



DEC 3000  
Model 500X AXP  
Service Information

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**April 1993**

This guide is a support and reference document for Digital service personnel who perform maintenance work on the DEC 3000 Model 500X AXP workstation. The guide is also intended for Digital customers who have a self-maintenance agreement with Digital.

This guide is a supplement to *DEC 3000 Model 500/500S AXP Service Information*.

**This is a new document.**

**Digital Equipment Corporation**

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# Preface

## About This Guide

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### **Purpose and Audience**

This guide is a support and reference document for Digital service personnel who perform maintenance work on the DEC 3000 Model 500X AXP workstation. The guide is also intended for Digital customers who have a self-maintenance agreement with Digital.

This guide is a supplement to *DEC 3000 Model 500/500S AXP Service Information*.

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### **Organization**

This guide is organized to match the *DEC 3000 Model 500/500S Service Information* guide.

Four chapters and one appendix provide new information on the Model 500X system:

- Chapter 1 provides an overview of the DEC 3000 Model 500X AXP CPU, memory subsystem, and network interface.
- Chapter 2 provides jumper configuration information for the system module.
- Chapter 6 describes how to troubleshoot power and fan failures.
- Chapter 7 describes how to remove and replace field replaceable units (FRUs).
- Appendix D lists FRU part numbers.

Chapter 6 and the remaining chapters and appendices refer you to *DEC 3000 Model 500/500S Service Information*:

- Chapter 3, Using the Console
  - Chapter 4, Diagnostic Testing
- 

*Continued on next page*

## About This Guide, Continued

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- Chapter 5, SCSI Utilities
  - Chapter 6, Troubleshooting
  - Appendix A, Upgrading Firmware
  - Appendix B, Monitor Alignment Diagnostics
  - Appendix C, LED Codes and Error/Status Messages
- 

### Conventions Used in This Guide

This guide uses the following conventions:

---

Convention	Meaning
Note	Provides general information on the current topic.
Caution	Provides information to prevent damage to equipment and software.
Warning	Provides information to prevent personal injury.
<code>Key</code>	Keys and switches that are labeled appear in a <code>box</code> . For example, <code>Return</code> indicates that you press the Return key on your terminal.
<code>{ }</code>	In command formats, braces contain required information. The brackets <code>{ }</code> are not part of the syntax and should not be typed.
<code>[ ]</code>	In command formats, brackets contain optional information. The brackets <code>[ ]</code> are not part of the syntax and should not be typed.
<b>BOLD</b>	Bold type in examples indicates user input.
<b>❶</b>	Circled numbers provide a link between figures and text.

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## About This Guide, Continued

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### Related Documentation

The following documents provide additional information about the DEC 3000 Model 500X AXP workstation:

---

Document	Order Number
DEC 3000 Model 500X AXP Owner's Guide	EK-D5AXP-OG
DEC 3000 Model 500X AXP Options Installation Guide	EK-D5AXP-PG

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# Chapter 1

## System Overview

### System Overview

---

#### System Components

The DEC 3000 Model 500X AXP system is a high-performance deskside workstation. The system includes the following components:

- System module
- I/O module
- Memory subsystem
- Power supply
- Regulator module

The DEC 3000 Model 500X AXP system provides support for

- Up to four SCSI internal disk drives
  - Two 5.25-inch, half-height, removable SCSI devices
  - Up to seven external SCSI devices
- 

#### System Module

The system module includes the following components:

- 200 MHz DECchip (CPU)
  - 8K byte serial ROM
  - 512K byte backup cache
  - Main memory controller
- 

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## System Overview, Continued

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### System Module (continued)

- Controller for the TURBOchannel I/O bus
  - 8-plane two-dimensional graphics buffer logic for base graphics
  - 256K byte flash ROM (system ROM)
  - Three TURBOchannel option slots
- 

### I/O Module

The I/O module includes the following components:

- TOY/NVR controller chip
- Two serial line controllers
- ISDN interface with audio I/O
- Two SCSI controllers
- Ethernet controller
- 256K byte of flash ROM
- Two TURBOchannel option slots
- One power supply regulator slot

The DEC 3000 Model 500X AXP system provides interfaces to

- Serial lines
- Ethernet
- SCSI
- ISDN network
- Audio in/out
- Battery backed-up TOY
- High-performance two-dimensional graphics subsystem

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## System Overview, Continued

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Addresses generated by DMA devices in the I/O system may be translated by a scatter/gather map. The scatter/gather map can map 32K byte pages. This translation is an option, enabled on a device-by-device basis.

**Serial Lines:** The serial line interface supports the following equipment:

---

Equipment	Function
Keyboard	Connects to a 15-pin D-sub connector.
Mouse	Shares 15-pin D-sub connector with keyboard.
Printer	Connects to a 6-pin MMJ and is DEC-423 compliant.
Communication port	Connects to a 25-pin D-sub connector and supports full modem control.

---

**Ethernet Interface:** The Ethernet interface can connect to the local area network (LAN) by using an attachment unit interface (AUI, or thickwire) or 10BaseT twisted-pair cable. The selection (thickwire or twisted pair) is software-controllable.

**SCSI Interface:** The SCSI interface consists of two separate channels using two SCSI controller chips. These controller chips connect to the TURBOchannel through an ASIC. The ASIC buffers data to and from the SCSI controllers, providing 16 longword DMA bursts across the TURBOchannel for increased bus efficiency.

**ISDN Interface and Audio In/Out:** An AMD 79C30A controller chip provides an ISDN interface and telephone-quality audio input and output. Jacks and connectors in the front of the unit provide connections for a microphone and headphones.

**Battery Backed-Up TOY:** A battery backed-up time-of-year (TOY) chip provides a time reference when the unit is powered off.

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## System Overview, Continued

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### Memory Subsystem

The memory subsystem includes the following:

- Four memory motherboards (MMB) that mount on the system module. To have an operational memory subsystem, all four MMBs must be present.
- The memory arrays are spread among the four MMBs. Each bank of memory consists of eight memory modules, two on each MMB.

The memory subsystem can support up to 256M bytes, with a future expansion of up to 1 gigabyte of memory.

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## System Overview, Continued

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### CPU/Cache

The DEC 3000 Model 500X AXP system contains a single chip processor and floating point running at 5.0 nanoseconds. The processor is a superscalar, superpipelined implementation of the Alpha AXP architecture.

The DEC 3000 Model 500X AXP system contains the following direct-mapped caches:

- Icache (instruction cache)
- Dcache (data cache)

The system employs a second-level cache to help minimize the performance penalty of misses and write-throughs to the primary cache. This second level cache is a 512K byte, direct-mapped, write-back cache with a block size of 32 bytes.

The cache is implemented on the system module using 32K byte  $\times$  8 static RAMs. The read bandwidth between the processor and the second level cache is approximately 640 MB/s, and the write bandwidth is 420 MB/s.

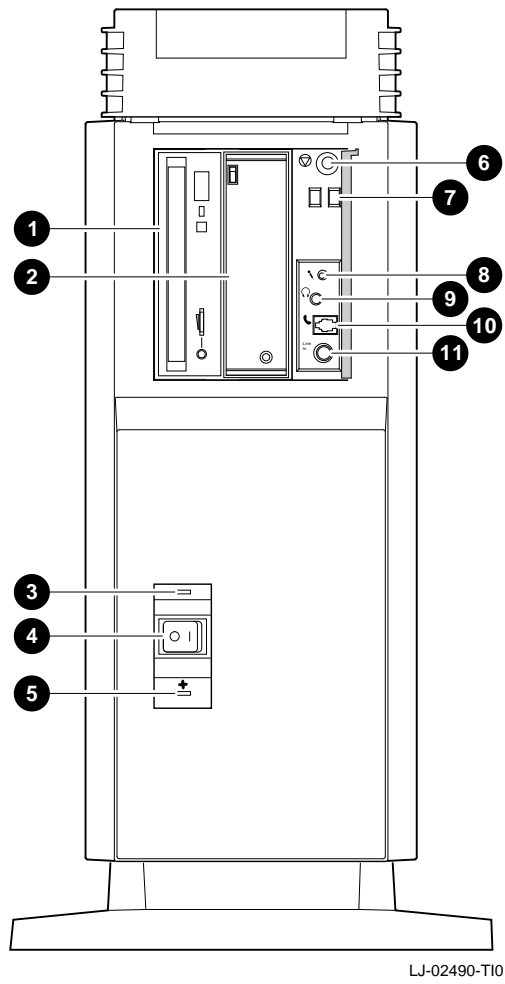
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# Front View

## Front View

Figure 1-1 shows the controls, lights, and devices on the front of the DEC 3000 Model 500X AXP system. Table 1-1 describes their function.

Figure 1-1 Front View



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## Front View, Continued

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Table 1-1 DEC 3000 Model 500X AXP System (Front)

---

This Feature...	Lets You...
❶, and ❷ Removable media device slots	Access devices that use removable storage media, such as diskettes, compact disks, cassette tapes, or cartridge tapes.
❸ DC OK light	Check that all dc voltages are present on the power supply.
❹ On/Off switch	Turn the system unit on (   ) and off (0).
❺ Fan failure indicator light	Check whether a fan has failed.
❻ Halt button	Put the system in console mode.
❼ Diagnostic display	View error codes that indicate potential system problems.
❽ Microphone input jack	Connect for a microphone.
❾ Speaker output jack	Connect a speaker or headphone for audio output.
❿ Telephone jack	Connect a telephone handset.
⓫ Audio input jack	Connect an audio input line.

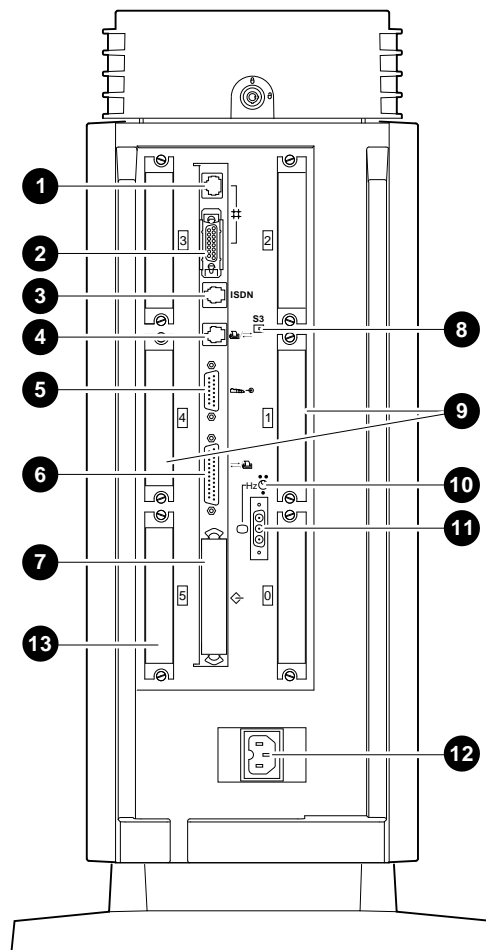
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# Rear View

## Rear View

Figure 1-2 shows the location of switches, connectors, and modules on the rear of the DEC 3000 Model 500X AXP system. Table 1-2 describes their function.

Figure 1-2 Rear View



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*Continued on next page*

## Rear View, Continued

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**Table 1–2 DEC 3000 Model 500X AXP System (Rear)**

---

<b>This Feature...</b>	<b>Lets You...</b>
❶ 10baseT port	Connect a 10baseT (twisted-pair) Ethernet network cable.
❷ AUI Ethernet port	Connect an AUI (Thickwire) Ethernet network cable.
❸ ISDN port	Connect an ISDN network cable.
❹ Printer/alternate console port	Connect a printer or an alternate console.
❺ Keyboard/mouse port	Connect a keyboard or mouse.
❻ Synchronous/asynchronous communications port	Connect a communications device, such as a modem.
❼ External SCSI port	Connect small computer system interface (SCSI) peripheral devices.
❽ Printer/alternate console switch	Select the function of the printer/alternate console port.
❾ Five TURBOchannel slots*	Install TURBOchannel option modules. There are two designated slots for the I/O module and three designated slots for the system module.
❿ Video refresh switch	Select the correct video refresh rate (66Hz or 72Hz) for the monitor.
⓫ Monitor port	Connect the monitor video cable.
⓬ System power port	Connect the system power cord. The port is keyed.

---

\*The regulator module occupies reserved TURBOchannel slot 5 on the I/O module.

The regulator module is not a TURBOchannel option.

---



# Chapter 2

## Configuration

### Chapter Overview

---

**Chapter Topics** This chapter covers the following topics:

- System Module Jumper Locations
  - Internal Cable Routing
  - Power Cable Routing
- 

**Model 500/500S  
Guide**

For information on the following topics, see the configuration chapter in *DEC 3000 Model 500/500S AXP Service Information*:

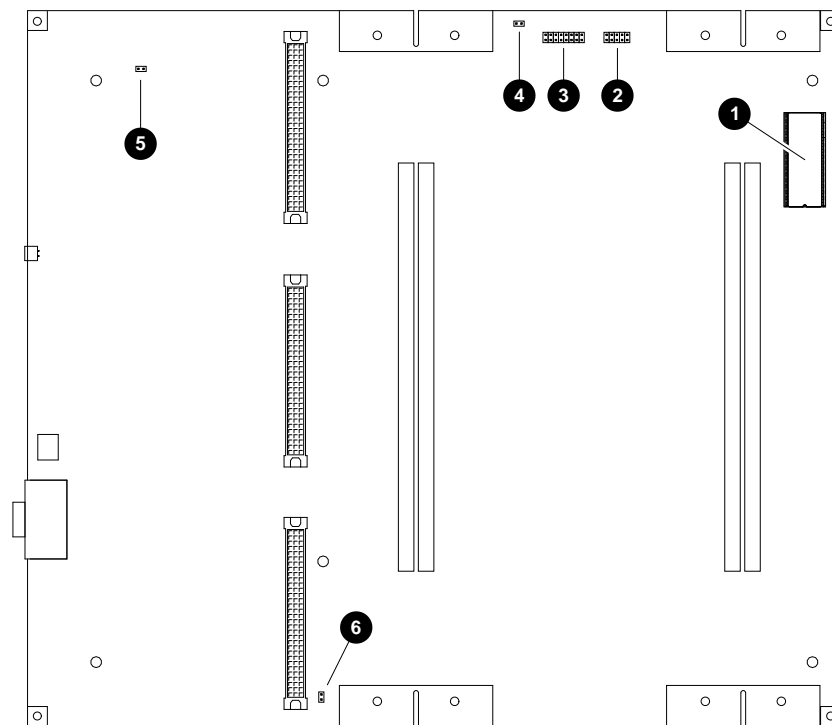
- General configuration rules
  - System module jumper locations (Model 500/500S)
  - I/O module jumper locations
  - Console security
  - Storage devices
    - Configuring SCSI drives
  - Memory configuration
    - Memory configuration rules
    - Identifying memory modules
-

# System Module Jumper Locations

## System Module Jumper Locations

Figure 2-1 shows the location of jumpers, the serial ROM, and the sense cable connection on the system module. Table 2-1 describes the jumpers.

Figure 2-1 System Module Jumper Locations



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## System Module Jumper Locations, Continued

Table 2-1 System Module Jumpers

Feature	Description	Comments	Default Setting
❶	Serial ROM	–	–
❷	Sense cable connection	Must be installed.	Installed.
❸	Serial ROM jumpers	–	Jumper location 0 only.
❹	200 MHz jumper	Must be installed.	Enabled.
❺	Test pins	Used by Digital Engineering.	–
❻	Flash enable jumper	In = enabled. Out = disabled.	Disabled.

