

ftServer 3300

Technical Service Guide

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Manual Name: *ftServer 3300 Technical Service Guide*

Services Technical Communications Department

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Preface

The *ftServer 3300 Technical Service Guide* contains technical information pertinent to ftServer systems operating under Microsoft Windows 2000 Advanced Server operating systems.

This document is organized as follows:

Section 1 - Introduction

Section 2 -Operation and Troubleshooting Procedures

Section 3 - CRU Removal and Replacement Procedures

Section 4 – FRU and DRU Removal and Replacement Procedures

Section 5 - Theory of Operation

Section 6 Upgrades

Section 7 - Part Numbers

Audience

This guide is intended for authorized service personnel who install and maintain Stratus systems, and who have completed Stratus field-service training courses.

1. Introduction

This section describes the requirements, components, configurations, and specifications for the Stratus ftServer 3300 system. It covers the following topics:

- Overview
- Operating system requirements
- Hardware components
- System configurations
- System specifications



1.1 Overview

ftServer 3300 systems are distributed servers on a fault-tolerant hardware architecture. Stratus customizes the software, providing fault-hardened device drivers, enhancements to the operating system, and application reliability and availability, to promote fault tolerance.

The ftServer 3300 is based on the 2.4-GHz Intel® IA32 architecture using Intel's Xeon Prestonia processors and one-way or two-way (one or two processors per CPU, respectively) symmetric multiprocessing (SMP).

Each ftServer 3300 system consists of two CPU enclosures, providing dual modular redundancy (DMR), and two core I/O enclosures housed in a chassis. Chassis are available in free-standing pedestals, or can be mounted in standard 19-inch racks available from Stratus or a third-party source.

Each CPU and I/O enclosure is 1U (1.75 inches) in height, totaling 4U (7.0 in) of height per ftServer 3300 system.

The CPU and core I/O enclosures are installed from the front of the chassis and connect to a backplane located at the rear of the chassis. The clock card, power inlets, VGA, USB, serial ports, and connections to the installed PCI adapters are also located at the rear of the chassis.

To enable connectivity to the Stratus ActiveService Network (ASN), which allows the CAC or an authorized Stratus service representative to remotely manage the system, the system can be configured with one of the following:

- An external modem (ASN connectivity is only possible if the operating system is operational.)
- Two duplexed ftServer Access Adapters

Systems that contain two duplexed ftServer Access Adapters (ftSAA) provide the highest level of availability. These adapters connect to the ASN over an internal modem and provide ASN connectivity even when the operating system is not operational. The adapter allows internal administrators to remotely service the system over an IP network, regardless of the state of the operating system.

1.2 Operating System Requirements

The ftServer 3300 system is currently supported by the Windows 2000 Advanced Server operating system.

1.3 Hardware Components

The main hardware components in the ftServer 3300 system are the following:

- 2 CPU Enclosures
- 2 I/O Enclosures
- Backplane

1.3.1 CPU Enclosure

Each CPU enclosure contains:

- One or two processors
- 6 DIMM slots

The ftServer 3300 uses DDR (Dual Data Rate) Dual Inline Memory Module (DIMM) memory in 256-MB and 512-MB configurations. The minimum ftServer 3300 logical memory is 512 MB; the maximum logical memory is 3 GB.

Up to six DIMMs can be housed in each CPU enclosure.

Both CPU enclosures must be configured with identical total memory size. DIMMs of different capacities and from different manufacturers may not be mixed within a CPU enclosure. DIMMs of identical capacity must be mounted in the corresponding memory slot between each CPU enclosure.

The following table lists the memory modules currently supported in ftServer 3300 systems.

Model Number	Description	Minimum # per CPU Enclosure	Maximum # per CPU Enclosure
M227	256-MB DDR DIMM	2	6
M228	512-MB DDR DIMM	2	6

The following table shows the possible memory configurations.

Total Memory in CPU Enclosure	# Memory Modules
512 MB	2 M227 modules
1 GB	4 M227 modules or 2 M228 module
2 GB	4 M227 modules and 2 M228 modules or 4 M228 modules
3 GB	6 M228 modules

1.3.2 I/O Enclosure

Each IO enclosure contains:

- One CD-ROM drive
- One 10/100 Ethernet port
- One 10/100/1000 Ethernet port
- Three single-initiated internal SCSI disk slots
- One external SCSI port for tape drive
- One 32-bit 33-MHz PCI slot (reserved for ftSAA or VGA Adapter)
- Two 64-bit 33-MHz PCI slots

1.3.2.1 PCI Adapters

The following table lists the PCI adapters supported on ftServer 3300 systems.

Model	Description	Min. #	Max. #
U462	ftServer Access Adapter (ftSAA)	0	2
U486	8-port Asynchronous Adapter	0	4
U515	1-port 10/100BaseTx Ethernet Adapter	0	4
U521	Ultra 160 2-port SCSI HBA Adapter	0	2
U525	EMC SAN Fibre Channel Adapter	0	2
U526	EMC Direct Fibre Channel Adapter	0	2
U570	1-port 1000BaseSx Ethernet Adapter	0	4
U571	1-port 10/100/1000Base-T Ethernet Adapter	0	4
U917	VGA Adapter	0	2

1.3.2.2 SCSI Disk Drives

A minimum of one SCSI disk drive (of the same size) is required in each core I/O enclosure.

The following table lists the SCSI disk drives supported in the Core I/O enclosures on ftServer 3300 systems.

Model	Description
D531	36-GB disk drive (10K RPM)
D532	73-GB disk drive (10K RPM)
D533	18-GB disk drive (15K RPM)

1.3.3 Backplane

The ftServer 3300 system contains a backplane through which the CPU and I/O enclosures interconnect.

The backplane contains the system clock card, two IDPROMs, and the connector I/O card. The connector I/O card contains the serial, USB, and VGA ports.

1.3.4 Optional Components

Optional components of an ftServer 3300 system include:

- Ultra160 SCSI storage enclosure
- Tape drives
- Keyboard, mouse, and monitor
- Modem, for systems without ftServer Access Adapters
- External Floppy Disk Drive
- Power Distribution Unit (PDU)

1.3.4.1 Ultra 160 SCSI Storage Enclosure

An ftServer 3300 system supports an optional Ultra160 SCSI storage enclosure configured in split-bus mode. The Ultra160 SCSI storage enclosure occupies 3U of vertical height in the rack mount. It supports a mix of drive capacities and any combination of disk drives, but only similar disk models can mirror each other.

Each Ultra160 SCSI storage enclosure houses the following components:

- 2-14 hot-pluggable 3.5" disk drives
- 1 enclosure LED module
- 2 advanced cooling modules (ACMs)
- 2 power supply modules (PSMs)
- 2 Cluster Services Modules (CSMs)

The following table lists the disk drives supported in Ultra160 SCSI storage enclosures.

Model	Description
D522	36-GB disk drive (10K RPM)
D523	73-GB disk drive (10K RPM)
D524	18-GB disk drive (15K RPM)

A pair of U521 Ultra 160 2-port SCSI host bus adapters (HBA) is required for fault tolerant operation.

The Ultra 160 enclosure can contain the system boot disks.

1.3.4.2 EMC Attachment HBA Kit for EMC/Symmetrix/Clariion Storage Systems

The EMC Symmetrix/Clariion Storage System is a full Fibre Channel networked storage system. The ftServer 3300 system supports two types of Fibre Channel (FC) PCI adapters for connections to the storage system.

The U525 Optical Fibre Channel PCI Adapter provides a 2-gigabit (Gb) attachment to the storage system through a Storage Area Network (SAN) or switch.

The U526 Optical Fibre Channel PCI Adapter provides a 2-Gb direct attachment to the storage system.

Each FC PCI adapter is a 64-bit host bus adapter (HBA) that supports both 66 megahertz (MHz) PCI and 2-Gb FC I/O technologies.

1.3.4.3 Tape Drives

ftServer 3300 systems support DLT 8000 and DDS-4 tabletop tape drives. No tape drives are mounted in the storage enclosure. They are all external to the cabinet.

Each core I/O enclosure can support up to two daisy-chained tape drives. The first tape drive connects to the external SCSI port on the core I/O enclosure.

CAUTION: Each tape drive must have a unique SCSI ID assigned to it. Failure to do so will create SCSI bus conflicts.

The following table lists the tape drives supported on ftServer 3300 systems.

Model	Description
T511	HP-DDS-4 DAT tape drive
T512	HP-DDS-4 DAT tape drive with autoloader
T513	Quantum DLT 8000 tape drive

1.3.4.4 Keyboard/Monitor/Mouse

The keyboard and mouse connect to the system by the USB port on the core I/O enclosure.

The following table lists the keyboard, monitor, and mouse types.

Model	Description
V122	External 17" Color VGA Monitor
V125	ftServer 15" Rack Mount LCD with Keyboard Drawer.
V115	ftServer USB Keyboard/Mouse

1.3.4.5 Modem

If the system does not have ftServer Access Adapters, a modem is required to connect to the Stratus ActiveService Network (ASN).

The C719, a 56K Data/Fax MultiTech ZBA Modem, is the external serial modem used for the ASN. The C719 is a Stratus certified and recommended external modem.

1.3.4.6 External Floppy Disk Drive

The ftServer 330 system does not support an internal floppy disk drive. An optional external USB floppy drive can be connected via a USB port.

1.3.4.7 Power Distribution Unit (PDU)

The PDU provides an optional way of managing power in the ftServer 3300 system.

The rack-mounted configuration is divided into two sides: Side A and Side B. Both sides are powered, but Side A must be capable of still functioning if power to Side B is lost. The Side A PDU provides power to a monitor and other components that are not duplexed. The Side A wattage is always be equal to or greater than the Side B wattage.

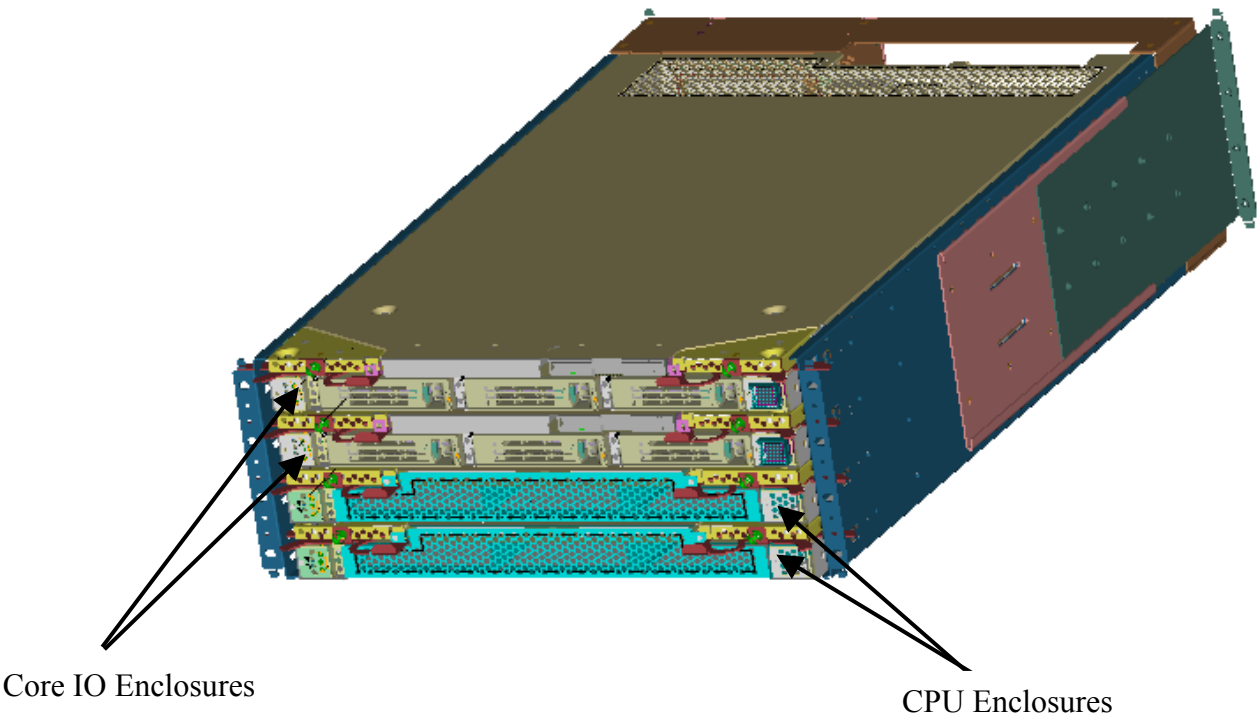
Each PDU supports a maximum of 15 amps.

The PDU has eight IEC C13 outlets. The maximum outlet current is 8 Amps. The PDU has an IEC C20 (20-Amp) inlet connector and a 16-Amp circuit breaker to provide protection.

1.4 System Configurations

Marketing ID	P3101R-1D-AS	P3101R-2D-AS	P3101-1D-AS	P3101-2D-AS
Chassis	Rack Mount	Rack Mount	Pedestal	Pedestal
Processor	DMR	DMR	DMR	DMR
SMP	1-way	2-way	1-way	2-way
Processor speed	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz
Cache size	512 KB	512 KB	512 KB	512 KB
No. CPU Enclosures	2	2	2	2
No. physical processors	2	4	2	4

The following diagram is a representation of the system configuration, independent of a cabinet.



1.5 System Specifications

1.5.1 4U Pedestal

Physical	
Height	21.8 inches (56.4 cm)
Width	8.75 in. (22.23 cm)
Depth	31.0 in. (78.8 cm) without bezel 31.5 in. (80 cm) with bezel
Weight	175 lbs (386 Kg) fully loaded with three disk drives in each I/O enclosure
Environmental	
Operating temperature	41°F to 95°F (5°C to 35°C)
Maximum rate of temperature change during operation	18°F/hr (10°C/hr) or 0.30°F/min (0.17°C/min)
Relative humidity during operation	20% to 80% (non-condensing)
Relative humidity during storage	8% to 80%
Heat dissipation	3500 BTUs per hour
Electrical	
Input voltage	100–240 VAC; 50/60 Hz
Output wattage	1000 W (AC)

1.5.2 4U Rack-Mount

Physical	
Height	7 in. (17.78 cm) (4U)
Width	17.75 in. (45 cm)
Depth	29.23 in. (75 cm)
System Weight	124 lb (56 kg) to 137 lb (62 kg)
Environmental	
Operating temperature	41°F to 95°F (5°C to 35°C)
Maximum rate of temperature change during operation	18°F/hr (10°C/hr) or 0.30°F/min (0.17°C/min)
Relative humidity during operation	20% to 80% (non-condensing)
Relative humidity during storage	8% to 80%
Heat dissipation	3500 BTUs per hour
Electrical	
Input voltage	100–240 VAC; 50/60 Hz
Output wattage	1000 W (AC)

1.5.3 V125 Monitor

Physical	
Height	1.75 in. (4.45 cm) (1U)
Width	19 in. (48.3 cm)
Depth	27 in. (68.6 cm)
Heat dissipation	153.5 BTUs per hour
Electrical	
Input voltage	100–240 VAC; 50/60 Hz
Output wattage	45 W (AC)

1.5.4 V122 17-inch Color VGA Monitor

Physical	
Height	16 in. (41 cm)
Width	16 in. (41 cm)
Depth	16.5 in. (40.8 cm)
Weight	30 lb (13.61 kg)
Heat dissipation	341.2 BTUs per hour
Electrical	
Input voltage	100–240 VAC; 50/60 Hz
Output wattage	100 W (AC)

1.5.5 D527 Ultra160 SCSI Storage Enclosure

Physical	
Height	5.22 inches (13.3 cm) (3U)
Width	17.5 inches (44.5 cm)
Depth	20 inches (50.8 cm)
Weight without disk drives	33 lb (15.9 kg)
Weight fully configured	75 lb (34 kg)
Environmental	
Operating temperature	32°F to 113°F (0°C to 45°C) Drives can operate at this temperature but should not be cold-started below 5°C.
Storage Temperature	-40°F to 158°F (-40°C to +70°C)
Maximum rate of temperature change	68°F (20°C) per hour
Relative humidity during operation	10% to 80% (noncondensing)
Relative humidity during storage	10% to 95% (noncondensing)
Operating altitude	-200 to 10,000 feet
Storage altitude	-200 to 40,000 feet
Heat dissipation	2296 to 2911 BTUs per Hour
Electrical	
Input voltage	85–264 VAC; 47/63 Hz
Output wattage	400 W (AC)

1.5.6 P41104 Power Distribution Unit (PDU)

Physical	
Height	1.75 in. (4.45 cm)
Width	19.1 in. (48.51 cm)
Depth	6.75 in. (17.15 cm)
Environmental	
Operating temperature	
-200 to 6,000 ft	40° F to 95° F (4.5° C to 35° C)
6,000 to 8,000 ft	40° F to 86° F (4.5° C to 30° C)
8,000 to 10,000 ft	40° F to 77° F (4.5° C to 25° C)
Storage Temperature (to 40,000ft.)	-38° F to 158° F (-40° C to 70° C Unvented) -38° F to 140° F (-40° C C to 60° C Vented)
Relative humidity during operation	10% to 80% non-condensing
Relative humidity during storage	To 95%
Heat dissipation	6 BTUs per Hour
Electrical	
Input voltage	200–240 VAC; 50/60 Hz

2. Operation and Troubleshooting Procedures

This section describes procedures related to ftServer 3300 system operation and solving problems with the hardware components. It covers various topics, including the following:

- System Startup
- System Shutdown
- Device IDs
- Troubleshooting Hardware Components
- Taking a Component Offline
- Bringing a Component Online

2.1 System Startup

Whenever the system is plugged into live AC outlets, low-level power is present in the ftServer system. This standby power enables the Baseboard Management Controller (BMC) to monitor the status of the system components, even when system power is off.

If the Windows 2000 operating system is not running, starting, or stopping, you can initiate a start-up sequence that will power-up the rest of the system and start Windows 2000.

The system power button is located on the front of the system and functions as follows:

- If the system power is **off** and standby power is **on**, pressing the system power button turns the system power on and boots Windows 2000.
- If the system power is **on** and Windows 2000 or the system BIOS is starting, stopping, or running, pressing the system power button will turn the system off.
- If the system power is **on** and Windows 2000 is completely shut down, pressing the live power button (the one whose LED is lit) on the I/O enclosure shuts down system power. (Standby power remains on.)

To initiate the power-up sequence, perform the following steps:

1. Make sure the system power cords are plugged into live AC outlets.
2. Turn on the monitor, any attached storage enclosures, and any other peripheral devices.

3. On the I/O enclosure whose system power-button LED is lit, press the system power button to power on the rest of the system and boot Windows 2000.

Figure 2-1. System Power Button



2.2 System Shutdown

Before shutting down the ftServer, warn all users that a shutdown is imminent so that they have time to save their files and exit their applications. Give users sufficient time to exit.

Perform the following procedure to gracefully shut down an ftServer system running Windows 2000. Any Windows settings will be saved and the contents of memory are saved to disk. The operating system should always be shut down in this manner if at all possible.

1. Click the **Start** button on the Windows 2000 desktop and click **Shut Down**.
2. In the **Shut Down Windows** dialog box, select **Shut Down** and then click **OK**. A message states that your system is shutting down.
3. When the system displays the message `It is now safe to turn off your computer`, the system will turn off its power automatically.
This removes main power from the system; however, standby power to the Baseboard Management Controller (BMC) remains on.
4. Turn off power to the monitor and any peripheral devices.

2.3 Device Ids

A device ID is an identifier used to physically locate hardware components within a Stratus system. Traditionally, Stratus Customer Service relies on the Device ID for identification of failed parts within the system cabinet. Windows 2000 provides no facility to relate a physical device location to a device driver.

A device ID is a 64-bit value divided into 8 separate bytes. Each byte represents a physical layer of hardware in the system. These bytes are also called Levels. Levels are DECIMAL values ranging from **0** through **254**, allowing for a maximum of 255 unique values. The Value **255** is reserved and represents an end marker (called a null Device ID value) for parsing the 64-bit Device ID.

Device IDs are represented in the system as a series of / separated decimal numbers without the end marker. Examples are **0**, **0/2** and **10/0/1**.

It is desirable to be able to make associations between devices. For example, a core I/O board has PCI adapters plugged into it, and if the core I/O board breaks, these PCI adapters will subsequently be non-functional. This so called ‘parent to child’ relationship needs to be clearly articulated within a Customer Service call by the system management software, since the failure of the parent (in this case the core I/O board) has caused child devices (the PCI adapters) to fail. In this case, the PCI adapters should not be replaced since the core I/O board is the only faulty device.

A component’s address, or Device ID, is a hierarchical number where each level is used to represent different layers of the physical hardware in an ftServer system. Device IDs are derived using a top-down approach, starting with the highest layer. Each additional layer provides finer granularity and detail. Each level in the Device ID represents a replaceable unit.

The following subsections describe the device IDs.

2.3.1 Level 1 Devices

Level 1 devices fit directly into the system chassis. Level 1 devices are CPU enclosures, I/O enclosures and SCSI storage enclosures.

They are shown in the following table.

Level 1 Device	Range of Device IDs	Device Ids Currently Used
CPU Enclosures	0-9	0, 1
I/O Enclosures	10, 11	10, 11
SCSI Storage Enclosure	Start at 40 and increment by 1.	40 for Ultra160 SCSI Storage enclosure: split-bus. 41 and 42 for Ultra160 SCSI Storage enclosures: two joined-bus.
Uninterruptible Power Supply (UPS)	32, 33	32, 33

2.3.2 Level 2 Devices

Level 2 devices consist of components that plug into Level 1 devices. Level 2 devices include memory modules (DIMMs), processors, PCI slots, SCSI disk slots, and environmental devices (fans, temperature, voltage).

Level 2 devices are shown in the following table.

Level 2 Device	Range of Device IDs	Device Ids Currently Used
Core I/O enclosure Slots	0-99	10/0-10/3
CPU Enclosure processors	20-39	0/20, 0/21, 1/20, 1/21, 2/20, 2/21
CPU Enclosure Memory Modules	0-19	0/0-0/3, 1/0-1/3
CPU Enclosure Power Supplies	100-109	0/100-2/100
Ultra160 SCSI Storage Enclosure Fans		40/110-40/112, 41/110-41/112, 42/110-42/112
Ultra160 SCSI Storage Enclosure Power Supplies		40/100, 40/101, 41/100, 41/101, 42/100, 42/101
Ultra160 SCSI Enclosure Slots (Disk Drives)	0-99	40/1- 40/14, 41/1-41/14, 42/1-42/14

2.3.3 Level 3 Devices

Level 3 devices include SCSI buses and Ethernet ports on a PCI adapter. These are assigned addresses of 1 and 2. Fan speed sensor is a level 3 device under Fans and always has a device path ID of 140.

2.3.4 Level 4 Devices

Level-4 devices include SCSI targets on a SCSI bus connected to a specific port on a specific SCSI PCI adapter. Note that these devices would typically be represented by two different Level-4 devices (one for each port connected to the bus) and may also be represented as Level-2 devices within a storage enclosure. Typically, the SCSI target device ID would NOT be displayed for end users but may be used internally where appropriate.

2.4 Troubleshooting Hardware Components

ftServer systems provide hardware- and software-based methods of troubleshooting system hardware. Hardware-based troubleshooting is implemented through light-emitting diodes (LEDs). Software-based troubleshooting is accomplished by means of the **ftServer Manager**.

This section provides general information and guidelines for troubleshooting hardware failures in the ftServer system. For more information about monitoring and troubleshooting the system, refer to the [Stratus ftServer: System Administrator's Guide \(R014W\)](#)

2.4.1 Hardware-Based Troubleshooting

ftServer 3300 systems signal hardware status through LEDs, or status lights. LEDs are located on the front (only) of the CPU enclosure, and on the front and rear of the core I/O enclosure.

During the boot process, the ftServer Access Adapter (ftSAA) verifies that components of CPU and I/O enclosures, such as clock cards, are present and performing normally before the ftSAA turns that enclosure on. If a component has failed, the ftSAA removes power from that enclosure. As a result, the LEDs on an enclosure may be lit briefly and then turn off, or the LEDs may not be lit at all, indicating a failed component of the enclosure.

2.4.1.1 CPU Enclosure LEDs

Each CPU enclosure has two LEDs, a red and a green-amber. They are located at the front .

The following table describes the meaning of the status LEDs when lit and shows what action, if any, should be taken.

LED	Meaning	Action
Red	The CPU enclosure is broken.	Replace CPU enclosure.
Amber	The CPU enclosure is operating simplex. Taking it offline will crash the system.	Return the offline CPU enclosure to service.
Red and Green	CPU enclosure is testing.	Wait.
Green	CPU enclosure is operating duplexed.	None.
Clear (unlit)	No standby power present.	Check that the enclosure is inserted correctly. Verify that AC power cords are connected or take other measures to supply AC power to the system.

2.4.1.2 Core I/O Enclosure LEDs

The LEDs on the core I/O enclosure are located on the front and rear of the enclosure. They consist of the following:

1. Baseboard Management Controller (BMC) status
2. Core I/O enclosure status
3. Disk activity/fault
4. Disk power, read/write
5. System power button and LED
6. Core I/O enclosure status
7. PCI adapter slot status
8. Ethernet port LEDs
9. 10/1000 Ethernet port
10. 10/100 Ethernet port

Baseboard Management Controller (BMC) LED

The BMC LED indicates the status of the BMC and the ftServer 3300 system as a whole.

Each core I/O enclosure has a BMC LED. The primary BMC LED is the one on the I/O enclosure whose power button is lit (the primary enclosure). The secondary BMC LED is the one on the other I/O enclosure (the secondary enclosure). When a system is running in duplex with no error, only the primary BMC LED lights. This is the power button that powers the system on and off. The secondary BMC assumes operation and control of the system if the primary BMC goes offline.

The BMC LED is a single bicolor LED that either lights green, red, or amber (green and red together), or goes unlit to signify the states described in the following table.

NOTE: The LED states defined in the following table are signaled only by the BMC LED on the primary I/O enclosure, except where noted.

LED	Meaning	Action
Red	The BMC is not ready.	Wait.
Blinking red	BMCs are synchronizing, or the BMC firmware versions are incompatible.	Wait for synchronization to end. If condition continues indefinitely, install compatible BMC firmware versions.
Green	The system is operating normally	None.
Blinking green	System is operating simplexed. Taking it offline will crash the system.	Restore offline enclosure to service.
Amber	The system has a critical condition (e.g., over-temperature condition).	Refer to system administration documentation to identify the critical condition and take actions to correct it.
Blinking amber	On a single core I/O enclosure: The system has a noncritical warning condition (e.g., a secondary BMC failure).	Refer to system administration documentation to identify the critical condition and take actions to correct it.
	On both core I/O enclosures: the system clock card has failed.	Shut down system and replace the clock card.
Clear (unlit)	Power to the primary I/O enclosure, and therefore to the system is off. (The secondary BMC is off when the primary I/O enclosure is operating.)	Check that the enclosure is inserted correctly. Verify that AC power cords are connected, or take other measures to supply AC power.

Core I/O Enclosure Status LEDs

Each core I/O enclosure includes two pairs of LEDs to describe the status of the enclosure: one in the front and one in the back of each enclosure. Each pair consists of one red LED and one green-yellow LED.

The following table describes the core I/O enclosure LED states.

LED	Meaning	Action
Red	Enclosure is broken.	Replace I/O enclosure.
Red and Green	Testing.	Wait.
Green	Enclosure is running duplexed.	None.
Amber	Enclosure is running simplexed. Taking it offline will crash the system.	Restore offline I/O enclosure to service.
Clear (unlit)	Standby power is off.	Verify that AC power cords are connected, or take other measures to supply AC power to the system.

Disk Activity LED

A single red-green LED indicates the status of disk activity of all of the disks within that core I/O enclosure. This LED is different from the LEDs on the individual SCSI disk drives.

The following table describes the Disk Activity LED states.

LED	Meaning	Action
Blinking green	Disk activity in one or more SCSI disk.	None.
Amber	Disk fault in one or more SCSI disk.	Determine which disk has the fault. Verify that it is properly installed. If necessary, replace the disk.

SCSI Disk-Drive LEDs

Each core I/O enclosure supports three SCSI disks. Each SCSI disk has a single green-amber LED on its front side.

The following table explains the SCSI disk LED states.

LED	Meaning	Action
Green	Disk and power are present.	None
Blinking green	Disk activity.	None.
Amber	Disk error.	Verify that the disk is properly installed. If necessary, replace the disk.

PCI Slot Status LEDs

The core I/O enclosure contains three, single, bicolor (red-amber) LEDs to describe the status of each of the three PCI slots within that enclosure. The three LEDs are only at the rear of the enclosure.

The following table describes the PCI slot status LEDs.

LED	Meaning	Action
Red	The PCI adapter is broken.	Replace the PCI adapter.
Amber	The PCI adapter is operating simplex. Taking it offline will result in lost connectivity.	Insert identical adapter in corresponding slot in the other I/O enclosure.
Clear (unlit)	The PCI slot is operating duplexed, or is empty.	if the PCI slot is operating duplexed, take no action.

Ethernet LEDs

Each core I/O enclosure contains two Ethernet ports: a 10/100 Mbit port and a 100/1000 Mbit port. Each of these ports has two integrated LEDs: a green and an amber. The Ethernet ports and their LEDs are located at the rear of the enclosure. The 10/100 Mbit port is on the right; the 100/1000 Mbit port is on the left.

The following table describes the ethernet LEDs.

LED	Meaning	Action
Green	Connection or activity taking place	None
Blinking green	Receiving or transmitting data.	None.
Amber	10/100 Mb port: 100 Mb connection speed. 100/1000 Mb port: 1000 Mb connection speed. Connection or activity.	None.

2.4.1.3 Ultra160 SCSI Enclosure

The Ultra160 SCSI storage enclosure and its associated, integrated subsystems (CSM, ACM, and power supplies) include a number of LEDs that supply status information.

LED Module LEDs

The Ultra160 SCSI enclosure's LED module has three LEDs labeled P, S, and F that report the status.

The LEDs are described in the following table.

LED	Meaning
P LED, Power On (Green)	On when power is applied to the enclosure. Off when power is not applied.
S LED, Split-Bus (Green)	On when bus is in split-bus mode.
F LED, Fault (Amber)	Off when enclosure has no fault; on when it has a fault.

Disk Drive LEDs

Each disk drive contains two status LEDs, which are visible from the front of the Ultra160 SCSI enclosure.

The LEDs are described in the following table.

Name	Color	Description	Safe to Remove Disk Drive?
Disk Drive State LED (located on the right)	Solid green	Illuminates when the disk drive is initialized (contains at least one volume or partition) and mirrored, or when the disk drive is uninitialized.	Yes
	Solid amber	Illuminates when the disk drive is initialized but not mirrored.	No
	Blinking amber	Illuminates when a fault occurs within the disk drive.	Yes
	Slow blinking green	Illuminates when the storage enclosure is first powered on (in its initial state) or when the disk drive is offline.	No, if the storage enclosure has just been powered on. Yes, if the disk drive is offline
	Fast blinking green	Illuminates when the disk drive is being identified (when you select the disk drive through ftSMC for identification).	No
Disk Activity LED (located on the left)	Solid green	Illuminates when the disk drive is active (performing read/write operations).	No

ACMs and Power Supply LEDs

The Ultra160 SCSI enclosure ACMs and power supplies include the status-reporting LEDs. The audible alarm button shown is permanently disabled through firmware, although it beeps once upon successful completion of the CCM power-on self-test (POST).

1. ACM fan 1 LED
2. ACM fan 2 LED
3. Power supply fault LED
4. Power on LED
5. Audible alarm button

The Ultra160 SCSI enclosure ACM and power supply status-reporting LEDs are described in the following table.

Component	LED	Meaning
ACM LEDs and Alarm Button	Fan 1 LED (Amber) Fan 2 LED (Amber)	These light only when the CSM detects a fan fault.
	Audible alarm button	The alarm is disabled by ftServer software.
Power Supply LEDs	Power On (Green)	Lights when the power supply is on and operating normally.
	Fault LED (Amber)	Lights steadily when the CSM detects a power-supply fault.

CSM LEDs

The CSM controls and monitors a number of the storage enclosure's operations.

In split-bus mode, the two Bus A LEDs on the left CSM and the two Bus B LEDs on the right CSM (as seen from the rear) are steadily lit green.

The ES activity LED is on when the CSM's ES module is active. It is off when the ES is in standby mode.

2.4.1.4 SCSI Disk Drive and CD-ROM Drive Problems and Solutions

System Disk Drives

The following table lists some possible problems that the system disk drives may encounter, as well as some corrections.

Problem	Action
Disk Fault LED is illuminated.	A fault has occurred within the disk drive. Replace disk drive.
System will not boot from system disk.	Ensure that the disk drive boot is enabled through the BIOS setup program. For more information, see the Windows 2000 Help system.
	Try to boot from the system disk's mirrored partner. To do so, unlatch the suspected faulty system disk.
Cannot access data.	Some files may contain viruses. Run a virus-scan utility on the disk drive.
	Some files may be corrupted. Use the Emergency Repair Disk (ERD) to help repair problems with system files. For more information, see the Windows 2000 Help system.
Slow response time	The disk drive may be full. Ideally, at least 15 percent of the disk drive should be free. Delete unnecessary files, or move files to another disk drive.
	The disk drive may need to be defragmented. To defragment a disk, use the Disk Defragmenter tool of Windows 2000. For more information, see the Windows 2000 Help system.
	Mirror regeneration may be occurring. Try to schedule mirror regeneration for a time when the system is not heavily used. However, if the disk contains business-critical data, you should regenerate the mirrors as soon as possible.
	The disk drive may be reading a compressed file. In the future, avoid compressing files that are heavily used.
	Many read or write operations may be queued to the disk drive. If the ftServer Software Availability Manager indicates an unusually high number of disk requests outstanding, you should examine how your applications are using the disks. For more information about the ftServer Software Availability Manager, see the <i>Stratus ftServer Software Availability Manager User's Guide (R007W)</i>.
	Errors may be occurring on the drive. Check the system event log.

CD-ROM Drives

The CD-ROM drive has a single LED (the Busy Indicator) that indicates whether the drive is busy. It does not have an LED that indicates whether a fault has occurred.

The following table lists some possible problems that the CD-ROM drive could encounter, as well as some corrections.

Problem	Action
CD-ROM drive is not working properly	Ensure that the disc has been inserted correctly.
	Check for environmental problems that can damage disc media and drive heads. Environmental problems can result from airborne contaminants (smoke, steam, dust, and ashes) or radiated interference (hand-held receivers, communications and radar installations, and radio/television broadcast transmitters).
	Check that no paper or plastic label, or any residue, is attached to the surface of the disc that is in use.
	Ensure that the correct drivers are installed.
System cannot read disc	Ensure that the disc is clean and does not contain any scratches.
CD-ROM drawer will not open	Insert a straightened paper clip into the emergency eject hole.
System will not boot from CD-ROM drive	Ensure that the CD-ROM boot is enabled through the BIOS setup program. For more information, see the Windows 2000 Help system.

2.4.2 Software-Based Troubleshooting

When a fault or some other event occurs at a hardware device, for example, a PCI card failure or an environmental monitor exceeding a threshold, the device driver notifies the **ftServer Manager (ftSM)**. If **ftSM** determines that the event is significant, as defined by the ftServer's Policy Service, it forwards the event notification to the Alarm Service for processing. The Alarm Service then forwards the notification as follows:

- Event information is recorded in the Windows 2000 Event Log.
- The user is notified by email or pager, depending on user configuration of the ftServer Manager.

Hardware errors are detected by the system hardware and evaluated by the maintenance and diagnostics software. After a hardware error, the software directs the affected device to self-test. If the device fails the test, the error is called a *hard error* and the device is taken out of service. If the device passes the test, the error is called a *soft error*.

The system takes the device out of service and places it in the *Broken* state under the following circumstances:

- The error is a hard error.
- The error is a soft error and the MTBF (Mean Time Between Failures) threshold for the device has been reached.

If the error is a hard error and the MTBF threshold has not been reached, the system attempts to enable the device and return it to service.

In addition, **ftSM** continuously copies the ftServer Windows 2000 Event Log to the ftServer Access Host Log on both ftServer Access adapters so that support personnel can retrieve the log in the event of a failure of the ftServer system.

Information about hardware failures can be viewed from various sources:

- Windows 2000 Event Log
- ftServer Access Logs
- System Inventory from the ftServer Management Console

Windows 2000 Event Log

The Windows 2000 Event Viewer can access three log files:

- Application log - records events about system applications.
- Security log - records events about system security.
- System log - records events about general system activity.

Hardware failure information is contained in the system log. These logs are accessed through the Windows 2000 **Administrative Tools**, using the **Event Viewer** option.

To access the **Event Viewer** go to

Start → **Programs** → **Administrative Tools** → **Event Viewer**

For more information about these logs, what they contain, and how to access them, refer to the [Stratus ftServer: System Administrator's Guide \(R014W\)](#)

ftServer Access Logs

The **ftServer Access Console (ftSAC)** displays two logs: the **Host log** and the **ftSA log**. The **Host log** contains messages related to events occurring on the ftServer system. The **ftSA log** contains messages related to events occurring on the **ftSA**. These logs are accessed through the **Logs** tab of the **ftSAC** user interface. For more information about these logs, what they contain, and how to access them, refer to the [Stratus ftServer Access User's Guide \(R003W\)](#)

To connect to ftServer Access

1. In a Web browser, specify the IP address of one of the ftServer Access Adapters, followed by a forward slash (/), as the Address or Location. For example:
2. Log on to the ftServer Access Console.

To examine entries from the host log

1. On the **Logs** tab, scroll down to the box labeled **Host Log**.
2. To select the number of entries you want to see, click the **View Log Entries** list above the **Host Log** box and click a setting.
3. Click **Refresh** to update the log entries with the most recent entries.

To examine entries from the ftServer ftSA log

1. On the **Logs** tab, scroll down to the box labeled **ftSA Log**.

2. To select the number of entries you want to see, click the **View Log Entries** list above the **ftSA Log** box.
3. Click **Refresh** to update the log entries with the most recent entries.

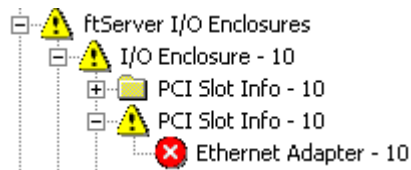
System Inventory (Component Status)

The ftServer System Inventory, which is accessible through the **ftServer Management Console (ftSMC)**, displays a tree-list of system components. Next to each component name is an icon that indicates the status of the component. A failed component is indicated by a white X in a red circle. This condition causes a warning icon (yellow triangle with !) to appear next to all parent nodes of the failed node. The error icon appears next to the SCSI slot that failed, and the warning icon appears in the three nodes that precede the failed node.

To determine that a component failed

1. Go to **Start** → **Programs** → **Administrative Tools**
2. Click on **Console.msc**
3. In the Console tree, click on the ftServer node.
4. Look for **Warning** or **Error** icons. If you see a **Warning** icon, click the plus sign (+) in front of nodes that have a **Warning** icon until you see an **Error** icon indicating the component that has failed.

For example, **Warning** icons appear in these three nodes and the **Error** icon appears beside the SCSI Slot that has a problem, as shown below.



5. Click the problem node and check the MTBF: Current value in the Details pane. If it is less than the MTBF: Threshold value, the node has failed and the system takes it out of service.

For example:

```
MTBF: Time of Last Fault May 30, 2001 15:07:24
MTBF: Threshold 300 seconds
MTBF: Number of Faults 2
MTBF: Current 220 second
```

For more information about System Inventory, refer to the the [Stratus ftServer: System Administrator's Guide \(R014W\)](#)

2.5 Taking a Component Offline

In the **ftSMC** Console tree, select and right-click the failed component.

From the pop-up menu, select **Initiate Bring Down**. This results in shutting down the component.

NOTE: If the failed component is a mirrored disk, break the mirror before shutting the failed disk down.

If you are going to remove a disk, first confirm that the disk's mirror is present and functioning. If the mirror is present, go to Windows 2000 **Disk Management** and break the mirror. To break a mirror, right-click one of the disks and select **Break Mirror**.

To determine what disks are mirrored, go to Windows 2000 **Disk Management**. The logical disks that have the same drive letter are a mirrored pair. Replace the component and bring the replaced component back online. See the next subsection.

2.6 Bringing a Component Online

In the **ftSMC** Console tree, select and right-click the new component.

From the pop-up menu, click **Initiate Bring Up**. This results in bringing the component online.

3. CRU Hardware Removal and Replacement Procedures

This section lists the Customer Replaceable Units (CRUs) in the ftServer 3300 system and describes the removal and replacement procedures for each one.

3.1 List of CRUs

The following table lists the CRUs in the ftServer 3300 system.

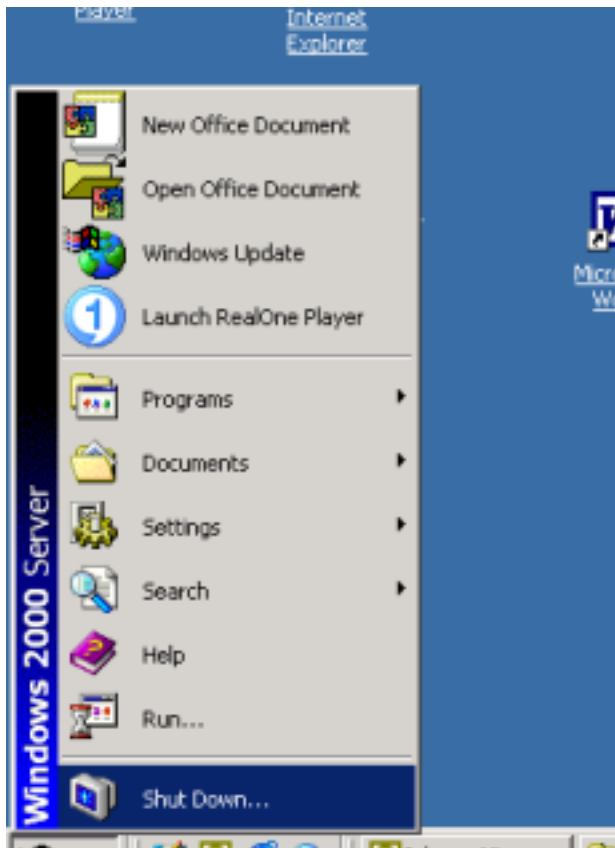
Component	Part Number
CPU Enclosure (No memory or CPU)	AA-G92XX0
CPU Enclosure LED PCB Panel	AA-E70700
Enclosure Cover (CPU and I/O)	NA
CPU Enclosure Power Supply (350 watts)	AA-P70300
CPU Enclosure Memory Module (DIMM)	AA-M22X00
CPU Enclosure Power Cable	AW-020088
Core I/O Enclosure	AA-E89800
Core I/O Enclosure PCI Adapter	AA-UXXX00
Core I/O Enclosure Fan Assembly	MA000569
Core I/O Enclosure CD-ROM Drive	AA-D55100
Core I/O Enclosure Disk Drive	AA-D53X00
4 U Backplane PCB	AA-E70200
Clock Card	AA-E70300
Connector I/O PCB	AA-E70100
Ultra 160 SCSI Enclosure with Split Backplane	AA-D52003
Ultra 160 SCSI Enclosure Advanced Cooling Module (ACM)	MF000041
Ultra 160 SCSI Enclosure Power Supply Module (PSM)	AA-P57009
Ultra 160 SCSI Enclosure Cluster Services Module (CSM)	AA-E52200
Ultra 160 SCSI Enclosure Disk Drive or LED Module	AA-D52X00/ AA-00038X

3.2 Power Removal

If total power removal is required, the system must be shut down prior to removing power and rebooted after the replacement unit is installed.

