AD450NX Server
System Product Guide

Order Number: 678269-002

The AD450NX Server System may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request. Copies of documents which have an ordering number and are referenced in this document, or other Intel literature, may be obtained from:

Intel Corporation
P.O. Box 5937
Denver, CO 80217-9808

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Quick Reference and Conventions

For translated warnings, see Appendix C, “Warnings.”

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Conventions

WARNING

WARNING indicates a hazard that *can* cause personal injury or equipment damage if the hazard is not avoided.

CAUTION

CAUTION indicates a hazard that might cause personal injury, damage to hardware, or software if the hazard is not avoided.

NOTE

Notes provide information and may be used to emphasize a recommended sequence of steps.

<F1>	A letter, number, symbol, or word enclosed in < > represents a key on your keyboard. For example, the instruction "press <F1>" means press the key labeled "F1" on your keyboard.
<Enter>	The <Enter> key is used to enter commands and responses to prompts. Some manuals refer to <Enter> as RETURN, CARRIAGE RETURN, <CR>, or use an arrow. All of these terms are interchangeable.
<x + y>	Two or three key names, separated by plus signs, indicate multiple-key entries. For example, <Ctrl + Alt + Del> means hold down <Ctrl> and <Alt> and press <Del>.
_L	In all tables in this guide, active-low signal names have an “_L” symbol following the name; for example, DSTBN3_L. Active-high signal names do not have a “_L” suffix.

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1 Introduction to the High-performance Server

The modular scaleable architecture of your high-performance server supports symmetrical multiprocessing (SMP) and a variety of operating systems. The server comes with Peripheral Component Interconnect (PCI) and Industry Standard Architecture (ISA) buses. The server board set consists of seven individual boards.

- I/O baseboard
- I/O riser card
- CPU baseboard
- Memory module
- Memory terminator module
- Front side bus terminator module
- Interconnect backplane

The I/O and CPU baseboards are physically installed back to back on the center bulkhead inside the chassis. They are connected to each other by the interconnect backplane.

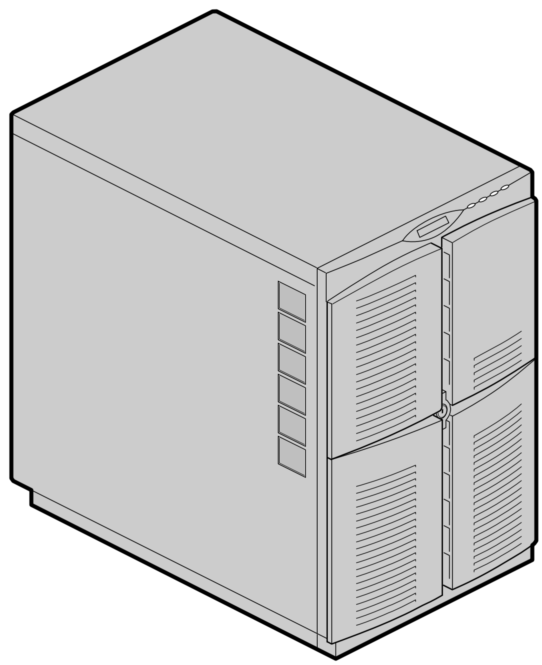


Figure 1-1. High-performance Server

The easy-to-integrate server chassis contains a 3.5-inch diskette drive in the 3.5-inch bay, a CD-ROM drive in the top 5.25-inch bay, and, depending on the server configuration, up to four 420 watt autoranging power supplies. The other three 5.25-inch bays can house mass storage devices such as tape, DVD, and CD-ROM drives. Any two adjacent 5.25-inch bays can be converted into a single full-height bay. A 3.5-inch bay above the 5.25-inch bays provides space for a boot hard disk drive—IDE or SCSI. The twelve 3.5-inch hot-docking bays, when fully configured with 9 GB hard disk drives, provide the server with up to 108 GB of storage. However, the total amount of data storage can change with higher capacity hard disk drives. The hot-docking bays allow hot-swapping of Small Computer System Interface (SCSI) hard disk drives without shutting down the server.

The server can easily accommodate the needs of a variety of high performance applications—for example, network servers, multiuser systems, and large database operations. As your application requirements increase, you can upgrade your server with

- More powerful processors
- Additional memory
- Other peripheral devices
- Add-in I/O boards

Server Features

Feature	Comment
Power system with redundancy	The 420 watt autoranging power supplies include integrated fans for cooling. The server requires a minimum of three power supplies. In a server with four power supplies, the fourth one is redundant. The supplies can be replaced—hot-swapped—in a redundant configuration without turning the server power off. Each supply comes with a spring-loaded mechanical interlock. It prevents removal of the supply when the AC power cord is attached.
Server chassis	The electrogalvanized metal used in manufacturing the server chassis minimizes electromagnetic interference (EMI) and radio frequency interference (RFI). Four power supply bays. 3.5-inch diskette drive in the 3.5-inch bay. Four 5.25-inch half-height bays for removable media devices—top bay contains a CD-ROM drive. A 3.5-inch bay above the 5.25-inch bays provides space for a 1-inch high by 3.5-inch wide SCSI or IDE boot hard disk drive (accessible from inside the server) Twelve 3.5-inch hot-docking bays arranged in two rows; each row has space for either six 1-inch high or six 1.6-inch high, 3.5-inch wide single connector attachment (SCA) SCSI hard disk drives; each row is on a separate SCSI channel. Eleven I/O expansion slot covers. The plastic front bezel provides airflow and easy access to drives in the hot-docking bays. The removable top and side covers provide proper airflow and easy access to components inside the server. You must remove the top cover before you can remove the side covers. A padlock (not supplied) on the back of the chassis secures the covers to prevent unauthorized entry into the server—only technically qualified personnel should remove the server covers.

continued

Server Features (continued)

Feature	Comment
Cooling fans	An array of three fans cools and circulates air through the I/O baseboard side of the server. Two arrays of three fans cool and circulate air through the CPU baseboard side of the server. Integrated power supply fans (three or four) cool and circulate air through the power supplies and the hot-docking bays.
Front panel board	The front panel board provides the user interface to the server. The board allows other servers to communicate with this server, even while power is down, via an Intelligent Chassis Management Bus (ICMB). Push-button switches control power-up, reset, and nonmaskable interrupt (NMI) functions. LEDs indicate power on, power supply failure, hard drive failure, or a fan or other server cooling failure. An LCD panel provides information about boot status, available number of processors, and other server management information.
Server management	Inter-integrated circuit bus (I^2C) for diagnostic and intrachassis communication. ICMB for interchassis platform management communications. Real-time clock/calendar (RTC). Front panel controls and indicators (LEDs). Basic Input/Output System (BIOS), Power-on Self Test (POST), and Setup Utility stored in a flash memory device. SCSI*Select*† Utility. System Setup Utility (SSU). Emergency Management Port (EMP) Utility. Field Replacement Unit (FRU) and Sensor Data Repository (SDR) Load Utility.
CPU baseboard	The baseboard supports up to four processors, each processor is packaged in a Single Edge Contact (S.E.C.) cartridge; the baseboard supports two memory modules.
Processor packaged in an S.E.C. cartridge	The cartridge includes the processor core and L2 cache components.
Front side bus (FSB) terminator module	The module plugs into any unpopulated slot 2 connector on the CPU baseboard. The module terminates the FSB GTL+ signals of the slot 2 connectors when a processor is not installed in them.
Memory module	Each memory module supports up to 4 GB of ECC memory using sixteen 72-bit dual inline memory modules (DIMMs). (The CPU baseboard requires two memory modules or one memory module and one memory terminator module.)
Memory terminator module	The memory terminator module provides electrical termination for the memory bus in the event that only one memory module is in installed on the CPU baseboard.

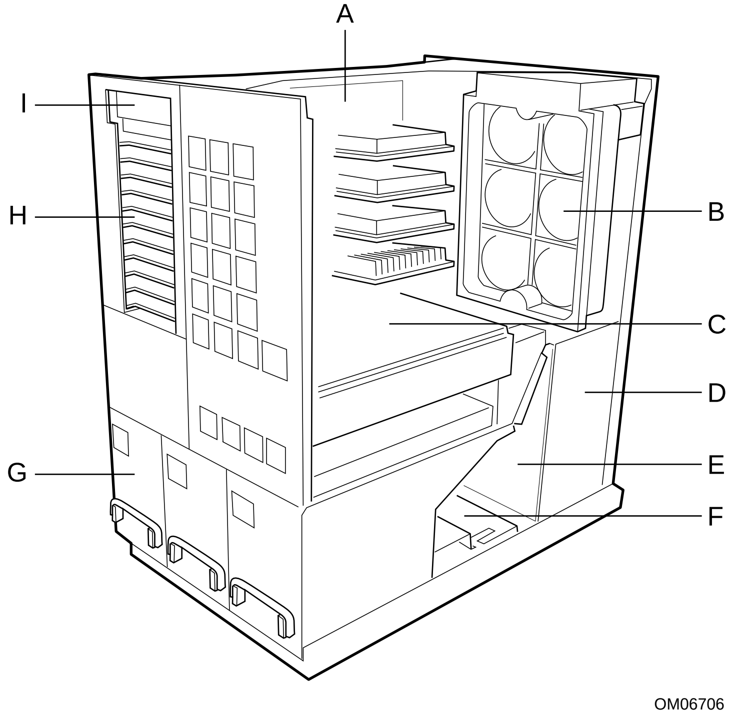
continued

Server Features (continued)

Feature	Comment
I/O baseboard	One 16-bit ISA expansion slot shares a common chassis I/O expansion slot with a 32-bit PCI slot (you can use the shared slot for either ISA or PCI but not both). Six 32-bit PCI expansion slots; one of them shares a common chassis I/O expansion slot with the ISA slot (you can use the shared slot for either PCI or ISA but not both). Five 64-bit PCI expansion slots. Integrated Cirrus Logic GD5446 VisualMedia† PCI super video graphics array (SVGA) controller with 2 MB of video memory. Adaptec AIC†-7880 SCSI-III controller for SCSI devices such as tape, CD-ROM, and DVD drives installed in the 5.25-inch user-accessible drive bays. Diskette controller that supports two drives. PCI-enhanced Integrated Drive Electronics (IDE) interface that supports two IDE buses. PS/2†-compatible keyboard/mouse controller. Two universal serial bus (USB) ports.
I/O riser card	This card contains all legacy I/O connections; it plugs into a card edge connector on the I/O baseboard. PS/2-compatible keyboard and mouse ports (these are interchangeable). PS/2-compatible parallel port. Analog VGA†, 15-pin video port. Two PS/2-compatible, 9-pin serial ports.
AHA†-3940AUW MultiChannel† PCI-to-*Ultra*SCSI controller card	This card is installed in one of the 32-bit PCI expansion slots on the I/O baseboard. The AHA-3940AUW provides a 16-bit interface between the PCI bus and the dual channel SCSI hot-docking backplane.
Interconnect backplane	The backplane electrically connects the I/O and CPU baseboards by common fast 16-bit expander buses.
SCSI hot-docking backplane	This backplane supports hot-swapping of SCA type SCSI drives, mounted in carriers, in and out of the hot-docking bays.
Power distribution backplane	This backplane serves as an interface between the power supplies, the interconnect backplane, and the SCSI hot-docking backplane. The power distribution backplane distributes the power load of the server among three or four 420 watt autoranging power supplies.

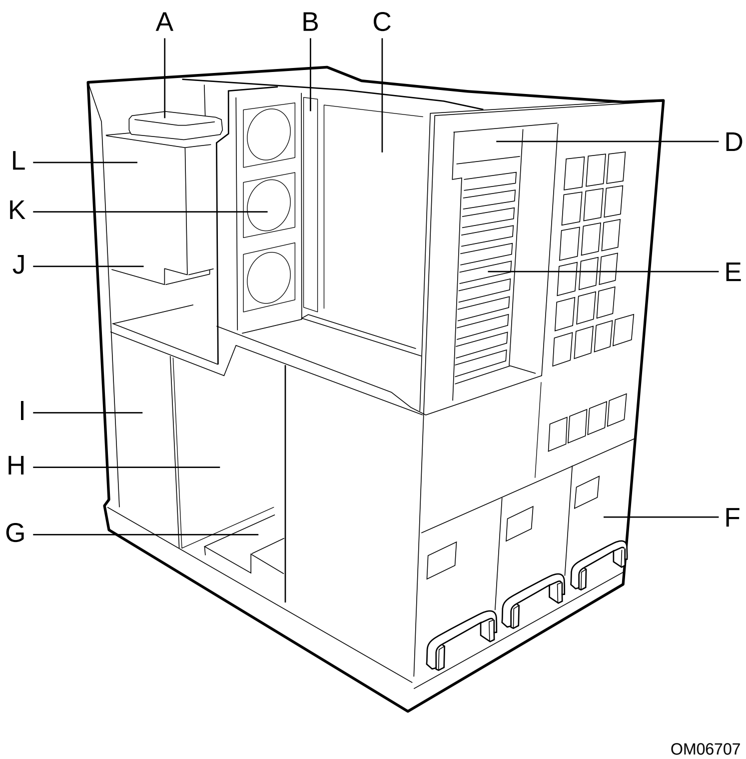
Chassis

Figures 1-2 and 1-3 show the major components of the server.



A CPU baseboard and processors
B Two, three-fan arrays
C Memory modules
D 3.5-inch SCSI hot-docking bays
E SCSI hot-docking backplane
F Power distribution backplane
G Power supplies
H Expansion slots
I I/O panel

Figure 1-2. Server, Back/Left Side View



A 3.5-inch boot drive bay
B Interconnect backplane
C I/O baseboard
D I/O panel
E Expansion slots
F Power supplies
G Power distribution backplane
H SCSI hot-docking backplane
I 3.5-inch SCSI hot-docking bays
J 3.5-inch diskette drive
K Three-fan array
L 5.25-inch half-height bays

Figure 1-3. Server, Back/Right Side View

Controls and Indicators

See Figure 1-4 on page 25.

Item	Feature	Description
Front Panel		
A	Front panel LCD	It displays information about processor type and failure codes.
B	NMI switch	When pressed, it causes a nonmaskable interrupt. This switch is recessed behind the front panel to prevent inadvertent activation. It must be pressed with a narrow tool (not supplied).
C	Power LED (green)	When lit continuously, it indicates the presence of DC power in the server. It goes out when the power is turned off or the power source is disrupted.
D	Power fault LED (yellow)	When lit continuously, it indicates a power supply failure. When flashing, it indicates a 240 VA overload shutdown and power control failures.
E	Cooling fault LED (yellow)	When flashing, it indicates a fan failure has been detected in the server.
F	Drive fault LED (yellow)	When lit continuously, it indicates an asserted fault status on one or more hard disk drives in the hot-docking bay. When flashing, it indicates drive reset in progress.
G	Power switch	When pressed, it turns on or off the DC power inside the server.
H	Reset switch	When pressed, it resets the server and causes the power-on self test (POST) to run.
CD-ROM Drive		
I	Headphone jack	It provides a connection for headphones or speakers.
J	Volume control	It adjusts the volume of headphones or speakers.
K	Activity LED	When lit, it indicates the drive is in use.
L	Open/close button	When pressed, it opens or closes the CD tray.
Security Key Lock		
M	Two-position lock	It secures the front doors of the bezel.
3.5-inch Diskette Drive		
N	Activity LED	When lit, it indicates the drive is in use.
O	Ejector button	When pressed, it ejects the diskette.
Status LEDs for SCSI Drives in Hot-docking Bays		
P	Drive power LED (green)	When lit continuously, it indicates the presence of the drive and power on the drive.
Q	Drive activity LED (green)	When flashing, it indicates drive activity.
R	Drive fault LED (yellow)	When lit continuously, it indicates an asserted fault status on one or more hard disk drives in the hot-docking bay. When flashing, it indicates drive reset in progress.

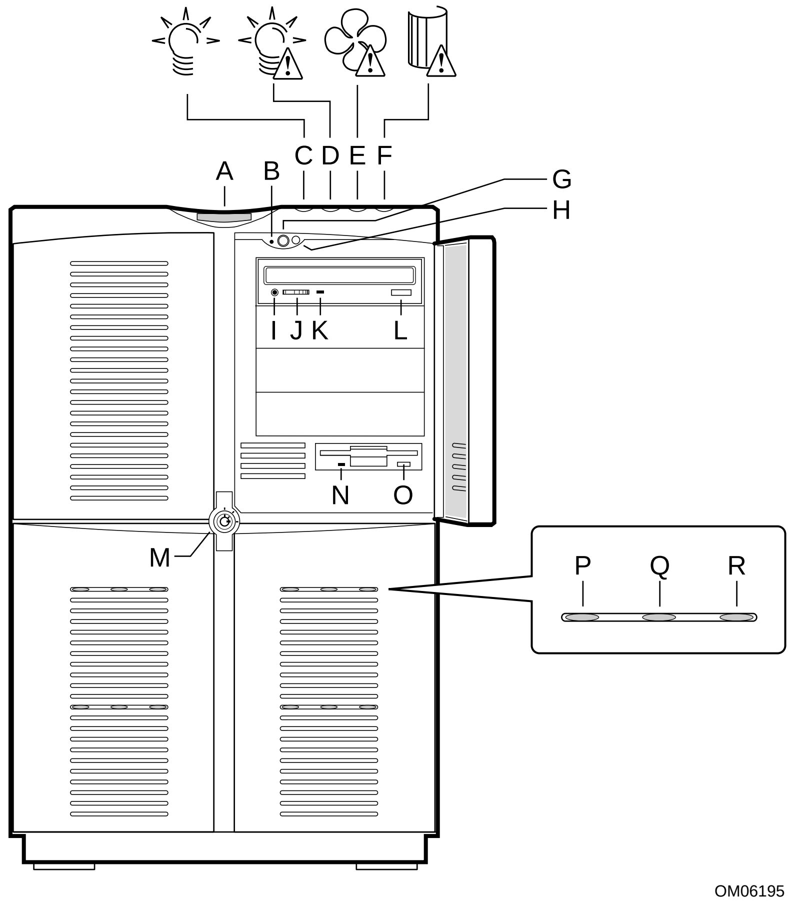


Figure 1-4. Server Controls and Indicators

Server Security

There are several ways to prevent unauthorized entry or use of the server.

Security with a built-in key lock, a padlock, and alarm switches:

- Secure the front panel controls and drive bays with the two-position key lock on the front bezel.
- Secure the top and side covers to the chassis with a padlock on the back of the server.
- Activate alarm switches for the doors and covers. These switches transmit alarm signals to the I/O baseboard. Software on the I/O baseboard intercepts these signals and alerts the user of unauthorized activity.

Security with the Setup utility:

- Set server administrative and user passwords.
- Set secure mode to prevent keyboard or mouse input and to prevent use of the front panel controls.

Security with the System Setup Utility (SSU):

- Enable the keyboard lockout timer so that the server requires a password to reactivate the keyboard and mouse after a specified time-out period—1 to 120 minutes.
- Set an administrative password.
- Set a user password.
- Activate the secure mode hot-key.
- Disable writing to the diskette drive.

Front Bezel Key Lock Features

The two-position lock in the front panel bezel lets you lock and unlock the server doors.

- **Door 1**—provides access to the drives in the 3.5- and 5.25-inch bays and the reset, power on/off, and NMI switches.
- **Doors 2 and 3**—provide access to the hot-swappable drives in the 3.5-inch hot-docking bays.

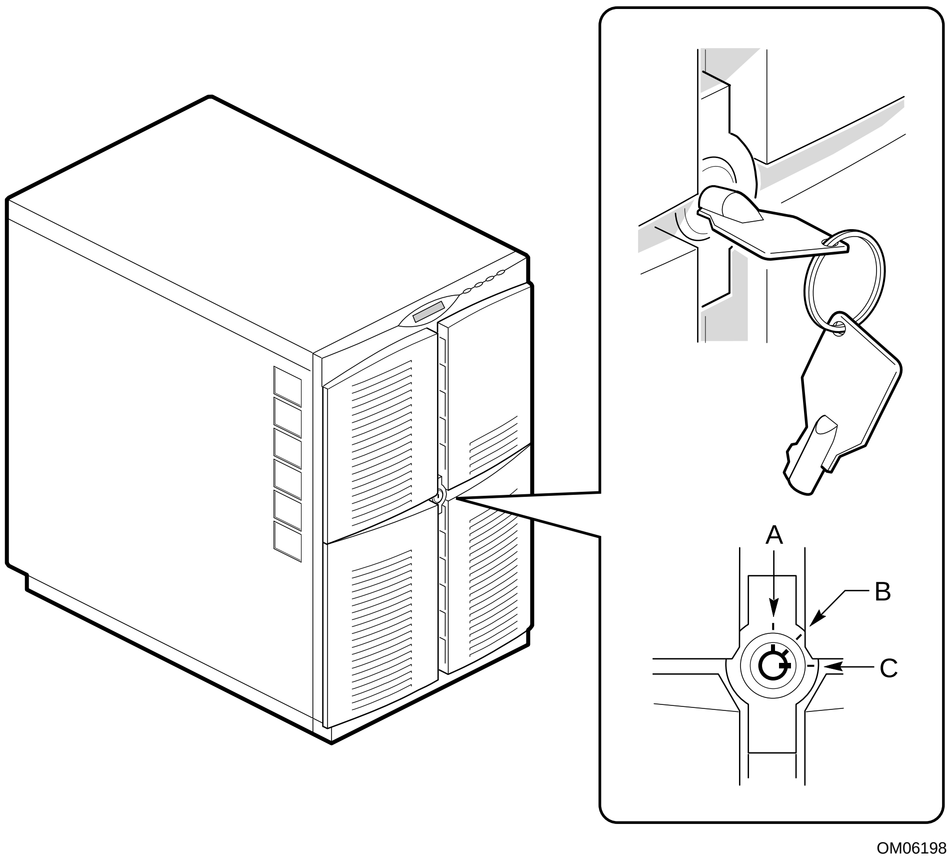


Figure 1-5. Front Bezel Security Key Lock

A Not used
B Locked position
C Unlocked position

Back of Chassis Padlock

A padlock—not provided—can be inserted through the metal loop on the back of the chassis to prevent access to the CPU and I/O baseboard areas of the server. The mechanical design of the top and side covers allows one padlock to secure all three of them. (The top cover must be removed before the side covers can be removed.)

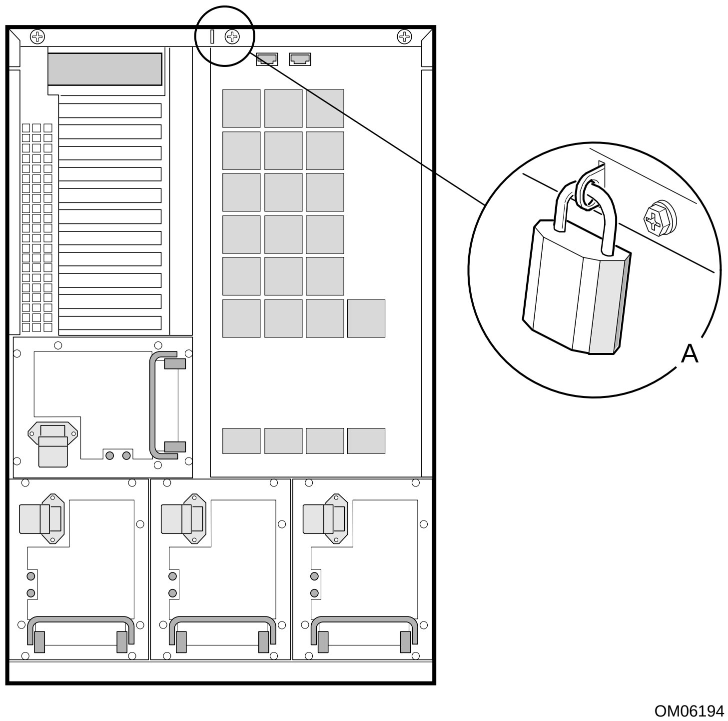


Figure 1-6. Top and Side Covers Security Padlock

Alarm Switches

The server has three alarm switches to prevent unauthorized entry into the server. A switch on the front panel board monitors the top cover. Two switches on the hot-docking backplane monitor the the doors to the hot-docking bays.

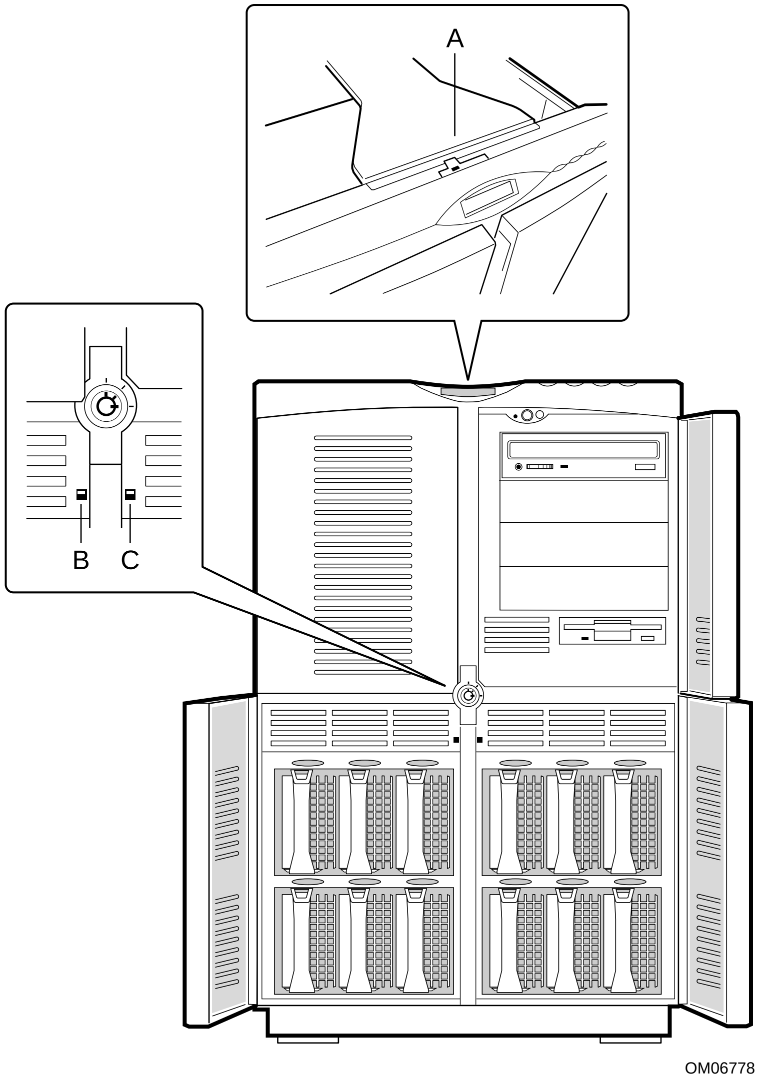


Figure 1-7. Alarm Switches

A	Top cover switch
B	Left hot-docking bay door switch
C	Right hot-docking bay door switch

Password Protection

BIOS passwords prevent unauthorized tampering with the server. If you set the user password, but not the administrative password, the BIOS requires you to enter the user password before you can boot the server or run the SSU. If you set both passwords, entering either password lets you boot the server or enable the keyboard and mouse. Only the administrative password lets you change the server configuration with the flash-resident Setup utility.

Secure Boot Mode

The secure boot mode allows the server to boot and run the operating system (OS). However, you cannot use either the keyboard or the mouse until you enter the user password.

You can use Setup to put the server in the secure boot mode. If the BIOS detects a disk in the CD-ROM drive or a diskette in drive A at boot time, it prompts you for a password. When you enter the password, the server boots from the disk in the CD-ROM drive or the diskette in drive A. Entering a password also disables the secure mode.

If there is no disk in the CD-ROM drive or diskette in drive A, the server boots from drive C. It automatically goes into secure mode. All enabled secure mode features go into effect at boot time.

If you set a hot-key combination, you can secure the server immediately.

Boot Sequence Control

The BIOS security features determine the boot devices and the boot sequence. They also control disabling writes to the diskette drive in secure mode. You can use the SSU to select each boot device. The default boot sequence is diskette, hard disk, CD-ROM, and Network.

Boot Without Keyboard

The server can boot with or without a keyboard. Before it boots, the BIOS displays a message about the keyboard stating whether or not it detects one. During POST, the BIOS automatically detects and tests the keyboard if it is present.

Locked Power and Reset Switches

The power and reset push-button switches on the front panel are locked when the server is in the secure mode. To exit from the secure mode, you must enter your user password.

Diskette Write Protect

If Diskette Write Protect is enabled in Setup, it write-protects the diskette drive only while the server is in the secure mode. To exit from the secure mode, you must enter your user password.

Video Blanking

If Video Blanking is enabled in Setup, the video display will be off when the server is in the secure mode. To exit from the secure mode, you must enter your user password.

2 On-site Installation: Installing the Server

This chapter tells how to

- Select a site
- Connect input and output devices
- Turn on the server and create installation diskettes from the Server System Configuration Software CD
- Read and print a copy of this manual
- Exit to DOS

WARNING

To avoid personal injury when moving the server from one location to another, use only a mechanical assist unit to move it. The minimum server configuration weighs about 58 kg (128 lbs), and the maximum one weighs close to 79 kg (175 lbs).

Do not attempt to lift or move the server by the handles on the power supplies.

Selecting a Site

The server operates reliably within the specified environmental limits (see page 34). Choose a site that is

- Near a grounded power outlet
  - In the United States and Canada, this means a NEMA 5-15R outlet for 100-120 V~ or a NEMA 6-15R outlet for 200-240 V~.
  - For international sites, this means a grounded power outlet applicable for the electrical code of the region.

CAUTION

Ensure that the power service connection is through a properly grounded outlet.

- Clean and dust-free
- Well ventilated and away from sources of heat
- Isolated from strong electromagnetic fields and electrical noise caused by electrical devices such as air conditioners, large fans, large electric motors, radio and TV transmitters, and high frequency security devices
- Spacious enough to provide sufficient room behind and around the server so that you can remove AC power from it by unplugging the power cord from each power supply or wall outlet
- Away from sources of vibration or physical shock

Physical Specifications

Height	69.85 cm (27.5 inches)
Width	43.18 cm (17.0 inches)
Depth	71.12 cm (28.0 inches)
Weight	58 kg (128 lbs) minimum configuration; 79 kg (175 lbs) maximum configuration
Front clearance*	30.5 cm (12.0 inches)
Side clearance*	7.6 cm (3.0 inches)
Rear clearance*	15.2 cm (6.0 inches)

* This is the minimum clearance required for server cooling and airflow; additional clearance is required for servicing.

Environmental Specifications

Temperature Nonoperating Operating	 –40° to 70 °C (–40° to 158 °F) 5° to 35 °C (41° to 95 °F); derated 0.5 °C for every 1000 ft (305 m)
Humidity Operating wet bulb Nonoperating Operating	 Not to exceed 33 °C (91.4 °F) (with diskette drive or hard disk drive) 95% relative humidity (noncondensing) at 55 °C (131 °F) 85% relative humidity (noncondensing) at 35 °C (95 °F)
Shock Nonoperating Operating	 20 g, 11 msec, 1/2 sine 2.0 g, 11 msec, 1/2 sine
Altitude Nonoperating Operating	 To 50,000 ft (15,240 m) To 10,000 ft (3,048 m)
Acoustic noise	Typically <50 dBA at 28 °C (82 °F) with four internal hard disk drives (measured at 1 meter from the front of the server with the peripherals idle). The noise of the variable-speed power supply fans will increase with temperature and power load. Your selection of peripherals may change the noise level.
Electrostatic discharge (ESD)	Tested to 20 kilovolts (kV), no component damage. (CD-ROM drive tested to 15 kV, manufacturer's specification.)
AC Input Power 100-120 V~ 200-240 V~	Single power supply, fully loaded 100-120 V~, 7.0 A, 50/60 Hz 200-240 V~, 3.5 A, 50/60 Hz

After Unpacking the Server

Inspect the shipping box for evidence of mishandling during transit. If the shipping box is damaged, photograph it for reference. After removing the contents, keep the damaged box and the packing materials. If the contents appear damaged, file a damage claim with the carrier immediately.

Save the shipping boxes and packing materials to repackage the server in the event you decide to move it to another site.

Moving the Server

The front casters on the base of the server are locked to prevent the server from moving.

1. Using your finger, pull the hinged plastic locks to the open position to unlock the front casters.
2. After you connect peripheral devices, cables, and power cords to the server, slide the server in to its operating position.
3. Push the plastic locks to the closed position to lock the front casters.

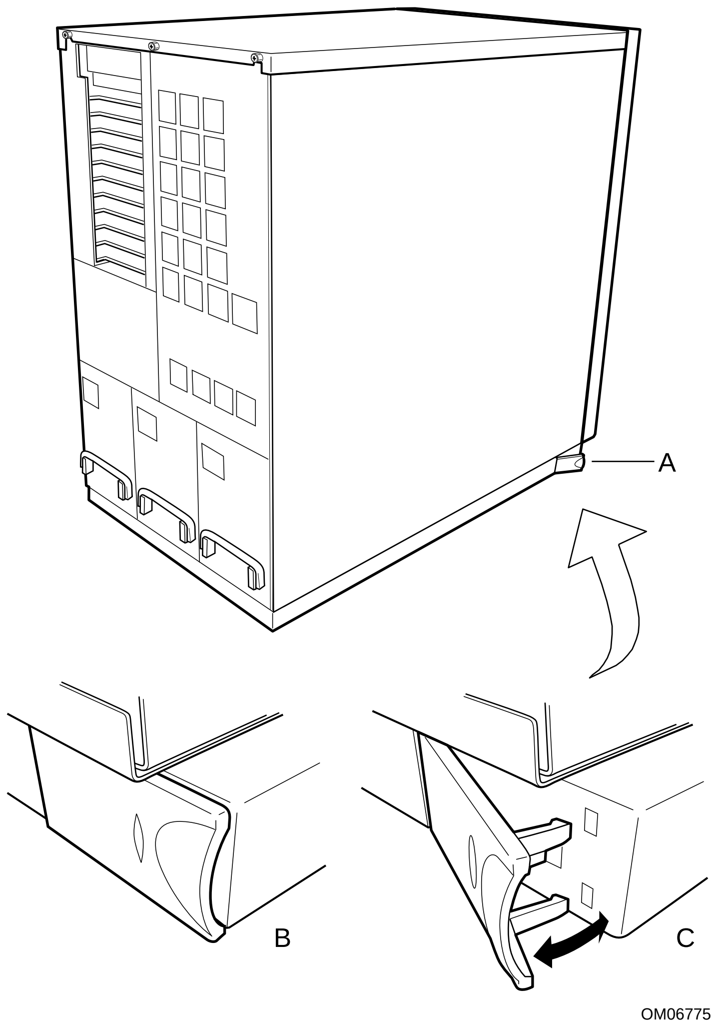


Figure 2-1. Server Casters

A	Hinged plastic caster lock
B	Closed
C	Open

Connecting Peripheral Devices

⚠ **CAUTION**

Before connecting peripheral devices to the server, verify that the power cords are unplugged from the power supplies. Otherwise, equipment damage can result.

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server.

If your server normally operates without a video monitor and keyboard—for example, as a network server—you must install them to configure it. You may remove them after running the SSU. See Chapter 5, "System Setup Utility: When to Run" for information about running this utility.

Connect your keyboard, mouse, monitor, and other peripheral devices after a ***qualified service technician*** installs internal options. See Figure 2-2.

Keyboard and Mouse	Connect the signal cable of a PS/2-compatible keyboard or mouse to either one of the 6-pin miniature Deutsche Industrie Norm (DIN) connectors on the server back panel. The BIOS detects and initializes the keyboard and mouse ports accordingly. Each port is overcurrent protected by a 1-ampere positive temperature coefficient (PTC) resistor.
Monitor	Connect the signal cable of the video monitor to the 15-pin connector of the Super VGA port on the back panel.
Other Devices	Connect other external peripheral devices by following the manufacturer's documentation. The back panel also provides two serial ports, a parallel port, and two USB ports. The back of the chassis provides two Intelligent Chassis Management Bus (ICMB) ports.