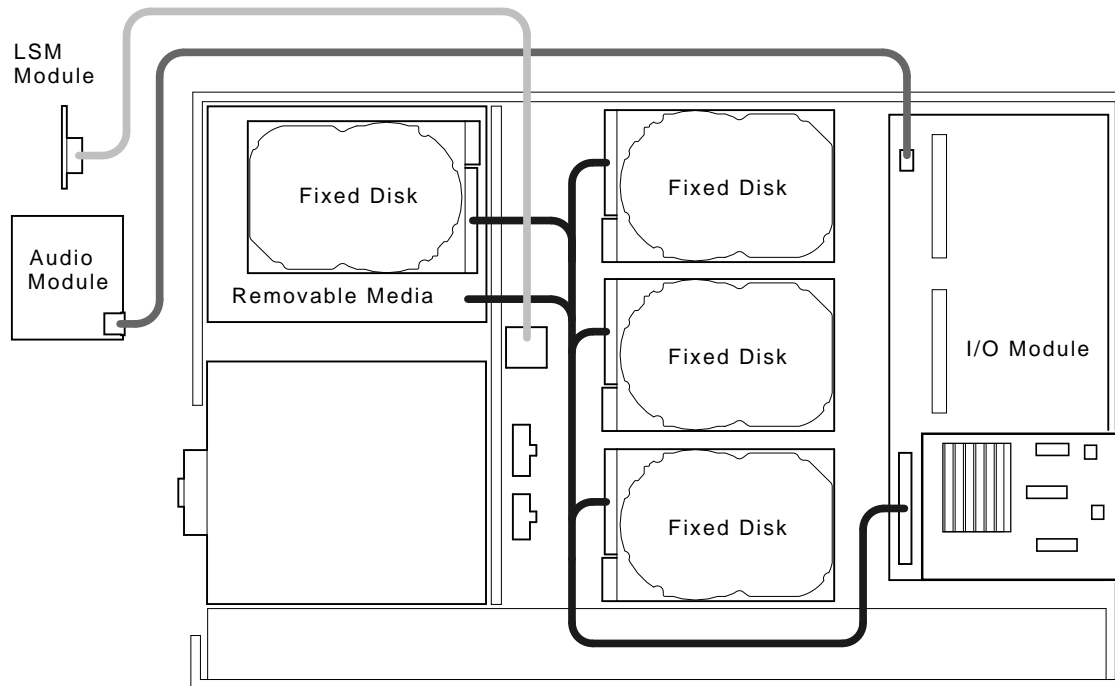
# Internal Cable Routing

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## Internal Cable Routing

Figure 2-2 shows cable connections between modules and disks in the DEC 3000 Model 500X AXP system.

Figure 2-2 Internal Cabling



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LSM is the lights and switch module.

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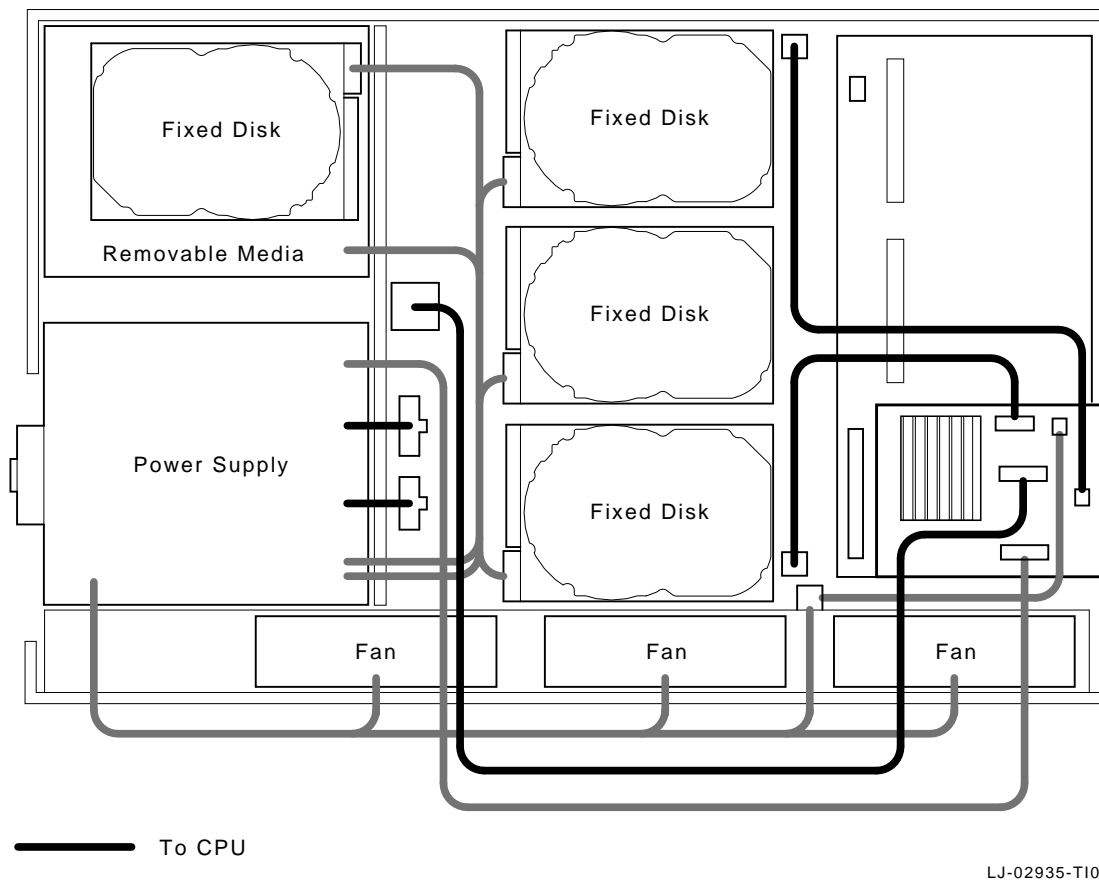
# Power Cable Routing

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## Power Cable Routing

Figure 2-3 shows power connections between the power supply, disks, fans, the system module, and the regulator module.

Figure 2-3 Power Cabling



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# Chapter 3

## Using the Console

### Chapter Overview

---

#### **Model 500/500S Guide**

For information on using the console, see Chapter 3 in *DEC 3000 Model 500/500S AXP Service Information*. That chapter covers the following topics:

- Console Command List
  - Commands:
    - BOOT
    - CONTINUE
    - DEPOSIT
    - EXAMINE
    - HELP
    - INITIALIZE
    - LOGIN
    - REPEAT
    - SET
    - SHOW
    - START
    - TEST
  - Alternate Consoles
-



# Chapter 4

## Diagnostic Testing

### Chapter Overview

---

#### **Model 500/500S Guide**

For information on diagnostic testing, see Chapter 4 in *DEC 3000 Model 500/500S Service Information*. That chapter covers the following topics:

- FRU Code Table
  - List of Diagnostics
  - Running Diagnostic Tests
  - Entering and Exiting Console and Service Mode
  - Diagnostics:
    - ASIC
    - NVR
    - MEMORY
    - CXT
    - SCSI
    - NI
    - SCC
    - ISDN
  - Testing TURBOchannel Options
-



# Chapter 5

## SCSI Utilities

### Chapter Overview

---

#### **Model 500/500S Manual**

For information on utilities, see Chapter 5 in *DEC 3000 Model 500/500S Service Information*. That chapter covers the following topics:

- SCSI Utility List
  - Show Device Utility
  - Hard Disk Eraser Utility
  - Diskette Formatter Utility
  - Disk Verifier Utility
-





# Chapter 6

## Troubleshooting

### Chapter Overview

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**Chapter Topics** This chapter covers the following topics:

- Power or Fan Failures
- 

**Model 500/500S Guide** For information on the following topics, see Chapter 6 in *DEC 3000 Model 500/500S Service Information*. That chapter covers the following topics:

- System Device FRU Codes
- Power-Up LED Error Codes
- 84 Fail Code
- Troubleshooting Tables

System Problems  
Monitor Problems  
Mouse/Tablet Problems  
Keyboard Problems  
Drive Problems  
Network Problems  
Audio Problems

#### NOTE

The troubleshooting techniques described do not identify all possible problems, nor do the actions correct all problems.

Before replacing modules, first check for cable connections, installed loopbacks, and proper termination.

---

# Power or Fan Failures

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## Indications

When a power failure or fan failure occurs, the following conditions exist:

- The on/off switch is on.
- The green DC OK LED above the on/off switch is off.
- No power is present.
- The red fan failure LED below the on/off switch may be on or off, depending on the failure.

If the unit has powered up properly, the following settings exist:

- The on/off switch is on.
- The green DC OK LED is on.
- The red fan failure LED is off.

### NOTE

**Record the condition of LEDs before the unit is powered down.**

**If the unit has been powered down, you must wait 60 seconds before the unit can be powered up again.**

---

## Fan Failure LED On

If the red fan failure LED is on, the following FRUs are suspect:

- System fan
- Impingement fan

Perform the following steps. If you replace an FRU, power up the unit; if the problem persists, go on to the next step unless instructed otherwise.

Before you start, make sure the on/off switch is off and all power cable connections are secure.

1. Disconnect the cable at connector J4 on the regulator module (Figure 6-1).
- 

*Continued on next page*

## Power or Fan Failures, Continued

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2. Power up the unit.
  - If the power supply shuts down, then one of the three bottom system fans have failed.

**NOTE**

**When the unit is powered down, there is a 10-second delay before the power supply shuts down.**

- If the power supply does not shut down, replace the impingement fan
- 

### Fan Failure LED Off

If the red fan failure LED is off, the following FRUs are suspect:

- Power supply
- Regulator module
- System module
- I/O module
- Disk harness

Perform the following steps. If you replace a part, power up the unit; if the problem persists, go on to the next step unless instructed otherwise.

See Figures 6-1 and 6-2 for cable connection locations.

Before you start make sure the on/off switch is off and all power cable connections are secure.

1. Disconnect the five cables on the rear of the power supply (6-2). Do not disconnect the fan cable on the bottom of the power supply, next to the ac power cable.
2. Power up the unit.
  - If the unit does not power up, replace the power supply.
  - If the unit does power up, power down the unit and connect the disk harness cables to the power supply (6-2).

---

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## Power or Fan Failures, Continued

---

3. Power up the unit with the disk harness cables to the power supply connected.
  - If the DC OK LED is off, this indicates the disk harness is bad.
  - If the DC OK LED is on, power down the unit and connect the regulator input cable to the power supply (6-2).
4. Power up the unit with the disk harness and regulator input cables to the power supply connected.
  - If the DC OK LED is on, go to step 7.
  - If the DC OK LED is off, power down the unit and disconnect the cables from connectors J2 and J3 on the regulator module (6-1).
5. Power up the unit:
  - If the DC OK LED is off, replace the regulator module.
  - If the DC OK LED is on, power down the unit and reseal the connection between the system module and I/O module.
6. Power up the unit:
  - If the unit powers up correctly, the failure is corrected.
  - If the unit does not power up correctly, go to step 7.
7. Power down the unit.
  - Connect the +5.1 V A cable to the power supply (6-2).
8. Power up the unit.
  - If the DC OK LED is on, go to step 11.
  - If the DC OK LED is off, disconnect the 5.1 V A cable from the system module.
9. Power up the unit.
  - If the DC OK LED is on, replace the I/O module. If the problem persists, replace the system module.

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## Power or Fan Failures, Continued

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- If the DC OK LED is off, replace the 5.1V A cable. When you replace the cable, connect both ends.
10. Power up the unit.
- If the unit powers up correctly, the failure is corrected.
  - If the unit does not power up correctly, go to step 11.
11. Power up the unit.
- Connect the +5.1 V B cable to the power supply (6-2).
12. Power up the unit.
- If the DC OK LED is on and the unit powers up correctly, no problem found.
  - If the DC OK LED is off, disconnect the +5.1 B cable from the system module.
13. Power up the unit:
- If the DC OK LED is off, replace the +5.1 B cable. When you replace the cable, connect both ends.
  - If the DC OK LED is on and the unit powers up correctly, no problem found.

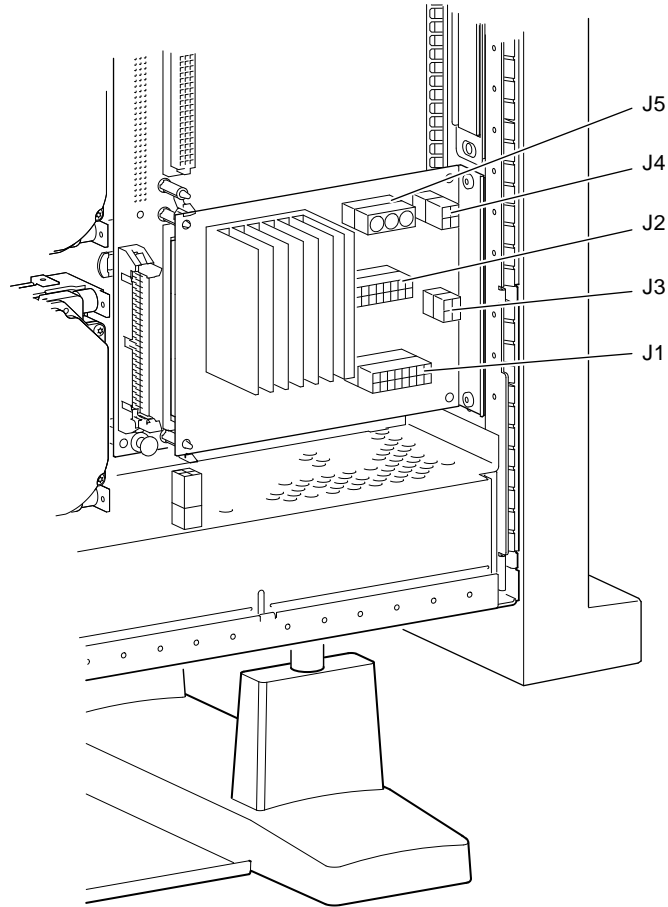
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# Power or Fan Failures, Continued

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**Figure 6-1 Regulator Module Connections**



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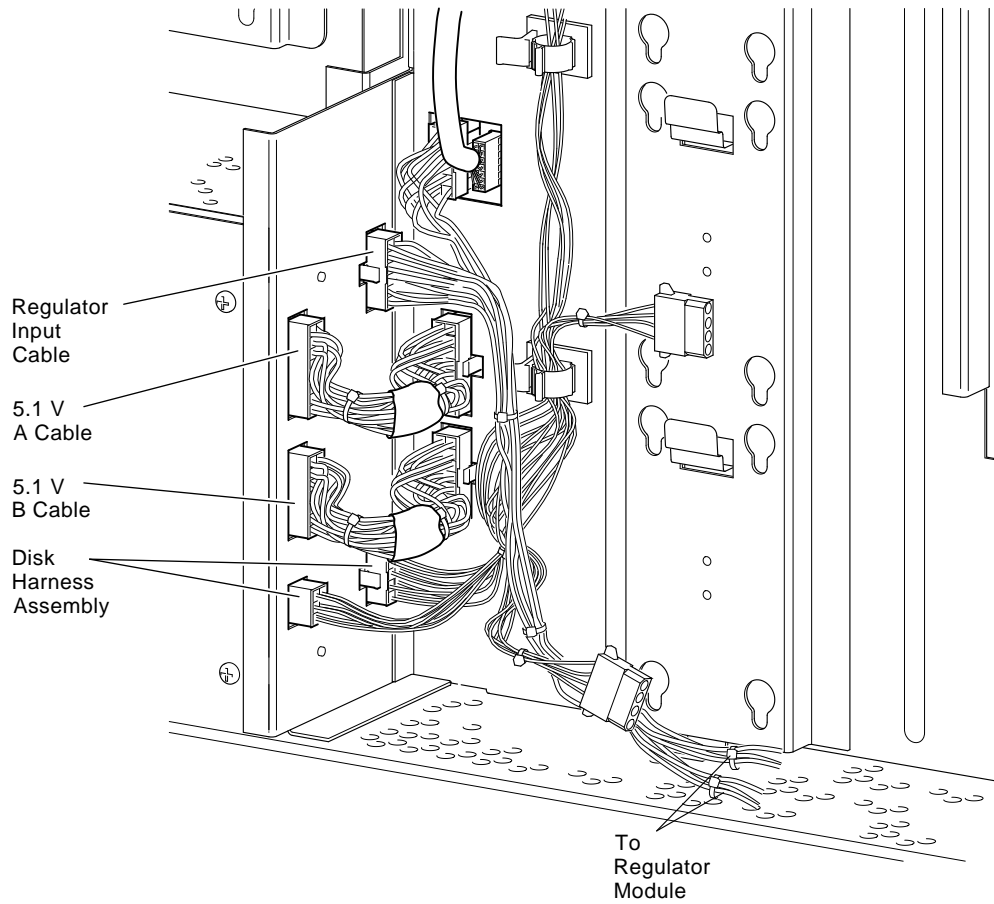
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# Power or Fan Failures, Continued

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Figure 6-2 Power Supply Connections



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# Chapter 7

## Removing and Replacing FRUs

### Chapter Overview

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**Chapter Topics** This chapter covers the following topics:

- FRU Locations
- Top Cover
- Front Bezel
- Side Panels
- Rear Bezel
- Audio Module Assembly
- Lights and Switch Module
- Power Supply
- RZxx Disk Drives
- TURBOchannel Module
- Regulator Module
- I/O Module
- System Fans
- Impingement Fan

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## Chapter Overview, Continued

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### Chapter Topics (continued)

- Memory Motherboard
  - Memory Module
  - System Module
  - System and Power Cable Routing
- 

### Part Numbers

For convenience, each removal procedure lists the part numbers of the FRUs removed in that procedure.

