. Remove the DIMM by releasing the end latches **(1)** and pulling it gently upwards out of the socket **(2)**.

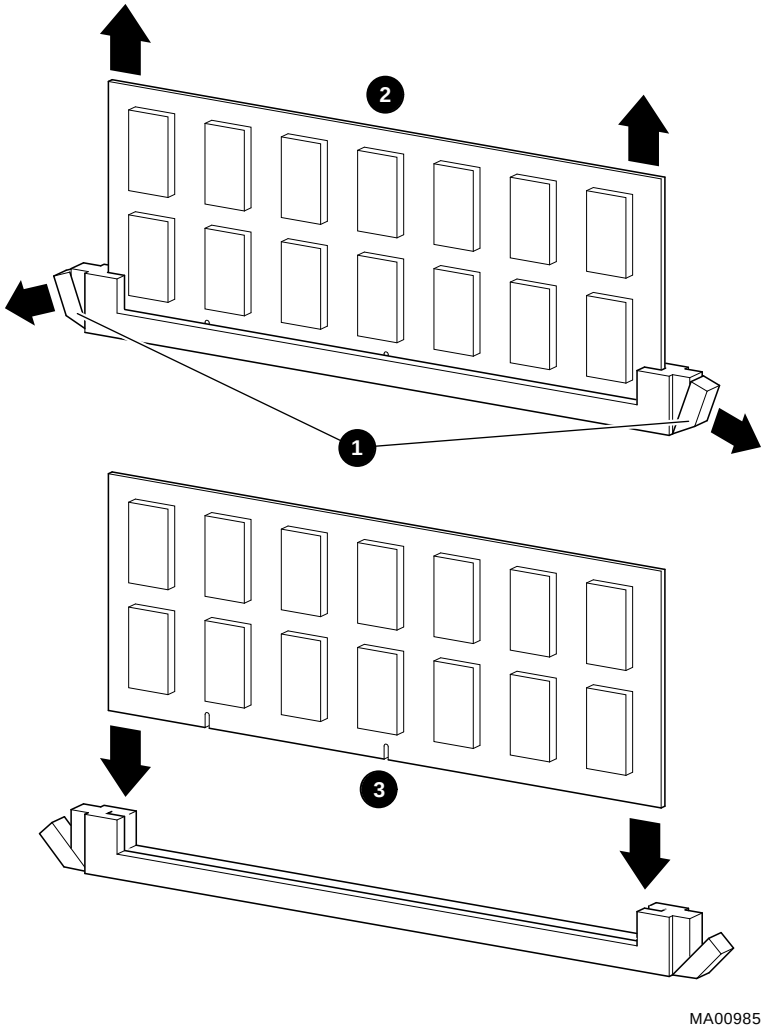

Figure 2-10 Removing a Memory DIMM

10. Remove the system fan.

To remove the system fan:

A. Disconnect the fan wire at J1 on the system board, noting the wire routing.

B. Remove the cooling-fan and bracket by lifting it upward **(1)**.

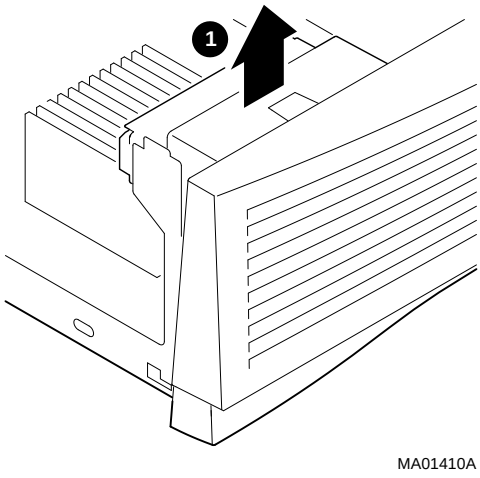

Figure 2-11 Removing the System Fan

11. Disconnect all internal cables plugged into the system board.

The following checklist is provided for your convenience. You may have already disconnected some of the cables.

Cable:	Connects:
SCSI	System board and SCSI drives
MAU	System board and MAU Ethernet card
Floppy	System board and floppy drive
Power (3v)	System board and power supply
Power (5v)	System board and power supply
Power (12v)	System board and power supply
LEDs/Halt/Reset	System board and LEDs/Halt/Reset button
System fan	System board and system fan

12. Remove the nine system board mounting screws, and lift the board out of the enclosure.

To remove the system board:

A. Remove the nine system board mounting screws. The two screws at the front corner of the enclosure are located just inside the locator pin holes (see **(1)** and **(2)**, below for the positioning of the locator pin holes and the two front screws, respectively).