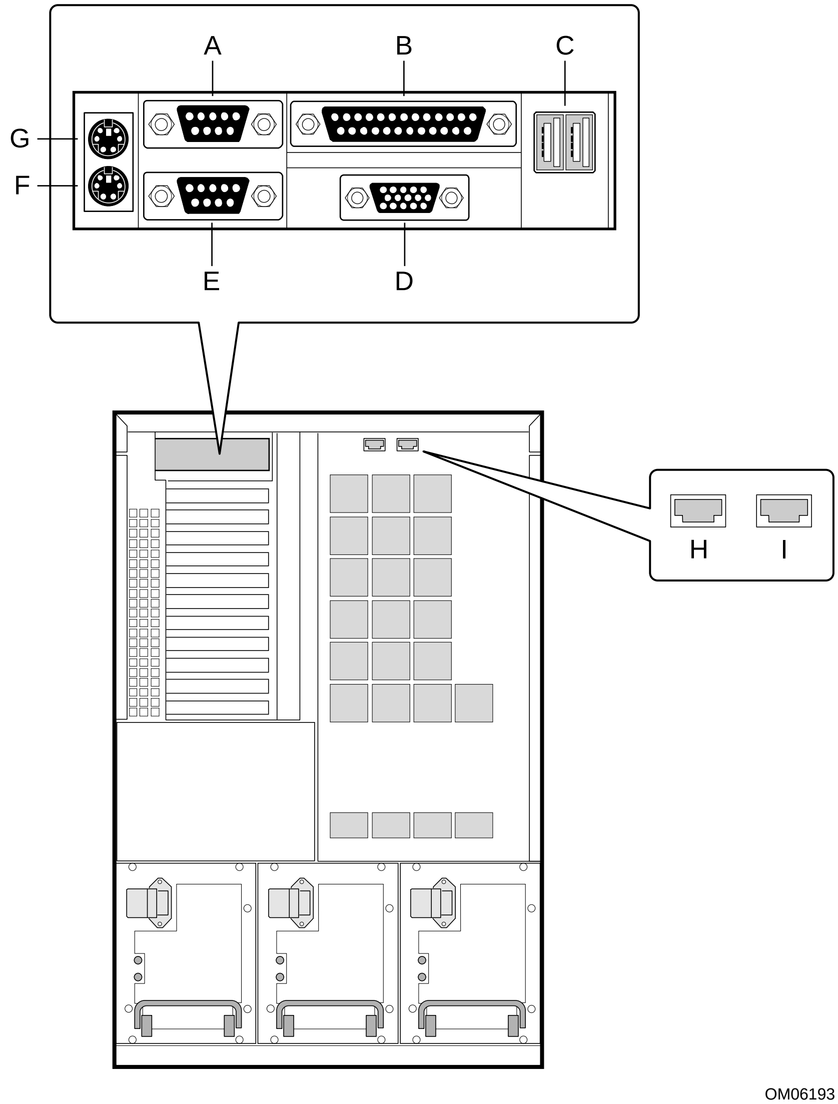


Figure 2-2. Server I/O Panel

A	PS/2-compatible serial port 1 (COM1), 9-pin RS-232 connector
B	PS/2-compatible parallel port (LPT), 25-pin bidirectional subminiature D connector
C	USB ports O and 1, 4-pin connectors
D	Super VGA compatible, 15-pin video connector
E	PS/2-compatible serial port 2 (COM2), 9-pin RS-232 connector
F	PS/2-compatible keyboard port, 6-pin connector
G	PS/2-compatible mouse port, 6-pin connector
H	Intelligent Chassis Management Bus (ICMB) port 1, SEMCONN† 6-pin connector
I	Intelligent Chassis Management Bus (ICMB) port 2, SEMCONN 6-pin connector

Obtaining Power Cords

WARNING

Do not attempt to modify or use AC power cords that are not the exact type required.

Because power cords are not supplied for the server power supplies, you must obtain power cords that meet the following criteria:

- The cord must be rated for the available AC voltage and have a current rating that is at least 125% of the current rating of the server.
- The connector that plugs into the wall outlet must be a grounding-type plug designed for use in your region. It must have certification marks showing certification by an agency acceptable in your region.
- The connector that plugs into the AC receptacle on the server power supply must be an IEC 320, sheet C13, type female connector.
- The cord must be less than 4.5 meters (14.76 feet) long, and it must be flexible <HAR> (harmonized) or VDE certified cordage to comply with the server safety certifications.

Turning on Your Server

WARNING

The push-button on/off power switch on the front panel of the server does not turn off the AC power. To remove AC power from the server, you must unplug each power cord from each power supply or wall outlet.

1. Make sure all external devices, such as a video monitor, keyboard, and mouse (optional) have been connected.
2. Remove drive protection cards (if present) from the removable media drives.
3. Turn on your video monitor.
4. For each power supply present in the server, plug the female end of a power cord into the power supply input receptacle on the back of the chassis (your server may be configured with either three or four power supplies).

NOTE

To plug in a power cord, push and hold the spring-loaded safety interlock mechanism toward the edge of the power supply. Then plug the power cord into the exposed inlet receptacle, and release the safety interlock.

5. For each power supply present in the server, plug the power cord into a properly grounded power outlet. See page 33 for power outlet requirements.

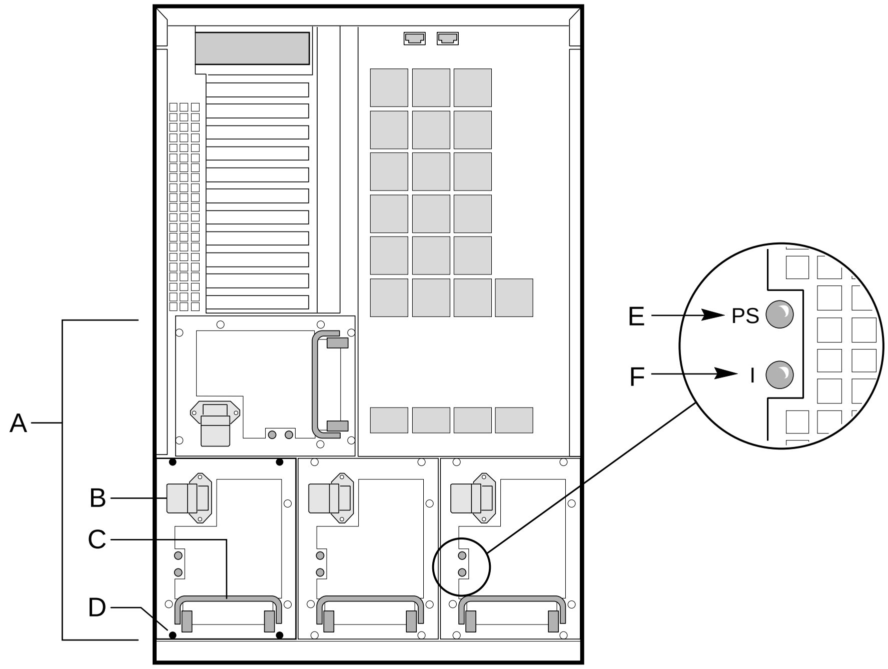


Figure 2-3. Power Supplies With Safety Interlocks

A Four Power Supplies (fourth power supply is redundant)

B AC power inlet receptacle and safety interlock mechanism

C Handle for removing the power supply

D Four screws

E PS LED (green) power supply okay
When lit, indicates the power supply is on and working. When off, it may indicate either that the power supply has failed, the system-loading on the power supply is too low to detect failure, or the supply is not properly plugged in.

F I LED (green) power supply current OK
When lit, indicates power supply is on and OK. When off, indicates the power supply has shut down because of an overcurrent condition or the power supply has failed.

6. If the server does not come on when you plug the power cords into the power outlets, press the power switch on the front panel.
7. Verify that the power-on light on the front panel is lit. After a few seconds the power-on self test (POST) begins. See “Power-on Self Test” on page 41.

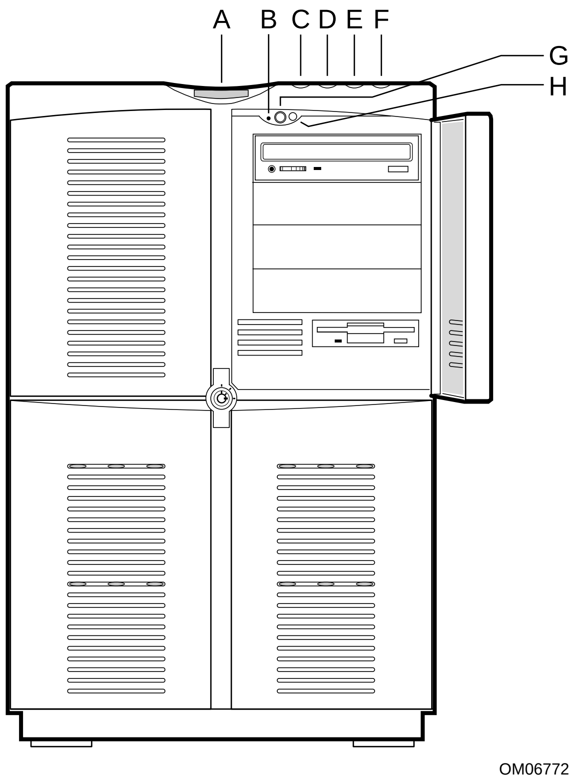


Figure 2-4. Server Power and Reset Switches

A	Front panel LCD
B	NMI switch
C	Power LED (green)
D	Power fault LED (yellow)
E	Cooling fault LED (yellow)
F	Drive fault LED (yellow)
G	Power switch
H	Reset switch

Power-on Self Test

Each time you turn on the server the power LED on the front panel turns on and the power-on self test (POST) starts running. POST checks the I/O system board, processor system board, keyboard, and most installed peripheral devices.

During the memory test, POST displays the amount of memory that it is able to access and test. Depending on the amount of memory installed on each memory board, the test may take several minutes.

These screen prompts and messages appear after the memory test:

```
Mouse initialized....
```

```
Keboard detected
```

```
Press <F2> to enter SETUP
```

Do *NOT* press <F2>. The above message remains for a few seconds, and POST continues. The server beeps once, and this message appears:

```
Operating system not found
```

Go to “Booting From the Server Configuration Software CD” on page 42.

Booting From the Server Configuration Software CD

⚠ CAUTION

The Server Configuration Software CD contains only a limited operating system. This limited operating system provides enough function to let you boot from the CD and copy and use the utility and manual files from the CD.

But this limited OS is *NOT* intended to be copied onto diskettes or onto your hard disk as a full-function OS that supports networking or Windows†. To run your server and applications, you must buy the OS of your choice and install it on the server.

See Figure 2-5.

1. Open the CD tray by pressing the open/close button on the front panel of the CD-ROM drive—the tray will slide out of the drive.
2. Open the CD case. Press down on the center hub of the case with your finger to release the hub tension on the CD.

⚠ CAUTION

Handle the CD only by the inner and outer edges. Do not touch the data side of the CD—the side without the label.

3. Gently grasp the center hole and outer edge of the CD, remove it from the case, and place it **label-side** up in the tray.
4. Press the open/close button or gently push on the tray—it will automatically slide into the drive.

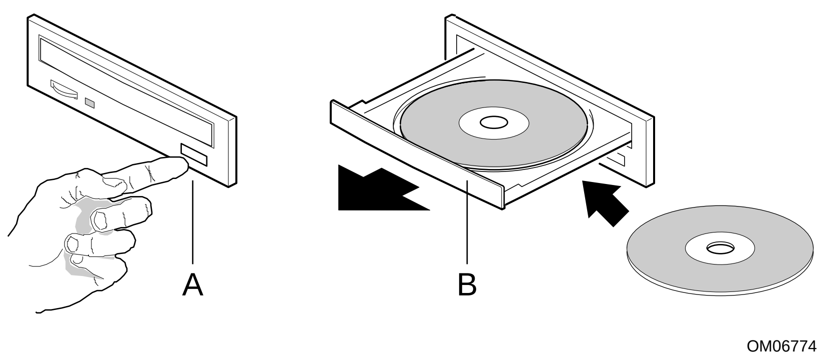


Figure 2-5. CD-ROM Drive

A Open/close push-button switch
B CD tray

5. Press the reset switch on the front panel to reboot the server.
6. When POST completes, the server beeps once, boots from the CD, installs a mouse driver, and displays the CD-ROM menu. Use the arrow keys to scroll through the menu bar and to view the tasks in the pop-up menus.

⟹ **NOTE**

If you do not see the CD-ROM menu but see the following message instead, you need to change the "Boot Device Priority" to the CD-ROM. See "Server Won't Boot From the CD" on page 44 for instructions.

```
Operating system not found
```

Copying Configuration Software to Diskettes

When you copy software from the CD onto diskettes, device drivers suitable for several different operating systems are copied onto the diskettes. However, your operating system will read only those drivers it can recognize, so you cannot usually check the directory of a diskette that is not formatted for your operating system. Instead, you may see a message to the effect, "disk not formatted, do you want to format it now?" Don't worry; the drivers for YOUR operating system should be present on the diskette and available for you to load on the system.

1. Before starting, make sure that you have on hand several blank high-density diskettes.
2. From the CD-ROM menu bar, select Create Diskettes and press <Enter>.
3. Follow the prompts to copy the software onto the diskettes.
4. When finished, select Quit to DOS (on the CD-ROM menu bar), and press <Enter>.
5. Remove the CD from the drive.

Installing Video Drivers

After configuring the server, you can install various video drivers to take full advantage of the enhanced features provided by the onboard Cirrus Logic GD5446 PCI VisualMedia accelerator. The server may not operate properly without these drivers installed.

After copying the drivers from the Configuration Software CD to diskettes, read the README.TXT file on the Display Drivers and DOS Utilities diskette. The .TXT file contains the most current information about which video drivers you need to install on your server. Follow the installation instructions in the README.TXT file.

To install these drivers, do this:

1. Fully configure your server. (This can include adding application software, an ISA add-in board, PCI add-in boards, and the like.)
2. Insert disk 1 of the video drivers and utilities for MS-DOS† and Windows into drive A.
3. At the DOS command prompt, type **`A:install`** and press <Enter>.
4. Follow the onscreen directions to install the video drivers.

Installing SCSI Drivers

After copying the SCSI drivers from the Configuration Software CD to diskettes, follow the instructions in the README.TXT file on the first diskette to install the drivers.

Server Won't Boot From the CD

It is possible that your server was shipped with the diskette drive or another device set as the first boot device. If so, the server will try to boot from a diskette or other device rather than from the CD we have provided. By pressing <Esc> during POST, you can override the boot sequence specified in Setup by selecting a different primary boot device. This override is valid only for that specific boot. Subsequent boots revert back to the sequence specified in Setup. If the chosen device fails to load the operating system, the BIOS reverts to the previous boot sequence. The <Esc> hot key is valid while the "Press <F2> key to enter Setup" message is displayed on the screen. At the end of POST, if the <Esc> key was pressed, a pop-up boot menu is displayed. It allows you to change the boot sequence, or to enter Setup and permanently change the sequence.

To override the boot sequence, do this:

1. Press the reset switch on the front panel to reboot the server—the CD can be in the drive or not.
2. When POST displays this message:

   ```
   Press <F2> to enter SETUP
   ```

3. Press <Esc> and wait for the following boot menu to display:

Boot Menu

```
Use <↑> or <↓> to select a boot
device or the Setup utility.
Press <Enter> to accept or
<Esc> to exit.

1.  Diskette Drive
2.  Removable Devices
3.  Hard Drive
4.  ATAPI CD-ROM Drive
    <Enter Setup>
```

OM08360

Figure 2-6. Boot Menu

4. From the boot menu, select the CD-ROM drive, and press <Enter>.
5. When you see the following pop-up menu, press <Enter> to boot from the CD.

CD-ROM BOOT MENU

```
1.  Hard Drive
```

OM08361

Figure 2-7. CD-ROM Boot Menu

The server should now boot from the CD, displaying a menu bar that includes creating diskettes, diagnostics, reading/printing the manual, and quitting to DOS.

CAUTION

If the server does not operate as described in this chapter, contact a ***qualified service technician***.

3 Power-on Self Test: Description/Running

Power-on Self Test

WARNING

The push-button on/off power switch on the front panel of the server does not turn off the AC power. To remove AC power from the server, you must unplug each AC power cord from each power supply or wall outlet.

Each time you turn on the server the power LED on the front panel turns on and POST starts running. It checks the I/O baseboard, CPU baseboard, keyboard, and most installed peripheral devices. During the memory test, POST displays the amount of memory that it is able to access and test. Depending on the amount of memory installed on the memory module, it may take several minutes to complete the memory test.

Turn on your video monitor and server. After a few seconds the power-on self test (POST) begins.

You can enter Setup when POST displays this message:

```
Press <F2> to enter SETUP
```

If you press <F2>, follow the instructions on the monitor when Setup appears.

NOTE

Because POST must complete test and initialization functions after pressing <F2>, a few seconds may pass before entering Setup.

If you do not press <F2>, POST continues.

During bootup, the server first recognizes and displays the BIOS banner for the AIC-7880 SCSI host adapter on the I/O baseboard.

Next, the server recognizes and displays the BIOS banner for the AHA-3940AUW SCSI host adapter on the add-in board plugged into a 32-bit PCI slot on the I/O baseboard.

When the BIOS banner for each adapter appears, you can run the included SCSI*Select* utility by pressing <Ctrl+A> when this message appears:

```
Press <Ctrl><A> for SCSISelect(TM) Utility!
```

If you have installed SCSI devices in the server, press <Ctrl+A>. When the utility appears, follow the instructions on the monitor to configure each host adapter and run the SCSI disk utilities. See Chapter 6, “SCSI*Select* Utility: When to Run,” for instructions.

If POST detects an error, it displays the error code, the server beeps once, and this message appears:

```
Press <F2> for Setup, <ESC> to Boot
```

To enter Setup, Press <F2>. When the Setup utility appears, follow the instructions on the monitor.

To boot the server, press <ESC>. However, if a drive with bootable media is not detected, the server beeps once, and this message appears:

```
Operating System not found
```

If POST did not detect an error and you choose not to run the SCSI*Select* Utility, POST continues, the server beeps once, and this message appears:

```
Operating System not found
```

See Chapter 2, “On-site Installation: Installing the Server,” for instructions on creating software installation diskettes.

If the server halts before POST completes running, it emits a beep code indicating a fatal system error that requires immediate attention. If POST can display a message on the video monitor, it causes the speaker to beep twice as the message appears.

Note the screen display and write down the beep code you hear; this information is useful for your service representative. For a listing of beep codes and error messages that POST can generate, see Chapter 22, "Solving Problems: Troubleshooting/Error Messages."

4 Setup Utility: When to Run

The flash-resident BIOS Setup utility is used to configure I/O baseboard resources. It is stored in both flash memory (NVRAM) and the battery-backed memory of the real-time clock (RTC) on the I/O baseboard.

When to Run the BIOS Setup Utility

The BIOS Setup is a flash-based configuration utility that is used to configure onboard resources and to set user-selectable options such as boot device ordering, keyboard autorepeat, and security. Use Setup to configure the server into a bootable state, and then use the SSU and other utilities to further configure the server.

Setup lets you change the server configuration defaults. It does not allow you to enter or change information about PCI or ISA add-in boards; you must use the SSU instead. Setup stores the configuration values in flash memory; they take effect when you boot the server. POST checks these values against the actual hardware configuration; if they do not agree, POST generates an error message. You must then run Setup to specify the correct configuration.

You can run Setup with or without an operating system being present.

Because values entered using Setup are overwritten when you run the SSU, you should run Setup only under the following conditions:

- If the diskette drive is disabled
- If the server has a diskette drive that is disabled or improperly configured, use Setup to configure the server into a bootable state, and then use the SSU and other utilities to further configure the server. In Setup, you can enable the drive so you can use the SSU. If necessary, you can disable the diskette drive again after exiting the SSU.
- If the server does not have a diskette drive, or it is disabled, use Setup to configure the server.
- If you have installed only an ISA add-in board in your server

If the server has a properly configured, enabled diskette drive, use the SSU to configure the server. Information entered using the SSU overrides any entered using Setup.

Running the Setup Utility

You can enter Setup under several conditions:

- when you turn on the server
- when you reboot the server by pressing the push-button reset switch on the front panel
- when you reboot the server by pressing <Ctrl+Alt+Del> while at the DOS operating system prompt
- when you turn on or reset your server after an orderly shutdown of an operating system other than DOS

Each time you turn on or reboot your server POST begins and, after a few seconds, displays this message:

```
Press <F2> to enter Setup
```

After pressing F2, a few seconds may pass before entering Setup while POST completes tests and initialization functions. When the F2 prompt disappears, pressing F2 will have no effect. When Setup is entered, the Main Menu options page is displayed.

Use the following keys to navigate through the menus and submenus.

Press	To
F1	Get help about an item
ESC	Go back to a previous item
↑	Select the previous value in a menu option list
↓	Select the next value in a menu option list
← →	Select a major menu
-	Change the value of the current menu item to the previous value
+	Change the value of the current menu item to the next value
Enter	Activate submenus, select feature options, and change feature values

F9	Display the following message:
	`Setup Confirmation`
	`Load default configuration now?`
	`[Yes]     [No]`
	The [Yes] button will be highlighted. If you press <Enter>, all Setup fields return to their default values. If you press <ESC> or select No, the server returns to the configuration it had before you pressed <F9>, without affecting any existing field values.

F10	Display the following message:
	`Setup Confirmation`
	`Save configuration changes and exit now?`
	`[Yes]     [No]`
	The [Yes] button will be highlighted. If you press <Enter>, all current Setup values are saved, and the system is reset. If you press <ESC> or select No, the server returns to the configuration it had before you pressed <F10>, without affecting any existing values.

Main Menu

Default values are in bold typeface, and auto-configured values are shaded.

Feature	Option	Description
System Time	HH:MM:SS	Set the System Time. To select a field, press <Tab>, <Shift + Tab>, or <Enter>. Then type in a new value. If you replace the battery, the default time is 00:00. (This is a 24-hour clock.)
System Date	MM/DD/YYYY	Set the System Date. To select a field, press <Tab>, <Shift + Tab>, or <Enter>. Then type in a new value. If you replace the battery, the default date is Jan 1990.
Legacy Diskette A:	Disabled 360 KB, 5 ¼” 1.2 MB, 5 ¼” 720 KB, 3 ½” **1.44/1.25 MB, 3 ½”** 2.88 MB, 3 ½”	Select the diskette type for drive A:. (The 1.25 MB, 3.5-inch refers to a 1024 byte/sector Japanese media format. To support the 1.25 MB, 3.5-inch requires a 3.5-inch 3-mode diskette drive.)
Legacy Diskette B:	**Disabled** 360 KB, 5 ¼” 1.2 MB, 5 ¼” 720 KB, 3 ½” 1.44/1.25 MB, 3 ½” 2.88 MB, 3 ½”	Select the diskette type for drive B: (The size 1.25 MB, 3.5-inch refers to a 1024 byte/sector Japanese media format. To support the 1.25 MB, 3.5-inch requires a 3.5-inch 3-mode diskette drive.)
Primary Master	CD-ROM	Press <Enter> for options.
Autotype Fixed Disk:	Press <Enter>	Pressing <Enter> attempts to detect the drive type for drives that comply with ANSI specifications.
Type:	User **Auto** 1-39 CD-ROM ATAPI Removable	User—lets you enter the parameters of the hard disk drive installed at this connection. Auto—autotypes the hard disk drive installed here. 1-39—lets you select the predetermined hard disk drive installed here. CD-ROM—a CD-ROM is installed here. ATAPI Removable—removable disk drive installed here.
Multi-sector Transfers:	Disabled	
LBA Mode Control	Disabled	
32-bit I/O:	**Disabled** Enabled	Enabled allows 32-bit IDE data transfers.
Transfer Mode	Standard	
Ultra DMA Mode:	Disabled	
Primary Slave	None	Press <Enter> for options.
Autotype Fixed Disk:	Press <Enter>	Pressing <Enter> attempts to detect the drive type for drives that comply with ANSI specifications.

continued

Main Menu (continued)

Feature	Option	Description
Type:	User **Auto** 1-39 CD-ROM ATAPI Removable	User—lets you enter the parameters of the hard disk drive installed at this connection. Auto—autotypes the hard disk drive installed here. 1-39—lets you select the predetermined hard disk drive installed here. CD-ROM—a CD-ROM is installed here. ATAPI Removable—removable disk drive installed here.
32-bit I/O:	**Disabled** Enabled	Enabled allows 32-bit IDE data transfers.
Ultra DMA Mode:	Disabled	
Secondary Master	None	Press <Enter> for options.
Autotype Fixed Disk:	Press <Enter>	Pressing <Enter> attempts to detect the drive type for drives that comply with ANSI specifications.
Type:	User **Auto** 1-39 CD-ROM ATAPI Removable	User—lets you enter the parameters of the hard disk drive installed at this connection. Auto—autotypes the hard disk drive installed here. 1-39—lets you select the predetermined hard disk drive installed here. CD-ROM—a CD-ROM is installed here. ATAPI Removable—removable disk drive installed here.
32-bit I/O:	**Disabled** Enabled	Enabled allows 32-bit IDE data transfers.
Ultra DMA Mode:	Disabled	
Secondary Slave	None	Press <Enter> for options.
Autotype Fixed Disk:	Press <Enter>	Pressing <Enter> attempts to detect the drive type for drives that comply with ANSI specifications.
Type:	User **Auto** 1-39 CD-ROM ATAPI Removable	User—lets you enter the parameters of the hard disk drive installed at this connection. Auto—autotypes the hard disk drive installed here. 1-39—lets you select the predetermined hard disk drive installed here. CD-ROM—a CD-ROM is installed here. ATAPI Removable—removable disk drive installed here.
32-bit I/O:	**Disabled** Enabled	Enabled allows 32-bit IDE data transfers.
Ultra DMA Mode:	Disabled	
Processor Information	Press <Enter>	Displays information about all processors. You cannot modify any items in this menu. Consult your system administrator if an item requires changing.
Processor 1		Stepping ID 2.
Processor 1		L2 cache size [512 KB].
Processor 2		Stepping ID, absent or disabled.

continued

Main Menu (continued)

Feature	Option	Description
Processor 3		Stepping ID, absent or disabled.
Processor 4		Stepping ID, absent or disabled.
Keyboard Features		Press <Enter> for options.
Numlock:	**Auto** On Off	Select power-on state for numlock.
Key Click:	**Disabled** Enabled	Enabled produces the key click.
Keyboard auto-repeat rate:	**30/sec** 26.7/sec 21.8/sec 18.5/sec 13.3/sec 10/sec 6/sec 2/sec	Select key repeat rate.
Keyboard auto-repeat delay:	1/4 sec **1/2 sec** 3/4 sec 1 sec	Select delay before key repeat.
Language	**English (US)** Français Deutsch Italiano Español	Select the display language for the BIOS.

Advanced Menu

Setup Warning

Setting items on this menu to incorrect values may cause your system to malfunction.

Feature	Option	Description
Plug & Play O/S:	**No** Yes	Select Yes if you are using a Plug and Play capable operating system. Select No if you need the BIOS to configure nonboot devices.
Reset Configuration Data:	**No** Yes	Select Yes if you want to clear the system configuration data.
Enable ACPI	**No** Yes	Select Yes if you want to enable the advanced configuration and power interface (ACPI) BIOS.
Use Multiprocessor Specification	**1.1** 1.4	Configure the Multiprocessor Specification revision level. Some OSs require 1.1 for compatibility.
Large Disk Access Mode	CHS **LBA**	Select the drive access method for IDE drives. Most OSs use logical block addressing (LBA). However, some operating systems may use the cylinder head sector (CHS). See your OS documentation for further help.

continued

Advanced Menu (continued)

Feature	Option	**Description**
Pause Before Boot	**Disabled** Enabled	Pause five seconds before booting the OS.
PCI Configurations		Additional Setup menus to configure PCI devices.
PCI Device, Embedded SCSI A		Setup items for configuring the specific PCI device.
Option ROM Scan:	**Enabled** Disabled	Initialize device expansion ROM.
Enable Master:	**Enabled** Disabled	Enable selected device as a PCI bus master.
Latency Timer:	Default 0020h **0040h** 0060h 0080h 00A0h 00C0h 00E0h	Allot minimum guaranteed time slice for bus master in units of PCI bus clocks.
PCI Devices		
Option ROM Scan:	**Enabled** Disabled	Initialize device expansion ROM.
Enable Master:	**Enabled** Disabled	Enable selected device as a PCI bus master.
Latency Timer:	Default 0020h **0040h** 0060h 0080h 00A0h 00C0h 00E0h	Allot minimum guaranteed time slice for bus master in units of PCI bus clocks.
I/O Device Configuration		
Serial Port A	Disabled **Enabled** Auto	Configure serial port A using these options: • Disabled—no configuration. • Enabled—user configuration. • Auto—BIOS or OS chooses the configuration. • OS Controlled—displayed when controlled by the OS.
Base I/O Address	**3F8** 2F8 3E8 2E8	Set the base I/O address for serial port A.
Interrupt	IRQ3 **IRQ4**	Set the interrupt for serial port A.

continued

Advanced Menu (continued)

Feature	Option	Description
Serial Port B	Disabled **Enabled** Auto	Configure serial port B using these options: • Disabled—no configuration. • Enabled—user configuration. • Auto—BIOS or OS chooses the configuration. • OS Controlled—displayed when controlled by the OS.
Base I/O Address	3F8 **2F8** 3E8 2E8	Set the base I/O address for serial port B.
Interrupt	**IRQ3** IRQ4	Set the interrupt for serial port B.
Parallel Port	Disabled **Enabled** Auto	Configure the parallel port using these options: • Disabled—no configuration. • Enabled—user configuration. • Auto—BIOS or OS chooses the configuration. • OS Controlled—displayed when controlled by the OS.
Mode	Output only **Bidirectional** EPP ECP	Set the mode for the parallel port.
Interrupt	IRQ5 **IRQ7**	Set the interrupt for the parallel port.
Diskette Controller	Disabled **Enabled** Auto	Configure the diskette controller using these options: • Disabled—no configuration. • Enabled—user configuration. • Auto—BIOS or OS chooses the configuration. • OS Controlled—displayed when controlled by the OS.
Base I/O Address	**Primary** Secondary	Set the base I/O address for the diskette controller.
Advanced Chip Set Control		
Address Bit Permuting	Disabled **Enabled**	Enabled automatically sets two-way or four-way permuting based on the memory configuration. Enabled requires • number of rows to be a power of two. • all rows to be the same size. • all populated rows to be adjacent and start at row 0.
Card to Card Interleave	**Disabled** Enabled	Enabled requires a symmetric RAM configuration between two memory modules.

continued

Advanced Menu (continued)

Feature	Option	Description
Base RAM Step	**1 MB** 1 KB Every location	Tests base memory once per MB or once per KB or every location.
Extended RAM Step	**1 MB** 1 KB Every location	Tests extended memory once per MB or once per KB or every location.
L2 Cache	Disabled **Enabled**	Enabled causes the secondary cache to be sized and enabled. Disabled causes the L2 cache to be disabled for core clock frequency bus ratios equal to 2.
ISA Expansion Aliasing	Disabled **Enabled**	Enabled causes every I/O access with an address in the range of x100h-x3FFh, x500h-x7FFh, x900h-xBFFh, and xD00h-xFFFh to be internally aliased to the range 0100h-03FFh before performing any other address range checking.
Memory Scrubbing	Disabled **Enabled**	Enabled lets the BIOS automatically detect and correct single-bit memory errors.
Restreaming Buffer	Disabled **Enabled**	When enabled, the data returned and buffered for a delayed inbound read may be reaccessed following a disconnect.
Read Prefetch for PXB0A	16 **32** 64	Configures the number of “Dwords” that will be prefetched on memory read multiple commands.
Read Prefetch for PXB0B	16 **32** 64	Configures the number of “Dwords” that will be prefetched on memory read multiple commands.
Read Prefetch for PXB1A	16 32 **64**	Configures the number of “Dwords” that will be prefetched on memory read multiple commands.
Multiboot Support	**Disabled** Enabled	Only enable when the total number of bootable devices is less than eight.
Special VGA Devnode	**Disabled** Enabled	Enable this node only when nonPCI compliant VGA cards need to be debugged. Enabling will impact I/O resources for a large configuration.

Security Menu

Feature	Option	Description
User Password Is	Clear	When you enter your user password, this field automatically changes to set.
Administrator Password Is	Clear	When you enter your administrator password, this field automatically changes to set.
Set User Password	**Enter**	The user password controls access to the system at boot. To enter a password, press <Enter> and follow the screen prompts.
Set Administrator Password	**Enter**	The administrator password controls access to the setup utility. To enter a password, press <Enter> and follow the screen prompts.
Password on Boot	**Disabled** Enabled	Requires password entry before boot. The system remains in the secure mode until you enter the password. Password on Boot takes precedence over Secure Mode Boot.
Diskette Access	User **Administrator**	Controls access to diskette drives.
Secure Mode Timer	**Disabled** 1 min 2 min 5 min 10 min 20 min 1 hr 2 hr	Select the time-out period of keyboard or mouse inactivity required before the secure mode activates. (A password must be entered for the secure mode to work.)
Secure Mode Hot Key	**[ ]**	Select a hot key, and then press <Ctrl+Alt+(your hot key) to place the system in the secure mode. The key should not conflict with any application. Available choices are A-Z and 0-9. Press <Del> to remove the hot key.
Secure Mode Boot	**Disabled** Enabled	Enabled lets the system boots in the secure mode. Requires a password to unlock the system.
Video Blanking	**Disabled** Enabled	Enabled blanks video when the secure mode activates. Requires a password to unlock the system.
Diskette Write Protect	**Disabled** Enabled	Enabled write protects the diskette drive when the Secure Mode activates. Requires a password to restore the diskette writes.
Front Panel Lockout	**Disabled** Enabled	Enabled disables the front panel controls when the Secure Mode activates. Requires a password to unlock the system.

Server Menu

Feature	Option	Description
System Management		An additional setup menu for changing server management features.
Firmware SMIs	Disabled **Enabled**	Disabled turns off all firmware SMI sources.
System Event Logging	Disabled **Enabled**	Enabled logs critical system events.
Clear Event Log	**Disabled** Enabled	Enabled cleans the system event log.
Assert NMI on AERR	**Disabled** Enabled	Enabled generates an NMI. Enabling the Firmware SMIs option is required to assert an NMI.
Assert NMI on BERR	**Disabled** Enabled	Enabled generates an NMI. Enabling the Firmware SMIs option is required to assert an NMI.
Assert NMI on PERR	**Disabled** Enabled	Enabled generates an NMI. Enabling the SERR option is required to activate this option.
Assert NMI on SERR	**Disabled** Enabled	Enabled generates an NMI.
Enable Host Bus Error	**Disabled** Enabled	Enables host single- and multi-bit errors.
Server Management Information		Displays system serial number, part number, and server management controller revisions. All items on this menu cannot be modified in user mode. If any items require changes, please consult your system administrator.
Board Part Number		Information only.
Board Serial Number		Information only.
System Part Number		Information only.
System Serial Number		Information only.
Chassis Part Number		Information only.
Chassis Serial Number		Information only.
BMC Revision		Information only.
FPC Revision		Information only.
Primary HSBP Revision		Information only.
Secondary HSBP Revision		Information only.
Console Redirection		Additional setup menus to configure the console.
COM Port Address	**Disabled** 3F8 2F8 3E8	Select the port address. Make sure these values are identical to those of serial ports A and B in the peripheral configuration setup menu.
IRQ #	None	

continued

Server Menu (continued)

Feature	Option	Description
Baud Rate	9600 **19.2 K** 38.4 K 115.2 K	Select the baud rate.
Flow Control	No Flow Control CTS/RTS XON/XOFF **CTS/RTS + CD**	Select the flow control. • CTS/RTS = Hardware • XON/XOFF = Software • CTS/RTS + CD = Hardware + carrier detect for modem use.
Processor Retest	**No** Yes	Yes causes the BIOS to clear historical processor status and retest all processors on the next boot.
EMP Password Switch	**Disabled** Enabled	Enable or disable the EMP password.
EMP ESC Sequence		The front panel controller firmware updates this field.
EMP Hangup Line String		The front panel controller firmware updates this field.
Modem Init String		This string accepts up to 16 characters. The upper four characters will go to the next field which will pop up as soon as the 16th character is filled. Trying to fill the 17th character in the same field will have a wraparound problem.
EMP Access Mode	Preboot Only Always Active **Disabled**	Preboot Only—EMP enabled during power down or POST. Always Active—EMP always enabled. Disabled—EMP disabled.
EMP Restricted Mode Access	**Disabled** Enabled	When enabled, power down, front panel NMI, and reset control via EMP are disabled. Restricted mode can be selected with preboot or always active.
EMP Direct Connect/Modem Mode	**Direct Connect** Modem Mode	You can connect directly to the port or use a modem.