---

### Prevent ESD

When removing an FRU, use a properly grounded wriststrap to prevent electrostatic discharge (ESD).

---

# FRU Locations

## Locating an FRU

To locate an FRU:

1. Find the FRU in Table 7-1.
2. Locate the FRU in Figure 7-1 or 7-2 by locating its reference number.
3. To remove the FRU, refer to the FRU's removal procedure in this chapter.

**Table 7-1 FRU Table**

FRU	Figure Reference
Front bezel	❶ Figure 7-1
Audio assembly	❷
Lights and switch module (LSM)	❸
Disks	❹
I/O module	❺
Rear bezel	❻
Fan assembly	❼
Power regulator module	❽
Left side panel	❾ Figure 7-2
Memory modules	❿
Memory motherboard (MMB)	⓫
System module	⓬
Top cover	⓭
Right side panel	⓮
Power supply	⓯
Impingement fan assembly	⓰

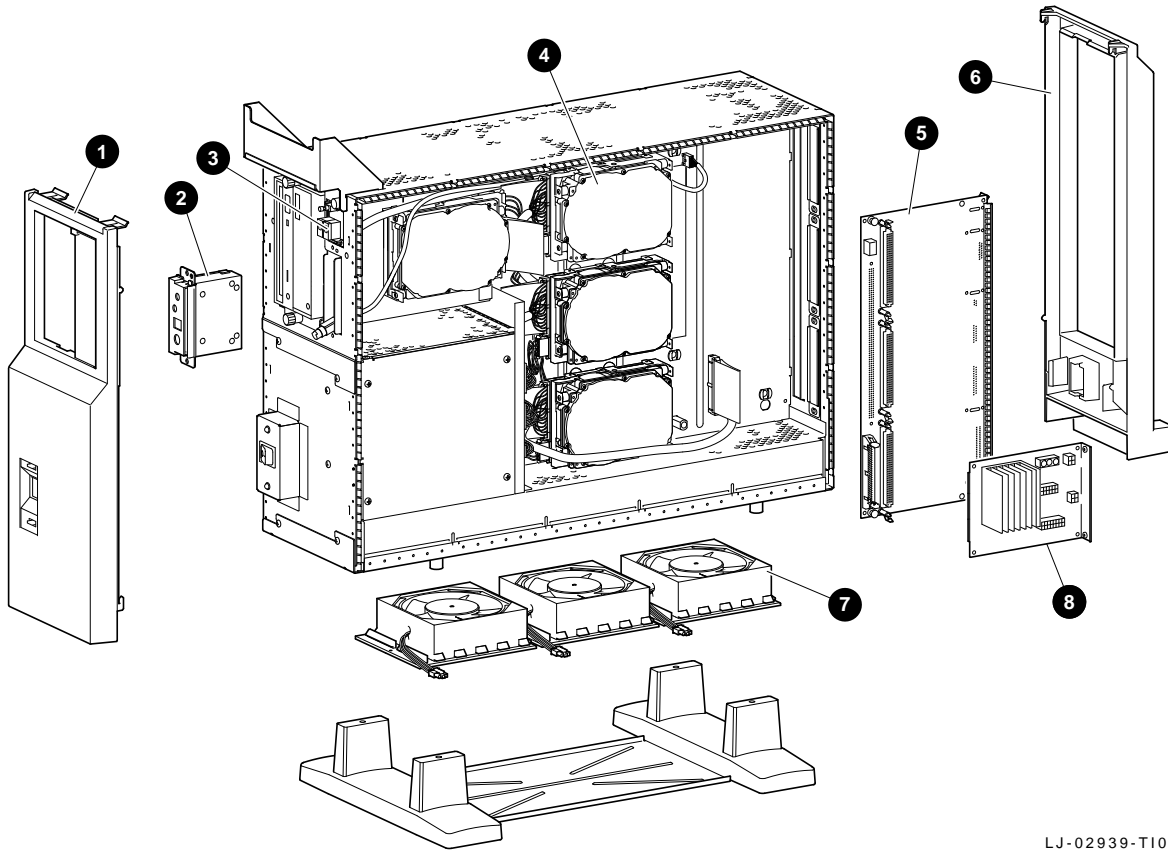
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# FRU Locations, Continued

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Figure 7-1 shows the right side of the DEC 3000 Model 500X AXP system.

Figure 7-1 FRU Locations (Right Side)



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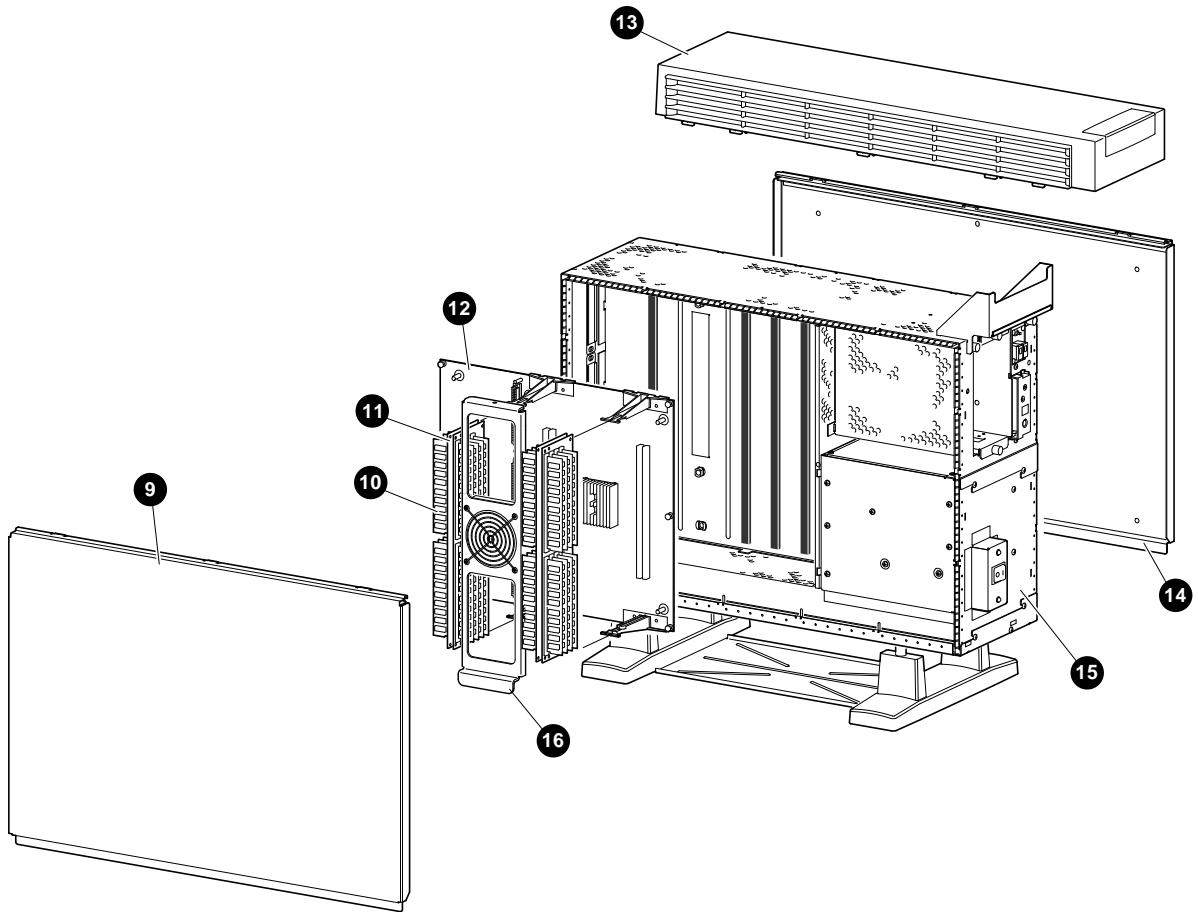
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# FRU Locations, Continued

---

Figure 7-2 shows the left side of the DEC 3000 Model 500X AXP system.

Figure 7-2 FRU Locations (Left Side)



LJ-02931-T10

# Top Cover

---

## Keylock Security

If the unit is locked, the customer is required to supply keys to the Digital service representative to open the top cover.

Before leaving the site, the Digital service representative should return all keys to the customer or inform the customer that the unit is locked.

Digital service personnel are not responsible for lost keys and will not provide keys. It is the responsibility of customers to ensure that the unit is secured; they should record key numbers stamped on keys.

If the unit is locked and keys are lost, then the customer will need to call a locksmith to open the unit.

---

## Top Cover Removal

### NOTE

**Before the system is powered down, have the system manager perform a system shutdown if needed.**

To remove the top cover:

---

Step	Action	Refer to Figure 7-3
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Unlock the top cover.	❶
4	Slide the cover forward and up off the system.	❷

---

## Part Number

---

Description	Part Number	Quantity
Top cover	70-30266-01	1

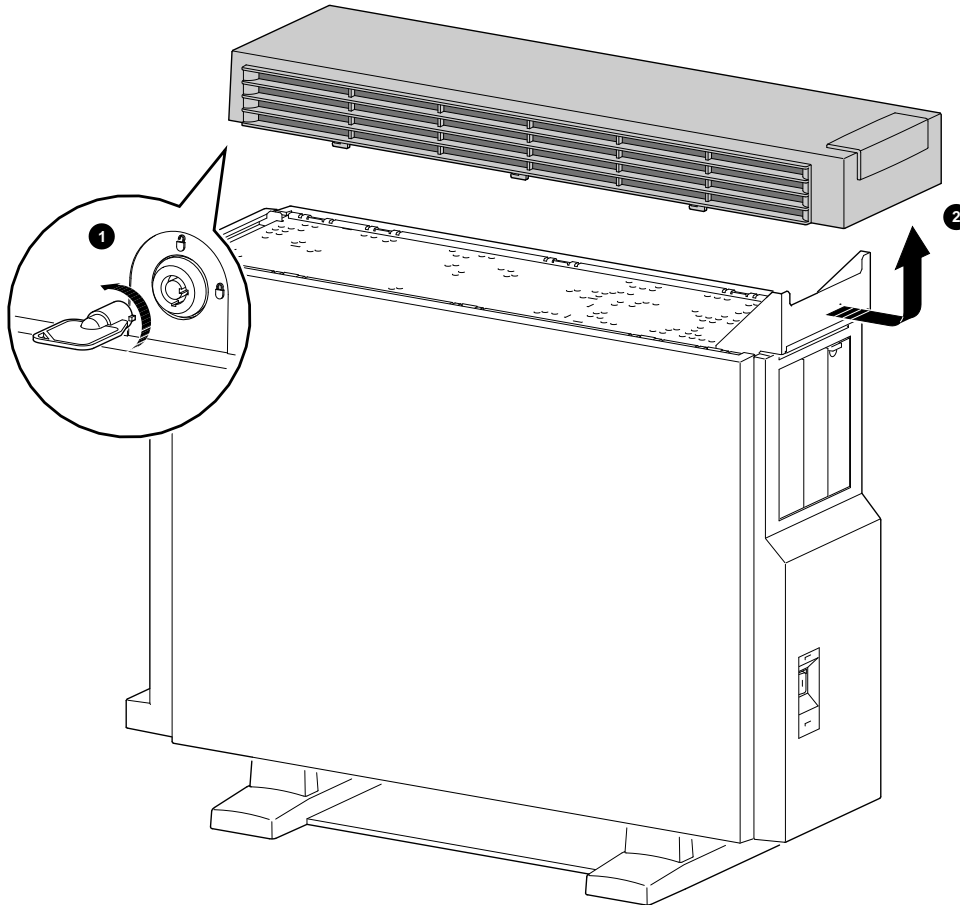
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*Continued on next page*

## Top Cover, Continued

---

Figure 7-3 Removing the Top Cover



LJ-01779-T10

---

### Top Cover Replacement

To install the top cover, reverse the removal steps.

---

# Front Bezel

## Front Bezel Removal

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove the front bezel:

Step	Action	Refer to Figure 7-4
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Release the two tabs.	❶
5	Tilt the front bezel forward and down off the system.	–

## Part Numbers

Description	Part Number	Quantity
Top cover	70-30266-01	1
Front bezel	74-43830-01	1

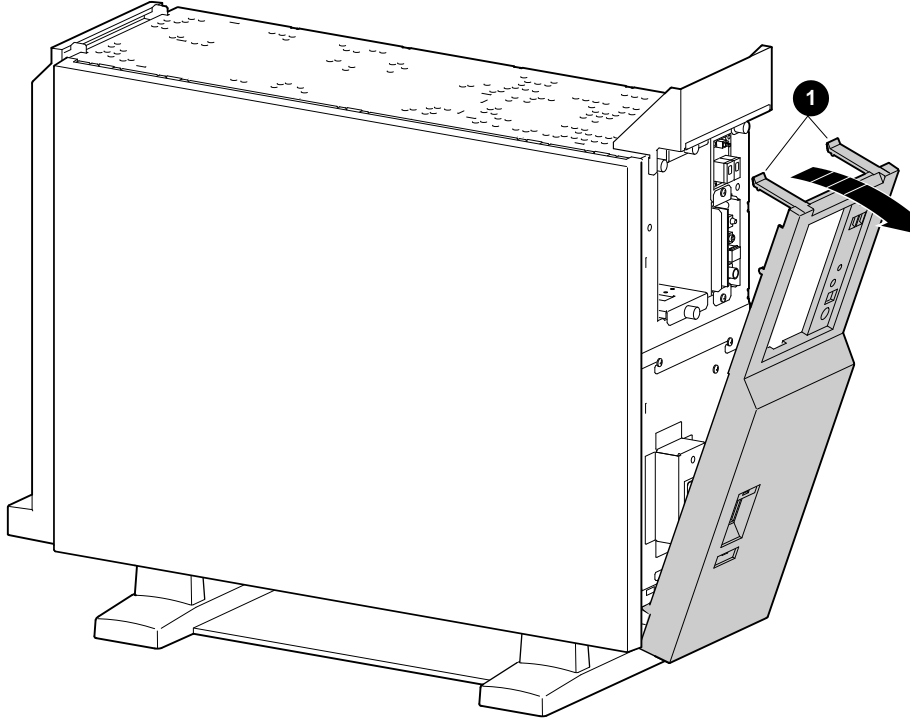
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## Front Bezel, Continued

---

Figure 7-4 Removing the Front Bezel



LJ-01776-T10

---

### Front Bezel Replacement

To install the front bezel, reverse the removal steps.