CAUTION

Be careful not to generate metal shards when removing screws; this can result in short circuits and/or system failure.

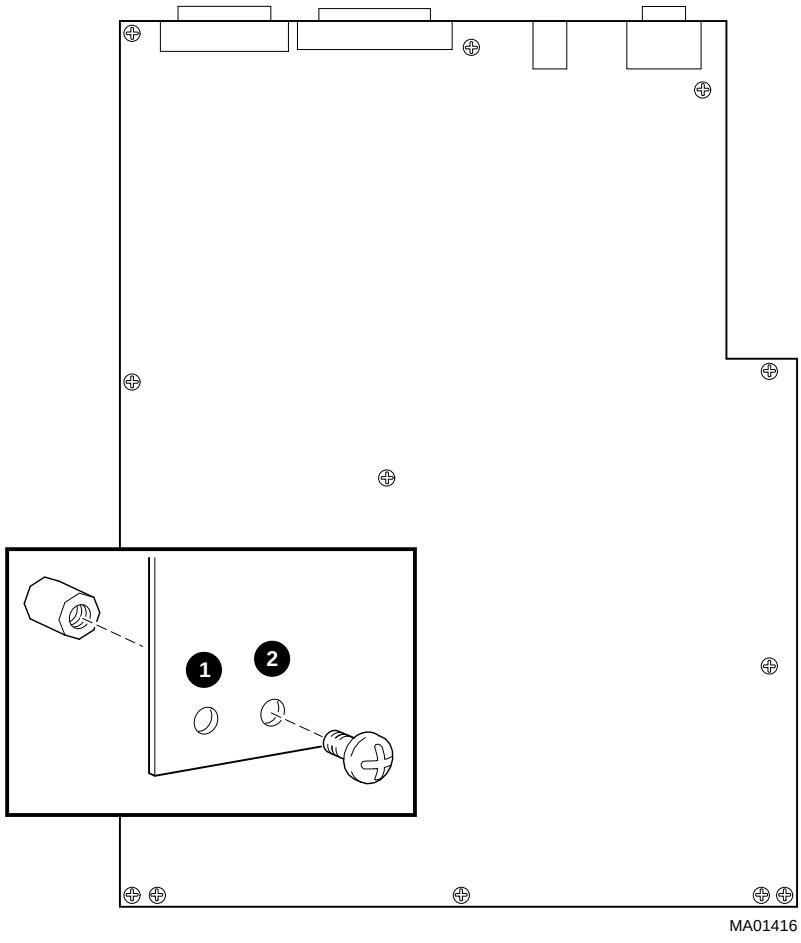

Figure 2-12 Removing the System Board

B. Gently lift the system board off its locating pins and out of the enclosure.

13. Place the new system board into the enclosure.

To install the new system board:

A. Place the system board into the appropriate slots at the rear of the enclosure and onto its locating pins.

B. Replace the nine mounting screws.

14. Attach the new PCI Slot Adapter to the System Fan, and Reinstall the System Fan.

Snap the new PCI slot adapter to the system fan as shown, and reinstall the fan and its cable.

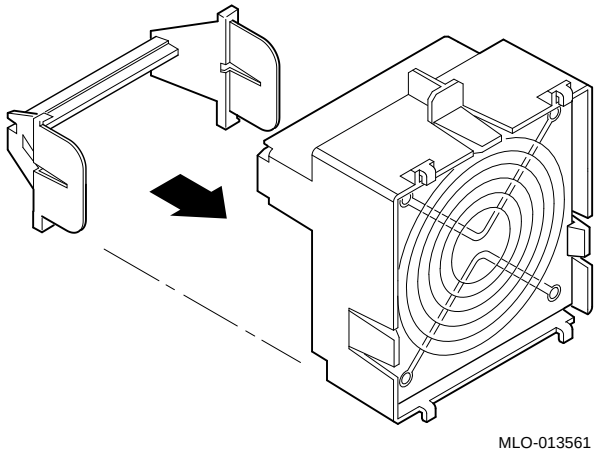

Figure 2-13 Attaching the PCI Slot Adapter to the System Fan

15. Connect the cache fan cable to the system board.

The new system board comes with a cache fan already installed. If you have to connect the new cache fan power cable to the system board. See Figure 1-4 for the location of the cache fan, and Figure 1-3 for the location of the fan connector on the system board.