Boot Menu

Feature	Option	Description
Diskette Check:	**Disabled** Enabled	Enabled verifies the diskette type on boot. Disabled speeds up the boot process.
Boot Device Priority		Select the search order for the types of boot devices.
	1. Diskette Drive 2. Removable Devices 3. Hard Drive 4. ATAPI CD-ROM Drive	Use the up and down arrow keys to select a device. Press <+> to move it up the list, and press <-> to move it down the list. Press <Esc> to exit this menu.
Hard Drive		The system attempts to boot to the OS from the first hard drive in this list. If it does not find an OS, the system tries the next drive listed until if finds an OS. Use the up and down arrow keys to select a device. Press <+> to move it up the list, and press <-> to move it down the list. Press <Esc> to exit this menu.
Removable Devices		The OS assigns drive letters to these devices in the order displayed. Change the sequence and the drive lettering of a device by selecting it with the up and down arrow keys. Press <+> to move it up the list, and press <-> to move it down the list. Press <Esc> to exit this menu.
Maximum Number of I20 Drives	**1** 4	Selects the maximum number of I20 drives that will be assigned a DOS drive letter
Message Timeout Multiplier	**1** 2 4 8 10 50 100 1000	All timeout values will be multiplied by this number.
Pause During Post	**Disabled** Enabled	Select enabled when you need to start the IRTOS manually. When you hear three beeps, POST has stopped. Press any key to continue.

Exit Menu Selections

The following menu options are available on the Server menu. Select an option by using the up or down arrow keys. Then press <Enter> to execute the option, and follow the prompts.

Option	Description
Exit Saving Changes	Exit Setup and save your changes to CMOS.
Exit Discarding Changes	Exit Setup without saving data to CMOS.
Load Setup Defaults	Load default values for all Setup items.
Load Custom Defaults	Load settings from custom defaults.
Save Custom Defaults	Save changes to custom defaults. Normally PhoenixBios reads setup settings from CMOS. However, if CMOS fails, it uses custom defaults—if you have set them. If not, it uses factory defaults.
Discard Changes	Load previous values from CMOS for all Setup items.
Save Changes	Save Setup data to CMOS.

5 System Setup Utility: When to Run

The System Setup Utility (SSU) is on the Server System Configuration Software CD shipped with the server. The SSU provides a graphical user interface (GUI) over an extensible framework for server configuration. For the AD450NX systems, the SSU framework supports the following functions and capabilities:

- assigns resources to baseboard devices and add-in cards prior to loading the operating system (OS)
- allows you to specify boot device order and system security options
- permits viewing and clearing of the system's critical event log
- allows troubleshooting of the server when the OS is not operational
- provides a system level view of the server's I/O devices

When to Run the System Setup Utility

The SSU is a DOS-based utility that supports extended system configuration operations for onboard resources and add-in boards. The utility also allows you to view the system event log (SEL) and to set system boot and security options. Use the SSU when you need to

- add and remove boards affecting the assignment of resources (ports, memory, IRQs, DMA)
- modify the server's boot device order or security settings
- change the server configuration settings
- save and restore the server configuration
- view or clear the SEL

If you install or remove an ISA add-in board, you must run the SSU to reconfigure the server. Running the SSU is optional for a PCI and ISA Plug and Play add-in boards.

The SSU is PCI-aware, and it complies with the ISA Plug and Play specifications. The SSU works with any compliant configuration (.CFG) file supplied by the peripheral device manufacturer.

The I/O baseboard comes with a .CFG file. The .CFG file describes the characteristics of the board and the system resources that it requires. The configuration registers on PCI and ISA Plug and Play add-in boards contain the same type of information that is in a .CFG file. Some ISA boards also come with a .CFG file.

The SSU uses the information provided by .CFG files, configuration registers, flash memory, and the information that you enter, to specify a system configuration. The SSU writes the configuration information to flash memory.

The SSU stores configuration values in flash memory. These values take effect when you boot the server. POST checks the values against the actual hardware configuration; if they do not agree, POST generates an error message. You must then run the SSU to specify the correct configuration before the server boots.

The SSU always includes a checksum with the configuration data so that the BIOS can detect any potential data corruption before the actual hardware configuration takes place.

What You Need to Do

The SSU may be run directly from the Server Configuration Software CD or from a set of DOS diskettes. If you choose to run the SSU from a set diskettes, you must copy the SSU from the Server Configuration Software CD to diskettes and follow the instructions in the README.TXT of diskette one. See Chapter 2, “On-site Installation: Installing the Server,” to create a set of SSU diskettes. Only diskette one of the set must be DOS bootable.

NOTE

If your diskette drive is disabled, or improperly configured, you must use the flash-resident Setup utility to enable it so that you can use the SSU. If necessary, you can disable the drive after you exit the SSU. Information entered using the SSU overrides any entered using Setup.

Running the SSU

- **Running the SSU Locally**

  Running the ssu.bat file provided on the SSU media starts the SSU. If the server boots directly from the SSU media, the ssu.bat file runs automatically. If it boots from a different media, the SSU can be started manually or by another application. When the SSU starts in the local execution mode (the default mode), the SSU accepts input from the keyboard and/or mouse. The SSU presents a VGA-based Graphical User Interface (GUI) on the primary monitor.

  The SSU runs from writable, nonwritable, removable, and nonremovable media. If you run the SSU from nonwritable media, all your preference settings will be lost because you cannot save them.

  The SSU supports the ROM-DOS V6.22 operating system. It can run on other ROM-DOS compatible operating systems but they are not supported. The SSU will not operate from a DOS-box running under an operating system such as Windows.

- **Running the SSU Remotely**

  To run the SSU remotely, you must invoke the SSU.BAT file with the /t switch and redirect the text-mode output via BIOS console redirection. The /t switch puts the display in text mode and allows the console to be viewed and controlled via BIOS console redirection.

  First, configure the server for BIOS console redirection. Then configure the modem to auto-answer and to “modem reaction to DTR set to return to command state.” After configuring the server, it should be booted to a DOS prompt either locally or remotely through the EMP. Once the server boots, the remote user can use any ANSI terminal emulation program to connect to the configured COM port and invoke SSU /t. This process requires a bootable DOS partition, and all files required for the SSU to run must be on the server.

Starting the SSU

The SSU consists of a collection of task-oriented modules plugged into a common framework called the Application Framework (AF). The AF provides a launching point for individual tasks and a location for setting customization information.

1. Turn on your video monitor and your system.
2. There are two ways to start the SSU.
   a. **From a set of SSU diskettes created from the CD:** Insert SSU diskette 1 in drive A, and press the push-button reset switch or <Ctrl+Alt+Del> to reboot your server from the diskette. Follow the screen prompts.
   b. **From the Server Configuration Software CD:** Insert the CD into your CD-ROM drive, and press the reset switch on the front panel or <Ctrl+Alt+Del> to reboot the server.
      - When prompted, press <F2> to enter BIOS Setup.
      - From the Boot Menu, select the Boot Device Priority option, and then select the CD-ROM drive as your primary boot device.
      - Press <F10> to save the new settings.
      - Press <Enter> to exit BIOS Setup and boot from the CD.
      - From the CD menu, select Run Utilities and press <Enter>.
      - Select Run System Setup Utility, and press <Enter>. Follow the screen prompts.

      If you boot from the CD, skip to step 4.
3. The mouse driver loads if it is available; press <Enter> to continue.
4. When the main window of the SSU appears, you can customize the user interface before continuing.

Customizing the SSU

The SSU lets you customize the user interface according to your preferences. The AF sets these preferences and saves them in the AF.INI file so that they take effect the next time you start the SSU. There are four user-customizable settings.

NOTE

If you run the SSU from nonwritable media like a CD, these preferences will be lost when you exit the SSU.

- **Color—**this button lets you change the default colors associated with different items on the screen with predefined color combinations. The color changes are instantaneous.
- **Mode—**this button lets you set the desired expertise level.
  - novice
  - intermediate
  - expert

  The expertise level determines which tasks are visible in the Available Tasks section and what actions each task performs. For a new mode setting to take effect, the user must exit the SSU and restart it.
- **Language—**this button lets you change the strings in the SSU to strings of the appropriate language. For a new language setting to take effect, you must exit the SSU and restart it.
- **Other—**this button lets you change other miscellaneous options in the SSU. The changes are instantaneous.

To change the interface default values:

Use the mouse to click on the proper button in the Preferences section of the SSU Main window.

or

Use the tab and arrow keys to highlight the desired button, and press the spacebar or <Enter>.

or

Access the menu bar with the mouse or hot keys (Alt + underlined letter).

Launching a Task

It is possible to have many tasks open at the same time, although some tasks may require complete control to avoid possible conflicts. The tasks achieve complete control by keeping the task as the center of operation until you close the task window.

To launch a task:

1. In the SSU Main window, double-click on the task name under Available Tasks to display the main window for the selected task.

   or

   Highlight the task name, and click on OK.

   or

   Use the tab and arrow keys to highlight the task name, and press the <spacebar> or <Enter>.

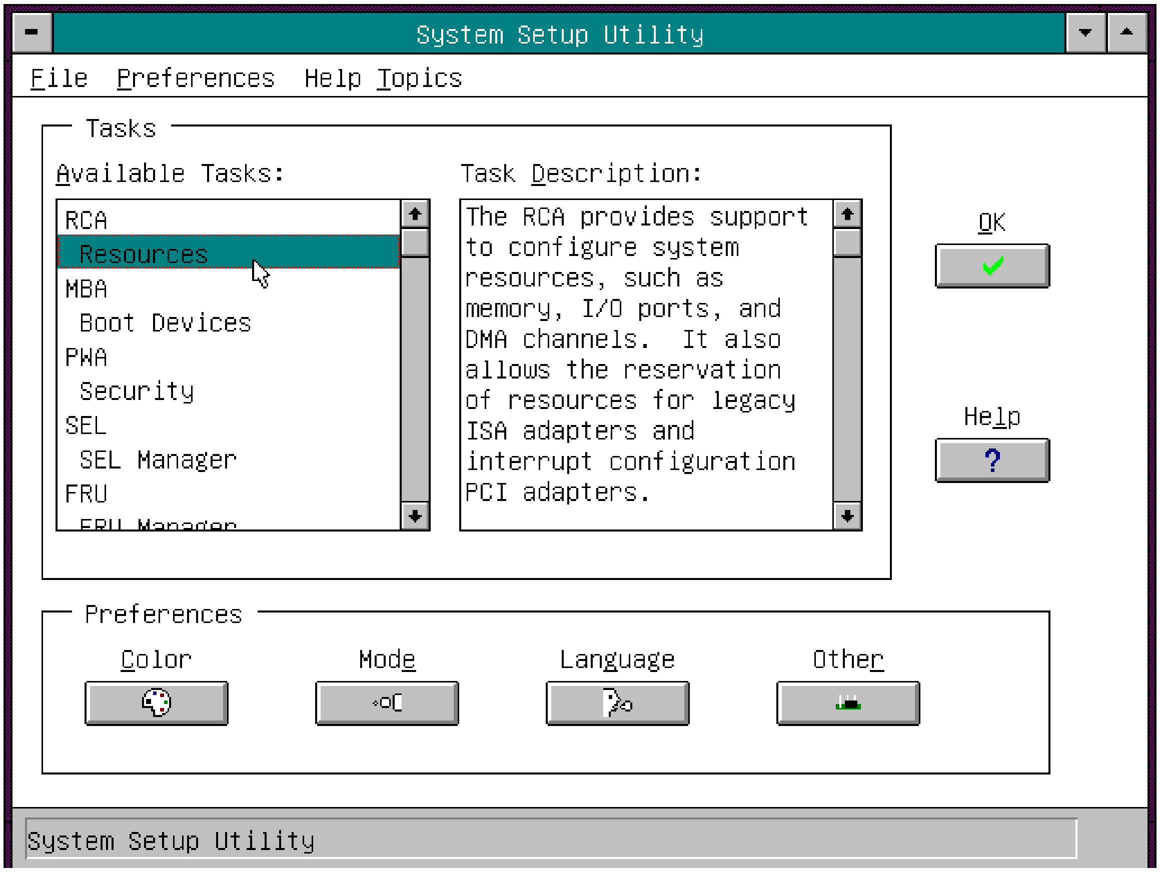


Figure 5-1. System Setup Utility Main Window

Resource Configuration Add-in (RCA) Window

The RCA provides three major functions:

- Creates representations of devices that cannot be discovered by the system (ISA cards)
- Modifies the contents of the system by adding and removing devices
- Modifies the resources used by devices

You can use the RCA window to define an ISA card or add an ISA card by clicking on the appropriate button. Removing an ISA card requires that the card be highlighted in the Devices section of the screen before clicking on the button.

NOTE

You can only add as many ISA cards as you have available ISA slots in the server.

1. From the SSU main window, launch the RCA by selecting the Resources task under the RCA heading in the task box.
2. When the RCA window appears, it displays messages similar to the following:

```
Baseboard:  System Board
PCI Card: Bus 00 dev 09 -- Multifunction Controller
PCI Card: Bus 00 dev 0A -- SCSI Controller
PCI Card: Bus 00 dev 0B -- Ethernet Controller
PCI Card: Bus 00 dev 0C -- VGA Controller
PCI Card: Bus 00 dev 0F -- Multifunction Controller
PCI Card: Bus 00 dev 10 -- Host Processor Bridge
PCI Card: Bus 00 dev 12 -- Host Processor Bridge
PCI Card: Bus 00 dev 13 -- Host Processor Bridge
PCI Card: Bus 00 dev 14 -- Host Processor Bridge
PCI Card: Bus 01 dev 09 -- Interrupt Controller
```

3. To configure a device, select its name in the Devices section of the RCA window, and press the spacebar or <Enter>, or double-click on the name.
4. It is possible to close the RCA window and return to the AF by clicking on the Back to AF button. Any changes made will be kept in memory for use by the RCA when it is rerun.
5. Save all the changes made by clicking on the Save button. Saving writes your current configuration to nonvolatile storage where it will be available to the system after every reboot.
6. Closing the window by clicking on the system menu—the dash in the upper-left corner—discards all changes.

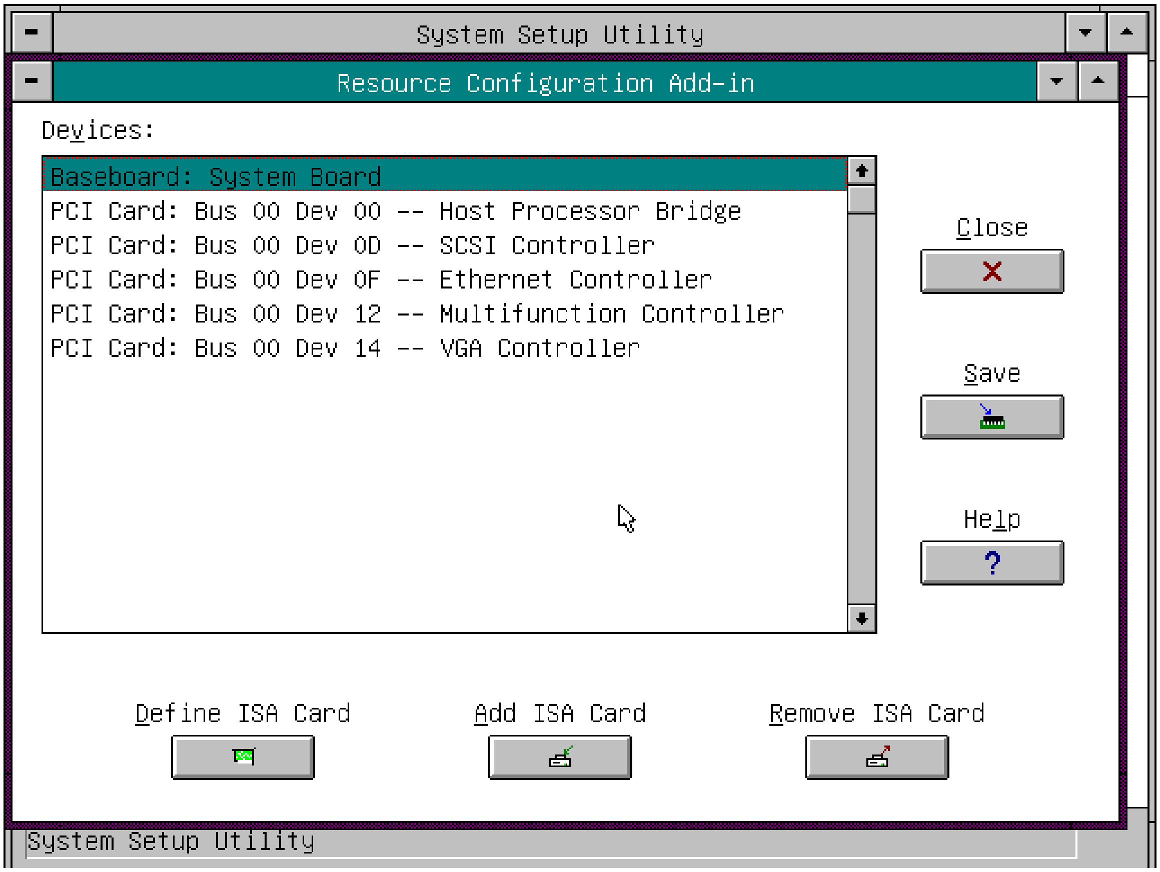


Figure 5-2. RCA Window

Defining an ISA Card

An ISA card usually comes with a vendor-created .CFG file that specifies the resources the card requires to function properly. If the .CFG file is unavailable, you must manually create it or define the card through the SSU. Defining an ISA card consists of specifying the name of the card and the resources it consumes. This allows the RCA to consider the ISA card resource requirements when the RCA tries to resolve conflicts. The system BIOS also uses the information to configure the hardware when the system boots.

1. To add or remove ISA card resources, click on the appropriate resource buttons, select the desired value, and click on Add or Remove.
2. After you complete the necessary information, click on Save.
3. To edit a card, click on Load to retrieve the card information. After making changes, click on Save.
4. To create a card, click on New.
5. To remove a current definition of a card, click on Delete.

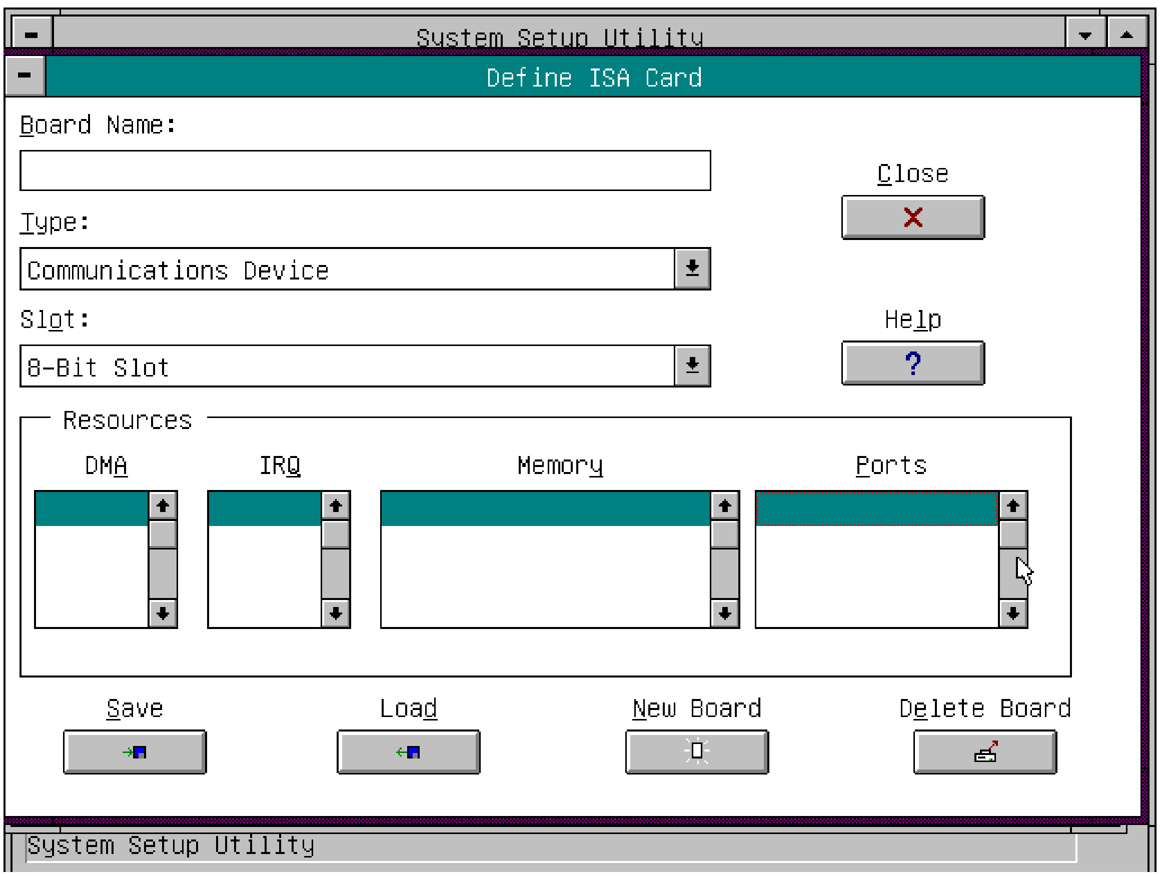


Figure 5-3. Define ISA Window

Adding and Removing ISA Cards

Adding and removing cards through the RCA provides a way for the RCA to run its conflict detection algorithms on the resources requested by the cards. This alerts you to any possible problems with that particular card in the current configuration.

- **To add an ISA card:**
  1. Click on Add ISA Card in the RCA window.
  2. Specify the directory for the .CFG file.
  3. Select the file and click on Ok.

- **To remove an ISA card:**
  1. Select a valid ISA card in the Devices section of the RCA window.
  2. Click on Remove ISA Card.

Modifying Resources

Modifying the resources of a device may be necessary to accommodate certain operating systems, applications, and drivers. It may also be necessary to modify resources to resolve a conflict.

- **To modify the resources associated with a device:**
  1. Highlight the device in the Devices section of the RCA window.
  2. Press the spacebar or <Enter>, or double-click on the entry.

  This displays the functions of the selected device along with possible choices and the resources associated with those choices.
- **To make a modification:**
  1. Highlight the function in the Configuration window.
  2. Press the spacebar or <Enter>, or double-click on the entry (this updates the Choice and resource lists).
  3. Press the tab key to get to the Choice list, and press <Enter>.
  4. Use the arrow keys to select a proper choice, and press <Enter> again.
  5. If the choice allows multiple possible values for a particular resource, use the hot key to select a resource, and press the spacebar or double-click on the resource.
  6. Select the desired resource, and click on Ok.

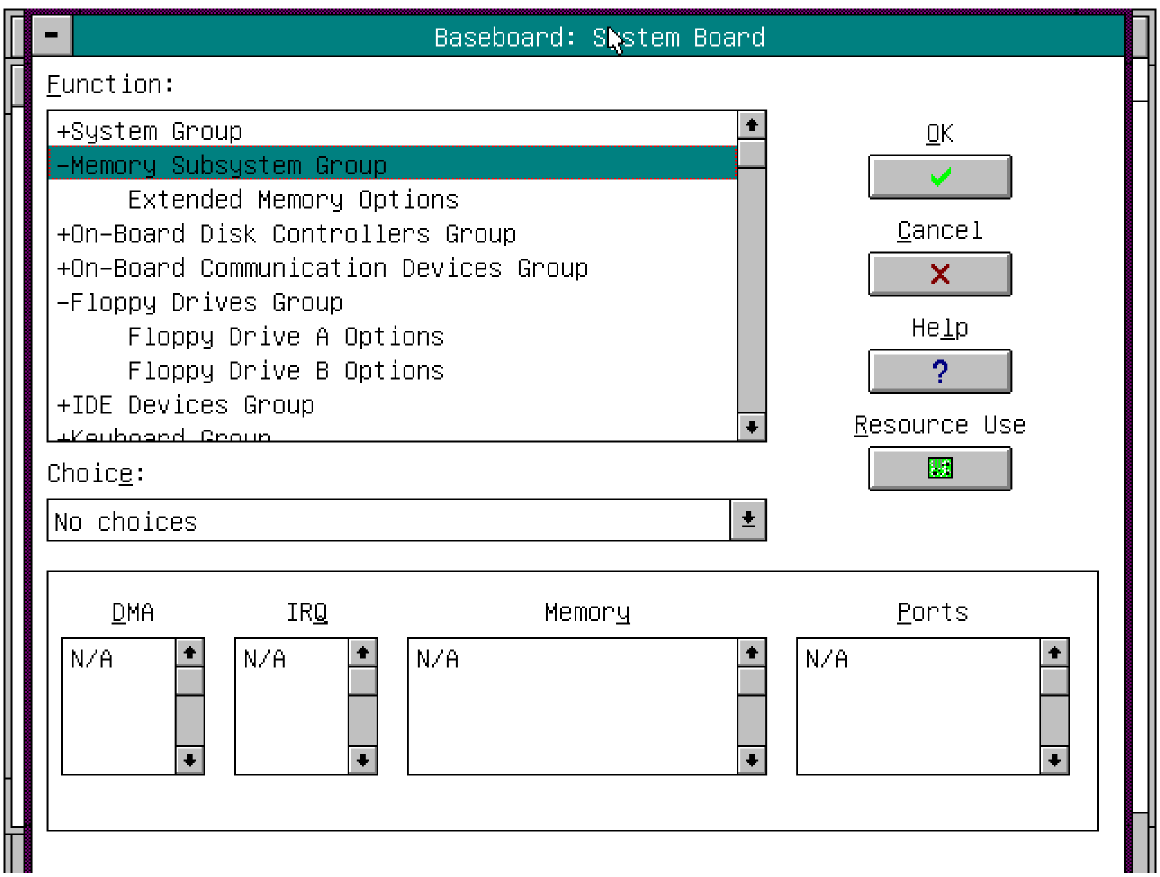


Figure 5-4. Configuration Window

System Resource Usage

Clicking on the Resource Use button in the Configuration window displays the System Resource Usage window. This window shows what resources each device is consuming. This information is useful for choosing resources if a conflict occurs. Devices can be organized according to the resources you want to examine using the options in the Resource section of the screen. The resource information can also be written to a plain text file though this window.

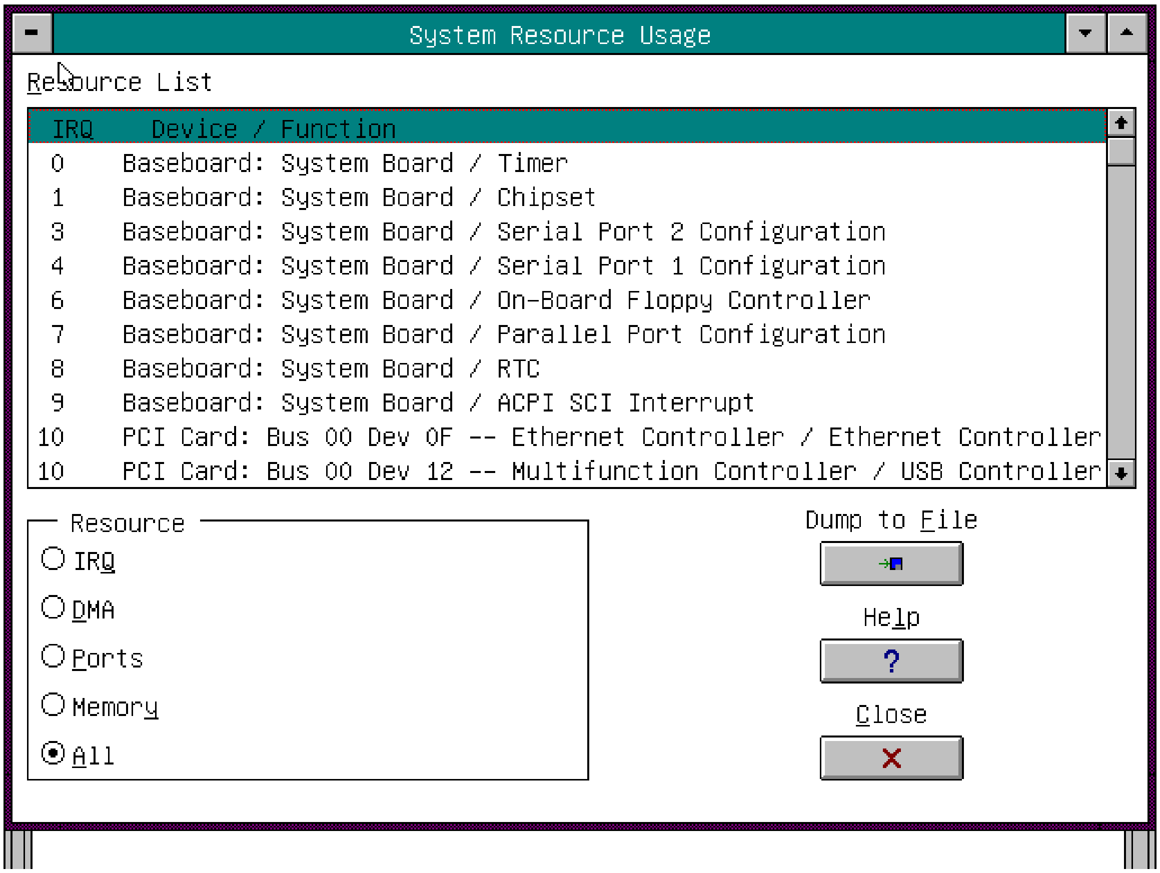


Figure 5-5. System Resource Usage Window

Multiboot Add-in

The Multiboot Add-in (MBA) provides an interface for selecting Initial Program Load (IPL) devices. Using the MBA, you can identify all IPL devices in the system and prioritize their boot order. On power-up, the BIOS sequentially attempts to boot from each device.

To change the boot device priority:

1. Click on the device to select it.
2. Click on the Move Up button to move the device up.
3. Click on Move Down button to move the device down.
4. Click on the Save button to save the boot order in the system nonvolatile storage.

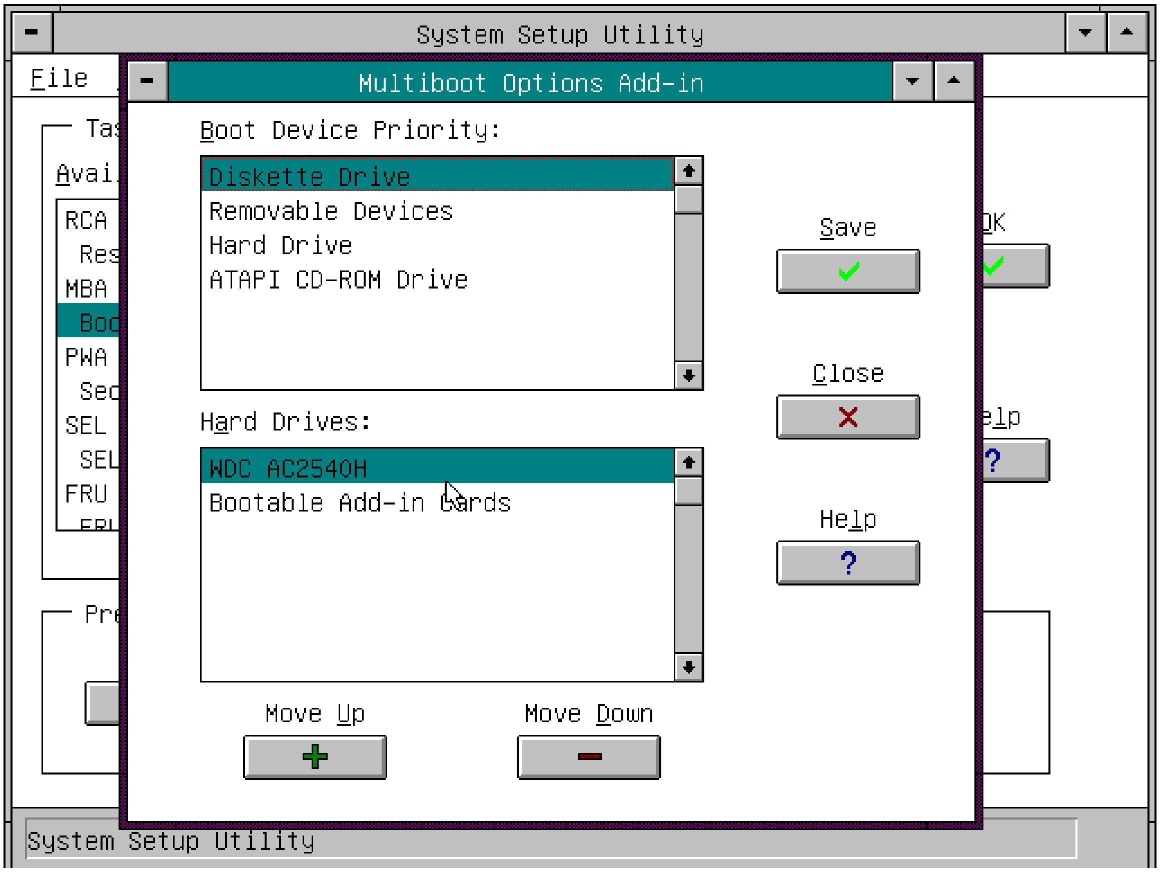


Figure 5-6. Multiboot Main Window

Security Add-in

The Security Add-in (PWA) provides security and password support options. Within the PWA, you can either set or modify the User and Administrator passwords or update any of the various security options available.

To Set the User Password

1. Click on the user password button.
2. Enter the password in the first field.
3. Verify the password by entering it again in the second field.

To Change or Clear the User Password

1. Click on the User password button.
2. Enter the old password in the first field.
3. Enter the new password in the second field or leave it blank to clear the password.
4. Verify the password by entering it again in the second field or leave it blank to clear the password.

To Set the Administrator Password

1. Click on the Administrator password button.
2. Enter the password in the first field.
3. Verify the password by entering it again in the second field.

To Change or Clear the Administrator Password

1. Click on the Administrator password button.
2. Enter the old password in the first field.
3. Enter the new password in the second field or leave it blank to clear the password.
4. Verify the password by entering it again in the second field or leave it blank to clear the password.

Security Options

Under this window, you can set the other security options:

- **Hot Key**—set a key sequence that, when pressed, will drop the server into secure mode.
- **Lock-Out Timer**—set an interval that, if no activity takes place during it, will drop the server into secure mode.
- **Secure Boot Mode**—force the server to boot directly into secure mode.
- **Video Blanking**—turn off the video when the server is in secure mode.
- **Floppy Write**—control access to the diskette drive while the server is in secure mode.
- **Reset/Power Switch Locking**—control the power and reset buttons while the server is in secure mode.