---

# Side Panels

## Side Panel Removal

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove either side panel:

Step	Action	Refer to Figure 7-5
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Pull the panel towards you by grabbing the metal tabs.	❶
5	Lift up and remove the panel.	❷

## Part Numbers

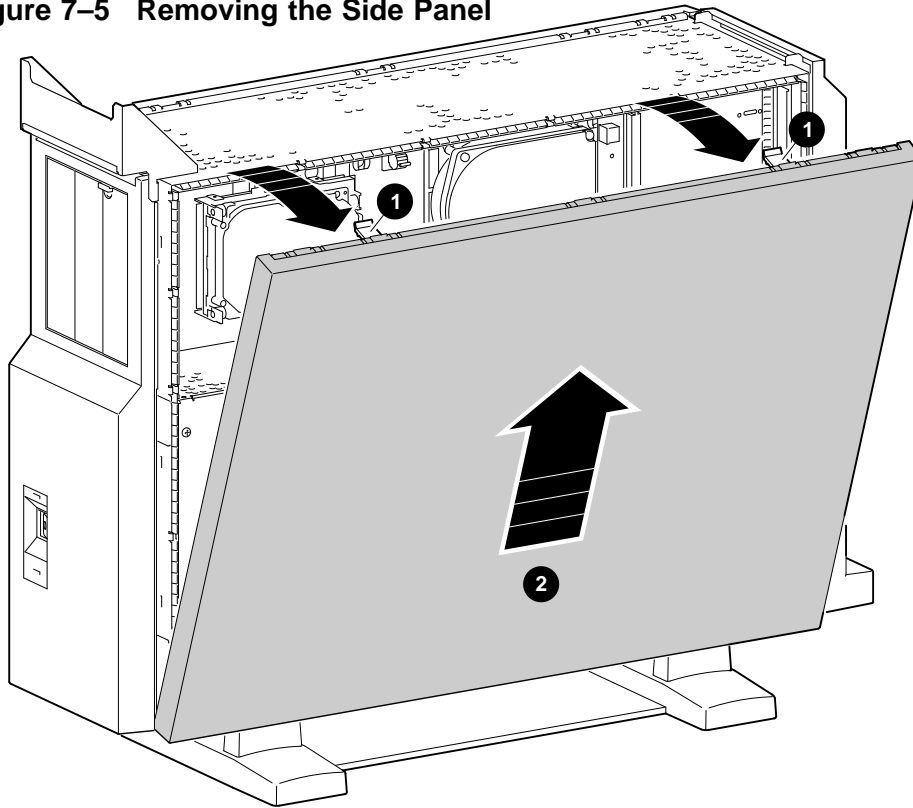
Description	Part Number	Quantity
Top cover	70-30266-01	1
Side panel	70-29563-01	1

*Continued on next page*

## Side Panels, Continued

---

Figure 7-5 Removing the Side Panel



LJ-01784-T10

---

### Side Panel Replacement

To install the side panel, reverse the removal steps.

---

# Rear Bezel

## Rear Bezel Removal

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove the rear bezel:

Step	Action	Refer to Figure 7–6
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Disconnect the cables from rear.	–
4	Remove the top cover.	–
5	Lift the bezel up and out of the system.	❶

## Part Numbers

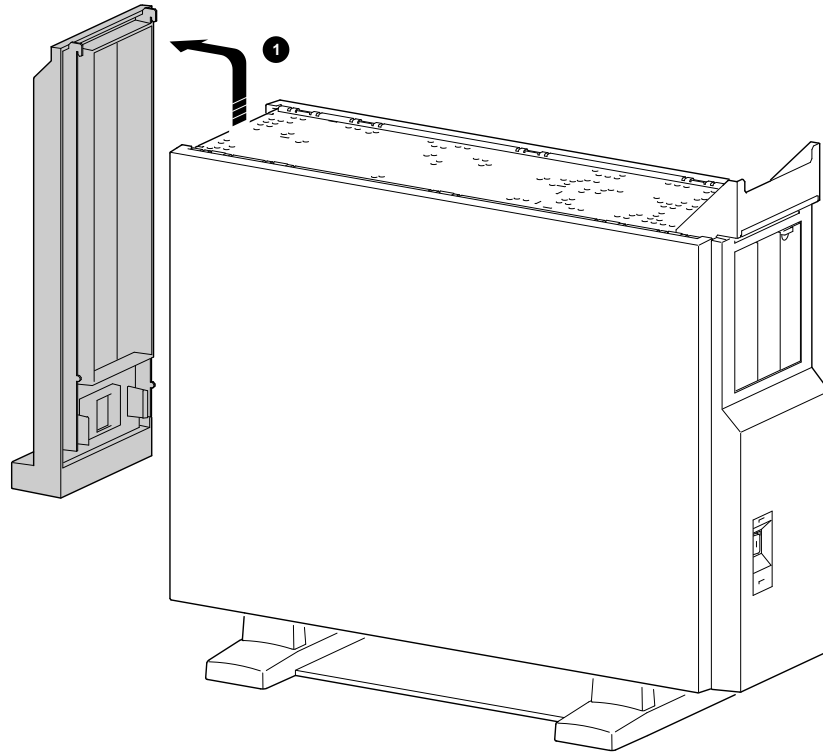
Description	Part Number	Quantity
Top cover	70-30266-01	1
Rear bezel	74-44072-01	1

*Continued on next page*

## Rear Bezel, Continued

---

**Figure 7-6 Removing the Rear Bezel**



LJ-01792-T10

---

### Rear Bezel Replacement

To install the rear bezel, reverse the removal steps.

---

# Audio Module Assembly

## Audio Module Removal

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove a failed or damaged audio module assembly:

Step	Action	Refer to Figure 7-7
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Remove the front bezel.	–
5	Remove the two removable rivets.	❶
6	Slide the audio module assembly out slightly.	❷
7	Disconnect the audio cable from the rear of audio module assembly and remove audio module assembly.	❸

## Part Numbers

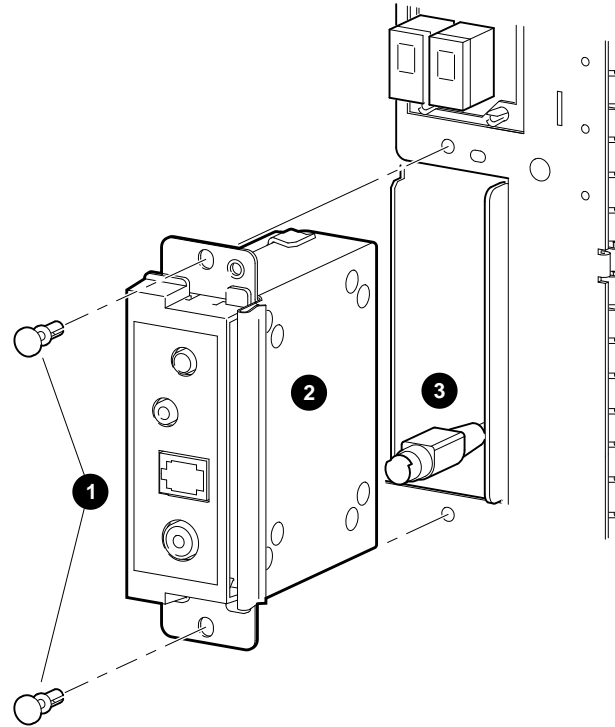
Description	Part Number	Quantity
Top cover	70-30266-01	1
Front bezel	74-43830-01	1
Removable rivets	12-36064-01	2
Audio assembly	70-29562-01	1
Audio cable	17-03502-01	1

*Continued on next page*

## Audio Module Assembly, Continued

---

Figure 7-7 Removing the Audio Module Assembly



LJ-02277-T10

---

### Audio Module Replacement

To install the audio module assembly, reverse the removal steps.

---

# Lights and Switch Module

## LSM Removal

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove a failed or damaged lights and switch module (LSM):

Step	Action	Refer to Figure 7–8
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Remove the right side panel.	–
5	Disconnect the LSM cable.	❶
6	Remove the four removable rivets.	❷
7	Remove the LSM module.	❸

## Part Numbers

Description	Part Number	Quantity
Top cover	70–30266–01	1
Front bezel	74–43830–01	1
LSM cable	17–03501–01	1
Removable rivets	12–36064–01	4
LSM module	54–21145–02	1

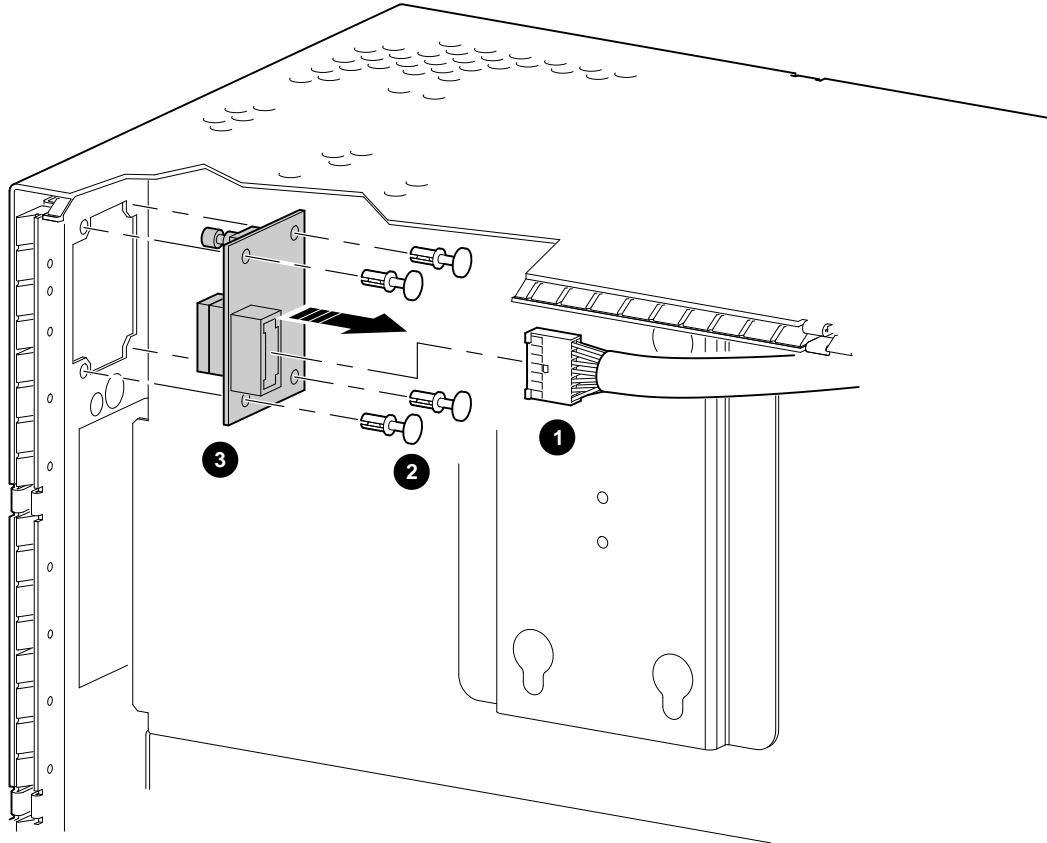
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## Lights and Switch Module, Continued

---

Figure 7-8 Removing the LSM Module



LJ-01667-T10

---

### Lights and Switch Module Replacement

To install the LSM module, reverse the removal steps.

---

# Power Supply

## Power Supply Removal

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove a failed or damaged power supply:

Step	Action	Refer to Figure
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Remove the front bezel.	–
5	Remove both side panels.	–
6	Disconnect the five power cables at the rear of power supply.	❶ Figure 7–9
7	Lower the access panel and disconnect the ac power cord and fan connector.	❷ Figure 7–10
8	Loosen the four mounting screws.	❸
9	Remove the power supply.	❹

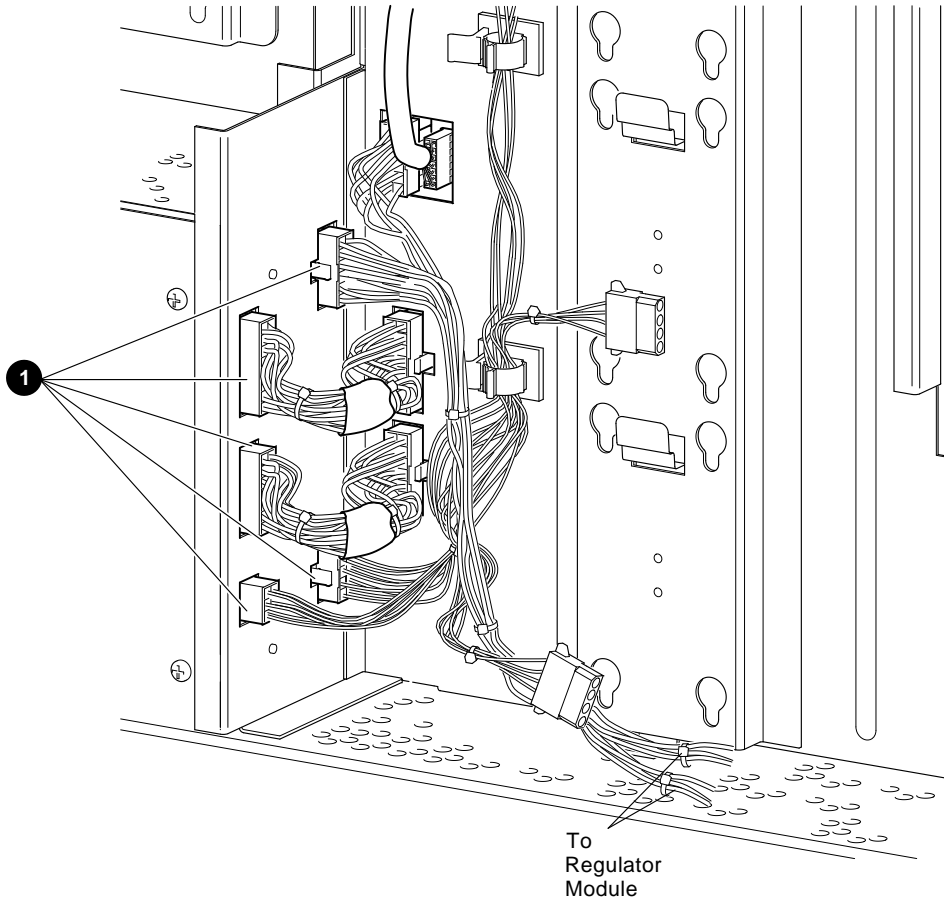
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# Power Supply, Continued

---

Figure 7-9 shows the power supply cabling for the DEC 3000 Model 500X AXP system.