1. To shut down the ftServer system, click the **Start** button on the Windows 2000 desktop and click **Shut Down**.

Figure 3-1. Start Menu



2. In the **Shut Down Windows** dialog box, select **Shut Down** and then click **OK**. A message states that your system is shutting down.

Figure 3-2. Shut Down Window



3. When the system displays the message *It is now safe to turn off your computer*, the system will turn off its power automatically. This removes main power from the system; however, standby power to the Baseboard Management Controller (BMC) remains on.
4. Turn off power to the monitor and any peripheral devices.
5. At the back of the system, remove the two AC power cords connected to the backplane power outlets.

Figure 3-3. AC Power Cords



3.3 Handling ESD Sensitive Parts

Clock cards and PCI adapters are particularly sensitive to damage from electrostatic discharge (ESD) because the electronic components are exposed when the device is not fully installed.

Caution: To avoid damaging these parts during handling, always take the following precautions.

- Always store cards and adapters in their static-protective envelope until you are ready to install them in the system.
- Always hold an adapter or card by its edges.
- Always ground yourself before handling a clock card or a PCI adapter, or before removing or replacing the I/O enclosure. Ground yourself by wearing a grounding strap.

3.4 Hardware Removal Procedures

This section contains the removal procedures for the CRUs listed in the preceding table. Each of these procedures indicates any power removal requirements for the CRU.

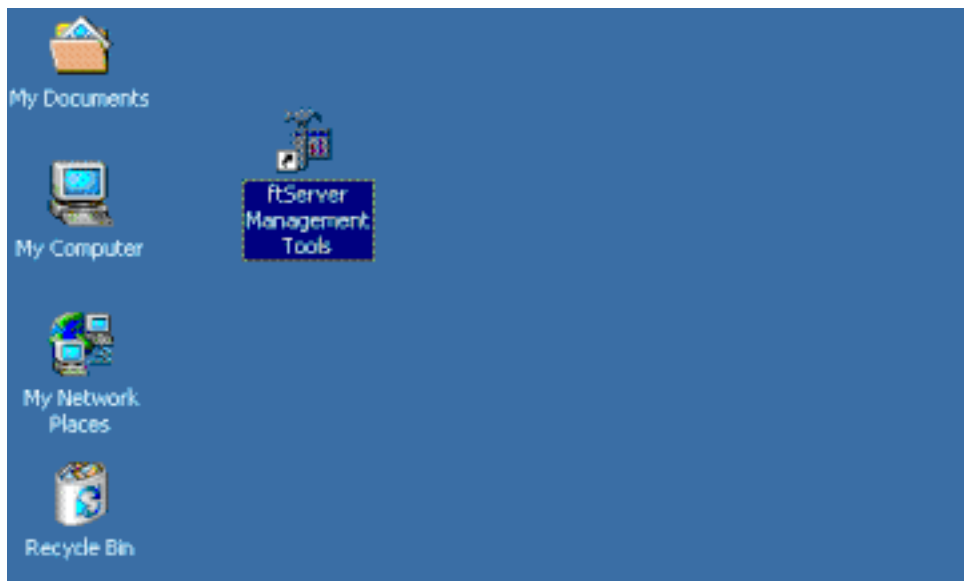
To perform the replacement procedure for each CRU, reverse the removal procedure. If any special replacement considerations are necessary, a replacement note is included.

3.4.1 CPU Enclosure

If the CPU enclosure is still in service, take it out of service as follows:

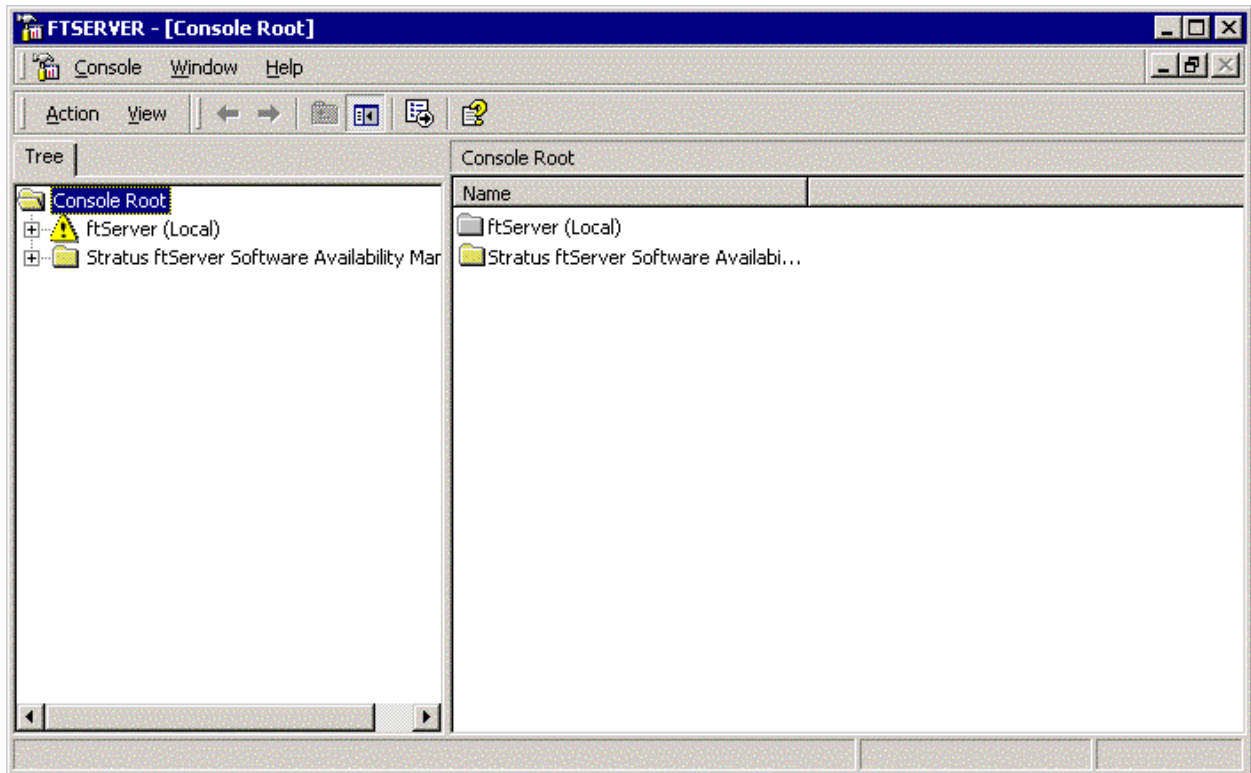
1. On the desktop, double click the **ftServer Management Tools** icon.

Figure 3-4. *ftServer Management Tools Icon*



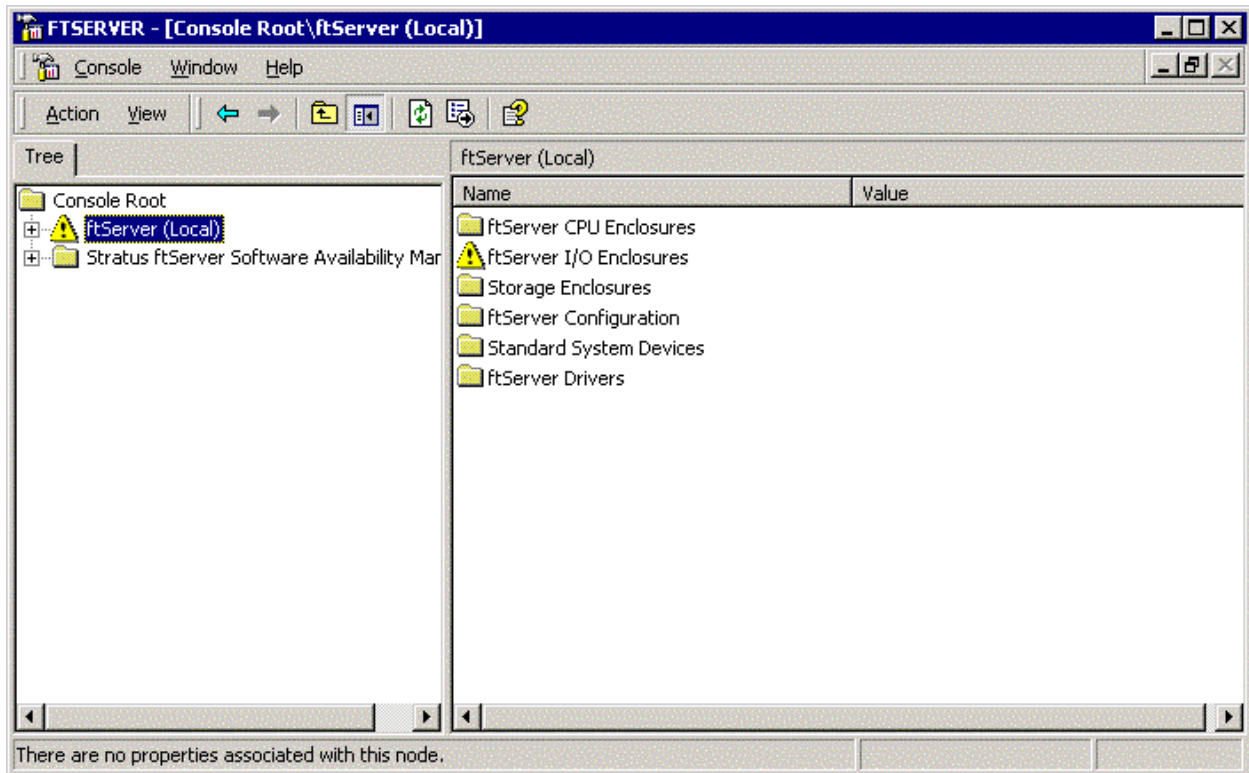
2. On the **ftServer Management [Console Root]** screen, select **Console Root**.

Figure 3-5. *ftServer Management Console Screen*



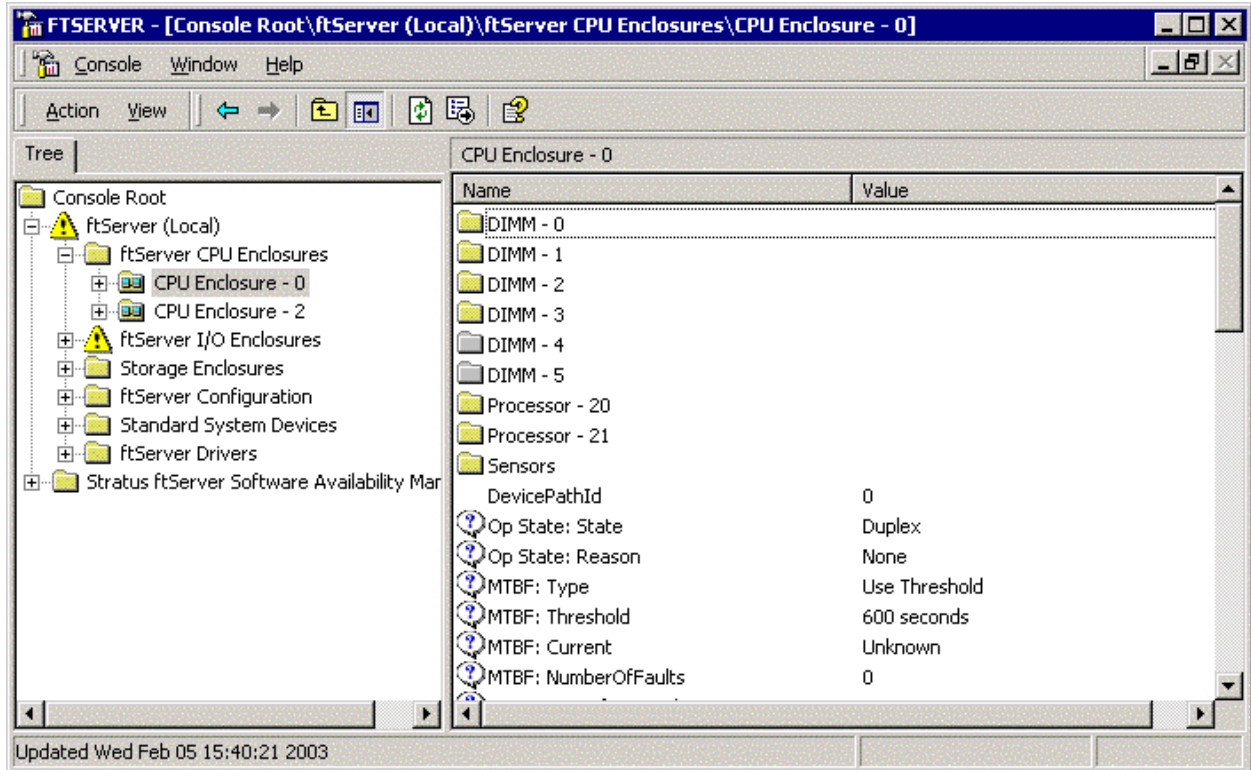
3. Select **ftServer (Local)**.

Figure 3-6. Console Root Screen



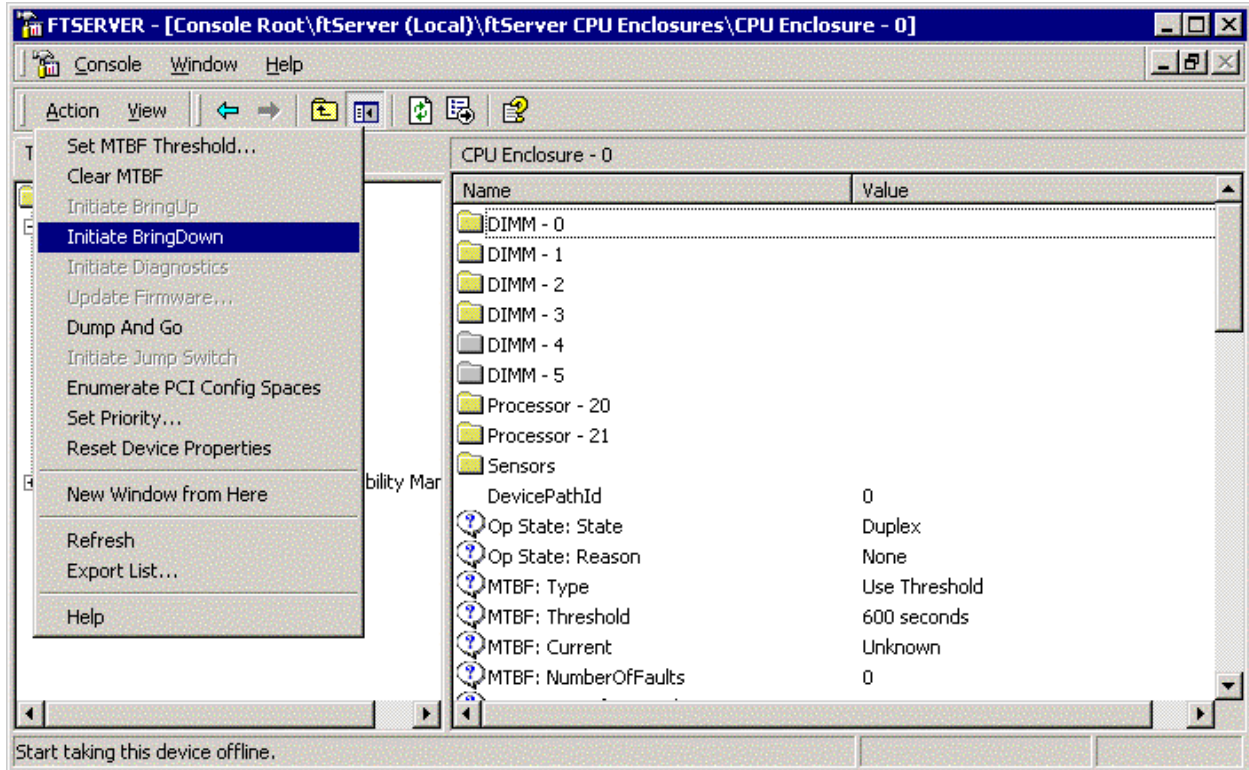
4. Select the CPU enclosure you want to remove.

Figure 3-7. *ftServer CPU Enclosures Screen*



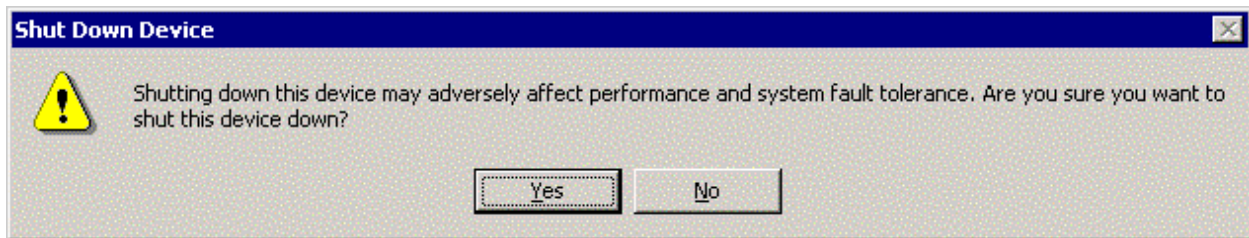
5. In the **Action** menu, click **Initiate BringDown**.

Figure 3-8. Action Menu Screen



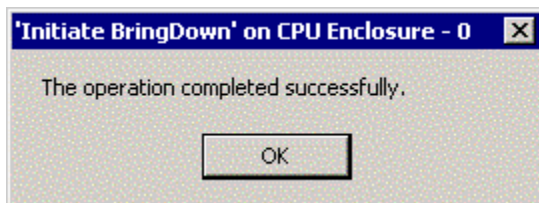
6. When the following screen appears, click on **Yes**.

Figure 3-9. Warning Screen



7. Monitor the status of the device to determine that it has been taken offline. Click **OK** to the message that appears.

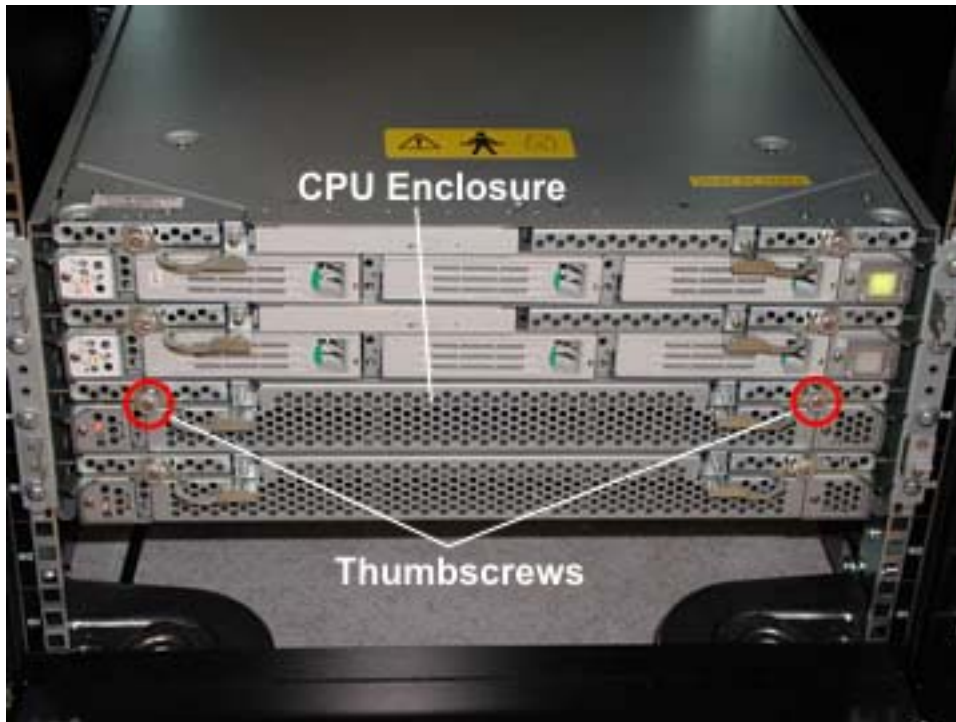
Figure 3-10. Message Screen



For detailed information about how to use the **ftServer Management Console**, see the [Stratus ftServer: System Administrator's Guide \(R014W\)](#)

8. At the front of the enclosure, loosen the two thumbscrews.

Figure 3-11. CPU Enclosure Thumbscrews



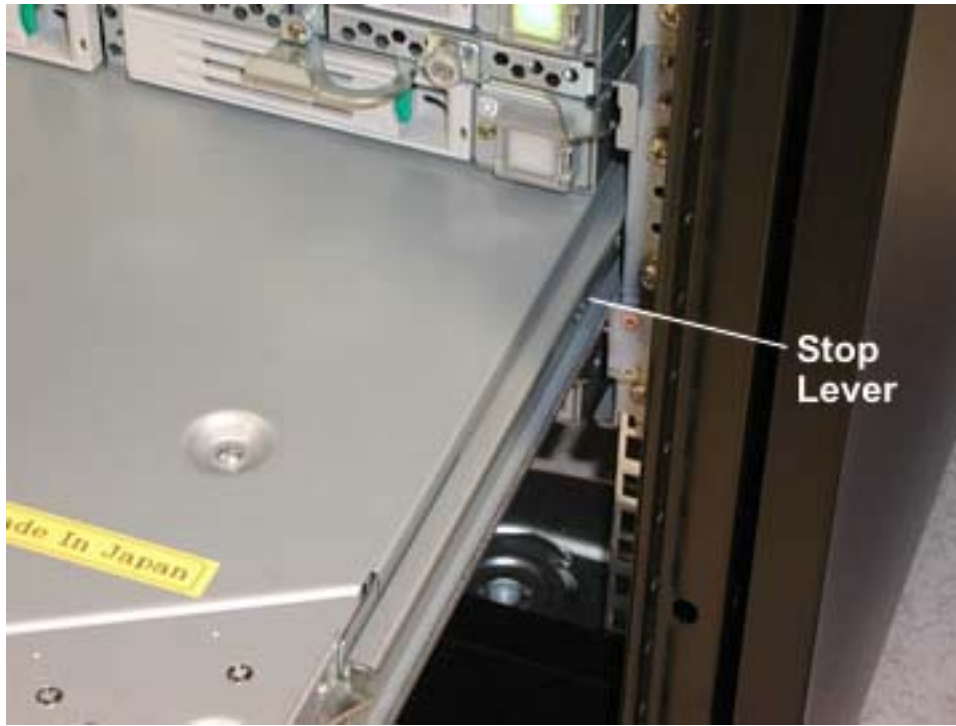
9. Pull the two ejector levers out.

Figure 3-12. CPU Enclosure Ejector Levers



10. Carefully pull the enclosure straight out until it stops. Press down on the stop lever on the right side of the enclosure and pull the enclosure all the way out.

Figure 3-13. CPU Enclosure Stop Lever



REPLACEMENT NOTE: The back left side of the enclosure (as seen from the front) is keyed to fit only into a CPU enclosure slot. Be sure that the enclosure is correctly aligned with the appropriate rails on both sides. It should be perfectly level. If you put the CPU enclosure into an I/O enclosure slot by mistake, it will be forced to a stop before being plugged into the backplane.

3.4.2 Core I/O Enclosure

If the I/O enclosure is still in service, take it out of service as follows:

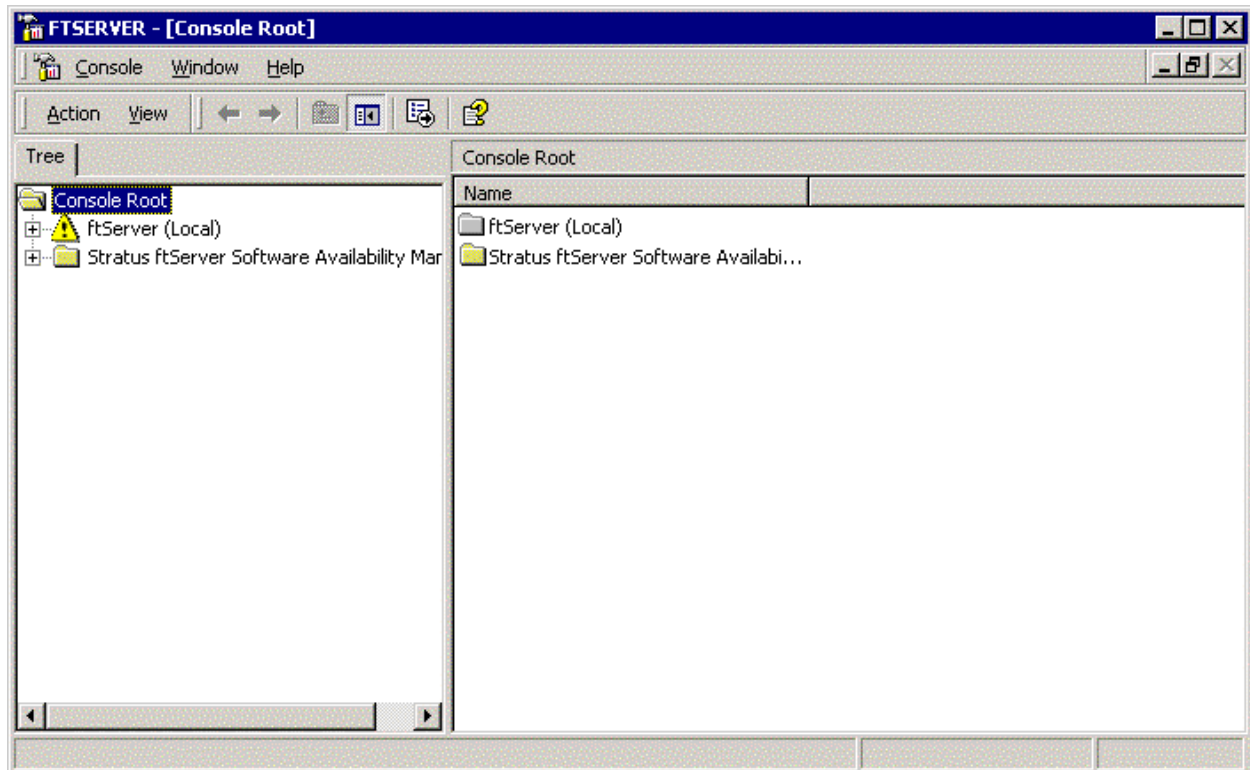
1. On the desktop, double click the **ftServer Management Tools** icon.

Figure 3-14. ftServer Management Tools Icon



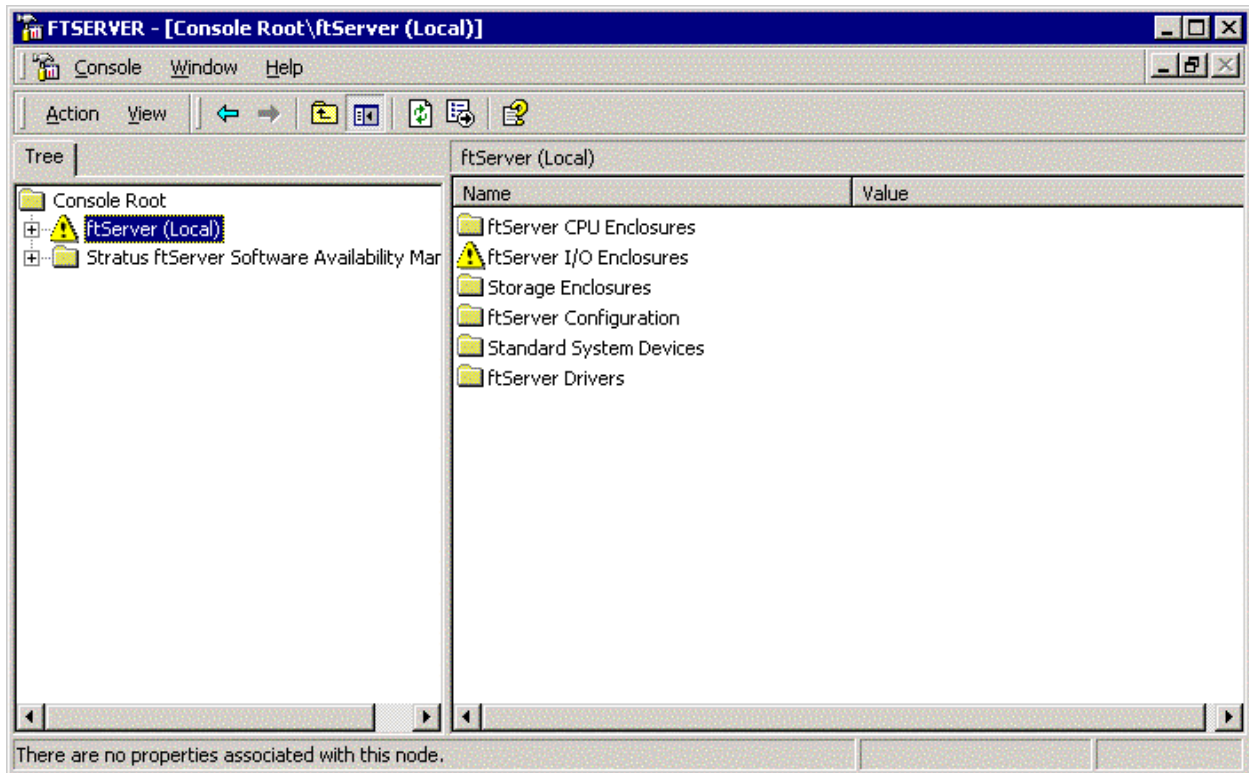
2. On the **ftServer Management [Console Root]** screen, select **Console Root**.

Figure 3-15. ftServer Management Console Screen



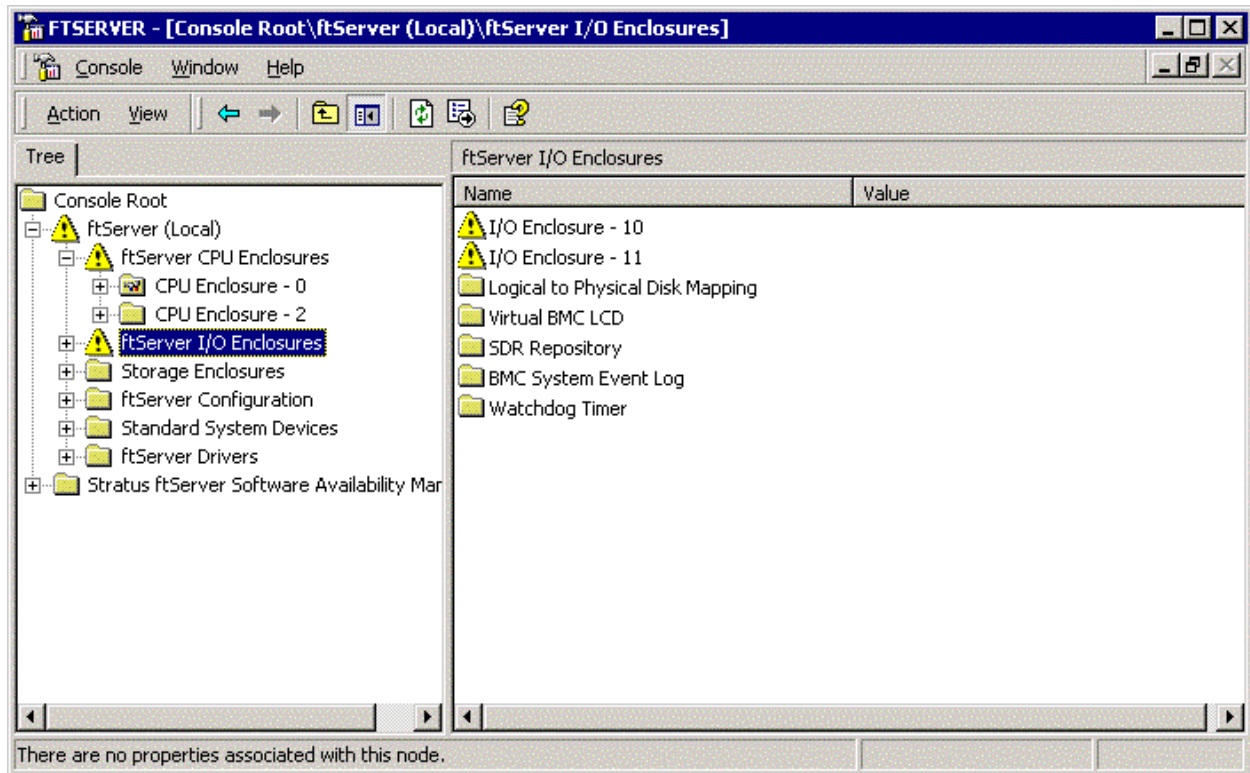
3. Select **ftServer (Local)**.

Figure 3-16. Console Root Screen



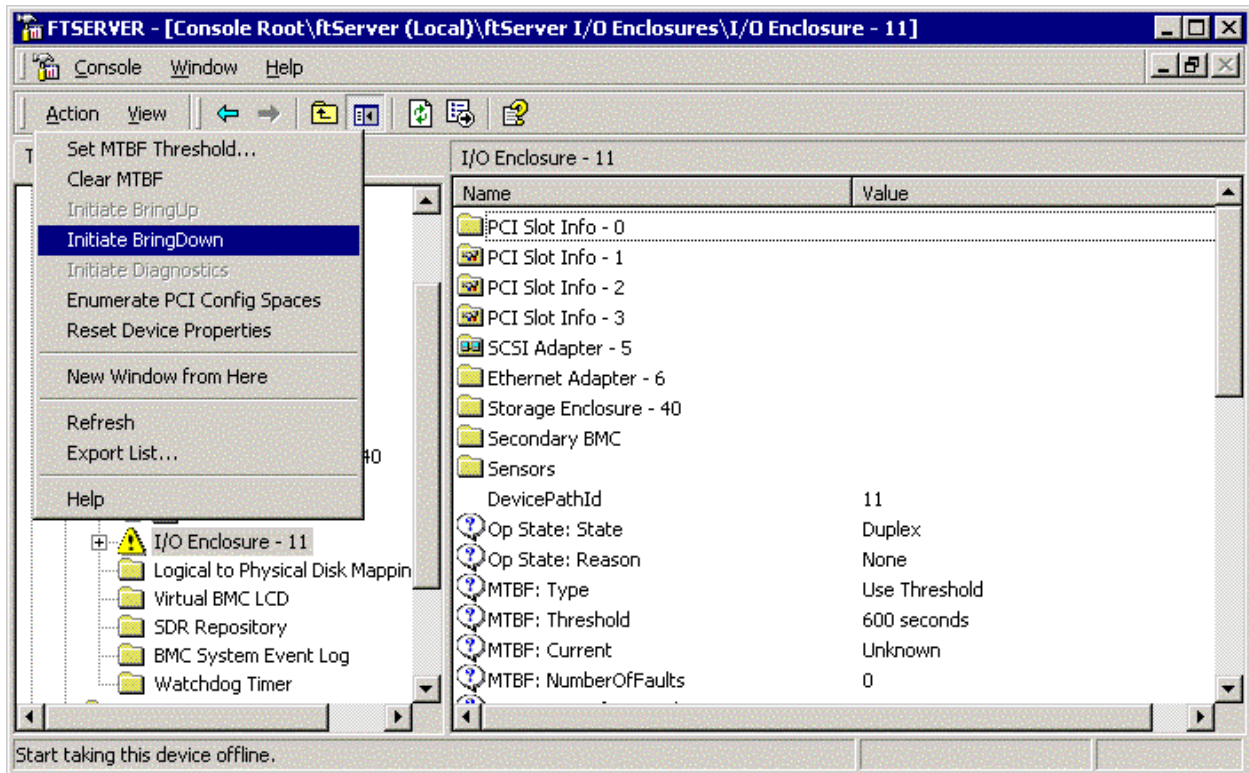
4. Select the I/O enclosure you want to remove.

Figure 3-17. *ftServer CPU Enclosures Screen*



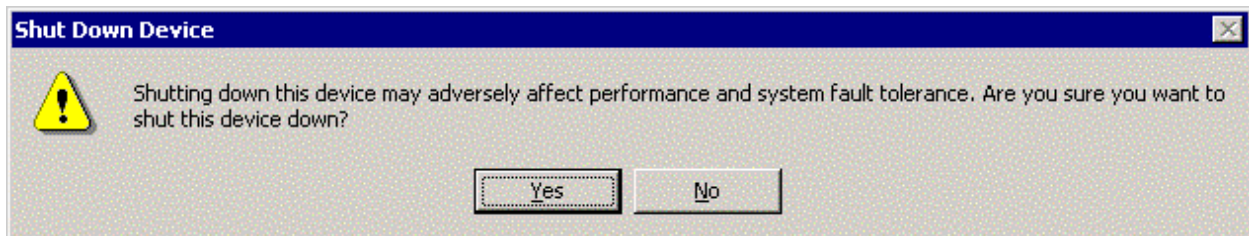
5. In the **Action** menu, click **Initiate BringDown**.

Figure 3-18. Action Menu Screen



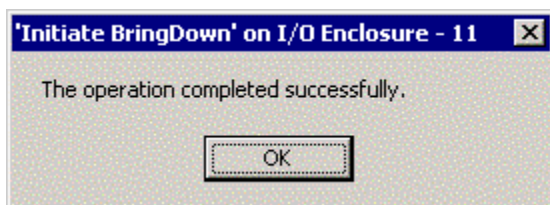
6. When the following screen appears, click on **Yes**.

Figure 3-19.



7. Monitor the status of the device to determine that it has been taken offline. Click **OK** to the message that appears.

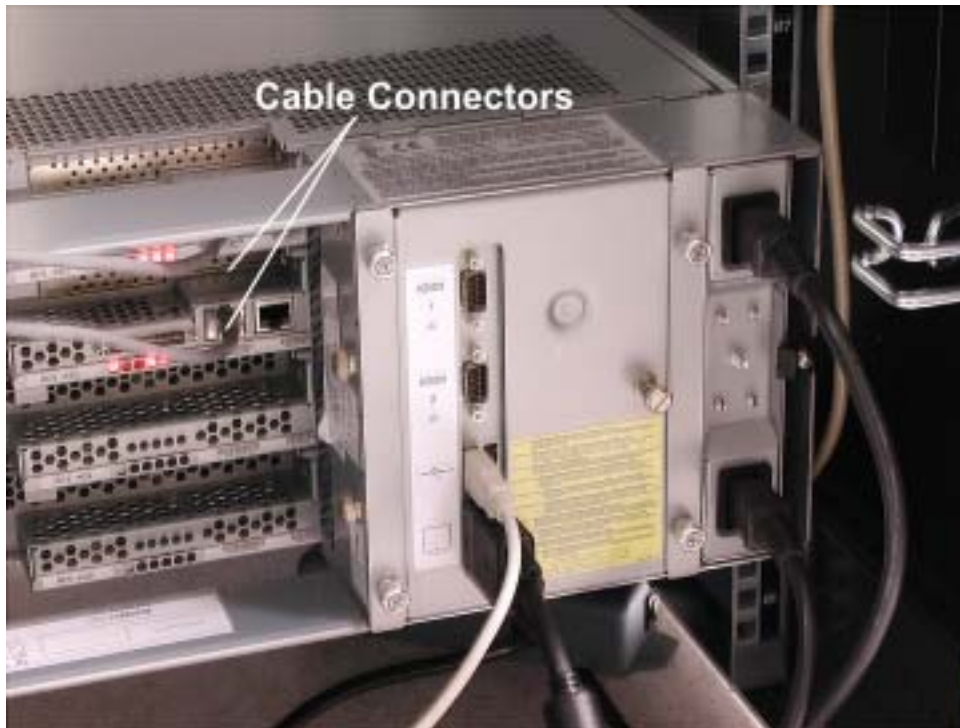
Figure 3-20. Message Screen



For detailed information about how to use the **ftServer Management Console**, see the [Stratus ftServer: System Administrator's Guide \(R014W\)](#)

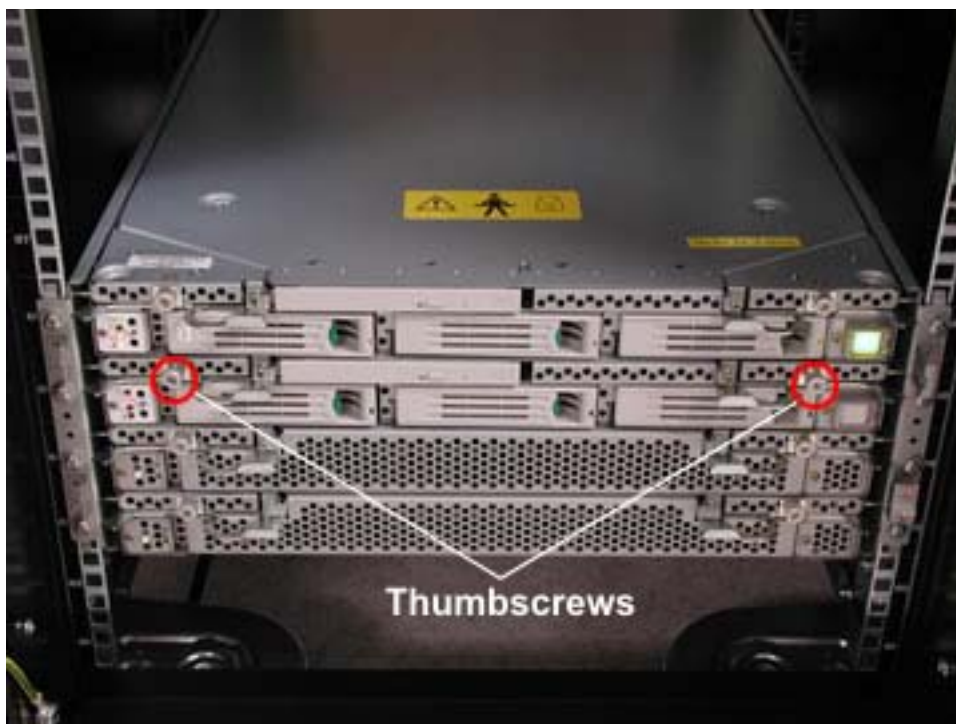
8. Disconnect all cables from the back of the enclosure.