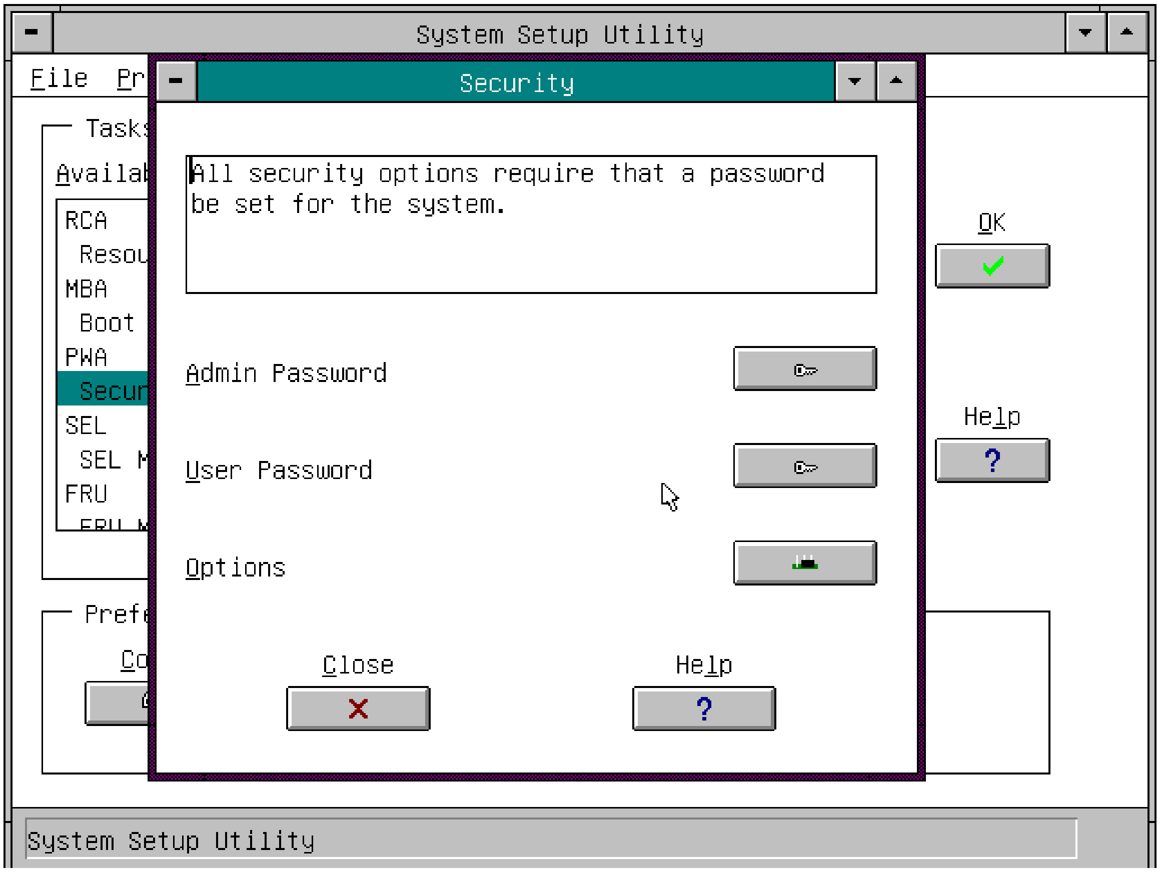


Figure 5-7. Password Main Window

System Event Log Manager Add-in

Clicking on the SEL Manger add-in task brings up the SEL Manager window. It lets you examine SEL records

- via the Baseboard Management Controller (BMC) in hex or verbose mode
- by sensor type or event type in hex or verbose mode
- from a previously stored binary file in hex or verbose mode

The SEL Manager window also lets you

- save the SEL records to a file in either text or binary form
- clear the SEL entries from the nonvolatile storage area

SEL Manager Menus	Click on	to
File	**Load SEL**	view data from a previously saved SEL file
	Save SEL	save the currently loaded SEL data to a file
	Clear SEL	clear the SEL data from the BMC
	Exit	quit the SEL Viewer
View	**SEL Info**	display information about the SEL (these fields are display only)
	All Events	display the current SEL data from the BMC
	By Sensor	bring up a pop-up menu that allows you to load only the data from a certain sensor type
	By Event	bring up a pop-up menu that allows you to load only the data from a certain event type
	View Realtime	
Settings	**Display HEX**	toggle between the Hex/interpreted mode of displaying the SEL records
	Display Verbose	
	Output Binary	determine whether SEL data will be saved to the file (as under File - Save) in binary format or verbose format
	Output Text	
Help	**About**	display the SEL Viewer version information

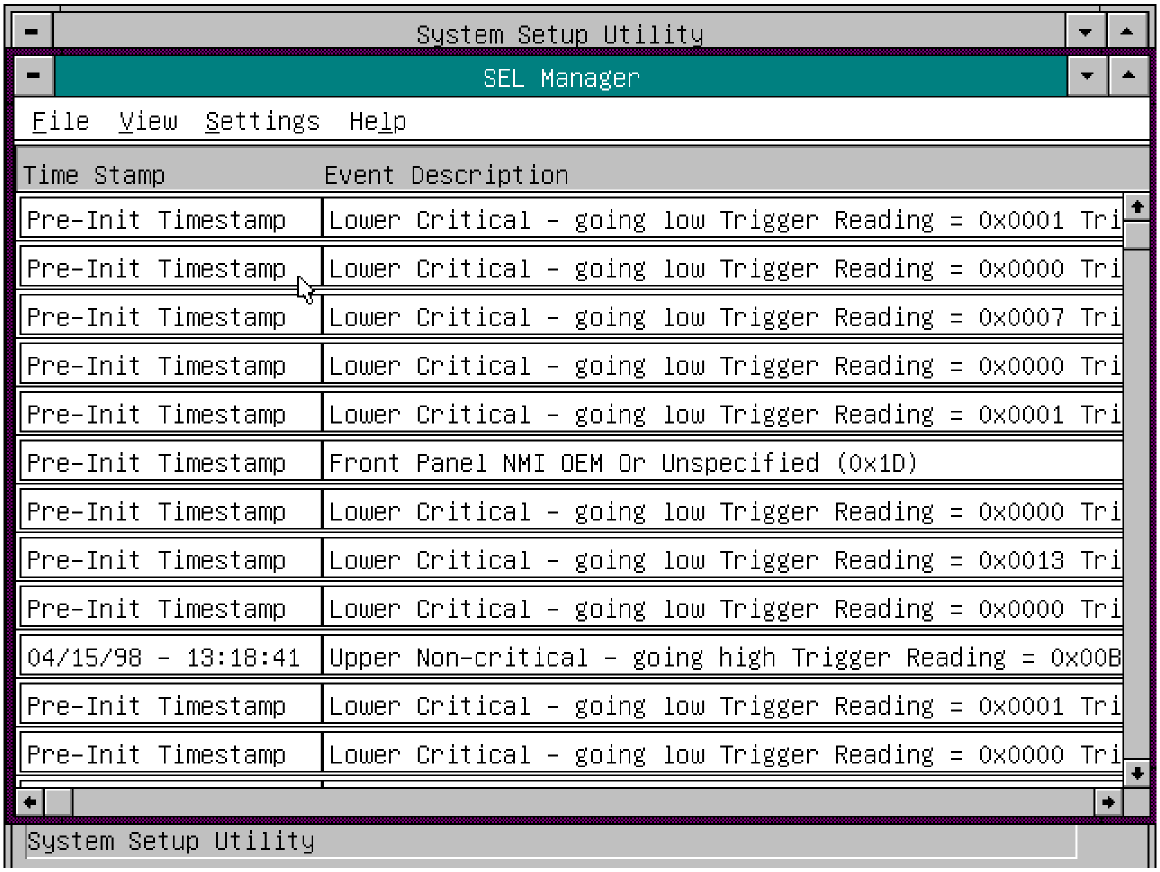


Figure 5-8. System Event Log Main Window

Exiting the SSU

Exiting the SSU causes all windows to close.

1. Exit the SSU by opening the menu bar item File in the SSU Main window. See “System Setup Utility Main Window” on page 67.
2. Click on Exit.

   or

   Highlight Exit, and press <Enter>.

6 SCSI*Select* Utility: When to Run

Each host adapter includes an onboard SCSI*Select* configuration utility that allows you to configure/view the settings of the host adapters and devices in the server.

- During bootup, the server first displays the BIOS banner for the AIC-7880 SCSI host adapter on the I/O baseboard.
- Next, the server displays the BIOS banner for the AHA-3940AUW SCSI host adapter on an add-in board plugged into a 32-bit PCI slot on the I/O baseboard.

When the BIOS banner for each adapter appears, you can run the included SCSI*Select* utility by pressing <Ctrl+A>.

When to Run the SCSI*Select* Utility

Use the SCSI*Select* utility to

- change default values
- check and/or change SCSI device settings that may conflict with those of other devices in the server
- do a low-level format on SCSI devices installed in the server

Running the SCSI*Select* Utility

1. When this message appears on the video monitor:

   ```
   Press <Ctrl><A> for SCSISelect(TM) Utility!
   ```

2. Press <Ctrl+A> to run the utility. When the main menu for the host adapter appears, choose the adapter that you want to configure—each SCSI bus accepts up to 15 devices.

NOTE

If the SCSI*Select* utility detects multiple host adapters in your server, the utility displays the PCI bus number and PCI device number—Bus:Device xx:xxh—of the host adapters. The host adapter menus are slightly different; see “Main Menu for AIC-7880” on page 82 and “Main Menu for AHA-3940AUW” on page 86.

Use the following keys to navigate through the menus and submenus.

Press	To
ESC	Exit the utility
Enter	Select an option
↑	Return to a previous option
↓	Move to the next option
F5	Switch between color and monochrome
F6	Reset to host adapter defaults

Main Menu for AIC-7880

Host Adapter	Option	Comment
AIC-7880 Ultra/Ultra W at Bus:Device 00:0Ah	Configure/View Host Adapter Settings	Press <Enter> to view the Configuration Menu.
	SCSI Disk Utilities	Press <Enter> to view the SCSI Disk Utilities Menu.

Configuration Menu

Feature	Option	Comment
SCSI Bus Interface Definitions		
Host Adapter SCSI ID	0–**7**–15	Use this option to change the SCSI ID of the host adapter. Each device on the SCSI bus, including the adapter, must have a unique ID. The ID defines the device, and the priority of the ID determines which device controls the bus when two or more devices try to use it simultaneously. Each adapter on the bus, whether 8- or 16-bit, has a default ID of 7, the highest priority on the bus.
SCSI Parity Checking	**Enabled** Disabled	When enabled, the host adapter always checks parity when reading from the SCSI bus to verify the correct transmission of data from the SCSI devices. Select disabled if any attached devices do not support SCSI parity.
Host Adapter SCSI Termination	**Low On/High On** Low Off/High Off Low Off/High On	The I/O baseboard does not support this feature. Low On/High On enables termination for both low and high bytes of the 16-bit Wide SCSI bus. (Bits 0 through 7 are the low byte, and bits 8 through 15 are the high byte.)
Additional Options		
Boot Device Options	Press <Enter>	See Boot Device Configuration Menu on page 83.
SCSI Device Configuration	Press <Enter>	See SCSI Device Configuration Menu on page 83.
Advanced Configuration Options	Press <Enter>	See Advanced Configuration Options Menu on page 84.

Boot Device Configuration Menu

Feature	Option	Comment
Boot Target ID	**0**–15	The default boot device is at SCSI ID 0 with logical unit number (LUN) 0. To specify a different boot device, choose a different SCSI ID (0 through 7 on 8-bit adapters, 0 through 15 on 16-bit adapters).
Boot LUN Number	**0**–7	If the boot device has multiple logical units, you must also specify the boot LUN. It can be 0 through 7 (on 8-bit or 16-bit adapters). If you disable Multiple LUN Support in the Advanced Configuration menu, specifying a number here has no effect.

SCSI Device Configuration Menu

Feature	Option	Comment
SCSI Device ID	**#0 - #15**	
Initiate Sync Negotiation	**yes** no	When yes, the SCSI host adapter initiates synchronous negotiation with the SCSI device. When no, the adapter does not initiate synchronous negotiation. However, if the device initiates synchronous negotiation, the adapter always responds.
Maximum Sync Transfer Rate	**40.0** 32.0 26.8 20.0	The host adapter supports synchronous data transfer rates up to the Fast SCSI maximum rate of 20 megatransfers/sec or 40MB/sec.
Enable Disconnection	**yes** no	When yes, the host adapter lets the SCSI device disconnect from the SCSI bus. When no, the adapter does not allow the device to disconnect from the bus. If two or more devices are connected to the adapter, leave this option set to yes.
Initiate Wide Negotiation	**yes** no	When yes, this option allows wide SCSI hard drives to achieve 2 bytes per transfer.
Send Start Unit Command	**yes** no	No effect if the BIOS is disabled. When yes—required for SCSI hard drives—the host adapter sends the Start Unit Command to the SCSI device during bootup. This reduces the load on the server power supply by allowing the adapter to power-up SCSI devices one at a time when you boot the server. The adapter sends the command to the device with the lowest SCSI ID. When it responds, the adapter sends the command to the next highest SCSI ID. When no, each device powers up in a normal fashion; if the device has been jumpered to wait for a start command, it will not start.
Include in BIOS Scan	**yes** no	When yes, the host adapter BIOS controls the SCSI device if it is an Int 13 device such as a SCSI disk drive. When no, the adapter BIOS does not scan SCSI IDs for devices to control; device driver software must be used to control the SCSI devices.

Advanced Configuration Options

Feature	Option	Comment
Reset SCSI Bus at IC Initialization	**Enabled** Disabled	Enabled lets the host adapter generate a SCSI bus reset the first time the host adapter is initialized.
Host Adapter BIOS (Configuration Utility Reserves BIOS Space)	**Enabled** Disabled	Enabled lets the server boot from a SCSI hard drive connected to the host adapter. When enabled, the AIC-7880 BIOS reserves 32 KB of BIOS space. No effect if the BIOS is disabled; however, 2 KB of memory space is still reserved per PCI and Plug and Play specifications.
Support Removable Disks Under BIOS as Fixed Disks	**Boot Only** All Disks Disabled	These options let you control which removable-media drives the host adapter BIOS supports. No effect if the BIOS is disabled. **CAUTION** Do not remove media from a removable-media drive if it is under BIOS control. Boot Only: Only a removable-media drive designated as the boot device is treated as a fixed (hard) disk drive. All Disks: All removable-media drives supported by the AIC-7880 BIOS are treated as fixed drives. (If you are a NetWare† user: all removable-media drives are automatically supported by NetWare as fixed disks regardless of how you set this option.) Disabled: No removable-media drives running under DOS are treated as fixed drives. Device driver software is needed because the drives are not controlled by the adapter BIOS.
Extended BIOS Translation for DOS Drives greater than 1 GB	**Enabled** Disabled	Enabled allows SCSI hard disk drives greater than 1 GB to use a translation scheme of 255 heads, 63 sectors per track. This extends the disk drive capacity limit under DOS to 8 GB. No effect if the BIOS is disabled.
Display <Ctrl-A> Message During BIOS Initialization	Disabled **Enabled**	When enabled, at boot time a prompt displays to let you run the SCSI*Select* program. No effect if the BIOS is disabled.
Multiple LUN Support	Enabled **Disabled**	Select enabled if any devices have multiple logical units. No effect if the BIOS is disabled.
BIOS Support for Bootable CD-ROM	**Enabled** Disabled	Enabled lets the server boot from a CD. The option displays only if the adapter BIOS is configured to include it. To boot from a hard drive or other device, either disable this option or make sure there is no bootable CD in the drive. No effect if the BIOS is disabled.
BIOS Support for Int13 Extensions	**Enabled** Disabled	When enabled, the adapter BIOS supports Int 13h extensions that are required for bootable CD-ROMs. The option displays only if the adapter BIOS is configured to include bootable CD-ROM support. You can disable the option if the boot device is *not* a CD-ROM, but it does no harm to leave it enabled. No effect if the BIOS is disabled.

continued

Advanced Configuration Options (continued)

Feature	Option	Comment
Support for *Ultra*SCSI Speed	**Enabled** Disabled	The option displays only if the BIOS is configured to support *Ultra*SCSI speeds. Select enabled to use *Ultra*SCSI speeds with the AIC-7880. No effect if the BIOS is disabled.

SCSI Disk Utilities Menu

When you select SCSI Disk Utilities, the SCSI*Select* utility scans the SCSI bus for SCSI devices. After scanning the bus, it reports a description of each device. If a device is present, select it and press <Enter> to see the options.

SCSI Device	Option	Comment
SCSI ID #0: No device (If a hard disk drive is present, select it, and press <Enter> to display the utilities.)	Format Disk	This utility performs a low-level format on the hard disk drive. **CAUTION** Back up your data before performing a low-level format. Once started, you cannot abort it.
	Verify Disk Media	This utility scans the media of the selected device for defects. If it finds bad blocks, it prompts you to reassign them. If you select yes, the blocks will no longer be used.
SCSI ID #1 - 6, #8 - #15: No device	None	No device present.
SCSI ID #7: AIC-7880 Ultra/Ultra W	None	This is the SCSI host adapter on the I/O baseboard.

Exit Menu

Feature	Option	Comment
Exit Utility?	Yes No	When you finish configuring your SCSI devices, select Yes and press <Enter>. When this message appears: `Please press any key to reboot` Press any key, and your server will reboot.

Main Menu for AHA-3940AUW

The AHA-3940AUW host adapter in the server provides two independent SCSI channels. You must configure each channel separately with the SCSI*Select* utility.

You have an AHA-3940AU/AUW/AUWD in your system. Move the cursor to the bus:device:channel of the one to be configured and press <Enter>.	Bus:Device:Channel 00:0B:A 00:0B:B
<F5> - Toggle color/monochrome	

Host Adapter	Option	Comment
AHA-3940AU/AUW/AUWD at Bus:Device:Channel 00:0B:A	Configure/View Host Adapter Settings	Press <Enter> to view the Configuration Menu.
	SCSI Disk Utilities	Press <Enter> to view the SCSI Disk Utilities Menu.

Configuration Menu

Feature	Option	Comment
SCSI Bus Interface Definitions		
Host Adapter SCSI ID	0–**7**–15	Use this option to change the SCSI ID of the host adapter channel. Each device on the SCSI bus, including the channel, must have a unique ID. The ID defines the device, and the priority of the ID determines which device controls the bus when two or more devices try to use it simultaneously. Each adapter on the bus, whether 8- or 16-bit, has a default ID of 7, the highest priority on the bus.
SCSI Parity Checking	**Enabled** Disabled	When enabled, the channel always checks parity when reading from the SCSI bus to verify the correct transmission of data from the SCSI devices. Select disabled if any attached devices do not support SCSI parity.
Host Adapter SCSI Termination	**Automatic** Low On/High On Low Off/High Off Low Off/High On	When Automatic, the host adapter automatically enables or disables termination. Low On/High On enables termination for both low and high bytes of the 16-bit Wide SCSI bus. (Bits 0 through 7 are the low byte, and bits 8 through 15 are the high byte).
Additional Options		
Boot Device Options	Press <Enter>	See Boot Device Configuration Menu on page 87.
SCSI Device Configuration	Press <Enter>	See SCSI Device Configuration Menu on page 88.
Advanced Configuration Options	Press <Enter>	See Advanced Configuration Options Menu on page 89.

Boot Device Configuration Menu

Feature	Option	Comment
Boot Channel	**A First** B First	Allows you to boot from either channel.
Boot SCSI ID	**0-**15	The default boot device is at SCSI ID 0 with logical unit number (LUN) 0. To specify a different boot device, choose a different SCSI ID (0 through 7 on 8-bit adapters, 0 through 15 on 16-bit adapters).
Boot LUN Number	**0**–7	If the boot device has multiple logical units, you must also specify the boot LUN. It can be 0 through 7 (on 8-bit or 16-bit adapters). If you disable Multiple LUN Support in the Advanced Configuration menu, specifying a number here has no effect.

SCSI Device Configuration Menu

Feature	Option	Comment
SCSI Device ID	**#0 - #15**	
Initiate Sync Negotiation	**yes** no	When yes, the host adapter initiates synchronous negotiation with the SCSI device. When no, the adapter does not initiate synchronous negotiation. However, if the device initiates synchronous negotiation, the adapter always responds.
Maximum Sync Transfer Rate	40.0 32.0 26.8 **20.0** 16.0 13.4 10.0	The 16-bit channel of the host adapter provides an effective maximum synchronous data transfer rate of 40MB/sec.
Enable Disconnection	**yes** no	When yes, the channel lets the SCSI device disconnect from the SCSI bus. When no, the device cannot disconnect from the bus. If two or more devices are connected to the channel, leave this option set to yes.
Initiate Wide Negotiation	**yes** no	When yes, the channel initiates wide negotiations with the SCSI device. The channel always responds if the device initiates wide negotiations.
Send Start Unit Command	yes **no**	No effect if the BIOS is disabled. When yes—required for SCSI hard drives—the channel sends the Start Unit Command to the SCSI device during bootup. This reduces the load on the server power supply by allowing the channel to power-up SCSI devices one at a time when you boot the server. The channel sends the command to the device with the lowest SCSI ID. When it responds, the channel sends the command to the next highest SCSI ID. When no, each device powers up when the server powers up; if the device has been jumpered to wait for a start command, it will not start.
BIOS Multiple LUN Support	yes **no**	When yes, the channel supports booting from a SCSI device with multiple LUNs.
Include in BIOS Scan	**yes** no	When yes, the host adapter BIOS controls the SCSI device if it is an Int 13 device such as a SCSI disk drive. When no, the adapter BIOS does not scan SCSI IDs for devices to control; device driver software must be used to control the SCSI devices.

Advanced Configuration Options

Feature	Option	Comment
Plug and Play SCAM Support	Enabled **Disabled**	Enabled lets the host adapter automatically assign SCSI IDs to attached devices supporting the SCAM protocol.
Reset SCSI Bus at IC Initialization	**Enabled** Disabled	Enabled lets the host adapter generate a SCSI bus reset the first time the host adapter is initialized.
Extended BIOS Translation for DOS Drives greater than 1 GB	**Enabled** Disabled	Enabled allows SCSI hard disk drives greater than 1 GB to use a translation scheme of 255 heads, 63 sectors per track. This extends the disk drive capacity limit under DOS to 8 GB. No effect if the BIOS is disabled.
Host Adapter BIOS (Configuration Utility Reserves BIOS Space)	**Enabled** Disabled	Enabled lets the server boot from a SCSI hard drive connected to the host adapter. When enabled, the AHA-3940AUW BIOS reserves 32 KB of BIOS space. No effect if the BIOS is disabled; however, 2 KB of memory space is still reserved per PCI and Plug and Play specifications.
Support Removable Disks Under BIOS as Fixed Disks	**Boot Only** All Disks Disabled	These options let you control which removable-media drives the channel BIOS supports. No effect if the BIOS is disabled. **CAUTION** Do not remove media from a removable-media drive if it is under channel BIOS control. Boot Only: Only a removable-media drive designated as the boot device is treated as a fixed (hard) disk drive. All Disks: All removable-media drives supported by the BIOS are treated as fixed drives. (If you are a NetWare user: all removable-media drives are automatically supported by NetWare as fixed disks regardless of how you set this option.) Disabled: No removable-media drives running under DOS are treated as fixed drives. Device driver software is needed because the drives are not controlled by the BIOS.
Display <Ctrl-A> Message During BIOS Initialization	Disabled **Enabled**	When enabled, at boot time a prompt displays to let you run the SCSI*Select* program. No effect if the channel BIOS is disabled.
BIOS Support for Bootable CD-ROM	**Enabled** Disabled	Enabled lets the server boot from a CD. The option displays only if the channel BIOS is configured to include it. To boot from a hard drive or other device, either disable this option or make sure there is no bootable CD in the drive. No effect if the BIOS is disabled.
BIOS Support for Int13 Extensions	**Enabled** Disabled	When enabled, the channel BIOS supports Int 13h extensions that are required for bootable CD-ROMs. The option displays only if the BIOS is configured to include bootable CD-ROM support. You can disable the option if the boot device is *not* a CD-ROM, but it does no harm to leave it enabled. No effect if the BIOS is disabled.

SCSI Disk Utilities Menu

When you select SCSI Disk Utilities, the SCSI*Select* utility scans the SCSI bus for SCSI devices. After scanning the bus, the utility reports a description of each device. If a device is present, select it and press <Enter> to see the options.

SCSI Device	Option	Comment
SCSI ID #0: No device (If a hard disk drive is present, select it, and press <Enter> to display the utilities.)	Format Disk	This utility performs a low-level format on the hard disk drive. **CAUTION** Back up your data before performing a low-level format. Once started, you cannot abort it.
	Verify Disk Media	This utility scans the media of the selected device for defects. If it finds bad blocks, it prompts you to reassign them. If you select yes, the blocks will no longer be used.
SCSI ID #0: WDIGTL ENTERPRISE		
SCSI ID #1 thru #5: No device	None	No device present.
SCSI ID #6: ESG-SHV SCA HSBP M4	None	Not a disk drive. This is the SCSI hot-docking backplane.
SCSI ID #7: AHA-3940AU/AUW/AUWD	None	This is the SCSI host adapter on the add-in board.
SCSI ID #8 thru #15: No device	None	No device present.

Exit Menu

Feature	Option	Comment
Exit Utility?	Yes No	When you finish configuring your SCSI devices, press <Esc>. Then select Yes and press <Enter>. When this message appears: `Please press any key to reboot` Press any key, and your server will reboot.

7 Emergency Management Port Console: How to Use

The Emergency Management Port (EMP) Console provides an interface to the Emergency Management Port (EMP). This interface allows remote server management via a modem or direct connection.

The server control operations available with EMP Console are:

- Connecting to remote servers
- Powering the server on or off
- Resetting the server

The EMP Console uses three management plug-ins to monitor the server:

- SEL Viewer (*not available on AD450NX servers*)
- SDR Viewer (*not available on AD450NX servers*)
- FRU Viewer

The EMP Console also has a Phonebook plug-in that can be used to create and maintain a list of servers and their phone numbers.

How EMP Console Works

The EMP shares use of the COM 2 port with the system on the server. When the EMP has control of the port, the port operates in command mode. When the system has control, the port operates in console redirect mode. When connecting to a server, the EMP Console checks to determine the mode of the COM 2 port. The following discussion covers how EMP Console functions in each mode:

- *Command mode* is the default COM 2 state. In this state, EMP Console communicates with the server's firmware, allowing the client to remotely reset or power the server up or down. The client can also view the server's System Event Log (SEL), Field Replaceable Unit (FRU) information, or Sensor Data Record (SDR) table. (*not available on AD450NX servers*)
- In *console redirect mode*, EMP Console serves as a PC ANSI terminal window for BIOS console redirection. Commands typed in this terminal window are transmitted through BIOS to the server's console, and text displayed on the server console is displayed on the EMP Console's terminal window. In this mode, you can remotely view boot messages, access BIOS setup, and run DOS text mode applications through the EMP Console's terminal window.

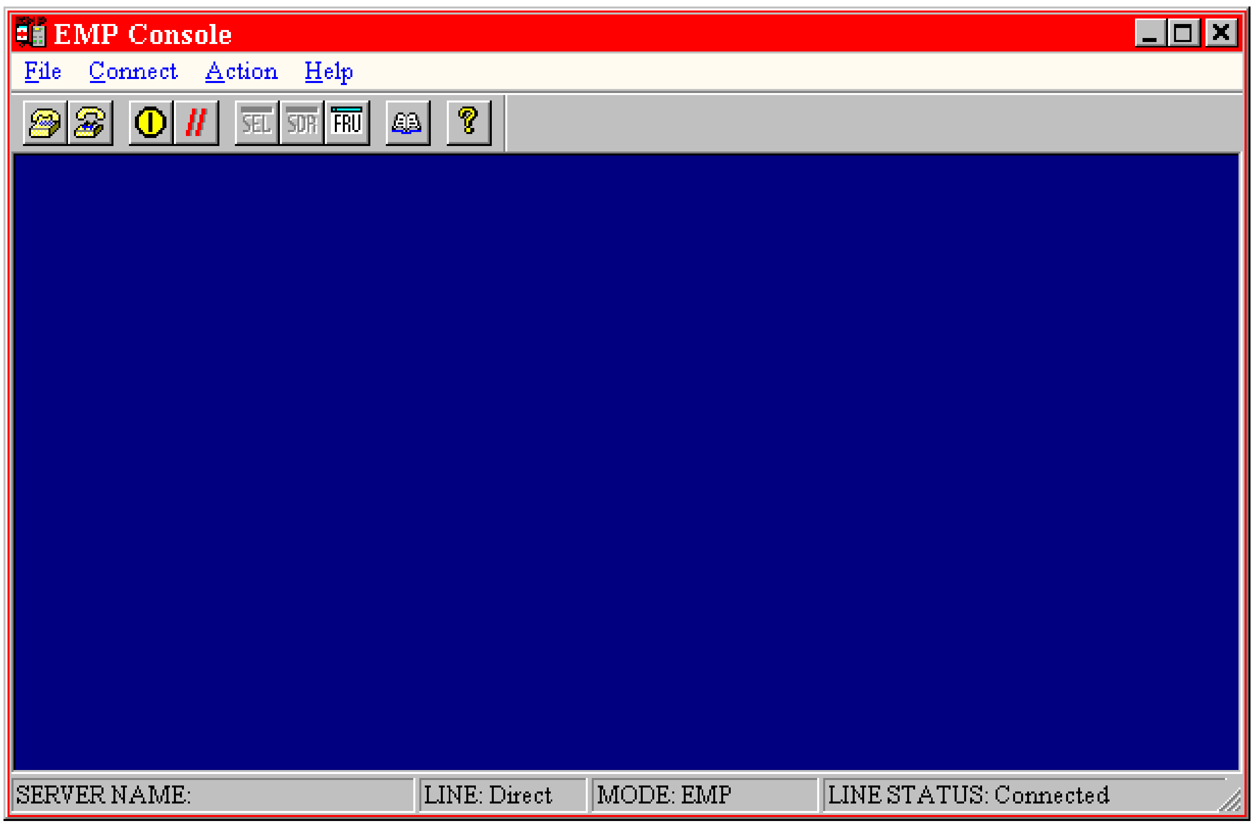


Figure 7-1. EMP Console in Command State

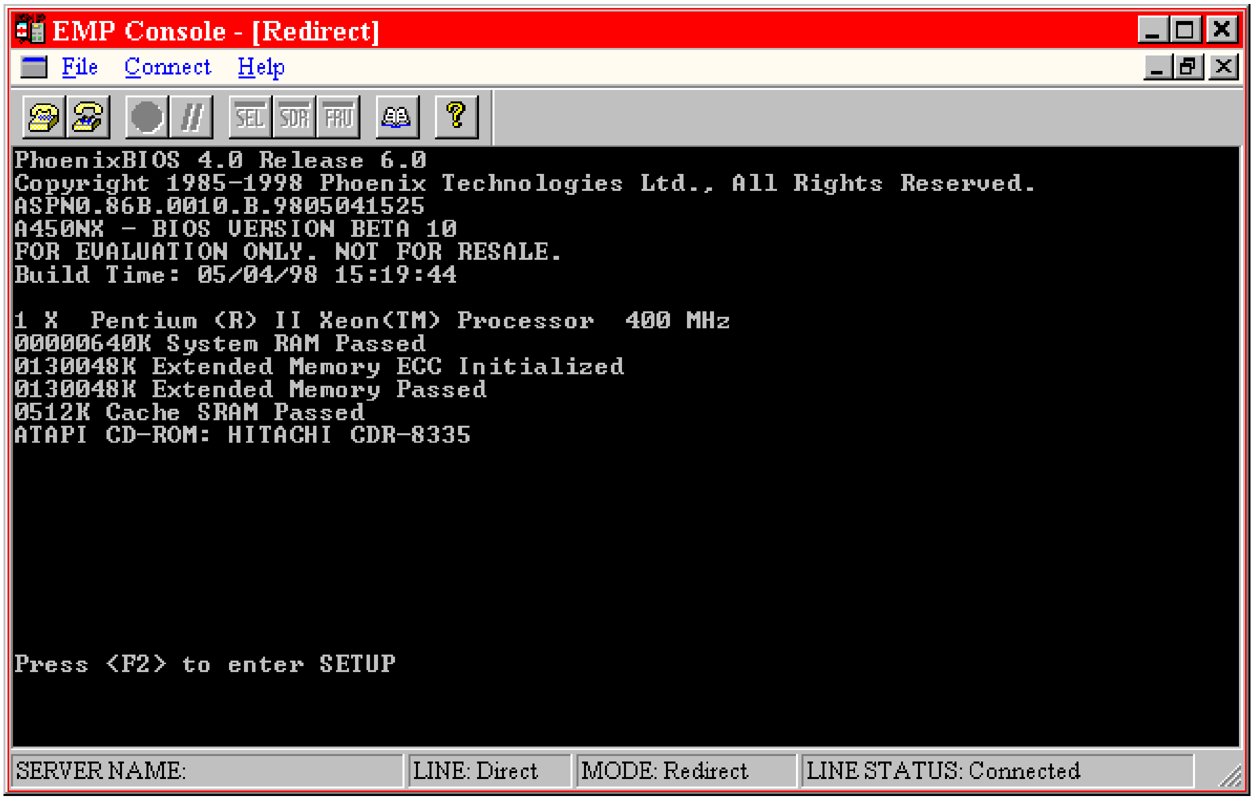


Figure 7-2. EMP Console in Redirect State

Figure 7-2 shows the EMP Console window in redirect mode with the terminal window. The text that appears on the server monitor displays in the Redirect window.

Availability of the various EMP Console features are determined by two factors: the BIOS EMP access mode and if the server's COM 2 port is configured for console redirection. The three EMP access modes are disabled, pre-boot, and always active.

Table 7-1. EMP Console Access Modes (Server configured for console redirection)

Mode	Server is powered off	During POST	After OS boots
Disabled	Redirect window appears, but is blank	Redirect window	Redirect window
Pre-boot	EMP commands available	Redirect window*	Redirect window
Always Active	EMP commands available	Redirect window*	EMP commands available

* The operation mode can be modified by selections in the Reset and Power on/off dialogs. These are server control dialogs available in EMP Console.

Table 7-2. EMP Console Access Modes (Server not configured for console redirection)

Mode	Server is powered off	During POST	After OS boots
Disabled	Redirect window appears, but is blank	Redirect window appears, but is blank	Redirect window appears, but is blank
Pre-boot	EMP commands available	EMP commands available	Redirect window appears, but is blank
Always Active	EMP commands available	EMP commands available	EMP commands available

Requirements

This section outlines the requirements and configurations necessary for using EMP Console.

Operating Systems:

- Windows 95
  - 16 MB of RAM, 32 MB recommended
  - 20 MB disk space
- Windows NT†
  - Windows NT 4.0
  - 24 MB of RAM, 32 MB recommended
  - 20 MB disk space

Client Configuration: EMP Console supports all COM ports on the client system, along with any Windows NT/95 compatible modem.

Server Configuration: EMP Console requires the server's COM 2 port to be connected to an external modem or directly connected to a serial cable.

Direct Connect Configuration: A null modem serial cable is needed. Connect one end of the cable to the COM 2 port of server and the other to a port on the client machine.

Modem Configuration: On the client, EMP Console uses the Windows Application Program Interface (API) to determine if a modem is connected and available. The EMP Console does not configure the modem; it should be preconfigured through Windows.

For modem support, the server must use a Hayes compatible modem that supports a baud rate of 19.2k. The modem must be on the NT Hardware Compatibility List provided by Microsoft. The server modem must be set in auto-answer mode for EMP Console to be able to connect to it.

Setting Up the Server for the EMP

To use the EMP, you must configure the server's BIOS with specific settings. These settings are found in the BIOS Server menu and the Console Redirection submenu. The BIOS settings section, found earlier in this document, shows all the available options. This section focuses on the settings that must be configured in order to use the EMP.

Server Menu

All EMP related settings occur in the Server main menu. Change only the items below; all other default settings should remain the same.

EMP Password Switch & EMP Password: Anytime an attempt to initiate a connection is made, a prompt for the user password appears. If no EMP password is setup, then anyone can access the EMP by clicking OK.

In the EMP Password area of the Server menu, the EMP Password Switch option must be set to enable. Then type in a password of up to eight alphanumeric characters. If a beep is heard, the password was accepted.

EMP Access Modes: Choose either Disabled, Pre-boot, or Always Active, depending on the type of EMP access needed. The tables above show what is available with a given setting.

EMP Restricted Mode Access: Set Restricted Mode to either enabled or disabled as needed. If in enabled mode, this means that EMP Console's server control options, Power off and Reset, are unavailable, except power on. In disabled mode, these same server control options are available.

EMP Direct Connect/Modem Mode: Select Direct Connect if a null modem serial cable directly connects the server's COM 2 port to the EMP Console client machine. If they are connected via a modem, select Modem Mode.

Console Redirection Submenu

The settings in the Console Redirection Submenu of the Server menu must be set exactly as noted to be able to use the EMP.

COM Port Address: Select 2F8. This is the COM 2 port that must be used by the EMP. The IRQ# setting is automatically populated with the correct number based on the COM Port Address choice.

Baud Rate: Select 19.2k.

Flow Control: Select CTS/RTS + CD.

Main EMP Console Window

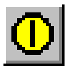
The main EMP Console window provides a graphical user interface (GUI) to access server control operations and to launch the management plug-ins. At the top of the window is the menu and tool bar. These provide the options to initiate plug-ins and other support features. A status bar at the bottom displays connection information such as server name, line status, and mode.

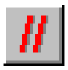
Toolbar

The tool bar buttons of the EMP Console main window combine server control and management plug-in commands available from both the Connect and Action menus as follows:

 Displays the Connect dialog to allow connection to a selected server.

 Disconnects from the currently connected server.

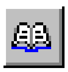
 Displays the Power On/Off dialog.

 Displays the Reset dialog.

 Launches the SEL Viewer. (*not available on AD450NX servers*)

 Launches the SDR Viewer. (*not available on AD450NX servers*)

 Launches the FRU Viewer.

 Displays the Phonebook Dialog.

 Displays the online help.

Status Bar

The status bar is displayed at the bottom of the main window. It contains the following status information:

- **SERVER NAME**: the name of the connected server when connecting via modem.
- **LINE**: the type of line connection. This is either direct or modem.
- **MODE**: either Redirect of EMP, depending on whether the EMP has control of the COM 2 port.
- **LINE STATUS**: gives status information about the server connection. For example, if a server is connected, the status bar says "Connected." Otherwise, the line is blank.

EMP Console Main Menu

- **File**
  - **Exit -** Exits EMP Console
- **Connect**
  - **Disconnect -** disconnects the server connection.
  - **[Re]Connect -** displays the connect dialog.
  - A list of the five most recent modem connections. Click on one of these server names to initiate a connection.