**Figure 7-9 Power Supply Cabling**



LJ-02938-T10

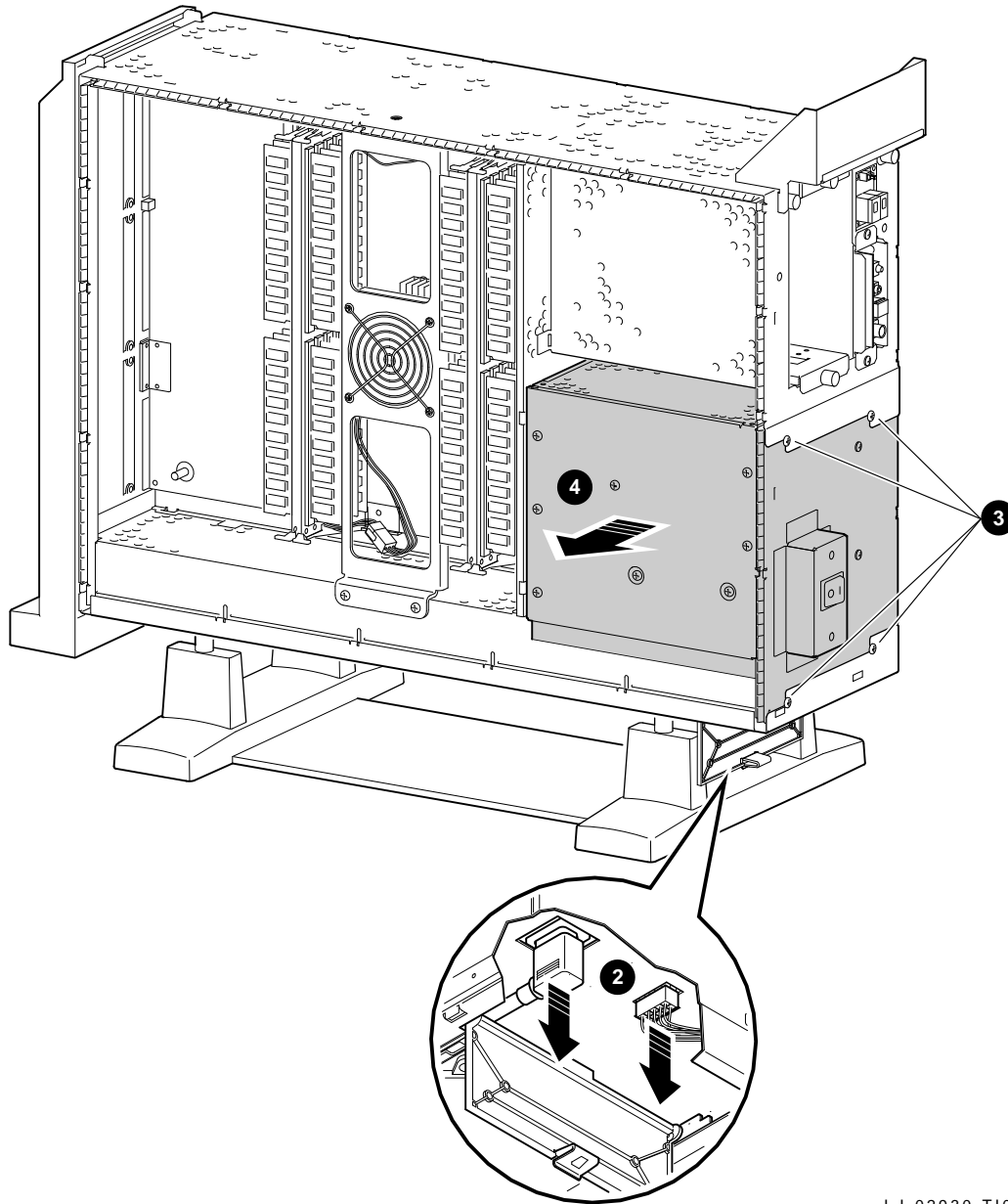
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# Power Supply, Continued

---

Figure 7-10 Removing the Power Supply



LJ-02930-T10

---

*Continued on next page*

## Power Supply, Continued

---

---

### Part Numbers

Description	Part Number	Quantity
Top cover	70-30266-01	1
Side panels	70-29563-01	2
Power cable	17-03395-01	1
Mounting screws	-	4
Power supply	H7883-YA	1

---

### Power Supply Replacement

To install the power supply, reverse the removal steps.

---

# RZxx Disk Drives

---

## Overview

This section describes how to remove the following RZ disk drives:

RZ24L-E  
RZ25-E  
RZ26-E

---

## RZxx Drive Removal

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove a failed or damaged RZxx disk:

---

Step	Action	Refer to Figure
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Remove the right side panel.	–
5	Disconnect the power/SCSI interface cables.	❶ + ❷ Figure 7–11
6	Press the release tab.	❸
7	Slide the RZxx drive up and lift out of system.	❹
8	Record the SCSI ID setting, for use on the replacement drive.	Figure 7–12

---

### NOTE

If you are adding disk drives, refer to the configuration chapter in *DEC 3000 Model 500/500S AXP Service Information*.

---

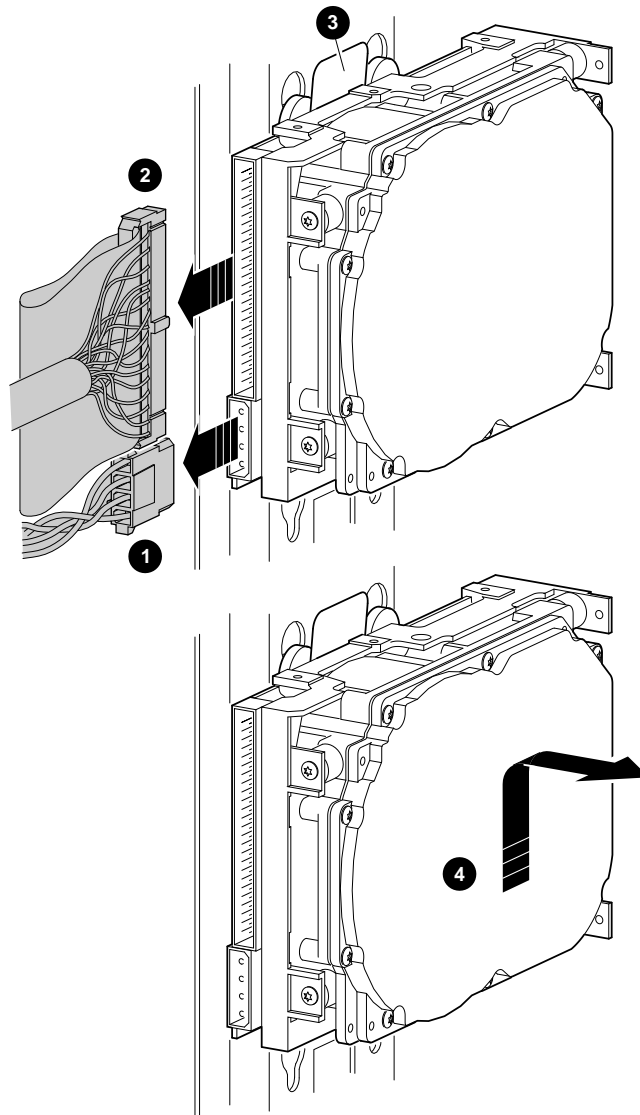
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## RZxx Disk Drives, Continued

---

Figure 7-11 shows the removal of an RZxx disk drive from the DEC 3000 Model 500X AXP system.

**Figure 7-11 Removing an RZxx Drive**



LJ-01787-T10

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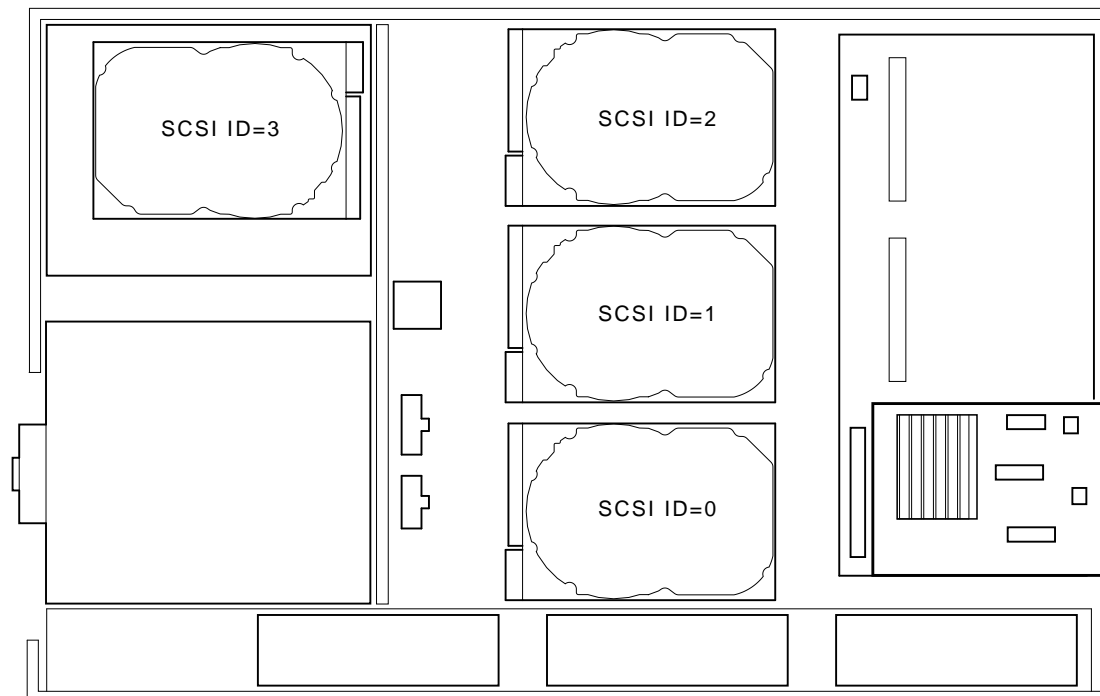
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## RZxx Disk Drives, Continued

---

Figure 7-12 shows the default SCSI ID settings for disk drives in the DEC 3000 Model 500X AXP system.

**Figure 7-12 Default SCSI ID Settings**



LJ-02937-T10

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*Continued on next page*



## RZxx Disk Drives, Continued

---

---

### Part Numbers

Description	Part Number	Quantity
Top cover	70-30266-01	1
Right side panel	70-29563-01	1
Disk drive	RZ24L-E	Up to 4 drives
Disk drive	RZ25-E	Up to 4 drives
Disk drive	RZ26-E	Up to 4 drives

---

### RZxx Disk Replacement

To install an RZxx disk drive, reverse the removal steps.

---

# TURBOchannel Module

## TURBOchannel Module Removal

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove a failed or damaged TURBOchannel module:

Step	Action	Refer to Figure 7-13
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Remove the side panel.	–
5	Disconnect the TURBOchannel external cable from rear of unit.	
6	Disconnect any cables attached to the TURBOchannel module.	
7	Remove the slot screws that hold the module in place.	❶
8	Release the latches that hold the edge of the module in place, then carefully pull the module connector away from the connector.	❷ & ❸*
9	Remove the TURBOchannel module.	
10	Replace the slot plate for any unused slots. Secure with two screws. †	

\*If you are removing a PMAGB-X graphics module, you may need help to release the six latches simultaneously and pull the module away from the system or I/O module.

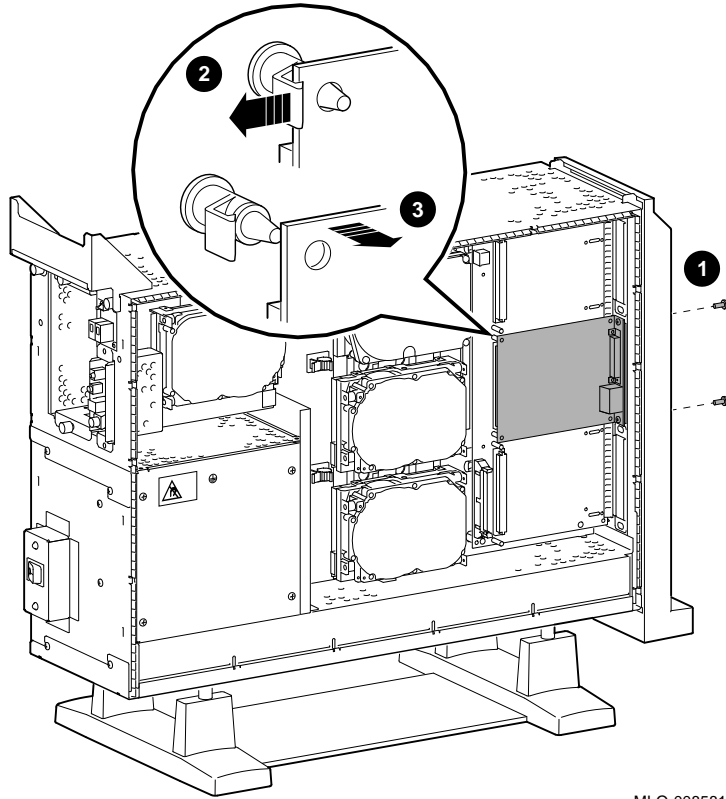
†When replacing the slot plate, make sure the long rib is toward the side panel, as shown in Figure 7-14.

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# TURBOchannel Module, Continued

---

Figure 7-13 Removing a TURBOchannel Module



MLO-008581

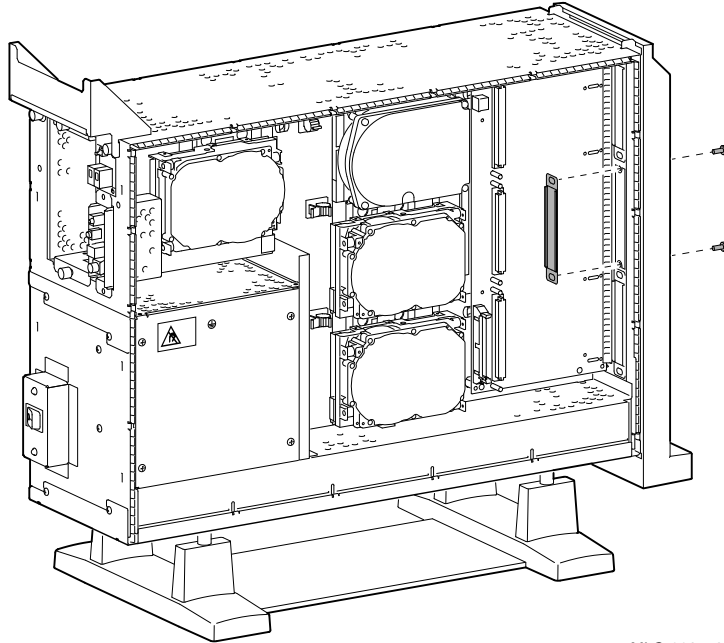
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# TURBOchannel Module, Continued

---

Figure 7-14 Replacing a Slot Plate



MLO-008578

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## TURBOchannel Module, Continued

---

---

**Part Numbers**

Description	Part Number	Quantity
Top cover	70-30266-01	1
Right side panel	70-29563-01	1
Left side panel	70-29563-01	1
TURBOchannel module	xx-xxxxx-xx*	Up to 5
Bulkhead assembly, blank	74-41143-05	1
Sem screw	90-00049-01	2

---

\*See the *DEC 3000 Model 500X AXP Options Installation Guide*.

---

**TURBOchannel  
Module  
Replacement**

To install a TURBOchannel module, reverse the removal steps:

---

# Regulator Module

## Regulator Module Removal

---

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove a failed or damaged regulator module:

---

Step	Action	Refer to Figure 7-15
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Remove the right side panel.	–
5	Disconnect all connections to the regulator module.	❶
6	Remove the two slot screws that hold the module in place.	❷
7	Release the two tabs (top and bottom).	❸
8	Remove the regulator module.	