Figure 3-21. I/O Enclosure Cables



9. Loosen the two thumbscrews at the front of the enclosure.

Figure 3-22. I/O Enclosure Thumbscrews



10. Pull the two ejector levers out.

Figure 3-23. I/O Enclosure Ejection Levers



11. Carefully pull the enclosure straight out until it stops. Press down on the stop lever on the right side of the enclosure and pull the enclosure all the way out.

Figure 3-24. Removing I/O Enclosure

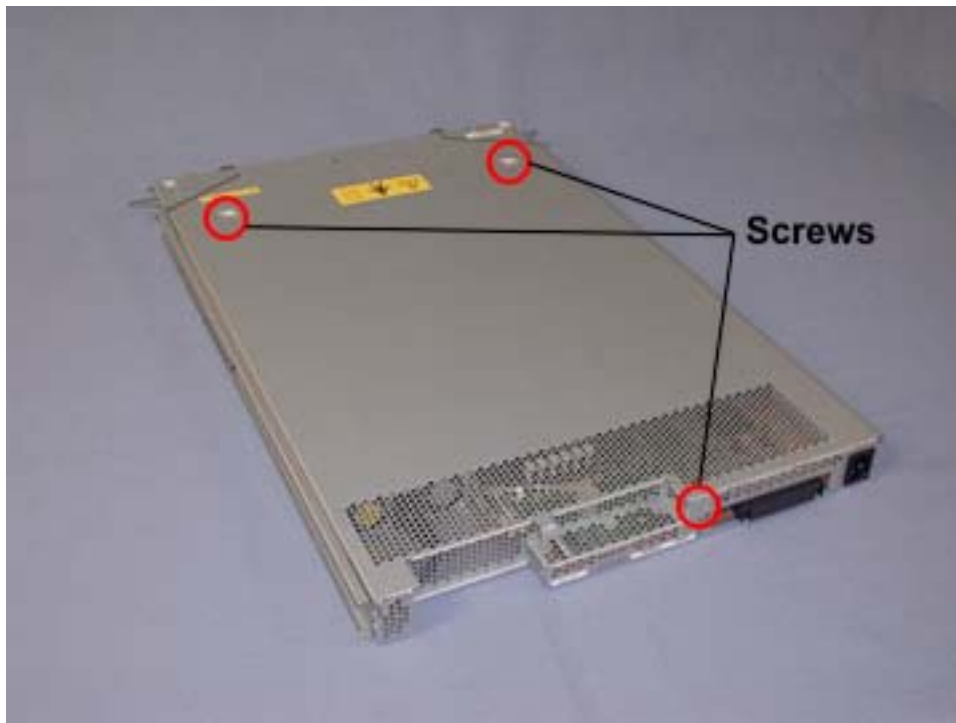


REPLACEMENT NOTE: The back of the I/O enclosure is keyed to fit only into an I/O enclosure slot. Be sure that the enclosure is correctly aligned with the appropriate rails on both sides. It should be perfectly level. If you put the I/O enclosure into a CPU enclosure slot by mistake, it will be forced to a stop before being plugged into the backplane.

3.4.3 Enclosure Cover (CPU and I/O)

1. Remove the CPU or I/O enclosure as described in Section 3.4.1 or Section 3.4.2.
2. Remove the three screws securing the enclosure cover.

Figure 3-25. Enclosure Cover Screws



3. Slide the cover straight back towards the rear of the enclosure.

Figure 3-26. Removing Enclosure Cover



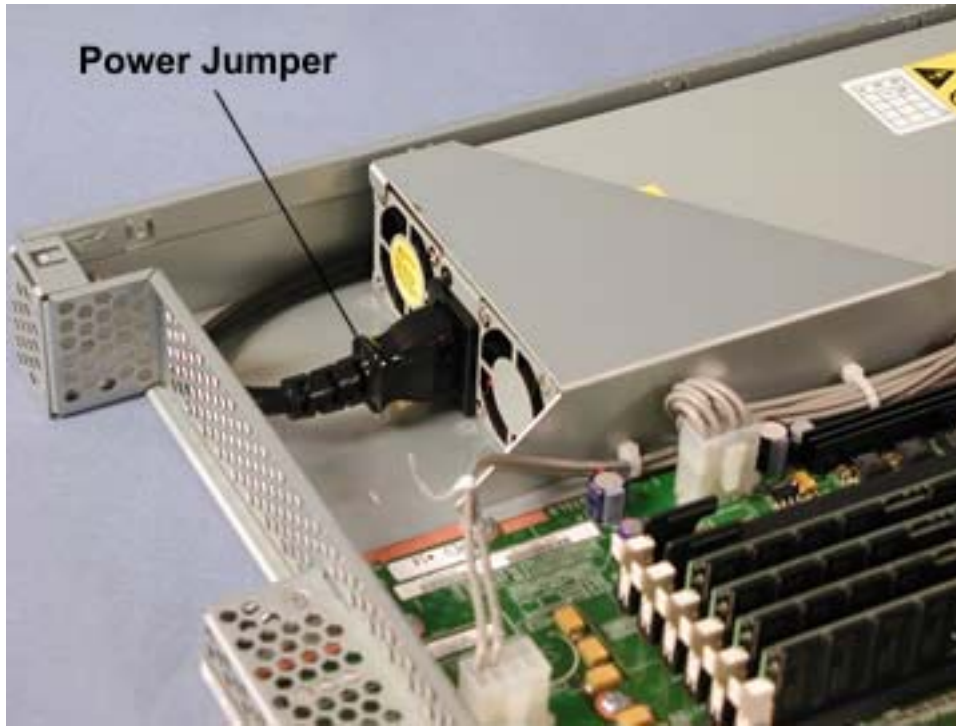
REPLACEMENT NOTE: When sliding the cover onto the enclosure make sure the small tab in the center front of the cover aligns with the tab hole on the front of the enclosure frame. The four tabs on the back of the cover must align with their holes in the back of the enclosure frame. The tapered ends of the top front portion of the cover must fit beneath the tapered ends of the enclosure front frame top.

REPLACEMENT NOTE: The back left side of the CPU or I/O enclosure (as seen from the front) is keyed to fit only into a CPU or I/O enclosure slot. Be sure that the enclosure is correctly aligned with the appropriate rails on both sides. It should be perfectly level. If you put the CPU enclosure into an I/O enclosure slot by mistake, it will be forced to a stop before being plugged into the backplane.

3.4.4 CPU Enclosure Power Supply

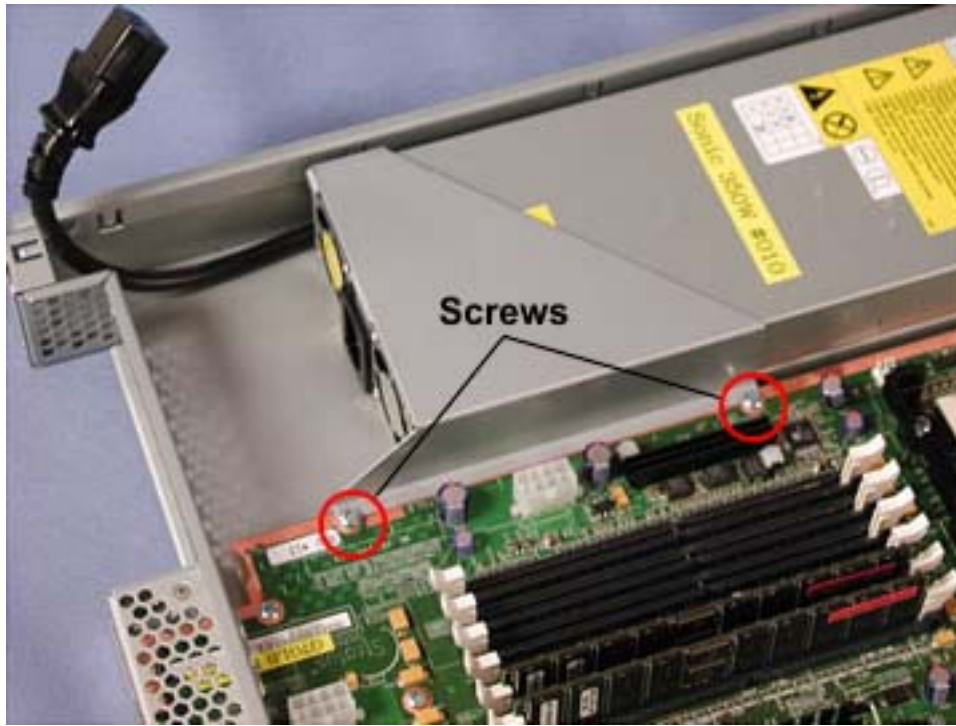
1. Remove the CPU enclosure as described in Section 3.4.1.
2. Remove the CPU enclosure cover as described in Section 3.4.3.
3. Disconnect the power jumper at the back of the power supply.

Figure 3-27. Power Jumper



4. Remove the two screws on the right side (from the back) of the metal bracket covering the power supply and lift the bracket off.

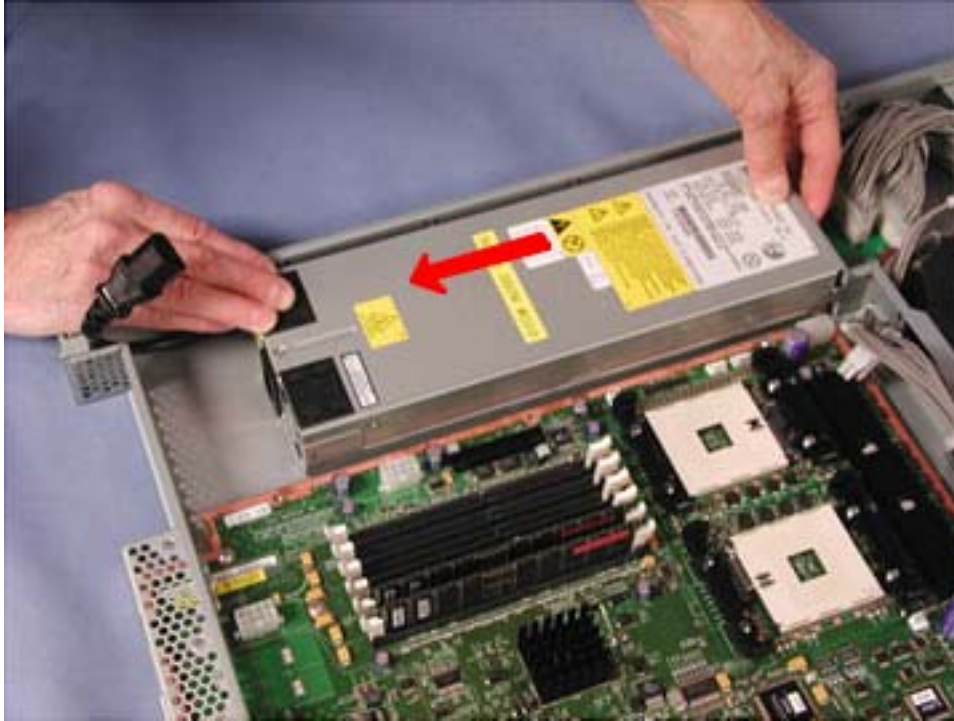
Figure 3-28. Power Supply Bracket Screws



CAUTION: The surface of the power supply may be hot.

5. Place one hand at the front of the power supply and push on it while pulling it the **straight** back with the other hand until it disconnects from the front connector, and remove it from the enclosure.

Figure 3-29. Removing Power Supply



3.4.5 Memory Module (DIMM)

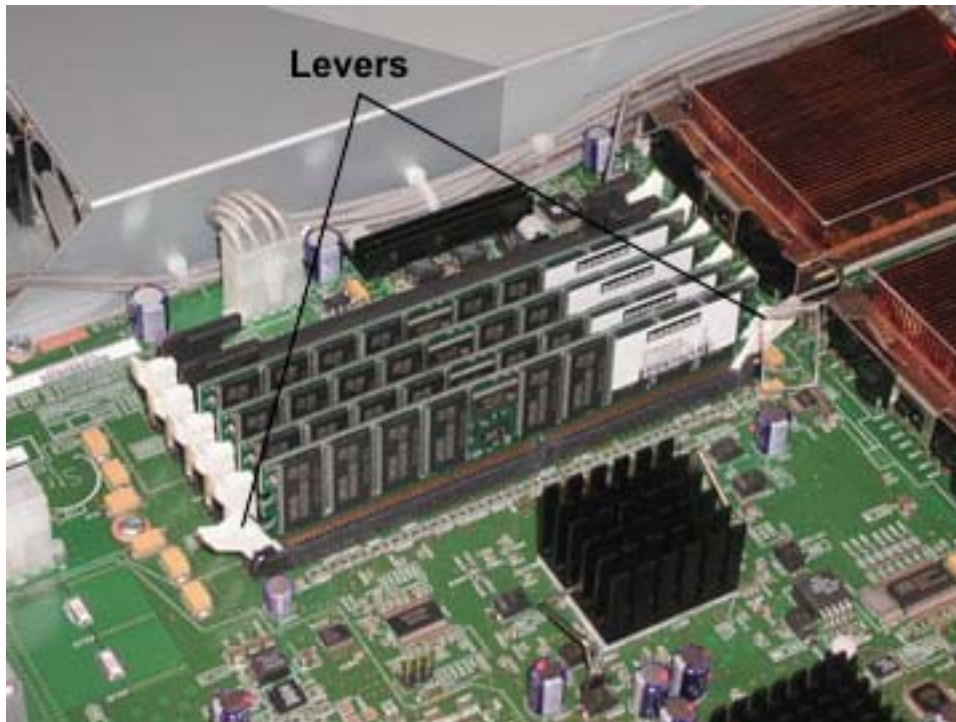
The CPU enclosure can accommodate up to four DIMMs. DIMMs must be placed starting in DIMM slot 0 (the leftmost slot, as seen from the enclosure front) and proceeding sequentially to DIMM slot 3.

Both CPU enclosures must be configured with identical total memory size. DIMMs of different capacities and from different manufacturers may be mixed within a CPU enclosure; however DIMMs of identical capacity must be mounted in the corresponding memory slot between each CPU enclosure.

1. Remove the CPU enclosure as described in Section 3.4.1.
2. Remove the CPU enclosure cover as described in Section 3.4.3.

3. Push down on the two levers at the ends of the DIMM socket to release the DIMM.

Figure 3-30. Removing a DIMM



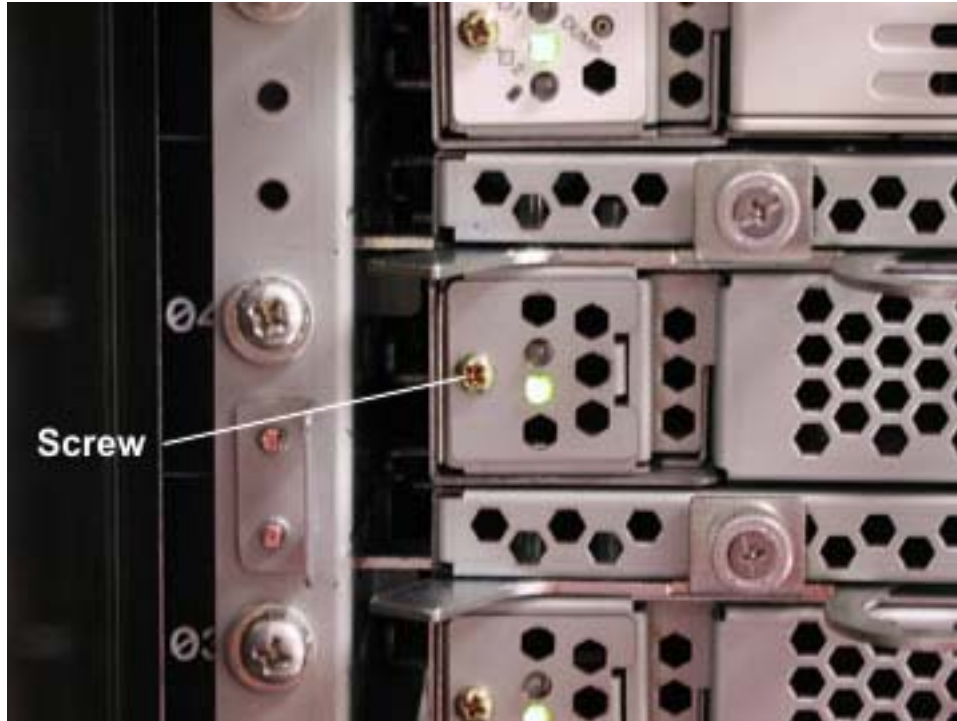
4. Pull the DIMM straight up and out of its socket.

REPLACEMENT NOTE: The DIMMs are keyed to fit only in the correct position.

3.4.6 CPU Enclosure LED PCB Panel

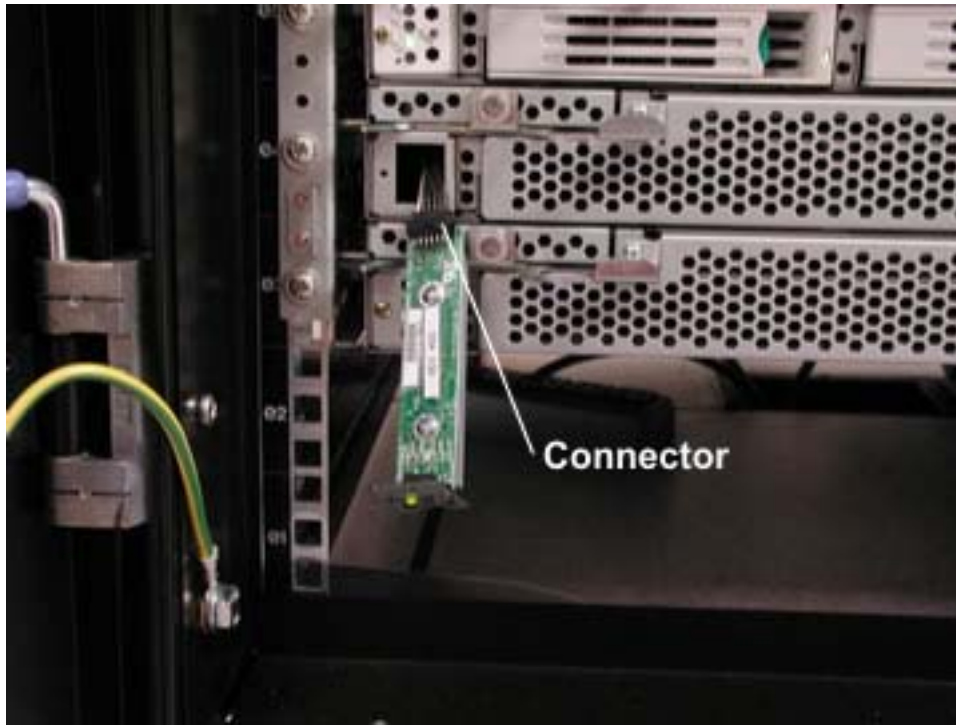
1. Remove the screw in the CPU enclosure LED PCB panel at the front of the enclosure.

Figure 3-31. CPU Enclosure LED PCB Screw



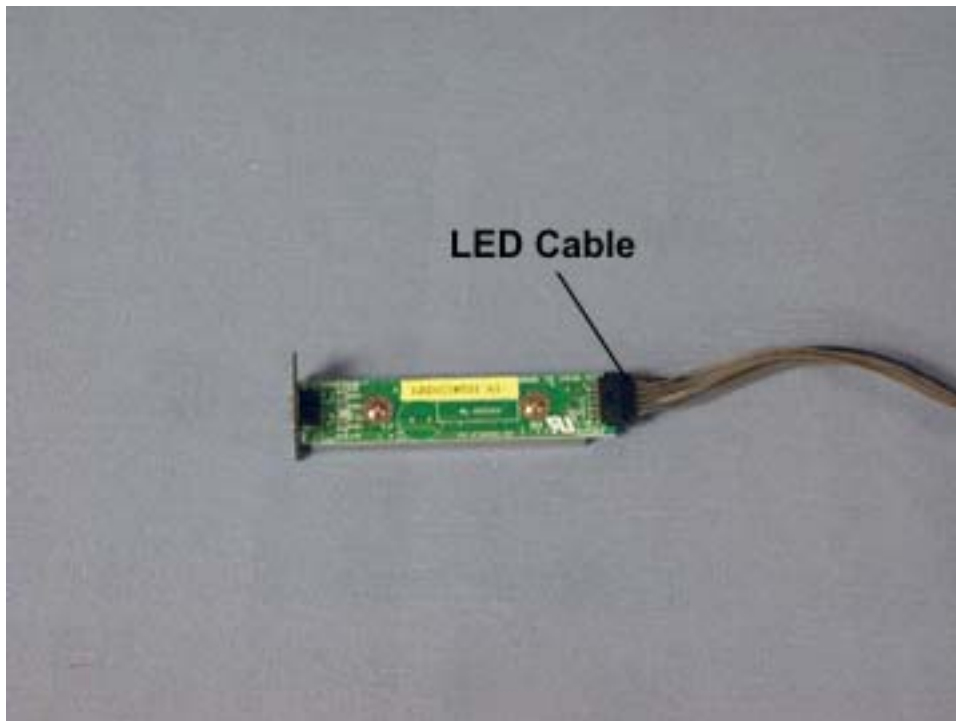
2. Pull the LED PCB panel straight forward out of the enclosure until the LED cable connector is accessible. Do not pull it out any farther than is necessary to access the connector.

Figure 3-32. Removing LED PCB



3. Disconnect the LED Cable from the back of the LED PCB panel.

Figure 3-33. CPU Enclosure LED PCB Connectors



3.4.7 CPU Enclosure Power Cable

1. Remove the CPU enclosure as described in Section 3.4.1.
2. Remove the CPU enclosure cover as described in Section 3.4.3.
3. Remove the power supply as described in Section 3.4.4.
4. Remove the plastic plenum covering the processor heat sink.

Figure 3-34. Plenum



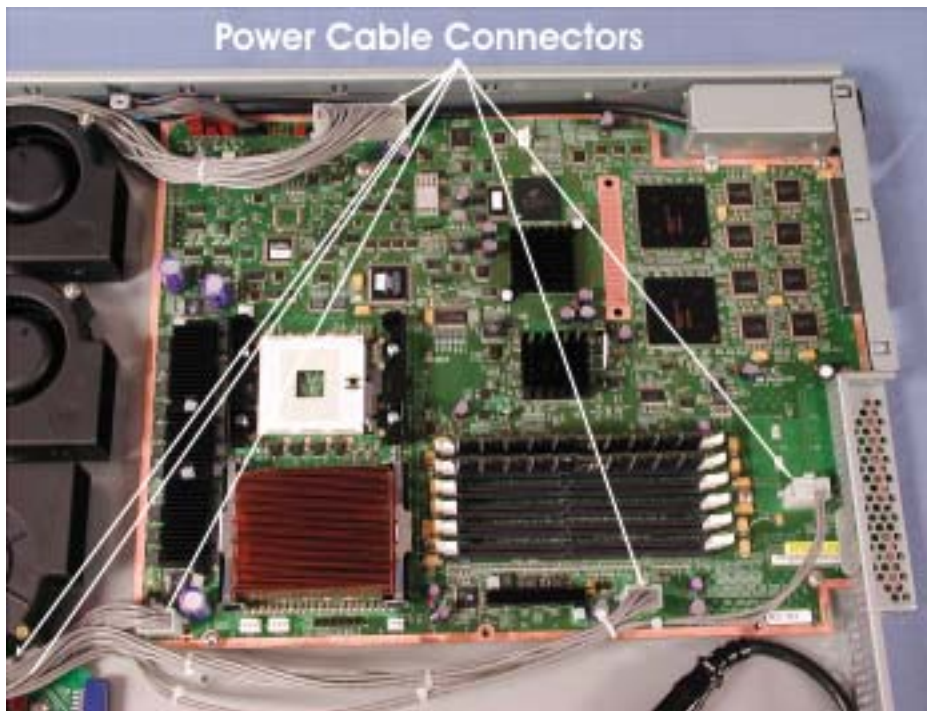
5. Remove the two screws securing the fan assembly bracket and lift it out.

Figure 3-35. Fan Assembly Bracket



6. Disconnect the power cable from the power connector board (2 connectors) and the motherboard (4 connectors).

Figure 3-36. Power Cable Connections at Power Connector Board and Motherboard

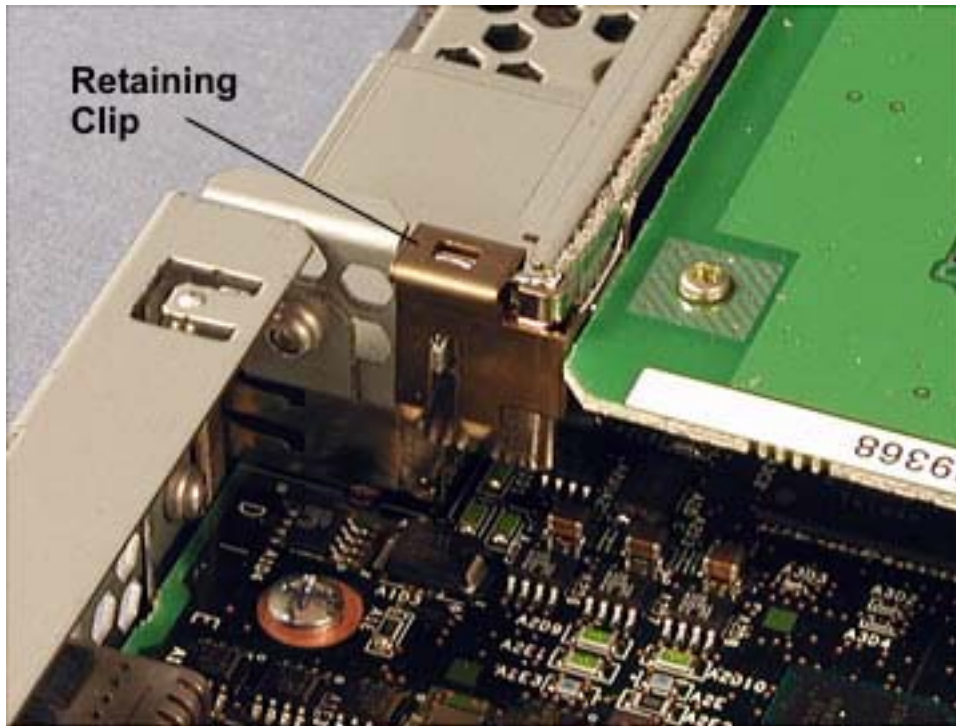


7. Carefully lift the power cable out from behind the fan assembly and out of the enclosure.

3.4.8 PCI Adapter

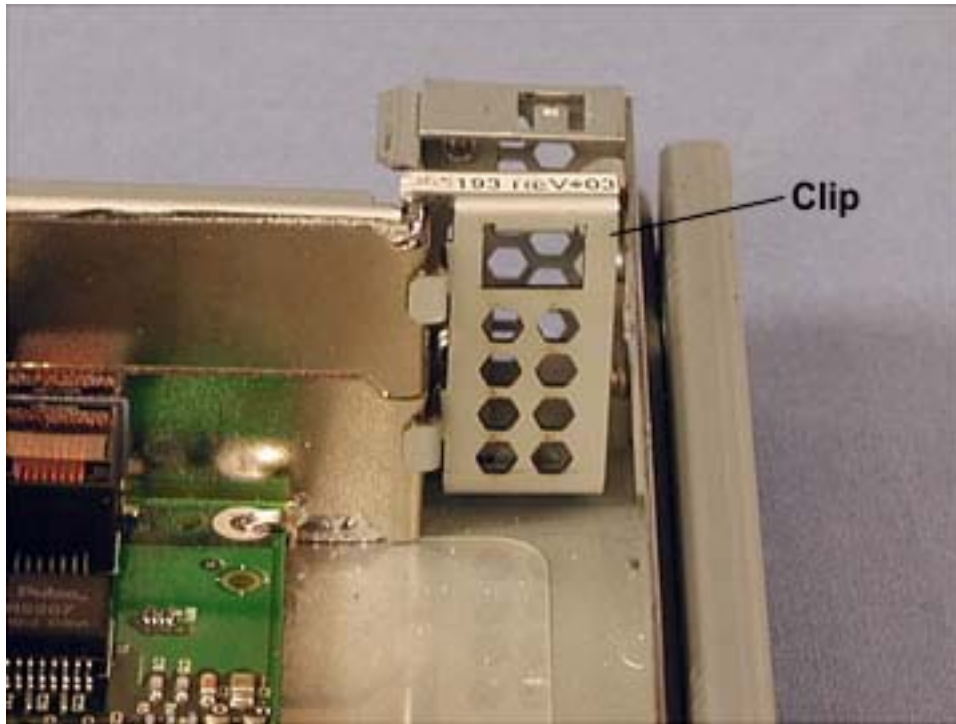
1. Remove the core I/O enclosure containing the PCI adapter as described in Section 3.4.1.
2. Remove the I/O enclosure cover as described in Section 3.4.3.
3. To remove the fitSAA or Video adapter, remove the retaining clip securing it to the chassis.

Figure 3-37. Retaining Clip



4. If this is the ftSAA, remove the screw from the stabilizing bracket and then remove the bracket.
5. To remove any of the other adapters, first remove the clip that secures the PCI adapters by pulling it straight upward.

Figure 3-38. Retaining Clip



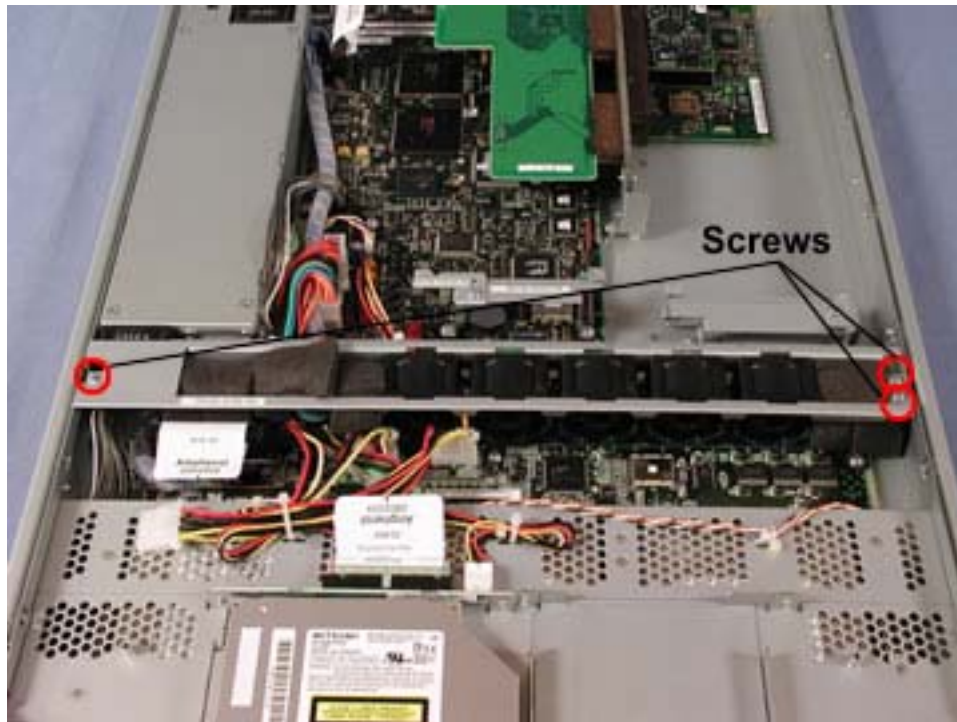
6. Pull the PCI adapter horizontally out of its connector

3.4.9 Core I/O Enclosure Fan Assembly

1. Remove the core I/O enclosure as described in Section 3.4.1.
2. Remove the I/O enclosure cover as described in Section 3.4.3.

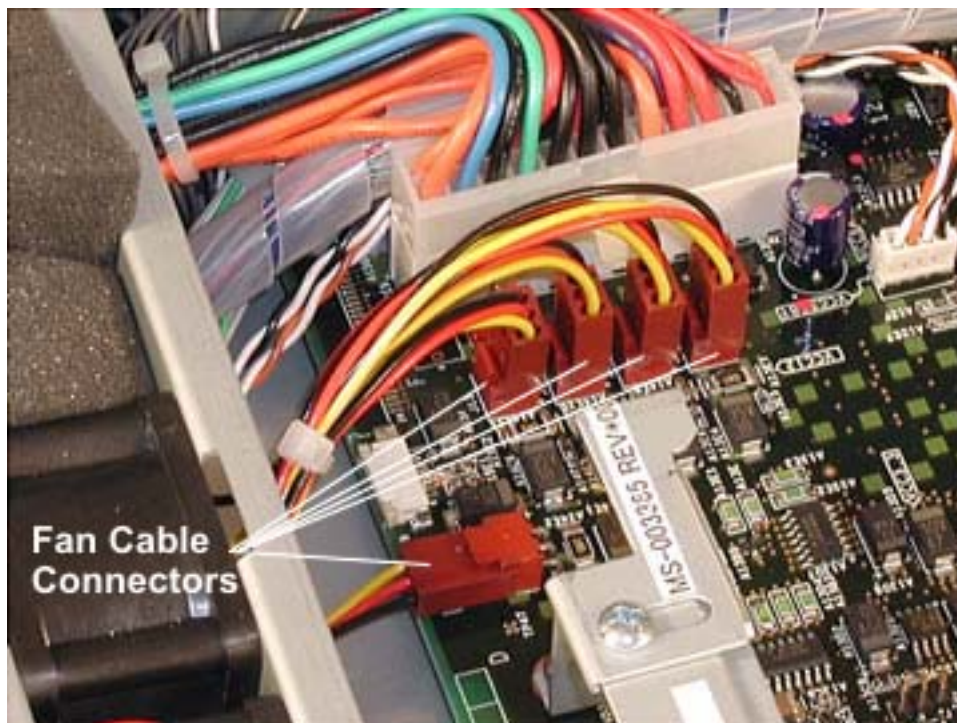
3. Remove the three screws securing the fan assembly.

Figure 3-39. Fan Assembly Screws



4. Disconnect the five fan assembly power cables from the core I/O board.

Figure 3-40. Fan Assembly Power Cable Connections



5. Lift the fan assembly straight up to remove it from the enclosure.

3.4.10 Core I/O Enclosure Disk Drive

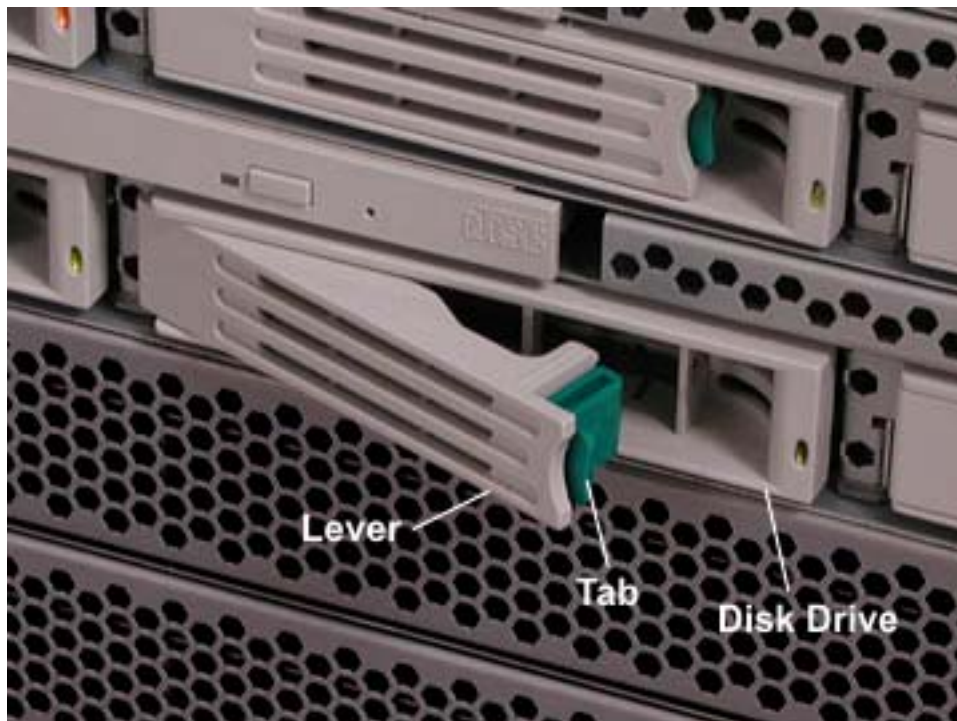
The procedure assumes that the disk drive being removed is mirrored by another drive on the system.

NOTE: NOTE: Before you remove a disk drive, you should use **VERITAS Volume Manager**, **ftSMC** or **Logical Disk Manager (LDM)** to ensure that the disk has failed. If you are removing a disk drive that has **not** failed (for example, if you are upgrading a disk drive), **VERITAS Volume Manager** or **LDM** will not list the disk drive as failed. In this case, you must use **VERITAS Volume Manager** or **LDM** to remove the disk drive's mirror and to add it back after you insert the replacement disk drive. Use **VERITAS Volume Manager** to verify that all disk drives are mirrored and healthy. (For more information about configuring disk mirroring, see the [Stratus ftServer: System Administrator's Guide \(R014W\)](#) and [VERITAS Volume Manager 2.7 for Windows 2000 User's Guide](#) .

CAUTION: Before you remove a mirrored disk drive, it is **critical** that you know which disk drives the disk drive is mirrored with. For information about determining which disk drives are mirrored, see the [Stratus ftServer: System Administrator's Guide \(R014W\)](#)

1. Press in the tab at the end of the disk-drive lever and pull the lever out to its fully open position.

Figure 3-41. Removing a SCSI Disk Drive



2. Pull the disk drive straight out of the enclosure.

3.4.11 Core I/O Enclosure CD-ROM Drive

Before removing the CD-ROM drive from the core I/O enclosure, you must remove the I/O enclosure from service.

1. Take the core I/O enclosure containing the CD-ROM drive out of service as described in steps 1-6 in Section 3.4.1. Do not remove the enclosure.
2. At the front of the enclosure loosen the two thumbscrews.

Figure 3-42. I/O Enclosure Thumbscrews



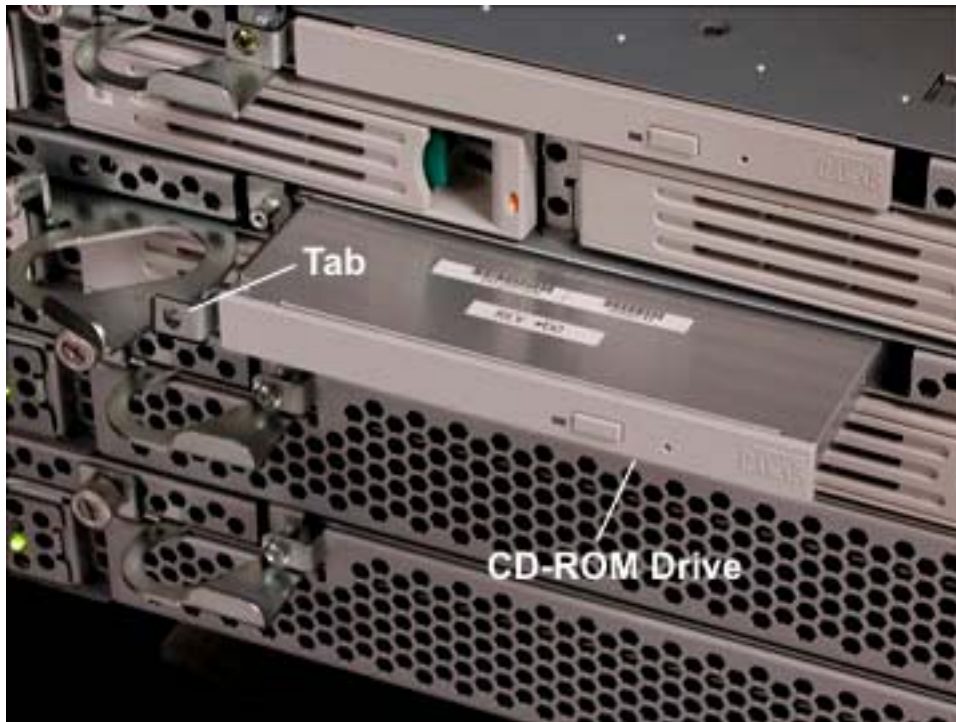
3. With the core I/O enclosure removed from service, open the enclosure's left ejector lever enough to access the screw that secures the CD-ROM drive.
4. Remove the screw at the front of the CD-ROM drive.

Figure 3-43. I/O Enclosure Ejector Lever and CD-ROM Screw



5. Hold the tab on the left side of the CD-ROM drive and pull it out of the enclosure.

Figure 3-44. CD-ROM Tab

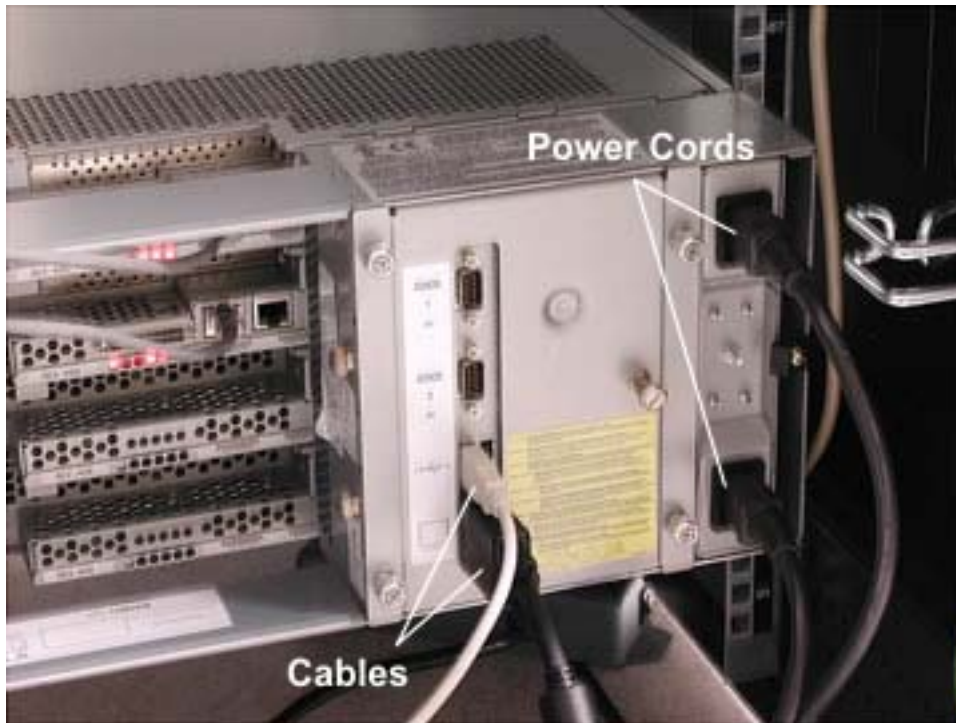


3.4.12 Clock Card

To remove the clock card, you must shut down the system and disconnect it from power.