- **Action**
  - — **Power On/Off -** displays the Power on/off dialog.
  - — **Reset -** displays the Reset dialog.
  - — **SEL Viewer -** displays the SEL Viewer. (*not available on AD450NX servers*)
  - — **SDR Viewer -** displays the SDR Viewer. (*not available on AD450NX servers*)
  - — **FRU Viewer -** displays the FRU Viewer.
  - — **Phonebook -** displays the Phonebook dialog.
- **Help**
  - — **Help Topics -** help topics for EMP Console.
  - — **Help About -** provides version information.

Server Control Operations

Three server control operations are available from the menu or toolbar in EMP Console: remote server connection, powering the server on and off, and resetting the server. The server console mode can also be switched between EMP active and BIOS redirect modes through post-power-up and reset options.

Connect

When [Re]Connect is selected from the Connect menu, the Connect dialog in Figure 7-3 is displayed. This dialog allows you to connect to a server. If the client machine is already connected to a server, initiating connection generates a warning message. The message indicates that the existing connection will be terminated if you continue trying to initiate the new connection. You are prompted to enter the EMP password whenever a connection is attempted.

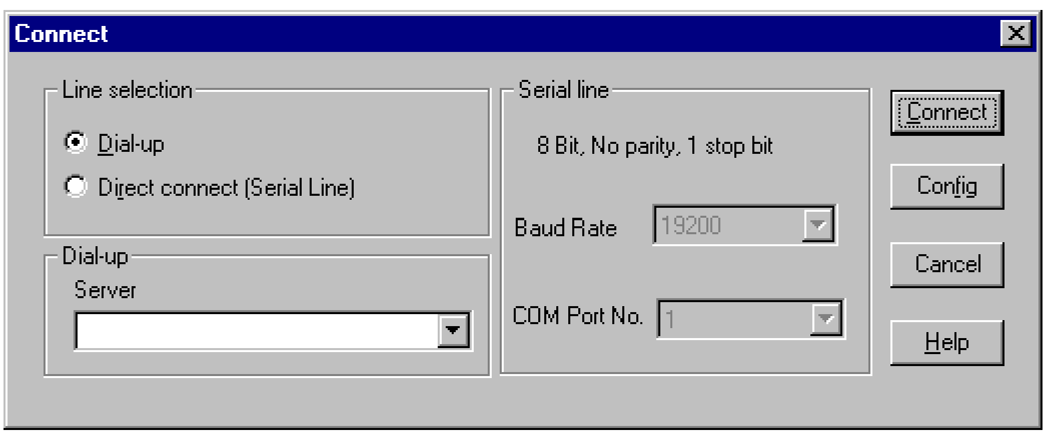


Figure 7-3. Connect Dialog

Options available in the dialog are:

- **Line Selection -** you can specify whether to use a direct connection or dial-up modem connection to the server.
  - — **Dial-up -** connects to a selected server with a modem.
  - — **Direct connect (Serial Line) -** connects to the selected server directly using a null modem serial cable.

- **Server** - a server name can be selected from the dropdown list of available servers. A server must be selected when the line selection is Dial-up.
- **Serial Line** - These options are enabled when the line selection is set to Direct connect (Serial Line).
  - **Baud Rate** - must be 19200 for EMP to connect properly.
  - **COM Port No.** - set the COM Port number to the port which the null modem serial cable is connected to.
- **Connect** - initiates the connection to the connected server. When this button is clicked, you are prompted for the EMP password.
- **Config** - displays the Phonebook dialog.
- **Cancel** - exits the Connect dialog without taking any action.
- **Help** - displays the help information for this dialog.

Power On/Off

Selecting Power On/Off from the Action menu displays the Power on/off dialog. This dialog provides commands to remotely power on or power off the server.

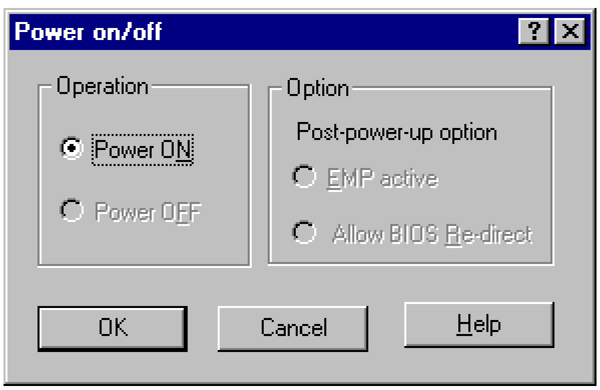


Figure 7-4. Power On/Off Dialog

Options available in the dialog are:

- **Power ON** - powers on the server.
- **Power OFF** - powers off the server. This option is not allowed if the server is configured in RESTRICTED mode for EMP operations.
- **Post-power-up option** - sets the mode selection of the server to EMP active or BIOS redirection. The setting is available after the next power-up. The default selection is EMP active.
- **Cancel** - exits the Connect dialog without taking any action.
- **Help** - displays the help information for this dialog.

Reset

Selecting Reset from the Action menu displays the Reset dialog. This dialog provides the ability to remotely reset the server with post-reset options.

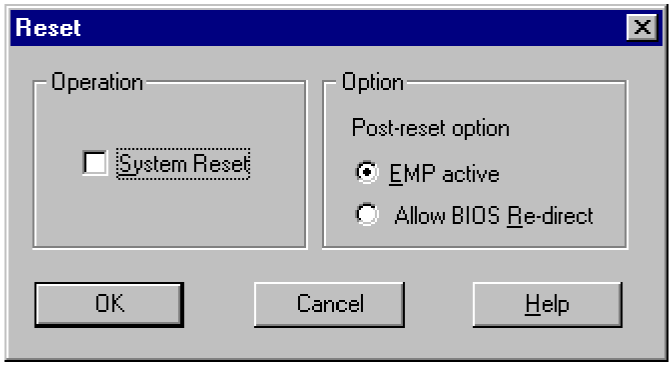


Figure 7-5. Reset Dialog

Options available in the dialog are:

- **System Reset -** resets the server with the selected post-reset options. This operation is not allowed if the server is configured in RESTRICTED mode for EMP operations.
- **Post-reset option -** sets the post-reset option that will be in effect after reset. The options are EMP active or BIOS redirection. The default selection is EMP active.
- **Cancel** - exits the Connect dialog without taking any action.
- **Help -** displays the help information for this dialog.

Phonebook

EMP Console provides a support plug-in known as Phonebook. It stores names and numbers of servers in a list that can be updated by adding, modifying or deleting entries. Phonebook can be opened from the main menu and toolbar, or launched from the Connect dialog by clicking the Config button.

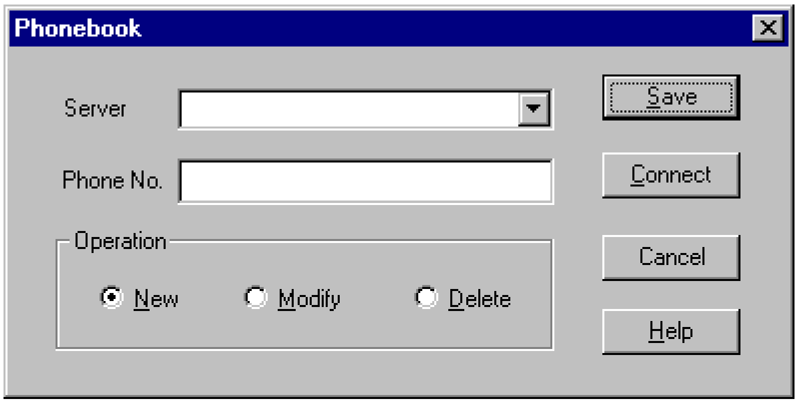


Figure 7-6. Phonebook Dialog

Options available in the dialog are:

- **Server** - a dropdown list of server names stored in Phonebook. If the New radio button is selected in the Operation area, this area is cleared.
- **Phone No.** - the number of the selected server. If the New radio button is selected in the Operation area, this area is cleared.
- **Operation**
  - **New** - lets you add a new entry in the Phonebook. Selecting this option clears the Server and Phone No. fields. You must click Save for the entry to be added to the Phonebook.
  - **Modify** - lets you edit an existing entry. You must select an existing entry from the Server dropdown list box and modify the existing phone number before selecting this option. Click Save in order to update the entry in the phonebook.
  - **Delete** - lets you delete an entry from the Phonebook. You must first select an existing server from the Server dropdown list box before selecting this option. You must click Save for the entry to be deleted.
- **Save** - saves a new or modified Phonebook entry, or deletes an entry if the Delete radio button is selected.
- **Connect** - displays the Connect dialog with the server from the Phonebook's Server dropdown list box already populating the Connect dialog's Server field.
- **Cancel** - exits the Connect dialog without taking any action.
- **Help** - displays the help information for this dialog.

FRU Viewer

The FRU Viewer allows you to view the server's FRU (Field Replaceable Unit) data from the server's Front Panel FRU information area. The options available in the FRU Viewer are:

- View all FRU records
- View FRU summary info
- Set FRU display mode to either Hex or verbose mode
- Close the FRU Viewer
- Exit EMP Console

FRU Viewer Menu Options

The following menu options are found on the FRU Viewer menu bar:

- **File**
  - **Close -** closes the FRU Viewer.
  - **Exit -** exits EMP Console.
- **View**
  - **Display all Records -** displays all FRU data, which consists of chassis, board, and product information.
  - **FRU Info -** displays the FRU summary information as returned by the server.
- **Settings -** lets you change operating parameters for the FRU Viewer. This menu displays the following options:
  - **Display HEX/Verbose -** toggles between HEX mode and interpreted mode of displaying FRU records.
- **Window -** gives options for displaying currently open windows.
- **Help**
  - **Help Topics -** help topics for EMP Console.
  - **Help About -** provides version information.

8 FRU and SDR Load Utility: When to Run

The Field Replacement Unit (FRU) and Sensor Data Record (SDR) Load Utility is a DOS based program used to update the server management subsystem's product level FRU, SDR, and the Desktop Management Interface (DMI) nonvolatile storage components (EEPROMs). The load utility

- discovers the product configuration based on instructions in a master configuration file
- displays the FRU information (it may have values the user can change)
- updates the nonvolatile storage device (EEPROM) associated with the Baseboard Management Controller (BMC) that holds the SDR and FRU area
- updates the DMI area located in the BIOS nonvolatile storage device
- generically handles FRU devices that may not be associated with the BMC

When to Run the FRUSDR Load Utility

You should run the FRUSDR Load Utility each time you upgrade or replace the hardware in your server, excluding add-in boards, hard drives, and RAM. For example, if you replace an array of fans, you need to run the utility. It programs the sensors that need to be monitored for server management.

The server must be reloaded to properly initialize the sensors after programming the Sensor Data Records. To do this, turn the server off and disconnect the AC power cords from the server power supplies. Wait approximately 30 seconds, reconnect the power cords, and turn the server on.

What You Need to Do

The FRUSDR Load Utility may be run directly from the Configuration Software CD or from diskettes you create from the CD. Before you can run the FRUSDR Load Utility from a diskette, you must copy the utility from the Server Configuration Software CD to a DOS-bootable diskette. See Chapter 2, "On-site Installation: Installing the Server," to create an FRUSDR Load Utility diskette.

NOTE

If your diskette drive is disabled, or improperly configured, you must use BIOS Setup to enable it. If necessary, you can disable the drive after you are done with the FRUSDR utility.

How You Use the FRUSDR Load Utility

This utility is compatible with ROM-DOS Ver. 6.22, MS-DOS Ver. 6.22, and later versions. The utility accepts CFG, SDR and FRU load files. The executable file for the utility is frusdr.exe. The utility requires the following supporting files:

- one or more .fru files describing the system's field replaceable units
- a .cfg file describing the system configuration
- a .sdr file describing the sensors in the system

Command Line Format

The basic command line format is

frusdr [-?] [-h] [-d {dmi, fru, sdr}] [-cfg filename.cfg] -p -v

Command	Description
frusdr	Is the name of the utility.
-? or -h	Displays usage information.
-d {dmi, fru, sdr}	Only displays requested area.
-cfg filename.cfg	Uses custom CFG file.
-p	Pause between blocks of data.
-v	Verbose, display any additional details.

Parsing the Command Line

The FRUSDR Load Utility allows only one command line function at a time. A command line function may consist of two parameters; for example, -cfg filename.cfg. Any invalid parameters result in displaying an error message and exiting the program. You can use either a slash (/) or a minus sign (-) to specify command line options. The -p and -v options may be used in conjunction with any of the other options.

Displaying Usage Information

When the utility is run with the -? or -h command line flags, the following message is displayed when the verbose flag -v is added to the help command:

```
FRU & SDR Load Utility Version 2.0

 Usage:   frusdr               Is the name of the utility.

          -? Or -h             Displays usage information

          -d {dmi,fru,sdr}     Only displays requested area.

          -cfg filename.cfg    Uses custom CFG file.

          -p                   Pause between blocks of data.

          -v                   Verbose, display any additional details.
```

```
Copyright (c) 1998, Intel Corporation, All Rights Reserved
This utility must be run from a system executing DOS. Running in a Window's
DOS box is insufficient and will provide incorrect results. Programming the
BMC FRU area clears the SDR table, therefore the SDR table must be
reprogrammed. Upon completing the programming of the FRU and SDR areas, the
server should be rebooted.
Note: DOS users may alternatively use a '/' instead of the '-'.
```

The following information is display if -v option is included in the command line.

```
The /D FRU command may be followed with up to 16 device addresses.  These
device addresses are used to view up to 16 different FRU areas, instead of
the default of displaying the BMC FRU. The arguments following the "-d FRU"
are in the same order and value as the NVS_TYPE, NVS_LUN, DEV_BUS and
DEV_ADDRESS which are found in the FRU file header in each FRU file. The
LUN address is optional.  If the LUN address is used, it must start with
an 'L'.

        Usage:    FRUSDR -d fru (device) [lun] (bus) (addr) (addr2) (etc)
        Example:  FRUSDR /D FRU IMBDEVICE L00 00 C0 C2

The configuration file may be used to load multiple FRU and SDR files.
In the configuration file, you may define which FRU and SDR areas are to
be programmed. Additionally, you may request information from the user
or ask the user to choose which areas to program.
```

To read this area	Enter this command line
I/O Baseboard FRU	frusdr -d fru IMBDEVICE FF 20
Front Panel FRU	frusdr -d fru IMBDEVICE 00 22
CPU baseboard FRU	frusdr -d fru DS1624S 01 98
Top Mem Mod FRU	frusdr -d fru DS1624S 01 9A
Bottom Mem Mod FRU	frusdr -d fru DS1624S 01 9E
Interconnect Backplane FRU	frusdr -d fru AT24C02 01 A2
I/O Riser FRU	frusdr -d fru AT24C02 01 AE
Power Distribution Backplane FUR	frusdr -d fru IMBDEVICE L02 00 22
SCSI Hot Swap Backplane FRU	frusdr -d fru IMBDEVICE 00 C0
Term card in Slot 1	frusdr -d fru AT24C02 03 A0
Term card in Slot 2	frusdr -d fru AT24C02 03 A4
Term card in Slot 3	frusdr -d fru AT24C02 03 A8
Term card in Slot 4	frusdr -d fru AT24C02 03 AC

Displaying a Given Area

When the utility is run with the -d DMI, -d FRU, or -d SDR command line flag, the indicated area is displayed. Each area represents a sensor; one sensor for each instrumented device in the server. If the given display function fails because of an inability to parse the data present or a hardware failure, the utility displays an error message and exits.

Displaying DMI Area

Each DMI area displayed is headed with the DMI area designated name. In each area, each field has a field name header followed by the field in ASCII or as a number.

Example:

To display the DMI area, type **`frusdr -d dmi -v -p`** and press <Enter>. A message similar to the following appears:

```
Displaying DMI Area...

System Information (Type 1, 8 bytes)

Manufacturer   = Intel

Product        = AD450NX Server System

Version        = ASDK128M1P2MBPP

Serial Number  = Z00418630

Board Information (Type 2, 8 bytes)

Manufacturer   = Intel Corp.

Product        = AD450NX Server System

Version        = ASDK128M1P2MBPP

Serial Number  = 0123456789

Chassis Information (Type 3, 9 bytes)

Manufacturer   = Intel

Type           = Main Server Chassis

Version        = ASDK128M1P2MBPP

Serial Number  = Z00418630

Asset Tag#     =
```

Displaying FRU Area

The FRU area is displayed in ASCII format when the field is ASCII or as a number when the field is a number. Each FRU area displayed is headed with the FRU area designated name. Each field has a field name header followed by the field in ASCII or as a number. The Board, Chassis, and Product FRU areas end with an END OF FIELDS CODE that indicates there is no more data in this area. The Internal Use area is displayed in hex format, 16 bytes per line.

Example:

To display the FRU area, type **`frusdr -d fru`** and press <Enter>. A message similar to the following appears:

```
Common Header Area (Version 1, Length 8)
Header Area Version   = 01h
Internal Area Offset  = 01h
Chassis Area Offset   = 0Ah
Board Area Offset     = 0Eh
Product Area Offset   = 16h
PAD                   = 00h
PAD                   = 00h
CHECKSUM              = D0h

Internal Information Area (Version 0, Length 72)
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00

Chassis Information Area (Version 1, Length 32)
Chassis Type          = 11h
Part Number (ASCII)   = ASDK128M1P2MBPP
Serial Number (ASCII) = Z00418630
END OF FIELDS CODE

Board Information Area (Version 1, Length 64)
Unicode Country Base         = 00h
Manufacturing Time (mins)    = 733803
Manufacturer Name (ASCII)    = Intel
Product Name (ASCII)         = AD450NX Server System
Serial Number (ASCII)        = 0123456789
Part Number (ASCII)          = 664653-001
END OF FIELDS CODE
```

```
Product Information Area (Version 1, Length 80)
Unicode Country Base        = 00h
Manufacturer Name (ASCII)   = Intel
Product Name (ASCII)        = AD450NX Server System
Part Number (ASCII)         = ASDK128M1P2MBPP
Version (ASCII)             =
Serial Number (ASCII)       = 0123456789
Asset Tag (ASCII)           =
END OF FIELDS CODE
```

Displaying SDR Area

The SDR nonvolatile storage area is displayed in the following hex format. The data is separated by a Sensor Record Number X header, where X is the number of that sensor record in the SDR area. The next line after the header is the sensor record data in hex format delineated by spaces. Each line holds up to 16 bytes. The data on each line is followed by the same data in ASCII format; nonprintable characters are substituted by a period (.).

Example:

To display the SDR area, type **`frusdr -d sdr`** and press <Enter>. A message similar to the following appears:

```
Reading SDR Record #1
0E 00 10 01 37 20 00 0F 05 00 10 F1 F8 02 01 85       ....7..........
02 00 00 00 04 00 00 C4 02 00 08 30 C2 07 91 95       ...........0....
8E FF 00 1B 1B 00 99 95 00 8A 8E 02 02 00 01 CC       ................
53 43 53 49 2D 42 2D 54 65 72 6D 33                   SCSI-B-Term3
Reading SDR Record #2
0E 40 10 01 30 20 00 13 05 00 10 F1 F8 04 01 05       .@..0 ..........
00 00 00 20 29 00 00 1E 02 00 00 00 00 00 00 00       ... )...........
00 FF 00 03 03 00 00 00 00 42 49 02 02 00 01 C5       .........BI.....
46 41 4E 2D 32                                        FAN-2
```

Using Specified CFG File

The utility can be run with the command line parameter of -cfg filename.cfg. The filename can be any DOS accepted, eight-character filename string. The utility loads the specified CFG file and uses the entries in the configuration file to probe the hardware and to select the proper SDRs to load into nonvolatile storage.

Displaying Utility Title and Version

The utility displays its title:

```
FRU & SDR Load Utility, Version 2.0
```

Configuration File

The configuration file is in ASCII text. The utility executes commands formed by the strings present in the configuration file. These commands cause the utility to perform various tasks needed to ultimately load the proper SDRs into the nonvolatile storage of the BMC and possibly generic FRU devices. Because some of the commands are interactive, you are required to make a choice.

Prompting for Product Level FRU Information

Through the use of a configuration file, the utility may prompt the user for FRU information.

Filtering Sensor Data Record From the SDR File

The MASTER.SDR file has all the possible SDRs for the system. These records may need to be filtered based on the current product configuration. The configuration file directs the filtering of the SDRs.

Updating the SDR Nonvolatile Storage Area

After the utility validates the header area of the supplied SDR file, it updates the SDR repository area. Before programming, the utility clears the SDR repository area. The utility filters all tagged SDRs depending on the product configuration set in the configuration file. Nontagged SDRs are automatically programmed. The utility also copies all written SDRs to the SDR.TMP file; it contains an image of what was loaded. The TMP file is also useful for debugging the server.

Updating FRU Nonvolatile Storage Area

After the configuration is determined, the utility updates the FRU nonvolatile storage area. First it verifies the Common Header area and checksum from the specified FRU file. The Internal Use Area is read out of the specified .FRU file and is programmed into the nonvolatile storage. The Chassis Area is read out of the specified .FRU file. Last it reads the Product Area out of the specified FRU file, then the area is programmed into the FRU nonvolatile storage. All areas are also written to the FRU.TMP file.

Updating DMI Nonvolatile Storage Area

After programming the BMC FRU area, the utility then programs the following Chassis, Board, and Product FRU information to the DMI fields.

Example:

```
Loading DMI System Area
  Manufacturer Name : Intel
  Name : AD450NX Server System
  Version Number : ASDK128M1P2MBPP
  Serial Number : 0123456789
Loading DMI Board Area
  Manufacturing Name : Intel
  Name : AD450NX Server System
  Serial Number : 0123456789
  Version Number : 661880-303
Loading DMI Chassis Area
  Chassis Part Number : 693792-003
  Chassis Serial Number : Z00418630
  Asset Tag :
```

If a failure occurs, the utility displays an error message and exits.

Cleaning Up and Exiting

If an update was successfully performed, the utility displays a single message and then exits.

If the utility fails, it immediately exits with an error message and exit code.

9 Hot-swappable SCSI Hard Disk Drives: Installing/Hot Swapping

Hot-docking Bays

Twelve 3.5-inch hot-docking bays provide space for 3.5-inch wide by either 1- or 1.6-inch high single connector attachment (SCA) SCSI hard disk drives. The WideUltra SCSI hot-docking backplane provides industry-standard 80-pin SCA-2 connectors arranged in two rows; each row is on a separate SCSI channel. You can install up to 12 industry-standard wide/fast-20 SCSI III SCA-type hard disk drives in these bays. They accept drives that consume up to 24 watts of power and run at a maximum ambient temperature of 50°C (112°F). When the bays are fully configured with 9 GB drives, they provide up to 108 GB of data storage.

The lower plastic doors on the front bezel conceal the hot-docking bays. The doors provide airflow and easy access to the drives in the bays. Carriers for 3.5-inch wide by either 1- or 1.6-inch height drives allow easy hot-swapping of drives in and out of these bays without shutting down the server.

By installing a Redundant Array of Independent Disks (RAID) controller board on the I/O baseboard, RAID software, and SCSI hard disk drives in the hot-docking bays, you can easily set up RAID applications.

Tools and Supplies You Need

- Phillips (cross-head) screwdriver (#2 bit)
- Antistatic wrist strap (recommended)
- Pen or pencil

Equipment Log

Use the equipment log form provided in Appendix B, “Equipment Log,” to record the model and serial numbers of the server, all installed options, and any other pertinent information about the server. You will need this information when running the SSU.

SCSI SCA Hard Disk Drives

The server supports a variety of single-ended SCSI SCA-type hard disk drives. As shipped from the supplier, the server may not contain any drives. Contact your sales representative or dealer for a list of approved drives that can be installed in the server.

WARNING

The single-ended SCSI hot-docking backplane requires installing single-ended SCSI controller boards and devices in your server. Installing differential SCSI device types can result in electrical damage to the controller boards and the drives.

Mounting a SCSI SCA Hard Disk Drive in a Carrier

See Figures 9-1 and 9-2.

1. Remove the 3.5-inch hard disk drive from the protective wrapper, and place it on an antistatic surface.
2. Record the model and serial numbers of the drive in your equipment log.
3. Orient the drive carrier so that the handle is toward your left and the metal EMI/ESD fingers are toward your right.
4. Orient the drive so that the board-side faces toward the finger-side of the carrier and the SCA connector faces away from you.
5. Being careful not to damage the metal fingers of the carrier, place it on the drive.
6. Place the drive and carrier assembly on an antistatic surface of a table or a workbench so that the drive handle and fingers overlap the edge of the table or the workbench.
7. Using four screws of the appropriate size and length (not supplied), attach the carrier to the drive.

CAUTION

Some specific hard disk drive designs require electrical isolation of the drive from the chassis or other ground paths. These drives are usually clearly labeled with this requirement on the drive. Full-height, 1.6-inch drives with this requirement must have an electrical isolator such as durable mylar tape placed between the EMI/ESD grounding fingers and the top cover of the drive. Failure to isolate this type of drive from the ground path will result in unpredictable operation of the drive, including severely impacted performance and data corruption.

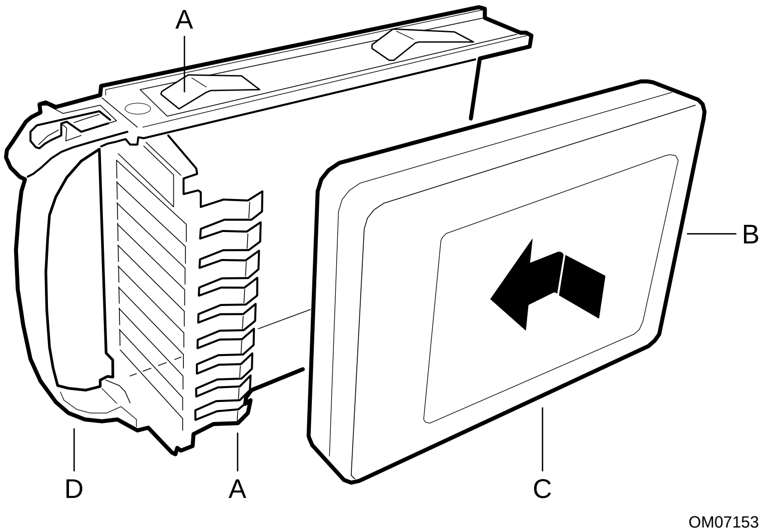


Figure 9-1. Hard Disk Drive and Carrier

A	EMI/ESD grounding clips and fingers
B	SCA connector
C	SCSI hard disk drive
D	Drive carrier handle

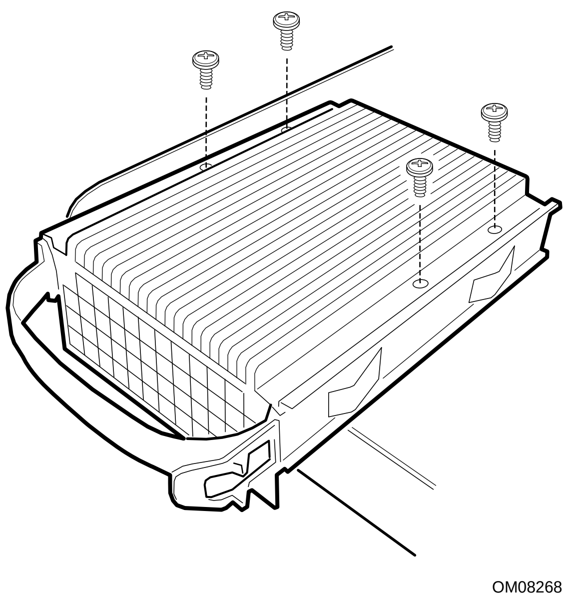


Figure 9-2. Hard Disk Drive and Carrier Assembly

A	Four screws

Installing a SCSI SCA Hard Disk Drive in a Hot-docking Bay

See Figures 9-3 and 9-4.

1. Insert the key in the front bezel lock, and turn it to position C to unlock the doors. Open the lower front doors of the server.
2. Orient the carrier and drive assembly in front of the hot-docking bay guide rails so that metal fingers of the perforated metal bracket attached to the carrier are facing to your right. Make sure that the carrier is placed correctly into the guide rails to avoid damage.
3. While grasping only the drive carrier handle, firmly push the assembly into the bay until the drive docks with the hot-docking backplane connector.

⚠ CAUTION

Do not press on the perforated metal bracket of the carrier when you push the assembly into the bay. Otherwise you may damage the metal fingers of the bracket.

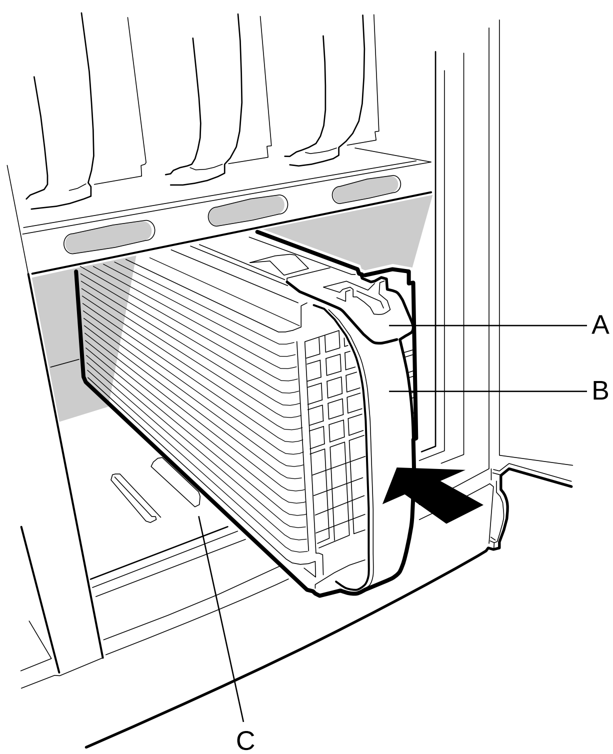


Figure 9-3. Installing a Hard Disk Drive

A Drive carrier latch
B Drive carrier handle
C Hot-docking bay guide rails

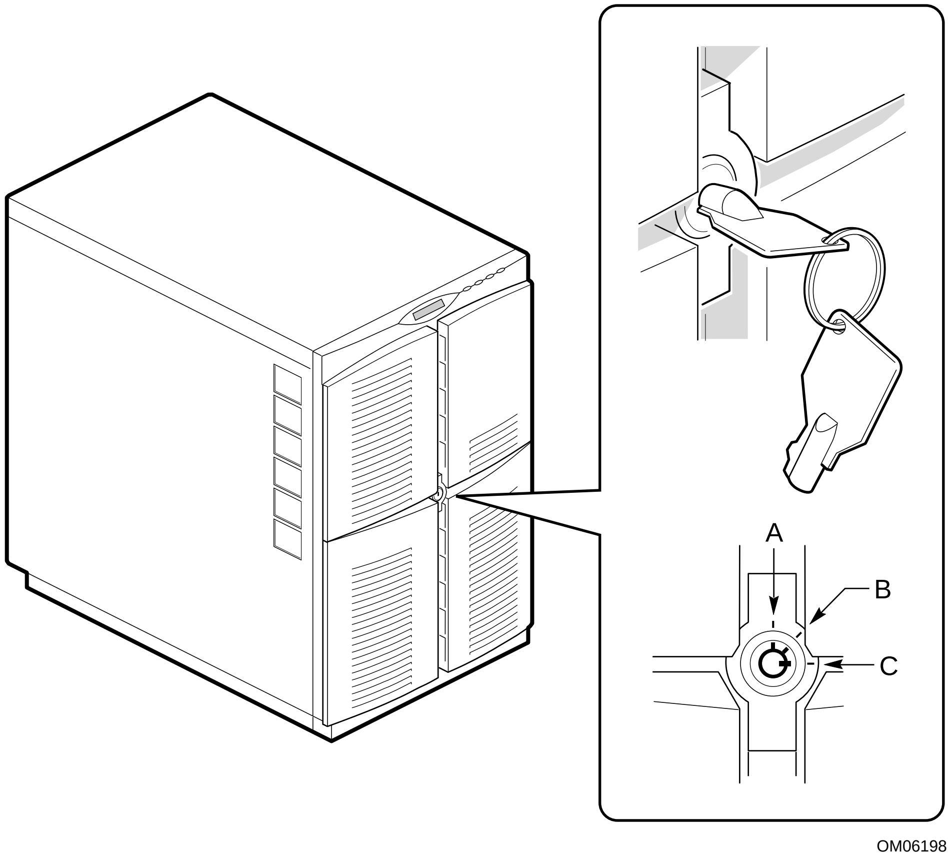


Figure 9-4. Front Bezel Security Key Lock

A Not used
B Locked position
C Unlocked position

4. Close the lower front doors of the server.
5. For security and to prevent unauthorized entry into the bays, lock the doors by turning the key to position B. Remove the key and store it in a safe place.
6. If you installed a RAID controller board in your server, run the Disk Array Controller Configuration utility supplied with the board. See the manufacture's documentation provided with the board.

Hot-swapping a SCSI SCA Hard Disk Drive

Status LEDs arranged in sets of three above each of the 12 hot-docking bays monitor the status of each drive. When a yellow LED is on continuously, it is okay to hot-swap (remove and replace) a bad drive with a good one. You *do not* need to shut the server down to hot-swap a drive.

SCSI Drive Status LED Descriptions

SCSI drive present, power on green LED, A	SCSI drive active green LED, B	SCSI drive faulty* yellow LED, C	Description and action if needed
● On	○ Off	○ Off	Drive is present with power.
● On	● Blinking	○ Off	Drive is present with power and is being accessed.
○ Off	○ Off	● On	Drive CAN be replaced. Steady yellow fault light indicates drive has a problem. Power to drive is off.
● On	○ Off	● Slow blinking	Drive SHOULD NOT be replaced at this time. A slowly blinking yellow fault light indicates that a drive that has just been replaced is in recovery mode (drive array being rebuilt). Power to drive is on.
○ Off	○ Off	○ Off	There is no drive installed in the bay.

* The hot-swap controller is responsible for turning the yellow drive fault LED on or off according to the states specified by commands received via SAF-TE and IMB.

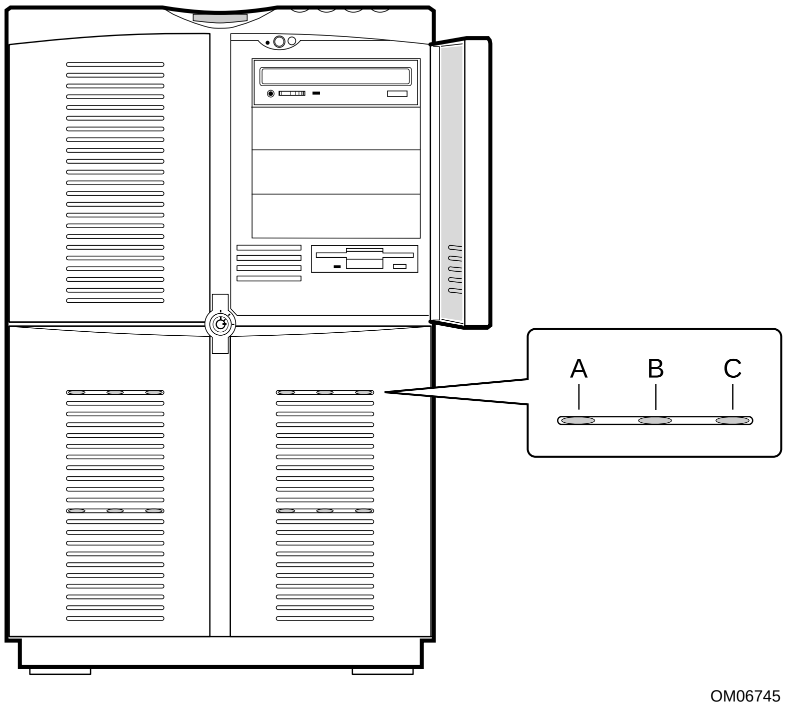
See Figures 9-3, 9-4, and 9-5.

1. Look at the yellow LEDs above the hot-docking bays to determine which drive is bad.
2. Insert the key in the front bezel lock, and turn it to position C to unlock the doors. Open the lower front doors of the server.
3. Push down on the drive carrier latch of the bad drive and carrier assembly, and while grasping the handle, pull the assembly toward you to disengage the drive from the backplane connector.
4. Carefully slide the assembly out of the bay, and place it on an antistatic surface.
5. Orient the new carrier and drive assembly in front of the hot-docking bay guide rails so that metal fingers of the perforated metal bracket attached to the carrier are facing to your right. Make sure you correctly place the carrier into the guide rails to avoid damage.
6. While grasping only the drive carrier handle, firmly push the assembly into the bay until the drive docks with the hot-docking backplane connector.