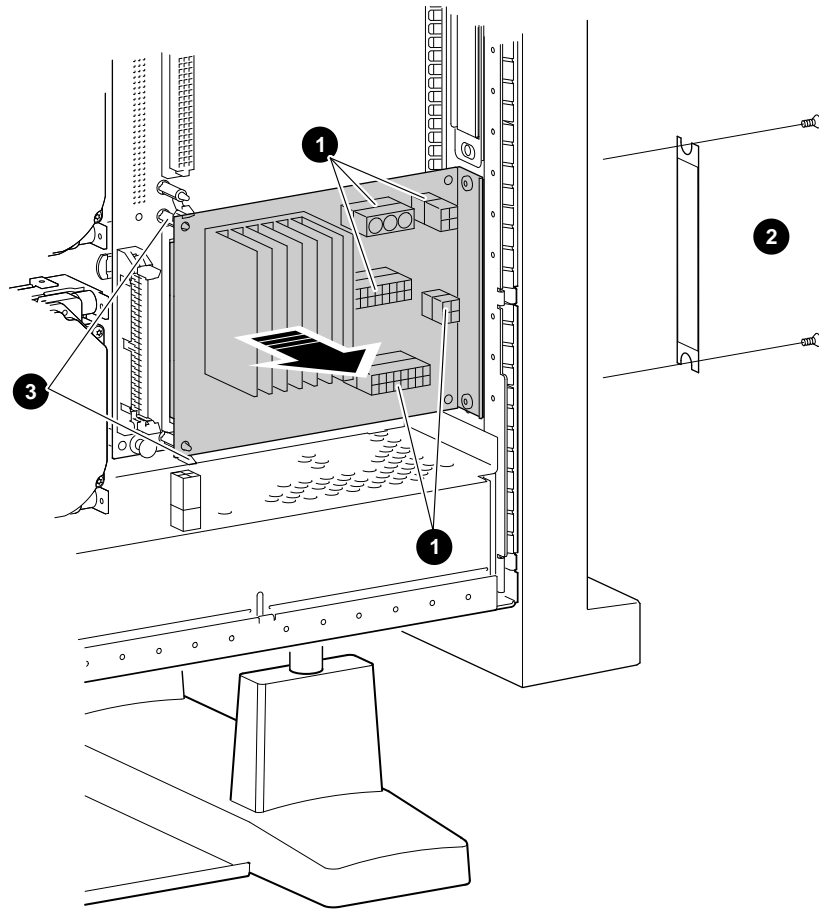
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# Regulator Module, Continued

---

Figure 7-15 Removing the Regulator Module



LJ-02943-T10

---

*Continued on next page*

## Regulator Module, Continued

---

---

### Part Numbers

---

Description	Part Number	Quantity
Top cover	70-30266-01	1
Right side panel	70-29563-01	1
Regulator module	54-23128-01	1
Regulator module cable*	17-03814-01	1
Regulator module cable*	17-03815-01	1
Regulator module cable*	17-03816-01	1
Regulator module cable*	17-03817-01	1
Regulator module cable*	17-03320-02	1
Slot screw	12-30934-01	2

---

\*See Appendix D for additional information

---

### Regulator Module Replacement

To install the regulator module, reverse the removal steps.

---



# I/O Module

## I/O Module Removal

### NOTE

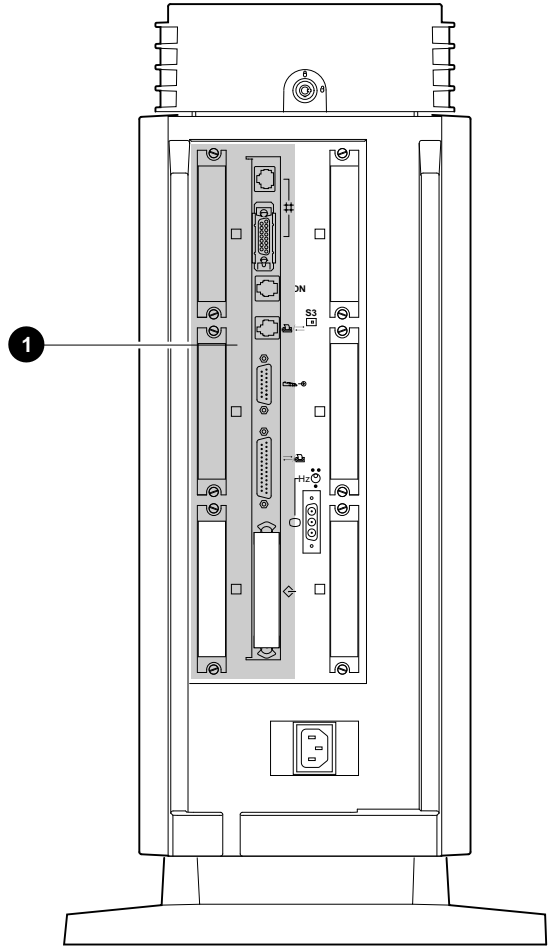
Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove a failed or damaged I/O module:

Step	Action	Refer to Figure
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Remove the right side panel.	–
5	Disconnect I/O bulkhead connections.	❶ Figure 7–16
6	Remove any TURBOchannel modules.	❷ Figure 7–17
7	Remove the regulator module.	❸
8	Disconnect the audio cable from the I/O module.	❹
9	Remove the SCSI I/O module cables.	❺
10	Release the two removable rivets (top and bottom).	❻
11	Release the tabs.	❼
12	Disconnect the fan harness cable	❽
13	Remove the I/O module.	

*Continued on next page*

**Figure 7–16 I/O Module Port Connections**



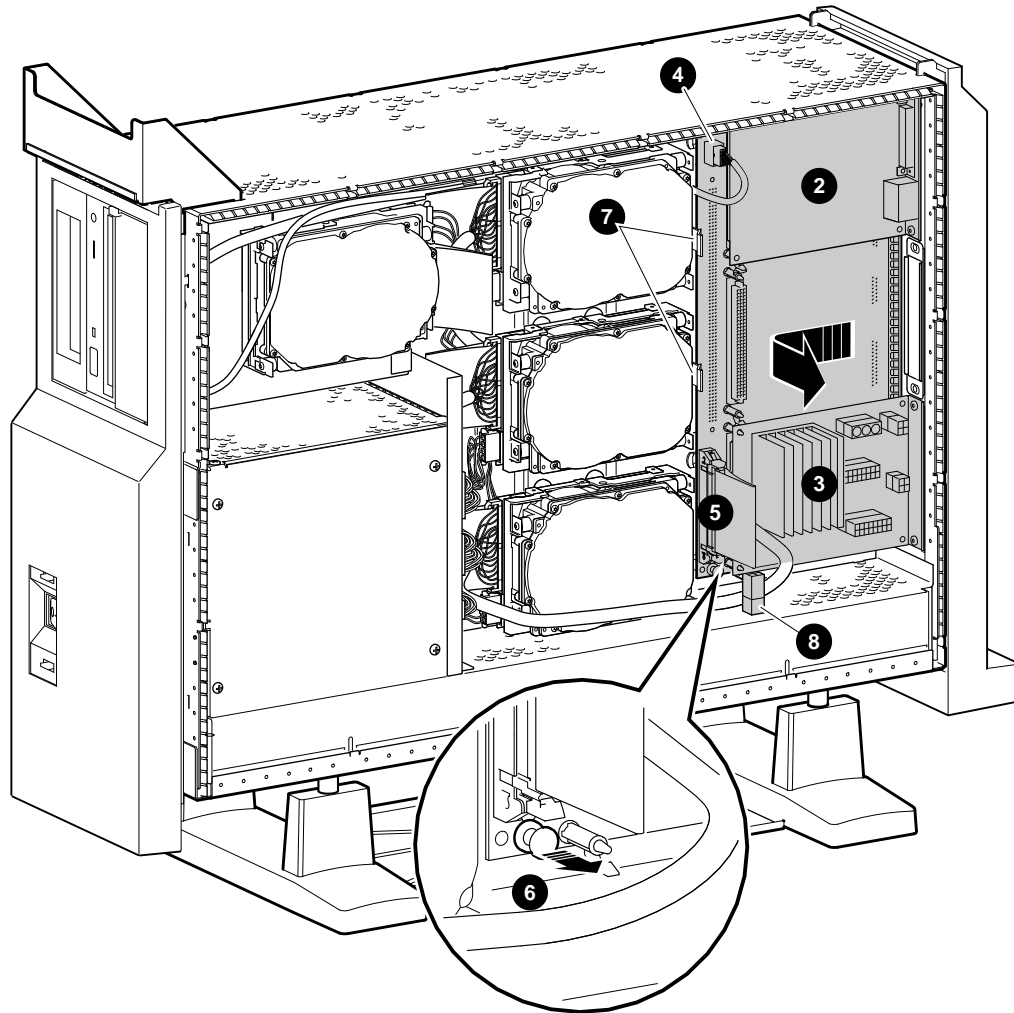
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## I/O Module, Continued

---

Figure 7-17 Removing the I/O Module (Side View)



LJ-02941-T10

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## I/O Module, Continued

---

---

### Part Numbers

Description	Part Number	Quantity
Top cover	70-30266-01	1
Right side panel	70-29563-01	1
TURBOchannel modules	xx-xxxxx-xx*	Up to 5
Removable rivets	12-36064-01	4
Regulator module	54-23128-01	1
I/O module	54-21147-01	1

---

\*See the *DEC 3000 Model 500X AXP Options Installation Guide*.

---

### I/O Module Replacement

Before installing the new I/O module, ensure that

- The console secure jumper is set to the same setting as the failed module
- The flash ROM jumper is set to the same setting as the failed module

To install the I/O module, reverse the installation steps.

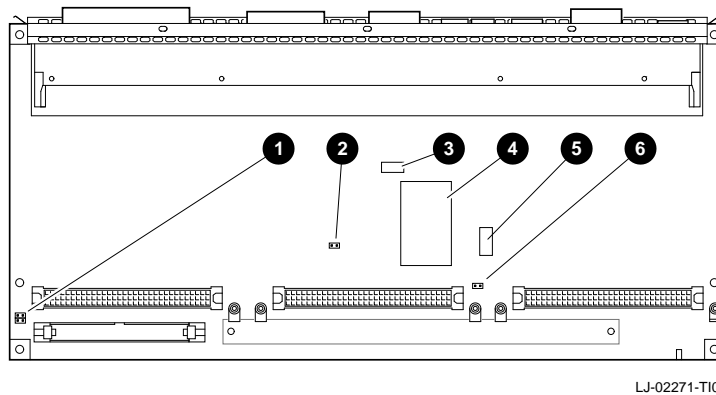
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## I/O Module, Continued

Figure 7–18 shows the I/O module jumper locations. Table 7–2 briefly describes each jumper.

**Figure 7–18 I/O Module Jumper Locations**



LJ-02271-T10

Table 7–2 describes each of the I/O module jumpers.

**Table 7–2 I/O Module Jumper Locations**

Location	Description	Comments	Default Setting
❶	Park location	Used to store unused jumper.	–
❷	Console secure jumper	In = enabled. Out = disabled.	Disabled
❸	Enet address chip	–	–
❹	TOY/NVR chip	–	–
❺	Flash ROM	–	–
❻	Flash ROM jumper	In = enabled. Out = disabled.	Enabled

# System Fans

## System Fan Removal

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

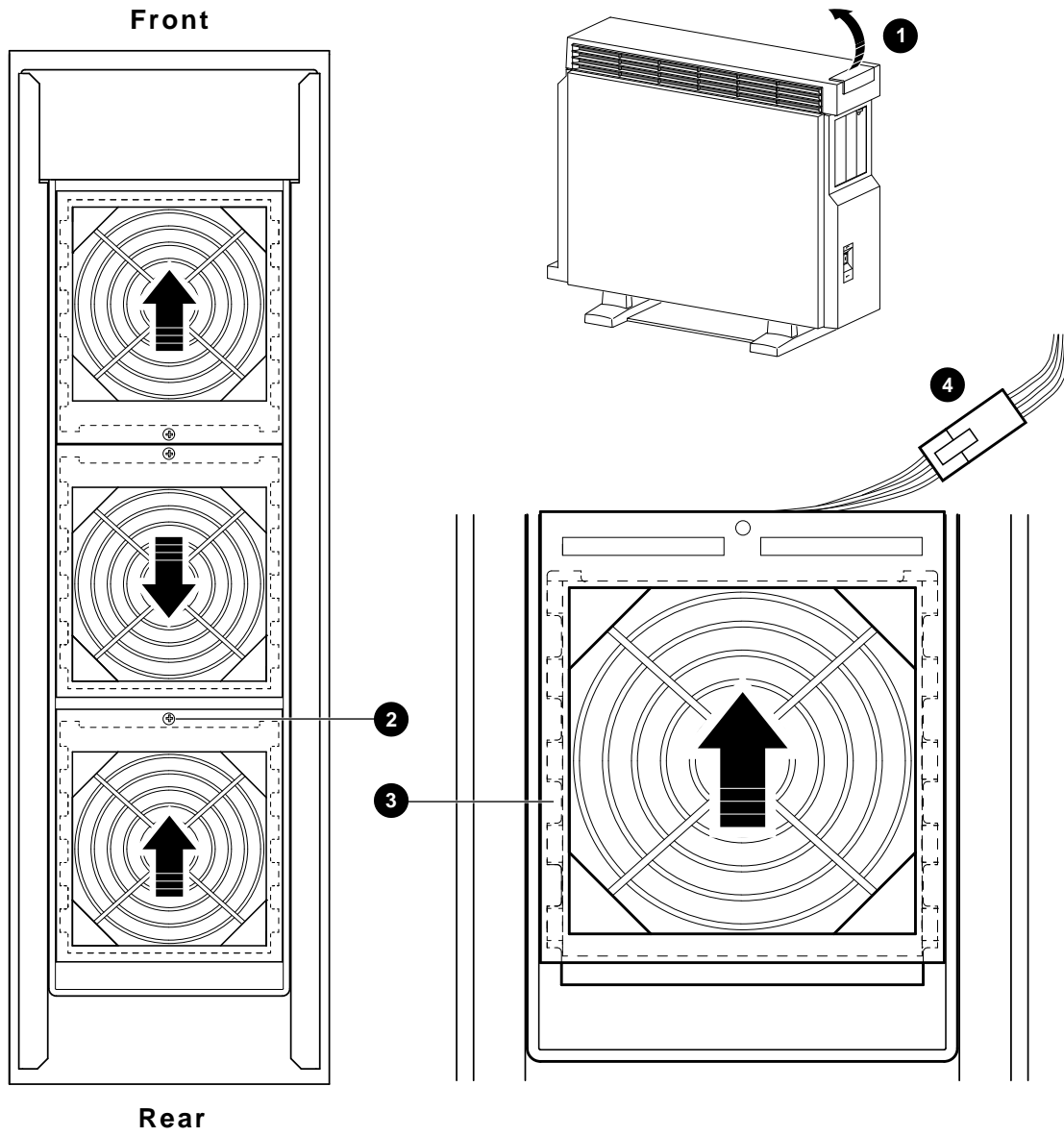
There are three system fans on the bottom of the unit. To remove a failed or damaged system fan:

Step	Action	Refer to Figure 7–19
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove all bulkhead cables from rear.	–
4	Face the front of the unit. Carefully tilt the unit back, so it is resting on its rear panel.	❶
5	Remove the fan screw.	❷
6	Slide the fan boot as shown.	❸
7	Disconnect the fan cable.	❹
8	Remove the fan.	