1. Shut down the fitServer system as described in Section 3.3.
2. At the rear of the cabinet, remove the two AC power cords and any cables connected to the connector I/O PCB.

Figure 3-45. AC Power Cords



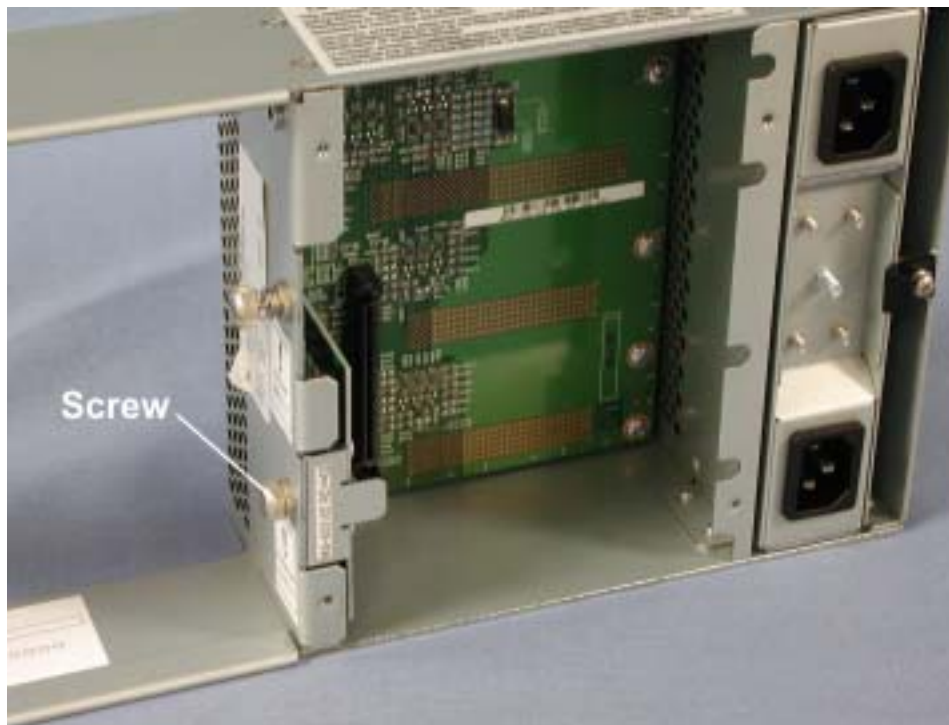
3. Unscrew the four thumbscrews on the backplane cover plate and remove the cover plate.

Figure 3-46. Backplane Cover Plate Screws



4. Unscrew the thumbscrew on the lower left side of the backplane. This screw secures the clock card in place.

Figure 3-47. Clock Card Screw

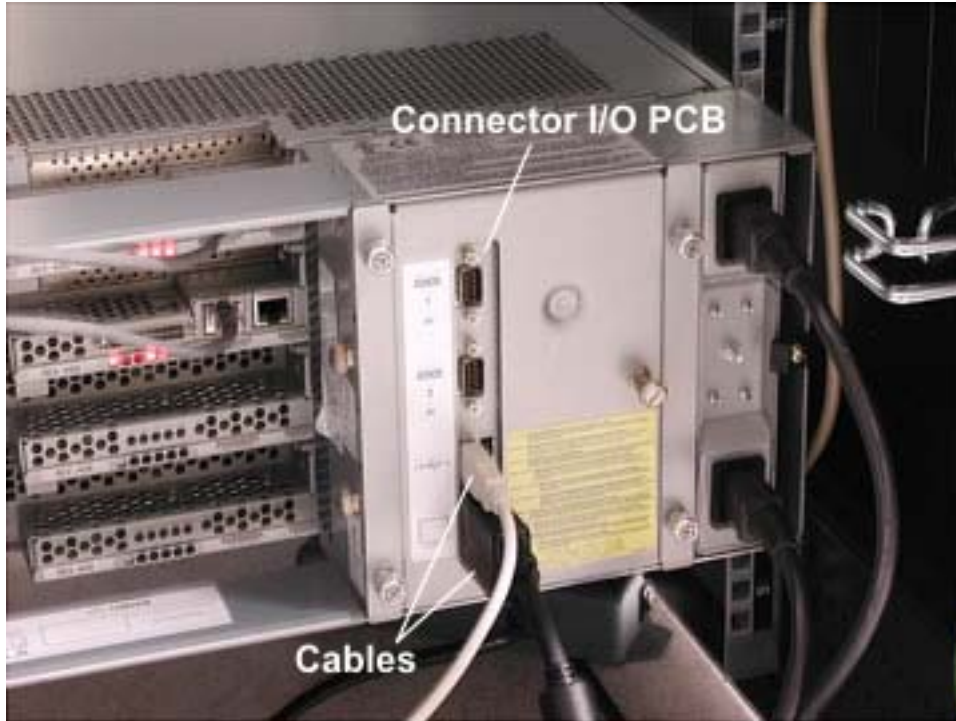


5. Pull the clock card straight out of the backplane, using the tab.

3.4.13 Connector I/O PCB

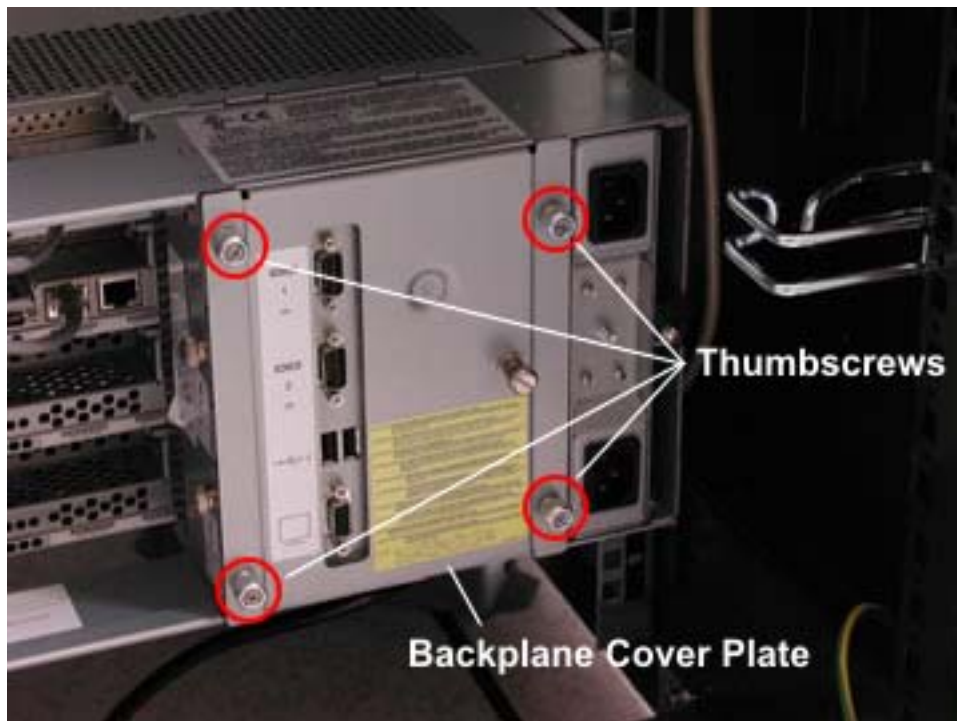
1. At the rear of the cabinet, remove the cables connected to the connector I/O PCB.

Figure 3-48. Connector I/O PCB Cable Connections



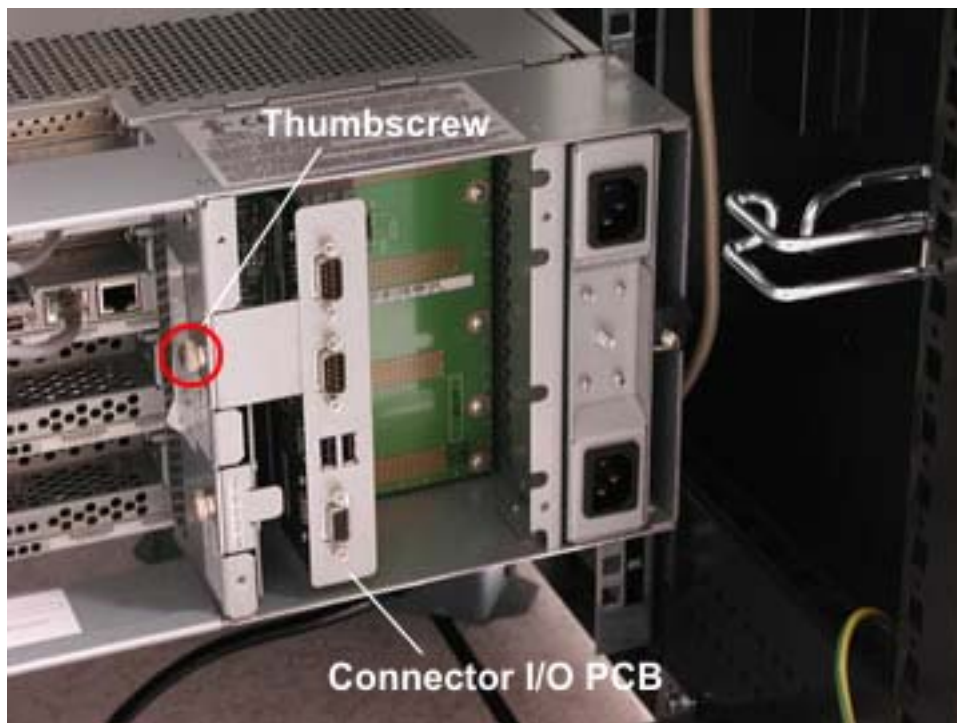
2. Unscrew the four thumbscrews on the backplane cover plate and remove the cover plate.

Figure 3-49. Backplane Cover Plate Screws



3. Unscrew the thumbscrew on the upper left side of the backplane. This screw secures the connector I/O PCB in place.

Figure 3-50. Connector I/O PCB Screw



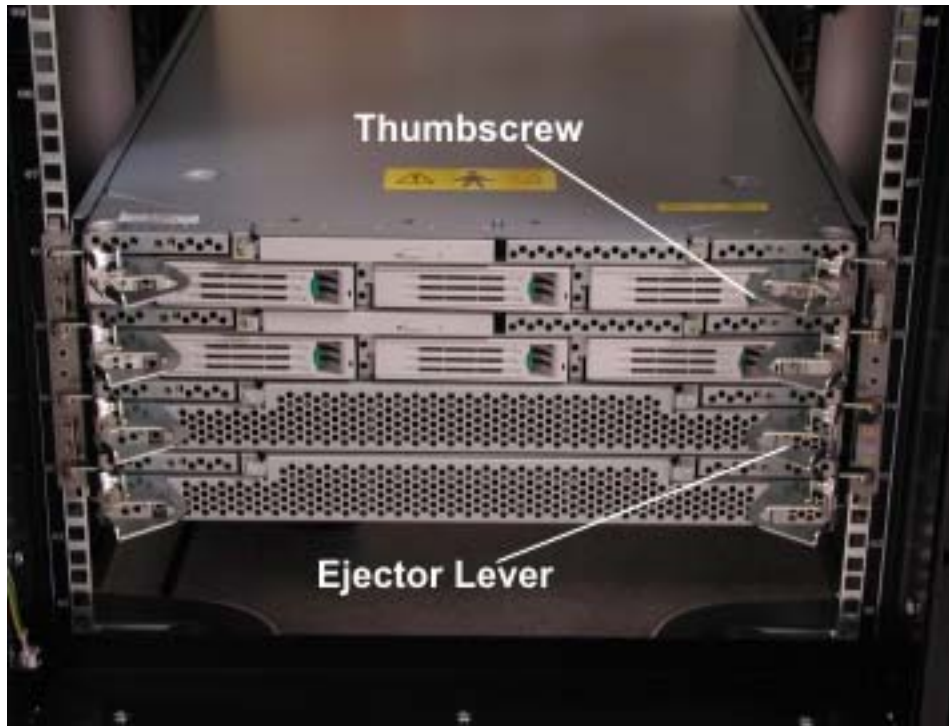
4. Pull the I/O connector PCB straight out of the backplane, using the tab.

3.4.14 Backplane PCB

To remove the backplane PCB, you must shut down the system and disconnect it from power.

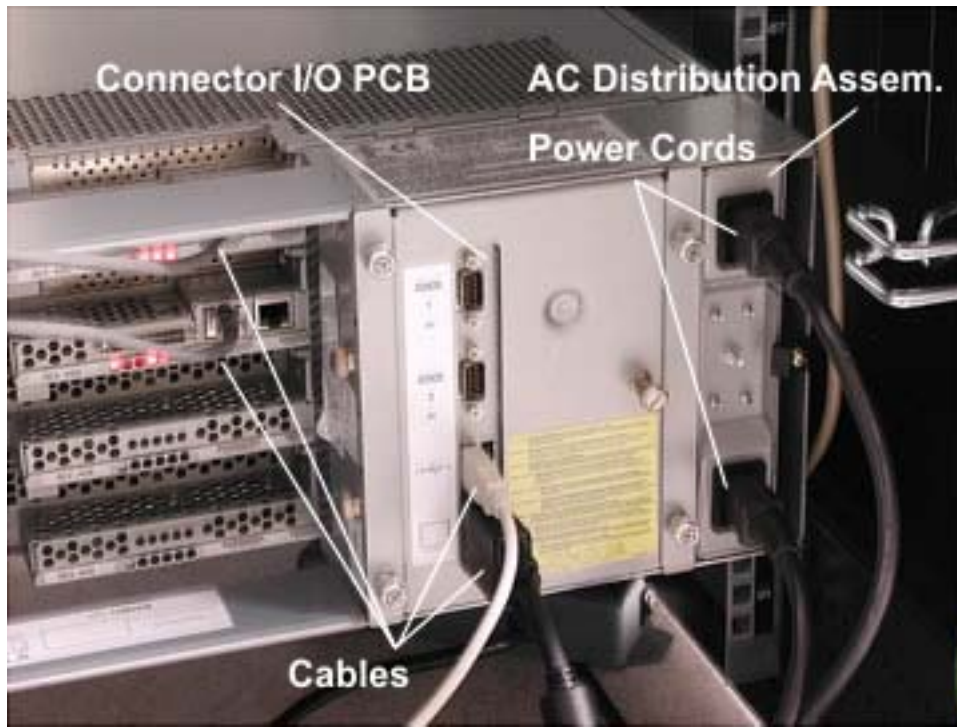
1. Shut down the ftServer system as described in Section 3.3.
2. At the front of the cabinet, loosen the two thumbscrews on the front of each CPU and I/O enclosure and open the ejector levers to disengage all the enclosures from the backplane.

Figure 3-51. CPU and I/O Enclosure Thumbscrews and Ejector Levers



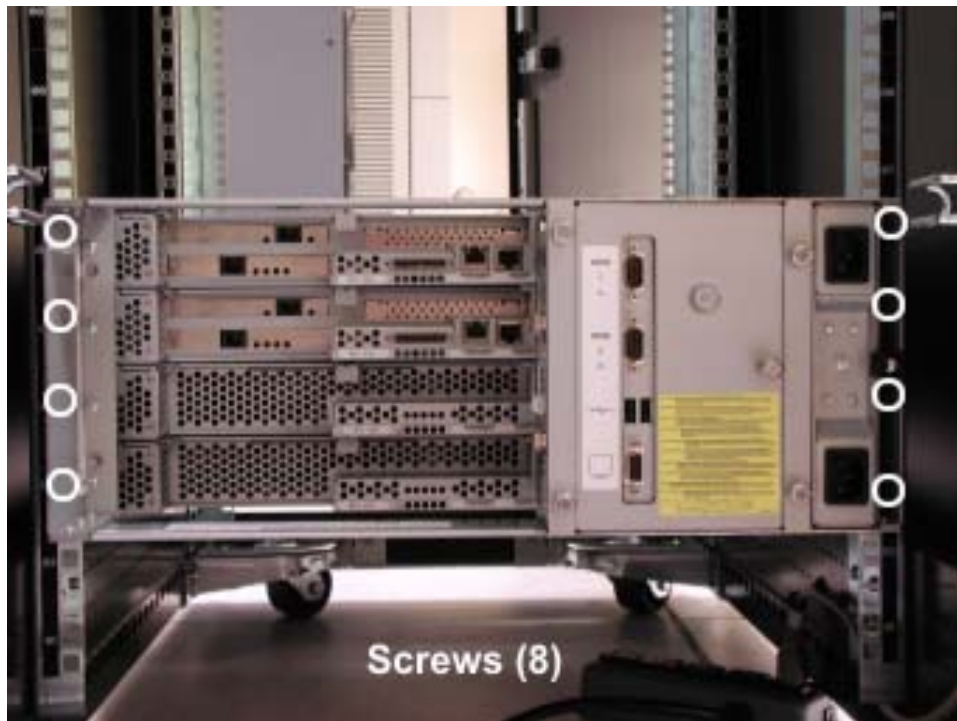
3. At the rear of the cabinet, disconnect the power cords from the AC distribution assembly and all the cables connected to the connector I/O PCB and the PCI adapters.

Figure 3-52. Power Cord and Cable Connections at Rear of Cabinet.



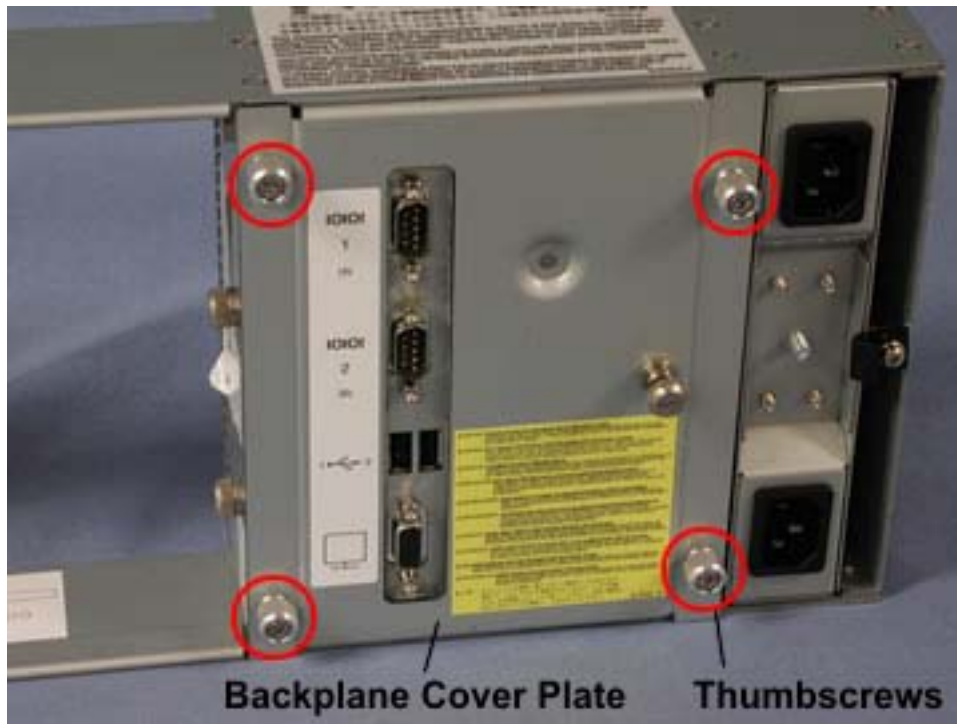
4. Remove the eight screws (four on each side) that secure the backplane assembly to the rails.

Figure 3-53. Backplane Assembly Screws



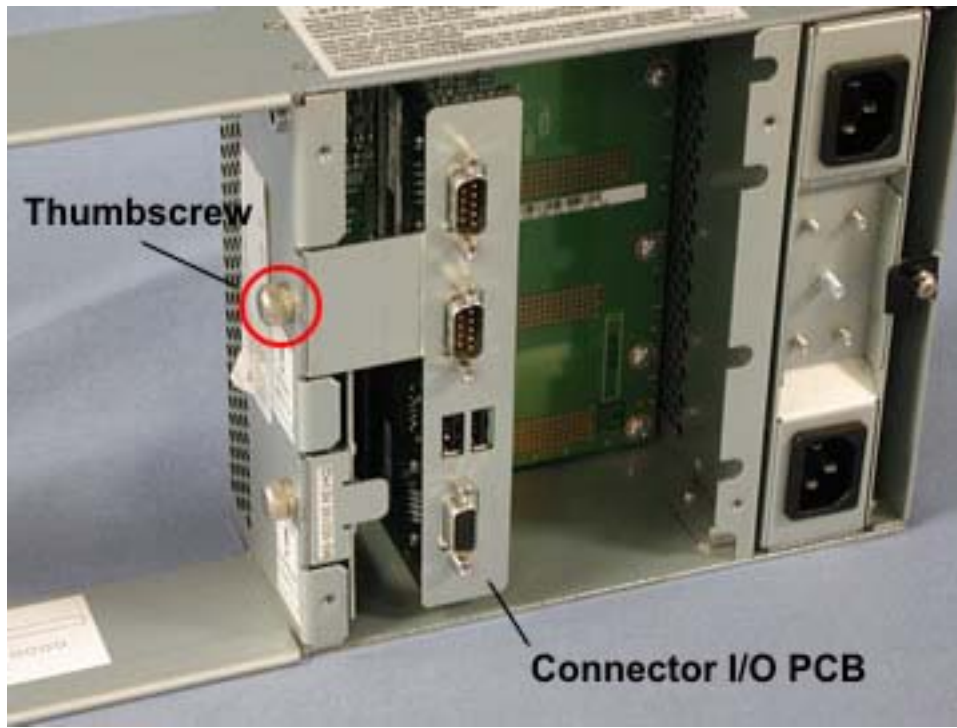
5. Using both hands, pull the backplane assembly straight out of the rails and set it on a stable surface.
6. Unscrew the four thumbscrews and remove the backplane cover plate. Backplane Cover Plate Screws

Figure 3-54. Backplane Cover Plate Thumbscrews



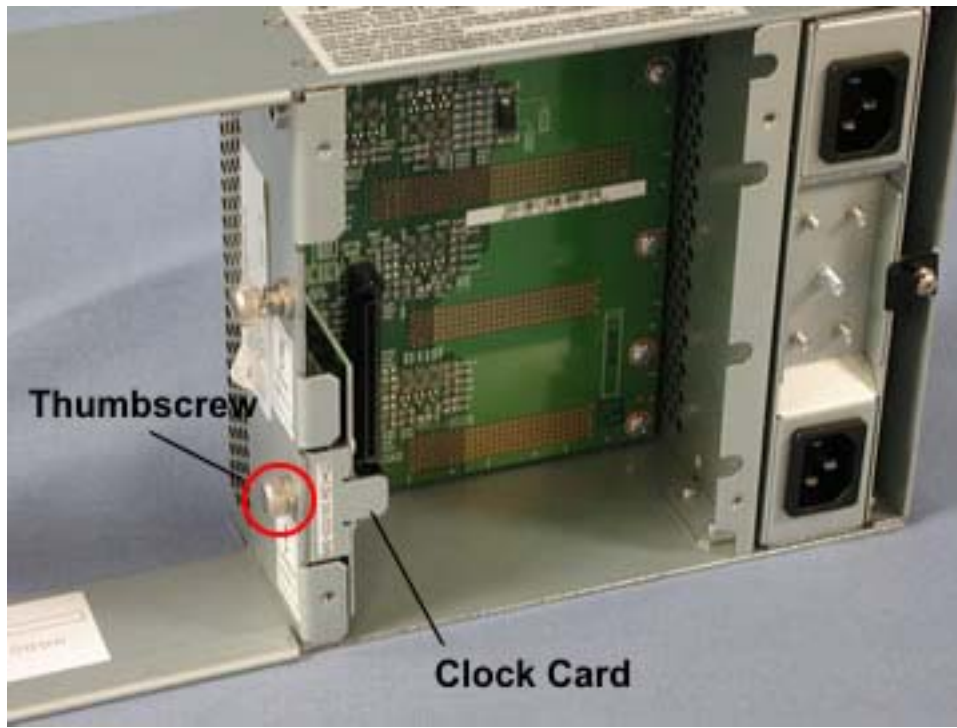
7. Unscrew the thumbscrew on the upper left of the backplane. This screw secures the I/O connector PCB.

Figure 3-55. I/O Connector PCB Screw



8. Unscrew the thumbscrew on the lower left of the backplane. This screw secures the clock card.

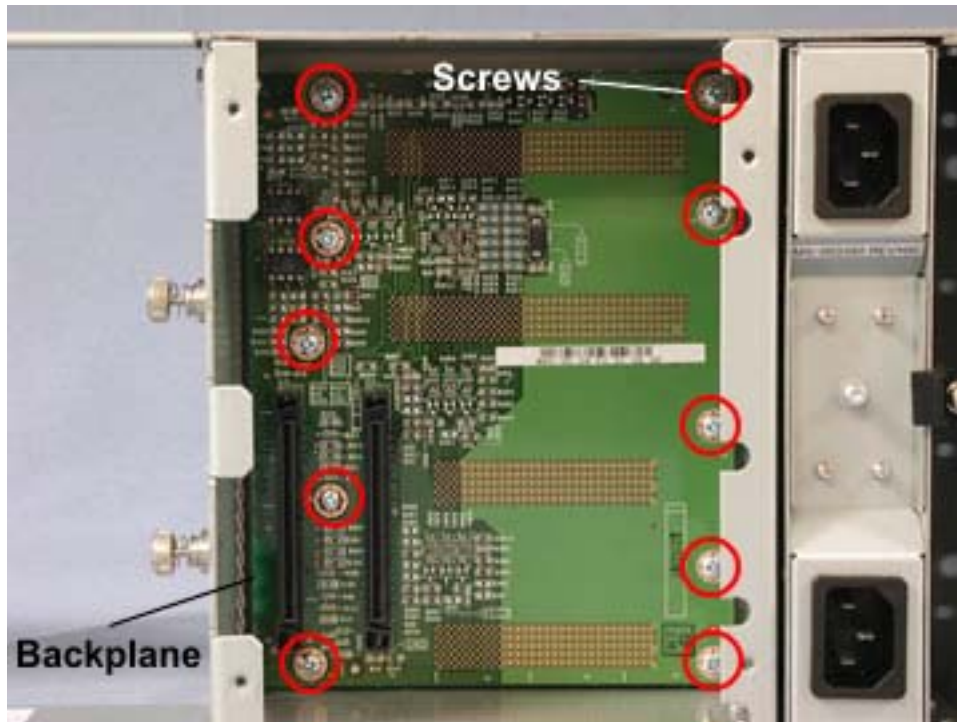
Figure 3-56. Clock Card Screw



9. Pull the clock card straight out of the backplane, using the tab.

10. Remove the 10 screws that secure the backplane PCB to the inside of the backplane.

Figure 3-57. Backplane PCB Screws



11. Lift the PCB out of the backplane.

3.4.15 Ultra 160 SCSI Enclosure Disk Drive or LED Module

The procedure assumes that the disk drive being removed is mirrored by another drive on the system.

NOTE: Before you remove a disk drive, you should use **VERITAS Volume Manager**, **ftSMC** or **Logical Disk Manager (LDM)** to ensure that the disk has failed. If you are removing a disk drive that has **not** failed (for example, if you are upgrading a disk drive), **VERITAS Volume Manager** or **LDM** will not list the disk drive as failed. In this case, you must use **VERITAS Volume Manager** or **LDM** to remove the disk drive's mirror and to add it back after you insert the replacement disk drive. Use **VERITAS Volume Manager** to verify that all disk drives are mirrored and healthy. (For more information about configuring disk mirroring, see the [Stratus ftServer: System Administrator's Guide \(R014W\)](#) and [VERITAS Volume Manager 2.7 for Windows 2000 User's Guide](#)).

CAUTION: Before you remove a mirrored disk drive, it is **critical** that you know which disk drives the disk drive is mirrored with. For information about determining which disk drives are mirrored, see the [Stratus ftServer: System Administrator's Guide \(R014W\)](#).

1. Squeeze the latch on the latching arm of the disk drive, and pull the latching arm down until it is fully extended.

Caution: After you pull the latching arm down completely, all of the LEDs on the disk drive should shut off. At this point, you must wait at least 30 seconds before proceeding to step 2 to ensure that the failed drive has spun down. Otherwise, the disk drive will be damaged.

2. Press in the tab at the end of the disk drive lever.

Figure 3-58. SCSI Disk Drive Latching Arm



3. Grasp the handle of the disk drive and slide the disk drive out of the storage enclosure.

SCSI Cable

1. Ensure that the SCSI devices for the affected enclosure are not in service.
2. At the rear of the Ultra160 SCSI enclosure, loosen the two captive fasteners on the SCSI cable connector and disconnect the cable from the enclosure.

Figure 3-59. Captive Screws on SCSI Cable Connector at Enclosure



3. Remove the connectors, noting which connector is attached to which port on the SCSI card.
4. **NOTE:** The connectors are keyed, and will only attach one way when installing the replacement cable.

3.4.20 Ultra 160 SCSI Enclosure Advanced Cooling Module (ACM)

CAUTION: Perform the entire replacement procedure within five minutes to avoid overheating the Ultra160 SCSI enclosure. Removing one of the ACMs causes the fans in the other ACM to accelerate to maintain the proper operating temperature. The enclosure should not operate for more than five minutes with only one ACM installed.

1. Loosen the two captive screws on either side of the ACM.

Figure 3-60. ACM Captive Screws



2. Pull the ACM out of the disk enclosure.

NOTE: The fans in the installed ACM will accelerate.

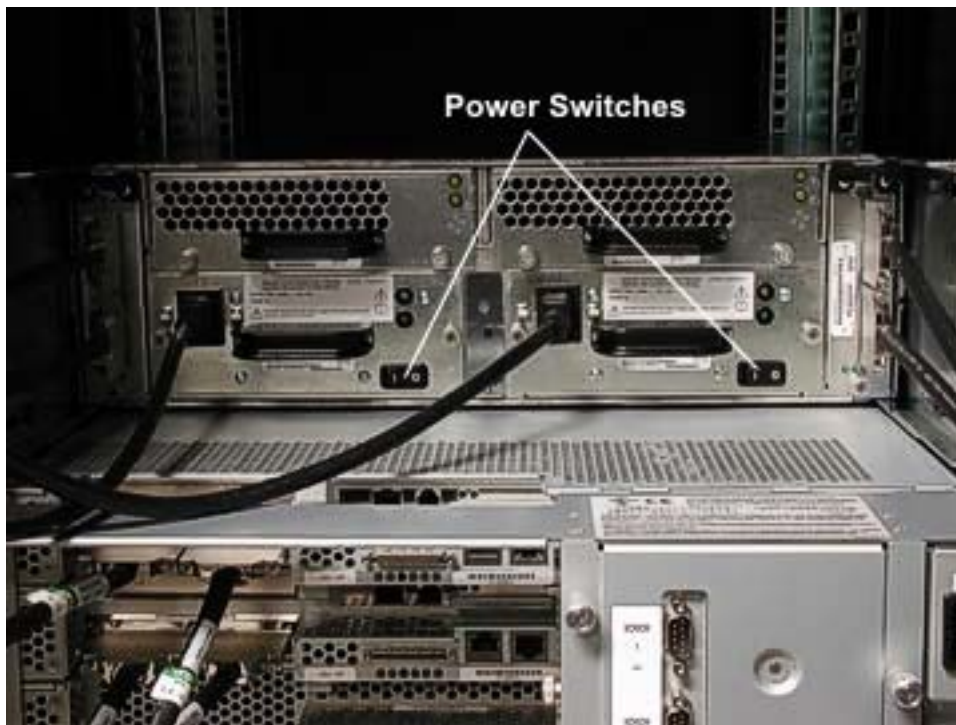
3.4.21 Ultra 160 SCSI Enclosure Power Supply Module (PSM)

NOTE: In case power is lost to both sides of the Ultra160 SCSI enclosure at the same time, wait at least 15 seconds before powering up the enclosure again.

CAUTION: Removing a power supply disrupts the airflow within the enclosure. Therefore, when replacing a power supply, place the new power supply in the slot immediately. Do not leave the slot empty.

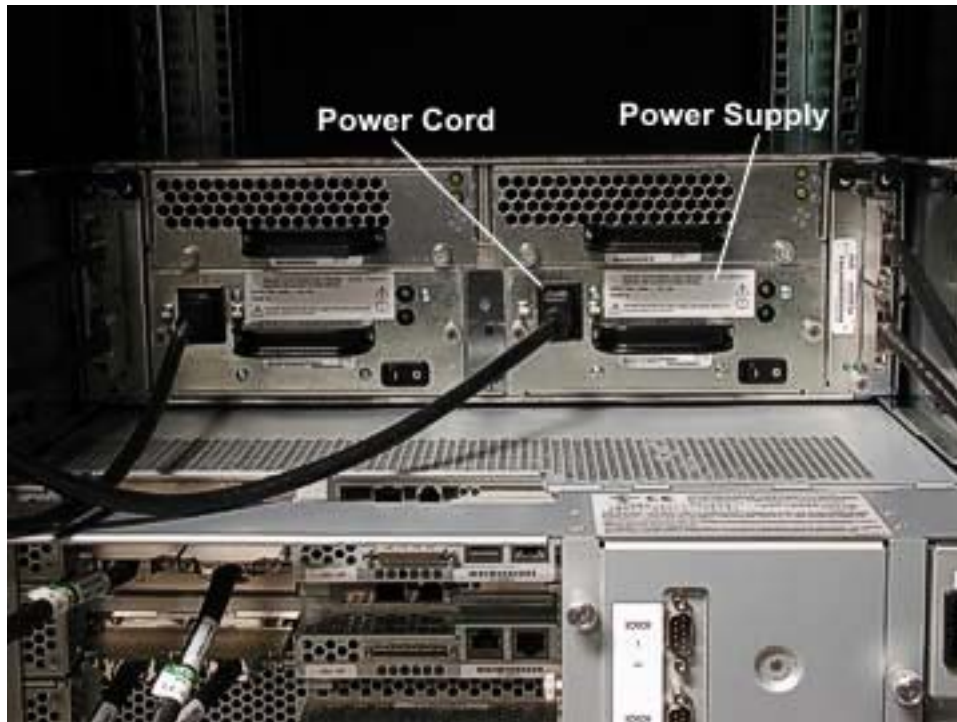
1. Have the new power supply ready at hand to place into the slot from which you are about to remove the old power supply.
2. At the rear of the Ultra160 SCSI enclosure, turn off the power supply switch.

Figure 3-61. Power Supply Switch



3. Disconnect the power cord from the power supply.

Figure 3-62. Power Supply Power Cord.



4. Loosen the two captive screws on either side of the power supply.

Figure 3-63. Power Supply Screws.



5. Pull the power supply module out of the disk enclosure.

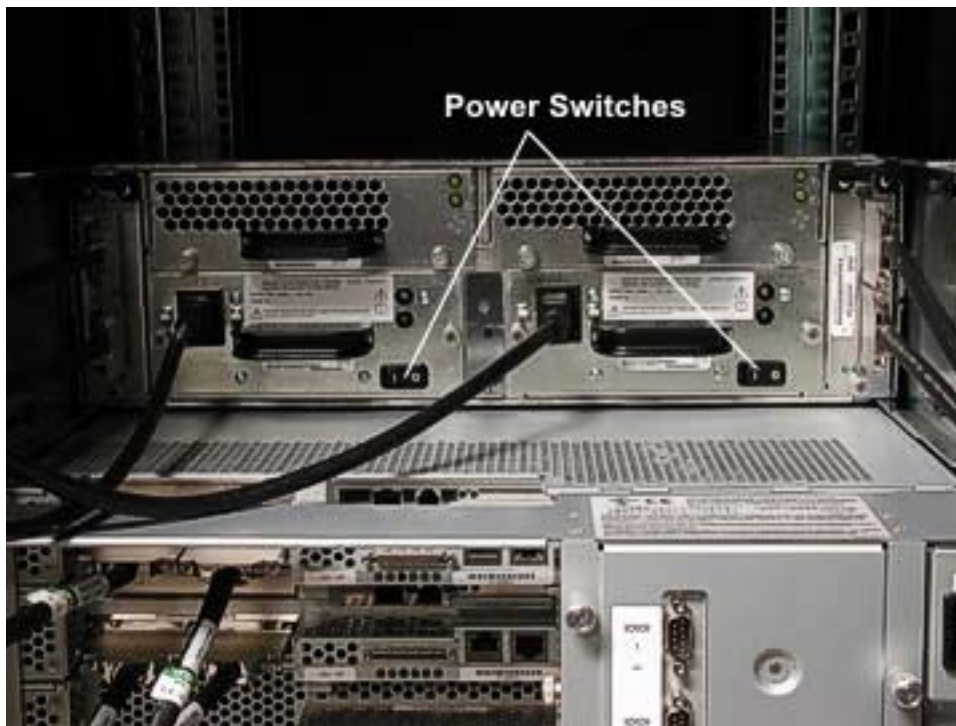
3.4.22 Ultra 160 SCSI Enclosure Cluster Services Module (CSM)

NOTE: Performing the following procedure requires you to re-mirror the disks. See the [Stratus ftServer Software Installation and Configuration Guide \(R002W\)](#) for information about mirroring disks.

To remove a CSM, you must take the ftServer system out of service and disconnect it from power.

1. Shut down the system as described in steps 1-3 in Section [3.4.19](#)
2. Turn off power to the monitor and any peripheral devices.
3. At the rear of the Ultra160 SCSI enclosure, turn off the switches on the power supplies.

Figure 3-64. Power Supply Switch



4. Remove all cables from the CSM.

Figure 3-65. CSM Cables



5. Loosen the thumbscrews that secure the module in place.

Figure 3-66. CSM Screws



3.4.23 Ultra 160 SCSI Storage Enclosure

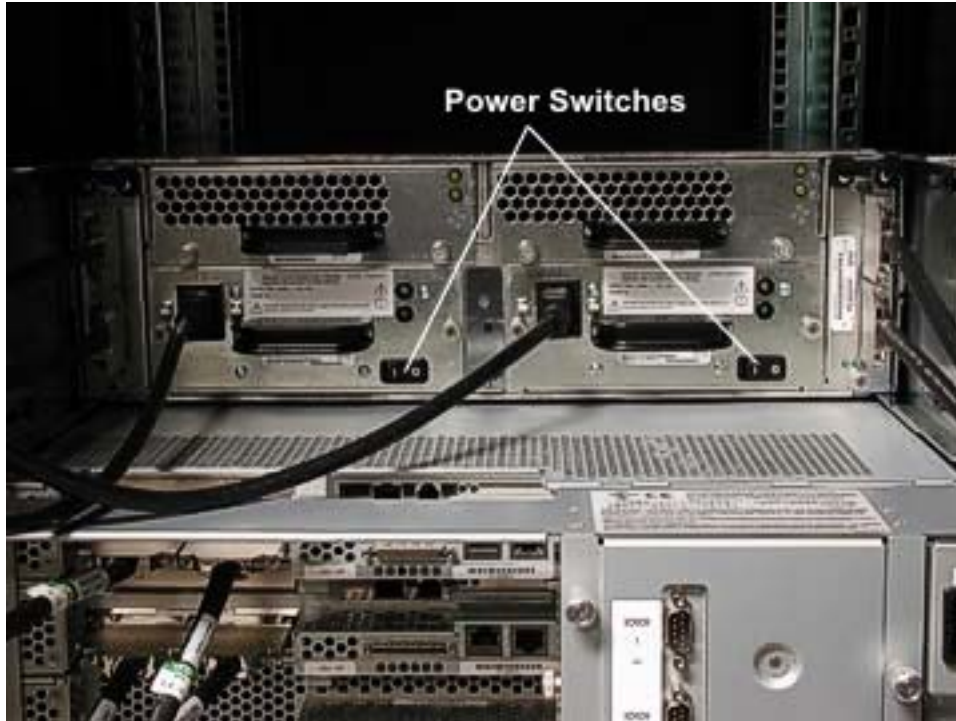
To remove the Ultra 160 storage enclosure, you must shut down the system.

1. Shut down the fitServer system as described in [Section 3.3](#).

All components in the Ultra 160 storage enclosure must be removed before the storage enclosure is removed. The procedures are described below.

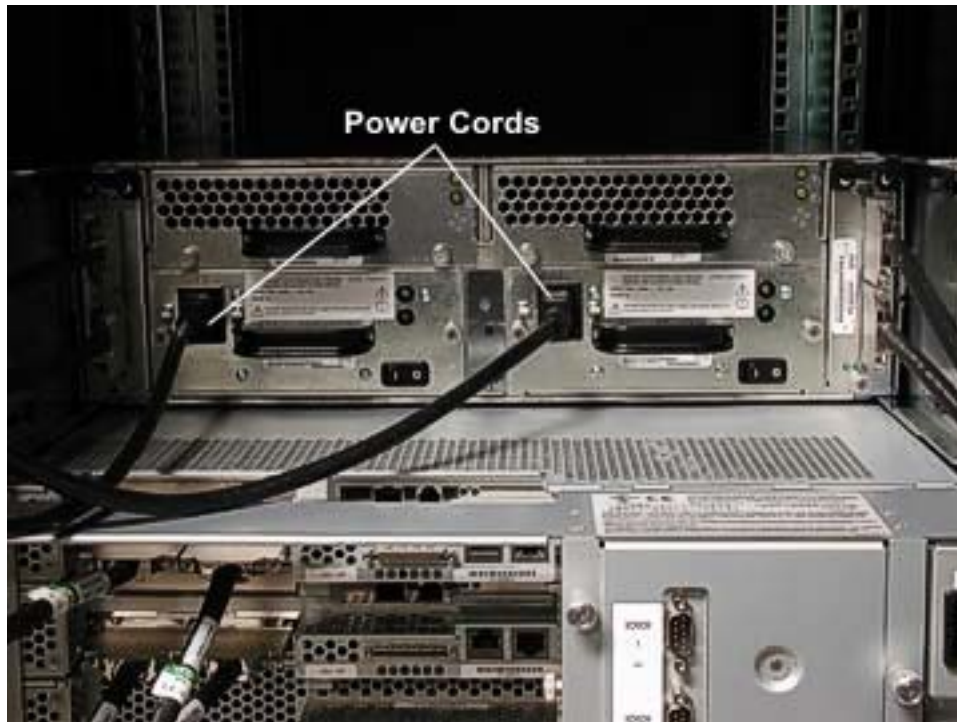
2. Turn off the power switches on the rear of the storage enclosure.