16. Reconnect and/or reinstall all cables, features, and options in the reverse order than when you removed them.

A. Reinstall the memory DIMMs.

B. Reinstall the audio and MAU Ethernet cards.

C. Reinstall the CD-ROM.

D. Reinstall the left-hand storage bay and floppy drive.

E. Reinstall the PCI riser card.

F. Reinstall any PCI cards.

G. Reconnect any other internal or external cables. See the cable checklist.

17. Install the EMI gasketing, close and power up the system.

A. New EMI gasketing has been supplied with your new system board. If your system does not already have this gasketing installed, peel off the backing, and stick it onto the location shown **(1)**.

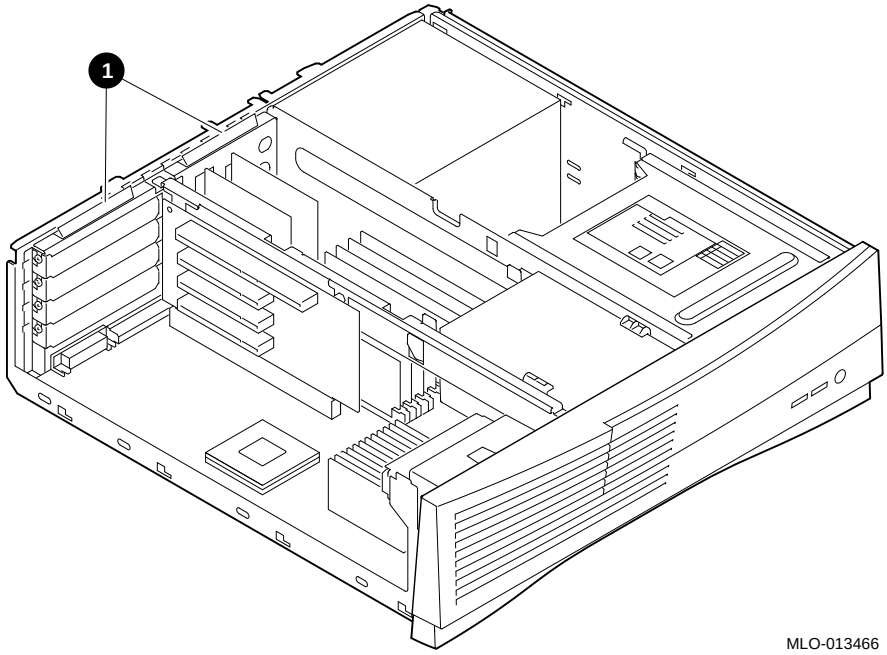

Figure 2-14 Installing the EMI Gasketing

B. Replace and secure the left side panel and the enclosure cover.

C. Reconnect the AC power cord and turn on the system.

CAUTION

Both the system fan and the cache fan must be connected to the system board. The system will power down immediately if it does not sense both fans.

18. Replace the label on the front of the system.

Remove the old “AlphaStation xxx Mhz” label from inside the front door of the system, and replace it with the new “AlphaStation xxx Mhz” label provided.