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# System Fans, Continued

Figure 7-19 Removing a System Fan (Bottom)



LJ-02983-T10

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## System Fans, Continued

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---

**Part Number**

---

<b>Description</b>	<b>Part Number</b>	<b>Quantity</b>
Fan assembly	12-23609-12	3

---

**Fan  
Replacement**

To install the system fan, reverse the removal steps.

---



# Impingement Fan

## Impingement Fan Removal

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove a failed or damaged impingement fan:

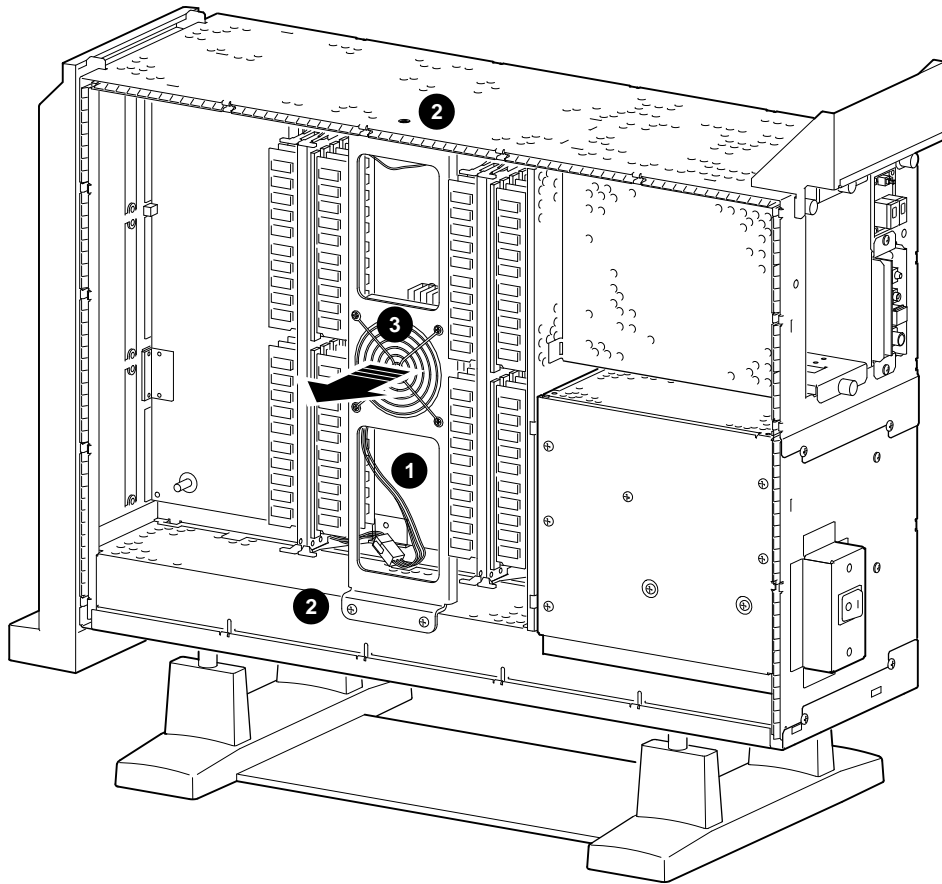
Step	Action	Refer to Figure 7–20
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Remove the left side panel.	–
5	Disconnect the fan's power cable.	❶
6	Remove the three screws from the impingement fan bracket assembly.	❷
8	Remove the impingement fan bracket assembly	❸

*Continued on next page*

# Impingement Fan, Continued

---

Figure 7-20 Removing the Impingement Fan



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## Impingement Fan, Continued

---

---

### Part Numbers

Description	Part Number	Quantity
Top cover	70-30266-01	1
Left Side panel	70-29563-01	1
Fan bracket assembly	70-30888-01	1

---

### Impingement Fan Replacement

To install the impingement fan assembly, reverse the removal steps.

---

# Memory Motherboard

## Memory Motherboard Removal

---

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove a failed or damaged memory motherboard (MMB):

---

Step	Action	Refer to Figure 7–21
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Remove the left side panel.	–
5	Release the module guide catch releases at the top and bottom of the module.	❶
6	Remove the MMB.	❷
7	Remove all memory modules on a failed MMB.	–

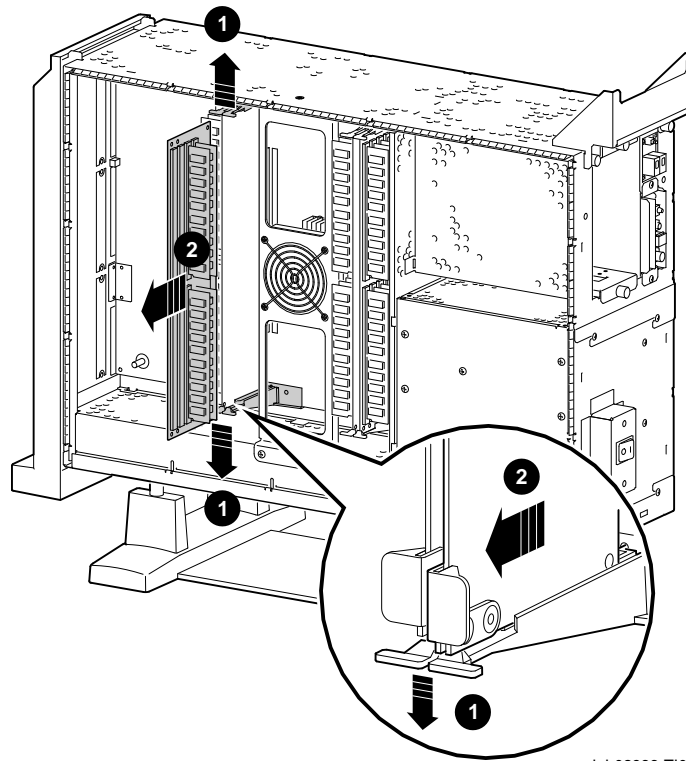
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# Memory Motherboard, Continued

---

Figure 7-21 Removing a Memory Motherboard



LJ-02933-T10

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## Memory Motherboard, Continued

---

---

### Part Numbers

Description	Part Number	Quantity
Top cover	70-30266-01	1
Left side panel	70-29563-01	1
Memory motherboard	54-21141-01	2

---

### Memory Motherboard Replacement

To install the memory motherboard, reverse the removal steps.

---

# Memory Module

## Memory Module Removal

---

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove a failed or damaged memory module:

---

Step	Action	Refer to Figure 7–22
1	Perform the system shutdown.	–
2	Power down the unit.	–
4	Remove the left side panel.	–
5	Remove the memory motherboard and place on an antistatic mat.	–
6	Release the connector latches and remove the memory module.	❶

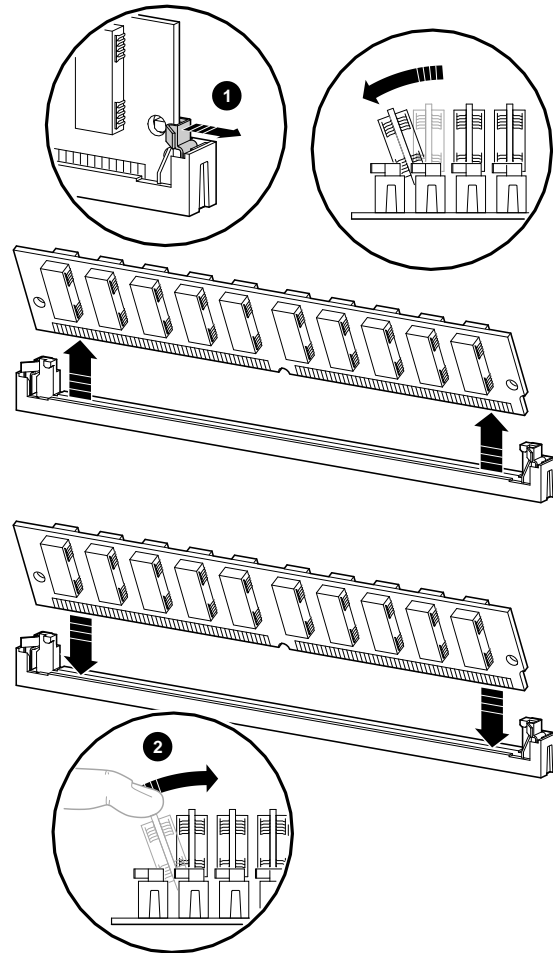
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# Memory Module, Continued

---

Figure 7-22 Memory Module Removal and Replacement



LJ-01778-T10

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*Continued on next page*



## Memory Module, Continued

---

---

### Part Numbers

Description	Part Number	Quantity
Left side panel	70-29563-01	1
Memory motherboard	54-21141-01	1
4 MB memory module	54-21139-CA	-
8 MB memory module	54-21139-DA	-

---

### Memory Module Replacement

To replace a memory module, perform the following steps:

---

Step	Action	Refer to Figure 7-22
1	Insert the module and carefully push forward until the it locks in place.	②
2	Reverse the removal steps.	-

---

# System Module

## System Module Removal

### NOTE

Before the system is powered down, have the system manager perform a system shutdown if needed.

To remove a failed or damaged system module:

Step	Action	Refer to Figure
1	Perform the system shutdown.	–
2	Power down the unit.	–
3	Remove the top cover.	–
4	Remove both side panels.	–
5	Remove the fan bracket assembly.	–
6	Disconnect the cables shown.	❶ Figure 7–23
7	Disconnect any TURBOchannel cables from the rear of the unit.	❷ Figure 7–24
8	Remove any TURBOchannel modules.	❸ Figure 7–25
9	Remove memory motherboards (MMB).  Do not remove memory modules from memory motherboards.	–
10	Disconnect the regulator module sense cable from the system module. (Figure 7–26 ❷ shows the connector on the system module.)	❹
11	Release the five captive rivets and two thumbscrews.	❺
12	Remove the system module.	

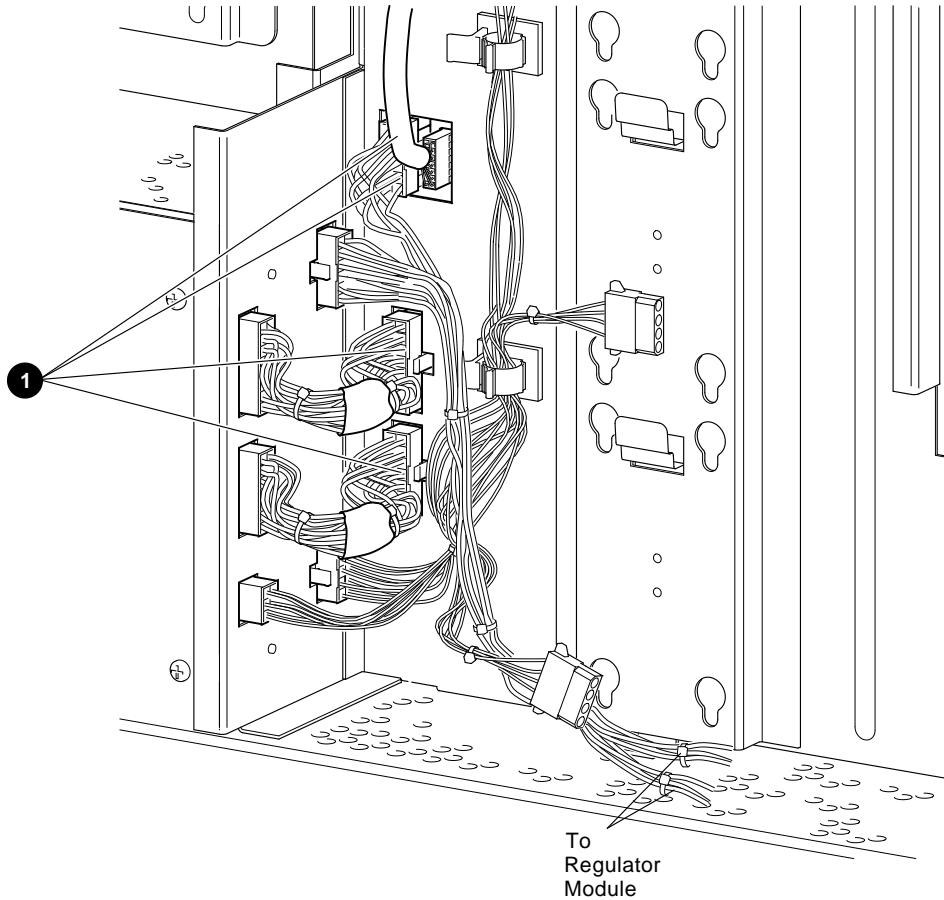
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## System Module, Continued

---

Figure 7-23 shows the system module power connections for the DEC 3000 Model 500X AXP system.

**Figure 7-23 System Module Power Connections**



LJ-02942-T10

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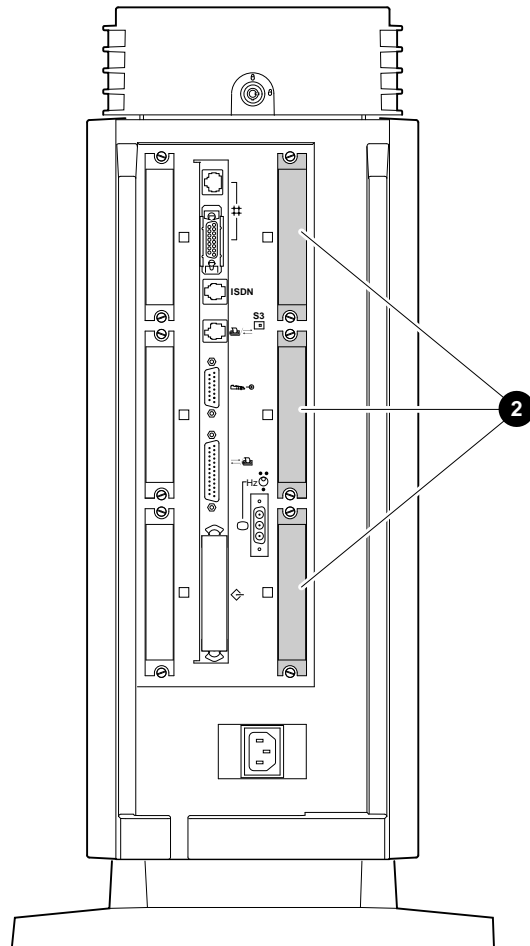
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## System Module, Continued

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Figure 7-24 shows the TURBOchannel connections for the DEC 3000 Model 500X AXP system.