Figure 3-67. Power Switches



3. Disconnect the power cords from the rear of the enclosure.

Figure 3-68. Power Cords



4. Disconnect the cables on the Cluster Services Module.

Figure 3-69. CSM Cables



5. Remove the four screws securing the enclosure at the front of the cabinet.

Figure 3-70. Enclosure Screws



6. Carefully slide the enclosure out of the front of the cabinet.

4. FRU and DRU Hardware Removal and Replacement Procedures

This section lists the Field Replaceable Units (FRUs) and Distributor Replaceable Units (DRUs) in the ftServer 3300 systems and describes the removal and replacement procedures for each one.

In most instances, FRUs and DRUs are duplexed and may be removed and replaced without total removal of power, and thus, without loss of continuous processing. However, in some instances, the system must be shut down and both main power switches turned off prior to removal and replacement of the FRU or DRU.

4.1 List of FRUs and DRUs

The following table lists the FRUs and DRUs in the ftServer 3300 system.

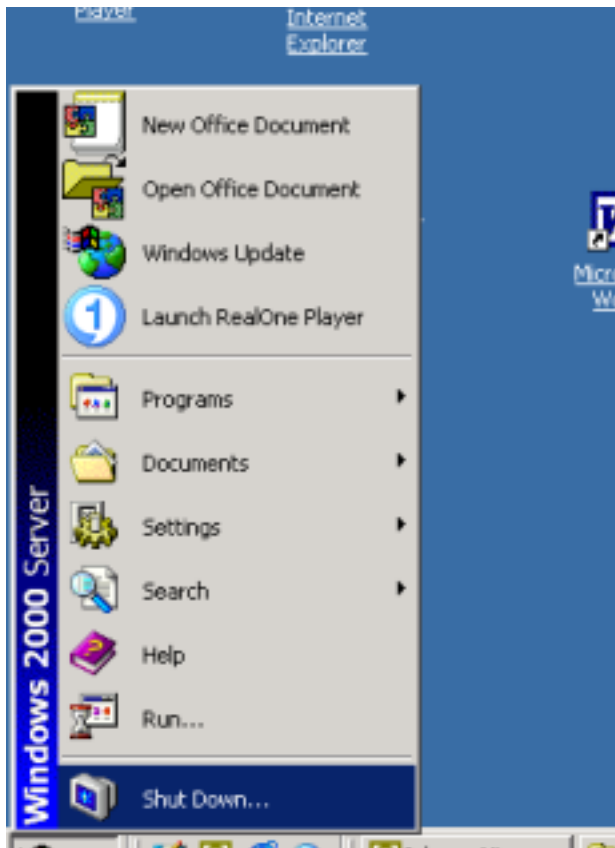
Component	FRU/DRU	Part Number
CPU Enclosure Fan Assembly	FRU	MF-000045
CPU Enclosure Processor/Heat Sink	DRU	AK-000424
CPU Enclosure Motherboard	DRU	AA-G9XXX0
CPU Enclosure LED Cable	DRU	AW-001102
CPU Enclosure Power Connector Board	DRU	AA-E72100
CPU Enclosure Power Jumper	FRU	AW-001106
Core I/O Enclosure Power Supply	FRU	AA-P70100
Core I/O Enclosure Power Switch Assembly	DRU	AS-000389
Core I/O Enclosure PCI Riser PCB	DRU	AA-E70400
Core I/O Enclosure Core I/O Board	DRU	AA-E70000
Core I/O Enclosure CD-ROM Interface Board	DRU	AA-E71500
Core I/O Enclosure Ground Cable (14 AWG)	DRU	AW-001117
Core I/O Enclosure Internal Power Jumper Cable	DRU	AW-001107
Core I/O Enclosure Ultra 160 SCSI Jumper 68P	DRU	AW-001104
Core I/O Enclosure IDE Cable	DRU	AW-001124
Core I/O Enclosure SCSI Backplane	DRU	AA-E70500
Core I/O Enclosure Power Switch with LED and Guard	DRU	AW-001123
Core I/O Enclosure LED Cable	DRU	AW-001102
AC Distribution Assembly	FRU	AS-E63010

4.2 Power Removal

If total power removal is required, the system must be shut down prior to removing power and rebooted after the replacement unit is installed.

1. To shut down the ftServer system, click the **Start** button on the Windows 2000 desktop and click **Shut Down**.

Figure 4-1. Start Menu



2. In the **Shut Down Windows** dialog box, select **Shut Down** and then click **OK**. A message states that your system is shutting down.

Figure 4-2. Shut Down Menu



3. When the system displays the message *It is now safe to turn off your computer*, the system will turn off its power automatically. This removes main power from the system; however, standby power to the Baseboard Management Controller (BMC) remains on.
4. Turn off power to the monitor and any peripheral devices.

5. At the back of the system, disconnect the two AC power cords.

Figure 4-3. AC Power Cords



4.3 Handling ESD Sensitive Parts

Clock cards and PCI adapters are particularly sensitive to damage from electrostatic discharge (ESD) because the electronic components are exposed when the device is not fully installed.

Caution: To avoid damaging these parts during handling, always take the following precautions.

- Always store cards and adapters in their static-protective envelope until you are ready to install them in the system.
- Always hold an adapter or card by its edges.
- Always ground yourself before handling a clock card or a PCI adapter, or before removing or replacing the I/O enclosure. Ground yourself by wearing a grounding strap.

4.4 Hardware Removal Procedures

This section contains the removal procedures for the FRUs and DRUs listed in the preceding table. Each of these procedures indicates any power removal requirements.

To perform the replacement procedure for each FRU or DRU, reverse the removable procedure. If any special replacement considerations are necessary, a replacement note is included.

4.4.1 CPU Enclosure Fan Assembly

1. Remove the CPU enclosure as described in Section 3.4.1.
2. Remove the CPU enclosure cover as described in Section 3.4.3.
3. Remove the power supply as described in Section 3.4.4.
4. Remove the plastic plenum covering the processor heat sink.

Figure 4-4. Plenum



5. Remove the two screws securing the fan assembly bracket and lift it out of the enclosure.

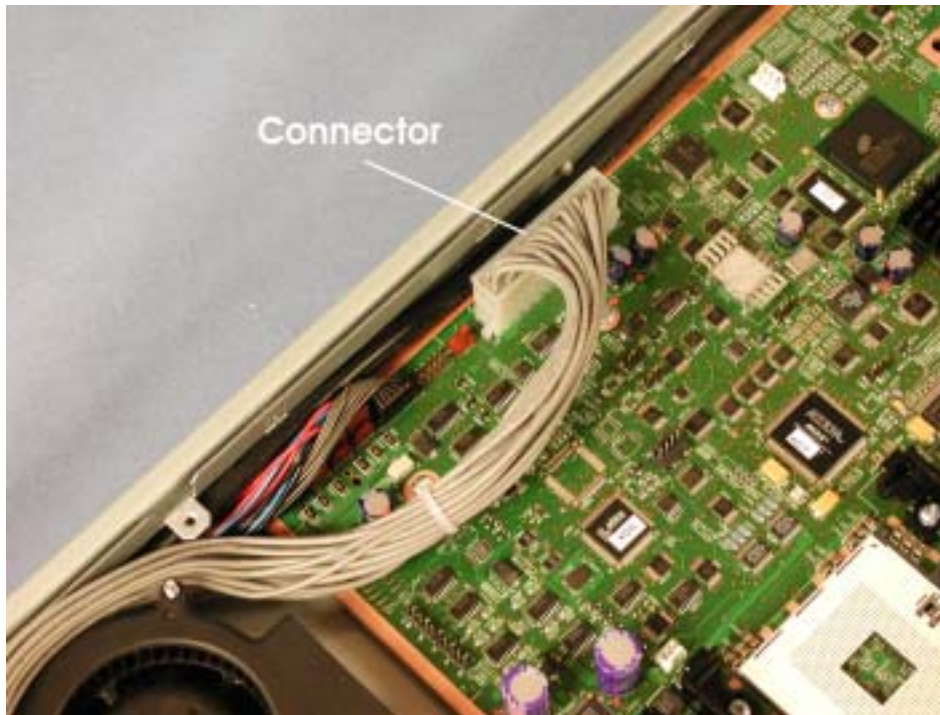
Figure 4-5. Fan Assembly Bracket Screws



NOTE: There are three fans in the blower assembly. Two are secured with 5/16“ nuts. The other is secured with two screws.

6. Disconnect the power cable connector from the motherboard.

Figure 4-6. Power Cable Connection at Motherboard



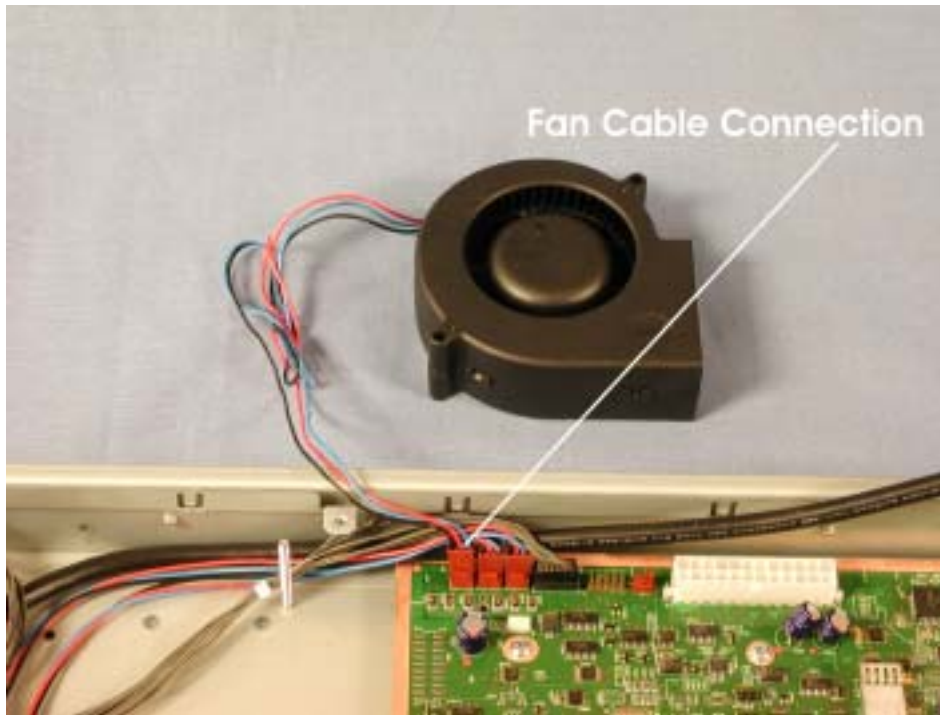
7. Remove the two 5/16" nuts (or screws) from the failed fan and lift it up.

Figure 4-7. Fan Nuts/Screws



8. Disconnect the failed fan's cable from the motherboard.

Figure 4-8. Fan Cable Connection



4.4.2 CPU Enclosure Processor/Heat Sink

1. Remove the CPU enclosure as described in Section 3.4.1.
2. Remove the CPU enclosure cover as described in Section 3.4.3.

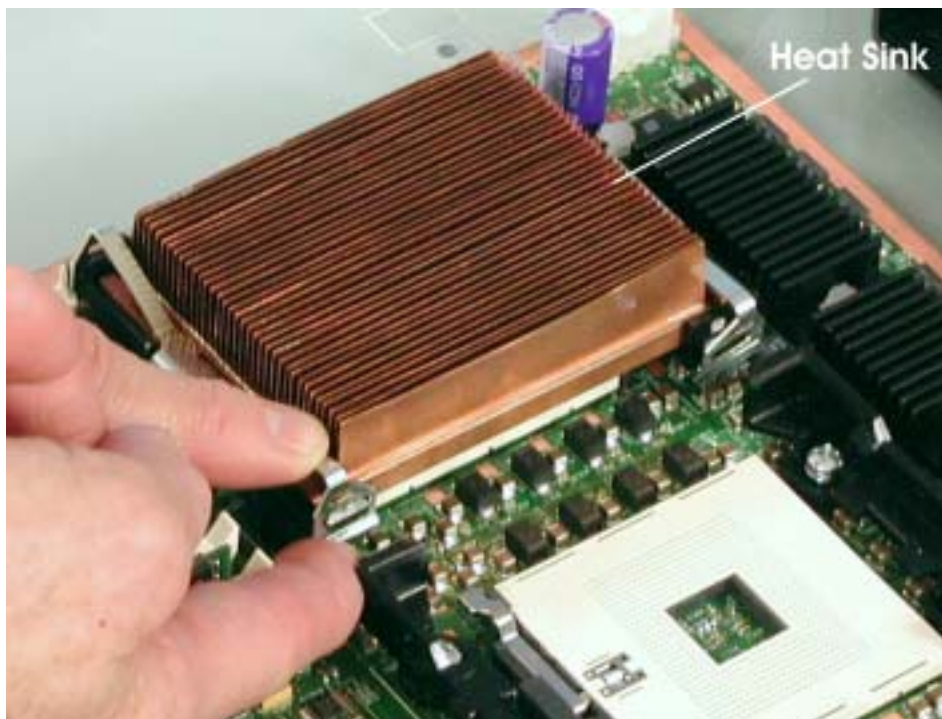
3. Remove the plastic plenum covering the processor heat sink.

Figure 4-9. Removing the Plastic Plenum



4. Push down on the heat sink clip with one hand and snap it off the bracket with the other. The heat sink must then be heated with a heat gun to allow it to be removed from the processor.

Figure 4-10. Removing Heat Sink



5. Release the processor's ejector levers and pull the processor straight up and out from the connector.

Figure 4-11. Processor Ejector Lever



REPLACEMENT NOTE: Use the thermal grease included in the processor heat sink kit to install the new heat sink on the processor.

4.4.3 CPU Enclosure Motherboard

1. Remove the CPU enclosure as described in Section 3.4.1.
2. Remove the CPU enclosure cover as described in Section 3.4.3.
3. Remove the power supply as described in Section 3.4.4.

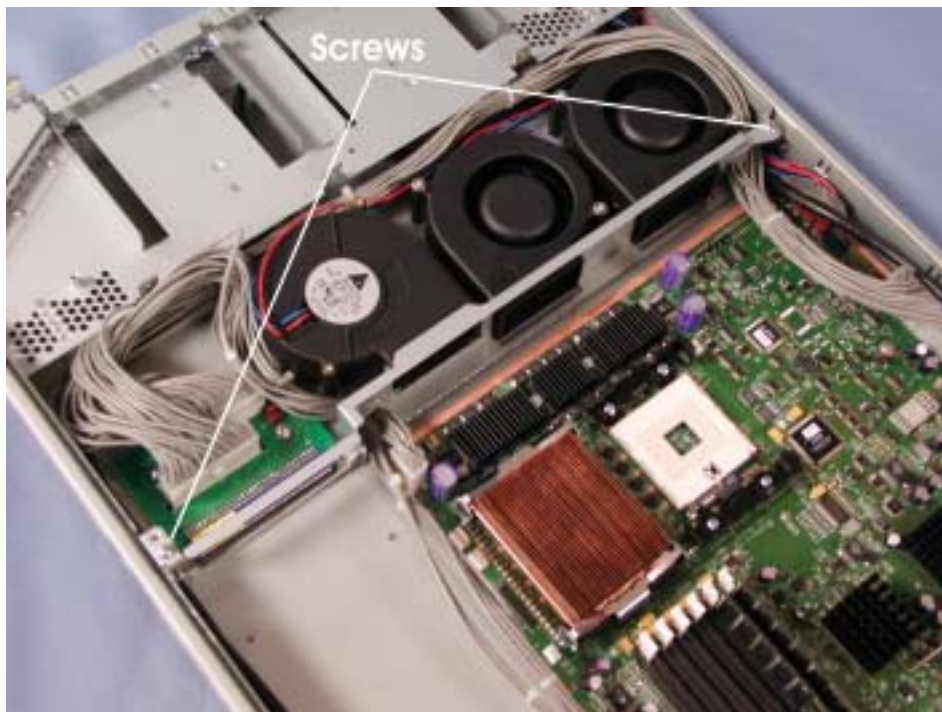
4. Remove the plastic plenum covering the processor heat sink.

Figure 4-12. Plenum



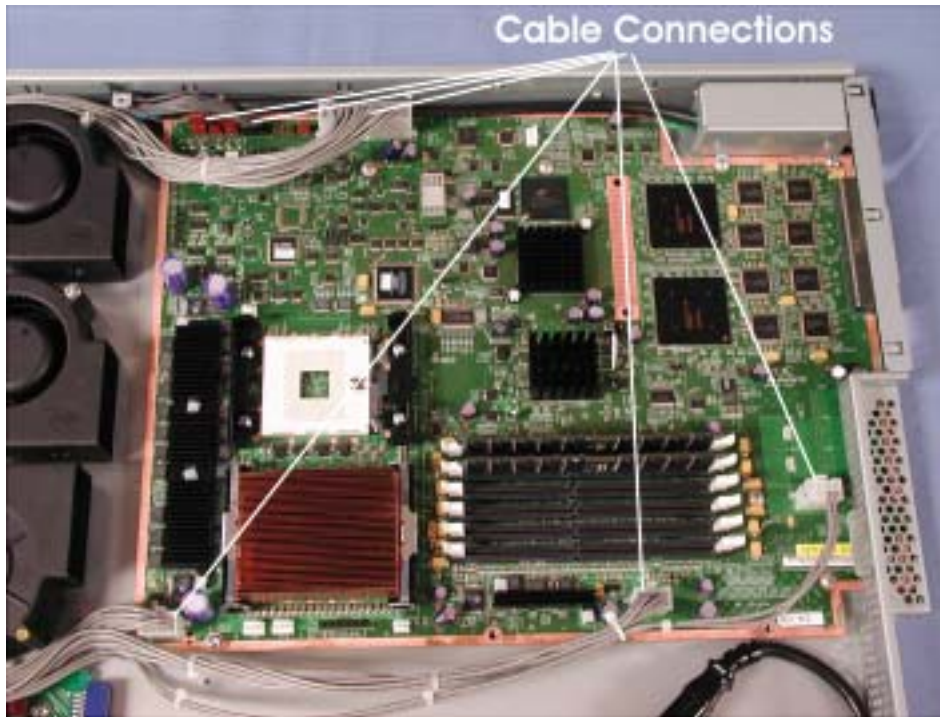
5. Remove the two screws securing the fan assembly bracket and lift it out of the enclosure.

Figure 4-13. Fan Assembly Bracket Screws



6. Disconnect all cables (eight total) from the motherboard.

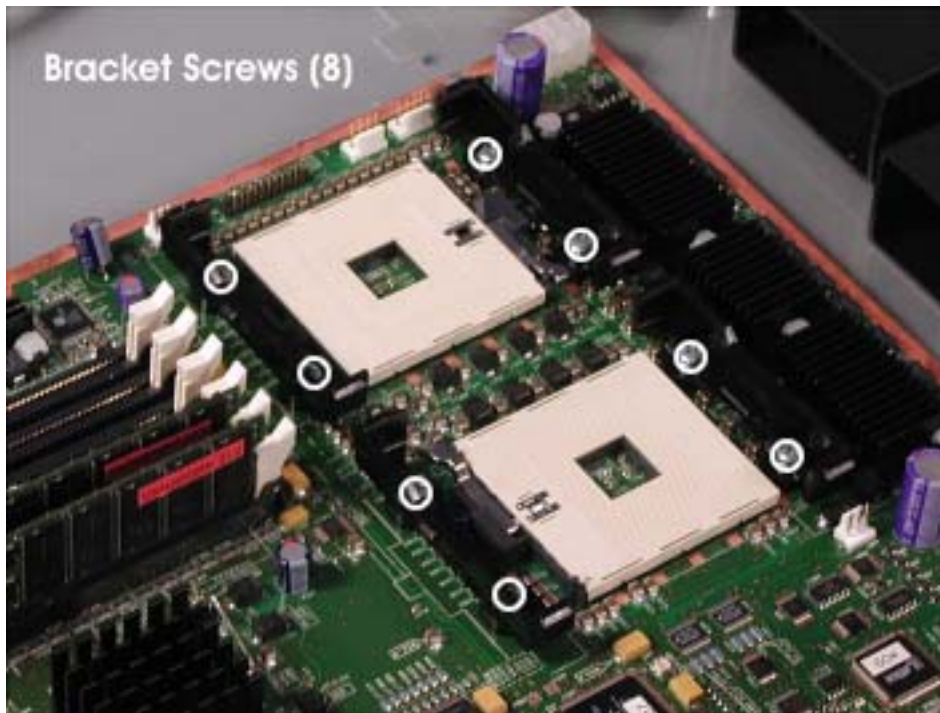
Figure 4-14. Motherboard Cable Connections



7. Remove each processor and its heat sink as described in Section 4.4.2.

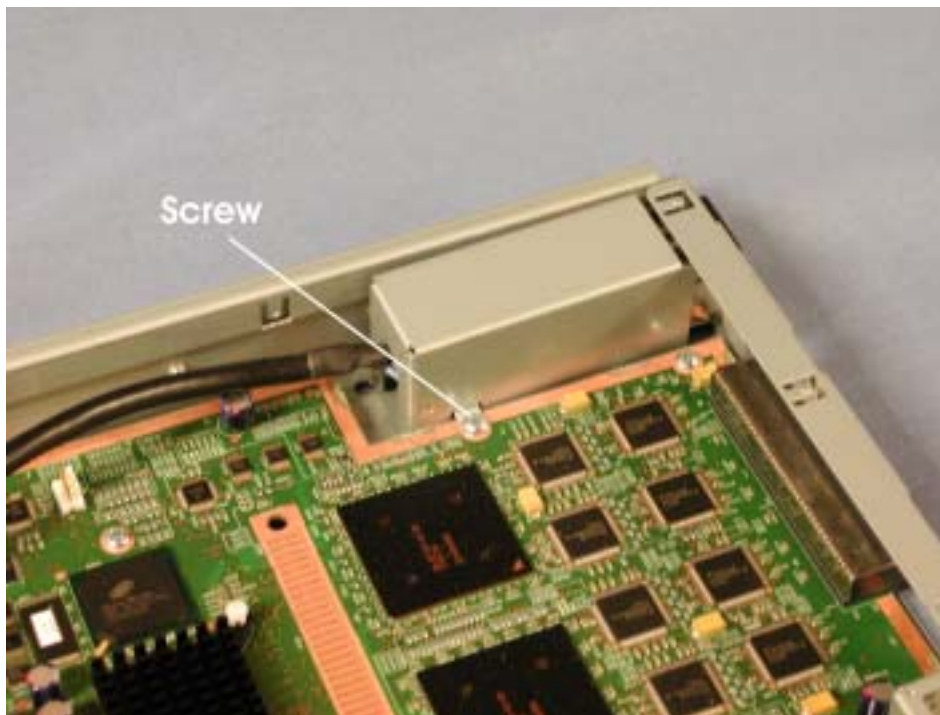
8. Remove the two screws securing each of the processor heat sink brackets (four brackets total).

Figure 4-15. Processor Heat Sink Bracket Screws



9. Remove the screw securing the AC inlet cover and lift off the cover.

Figure 4-16. AC Inlet Cover Screw



10. Remove the remaining seven screws securing the motherboard.

Figure 4-17. Motherboard Screws



11. Carefully slide the motherboard toward the front and lift it out of the enclosure.

4.4.4 CPU Enclosure LED Cable

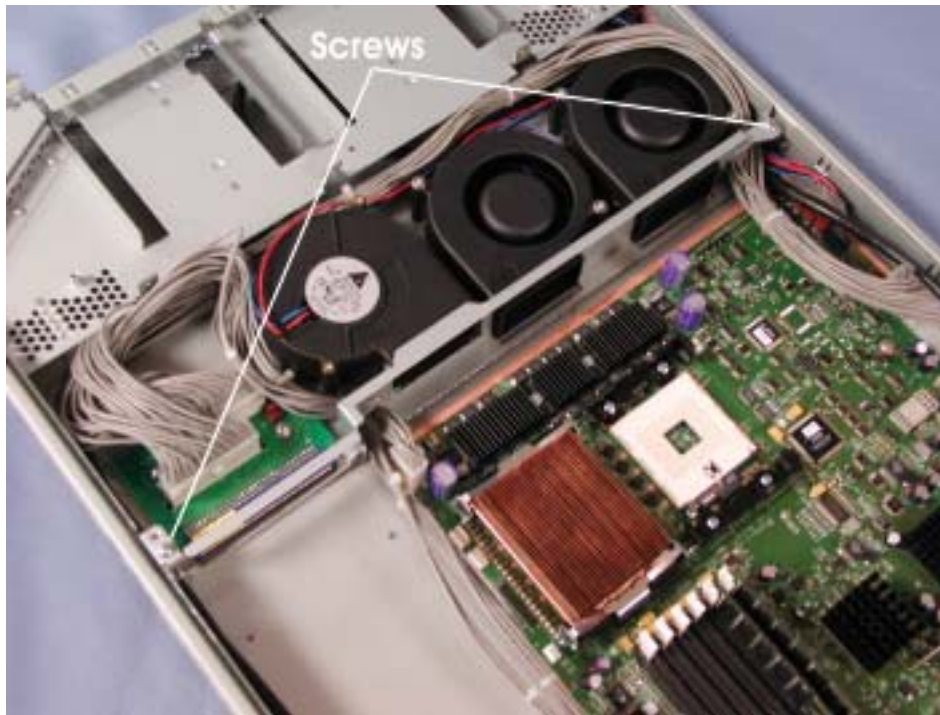
1. Remove the CPU enclosure as described in Section 3.4.1.
2. Remove the CPU enclosure cover as described in Section 3.4.3.
3. Remove the power supply as described in Section 3.4.4.
4. Remove the plastic plenum covering the processor heat sink.

Figure 4-18. Plenum



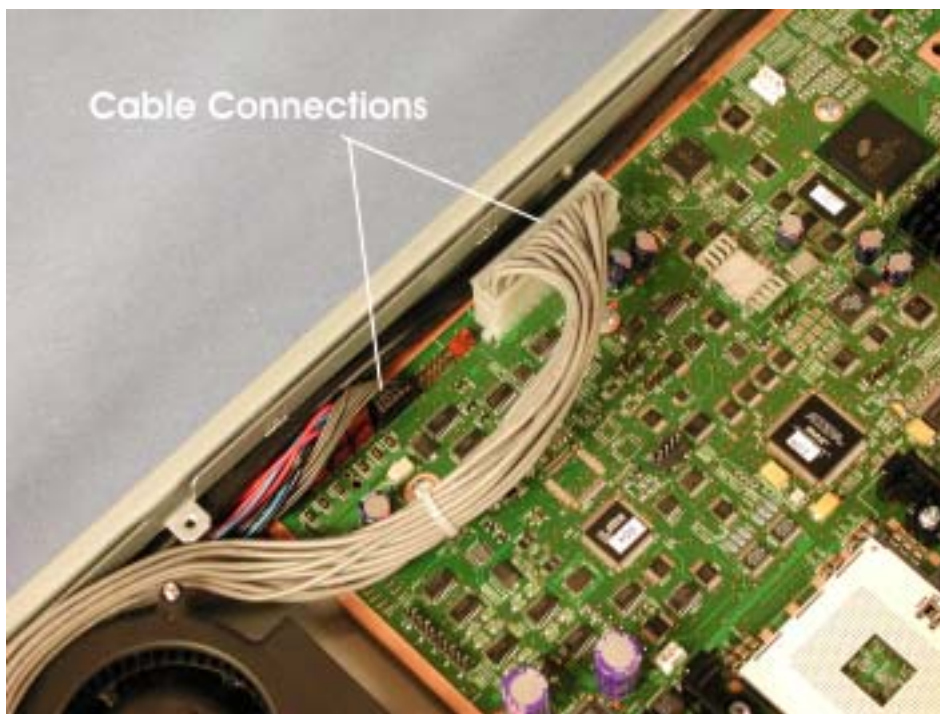
5. Remove the two screws securing the fan assembly bracket and lift it out of the enclosure.

Figure 4-19. Fan Assembly Bracket Screws



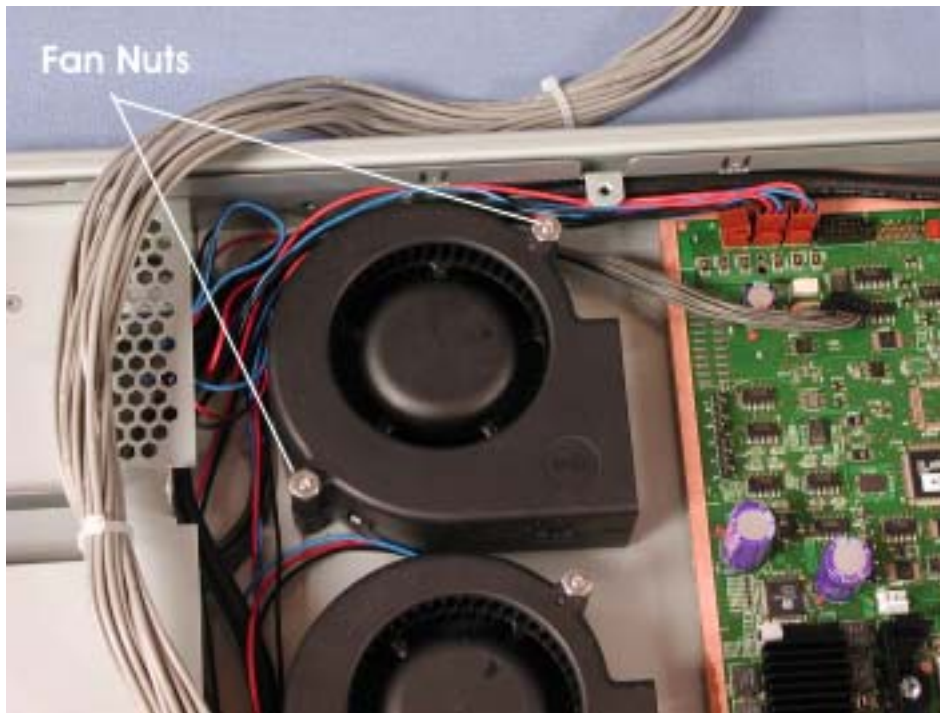
6. Disconnect the power cable and LED cable from the motherboard.

Figure 4-20. Power Cable and LED Cable Connectors at Motherboard



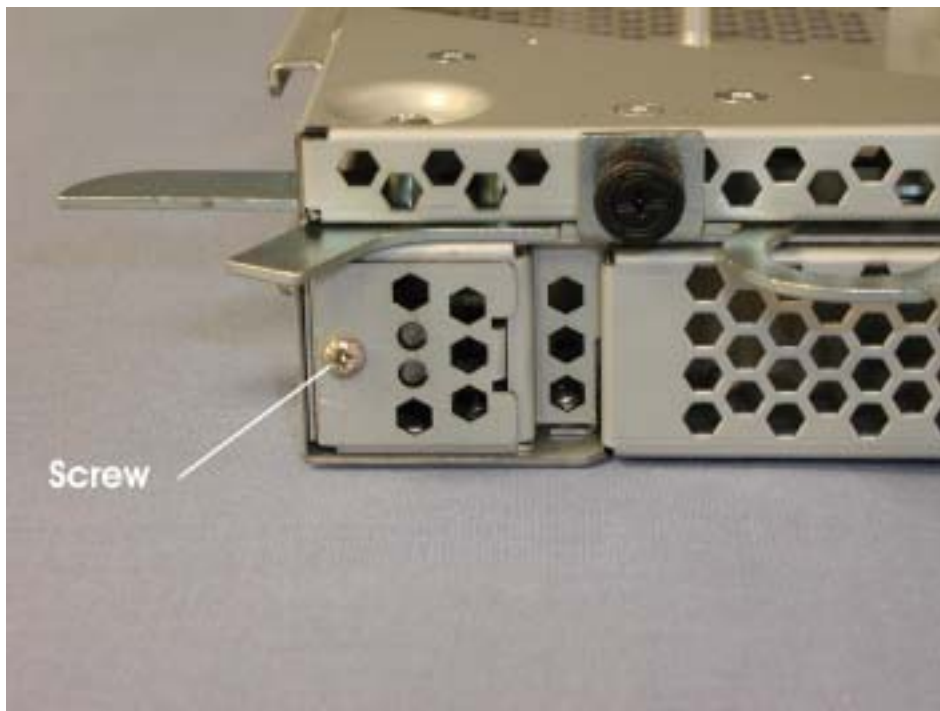
7. Remove the two 5/16“ nuts from the fan nearest the right side of the enclosure and lift up the fan.

Figure 4-21. Fan Nuts



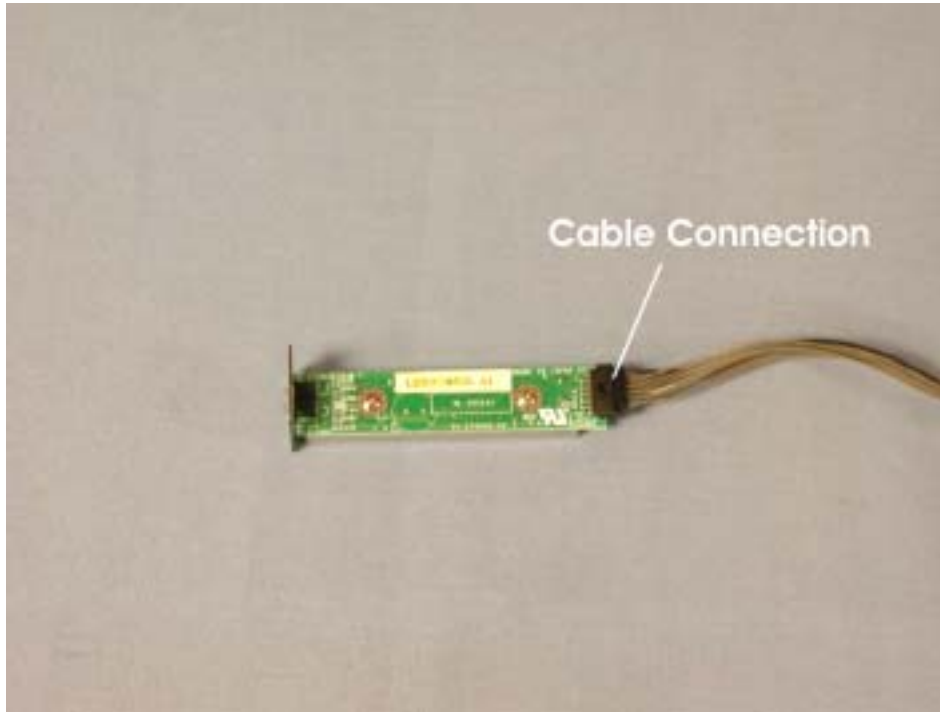
8. Remove the screw in the CPU enclosure LED PCB at the front of the enclosure.

Figure 4-22. CPU Enclosure LED PCB Screw



9. Pull the CPU enclosure LED PCB and cable straight forward and all the way out of the front of the enclosure.
10. Disconnect the LED Cable from the back of the LED PCB.

Figure 4-23. CPU Enclosure LED PCB and Cable Connector



4.4.5 CPU Enclosure Power Connector Board

1. Remove the core CPU enclosure as described in Section 3.4.1.
2. Remove the CPU enclosure cover as described in Section 3.4.3.

3. Disconnect the two cables from the power connector board.

Figure 4-24. Power Connector Board Connectors



4. Remove the two screws securing the power connector board to the chassis.

Figure 4-25. Power Connector Board Screws



5. Pull the power connector board straight out horizontally from the power supply.

Figure 4-26. Removing the Power Connector Board



4.4.6 CPU Enclosure Power Jumper

1. Remove the CPU enclosure as described in Section 3.4.1.
2. Remove the CPU enclosure cover as described in Section 3.4.3.
3. Remove the power supply as described in Section 3.4.4.

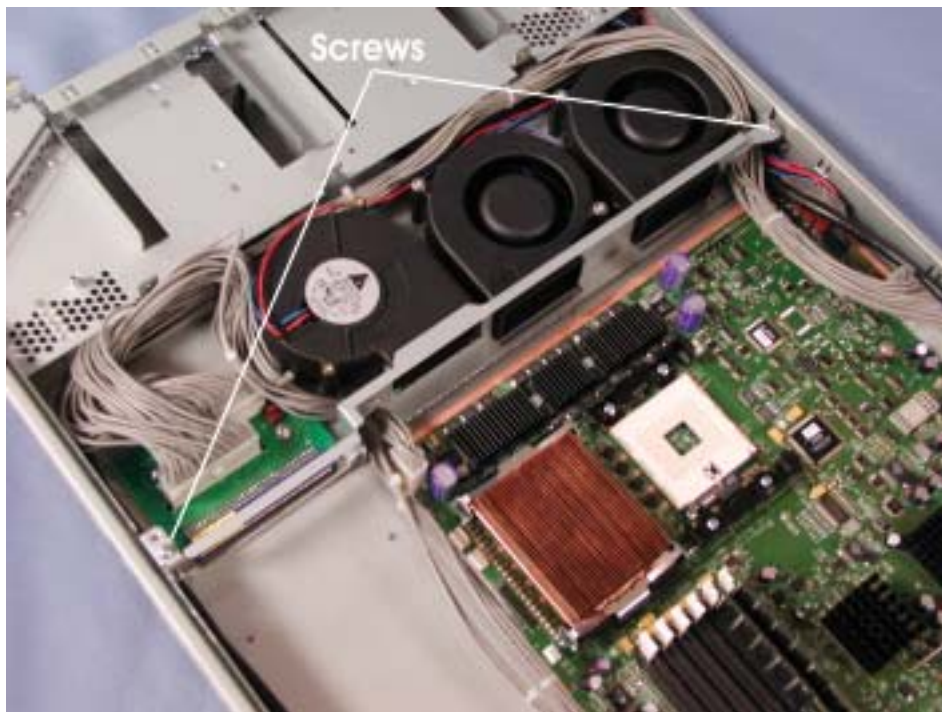
4. Remove the plastic plenum covering the processor heat sink.

Figure 4-27. Removing the Plastic Plenum



5. Remove the two screws securing the fan assembly bracket and lift it out of the enclosure.

Figure 4-28. Fan Assembly Bracket Screws



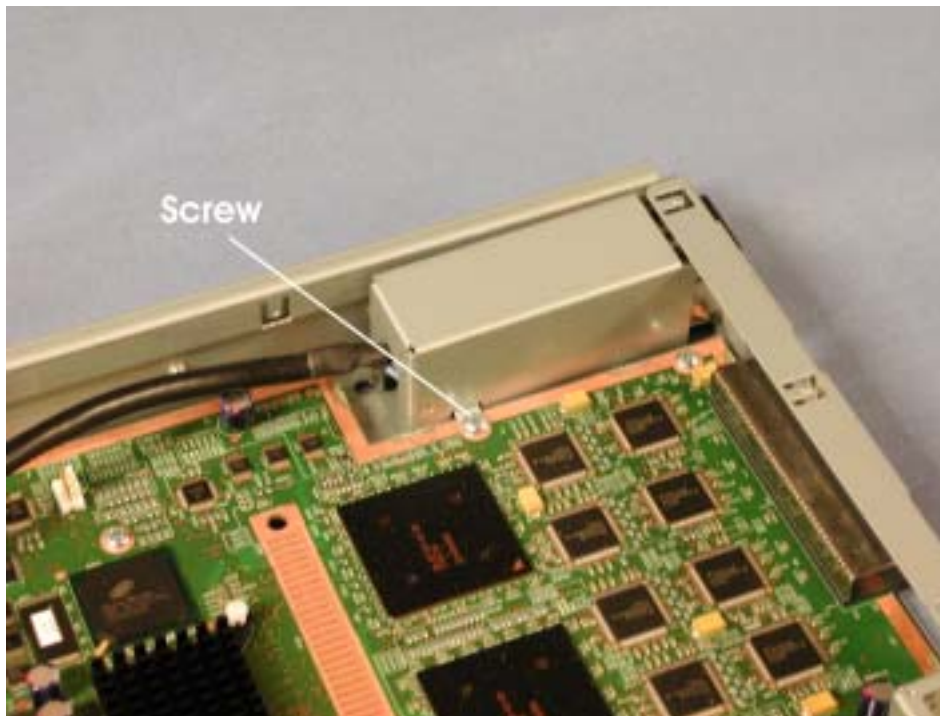
6. Remove the two 5/16“ nuts from the fan nearest the right side of the enclosure and lift up the fan.