CAUTION

Do not press on the perforated metal bracket of the carrier when you push the assembly into the bay. Otherwise you may damage the metal fingers of the bracket.

7. Close the lower front doors of the server.
8. For security and to prevent unauthorized entry into the hot-docking bays, lock the doors by turning the key to position B. Remove the key and store it in a safe place.



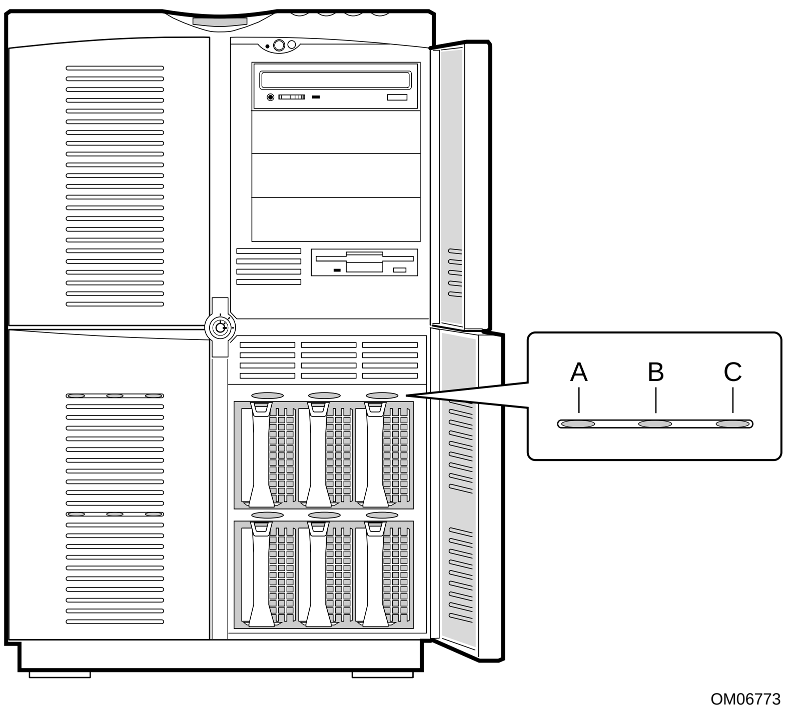


Figure 9-5. Hot-swapping a Hard Disk Drive

A	Green LED, drive power
B	Green LED, drive activity
C	Yellow LED, drive fault

10 Hot-swappable Power Supplies: Hot Swapping

This chapter tells how to hot-swap a server power supply.

When the yellow power supply failure LED on the front panel turns on, you can determine which power supply is defective by checking the status LEDs on the back of each one. The PS LED on the back of the failed power supply will be off. You must hot-swap it (remove and replace it) with a good one. If the server contains four power supplies, you *do not* need to shut the server down to hot-swap a power supply.

PS (power) green LED	Description
● On	When on, indicates power supply is on and working
○ Off	When off, it may indicate • power supply has failed • power supply is not properly plugged in
I (current) green LED	**Description and action if needed**
● On	When on, indicates power supply current is okay
○ Off	When off, it may indicate the power supply has shutdown because of an over current condition

Tools and Supplies You Need

- Phillips (cross-head) screwdriver (#2 bit)
- Antistatic wrist strap (recommended)
- Pen or pencil

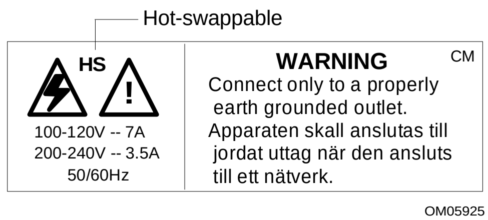
Equipment Log

Use the equipment log form provided in Appendix B, “Equipment Log,” to record the model and serial numbers of the server, all installed options, and any other pertinent information about the server. You will need this information when running the SSU.

Hot Swapping a Power Supply

In a fully configured server, the power system contains four 420 watt autoranging power supplies; the fourth one is redundant. If a single power supply fails in the redundant power system, the yellow power supply failure LED on the front panel turns on. You can easily hot-swap the defective power supply without turning the server power off. However, you must unplug the AC power cord from the defective power supply before you can remove the power supply from the server. There is a spring-loaded, safety interlock mechanism beside the AC inlet receptacle on the power supply; this interlock ensures that the supply cannot be removed or replaced while the power cord is attached.

Power supplies are hot-swappable only in configurations with four power supplies.



WARNING

Because of chassis airflow disruption, the power supply bay should not be vacant for more than five minutes when server power is on. Exceeding the five-minute limit may cause damage to certain peripheral components.

Before replacing a power supply in a three-power supply configuration, you must turn off power to the server and unplug the AC power cord from the power supply that is being replaced.

Removing a Power Supply

CAUTION

If the chassis contains only three power supplies, turn off all peripheral devices connected to the server. Then turn off the server power with the push-button on/off switch on the front panel. You do not need to unplug the AC power cords from the good power supplies.

See Figures 10-1 and 10-2.

1. Look at the green LEDs on the back of the power supplies to determine which one is defective.
2. Unplug the AC power cord from the power inlet receptacle on the defective power supply to release the spring-loaded safety interlock mechanism.
3. Remove and save the screws that attach the supply to the chassis.
4. Grasp the power supply handle, and pull the power supply toward you to unplug it from the power distribution backplane.
5. Remove the defective power supply, and set it aside.

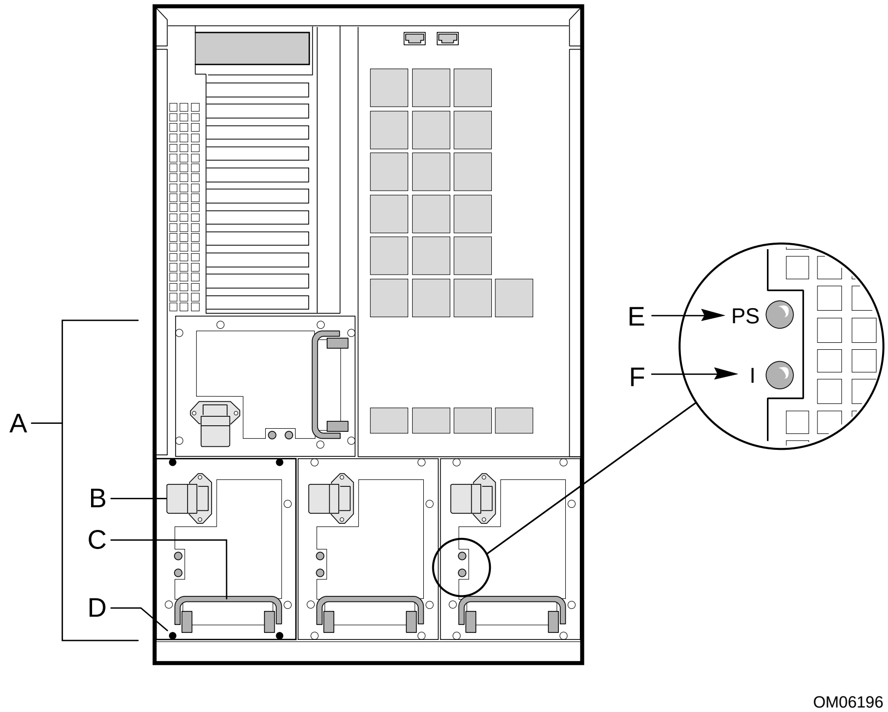


Figure 10-1. Removing a Power Supply

A Redundant power system (fourth power supply is redundant)
B AC power inlet receptacle and safety interlock mechanism
C Power supply handle
D Four screws
E PS LED (green) power
F I LED (green) current

Replacing a Power Supply

See Figure 10-2.

1. Remove the new power supply from the protective packaging, and place it on an antistatic surface.
2. Record the model and serial numbers of the power supply in your equipment log.
3. Align the guide rails on the replacement power supply with the guide rails in the power supply cavity.
4. Firmly push the power supply into the cavity to plug it into the power distribution backplane connectors.
5. Replace the four screws, and tighten them firmly (6.0 inch-pounds).
6. Push and hold the spring-loaded safety interlock mechanism toward the outer edge of the power supply. Plug the AC power cord into the exposed power inlet receptacle, and release the safety interlock.

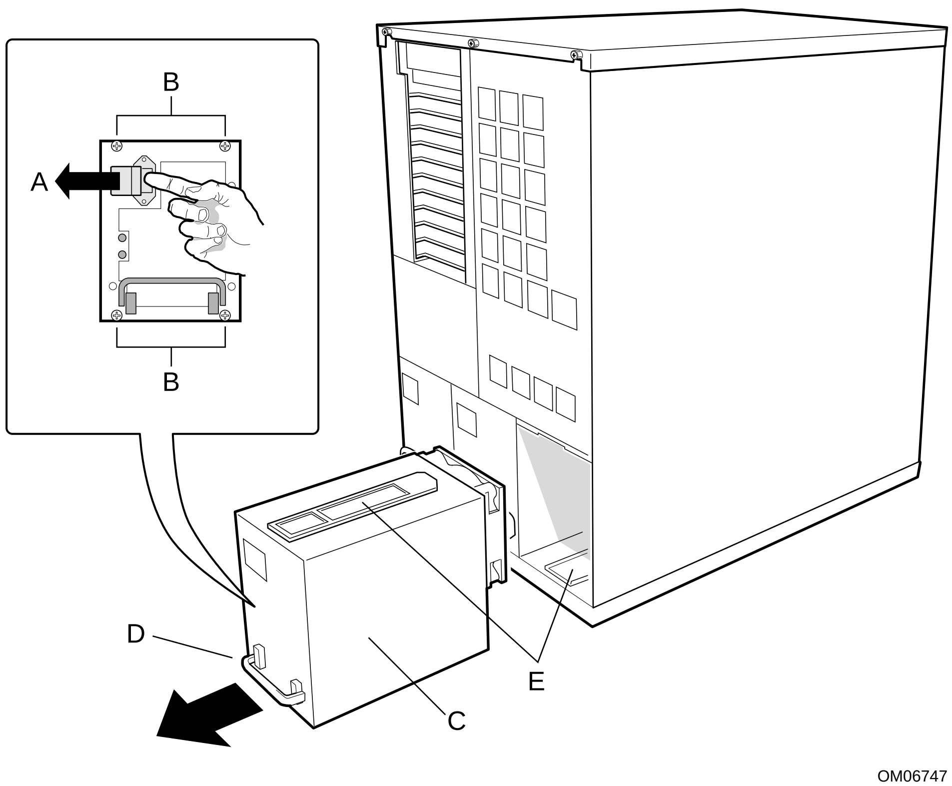


Figure 10-2. Removing/Replacing a Power Supply

A AC power inlet receptacle and safety interlock mechanism
B Screws (four)
C Power supply
D Power supply handle
E Guide rails

Part II: Service Technician's Guide

Safety Guidelines

BEFORE YOU REMOVE THE TOP AND SIDE COVERS OF THE SERVER, OBSERVE THESE GUIDELINES:

1. Turn off all peripheral devices connected to the server.
2. Turn off DC power in the server by pressing the push-button on/off power switch on the front panel of the server.
3. Disconnect AC power to the server by unplugging the alternating current (AC) power cord from each power supply or wall outlet.
4. Label and disconnect all peripheral cables attached to the I/O panel on the back of the server.
5. Provide some electrostatic discharge (ESD) protection by wearing an antistatic wrist strap attached to chassis ground of the server—any unpainted metal surface—when handling components.

Warnings and Cautions

These warnings and cautions apply whenever you remove the top and side covers of the server to access components inside it. Integration of the server should be done only by technically qualified personnel.

WARNING

Server power on/off: The *push-button on/off power switch* on the front panel of the server does not turn off the AC power. To remove AC power from the server, you must unplug each AC power cord from each power supply or wall outlet.

Hazardous conditions, power supply and power distribution backplane: Hazardous voltage, current, and energy levels are present inside the power supply and the power distribution backplane. There are no user-serviceable parts inside them; servicing should be done only by technically qualified personnel.

Hazardous conditions, devices and cables: Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the server and disconnect telecommunications systems, networks, modems, and each power cord attached to the server before opening it. Otherwise, personal injury or equipment damage can result.

CAUTION

Electrostatic discharge (ESD) and ESD protection: ESD can damage disk drives, add-in boards, and other components. This server can withstand normal levels of environmental ESD while you are hot-swapping SCSI hard disk drives and power supplies. However, we recommend doing all procedures in this manual only at an ESD workstation. If one is not available, you can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground of the server—any unpainted metal surface—when handling components.

Handling boards and modules: Boards and modules can be extremely sensitive to ESD and always require careful handling. After removing a board or module from a protective wrapper or from the server, place the board or module component-side up on a nonconductive, static-free surface. If you place the I/O baseboard on a conductive surface, the back-up battery leads may short out. If they do, this will result in a loss of CMOS data and will drain the battery. Do not slide a board or module over any surface.

Cooling and airflow: Operating the server with the top and side covers removed can damage the components inside it. For proper cooling and airflow, always replace the covers and air baffles before turning on the server.

Back-up battery: Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard the used battery according to the manufacturer's instructions.

11 Server Covers: Removing/Reinstalling

This chapter tells how to remove and reinstall the server covers.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see "Safety Guidelines" on page 125.

Tools and Supplies You Need

- Phillips (cross-head) screwdriver (#1 bit and #2 bit)
- Small flat-bladed screwdriver
- Antistatic wrist strap (recommended)
- Pen or pencil

Equipment Log

Use the equipment log form provided in Appendix B, "Equipment Log," to record the model and serial numbers of the server, all installed options, and any other pertinent information about the server. You will need this information when running the SSU.

Covers

The server comes with several removable covers:

- The top cover provides access to the front panel board and the 3.5-inch IDE or SCSI hard disk boot drive bay. You must remove the top cover before you can remove the side covers.
- The left side cover provides access to the CPU baseboard, power distribution backplane, and two three-fan-arrays.
- The right side cover provides access to the I/O baseboard, power distribution backplane, 3.5-inch boot drive bay, 5.25-inch drive bays, 3.5-inch diskette drive bay, SCSI hot-docking backplane, and an array of three fans.
- The doors on the plastic front bezel provide access to the front panel controls, 3.5-inch diskette drive bay, 5.25-inch drive bays, and the 3.5-inch SCSI hot-docking drive bays. You must remove the top and side covers before you can remove the front bezel.
- The plastic snap-on bay cover provides access to the 5.25-inch drive bays without removing the other covers.

CAUTION

For proper cooling and airflow, do not operate the server with the covers removed. Always reinstall them before turning on the server.

Removing the Top Cover

See Figure 11-1.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Turn off all peripheral devices connected to the server.
3. Turn the server off with the push-button on/off power switch on the front panel.
4. Unplug the AC power cords from the power inlet receptacles on the power supplies, or from the power source outlets.
5. Label and disconnect all peripheral cables attached to the I/O panel on the back of the server.
6. If you installed a padlock through the metal loop on the back of the server, unlock the padlock and remove it.
7. Remove and save the screws that attach the top cover to the chassis.
8. While facing the back of the server, grasp the built-in handles on the back of the top cover.

NOTE

Because of the EMI gaskets attached to the underside of the top cover, it is difficult to remove and replace.

9. Pull hard on the back edge of the cover to disengage the tabs along the front of the cover from the slots in the chassis.
10. Slide the cover backward about an inch, and lift it straight up. Set the cover aside.

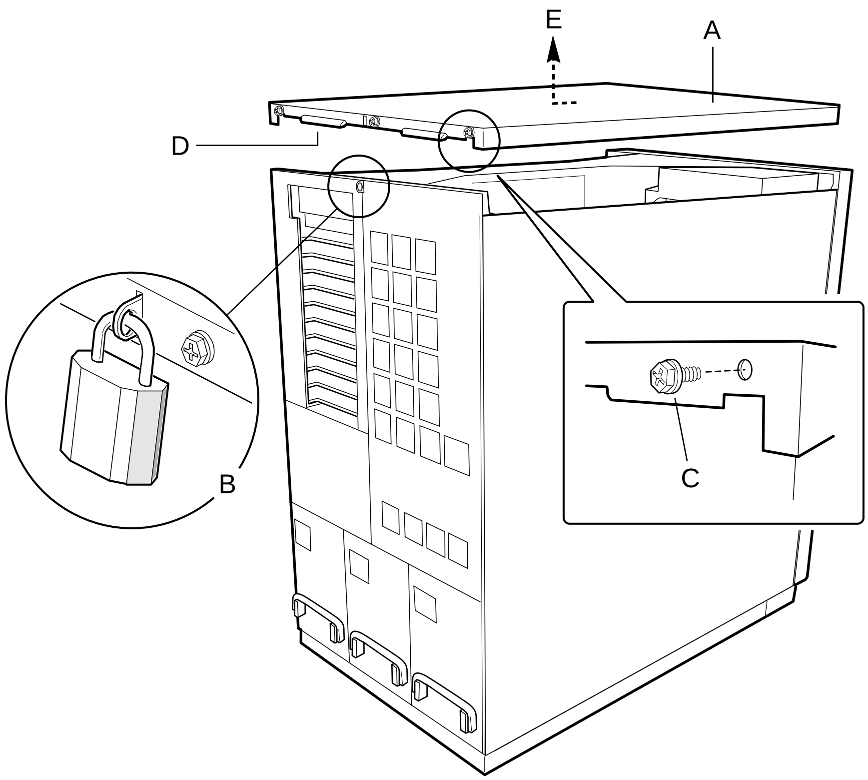


Figure 11-1. Top Cover

A	Top cover
B	Padlock
C	Three screws
D	Built-in handles
E	Remove top cover

Removing a Side Cover

See Figure 11-2.

1. Grasp the top edge of the side cover, and lift it straight up—about an inch—to disengage the tab in the middle of cover and the tabs along the bottom of the cover from the flanges of the chassis.

NOTE

Because of the strip magnets attached to the edges of the chassis, the side covers are difficult to remove.

2. Pull the top edge of the cover toward you to break the magnetic field of the strip magnets. Set the cover aside.

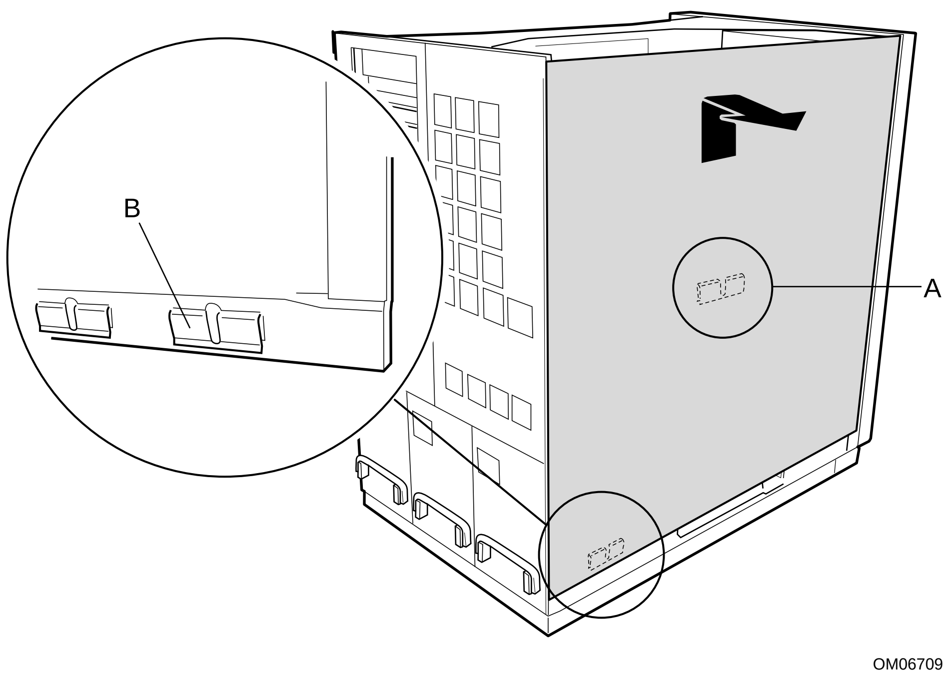


Figure 11-2. Side Covers

A Middle tab
B Bottom tabs

Reinstalling a Side Cover

The side covers are not identical; make sure you reinstall the covers on the appropriate sides of the server. See Figure 11-2.

CAUTION

When you reinstall a side cover, be careful not to dislodge the strip magnets attached to the edges and flanges of the chassis.

1. Before reinstalling the side covers, make sure you did not leave any tools or loose parts inside the chassis.
2. Ensure that add-in boards are firmly seated in their respective slots, the retaining bracket for the add-in boards is reinstalled, interior cables are properly connected, and the jig-saw foam air baffle is in place.
3. Grasp the top edge of the side cover, and position it about an inch above the bottom flange of the chassis.
4. Place the cover in contact with the strip magnets, and align the back edge of the cover with the back of the chassis.
5. Place one hand on the top edge of the cover and the other in the middle of it.
6. While gently pressing in on the middle of the cover, press down firmly on the top edge of it to seat the tabs onto the flanges of the chassis.

Reinstalling the Top Cover

See Figure 11-1.

1. Before reinstalling the top cover, make sure the side covers are properly seated.
2. While facing the back of the server, position the top cover over the chassis so that the tabs along the front edge of the cover align with the slots in the top edge of the chassis.
3. Gently lower the cover straight down on top of the server. Then place your hands on the outer surface of the cover, opposite each other, and push down to seat it.

NOTE

Because of the EMI gaskets attached to the underside of the top cover, it is difficult to remove and replace.

4. While pressing down firmly on the front edge of the cover, push hard on the back edge to firmly engage the tabs in the slots in the chassis.
5. Attach the cover to the chassis with the three screws, and tighten them firmly (6.0 inch-pounds).
6. Connect all external cables and power cords to the server.

NOTE

To plug in a power cord, push and hold the spring-loaded safety interlock mechanism toward the edge of the power supply. Then plug the power cord into the exposed inlet receptacle, and release the safety interlock.

7. For security, and to prevent unauthorized entry into the server, lock the padlock on the back of the server chassis.

Removing the Plastic Front Bezel

The plastic front bezel is attached to the chassis with four press-in rivets and six plastic latches. See Figure 11-3.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described earlier in this chapter.
3. Using a flat-bladed screwdriver, extract the press-in rivets, and set them aside.
4. Unsnap the plastic latches, and push them through the slots in the chassis.
5. Pull up on the top of the bezel to disengage the four plastic tabs along the top of it from the notches in the top flange of the chassis.
6. Remove the the bezel from the chassis, and place it on a smooth surface so that it does not get scratched.

Reinstalling the Plastic Front Bezel

See Figure 11-3.

1. Position the front bezel in front of the chassis, and insert the plastic tabs along the top of the bezel in the notches in the top flange of the chassis.
2. Insert the plastic latches on the bezel into the holes in the front of the chassis. Gently press the bezel onto the chassis until the latches snap in place. To prevent damage, do not press hard near the light-pipe areas.
3. Insert the press-in rivets through the bezel and into the holes in the chassis. Press down firmly on the rivets to properly seat them.
4. Reinstall the top and side covers as described earlier in this chapter.

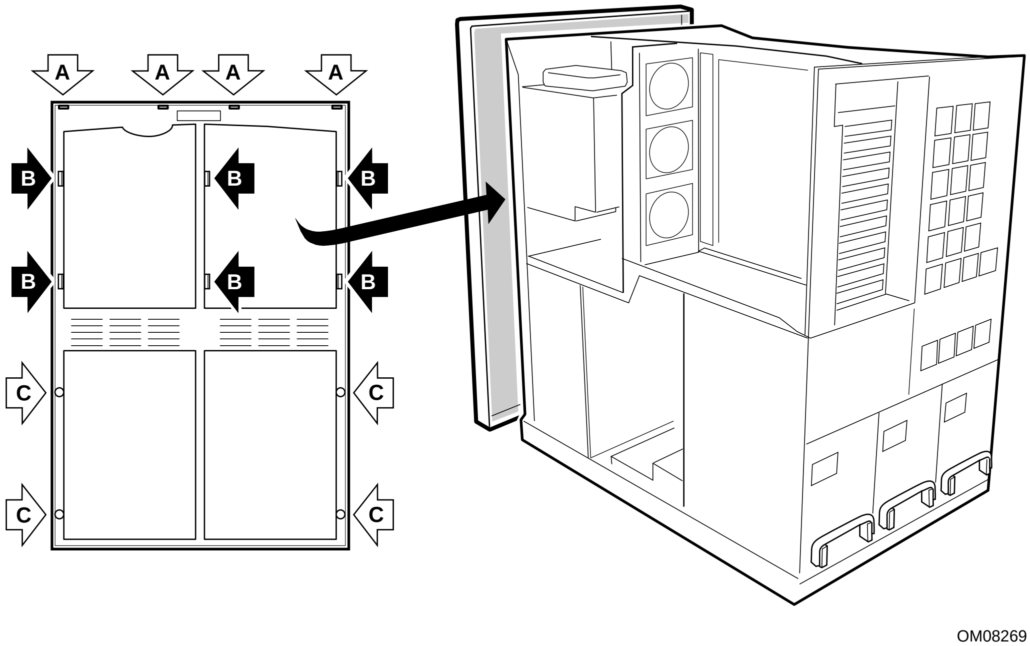


Figure 11-3. Plastic Front Bezel

A	Tabs
B	Latches
C	Press-in rivets

Removing the Snap-on Drive Bay Cover

See Figure 11-4.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Using a small flat bladed screwdriver, carefully insert it between the latch in the top of the snap-on cover and the edge of the front bezel.
3. Press down on the latch to unsnap it from the front bezel.
4. Carefully insert the screwdriver in the small opening beside the latch.
5. While pressing down on the latch, use the screwdriver to gently tilt the top of the cover toward you. Then tilt the cover slightly to the right so that it clears the door latch on the left.
6. Remove the cover from the server, and place it on a smooth surface.

Reinstalling the Snap-on Drive Bay Cover

See Figure 11-4.

1. Insert the rigid tabs along the bottom edge of the snap-on cover into the notches in the front bezel.
2. Tilt the cover slightly to the right so that it clears the door latch on the left.
3. Place your thumb below the latch, and gently push in on the cover until it snaps on the bezel.
4. Push up on the bottom of the latch until it snaps in place.

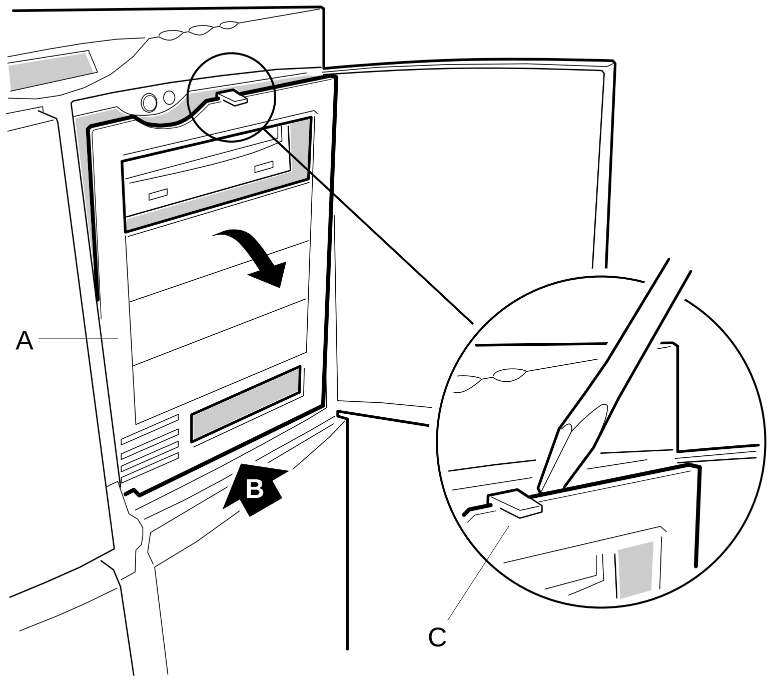


Figure 11-4. Snap-on Plastic Drive Bay Cover

A   Snap-on cover
B   Rigid tabs
C   Latch

12 Server Components: Removing/Reinstalling

This chapter tells how to remove and reinstall major server components. Because the CPU and I/O baseboards are mounted back to back, the procedures start with the covers and end up with the baseboards.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see "Safety Guidelines" on page 125.

Tools and Supplies You Need

- Phillips (cross-head) screwdriver (#1 bit and #2 bit)
- Small flat-bladed screwdriver
- Antistatic wrist strap (recommended)
- Pen or pencil

Equipment Log

Use the equipment log form provided in Appendix B, "Equipment Log," to record the model and serial numbers of the server, all installed options, and any other pertinent information about the server. You will need this information when running the SSU.

Jig-saw Foam Air Baffle

The air baffle concentrates air flow over the components and modules on the CPU baseboard.

Removing the Jig-saw Foam Air Baffle

See Figure 12-1.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Grasp the front and back sections of the baffle. Remove the baffle from the chassis, and set it aside.

Reinstalling the Jig-saw Foam Air Baffle

See Figure 12-1.

1. Connect the front and back sections of the baffle together if they fell apart on removal.
2. Grasp the front and back sections of the baffle to keep it from coming apart.
3. Position the baffle over the CPU baseboard.
4. Insert the baffle into the chassis, back in first, and gently push it into place.
5. Reinstall the top and side covers as described in Chapter 11.

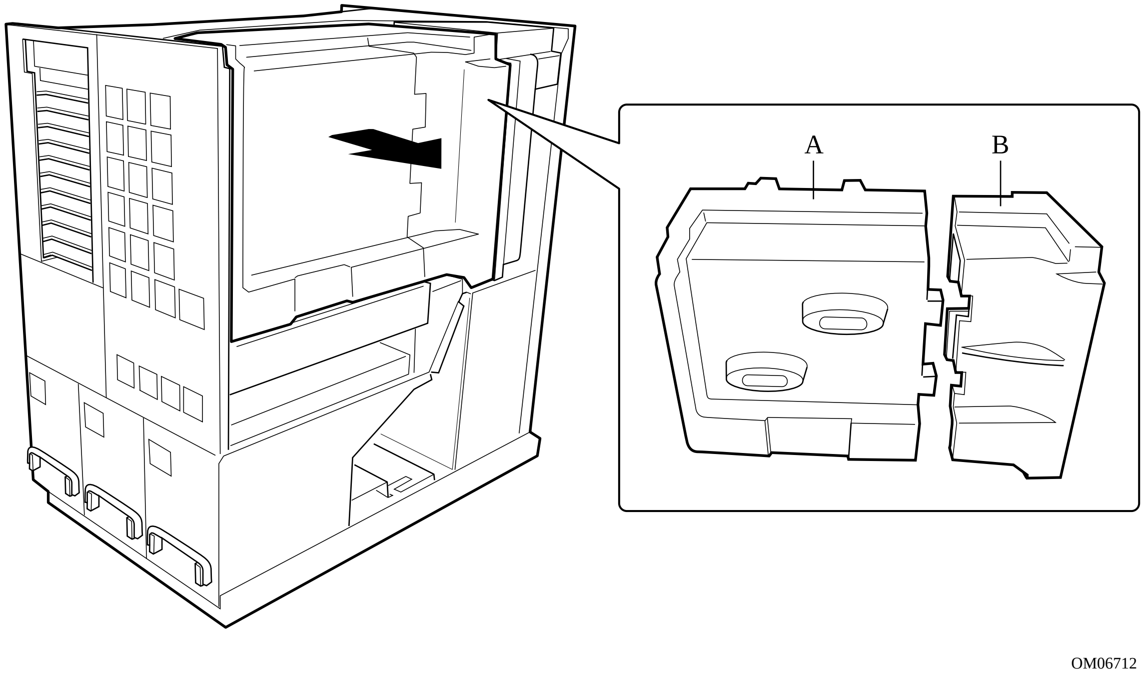


Figure 12-1. Jig-saw Foam Air Baffle

A Back section of the air baffle
B Front section of the air baffle

Two, Three-fan Array Assemblies

The two, three-fan array assemblies provide cooling for the CPU baseboard side of the server. The assemblies consists of two rubber housings mounted side by side in a foam housing. Each rubber housing contains three fans with their power cables connected to a common power connector.

Removing the Two, Three-fan Array Assemblies

See Figures 12-2 and 12-3.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the air baffle as described earlier.
4. Label and unplug the two fan cables from the SCSI backplane.
5. Pull the front of the two, three-fan array and foam housing assembly out slightly to your left and toward you to remove it from the chassis.

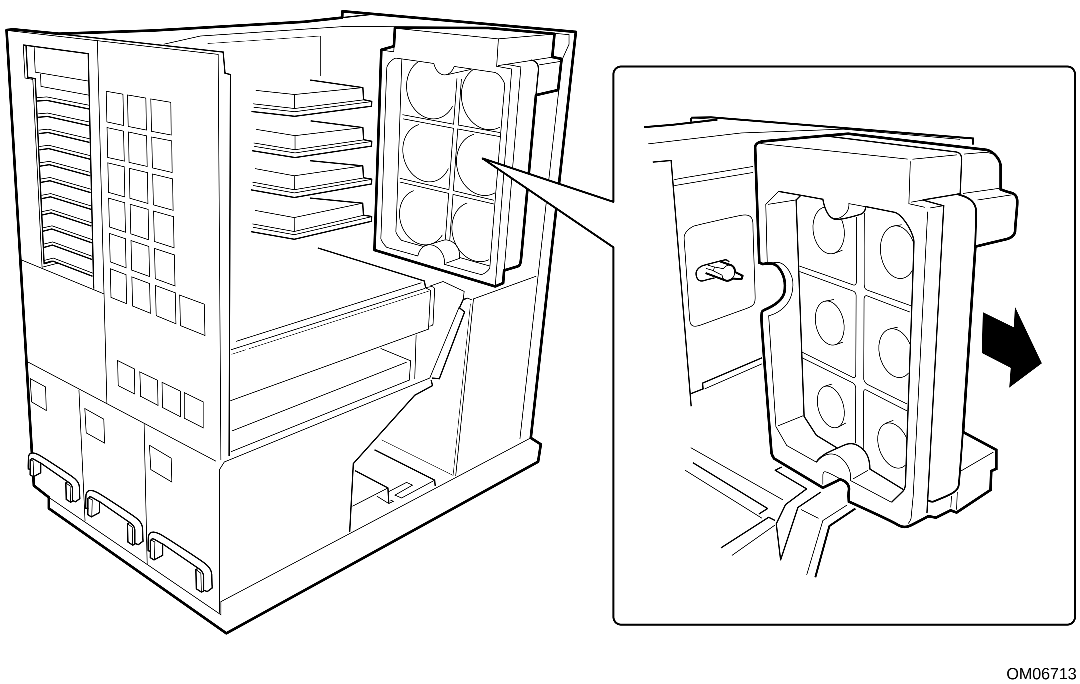


Figure 12-2. Two, Three-fan Array Assemblies

6. Remove the defective three-fan array assembly from the foam housing base. Set the base aside, and discard the three-fan array assembly.

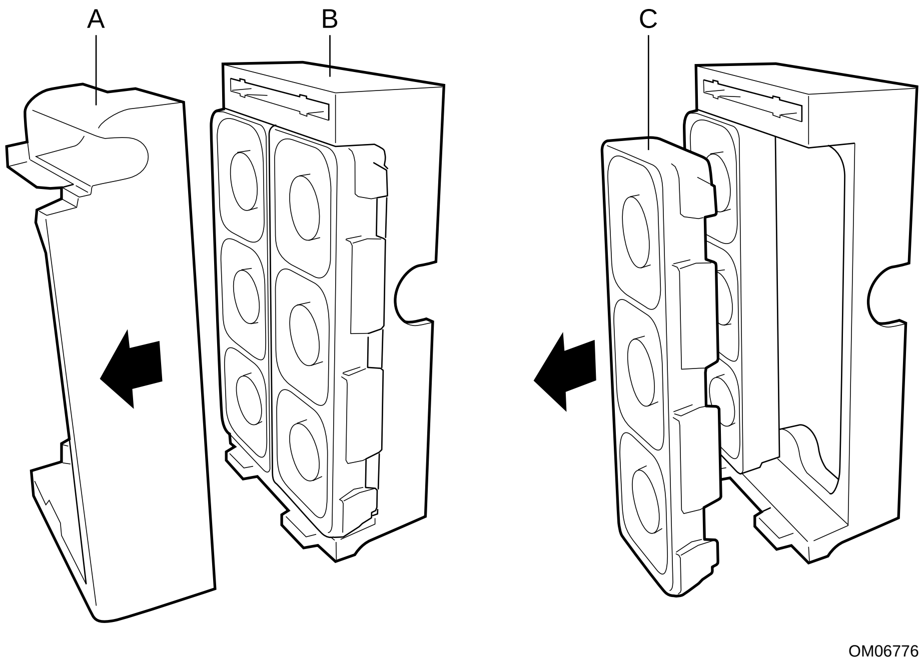


Figure 12-3. Two, Three-fan Array Assemblies

A	Foam housing cover
B	Foam housing base for fan arrays
C	Three-fan array in rubber housing

Reinstalling the Two, Three-fan Array Assemblies

See Figures 12-2 and 12-3.