**Figure 7-24 TURBOchannel Connections**



LJ-02141-T10

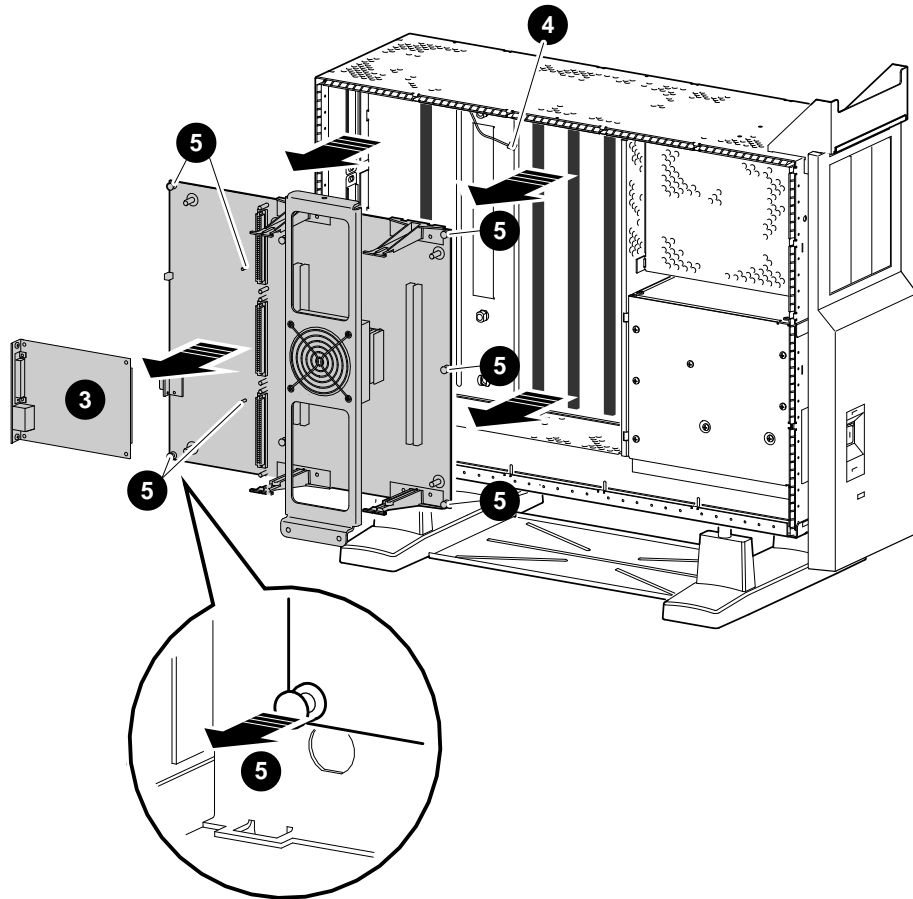
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# System Module, Continued

---

Figure 7-25 Removing the System Module



LJ-02932-T10

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## System Module, Continued

### Part Numbers

---

Description	Part Number	Quantity
Top cover	70-30266-01	1
Right side panel	70-29563-01	1
Left side panel	70-29563-01	1
TURBOchannel	xx-xxxxx-xx*	Up to 3
Memory motherboard (MMB)	54-21141-01	2
Recessed screw	90-06039-02	5
Sem screw	90-00049-01	2
System module	54-21149-03	1
Fan bracket assembly	70-30888-01	1

---

\*See the *DEC 3000 Model 500X AXP Options Installation Guide*

---

### System Module Replacement

To install the system module, reverse the removal steps.

See Figure 7-26 for system module jumper locations and Table 7-3 for a description of the jumpers.

#### NOTE

**Make sure that all captive rivets are in the out position before replacing the module.**

**Make sure that the setting for the flash ROM jumper is the same as on the failed FRU.**

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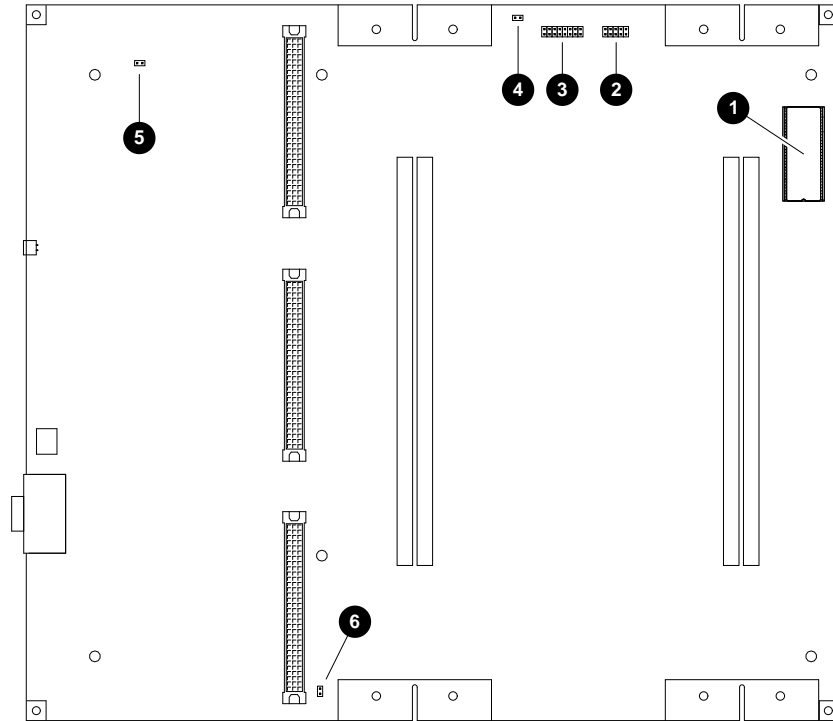
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# System Module, Continued

---

Figure 7-26 shows the locations of the jumpers on the system module.

**Figure 7-26 System Module Jumpers Locations**



LJ-02272-T10

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## System Module, Continued

---

Table 7–3 describes the system module jumpers.

---

**Table 7–3 System Module Jumper Locations**

---

<b>Location</b>	<b>Description</b>	<b>Comments</b>	<b>Default Setting</b>
❶	Serial ROM	–	–
❷	Regulator sense cable	Must be installed.	Installed.
❸	Serial ROM jumpers	Jumper location 0 only.	Installed.
❹	200 MHz jumper	Must be installed.	Enabled.
❺	Test pins	Used by Digital Engineering.	–
❻	Flash enable jumper	In = enabled. Out = disabled.	Disabled.

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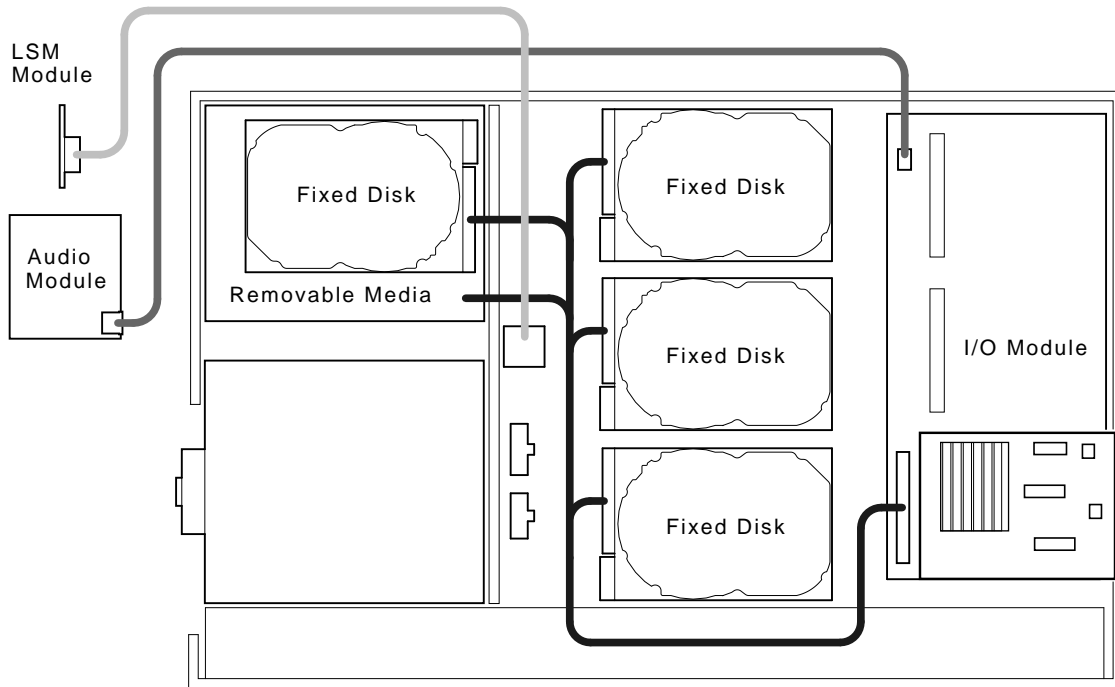


# System and Power Cable Routing

## Internal Cable Routing

Figure 7-27 shows cable connections between modules and disk drives in the DEC 3000 Model 500X AXP system.

Figure 7-27 Internal Cabling



LJ-02936-T10

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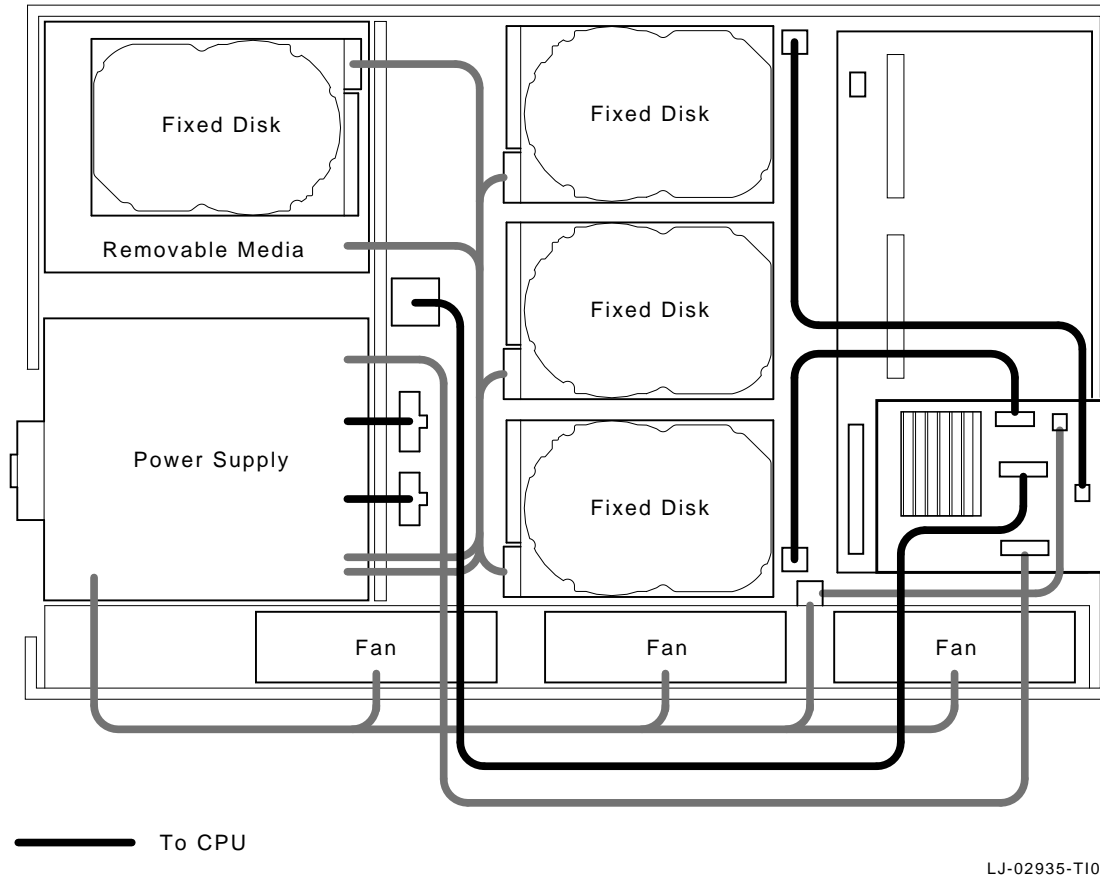
# System and Power Cable Routing , Continued

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## Power Cable Routing

Figure 7-28 shows power connections between the power supply, disk drives, the system module, and the regulator module.

Figure 7-28 Power Cabling



LJ-02935-T10

# Appendix A

## Upgrading Firmware

### Overview

---

#### **Model 500/500S Guide**

For information on the following topics, see Appendix A in *DEC 3000 Model 500/500S AXP Service Information*:

- Upgrading Firmware, Using a CD-ROM
  - Creating a Bootable Disk Over the Network
-



# Appendix B

## Monitor Alignment Diagnostics

### Overview

---

**Model 500/500S  
Guide**

For information on the following topics, see Appendix B in *DEC 3000 Model 500/500S AXP Service Information*:

- Monitor Alignment Diagnostics
-



# Appendix C

## LED Codes and Error/Status Messages

### Overview

---

#### **Model 500/500S Guide**

For information on LED codes and error/status messages, see Appendix C in *DEC 3000 Model 500/500S AXP Service Information*. That appendix covers the following topics:

- LED Codes
- Console Error Messages
- Console Halt Messages
- Diagnostic Error Codes:
  - CXT
  - ASIC
  - TOY/NVR
  - ISDN
  - SCC
  - SCSI
  - NI
  - MEMORY
- Diagnostic Status/Error Messages:
  - ASIC
  - ISDN
  - SCC
  - SCSI
  - NI

---

*Continued on next page*

## Overview, Continued

---

- MEMORY
  - MIPS Emulator
-



# Appendix D

## Recommended Spares List

### Recommend Spares List

---

**Spares List**                      Table D-1 lists the recommended spare parts for the DEC 3000 Model 500X AXP system.

---

**Table D-1 Recommended Spares List**

Part Number	Description	Comment
54-21139-CA	4 MB memory module	Half-populated module
54-21139-DA	8 MB memory module	Fully populated module
54-21141-01	Memory motherboard	
54-21145-02	Lights and switch module (LSM)	Pedestal mount only
54-21147-01	I/O module	
54-21149-03	System module	
54-23128-01	Power regulator module	
H3103	Printer port loopback	
H4082-AA	Twisted-pair loopback	10BaseT
H7883-YA	Power supply	
12-23609-12	System fan assembly	
12-25083-01	Serial line loopback	

---

*Continued on next page*

## Recommend Spares List, Continued

Table D-1 (Continued) Recommended Spares List

Part Number	Description	Comment
12-22196-01	Ethernet thickwire loopback	
12-30552-01	SCSI terminator	
12-30934-01	Slot screws	
12-36064-01	Removable rivets	Used on modules
17-03314-01	Removable media tray	
	SCSI data cable	
17-03315-01	Internal SCSI data cable	
17-03316-01	Internal power cable	20-conductor cable
17-03317-01	Internal fan power cable	
17-03318-01	Internal power cable	16-conductor cable
17-03319-01	Internal power cable	14-conductor cable
17-03320-01	Internal power cable	12-conductor cable
17-03344-01	Removable tray power cable	
17-03395-01	Internal ac power cable	
17-03501-01	LSM data cable	
17-03502-01	Audio cable	
17-00083-43	Power cord	
17-02640-02	Desktop mouse and keyboard cable	
17-02906-03	Video cable	

*Continued on next page*

## Recommend Spares List, Continued

Table D-1 (Continued) Recommended Spares List

Part Number	Description	Comment
17-03814-01	Harness assembly	12-conductor regulator cable (14-position connector)
17-03815-01	Harness assembly	3-conductor regulator cable
17-03816-01	Harness assembly	3-conductor regulator cable (4-position connector)
17-03817-01	Harness assembly	2-conductor regulator cable (voltage sense)
17-03320-02	Harness assembly	12-conductor regulator cable
70-29562-01	Audio assembly	
70-29563-01	Side panel	
70-30266-01	Top cover assembly	
70-30888-01	Fan bracket assembly	Impingement fan
74-41143-05	Bulkhead assembly, blank	
74-43810-01	Fan boot	Same for all three system fans
74-43811-01	Access door	
74-43830-01	Front bezel	
74-44072-01	Rear bezel	
74-44073-01	Top cover	
74-44141-01	Audio module cover	
74-44142-01	Audio box	
74-44487-02	Removable media bezel	
74-44620-01	LSM door	
74-44649-01	Audio bezel cover	

*Continued on next page*

## Recommend Spares List, Continued

---

Table D-1 (Continued) Recommended Spares List

---

Part Number	Description	Comment
90-00049-01	Sem screw	
90-06039-02	Recessed screw	

---

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