Figure 4-29. Fan Nuts



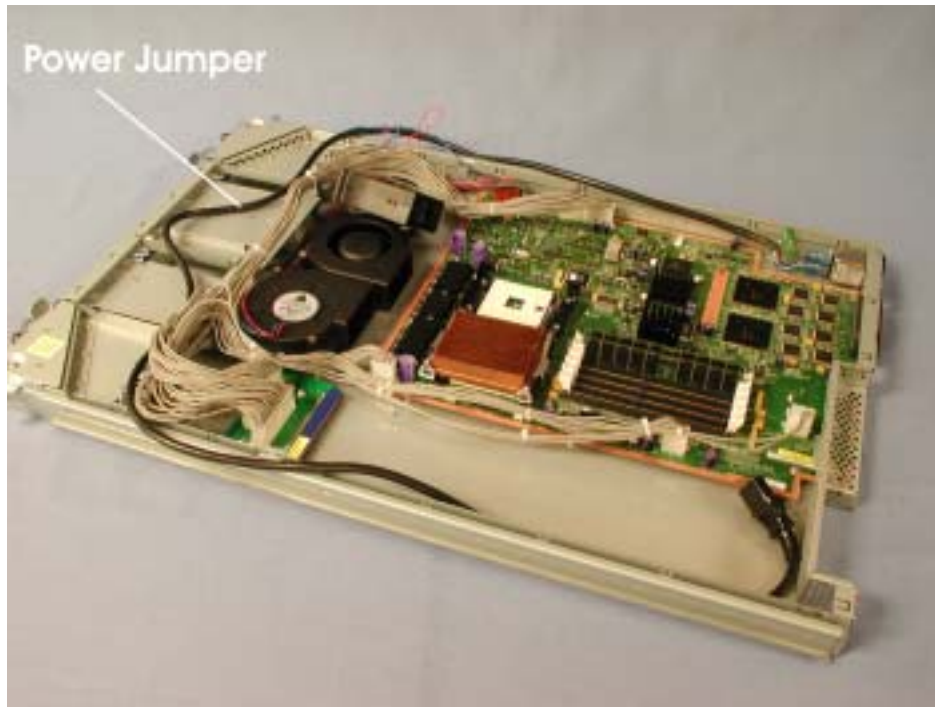
7. Remove the screw securing the AC inlet cover and lift off the cover.

Figure 4-30. AC Inlet Cover Screw



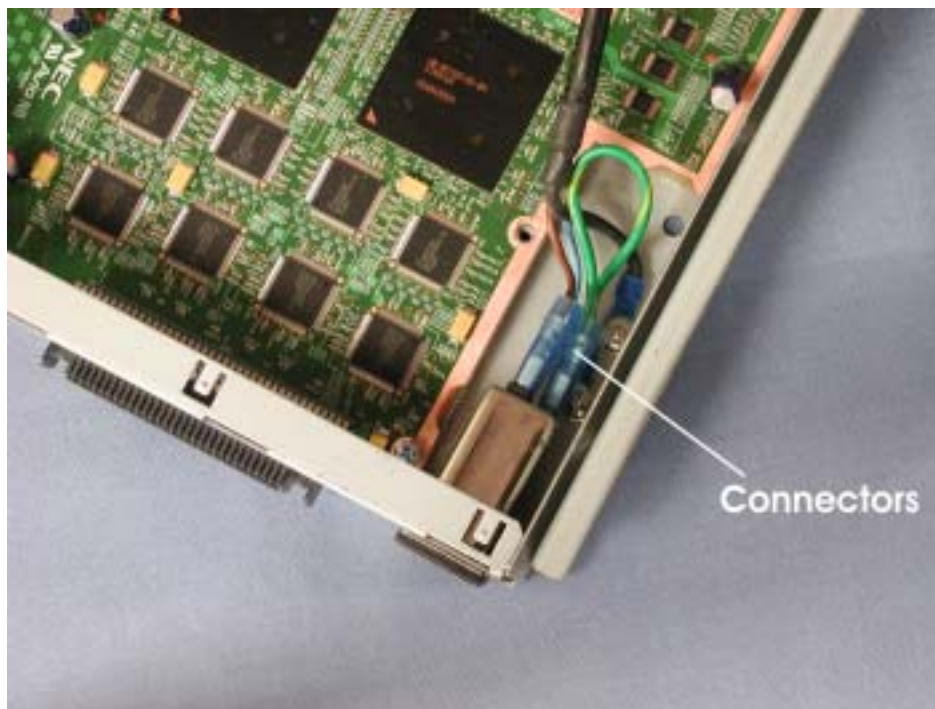
8. Pull the power jumper out from under the metal shield as shown.

Figure 4-31. Removing Power Jumper



9. At the rear of the enclosure, disconnect the power jumper from the AC inlet and the chassis (total of three connectors).

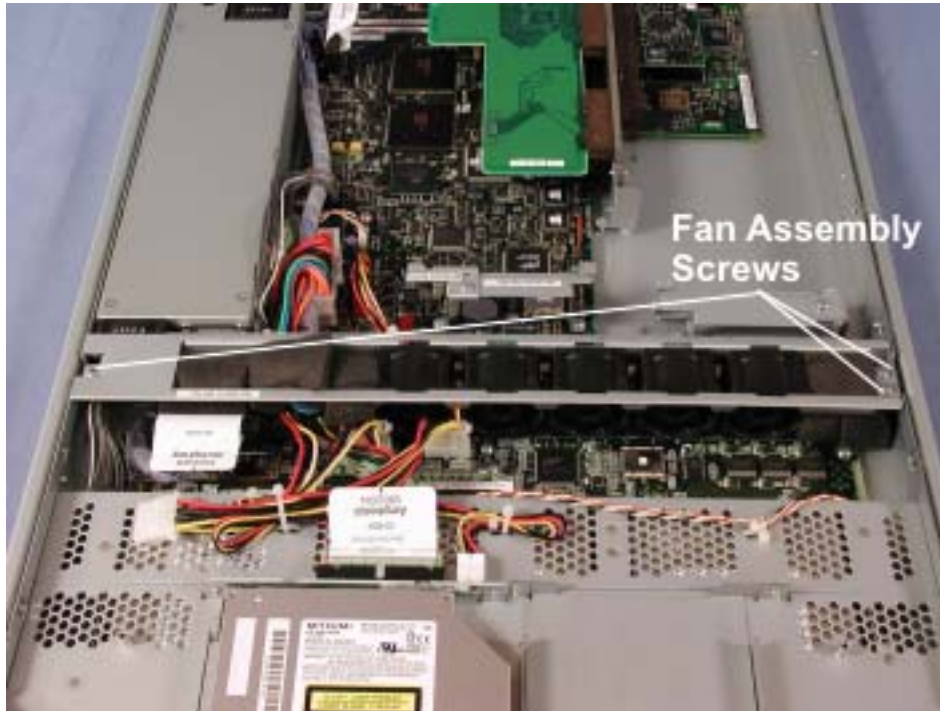
Figure 4-32. Power Jumper Connection at AC Inlet



4.4.7 Core I/O Enclosure Power Supply

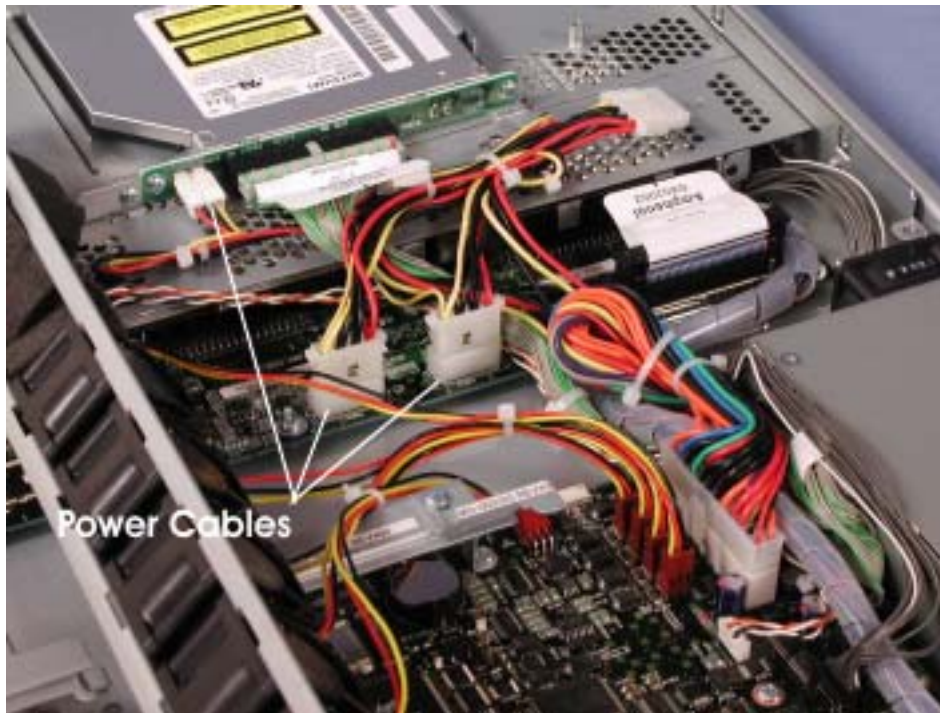
1. Remove the core I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.
3. Remove the three screws securing the fan assembly and carefully pull the assembly out of the way. You do not have to remove the fan assembly cables.

Figure 4-33. Fan Assembly Screws



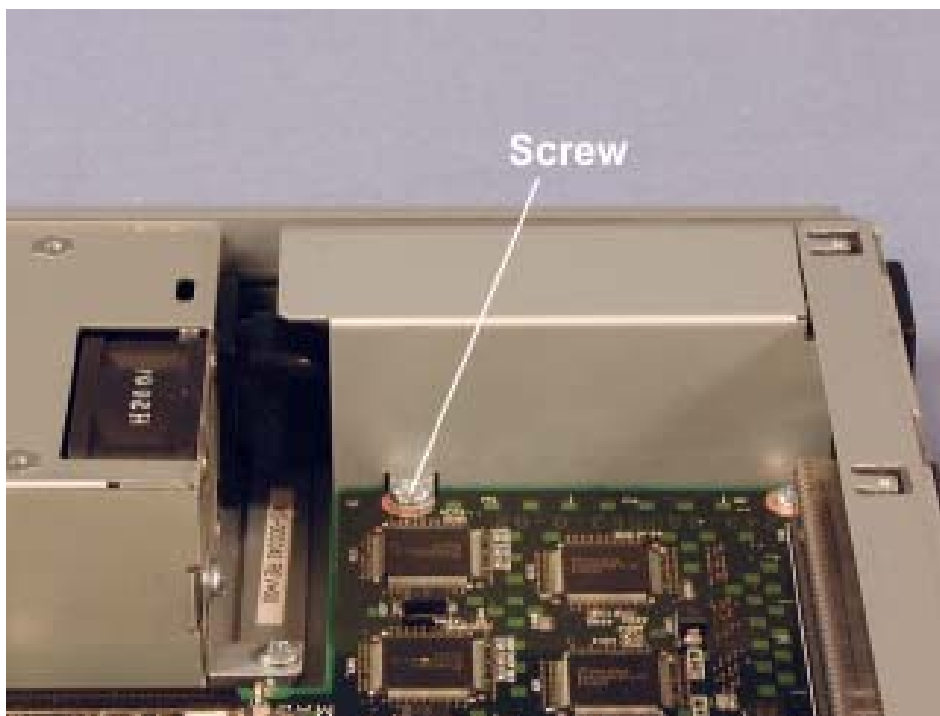
4. Disconnect the power cables from the SCSI backplane and the CD-ROM interface board.

Figure 4-34. Power Cables at SCSI Backplane and CD-ROM Interface Board



5. Remove the screw securing the AC inlet cover and lift the cover off.

Figure 4-35. AC Inlet Screw



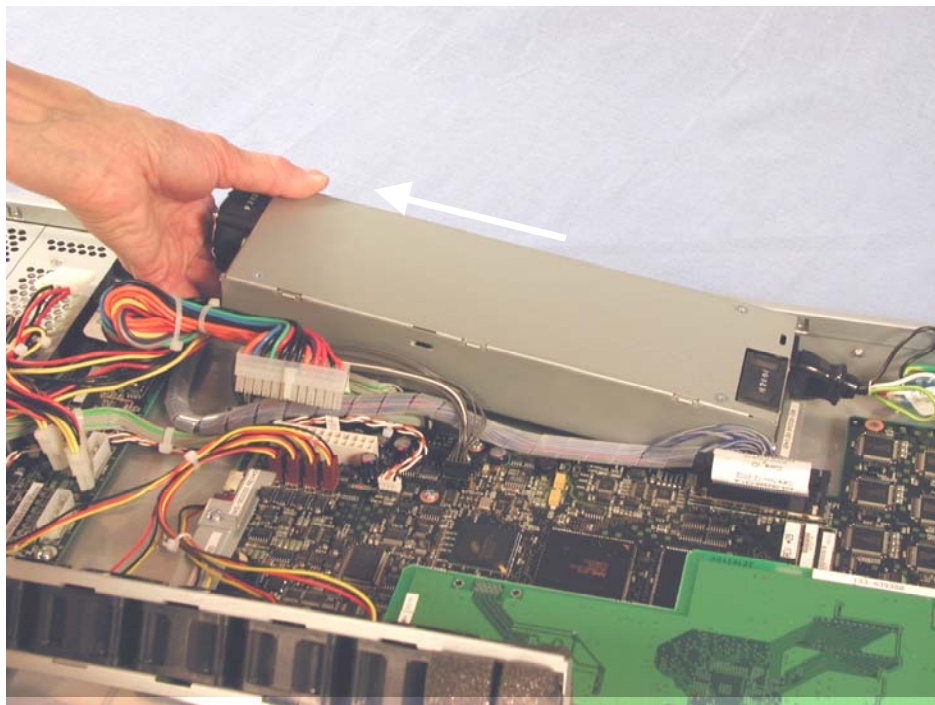
6. Remove the three screws securing the power supply.

Figure 4-36. Power Supply Screws



7. Lift the end of the power supply and slide it slightly forward.

Figure 4-37. Removing Power Supply



8. Disconnect the power jumper cable from the power supply.

Figure 4-38. Power Jumper Cable Connection



4.4.8 Core I/O Enclosure Power Switch

1. Remove the core I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.

3. Remove the three screws securing the fan assembly and carefully pull the assembly out of the way. You do not have to remove the fan assembly cables.

Figure 4-39. Fan Assembly Screws



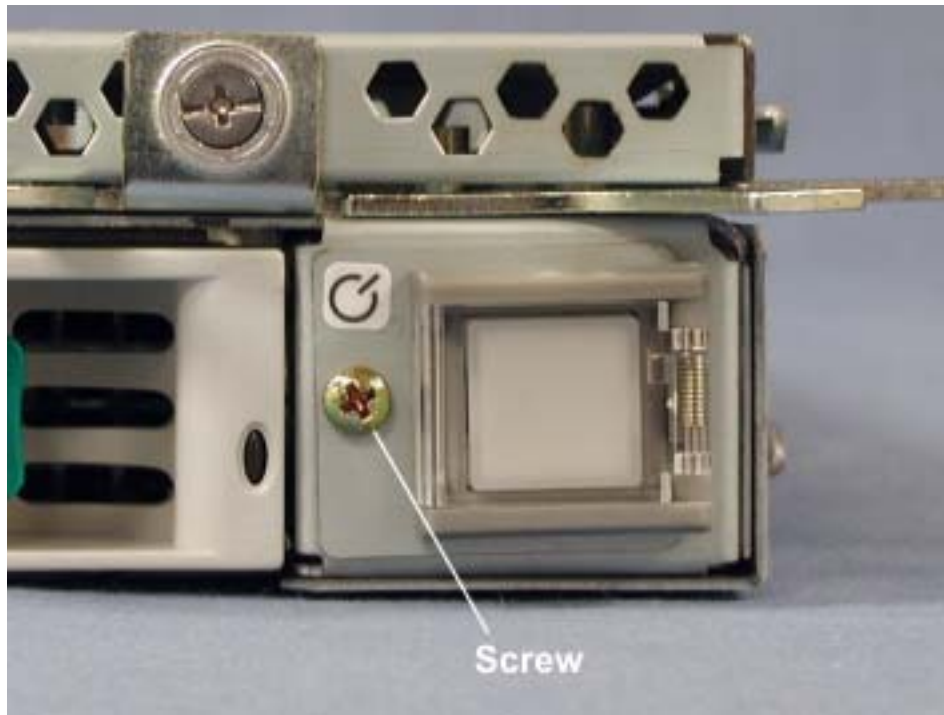
4. Cut the tie wrap securing the power switch cable to loosen the tension on the cable.

Figure 4-40. Power Switch Cable Tie Wrap



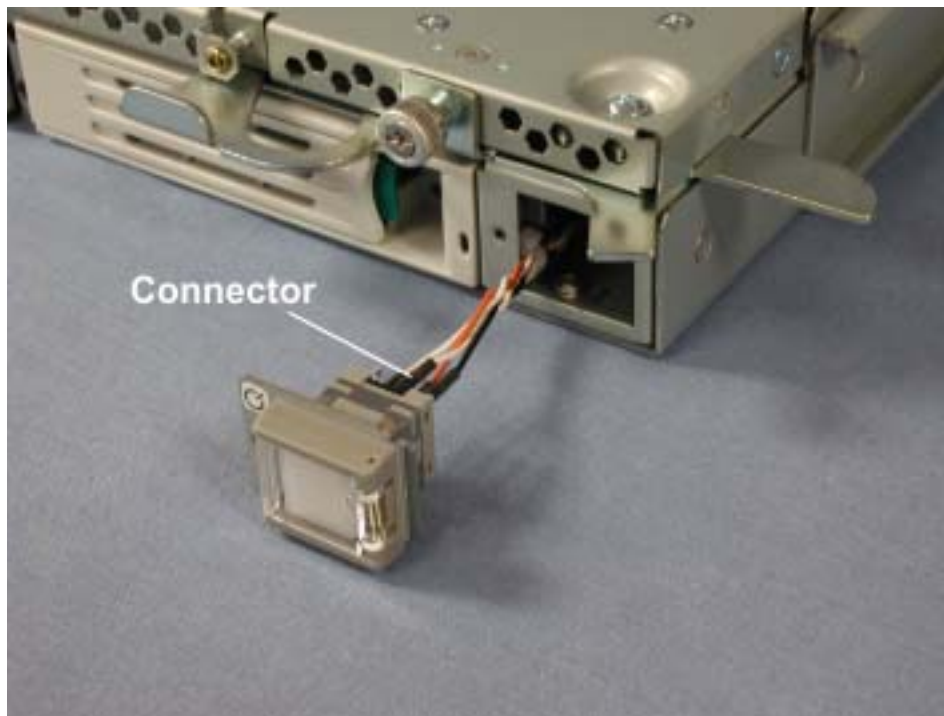
5. At the front of the enclosure, remove the screw securing the power switch cover.

Figure 4-41. Power Switch Cover Screw



6. Pull the power switch slightly out the front of the I/O enclosure and disconnect the cable from the switch.

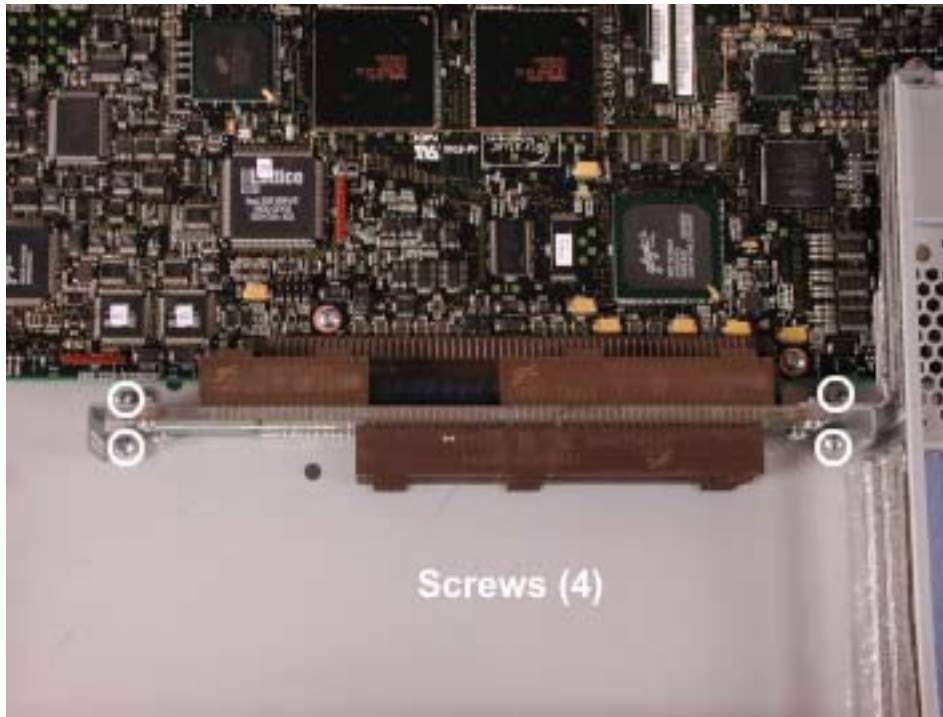
Figure 4-42. Removing Power Switch



4.4.9 Core I/O Enclosure PCI Riser PCB

1. Remove the core I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.
3. Remove all the PCI adapters as described in Section 3.4.10.
4. Remove the four screws securing the bracket holding the PCI riser PCB.

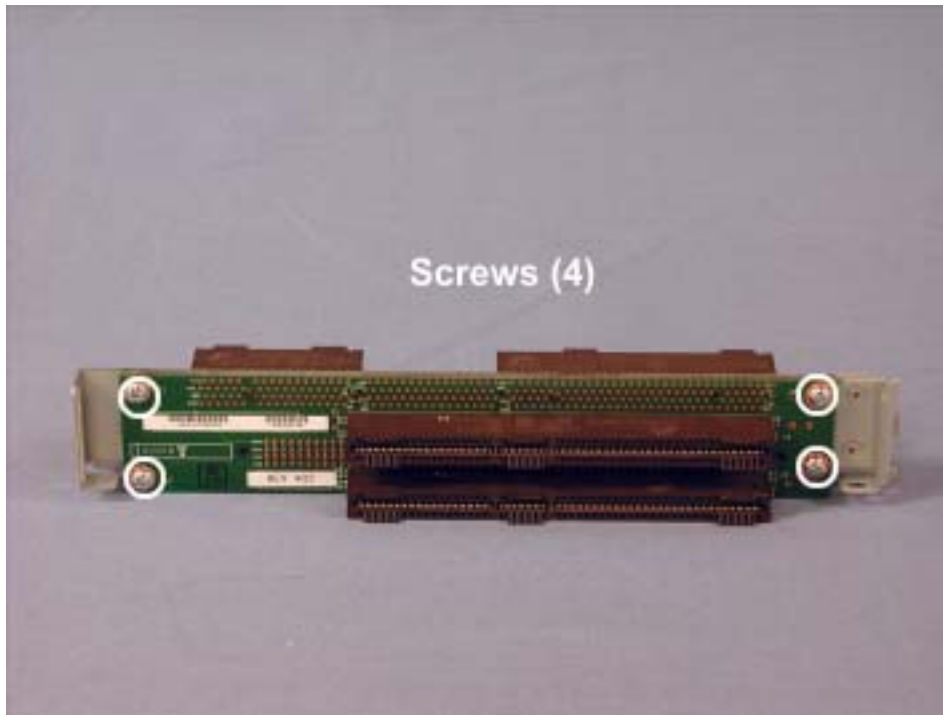
Figure 4-43. Bracket Screws



5. Pull the PCI riser bracket horizontally out of its connector.

6. Remove the four screws securing the PCI riser PCB to the bracket.

Figure 4-44. PCI Riser PCB Screws

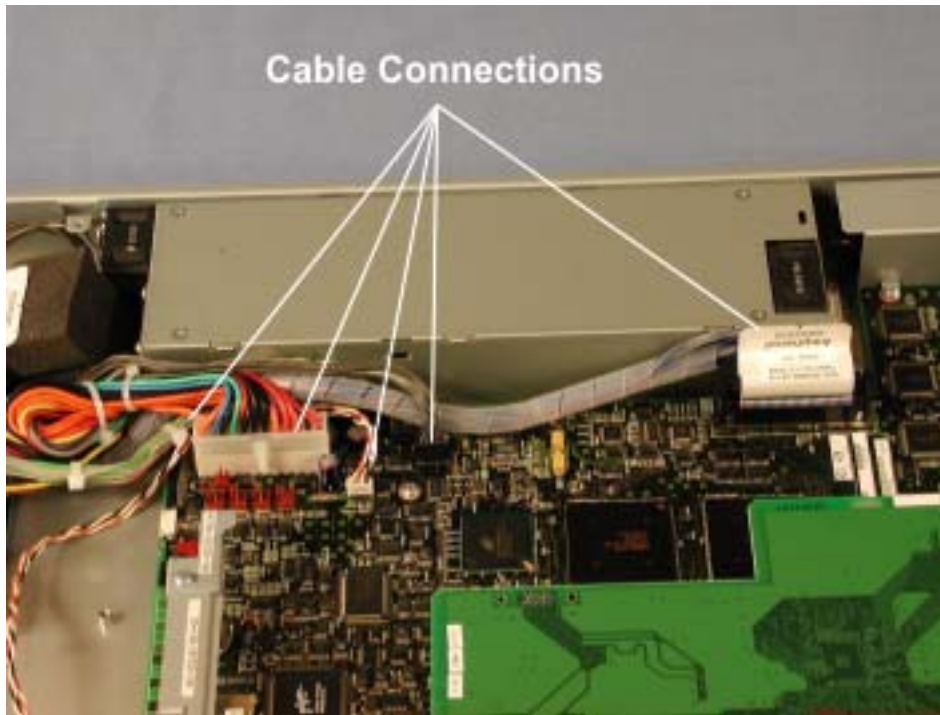


4.4.10 Core I/O Enclosure Core I/O Board

1. Remove the core I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.
3. Remove the fan assembly as described in Section 3.4.10.

4. Disconnect the remaining cables (five total) from the core I/O board.

Figure 4-45. Core I/O Board Cables



5. Remove each of the PCI adapters as described in Section 3.4.9.

6. Remove the PCI Riser PCB as described in Section 4.3.7.

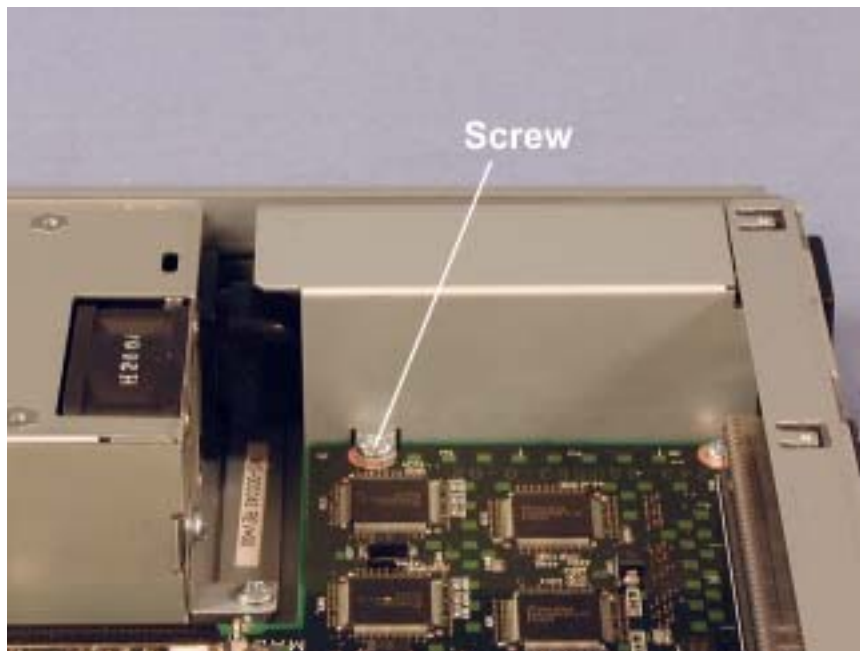
7. Remove the two screws securing the PCB stabilizing bracket to the core I/O board.

Figure 4-46. Stabilizing Bracket Screws



8. Remove the screw securing the AC inlet cover and lift off the cover.

Figure 4-47. AC Inlet Cover Screw



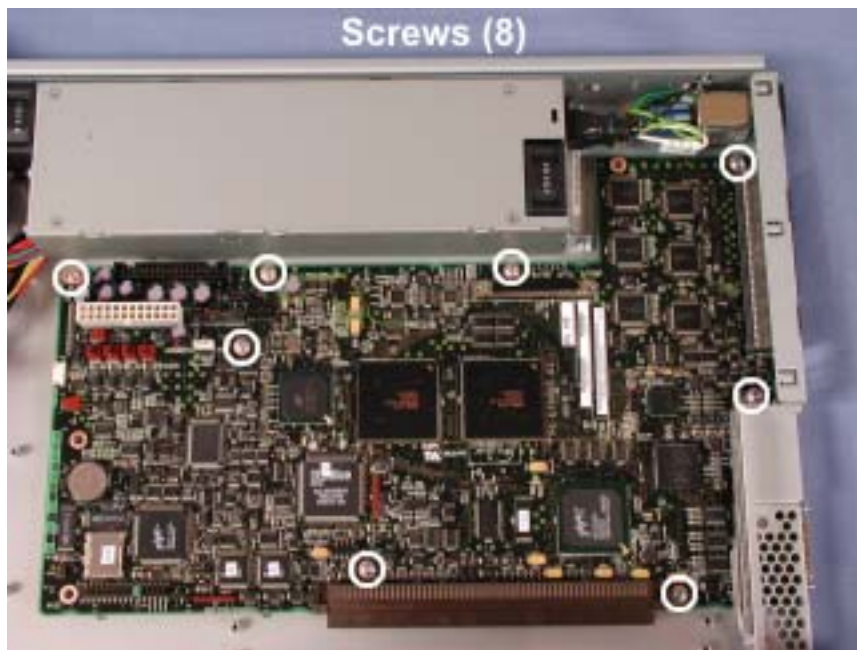
9. Remove the two screws securing the external SCSI connector at the rear of the enclosure.

Figure 4-48. External SCSI Connector Screws



10. Remove the remaining eight screws from the core I/O board.

Figure 4-49. Core I/O Board Screws



11. Carefully lift the end of the core I/O board and pull it slightly forward until the connectors at the rear clear the sheet metal.

4.4.11 CD-ROM Interface Board

1. Remove the core I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.
3. Disconnect the cables from the CD-ROM interface board.

Figure 4-50. CD-ROM Interface Board Cables



4. Remove the two screws securing the Interface board.

Figure 4-51. CD-ROM Interface Board Screws



5. Disengage the CD-ROM interface board from the CD-ROM and lift it out.

4.4.12 Core I/O Enclosure Ground Cable

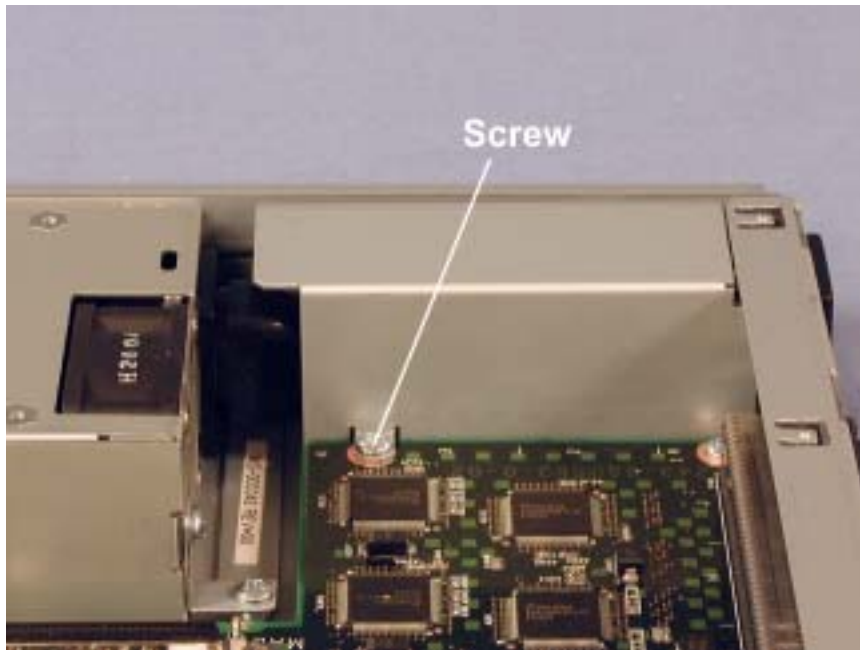
1. Remove the I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.
3. Remove the three screws securing the fan assembly and carefully pull the assembly out of the way. You do not have to remove the fan assembly cables.

Figure 4-52. Fan Assembly Screws



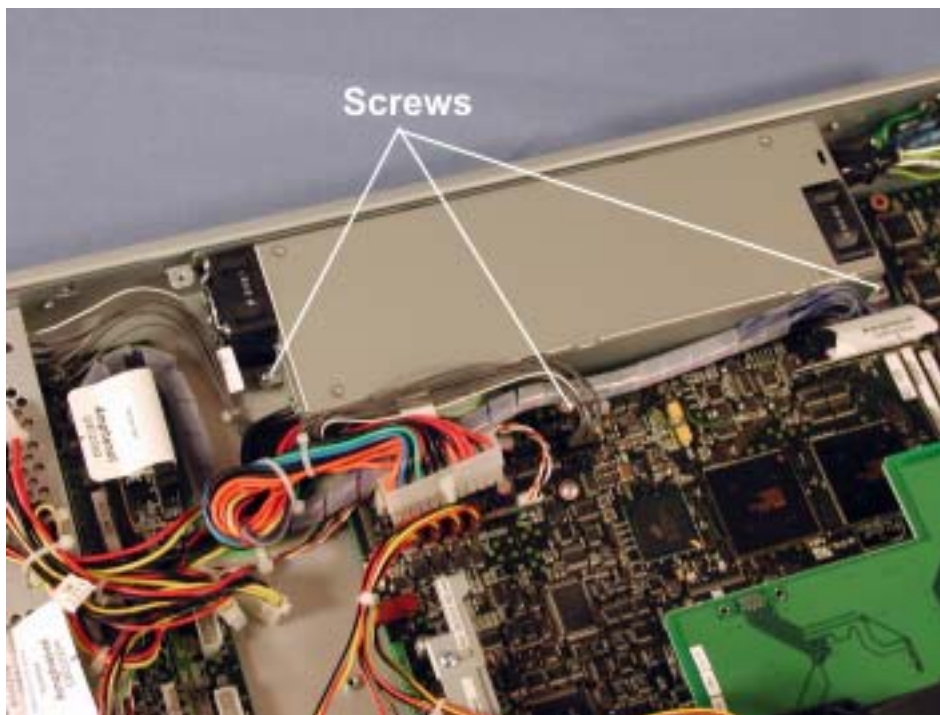
4. Remove the screw securing the AC inlet cover and lift off the cover.

Figure 4-53. AC Inlet Cover Screw



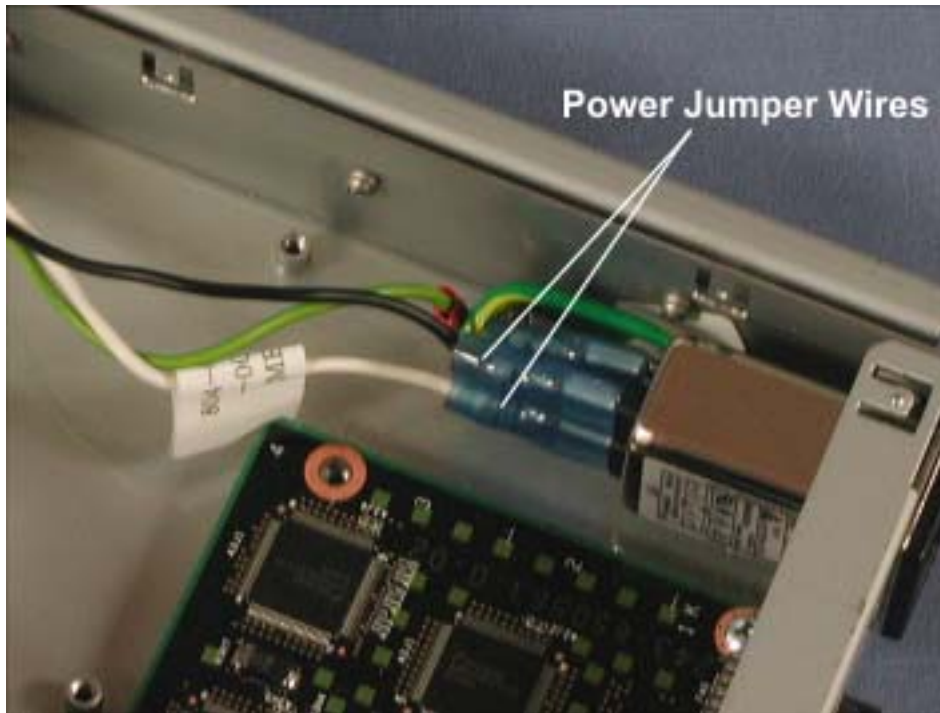
5. Remove the three screws securing the power supply and lift it out of the way. You do not need to disconnect the power connector.

Figure 4-54. Power Supply Screws



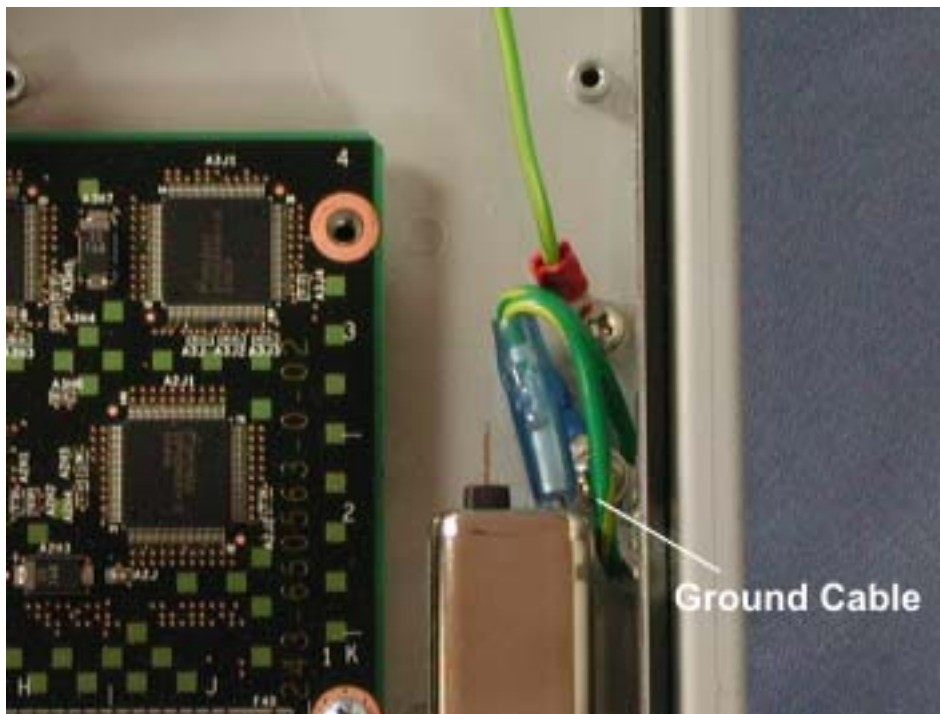
6. Disconnect the black and white wires on the power jumper cable from the AC inlet.

Figure 4-55. Power Jumper Cable Wires at AC Inlet



7. Disconnect the ground cable from the AC inlet.

Figure 4-56. Ground Cable Connection at AC Inlet



8. Remove the screw securing the ground cable to the enclosure.

4.4.13 Core I/O Enclosure Power Jumper Cable

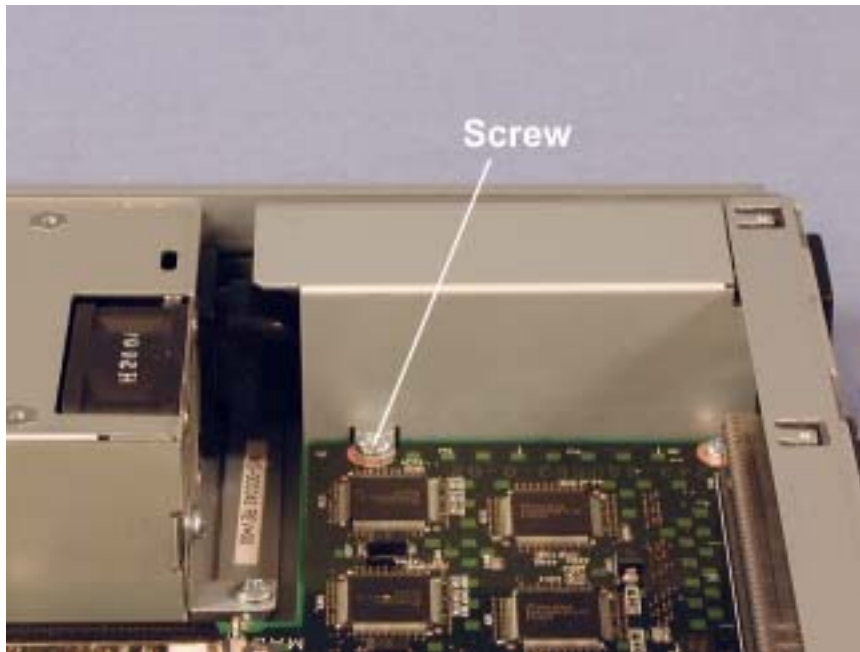
1. Remove the I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.
3. Remove the three screws securing the fan assembly and carefully pull the assembly out of the way. You do not have to remove the fan assembly cables.

Figure 4-57. Fan Assembly Screws



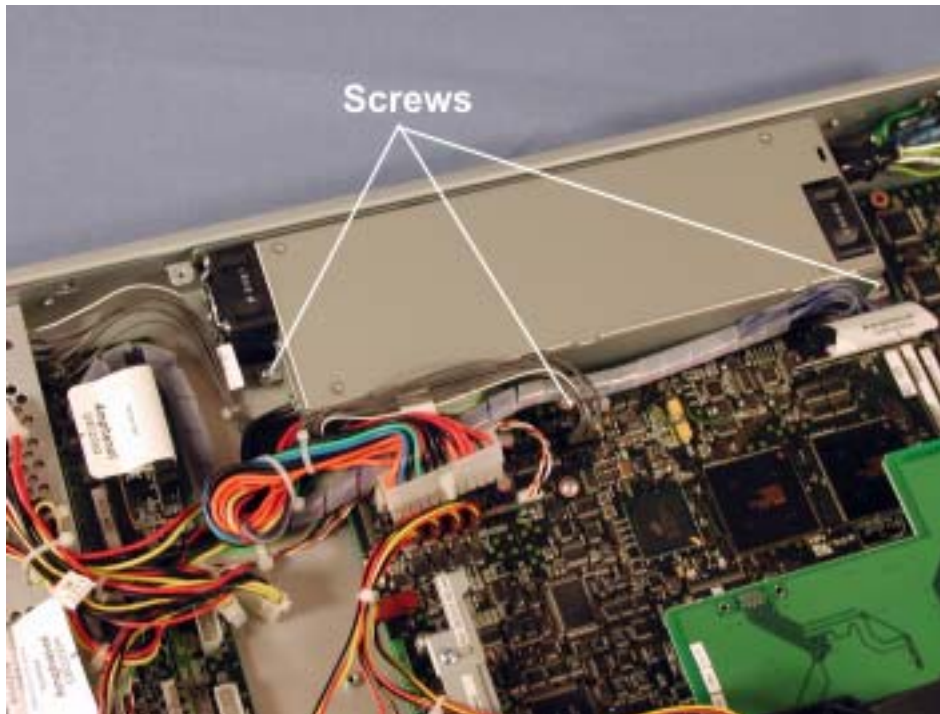
4. Remove the screw securing the AC inlet cover and lift off the cover.