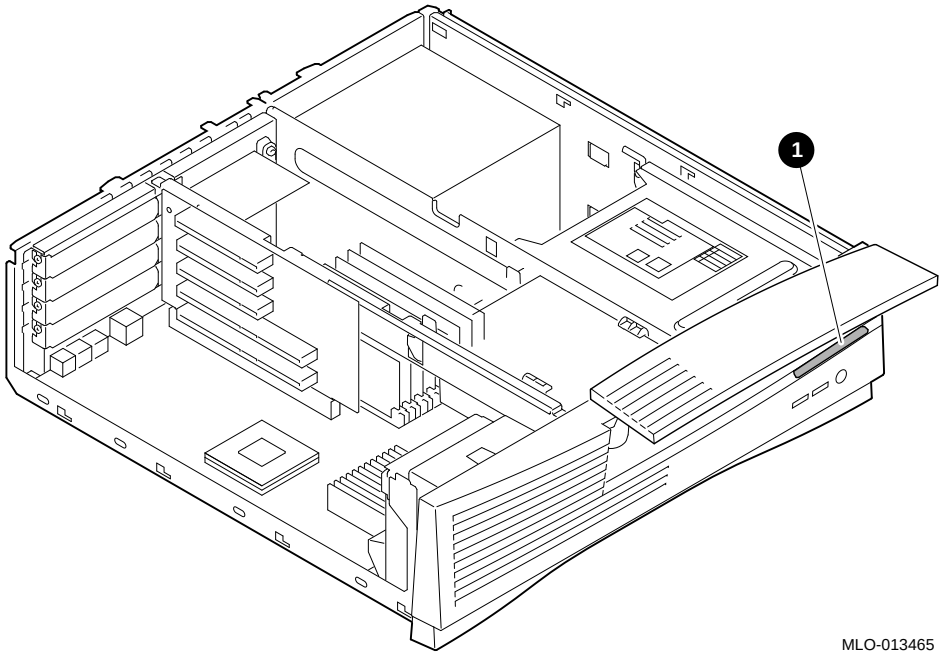

Figure 2-15 Replacing the Label

19. Replace the FCC Classification label if necessary.

Upgrading to certain levels of AlphaStation 500 Series systems may require FCC reclassification.

- If the system power supply revision is -C03 or higher, no reclassification is required.
- If the system power supply revision level is below -C03, the system requires FCC reclassification from Class B to Class A.

To reclassify the system as Class A, place the Class A update label included in your kit over the corresponding section of the FCC label on the bottom of the unit.

20. Return the old sytem board to Digital within 30 days.

Return the old system board to Digital within 30 days.

Place the old module in the shipping container, affix the appropriate return shipping label for your area (included in your kit) and return the module.

A non-return charge will be applied if your old module is not recieved by Digital with 30 days.

3

Supplemental Information

Conventions

Where applicable, this guide uses the following conventions:

Convention Example	Description
`c:\windowsc :\windows>`	Monospaced, bold text indicates file names, path names, directories, or screen text.
[Enter]	Square brackets surrounding text represent a key on the keyboard.
[Ctrl]+[R]	A plus sign between keyboard keys indicates that the keys shown should be pressed at the same time.
auto_action	Italic text indicates environment variables. Titles of information sources are in italic, and occasionally italic is used for emphasis in the text.
☞	A pointing hand indicates a reference to additional information.

Abbreviations

Where applicable, this guide uses the following abbreviations:

Abbreviation	Meaning
AC	alternating current
amp	ampere
ARC	advanced RISC computing (Windows NT console)
ARCINST	ARC installation program
C	Celsius
CD	compact disc
CD-ROM	compact disc read-only memory
CEE	International Commission for Conformity Certification of Electrical Equipment
CFG	configuration file
cm	centimeters
CPU	central processing unit
CSA	Canadian Standards Association
DC	direct current
DIMMs	dual in-line memory modules
DMA	direct memory access
DRAM	dynamic random-access memory
ECU	EISA configuration utility
EISA	extended industry-standard architecture
FDI	Floppy Drive Interconnect
flashROM	electrically erasable, rewriteable, nonvolatile memory
ft	feet
GB	gigabyte
Hz	hertz
IEC	International Electrotechnical Commission
I/O	input/output
IRQ	interrupt request

Abbreviation	Meaning
Abbreviation	**Meaning**
ISA	industry-standard architecture
ISACFG	ISA configuration file
ISO	International Organization for Standardization
Kb	kilobit
KB	kilobyte
kg	kilogram
lb	pound
LED	light-emitting diode
m	meter
MAU	media adapter unit
Mb	megabit
MB	megabyte
MHz	megahertz.
mm	millimeter
ns	nanoseconds
NVRAM	nonvolatile random-access memory
OSF	DEC Open Software Foundation/1 UNIX operating system
PCI	peripheral component interconnect
RISC	reduced instruction set computing
ROM	read-only memory
SCSI	small computer system interface
SIMMs	single in-line memory modules
SRM	system reference manual (the Digital UNIX and OpenVMS consoles)
SROM	serial read-only memory
UL	Underwriters Laboratories
VAR	value-added reseller
V AC	volts alternating current
VMS	Open VMS Operating System
W	watt

Additional Information Resources

You may wish to consult the following information resource for additional information about your AlphaStation 500 Series system:

- *AlphaStation 500 Series Installation Information* (order number EK-ALPH5-IN), which presents a graphical overview of the AlphaStation *500* Series system installation.
- *AlphaStation 500 Series User Information* (order number EK-ALPH5-UI), which presents detailed operating instructions and information for the AlphaStation *500* Series systems.

Contact your distributor or Digital representative for other available product-related information.

Reader's Comments

Digital welcomes your comments on this or any other manual.

Digital Equipment Corporation

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Please reference order number EK-ALPH5-UP. A01 in your correspondence.