1. Place the foam housing base flat-side down on a flat surface.
2. With the power cable side of the new three-fan array assembly facing down, place the assembly inside the base next to the other array of fans.

⚠ CAUTION

For proper cooling and airflow, make sure that the fan labels face toward the CPU baseboard so that the fans blow air into the chassis.

3. Orient the two, three-fan array and foam housing assembly so that the back is slightly to your right and goes in first as you slide it into the chassis. Carefully slide the assembly toward the front of the chassis to properly seat the foam housing flush against the front bulkhead.
4. Plug the two fan cables into the appropriate connectors on the SCSI backplane.
5. Reinstall the air baffle as described earlier.
6. Reinstall the top and side covers as described in Chapter 11.

Support Panel for Terminator and Memory Modules

A small metal panel supports the terminator and memory modules installed on the CPU baseboard. You must remove the panel to gain access to the modules.

Removing the Support Panel

See Figure 12-4.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the screws from the support panel, and set them aside.
4. Pull the end of the panel toward you, about 45°, and slide the tabs on the other end of the panel out of the slots in the chassis bulkhead. Set the panel aside.

Reinstalling the Support Panel

See Figure 12-4.

1. Orient the support panel so that the tabs face to your right. Slide the tabs into the slots in the chassis bulkhead.
2. Carefully position the panel so that the slots in the rubber gasket on the inside of the panel fit over the edges of the memory or terminator modules.

NOTE

If the memory or terminator modules are slightly warped, gently squeeze them together while positioning the support panel.

3. Gently push the panel onto the modules until the panel is properly seated.
4. Reinstall the screws, and tighten them to 8.0 inch-pounds.
5. Reinstall the top and side covers as described in Chapter 11.

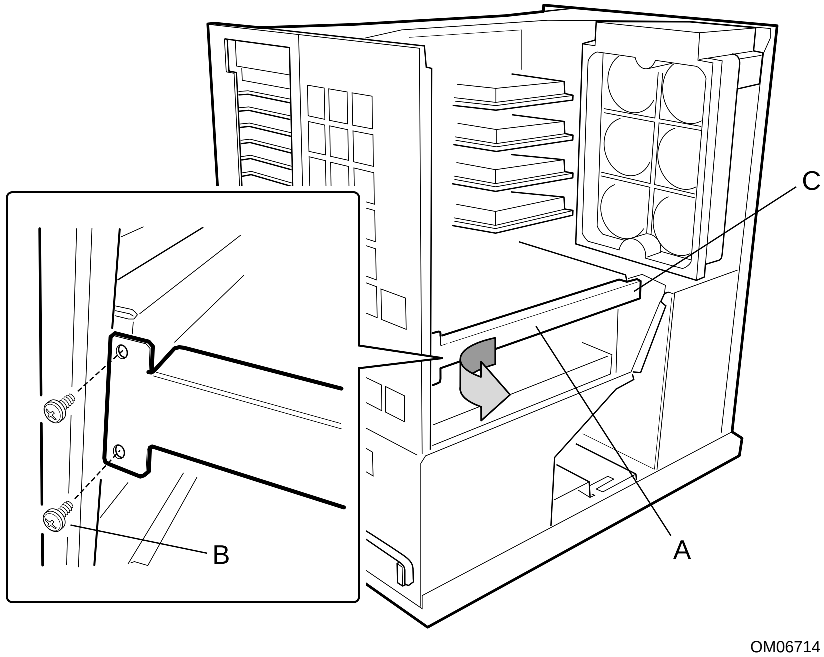


Figure 12-4. Support Panel for Memory Modules

A	Support panel
B	Screws
C	Tabs

Terminator and Memory Modules

CAUTION

To avoid damaging the memory module DIMM sockets, do not attempt to use the metal stiffener on the memory module as a handle.

Removing a Memory Module

See Figure 12-5.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the air baffle as described earlier.
4. Remove the support panel for the memory modules as described earlier.
5. Simultaneously rotate the eject/insert levers of the memory module outward about 90° to disengage the pin-and-socket connector of the module from the pin-and-socket connector of the CPU baseboard.
6. Being careful not to touch the components on the memory module, slide it out of the slot guides. Place the module DIMM-side up on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.

Reinstalling a Memory Module

See Figure 12-5.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. If the memory module support panel is in place, remove it as described earlier.
3. Being careful not to touch the components on the memory module, remove it from its protective wrapper. Place the module DIMM-side up on a nonconductive, static-free surface.
4. Record the serial number of the memory module in your equipment log.

NOTE

When you install a memory module in the upper slot, connector next to the VRM and slot-2 processor connectors, install the module DIMM-side up. When you install a memory module in the lower slot, connector next to the bottom edge of the CPU baseboard, install the module DIMM-side down.

5. Grasp the memory module by the eject/insert levers, and carefully slide it into the slot guides until the levers engage with the flanges in front of the guides.
6. Simultaneously rotate the levers inward until they are flush with the edge of the module to seat the pin-and-socket connector of the module into the pin-and-socket connector of the CPU baseboard.
7. Reinstall the support panel for the memory modules as described earlier.
8. Reinstall the air baffle as described earlier.
9. Reinstall the top and side covers as described in Chapter 11.

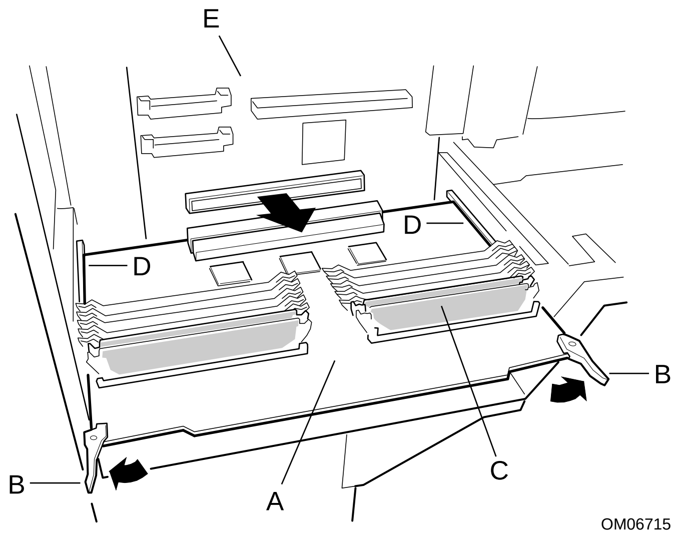


Figure 12-5. Memory Module

A	Memory module DIMM-side up	D	Slot guides
B	Eject/insert levers	E	CPU baseboard
C	DIMMs		

Removing/Installing a Memory Terminator Module

If only one memory module is installed on the CPU baseboard, a memory terminator module must be installed in the other memory connector to properly terminate the bus. To install a terminator module, follow the above procedures for removing/reinstalling a memory module.

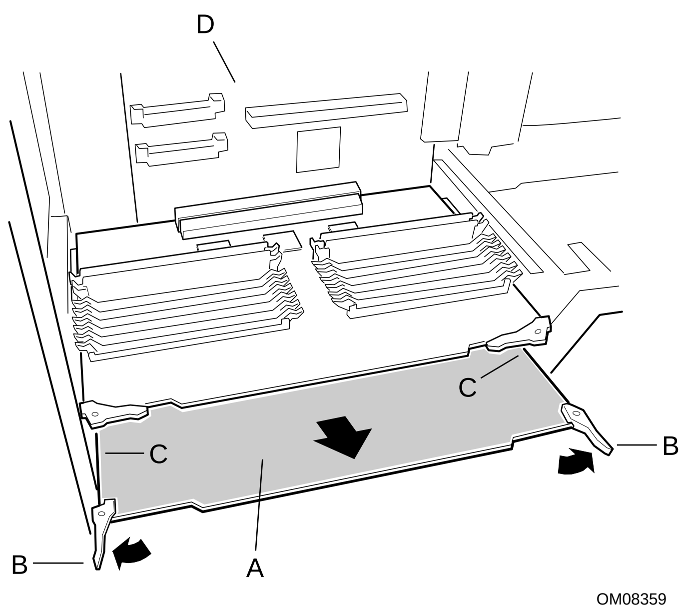


Figure 12-6. Terminator Module

A	Terminator module component-side down	C	Slot guides
B	Eject/insert levers	D	CPU baseboard

Front Side Bus Terminator Module

The CPU baseboard provides four slot 2 connectors for processors packaged in S.E.C. cartridges. If any slot 2 connector is depopulated, a terminator module must be installed in the connector to properly terminate the signals on the front side bus (FSB). For example, if only two slots are populated with processors, you need FSB terminator modules in the two unpopulated processor slots. The terminator modules are housed in plastic covers.

Removing a Terminator Module

See Figure 12-7.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the air baffle as described earlier.
4. Place your finger under the pull tab of the latch bar and your thumb on top of the bar. Then press down on the bar with your thumb while gently pulling back on the tab with your finger to release tension on the latch bar hook.
5. Pull the tab end of latch bar toward you to unhook it, and open the bar to about 90°.
6. Slide the bar to your left to unhook it from the slot guide. Set the bar aside.
7. Simultaneously rotate the eject/insert levers of the terminator module outward about 50° to eject the module out of the slot 2 connector on the CPU baseboard.
8. Slide the module out of the slot guides, and place the it component-side down on a nonconductive, static-free surface.

Reinstalling a Terminator Module

See Figure 12-7.

1. Grasp the terminator module by the eject/insert levers, and carefully slide it into the slot guides until the levers engage with the flanges in the front sides of the guides.
2. Simultaneously rotate the levers inward until they are flush with the edge of the module to seat the module into the slot 2 connector on the CPU baseboard.
3. Insert the hook end of the latch bar in the slot of the right slot guide.
4. Close the latch bar by rotating it inward onto the left slot guide.
5. Then press in on the middle of the bar until the latch hook catches under the front flange in the left slot guide.
6. Reinstall the air baffle as described earlier.
7. Reinstall the top and side covers as described in Chapter 11.

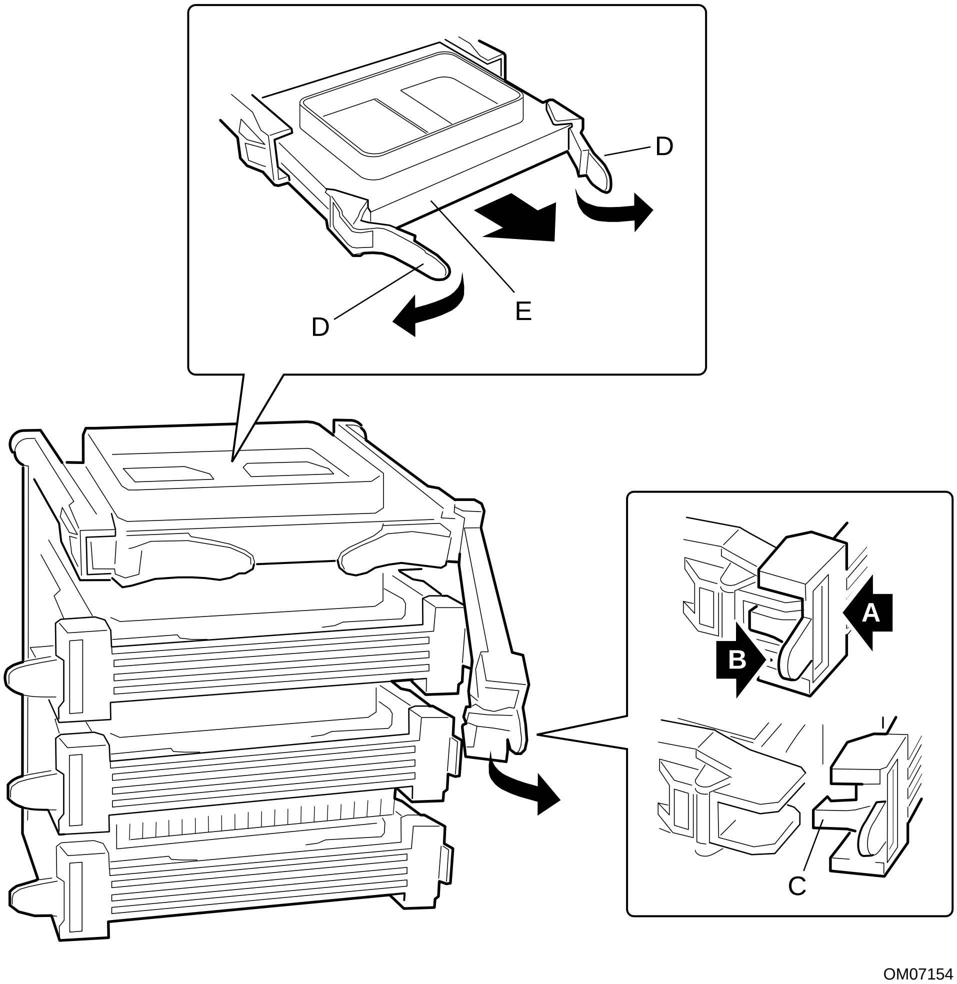


Figure 12-7. Front Side Bus Terminator Module

A Latch bar
B Pull tab
C Latch bar hook
D Eject/insert levers
E Terminator module assembly

Processor

The CPU baseboard supports up to four processors packaged in S.E.C. cartridges.

⚠ **CAUTION**

The processors can be extremely sensitive to ESD and always require careful handling. After removing a processor from a protective wrapper or from the CPU baseboard, place it on a nonconductive, static-free surface. Do not slide the processor over any surface.

Removing a Processor

See Figure 12-8.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the air baffle as described earlier.
4. Place your finger under the pull tab of the latch bar and your thumb on top of the bar. Then press down on the bar with your thumb while gently pulling back on the tab with your finger to release tension on the latch bar hook.
5. Pull the tab end of latch bar toward you to unhook it, and open the bar to about 90°.
6. Slide the bar to your left to unhook it from the slot guide. Set the bar aside.
7. Simultaneously rotate the eject/insert levers of the processor cartridge outward about 50° to eject the cartridge out of the slot 2 connector on the CPU baseboard.
8. Slide the cartridge out of the slot guides, and place it heat sink-side up on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.

⚠ **CAUTION**

If a slot 2 connector is depopulated, a terminator module must be installed in the connector to properly terminate the signals on the FSB.

Installing a Processor

See Figure 12-8.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the air baffle as described earlier.
4. Remove the processor cartridge or terminator module as described earlier.
5. Being careful not to touch the gold edge connector on the processor cartridge, remove it from the protective wrapper. Place the cartridge heat sink-side up on a nonconductive, static-free surface.
6. Record the serial number of the cartridge in your equipment log.

7. Grasp the cartridge by the eject/insert levers, and carefully slide it into the slot guides until the levers engage with the flanges in the front sides of the guides.
8. Simultaneously rotate the levers inward until they are flush with the edge of the cartridge to seat the cartridge into the slot 2 connector on the CPU baseboard.
9. Insert the hook end of the latch bar in the front flange of the right slot guide.
10. Close the latch bar by rotating it inward onto the left slot guide.
11. Then press in on the middle of the bar until the latch hook catches under the front flange in the left slot guide.
12. Reinstall the air baffle as described earlier.
13. Reinstall the top and side covers as described in Chapter 11.

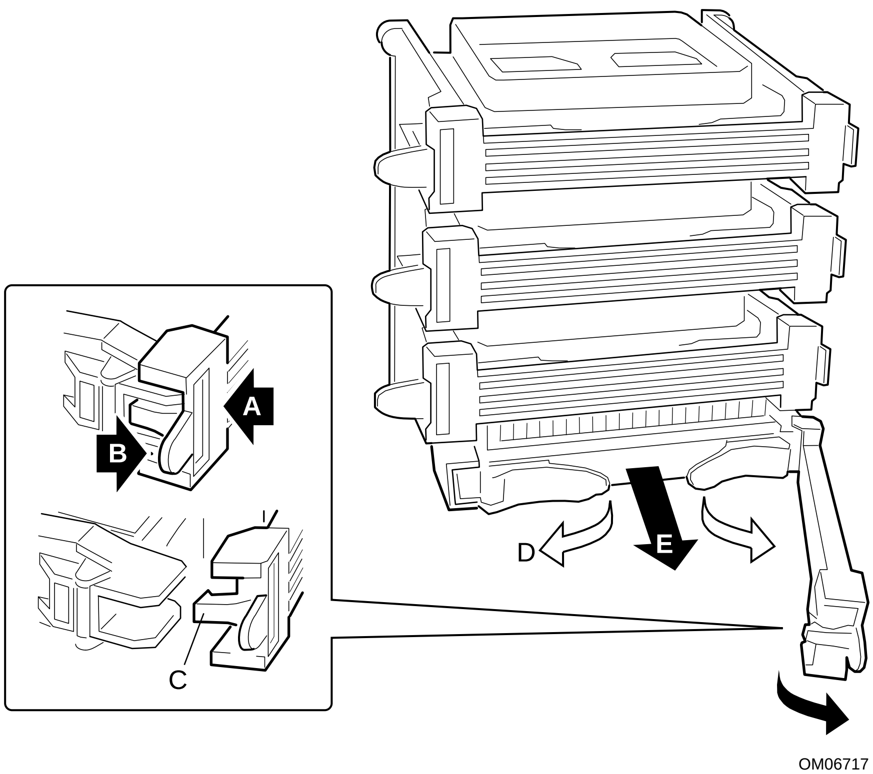


Figure 12-8. Removing a Processor

A	Latch bar
B	Pull tab
C	Latch bar hook
D	Eject/insert levers
E	Processor S.E.C. cartridge

DC to DC Converter VRM

VRM in connector	Provides power for	Description
J1	Processor #1	Processor core power only
J2	Processor #1 and #2	L2 Cache power only
J3	Processor #2	Processor core power only
J4	Processor #3	Processor core power only
J5	Processor #3 and #4	L2 Cache power only
J6	Processor #4	Processor core power only

Removing a DC to DC Converter VRM

See Figure 12-9.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the air baffle as described earlier.
4. Using a small flat-bladed screwdriver, push the plastic ejector levers on each end of the connector away from the VRM to eject it out of the connector.
5. Place the VRM on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.

Installing a DC to DC Converter VRM

NOTE

The top VRM connector is rotated 180° from the other five connectors.

See Figure 12-9.

1. Remove the DC to DC converter VRM from the antistatic package.
2. Carefully insert the VRM in the connector on the CPU baseboard. Make sure you do not bend the connector pins.
3. Push down firmly on each end of the VRM until the ejector levers of the connector snap into place, locking the VRM in the connector.
4. Reinstall the air baffle as described earlier.
5. Reinstall the top and side covers as described in Chapter 11.

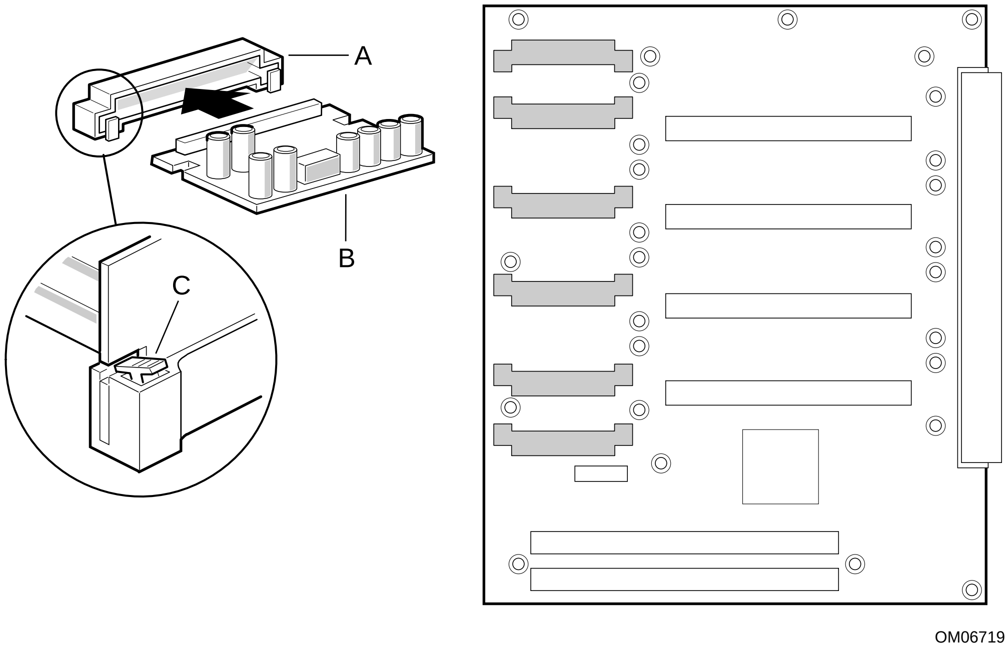


Figure 12-9. DC to DC Converter VRM

A VRM socket
B DC to DC Converter VRM
C Ejector lever

Interconnect Backplane Assembly

The interconnect backplane is attached to an insert/eject mechanical unit in the chassis. The unit inserts and removes the backplane on and off the I/O and CPU baseboard connectors.

Removing the Interconnect Backplane Assembly

See Figure 12-10.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the air baffle as described earlier.
4. Remove the two, three-fan arrays assembly as described earlier.
5. Unlock the insert/eject mechanical unit by pulling back on the lock/unlock lever, and, while holding the lever in place, turn the crank *counterclockwise* to disengage the interconnect backplane connectors from the connectors on the I/O and CPU baseboards.
6. Disconnect the signal cable and the three power cables of the interconnect backplane from the power distribution backplane.
7. Loosen the two captive screws that attach the mechanical unit to the center bulkhead of the chassis. Remove the interconnect backplane and mechanical unit assembly from the chassis, and place it on a flat surface.

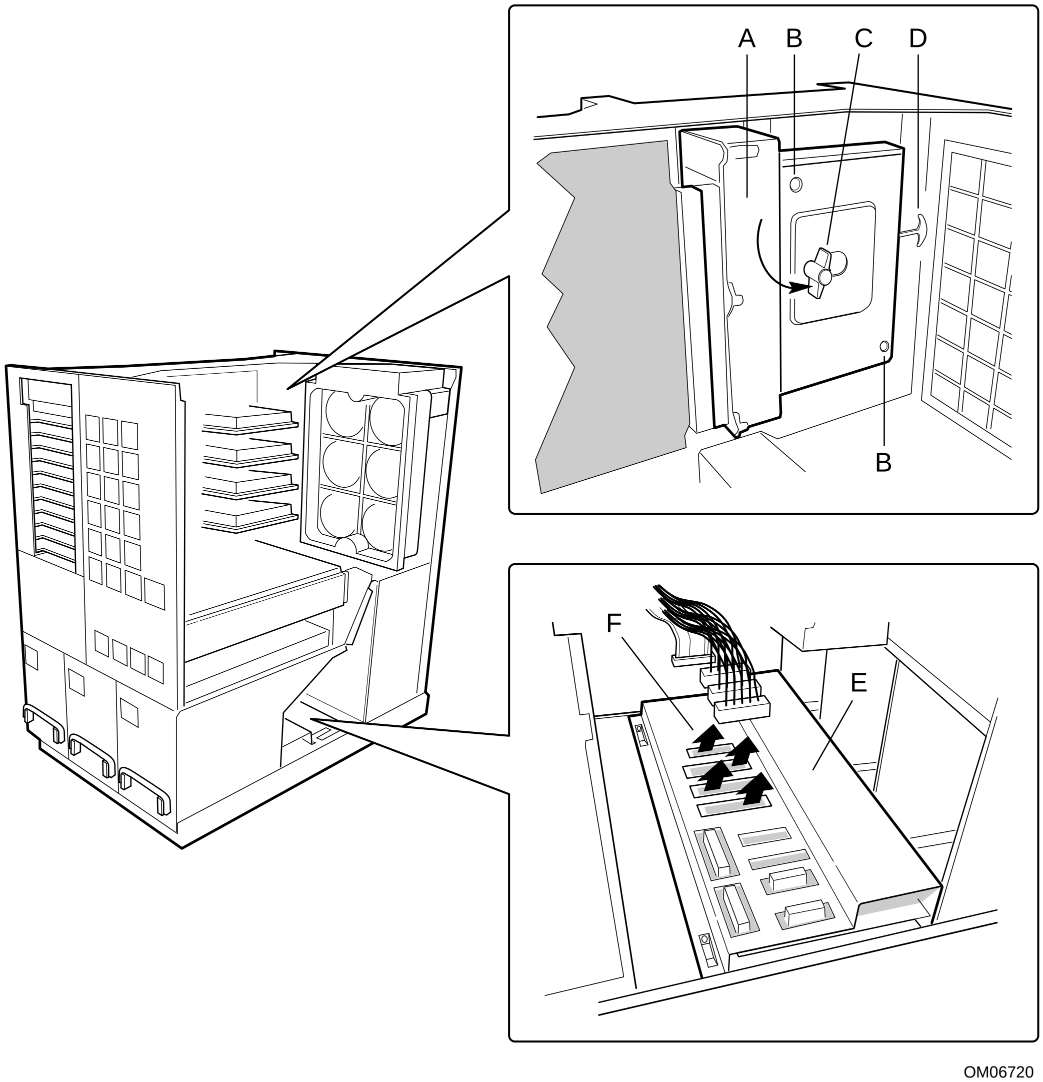


Figure 12-10. Interconnect Backplane Assembly

A Interconnect backplane
B Captive screws
C Mechanical unit crank
D Lock/unlock lever
E Power distribution backplane
F Cables

8. Orient the assembly so that the crank on the mechanical unit faces toward you.
9. Push down on the mechanical unit to disengage the tabs of the unit from the slots in the backplane housing.

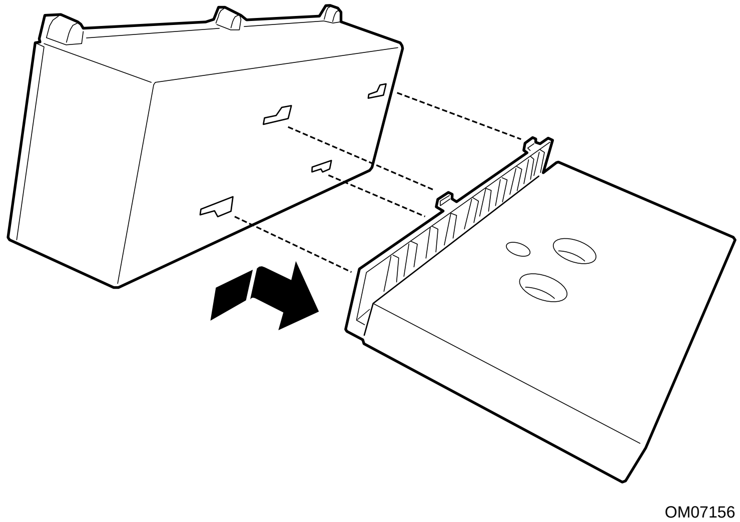


Figure 12-11. Detaching the Mechanical Unit From the Backplane

Reinstalling the Interconnect Backplane Assembly

See Figure 12-10.

1. Orient the interconnect backplane housing so that the small end of the slots in the housing face downward, and place it on a flat surface.
2. Orient the mechanical unit so that the crank faces away from you and the tabs face toward the slots in the housing.
3. Insert the tabs of the unit in the slots in the housing, and push down on the unit to seat the tabs in the slots.

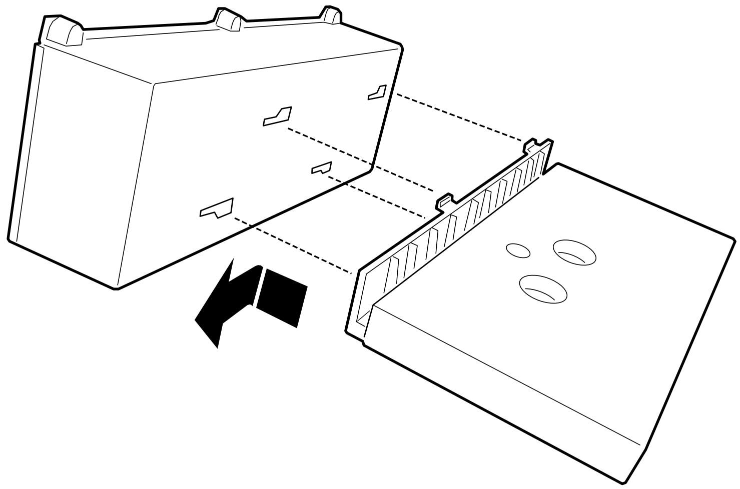


Figure 12-12. Attaching the Mechanical Unit to the Backplane

4. Position the mechanical unit side of the assembly over the holes in the center bulkhead of the chassis.
5. Attach the unit to the bulkhead with the two captive screws, and tighten them to 8.0 inch-pounds.
6. Turn the crank *clockwise* to just engage the interconnect backplane connectors with the connectors on the I/O and CPU baseboards. Do not tighten all the way yet!
7. When the backplane stops, firmly turn the crank *clockwise* again until the connector halves on the CPU baseboard side are closed. If an air gap is visible between the connector halves on the I/O baseboard side, squeeze the connector halves together.

⚠ CAUTION

The server may not function properly if you leave an air gap greater than .060 inches between the interconnect backplane connectors and the I/O and CPU baseboard connectors.

8. Connect the signal cable—the red stripe faces toward the SCSI backplane—and the three power cables of the interconnect backplane to the power distribution backplane.
9. Reinstall the two, three-fan arrays assembly as described earlier.
10. Reinstall the air baffle as described earlier.
11. Reinstall the top and side covers as described in Chapter 11.

CPU Baseboard

Removing the CPU Baseboard

See Figure 12-13.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the air baffle as described earlier.
4. Remove the two, three-fan array assemblies as described earlier.
5. Remove the processors, memory modules, and any terminator modules as described earlier.
6. Loosen the captive screws in the bases of the S.E.C. cartridge guides.
7. Remove the cartridge guides—they come out as one unit—and set them aside.
8. Disconnect the interconnect backplane from the I/O and CPU baseboards as described earlier.
9. Remove and save the screws that attach the CPU baseboard to the center bulkhead of the chassis.
10. Pull the baseboard toward you to unsnap it from the snap-on standoffs.
11. Place the baseboard on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.

Reinstalling the CPU Baseboard

See Figure 12-13.

1. Remove CPU baseboard from the antistatic protective wrapper if you placed it in one.
2. Position the baseboard over the snap-on and threaded standoffs on the center bulkhead of the chassis.
3. Press the baseboard onto the snap-on standoffs, and insert the screws loosely into the threaded standoffs.
4. Make sure the baseboard is properly seated, and then tighten all screws to 8.0 inch-pounds.
5. Connect the interconnect backplane onto the connectors of the I/O and CPU baseboards as described earlier.
6. Attach the cartridge guides to the CPU baseboard and to the center bulkhead with the captive screws, and tighten them to 8.0 inch-pounds.
7. Reinstall the processors, memory modules, and any terminator modules as described earlier.
8. Reinstall the two, three-fan array assemblies as described earlier.
9. Reinstall the air baffle as described earlier.
10. Reinstall the top and side covers as described in Chapter 11.

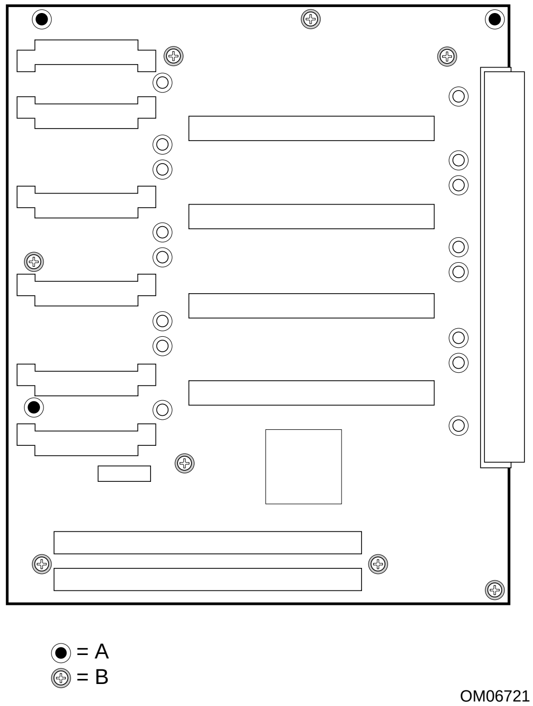


Figure 12-13. CPU Baseboard

A Snap-on standoffs (three)
B Screws (six)

Front Panel Board

The front panel board contains the server controls and indicators. It is mounted on snap-on and threaded standoffs inside the chassis.

Removing the Front Panel Board

See Figure 12-14.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the air baffle as described earlier.
4. Remove the two, three-fan array assemblies as described earlier.
5. Disconnect two signal cables (one from the LCD, one from the I/O baseboard) and one two-wire power cable from the front panel board.
6. Remove the three screws, and unsnap the board from the snap-on standoffs. Save the screws.
7. Place the board on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.

Reinstalling the Front Panel Board

See Figure 12-14.

1. Position the front panel board over the snap-on and threaded standoffs on the front bulkhead of the chassis.
2. Press the board onto the snap-on standoffs, and insert the screws loosely into the threaded standoffs.
3. Make sure the board is properly seated, and tighten all screws firmly (8.0 inch-pounds).
4. Connect the two signal cables and the two-wire power cable to the front panel board.
5. Reinstall the two, three-fan array assemblies as described earlier.
6. Reinstall the air baffle as described earlier.
7. Reinstall the top and side covers as described in Chapter 11.

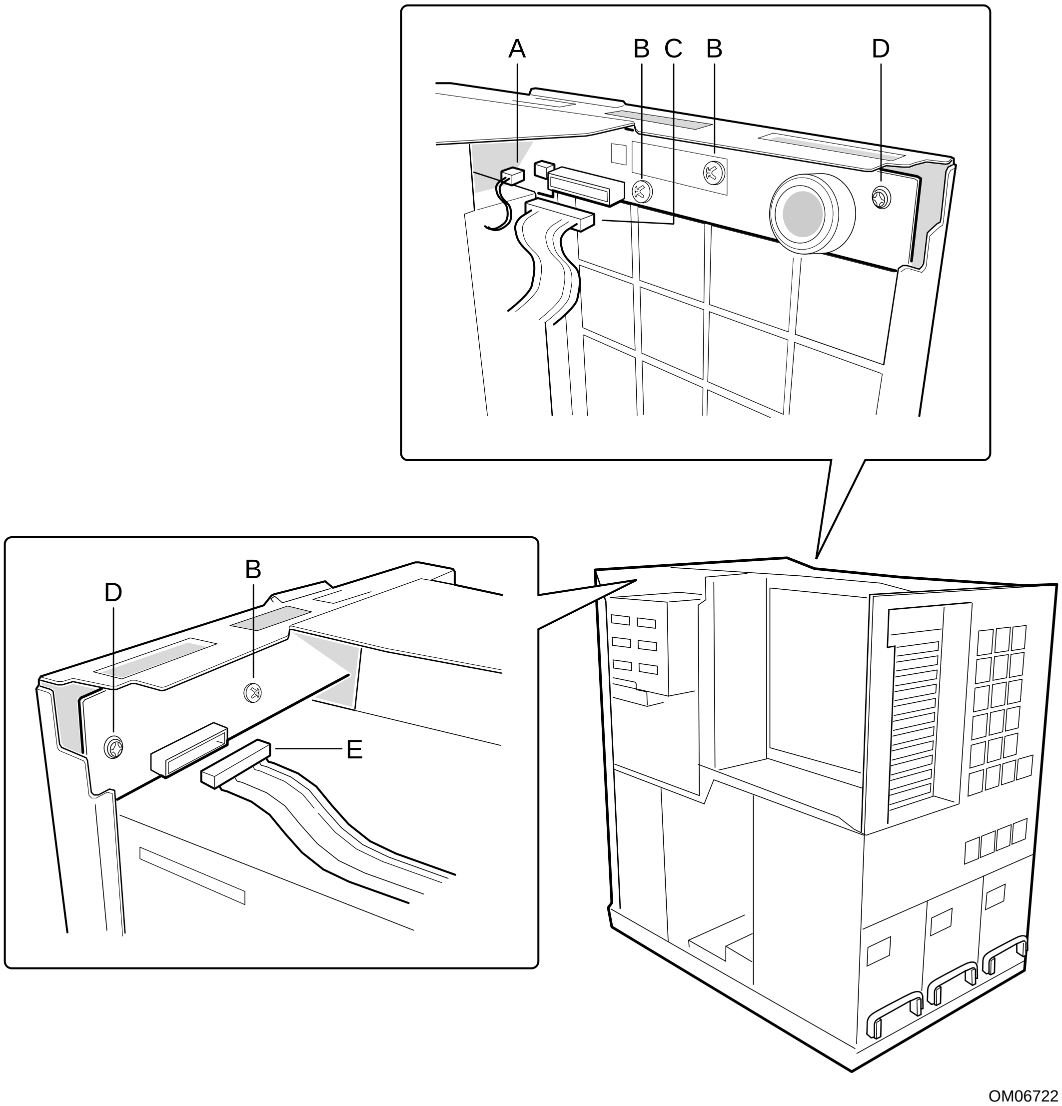


Figure 12-14. Front Panel Board

A	LCD two-wire cable
B	Screws (three)
C	LCD data cable
D	Snap-on standoffs (two)
E	Front panel to I/O baseboard cable

Retaining Bracket for Add-in Boards

Removing the Retaining Bracket for Add-in Boards

See Figure 12-15.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Loosen the captive screw on the bottom end of the bracket.
4. Remove the bracket by pulling the bottom end slightly toward you and sliding the top end tab out of the slot in the chassis. Set the bracket aside.