Figure 4-58. AC Inlet Cover Screw



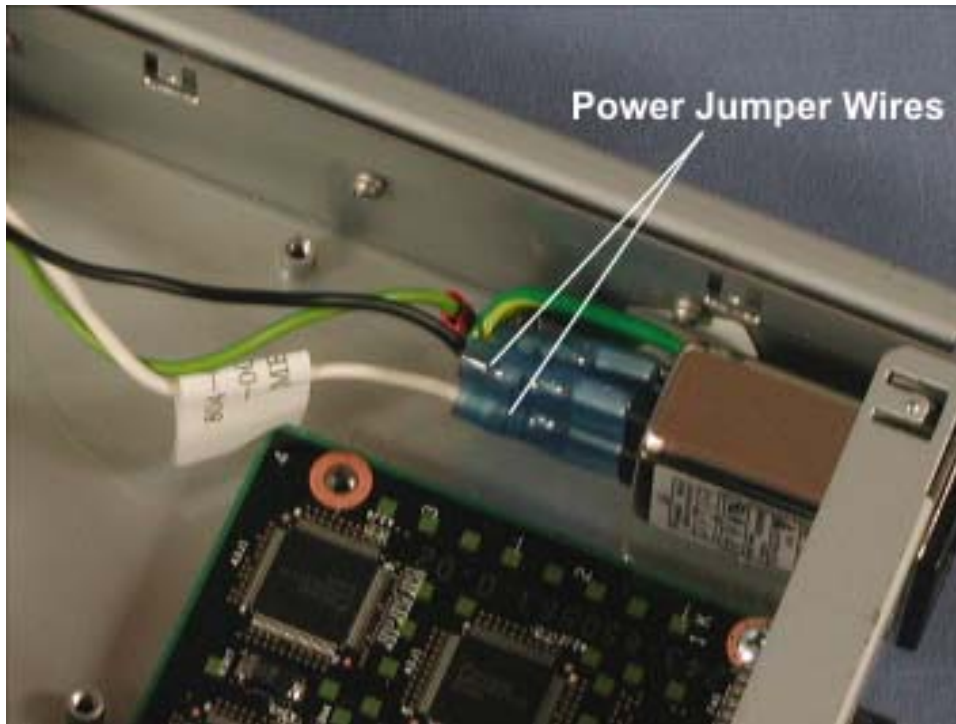
5. Remove the three screws securing the power supply and lift it out of the way. You do not need to disconnect the power connector.

Figure 4-59. Power Supply Screws



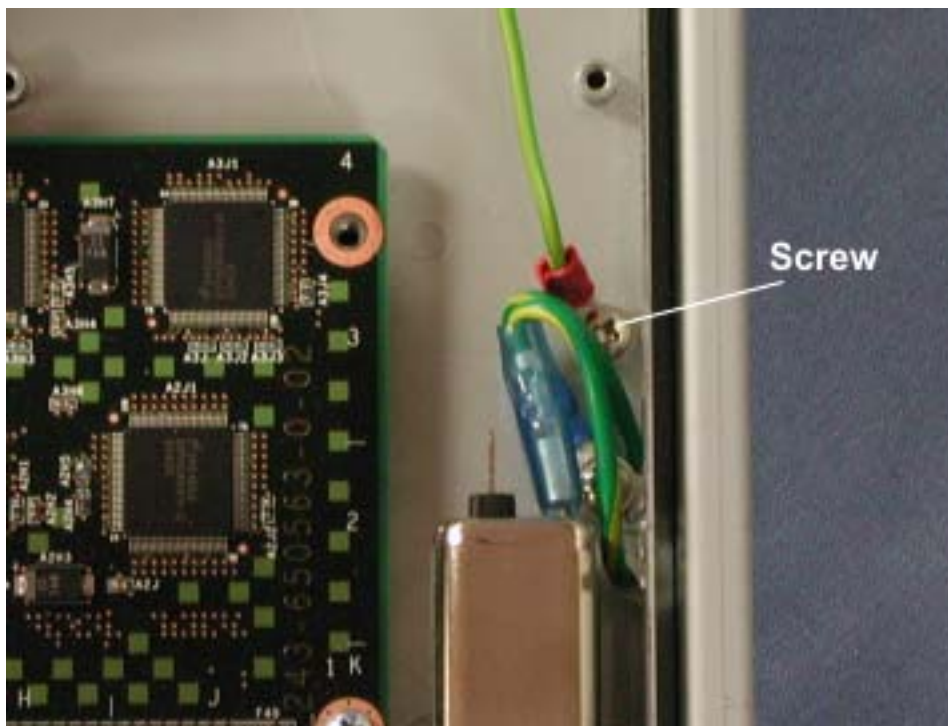
6. Disconnect the black and white wires on the power jumper cable from the AC inlet.

Figure 4-60. Power Jumper Cable Wires at AC Inlet



7. Remove the screw securing the power jumper cable's ground wire to the enclosure.

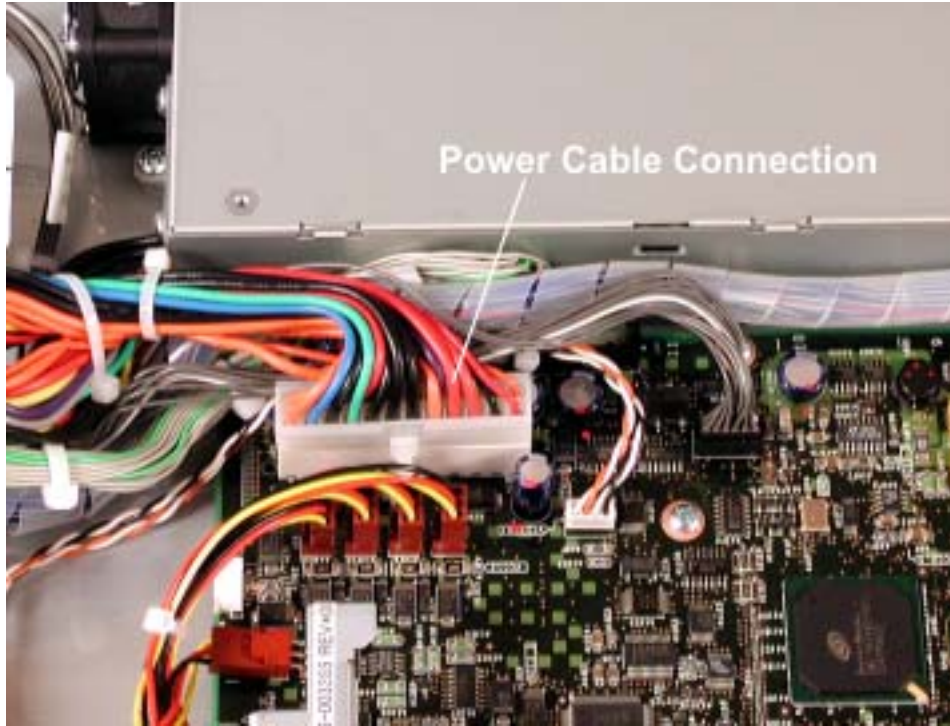
Figure 4-61. Power Jumper Cable Ground Wire



4.4.14 Core I/O Enclosure Ultra 160 SCSI Jumper

1. Remove the I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.
3. Disconnect the power cable from the core I/O board.

Figure 4-62. Power Cable Connection at Core I/O Board



4. Disconnect the Ultra160 SCSI jumper from the SCSI backplane and the core I/O board.

Figure 4-63. Ultra160 SCSI Jumper Connections



4.4.15 Core I/O Enclosure SCSI Backplane

1. Remove the I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.

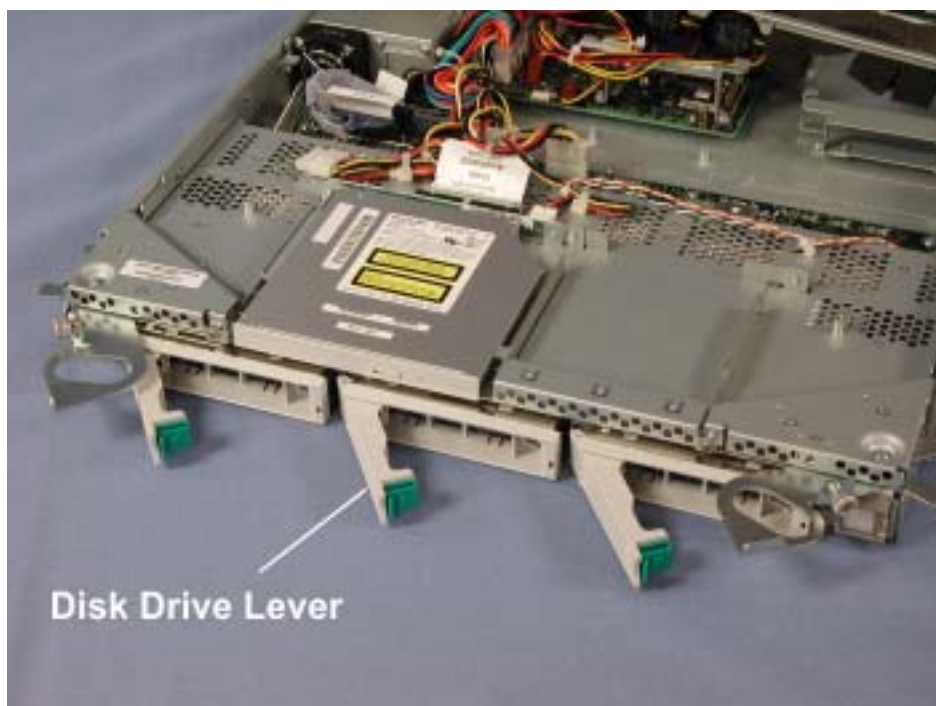
3. Remove the three screws securing the fan assembly and carefully pull the assembly out of the way. You do not have to remove the fan assembly cables.

Figure 4-64. Fan Assembly Screws



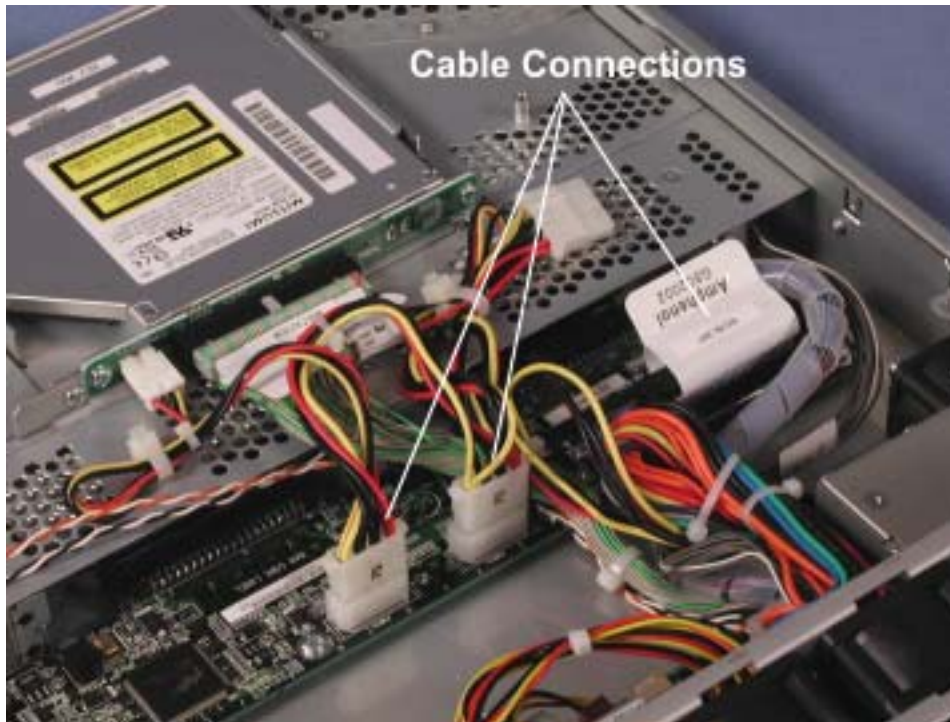
4. Disengage each disk drive from the SCSI backplane by pressing in the green tab at the end of the disk drive lever and pulling the lever out to its fully open position.

Figure 4-65. Disk Drive Lever



5. Disconnect the two power cables and the SCSI cable from the SCSI backplane..

Figure 4-66. SCSI and Power Cables at SCSI Backplane



6. Remove the eight screws securing the SCSI backplane and lift it out of the enclosure.

Figure 4-67. SCSI Backplane Screws



4.4.16 Core I/O Enclosure LED Cable

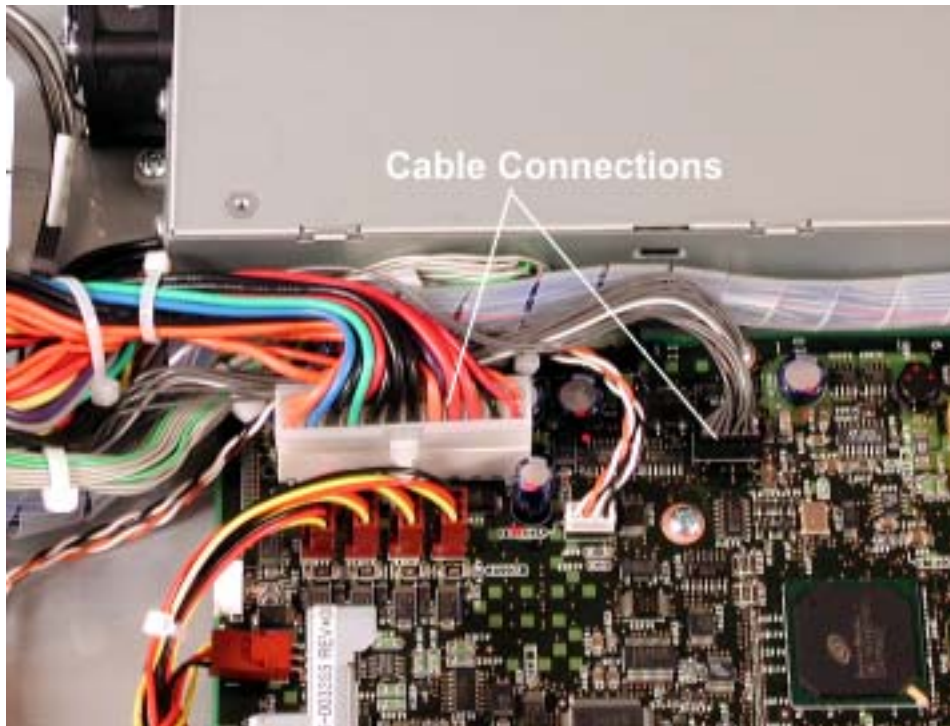
1. Remove the I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.
3. Remove the three screws securing the fan assembly and carefully pull the assembly out of the way. You do not have to remove the fan assembly cables.

Figure 4-68. Fan Assembly Screws



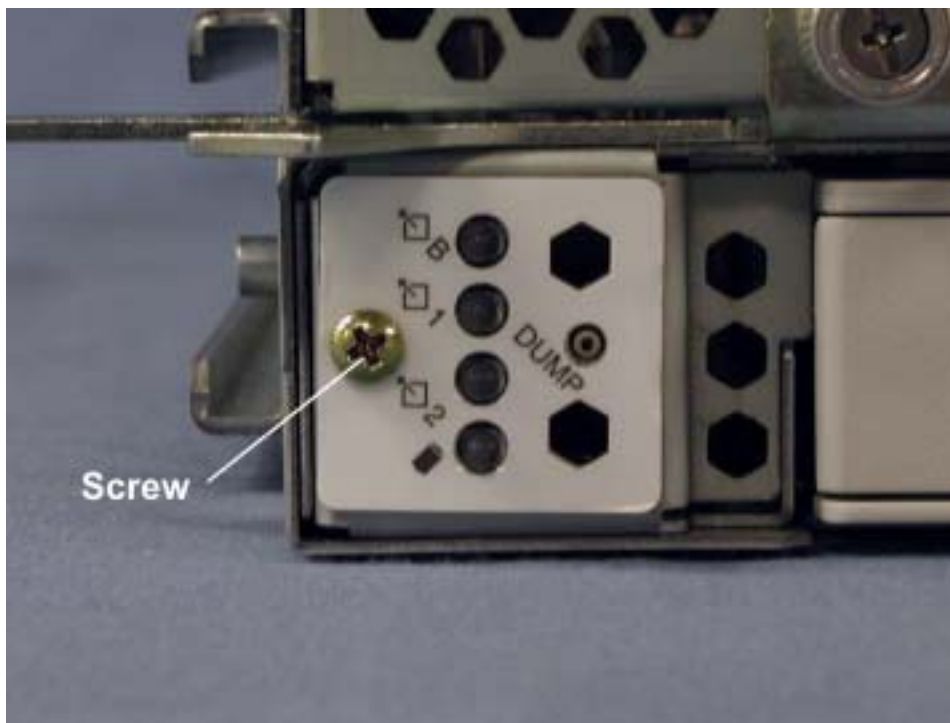
4. Disconnect the power cable and LED cable from the core I/O board.

Figure 4-69. Power Cable and LED Connections at Core I/O Board



5. Remove the screw in the I/O enclosure LED PCB at the front of the enclosure.

Figure 4-70. I/O Enclosure LED PCB Screw



6. Pull the I/O enclosure LED PCB and cable straight forward and out of the enclosure.

Figure 4-71. Removing LED PCB and Cable



7. Disconnect the LED cable from the back of the LED PCB.

4.4.17 Core I/O Enclosure Power Switch with LED and Guard

1. Remove the I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.

3. Remove the three screws securing the fan assembly and carefully pull the assembly out of the way. You do not have to remove the fan assembly cables.

Figure 4-72. Fan Assembly Screws



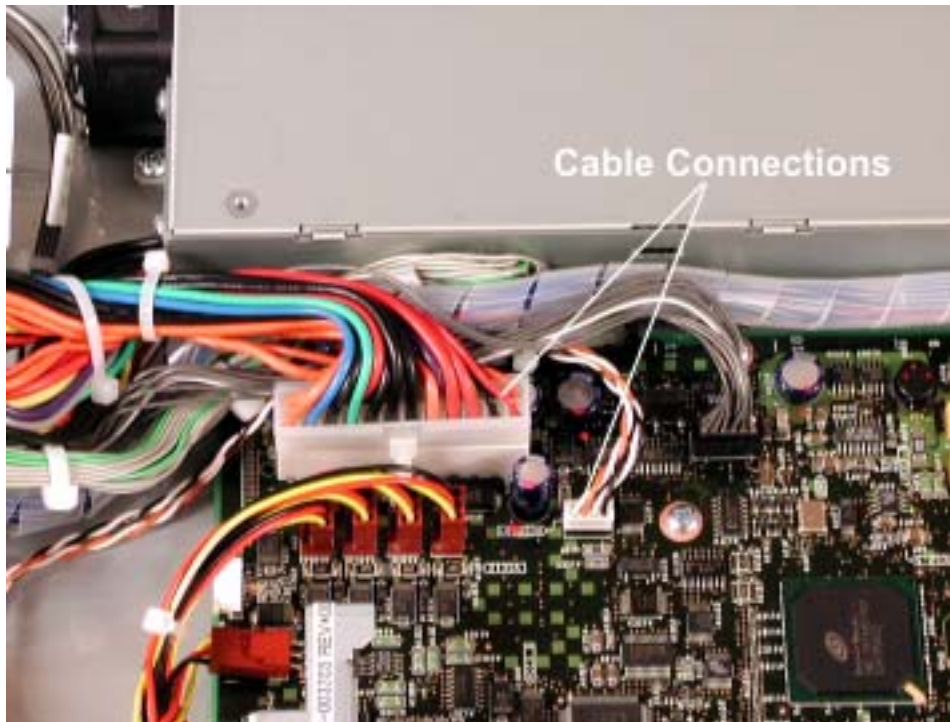
4. Cut the tie wrap securing the power switch cable to the chassis to loosen the tension on the cable.

Figure 4-73. Power Switch Cable Tie Wrap



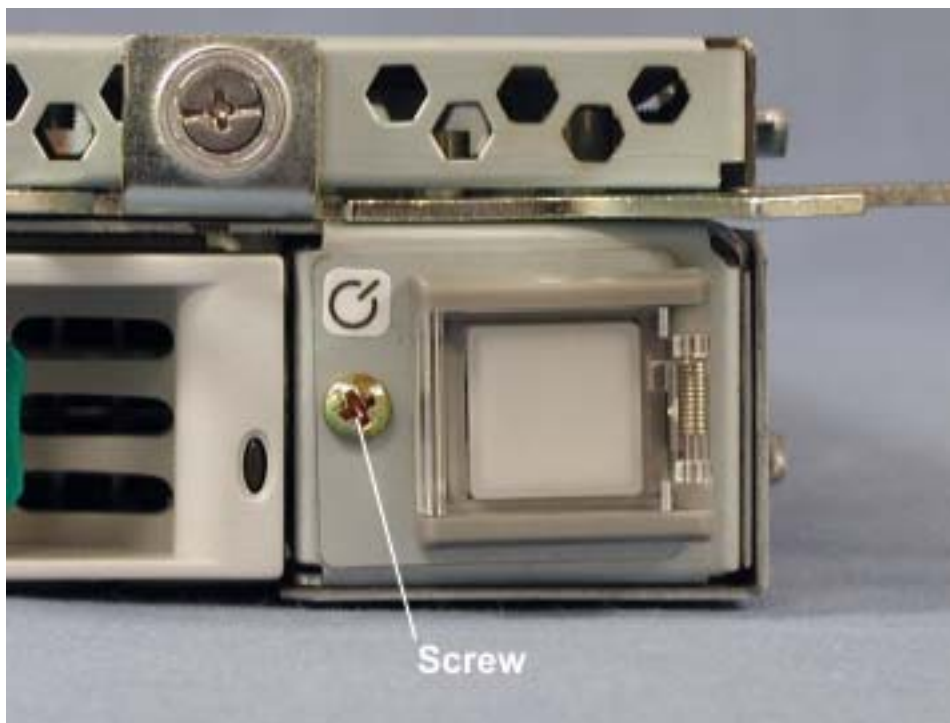
5. Disconnect the power switch cable and power cable at the core I/O board.

Figure 4-74. Power Switch Cable Connection at Core I/O Board



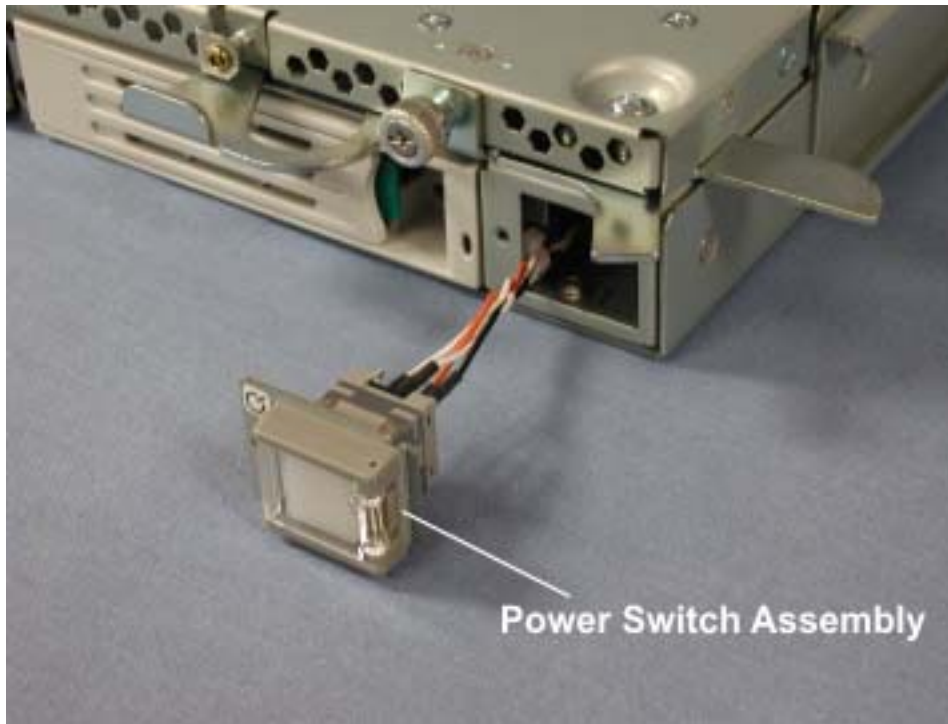
6. At the front of the enclosure, remove the screw securing the power switch assembly cover.

Figure 4-75. Power Switch Assembly Cover Screw



7. Pull the power switch assembly out the front of the I/O enclosure.

Figure 4-76. Removing Power Switch Assembly



4.4.18 Core I/O Enclosure IDE Cable

1. Remove the I/O enclosure as described in Section 3.4.2.
2. Remove the I/O enclosure cover as described in Section 3.4.3.

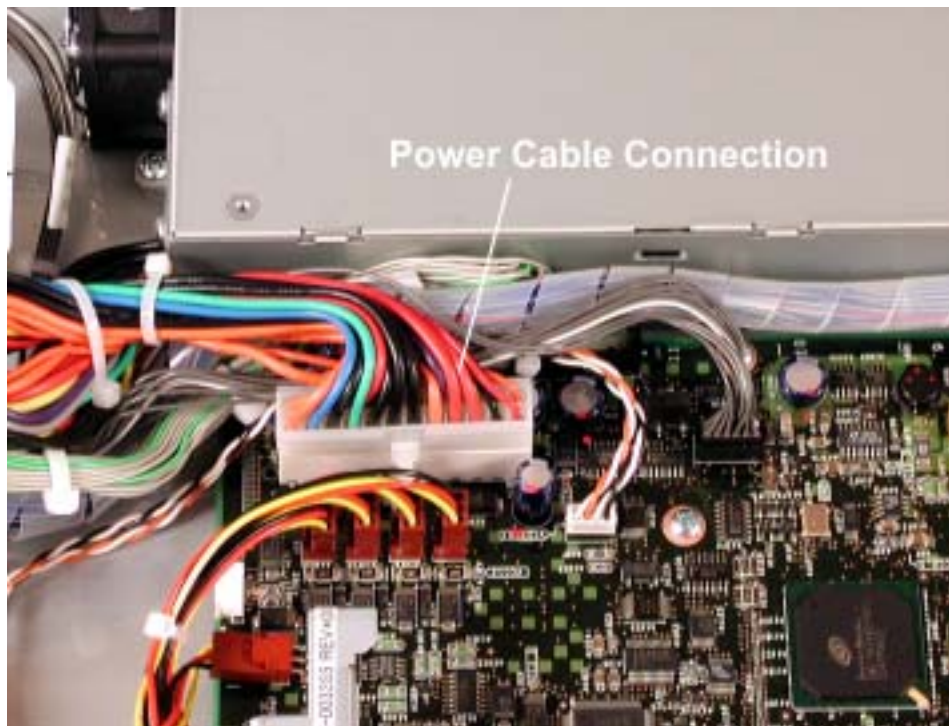
3. Remove the three screws securing the fan assembly and carefully pull the assembly out of the way. You do not have to remove the fan assembly cables.

Figure 4-77. Fan Assembly Screws



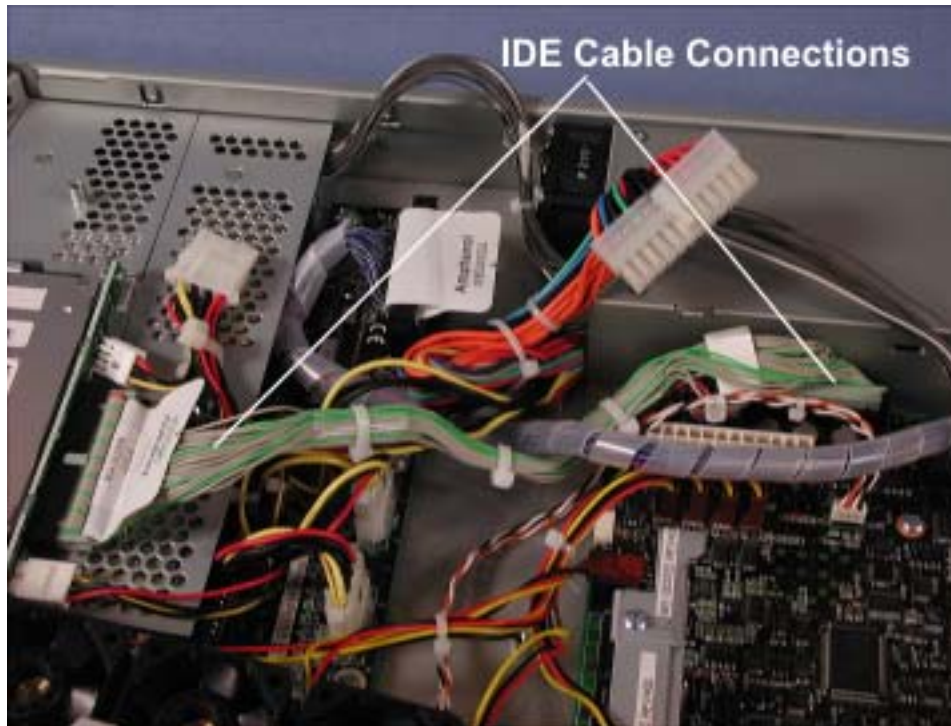
4. Disconnect the power cable at the core I/O board.

Figure 4-78. Power Cable Connection at Core I/O Board



5. Disconnect the IDE cable at the CD-ROM interface board and the core I/O board.

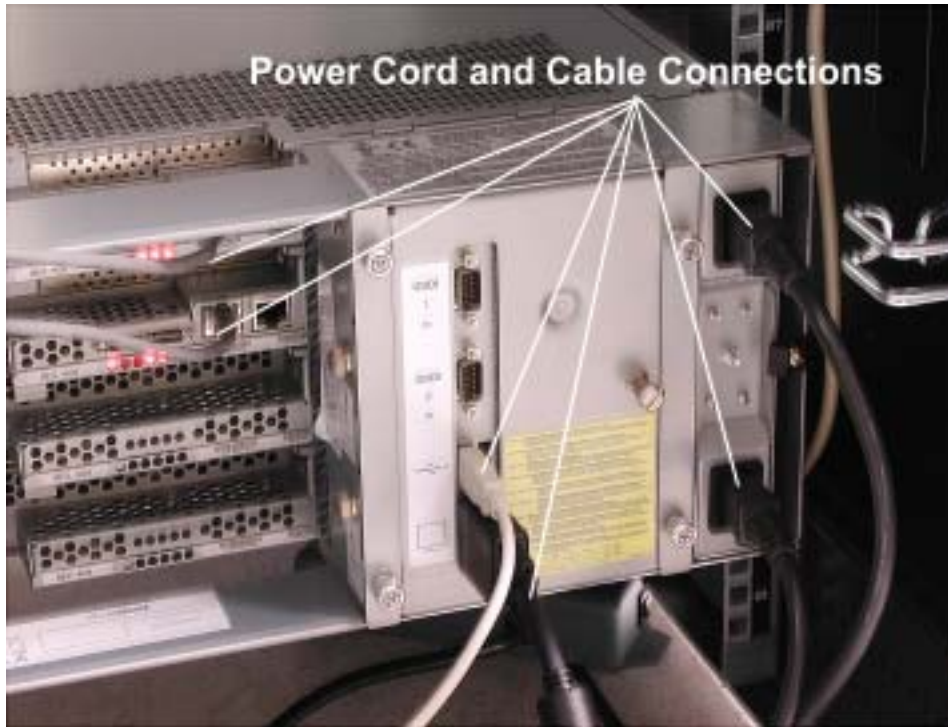
Figure 4-79. IDE Cable Connections at CD-ROM Interface Board and Core I/O Board



4.4.19 AC Distribution Assembly

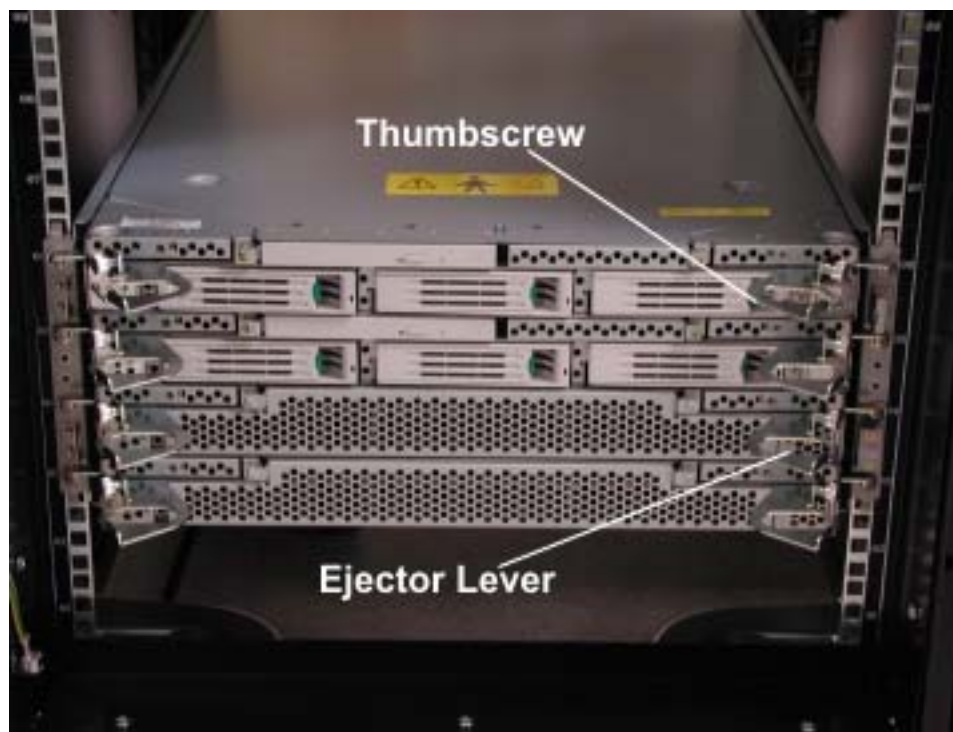
1. Shut down the ftServer system as described in Section 3.3.
2. At the rear of the cabinet, disconnect the power cords from the AC distribution assembly and all the cables connected to the connector I/O PCB and the PCI adapters.

Figure 4-80. Power Cord and Cable Connections at Rear of Cabinet.



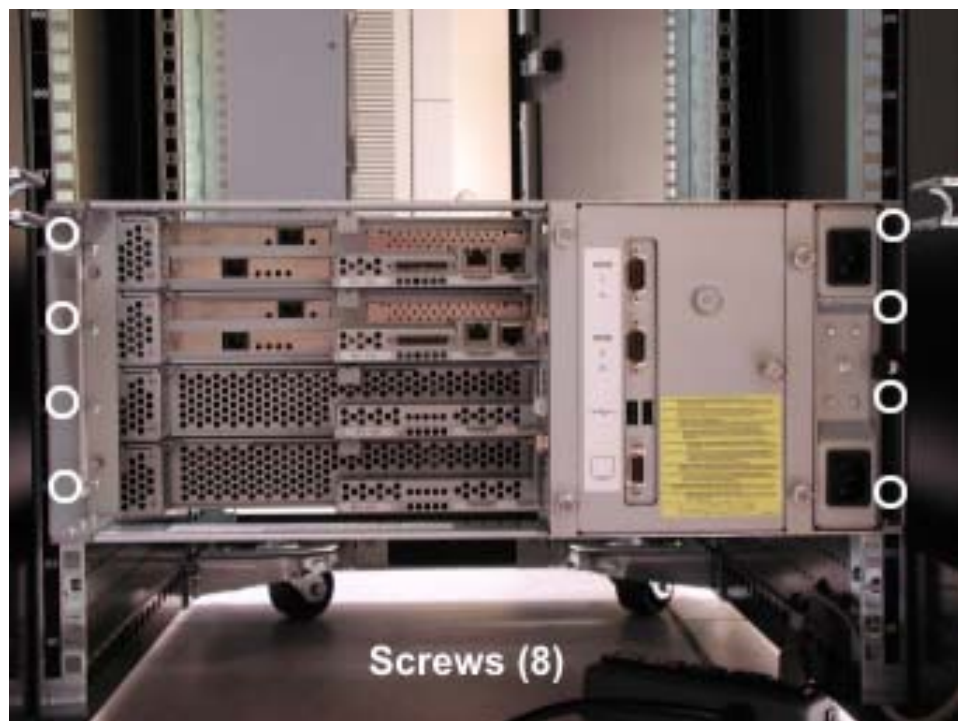
3. At the front of the cabinet, loosen the two thumbscrews on the front of each CPU and I/O enclosure and open the ejector levers to disengage all the enclosures from the backplane.

Figure 4-81. CPU and I/O Enclosure Thumbscrews and Ejector Levers



4. Remove the eight screws (four on each side) that secure the backplane assembly to the rails.

Figure 3-30. Backplane Assembly Screws



5. Using both hands, pull the backplane assembly straight out of the rails and set it on a stable surface.
6. Remove the 4 screws securing the AC distribution assembly to the backplane.

Figure 4-82. AC Distribution Screws



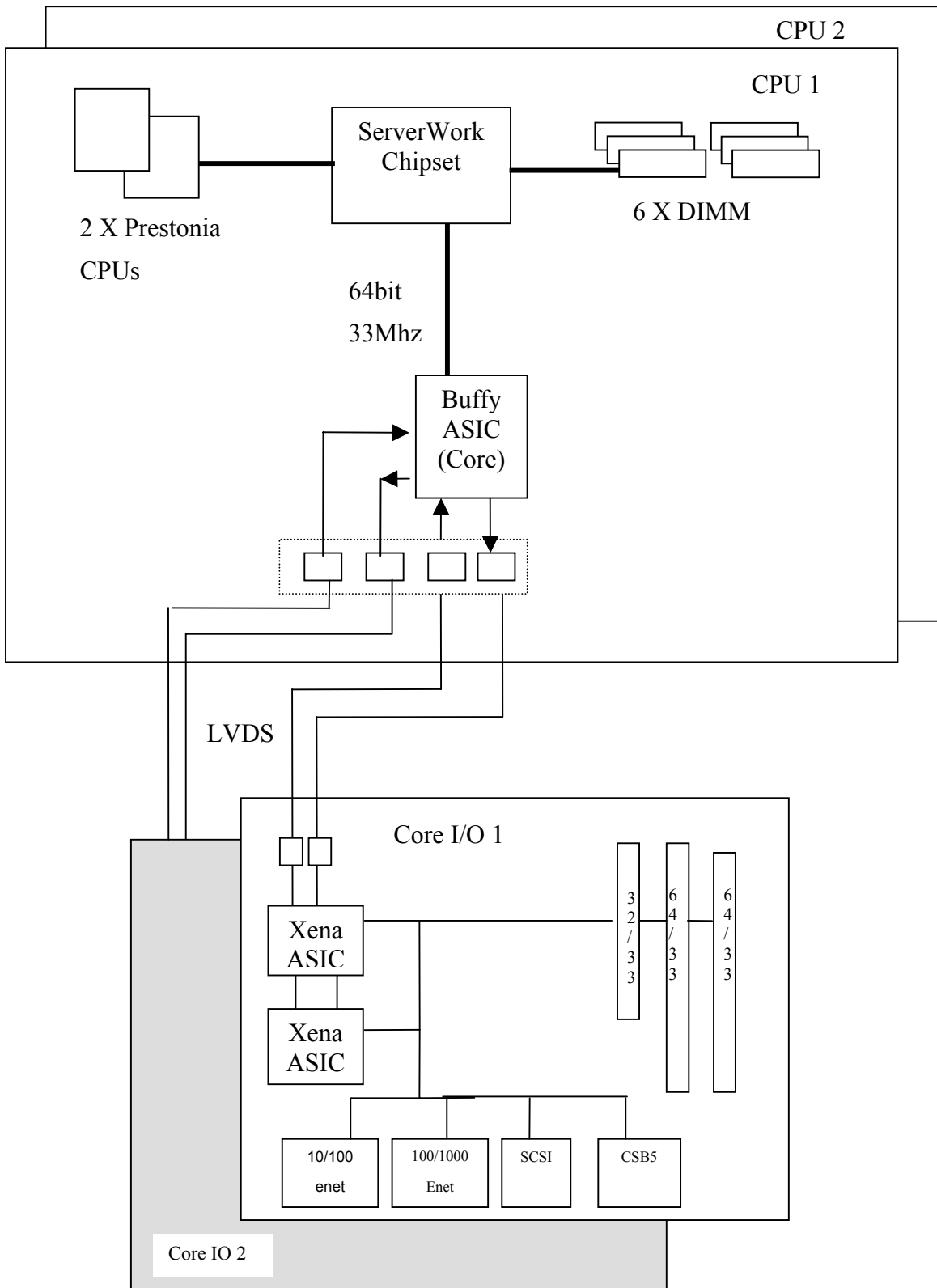
5. Theory of Operation

This section contains an overview of the theory of operation for the ftServer 3300 systems. It provides information on how the system operates and includes a description of each of the following major assemblies/subsystems.

- CPU Enclosure
- I/O Enclosure
- Backplane
- SCSI Ultra160 Storage Subsystem
- Tape Subsystem
- Power Subsystem
- Cooling Subsystem

The figure on the following page is a block diagram of the ftServer 3300 system.

Figure 5-1. ftServer 3300 Block Diagram

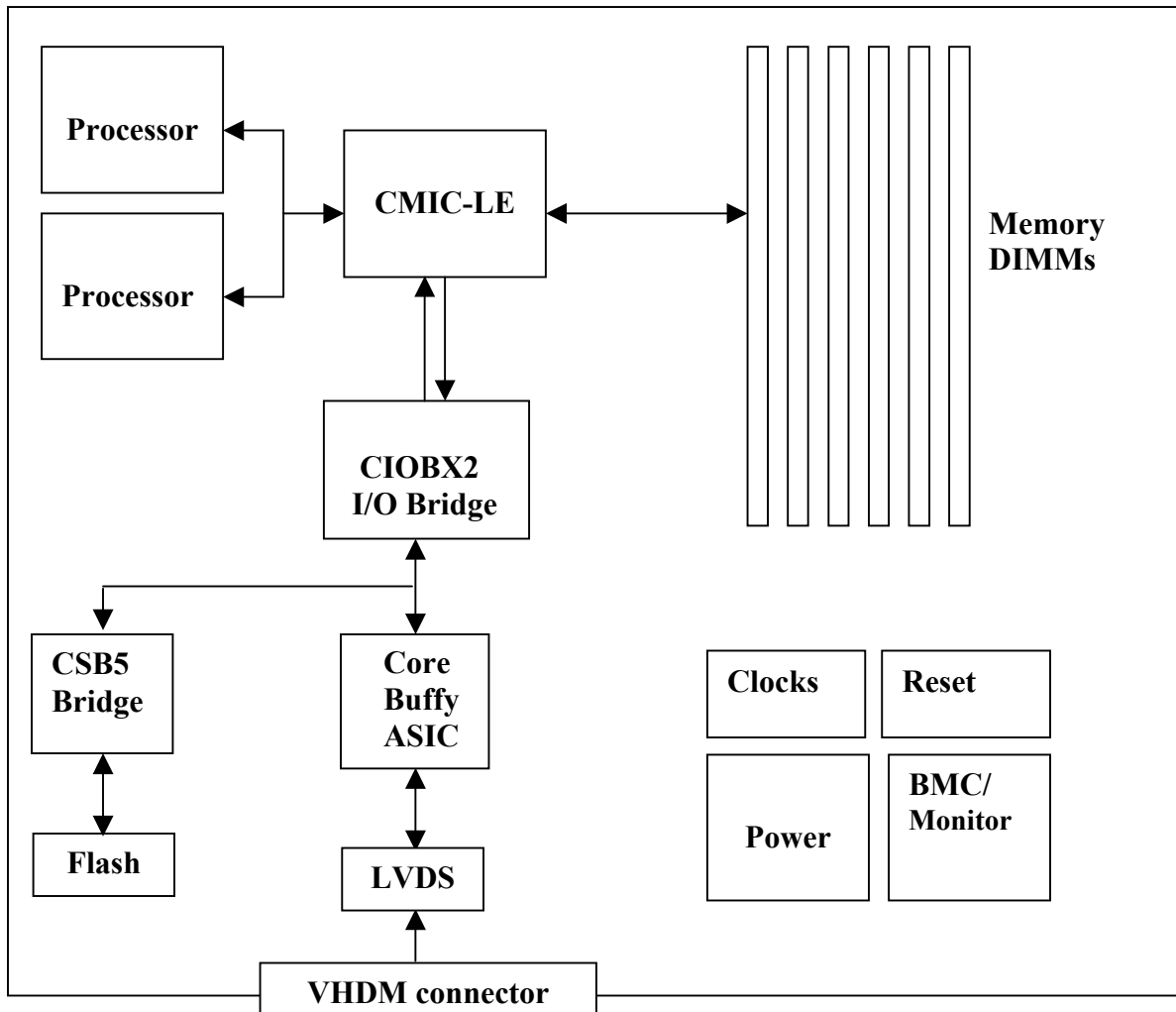


5.1 CPU Enclosure

The ftServer 3300 CPU enclosure is based on the Intel Xeon processor 'Prestonia' using the ServerWorks Grand Champion LE and CIOB-X2 PCI bridge to interface to a pair of Buffy ASICs, which provide the fault tolerant interface between the CPU enclosure and the I/O enclosures within the system. The enclosure is partnered with a duplicate CPU enclosure running in lockstep. In the event of a failure, the failing CPU enclosure is removed from service and the partner CPU enclosure continues to run without system interruption.

The following figure is a block diagram of the CPU enclosure.

Figure 5-2. CPU Enclosure Block Diagram



5.1.1 Processor

The Prestonia CPU operates at 2.4 GHz. It fits into a standard 603 Flip Chip Pin Grid Array (FCPGA) socket

The processor front side bus (FSB) operates at a physical speed of 100 MHz. To improve processor throughput the Prestonia architecture supports a feature called “pumping.” This means that multiple transfers occur per FSB clock cycle. Address cycles are double pumped, meaning address information is transferred on each rising and falling clock edge. Data cycles are quad pumped with data transfers occurring four times during each FSB clock cycle. This allows a maximum data transfer rate of 3.2 Gbytes/sec. between the CPU and the Grand Champion LE.

5.1.2 Grand Champion LE

The Grand Champion LE from ServerWorks serves as the interface between the CPU, memory and the CIOB-X2 I/O bridge. It provides three IMB busses, two 16-bit full duplex, double pumped, busses operating at 800 MHz (400 MHz physical) and one 4 bit uni-directional bus also double pumped to operate at 400MHz (200MHz physical). Of these three IMB busses only one of the 16-bit IMB busses is used to communicate with the CIOB-X2 I/O bridge, providing an interface with a maximum bandwidth of 1.6 Gbytes between the devices.

The memory interface of the CMIC can support up to 8 Double Data Rate (DDR) DIMMs with up to 16 Gbytes of RAM. The memory bus operates at a frequency of 200 MHz (100 MHz double pumped) and has a maximum bandwidth of 3.2 Gbytes/second. Due to memory interleaving the DIMM sockets must be populated in pairs, starting with DIMM sockets 1 and 2.

5.1.3 CIOB-X2 IO Bridge

The CIOB-X2 provides an interface for two PCI or PCI-X busses. The CIOB-X2 provides the PCI bus, which is a 64bit/33 MHz bus that connects to the Core Buffy ASIC.

5.1.4 BIOS Flash

The CPU motherboard contains a 1-Mbyte flash device that is used to store the BIOS code. This device stores the code required to initialize the hardware, verify the integrity of the hardware, and boot the system to the start of the OS initialization.

The BIOS can be upgraded in a running system using the ftServer management utility.

5.1.5 CSB5

The 3300 system contains a minimum of four CSB5 bridges, one on CPU board and one per Core I/O enclosure. The CSB5 captures accesses to the BIOS flash. It is also used to encode interrupts from the Buffy ASIC to be sent to the CMIC as a PCI transaction once the system has changed to XAPIC mode.

5.1.6 Buffy ASIC

Each CPU enclosure communicates with the Core I/O enclosures. This is achieved by a Buffy ASIC that resides on each of the CIOB PCI busses. Each Buffy accepts transactions destined for the IO enclosures on its PCI bus and encodes that data for transmission across the CPU-to-I/O bus. LVDS serializers and de-serializers on each of the CPU and I/O enclosures are used to

encode and decode data being transmitted across the bus. By using LVDS encoding, the number of pins required to interface the CPU enclosures to the I/O enclosures is greatly reduced.

The Buffy ASIC also receives data from the CPU-to-I/O bus sent by the Xena ASICs that reside on the I/O boards and decodes the northbound transactions before initiating a PCI transaction to the CIOB.

5.2 I/O Enclosure

The core I/O board provides the legacy I/O (keyboard, mouse, serial ports and IDE) for the 3300 system. In addition to providing legacy support, it also provide the following features:

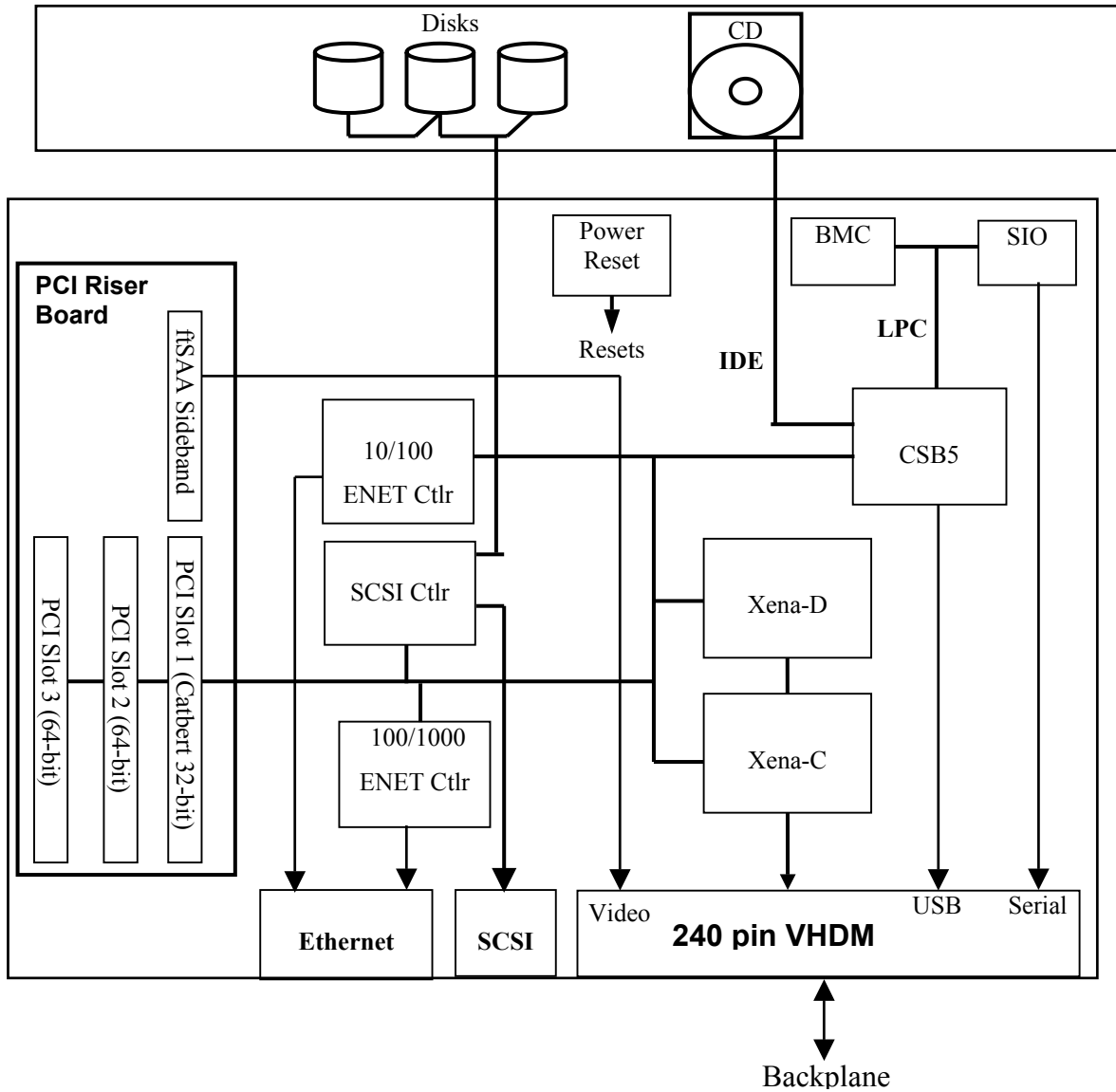
- Embedded SCSI controller
- SCSI backplane with 3 Ultra-3 SCSI slots
- 10/100 Ethernet controller
- 10/100/1000 Ethernet controller
- 2x64bit 33-MHz PCI slots
- 1x32bit 33-MHz PCI slot (with ftSAA sideband connector)
- Video, through sideband connector for fault tolerant video
- External SCSI port

The heart of the core I/O board is the PCI bus provided by the Xena ASIC pair. This bus is a 64-bit bus operating at a frequency of 33 MHz. To increase performance, all of the PCI devices and PCI slots are connected directly to the primary PCI bus.

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The figure on the following page is a block diagram of the core I/O enclosure.

Figure 5-3. I/O Enclosure Block Diagram



5.2.1. User-Defined PCI Slots

The core I/O enclosure can accept up to three user-installed PCI cards. Two of the PCI slots are 64-bit 33-Mhz PCI slots, and the third is a 32-bit 33-Mhz slot. The PCI cards are inserted into the PCI riser card that is attached in a horizontal position to the core I/O board. PCI slot 1 (32-bit slot) can accept an ftSAA card or an NEC video card. A sideband connector is provided to accommodate video, power and communication signals. To insert or remove a PCI card the whole Core I/O enclosure must be removed.

For PCI card and embedded PCI controller configuration, the IDSEL lines of the devices/slots are connected as described in the following table,

Xena Primary Address Bit	Device Number	PCI device
16	0	PCI Slot 1
17	1	PCI Slot 2
18	2	PCI Slot 3
19	3	100/1000 Ethernet
21	5	12160 SCSI ctrlr
22	6	10/100 Ethernet
31	15	CSB5

5.2.2 SCSI Controller

The core I/O enclosure contains an embedded 12160 PCI-to-SCSI bridge from Qlogic. This controller contains two SCSI busses: one is connected to an Ultra-3 SCSI backplane contained within the core I/O enclosure, and the second goes to a 68-pin high density external connector located to the rear of the core I/O enclosure. The SCSI bus is connected to the internal SCSI backplane and the other is connected to the external connector.

The external port of the SCSI controller on the core I/O board supports both single-ended (SE) and Low Voltage Differential (LVD) SCSI. The SCSI mode is selected by the device plugged into the external port. The external SCSI port is used to control a SCSI tape drive

The internal backplane supports LVD disks. The disks installed in the core I/O enclosure are single initiated; therefore a failure of a core I/O board removes all of the disks in that core I/O enclosure from service. The disks in the partner core I/O board run in simplex mode until the faulty core I/O board has been replaced and the disks re-mirrored.

5.2.3 Ethernet Controllers

The 3300 Core I/O board has two embedded Ethernet controllers; the first is an Intel 82554 10/100/1000 Mbits/sec controller, and the second is an Intel 82559/82550 10/100 Mbits/sec controller.

The two Ethernet controllers share the following features:

- Full auto-negotiation for connection speed and half/full duplex

- Integrated MAC and Physical layer functions
- Serial PROM for device configuration
- Copper RJ45 network interface
- Bus mastering PCI controller
- Reside on Core I/O primary PCI bus.
- LEDs to indicate connection status/speed.

5.2.3.1 10/100-Mbit 82559/82550 Ethernet Controller

The ftServer 3300 system uses the 82559 or the 82550 Ethernet controller. The 82559/82550 Ethernet controllers are 32-bit PCI devices They are supplied in a 196BGA package device and reside on the lower 32-bits of the core I/O PCI bus. The device requires only a small number of external components to implement a complete fast Ethernet interface. Physical connection to this controller is through an RJ45 connector that contains integrated magnetic components to provide electrical isolation and LEDs to show connection status and connection speed. When the system is in a standby state, the 10/100-Mbit port is still powered and can communicate with the BMC through the interface. Through this interface the BMC can remotely power on and boot a system.

5.2.3.2 10/100/1000-Mbit 82544 Ethernet Controller

The 10/100/1000-Mbit/sec connection to the core I/O enclosure is provided by the 82544 Ethernet controller. This device supports full auto-negotiation to a 10/100/1000-Mbit Ethernet network. A pulse transformer located on the motherboard between the 82544 and the RJ45 connector is used to isolate the onboard receive and transmit lines from the external interface. The RJ45 connector used for the 10/100/100-Mbit Ethernet port also contains integrated LEDs for connection status and connection speed indication.

5.2.4 VHDM interface

The core I/O enclosure mates with the ftServer 3300 chassis backplane through a 240-pin VHDM connector. This connector contains a path for the following signals:

- Crossbow bus
- System management
- Video
- Serial
- USB
- Clock
- Board present
- Gsync bus
- Power to backplane

As with the CPU enclosure, the crossbow bus uses LVDS serializers and de-serializers to reduce connector pin count.

In order to prevent corruption of the crossbow bus when enclosures are inserted certain signals on the VHDM connector have shorter pins, these recessed pins are used to ensure the bus pins are securely mated before power is applied to the board.

5.2.5 Legacy I/O

The ftServer 3300 uses the CSB5 and a National Semiconductor PC87417 Server I/O controller to provide Legacy I/O support. The CSB5 resides on the primary Xena bus providing two USB ports and an IDE interface to the CD-ROM. The Server I/O device provides a Real Time Clock (RTC) along with interfaces to the two serial ports and the SMBus interface. The Server I/O communicates to the PCI interface through a PCI-LPC bridge contained within the CSB5. The CSB5 also contains an ACPI controller through which ACPI functionality is supported. The Core I/O in the ftServer 3300 system does not contain an internal floppy disk drive; instead the system supports an externally attached USB floppy drive.

Keyboard and mouse connection to the system is via the USB interface. The RTC and SMBus interfaces are powered from the standby power supplied by the PSU. This allows all system events to be time stamped, including events that occur when the system is powered off. Battery backup for the RTC and BIOS CMOS is provided to retain correct time when a system has been removed from its AC source. A backup battery is located on each of the Core I/O enclosures. There is no parallel port support on the ftServer 3300 system.

5.2.6 System Management

System management for the ftServer 3300 is designed to incorporate a server management module (SMM) that resides on each core I/O enclosure. The function of the SMM or Baseboard Management Controller (BMC) is to provide Intelligent Platform Management Interface (IPMI) functions, fault tolerant maintenance and diagnostics functions, and system control. The ftServer 3300 has been designed to support both distributed and centralized server management control.

The distributed server management strategy incorporates distributed intelligent management controllers on each I/O enclosure and CPU enclosure. Each core I/O enclosure incorporates a QLogic Zircon BMC intelligent controller that provides an IPMI Keyboard Controller Style (KCS) interface to the HOST over the low pin count (LPC) bus to the Serverworks CSB5 south bridge. Each CPU board uses a QLogic Zircon PM, implemented as a satellite management controller (SMC), reporting sensor events to the BMC and providing a bridge from the BMC to I²C devices residing on the CPU's or Expansion I/O's local I²C bus/SMBus.

Each of the BMC and SMC controllers contain an interface to I2C. The I2C port from the controllers are connected to I/O expanders and I2C compatible devices to provide access to system data including, fan rotation speed, temperature, voltage levels on the various enclosures and system ID. The I2C busses are also used to control system functions such as LEDs and component power control.

The secondary BMC controller monitors the health of the primary controller using a heartbeat protocol. If it does not receive heartbeats from the primary BMC for a specified period of time it assumes the primary controller has failed and will attempt to become the primary SMM. The BMC controller also monitors the state of the system OS when the system is booted. It uses a watchdog timer to determine if the OS has crashed or halted. In the event of a hung system, the SMM takes appropriate action to re-start the system.

When anftSAA adapter is used in the ftServer 3300 system, it becomes the SMM and the Zircon BMC controller on the core I/O reverts to an SMC mode.

5.3 Backplane

The ftServer 3300 system contains a backplane through which the CPU and I/O enclosures interconnect. Data is transferred between the CPU and I/O enclosures using the Stratus proprietary Crossbow Bus protocol.

The Backplane contains 180-pin VHDM male connectors to mate with the CPU enclosure. 240-pin VHDM male connectors mate with the core I/O enclosures. AC power is provided to each enclosure slot through an IEC power connector.

The backplane contains the system clock card, two IDPROMs, and the connector I/O card.

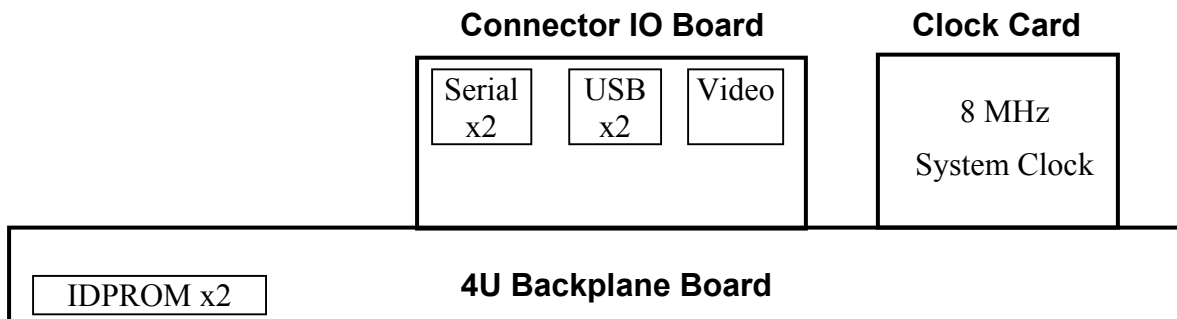
5.3.1 System Clock Card

The ftServer 3300 system contains only one clock card. This card supplies a copy of the 8 Mhz PECL clock to each of the slots in the chassis. The board contains the minimum number of parts required to generate the clocks to maximize the MTBF. A crystal oscillator is used to generate the 8.3333 Mhz with buffers to supply the required number of copies of the clock required by the system. To reduce system repair time, a spare clock card can be stored in a card holder on the backplane of each system shipped. This clock card is not powered and does not provide a fault tolerant clock. The system clock card is not hot pluggable and therefore the system must be powered off before the clock card is removed. The clock card is inserted into connector J5 on the SCSI backplane.

To reduce the risk of a system outage, the clocks are distributed using a pair of MC100LEVL14 clock buffers. Each buffer supplies clocks to specific slots, such that, in the event of a failure of one of the buffers, the alternate buffer will still supply clocks to one of the CPU and core I/O enclosures.

The following is a diagram of the backplane.

Figure 5-4. Backplane Diagram



5.3.2 Connector I/O board

The connector I/O board provides the following outputs to the user:

- Video X 1
- Serial ports X 2
- USB ports X 2

Only one of the core I/O enclosures can drive the video, serial, and USB ports at any one time. To achieve this, these signals from both core I/O boards are FET isolated and then wire ORed on the connector I/O board. The connector I/O board plugs into an 80 pin SCA-2 connector (J6) on the backplane.

The active compatibility core I/O enclosure drives the system I/O. In the event of a failure of the active compatibility core I/O the system, I/O transfers to the other core I/O enclosure after it has become the active compatibility core I/O.

Serial port two of the ftServer 3300 system can be used through a modem as a system management interface. This serial port is connected to the BMC controller on the core I/O board, Through this interface system events can be monitored and system power on/off can be controlled.

5.4 Ultra160 SCSI Storage Enclosure

The Ultra 160 storage enclosure is an optional storage component. It is installed in a 19-inch rack mount configuration. It consists of the following major components:

- 2 Cluster Services Modules (CSMs)
- 2 Power Supply Modules (PSM s)
- 2 Advanced Cooling Modules (ACMs)
- 1 Enclosure LED Module
- 2-14 Disk Drives

The CSM provides monitoring, reporting, and control of the system storage enclosure. The CSM reports status and receives control information via the SCSI bus per the SCSI-3 Enclosure Services specification. And finally, the CSM supports enclosure clustering capabilities. When a CSM is installed, the enclosure is in the cluster configuration. Each external SCSI connector can have 25 meters of SCSI cable attached. Each cable is connected to a Host. The CSM uses SCSI Expander chips to isolate the internal SCSI bus backpanel from the externally cabled Host SCSI bus. When a Host is disconnected from the enclosure, the CSM isolates the disconnected host from the internal storage and remaining Host. This allows one host to be taken offline without data disruption to the other Host.

The CSM module has 5 LED indicators and two external SCSI connectors. The CSM also contains an Environmental Services Processor ESP, repeater chips and terminators. The Environmental Services (ES) activity LED (labelled “ACTIVE”) shows if the ES block of the CSM is active or in standby mode. If the LED is on, the ES block is active and, if off, the ES block is in standby mode. In split bus mode Bus A will be on for one connector and Bus B will be on for the other connector corresponding to the buses they are connected to.

The Ultra160 SCSI enclosure consists of two Power Supply Modules (PSMs). The enclosure requires one power supply for normal operation. The second power supply provides redundancy for the power system. Two power supplies are required. The power supplies are hot swappable and fully redundant. Each power supply has two LEDs for status indication, a green LED (good output voltage) and an amber LED (power supply fault).

The Ultra160 SCSI enclosure consists of two Advanced Cooling Modules (ACMs). Each of the ACM units contains two variable speed fans, providing a total of four fans. The cooling system allows for the individual components (power supplies, disk drives, I/O modules, and all other embedded electronics) to meet their full operating specifications such that component maximum temperatures are not exceeded. The enclosure requires two ACMs for normal operation. The enclosure can run indefinitely with one fan failed within one ACM (i.e. three fans operational). The enclosure provides front to back airflow cooling. The ACMs are hot swappable. Each fan RPM is monitored and each ACM unit has two amber fault indicators (one per fan) located on the ACM assembly. Each ACM can communicate revision, status and receive speed set instructions.

The ACM fans have multiple speed capability and the ES Block sets the ACM speed depending upon ambient temperature and failure status. The ACM fans are set to high speed if one fan is detected to have failed. The ACMs are also set to high speed if one power supply is detected to have failed. The following table provides indicative values at which the ACM speeds may change.

ACM speed	Ambient Temp (°C)
Speed 1	0 to 26
Speed 2	26 to 28
Speed 3	28 to 30
Full speed	30+

The LED module consists of three light pipes that carry light indications from the backpanel to the front of the enclosure where they are visible. It has 3 LED indicators at the front that provide information on the enclosure. The LED indicators indicate enclosure power on, enclosure joined/split, and enclosure fault. The following table lists each LED in further detail.

	Description	Color	Indication
LED 1	Enclosure Power On	Green	Normally ON indicates power is applied to the enclosure. OFF indicates no power is applied.
LED 2	SCSI Bus Split mode	Green	When on the Green LED indicates that the SCSI bus is in split mode
LED 3	Enclosure Fault	Amber	Normally OFF indicates no faults exist in the enclosure. ON indicates that the storage enclosure has a fault.

The disk drives are 1.0-inch SCA-2 direct-attach disk drives. Each disk drive has two LED indicators visible from the front of the storage enclosure. The green LED is the disk drive activity LED. The disk drive has control over the green LED. The second LED is a bicolor LED which the CSM module controls

There are 4 LED scenarios that define the state of the drive. They are listed in the following table:

State of Disk	LED Indication	Condition
INITIALIZED and MIRRORED	Green	Set
INITIALIZED but NOT MIRRORED	Amber	Set
UNINITIALIZED (Good but novolumes or partitions)	Blinking Green 500 ms on, 500 ms off	N/A
BROKEN	Blinking Amber 500 ms on, 500 ms off	Set

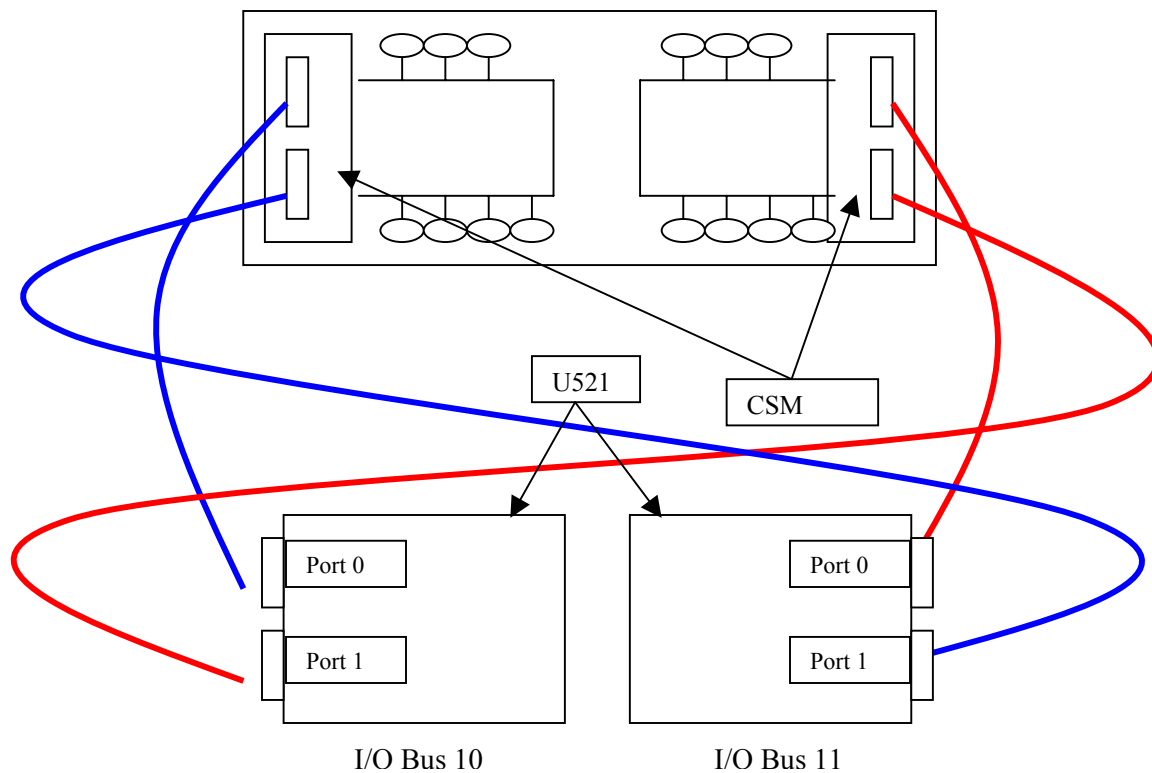
5.4.1 SCSI Bus

In ftServer 3300 systems the Ultra 160 SCSI storage enclosure supports a split (or dual) bus configuration. The split bus configuration consists of two virtual, independent, dual initiated SCSI buses. It requires two Cluster Service Modules (CSMs).

SCSI IDs available for disks are 8 through 14 on bus A and 8 through 14 on bus B. The left side of the enclosure is controlled by the left SCSI connections and the right side of the enclosure is controlled by the right SCSI connections. There are two SCSI bus connections on each CSM (for a total of four), one for each of the two HBAs per bus. In this configuration there are actually 6 separately terminated buses, three per virtual bus. There are two virtual buses (Bus A and Bus B) per enclosure. Each virtual bus consists of three physical buses. One bus connects from one HBA to the CSM via SCSI cable, one from the CSM through the internal SCSI bus back to the CSM, and one from the CSM to the other HBA via SCSI cable. Each HBA port (two per card) supplies termination and termination power. The two internal buses (one per virtual bus) are terminated separately and the 4 external buses (two per virtual bus) are terminated separately.

The following figure shows how the SCSI controllers are connected in a split bus configuration.

Figure 5-5. Split Bus Configuration



5.4.2 SCSI ID Slot Assignments

Front View

Disk Slot	14	13	12	11	10	9	8	7	6	5	4	3	2	1
SCSI ID	14	13	12	11	10	9	8	14	13	12	11	10	9	8

5.5 Tape Subsystem

ftServer 5240/6500 systems support DLT 8000 and DDS-4 tabletop tape drives. No drives are mounted in the storage enclosure. Tape drives are controlled by the U516 QLA1080 SCSI controllers configured as a single-initiators. Each U516 can support two tape drives daisy chained together..

Each tape drive must have a unique SCSI ID assigned. Failure to do so will create SCSI bus conflicts.

5.5.1 DDS-4 Tape Drive

The DDS-4 tape drive is the 4th generation of DDS products. DDS-4 has all of the benefits of previous DDS products with faster transfer speeds (3-6 MB/sec sustained), higher capacity and increased reliability. To achieve the speed and capacity benefits, DDS-4 150M media must be used. Cartridge capacity is 20 MB per cartridge native (40 MB per cartridge assuming 2:1 data compression). Previously archived data is easily accessible with read/write backward compatibility. The drives implement the LVD interface. DDS-4 drives are available on ftServer 5240/6500 systems in both a single-cartridge mechanism and a 6 to 8-cartridge magazine autoloader configuration.

5.5.2 DLT 8000 Tape Drive

DLT 8000 is the 4th generation of DLT products. Native transfer speed for the DLT 8000 product is 6MB/s native (up to 10MB/s w/compression). Cartridge capacity is 40MB per cartridge native (80MB per cartridge assuming 2:1 data compression). To achieve the speed and capacity, DLT Tape IV media must be used. Previously archived data is accessible with backward read/write compatibility. The drives implement the LVD interface. DLT 8000 drives are available on ftServer 5240/6500 systems in both a single-cartridge mechanism and autoloader configurations.

5.5.3 Tape Drive Configuration

The tape drive enclosure has two 68-pin Wide SCSI .050 series socket connectors that support a cable-in, cable-out daisy-chaining configuration or a cable-in and terminate configuration. There is a switch on the back of the enclosure that allows the selection of the device's SCSI ID.

The tape drive power supply is auto ranging to support 110-240 VAC and 47-63 Hz. A power switch is located on the back of the tape drive.

5.5.4 Tape Drive Termination

A tape drive is terminated externally if the drive is the last device on the SCSI bus. The terminator is a 68-pin SCSI-3, single-ended, low voltage differential, auto-switching multi-mode terminator.

5.5.5 Tape Drive Cabling

The maximum cable length for an LVD SCSI bus is 12 meters (approx. 39 ft.). The SCSI bus cable for the tape drives is available in three lengths: 12 ft., 20 ft., and 36 ft.

The cable connects from the U516 controller to an external tape drive. If this is the only tape drive on the bus, it must be terminated by an external terminator. If a second tape drive is daisy chained to the first, it must be terminated since it is the last drive on the SCSI bus.

5.6 Power Subsystem

The system is powered via dual power cords from a single-phase domestic power source. The system chassis contains a power block assembly with two AC line inputs and an individual output for each of the enclosures. The following table shows which enclosures are powered from each of the AC inputs.

AC power block in 1 (Top)	Core IO 0 CPU 0
AC power block in 2 (Bottom)	Core IO 1 CPU 1

A failure of one of the power cords or AC sources does not result in a system outage, provided the system is running in DMR. Each of the I/O enclosures contains a switched mode power supply that provides power to that enclosure. Each of the CPU enclosures contain an individual power supply to power that enclosure.

House-keeping power required by the standby logic is available whenever the system is plugged in and AC is available. The standby power for each CPU and IO enclosure is supplied by the power supply within that enclosure. Power to the backplane, clock card and IO connector card is supplied from the core I/O enclosures through the VHDM connector.

The core IO motherboard provides power to components external to the core IO enclosure via analogue switches. The analogue switch contains current limiting circuitry and diode ORing to protect the motherboard from a short circuit. The following table shows which external components are powered by the core IO enclosure and the supply required.

Component	Supply
ID Prom	VCC5_SBY
USB power	VCC5
Clock board	VCC3_3
Gsync bus termination	VCC5

The following table shows the outputs that are available from the AA-P70100 (250W) power supply and the min/max regulation for voltage and ripple.

Output Voltage	Load Range		Regulation			Ripple & Noise Max (mVpp)
	Min	Max	Min	Max		

+5V	1A	20A	4.75	5.25	+5% -5%	50mVpp
+12V	0.8A	7.5A	11.40	12.60	+5% -5%	120mVpp
+3V3	1A	20A	3.20	3.40	+3% -3%	50mVpp
-12V	0A	0.3A	-10.80	-13.20	+10% -10%	120mVpp
+5Vsby	0.1A	3A	4.75	5.25	+5% -5%	50mVpp

The following table shows the outputs that are available from the AA-P70300 (350W) power supply and the min/max regulation for voltage and ripple.

Output Voltage	Load Range			Regulation			Ripple & Noise Max (mVpp)
	Min	Max	Peak	Min	Max		
+5V	1A	12A		4.8	5.25	+5% -4%	50mVpp
+12V1	1.5A	16A	18A	11.52	12.60	+5% -4%	120mVpp
+12V2	1.5A	16A	18A	12.52	12.60	+5% -4%	120mVpp
+3V3	1.5A	16A		3.20	3.40	+3% -3%	50mVpp
-12V	0A	0.5A		-10.40	-13.08	+9% -5%	120mVpp
+5Vsby	0.1A	2A		4.80	5.25	+5% -4%	50mVpp

5.7 Cooling Subsystem

The CPU and IO enclosures are cooled with forced air-cooling provided by fans located within each enclosure. Each CPU enclosure contains three fan blowers and each Core IO enclosures has five cooling fans. Each of the fans in the system is monitored to ensure the fan is providing sufficient air flow. This is monitored using the tacho outputs from each of the fans. If any of the fans fall below specification, an alarm will be generated. A fan failure in any of the enclosures in the system is highlighted by the BMC status LEDs on the primary core IO enclosure. The fan failure, along with any other system error conditions, is highlighted by a flashing amber LED. Temperature sensors are provided on each of the enclosure motherboards to provide temperature information to the BMC firmware and OS.

There is no forced-air cooling provided for the backplane or backplane components.

Each of the power supplies used in the system contains two internal fans to provide sufficient cooling for that power supply.

6. Upgrades

Upgrades for the ftServer 3300 are listed in the following table.

Mktg ID	Description
UPC3101	Upgrade ftServer 3300 from 1-way DMR SMP to 2-way DMR SMP
AK423	Pedestal to Rack conversion kit
AK421	Rack to Pedestal conversion kit

7. Part Numbers

The tables in the following subsections list the part numbers for the Customer Replaceable Units (CRUs), Field Replaceable Units (FRUs), and Distributor Replaceable Units (DRUs) in ftServer 3300 systems.

7.1 CPU Enclosure

Description	CRU/FRU/DRU	Part Number
Enclosure (No memory or CPU)	CRU	AA-G92XX0
LED PCB Panel	CRU	AA-E70700
Power Supply (350 watts)	CRU	AA-P70300
Memory Module (DIMM)	CRU	AA-M22708/AA-M22808
Fan Assembly	FRU	MF-000045
Processor/Heat Sink/Adhesive Kit	DRU	AK-000424
Motherboard	DRU	AA-G9XXX0
LED Cable	DRU	AW-001102
Power Connector Board	DRU	AA-E72100
Power Cable	CRU	AW-020088
Power Jumper	FRU	AW-001106

7.2 Core I/O Enclosure

Description	CRU/FRU/DRU	Part Number
Core I/O Enclosure	CRU	AA-E89800
Fan Assembly	CRU	MA-000569
CD-ROM Drive	CRU	AA-D55100
CD-ROM Interface Board	DRU	AA-E71500
LED Cable	DRU	AW-001102
LED PCB Panel	CRU	AA-E70600
18G-B 15K RPM Disk Drive	CRU	AA-D53300
36-GB 10K RPM Disk Drive	CRU	AA-D53100
73-GB 10K RPM Disk Drive	CRU	AA-D53200
Power Supply	FRU	AA-P70100
Power Switch	DRU	AS-000389
Power Switch Cable Assembly (with LED and Guard)	DRU	AW-001123
PCI Riser PCB	DRU	AA-E70400
Core I/O Board	DRU	AA-E70000
SCSI Backplane	DRU	AA_E70500
ftServer Access Adapter	CRU	AA-U46200
Fibre Channel HBA for EMC Attach Kit (Fabric)	CRU	AA-U52500
Fibre Channel HBA for EMC Attach Kit (Direct)	CRU	AA-U52600
Ultra 160 2-port SCSI HBA - Qlogic 12160, with 2 SCSI Cables	CRU	AX-U52100
1-Port Ethernet PCI Adapter	CRU	AA-U51500
8-port Async PCI Adapter	CRU	AA-U48600
Intel pro/1000 F Server Adapter 1000base-sx (Fiber Gigabit)	CRU	AA-U57000
Intel pro/1000 T Server Adapter (Copper Gigabit)	CRU	AA-U57100
Video Board	CRU	AA-U91700
Floppy Drive USB Cable	CRU	AW-B20247-06
Fan Out Cable for Asynchronous Adapter	CRU	AW-001122
Ground Cable (14 AWG)	CRU	AW-001117

68P Ultra160 Jumper Cable	DRU	AW-001104
Internal Power Jumper Cable (IEC 320 C 13.6)	DRU	AW-001107
UL/CSA, IDE Cable	DRU	AW-001124
External Modem	CRU	AA-C71900
Ext. RJ11M Cable Assembly	CRU	AW-B20245

7.3 Backplane

Description	CRU/FRU/DRU	Part Number
4U Backplane PCB	CRU	AA-E70200
Connector I/O PCB	CRU	AA-E70100
Clock Card	CRU	AA-E70300
AC Distribution Assembly	FRU	AS-E63010

7.4 Ultra 160 SCSI Storage Enclosure

Description	CRU/FRU/DRU	Part Number
Storage Enclosure with Split Backplane	CRU	AA-D52003
Cluster Services Module (CSM)	CRU	AA-E52200
LED Module - Right	CRU	AA-000385
LED Module - Left	CRU	AA-000386
36-GB 10K Disk Drive	CRU	AA-D52200
73-GB 10K Disk Drive	CRU	AA-D52300
18-GB 15K Disk Drive	CRU	AA-D52400
Power Supply Module (PSM)	CRU	AA-P57000
Advanced Cooling Module (ACM)	CRU	MF-000041
Empty Disk Slot Filler	CRU	AA-000382
Locking Slot Blocker	CRU	AA-000388
Rackmount Rail Kit	CRU	AK-000385
UL/CSA SCSI Data Cable (66", VHDCI to VHDCI)	CRU	AW-001080-01

7.5 Tape Subsystem

Description	CRU/FRU/DRU	Part Number
HP DDS-4 DAT Tape Drive	CRU	AA-T51100
HP DD-4 DAT Auto Loader	CRU	AA-T51200
QUANTUM DLT-8000 Tape Drive	CRU	AA-T51300
External Tape Controller Cable (10 feet)	CRU	AW-001046-01
fExternal Tape Controller Cable (30 feet)	CRU	AW-001046-02
SCSI Daisy Chain Cable (3 feet)	CRU	AW-001072
SCSI Terminator LVD/SE Multi Mode	CRU	AX-T50004

7.6 Power Distribution Unit (PDU)

Description	CRU/FRU/DRU	Part Number
8-Outlet PDU (16 Amp)	CRU	AA-P41104
Power Cable (250 VAC, 20 Amps, IEC-309 Plug, IEC-309 Connector, 15 ft / 4.5 m)	CRU	AW-B50154-45M
Power Cable (250 VAC, 20 Amps, NEMA L6-20P Plug, US IEC-309 Connector, 15 ft / 4.5 m)	CRU	AW-B50155-45M
Power Cable (250VAC, 30 Amps, NEMA L6-30P Plug, US IEC-309 Connector, 15 ft / 4.5 m)	CRU	AW-B50156-45M
Jumper Cable for PDU (Black)		AW-B50500-15m
Jumper Cable for PDU (Gray)		AW-B50501-15m

7.7 Peripherals

Description	CRU/FRU/DRU	Part Number
1U Monitor	CRU	AA-V12500
17" Color VGA Monitor	CRU	AA-V10610
Keyboard	CRU	AA-V11510
Mouse	CRU	AA-V11610
USB Floppy Disk Drive	CRU	AA-000400
SBB Floppy Extender Cable	CRU	AW-B20247-06
UL/CSA VGA Cable (6')	CRU	AW-B20240
UL/CSA USB Cable (6')	CRU	AW-B51100