Reinstalling the Retaining Bracket for Add-in Boards

See Figure 12-15.

1. Before reinstalling the retaining bracket, make sure that all expansion slot covers are in place.
2. Reinstall the bracket by inserting the top end tab in the slot in the chassis.
3. Push the bracket up against the chassis, and insert the captive screw in the threaded hole in the chassis. Tighten the screw to 8.0 inch-pounds.
4. Reinstall the top and side covers as described in Chapter 11.

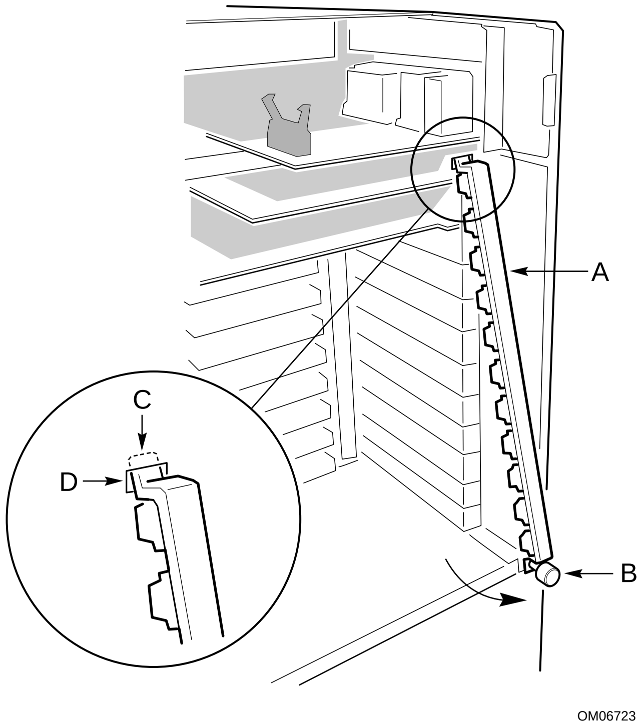


Figure 12-15. Retaining Bracket for Add-in Boards

A	Retaining bracket
B	Captive screw
C	Tab
D	Chassis slot

Add-in Boards

The I/O baseboard provides 11 PCI bus master slots and one ISA bus master slot. They accept any add-in PCI and ISA boards or any add-in board that is compatible with an IBM PC AT† or PC XT† system (except for an 8-bit drop card that fits only in an 8-bit PC XT connector). One PCI slot shares a common chassis I/O expansion slot with the ISA slot; you can use the slot for either PCI or the ISA, but not both.

⚠ **CAUTION**

Do not overload the I/O baseboard by installing add-in boards that draw excessive current. For expansion slot current limitations, see Chapter 20, “Power System: Description/Calculating Power Usage.”

Add-in boards can be extremely sensitive to ESD and always require careful handling. After removing the board from the protective wrapper or from the baseboard, place it component-side up on a nonconductive, static-free surface. Do not slide the board over any surface.

➯ **NOTE**

If you are installing or removing an ISA add-in board , you must run the SSU to reconfigure the server. Running the SSU is optional for a PCI add-in board.

Installing an Add-in Board

See Figures 12-16, 12-17, and 12-18.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the retaining bracket for add-in boards as described earlier.
4. Select the appropriate 16-bit ISA, 32-bit PCI, or 64-bit PCI expansion slot. Remove and save the expansion slot cover.

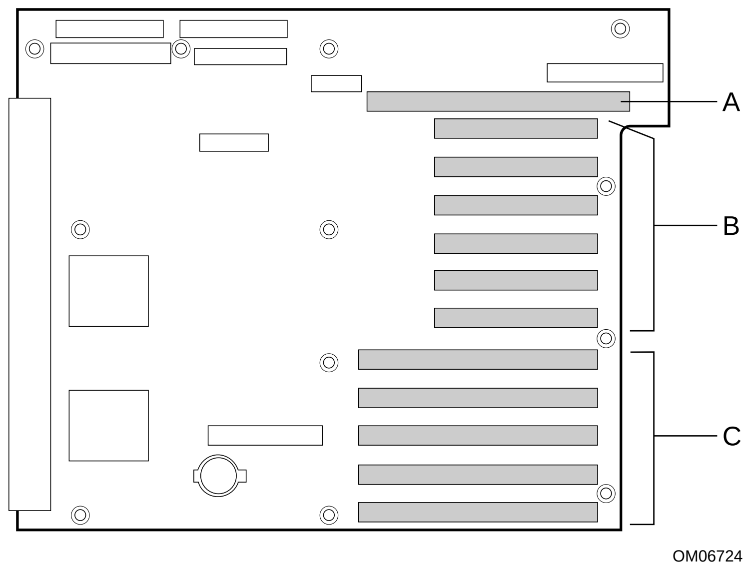


Figure 12-16. I/O Baseboard Expansion Slots

A	16-bit ISA slot
B	32-bit PCI slots
C	64-bit PCI slots

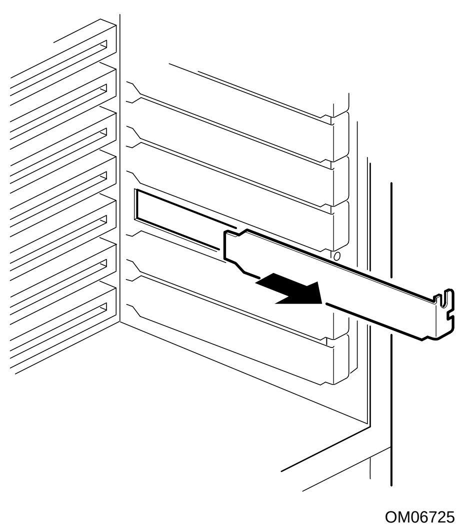


Figure 12-17. Expansion Slot Cover

5. Being careful not to touch the components or gold edge connectors on the add-in board, remove it from the protective wrapper, and place it component-side up on a nonconductive, antistatic surface.
6. Record the serial number of the board in your equipment log.
7. Set any jumpers or switches according to the board manufacturer's instructions.
8. Grasp the board by the top edge or upper corners, and firmly press it into an expansion slot on the I/O baseboard (Figures 12-18). The tapered foot of the board retaining bracket must fit into the mating slot in the expansion slot frame.
9. Reinstall the retaining bracket for add-in boards as described earlier.
10. Reinstall the top and side covers as described in Chapter 11.
11. If you installed an ISA add-in board, run the SSU to reconfigure the server. Running the SSU is optional for a PCI add-in board. For information about running this utility, see Chapter 5, "System Setup Utility: When to Run."

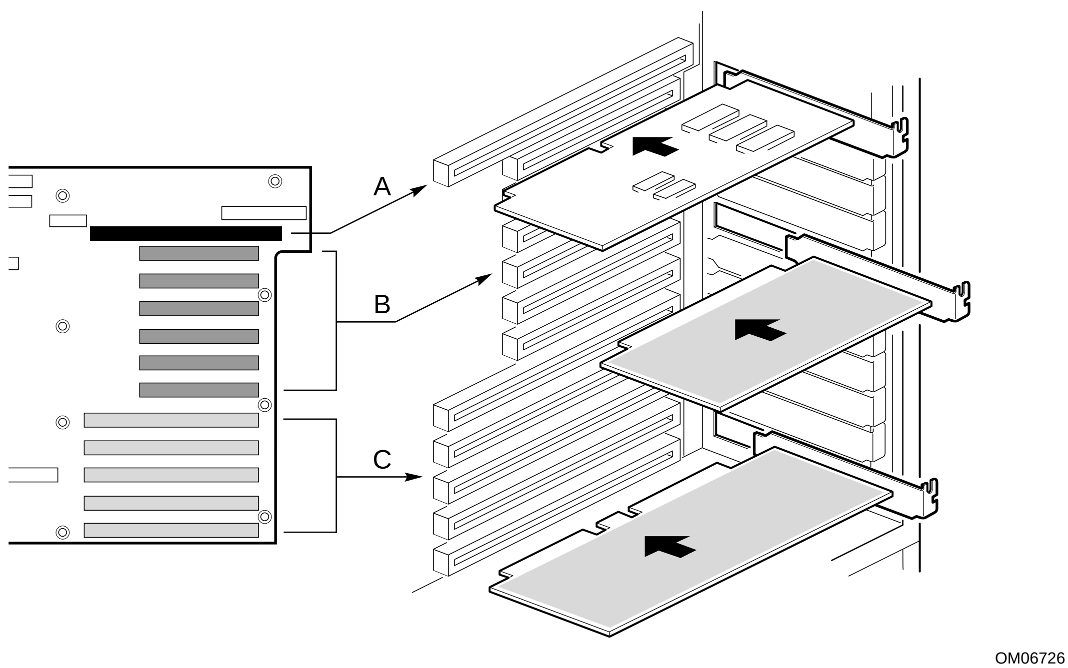


Figure 12-18. Installing an Add-in Board

A 16-bit ISA slot (ISA board component-side up)
B 32-bit PCI slot (PCI board, component-side down)
C 64-bit PCI slot (PCI board, component-side down)

Removing an Add-in Board

CAUTION

Expansion slot covers must be installed on all vacant slots to maintain the electromagnetic emission characteristics of the server and to ensure proper cooling of the server components.

See Figures 12-16, 12-17, and 12-18.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Disconnect any cables attached to the board you are removing.
4. Remove the retaining bracket for add-in boards as described earlier.
5. Grasp the board by the top edge or upper corners, and carefully pull it toward you until the edge connector of the board pulls free from the connector on the I/O baseboard. Make sure that you do not scrape the board against other components.
6. Store the board in an antistatic protective wrapper.
7. Install an expansion slot cover (Figure 12-17) over the vacant slot. The tapered foot of the cover must fit into the mating slot in the bottom of the expansion slot frame.
8. Reinstall the retaining bracket for the add-in boards as described earlier.
9. Reinstall the top and side covers as described in Chapter 11.
10. If you removed an ISA add-in board, run the SSU to configure the system. For information about running this utility, see Chapter 5, “System Setup Utility: When to Run.”

Three-fan Array Assembly

The three-fan array provides cooling for the I/O baseboard side of the server. The assembly consists of a rubber housing mounted inside a metal housing. The rubber housing contains three fans connected to a common power connector.

Removing the Three-fan Array Assembly

See Figure 12-19.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Disconnect the power cable of the three-fan array from the SCSI backplane.
4. Remove and save the two screws from the metal fan housing.
5. Remove the three-fan array assembly by pulling the back tabs on the metal housing out of the slots in the chassis center bulkhead. Set the assembly aside.
6. Remove the defective three-fan array from the metal housing. Set the metal housing aside, and discard the three-fan array.

Reinstalling the Three-fan Array Assembly

See Figure 12-19.

1. Place the metal housing—grille-side down—on a flat surface.
2. With the power cable side of the new three-fan array facing up, place the rubber housing inside the metal housing.

⚠ **CAUTION**

For proper cooling and airflow, make sure that the fan labels face toward the I/O baseboard so that the fans blow air into the chassis.

3. Orient the assembly so that the fans face toward the back of the metal card-guide panel, the tabs on the back of the metal housing face toward the center bulkhead, and the tabs on the front of the metal housing align with the slots in the flanges of the card-guide panel.
4. Slide the assembly toward the center bulkhead to engage the tabs.
5. Insert the screws you removed earlier in the threaded holes in the chassis. Tighten the screws firmly (8.0 inch-pounds).
6. Connect the power cable of the three fans to the SCSI backplane.
7. Reinstall the top and side covers as described in Chapter 11.

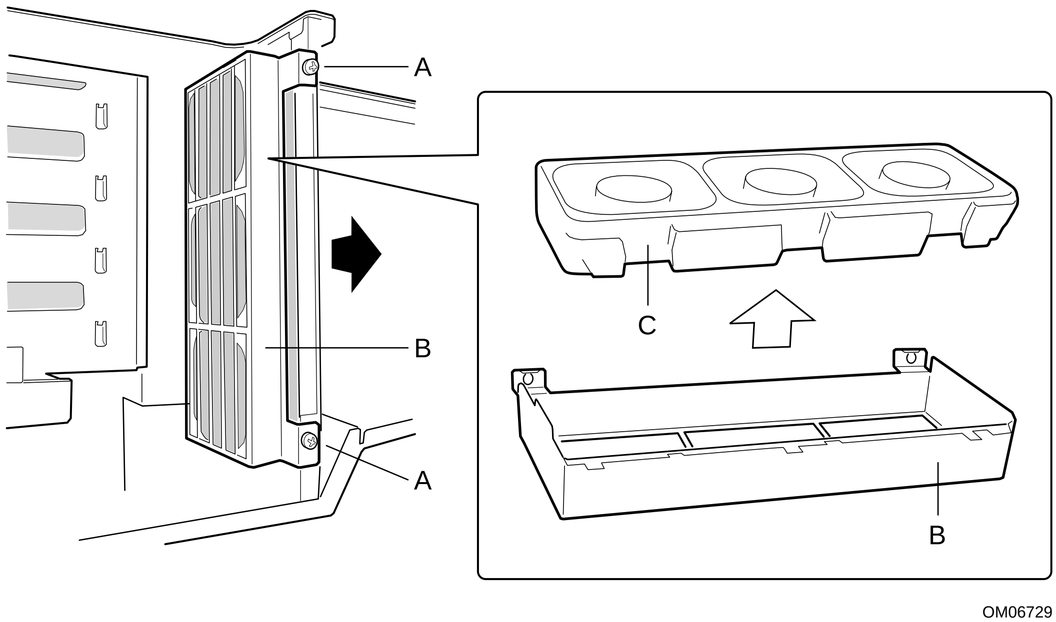


Figure 12-19. Three-fan Array Assembly

A Screws
B Metal housing
C Three-fan array and rubber housing

I/O Riser Card

Removing the I/O Riser Card

See Figure 12-20.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Disconnect the Intelligent Chassis Management Bus (ICMB) signal cable from J1 on the I/O riser card.
4. Remove and save the screw.
5. Holding the card by the top edge or upper corners, carefully pull it toward you until the edge connector of the card pulls free from connector J1B1 on the I/O baseboard. Make sure that you do not scrape the card against other components.
6. Place the card on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.

Reinstalling the I/O Riser Card

See Figure 12-20.

1. Remove the I/O riser card from the antistatic protective wrapper if you placed it in one.
2. Holding the card by the top edge or upper corners, carefully insert the edge connector of the card into connector J1B1 on the I/O baseboard. Press the card firmly into the connector.
3. Insert the screw you removed earlier in the threaded hole in the chassis. Tighten the screw firmly (8.0 inch-pounds).
4. Connect the ICMB signal cable to J1 on the riser card.
5. Reinstall the top and side covers as described in Chapter 11.

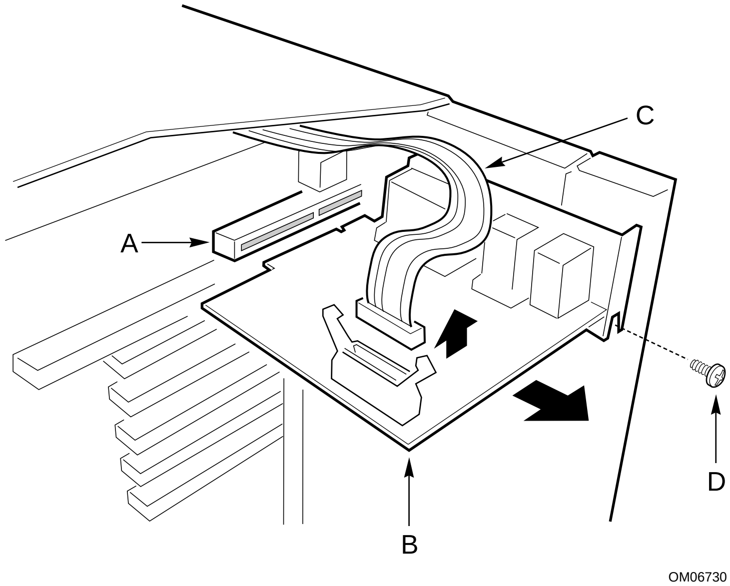


Figure 12-20. I/O Riser Card

A J1B1, I/O connector
B J1, ICMB connector
C ICMB signal cable
D Screw

I/O Baseboard

⚠ **CAUTION**

The I/O baseboard can be extremely sensitive to ESD and always requires careful handling. After removing the baseboard from the server, place it component-side up on a nonconductive, static-free surface to prevent shorting out the battery leads. If you place the baseboard on a conductive surface, the back-up battery leads may short out. If they do, this will result in a loss of CMOS data and will drain the battery. Do not slide the baseboard over any surface.

Removing the I/O Baseboard

See Figure 12-21.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Label and disconnect all internal cables connected to the add-in boards installed in the expansion slots.
4. Remove the retaining bracket for the add-in boards as described earlier.
5. Remove the add-in boards as described earlier.
6. Remove the I/O riser card as described earlier.
7. Label and disconnect all internal cables connected to the baseboard.
8. Remove the air baffle as described earlier.
9. Remove the two, three-fan array assemblies as described earlier.
10. Disconnect the interconnect backplane from the CPU and I/O baseboards as described earlier.
11. Remove and save the screws that attach the I/O baseboard to the center bulkhead of the chassis.
12. Pull the board toward you to unsnap it from the snap-on standoffs.
13. Place the board on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.

Reinstalling the I/O Baseboard

See Figure 12-21.

1. Remove the I/O baseboard from the antistatic protective wrapper if you placed it in one.
2. Position the baseboard over the snap-on and threaded standoffs on the center bulkhead of the chassis.
3. Press the baseboard onto the snap-on standoffs, and insert the screws loosely into the threaded standoffs.
4. Make sure the baseboard is properly seated, and tighten all screws firmly (8.0 inch-pounds).
5. Connect the interconnect backplane to the CPU and I/O baseboards as described earlier.
6. Reinstall the two, three-fan array assemblies as described earlier.
7. Reinstall the air baffle as described earlier.

8. Connect all internal cables to the I/O baseboard.
9. Reinstall the add-in boards in their original expansion slots as described earlier.
10. Connect all internal cables that go to the add-in boards installed in the expansion slots.
11. Reinstall the top and side covers as described in Chapter 11.
12. Connect all peripheral device cables that go to the I/O panel on the rear of the system.
13. Run the SSU, and use the saved configuration file to restore all options to the same settings. For information about running this utility, see Chapter 5, "System Setup Utility: When to Run."

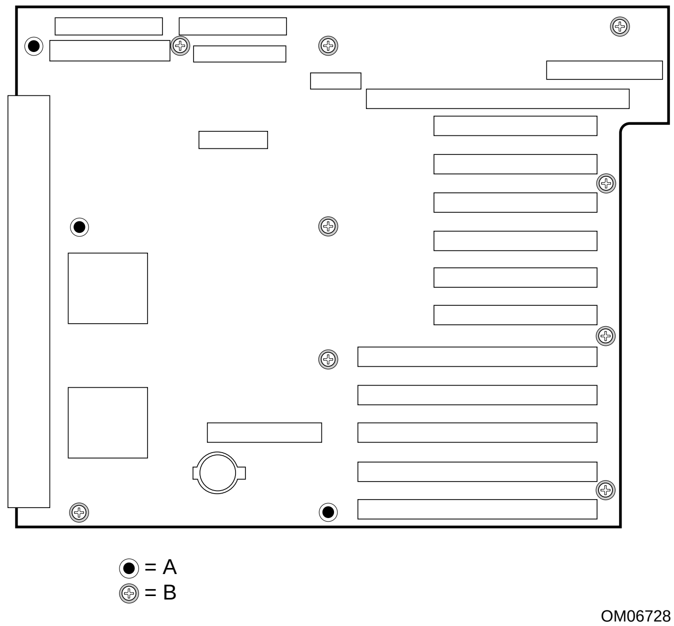


Figure 12-21. I/O Baseboard

A Snap-on standoffs (three)
B Screws (nine)

SCSI Hot-docking Backplane

The server contains a two-channel WideUltra SCSI hot-docking backplane. It supports hot swapping of SCA-type SCSI drives, enclosure management, and monitoring functions conforming to the *SCSI-Accessed Fault-Tolerant Enclosures* (SAF-TE) specification.

Removing the SCSI Backplane

See Figure 12-22.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Label and remove the SCSI hard disk drives from the hot-docking drive bays. Place the drives on a nonconductive, static-free surface, or store them in antistatic protective wrappers.
4. Label and disconnect the three fan cables from the connectors on top of the SCSI backplane.
5. Disconnect the two-wire door sensor cable from the connector on top of the SCSI backplane.
6. Disconnect the power distribution cables and the signal cable from the SCSI backplane connectors.
7. Disconnect the signal cables from SCSI channels A and B.
8. Remove the screws from the retaining bracket mounted on the right side of the hot-docking bays, and set them aside.
9. Remove the bracket and set it aside.
10. Grasp the left edge of the backplane, and slide it to the right (about 1/8-inch) until it stops.
11. Grasp the right and left edges of the backplane, and pull it straight back very carefully to remove it from the plastic right-angled standoffs on the hot-docking bay.
12. Place the backplane on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.

Reinstalling the SCSI Backplane

See Figure 12-22.

1. Remove the SCSI backplane from the antistatic protective wrapper if you placed it in one.
2. Position the backplane over the plastic right-angled standoffs on the back of the hot-docking bays. (Start with the last column of standoffs on the CPU baseboard side of the chassis.)
3. Press the backplane onto the standoffs, and slide it to your right until it stops. Make sure that it is properly seated under each standoff.
4. Reinstall the retaining bracket on the right side of the hot-docking bay with the screws you removed earlier, and tighten them to 8.0 inch-pounds.
5. Connect the SCSI signal cables to channels A and B.
6. Connect the power distribution cables and the signal cable to the SCSI backplane connectors.
7. Connect the three fan cables to the connectors on top edge of the SCSI backplane.
8. Connect the two-wire door sensor cable to the connector on top of the SCSI backplane.
9. Remove the SCSI hard disk drives from the antistatic protective wrappers if you placed them in wrappers.
10. Reinstall the drives in their original hot-docking bays.

11. Reinstall the top and side covers as described in Chapter 11.

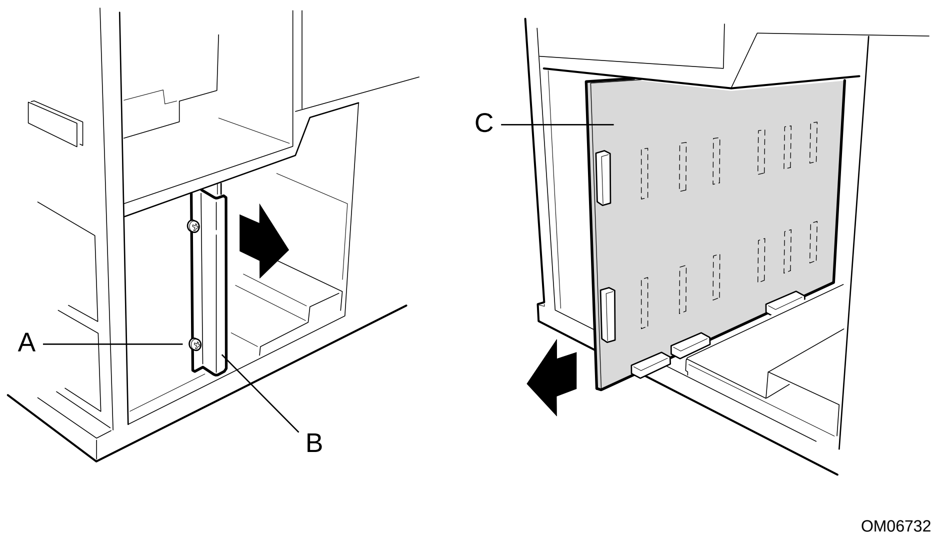


Figure 12-22. SCSI Backplane

A Screws (two)
B Retaining bracket
C SCSI backplane

Power Distribution Backplane

The power backplane distributes the power load of the server among three or four 420 watt autoranging power supplies.

WARNING

The push-button on/off power switch on the front panel of the server does not turn off the AC power. To remove AC power from the server, you must unplug each AC power cord from each power supply or wall outlet.

Hazardous voltage, current, and energy levels are present inside the power distribution backplane. There are no user serviceable parts inside it; servicing should be done only by technically qualified personnel.

Removing the Power Distribution Backplane

See Figure 12-23.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the power supplies as described earlier.
4. Disconnect the signal cable and the three power cables of the interconnect backplane from the power backplane.
5. Disconnect the signal cable and the two power cables of the SCSI backplane from the power backplane.
6. Label and disconnect the signal cable and the two power cables of the redundant power supply bracket from the power backplane.
7. Disconnect the daisy-chained power cable for the drives in the 5.25- and 3.5-inch drive bays from the power backplane.
8. Remove the screws from the power backplane.
9. Slide the power backplane toward the SCSI backplane to disengage it from the chassis.
10. Remove the power distribution backplane from the chassis, and set it aside.

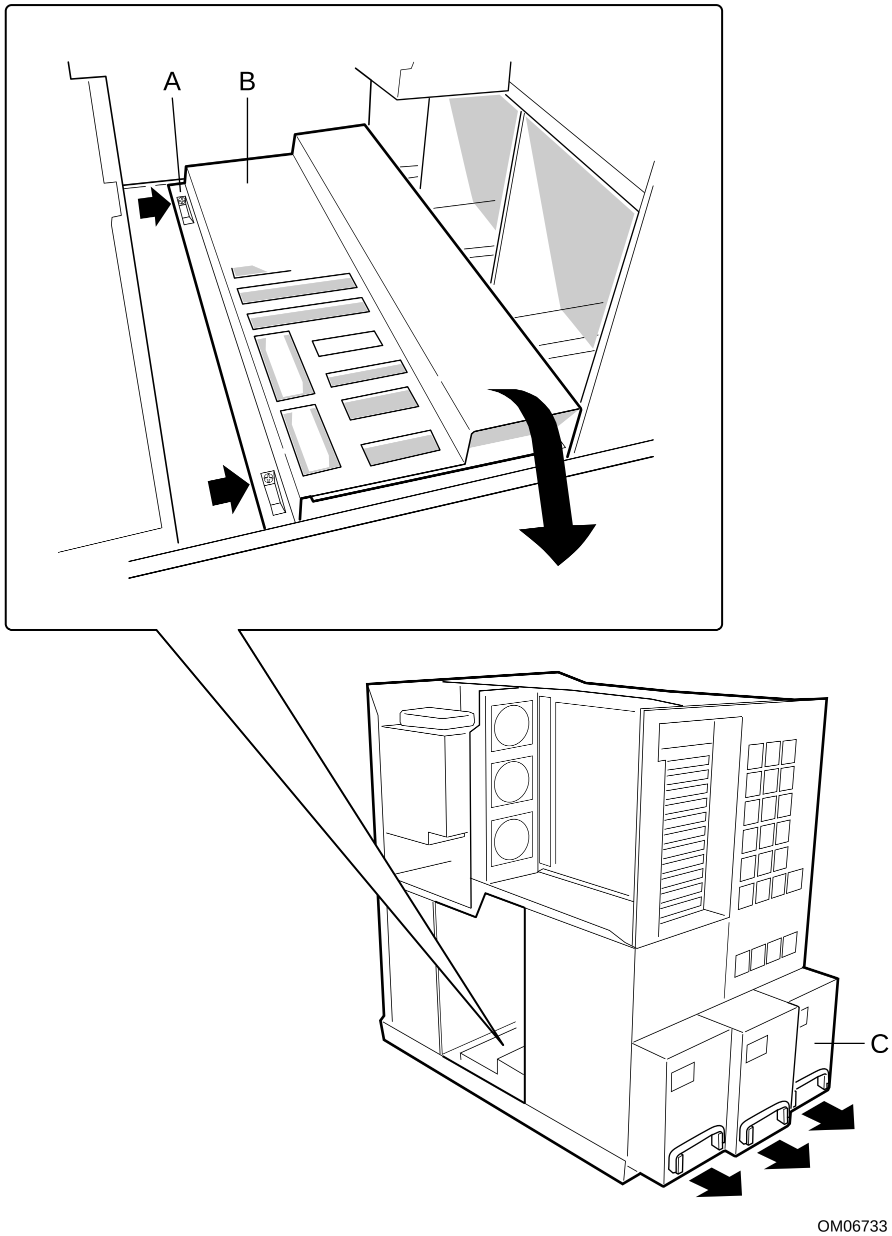


Figure 12-23. Power Distribution Backplane

A Screws (two)
B Power distribution backplane
C Power supplies

Reinstalling the Power Distribution Backplane

See Figure 12-23.

1. Position the power backplane in the space between the SCSI backplane and the power supply bays.
2. Slide the power backplane toward the power supply bays to engage the tabs in the chassis slots.
3. Reinstall the screws, and tighten them firmly (8.0 inch-pounds).
4. Connect the signal cable and the two power cables of the SCSI backplane to the power backplane
5. Connect the signal cable and the three power cables of the interconnect backplane to the power backplane.
6. Connect the signal cable and the two power cables of the redundant power supply bracket to the power backplane.
7. Connect the daisy-chained power cable for the drives in the 5.25- and 3.5-inch drive bays to the power backplane.
8. Reinstall the power supplies.
9. Reinstall the top and side covers as described in Chapter 11.

Intelligent Chassis Management Bus (ICMB) Board

Removing the ICMB Board

See Figure 12-24.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the air baffle as described earlier.
4. Disconnect the ICMB signal cable from connector J1 on the I/O riser card.
5. Carefully pull the signal cable through slot in the center bulkhead of the chassis.
6. Remove and save the two screws that attach the ICMB board to the rear bulkhead of the chassis.
7. Pull the board toward you to unsnap it from the snap-on standoff.
8. Place the board on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.

Reinstalling the ICMB Board

See Figure 12-24.

1. Remove the ICMB board from the antistatic protective wrapper if you placed it in one.
2. Position the board over the snap-on and threaded standoffs on the rear bulkhead of the chassis.
3. Press the board onto the snap-on standoff, and insert the screws loosely into the threaded standoffs.
4. Make sure the board is properly aligned, and tighten the screws firmly (8.0 inch-pounds).

5. Carefully insert the ICMB signal cable through the slot in the center bulkhead of the chassis.
6. Connect the signal cable to connector J1 on the I/O riser card.
7. Reinstall the air baffle as described earlier.
8. Reinstall the top and side covers as described in Chapter 11.

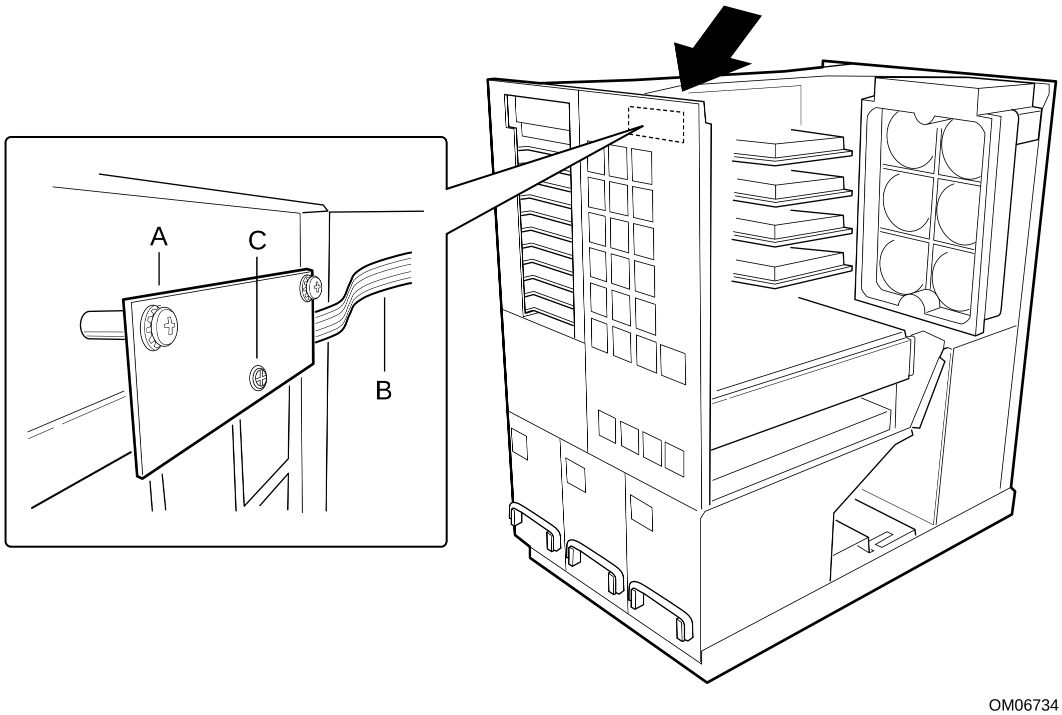


Figure 12-24. ICMB Board

A Screws (two)
B ICMB cable to J1 on I/O riser card
C Snap-on standoff

13 Boot Drives and Removable Media Drives: Installing/Removing/Replacing

This chapter tells how to install, remove, and replace an IDE or SCSI boot hard disk drive and removable media drives.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see "Safety Guidelines" on page 125.

Tools and Supplies You Need

- Phillips (cross-head) screwdriver (#1 bit and #2 bit)
- EMI gasket
- Small flat-bladed screwdriver
- Antistatic wrist strap (recommended)
- Pen or pencil

Equipment Log

Use the equipment log form provided in Appendix B, "Equipment Log," to record the model and serial numbers of the server, all installed options, and any other pertinent information about the server. You will need this information when running the SSU.

Boot Hard Disk Drive

The 3.5-inch boot drive bay, located inside the chassis above the 5.25-inch bays, provides space for a 1-inch by 3.5-inch wide SCSI or IDE boot hard disk drive.

Contact your sales representative or dealer for a list of approved add-in devices.

Installing the Boot Hard Disk Drive

See Figure 13-1.

1. Remove the 3.5-inch hard disk drive (IDE or SCSI) from the protective packaging, and place it on a nonconductive, static-free surface.
2. Record the model and serial numbers of the drive in your equipment log.
3. Set any jumpers and switches according to the drive manufacturer's instructions. If you are installing a SCSI hard disk drive, each SCSI device in the server must have a unique SCSI ID. For example, the default address for a SCSI CD-ROM drive is ID 5. If necessary, use the configuration jumpers on the back of the drive to change the ID. For reference, record the SCSI ID of the drive in your equipment log.
4. Orient the drive so that the board-side faces up and the connectors face to the right, and place the drive on an antistatic surface.
5. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
6. Remove and save the screw that attaches the drive carrier to the 3.5-inch boot drive bay.
7. Slide the carrier toward the fans to disengage the carrier tabs from the bay.
8. Orient the carrier above the drive so that the flanges and tabs face upward, place the carrier on the drive, and align the screw holes in the carrier with the ones in the drive.
9. Using four screws of the appropriate size and length (not supplied), attach the carrier to the drive.
10. Orient the drive and carrier assembly on the 3.5-inch boot drive bay so that the carrier tabs face down and the drive connectors face toward the fans.
11. Slide the assembly toward the front panel board to engage the tabs in the slots of the bay.
12. Using the screw you removed in step 5, secure the drive to the bay; tighten the screw firmly (between 4.0 and 6.0 inch-pounds).
13. Connect the power cable to the device.
14. For an IDE hard disk drive, connect the IDE signal cable to the drive. For a SCSI drive, connect the SCSI signal cable to the drive.
15. Reinstall the top and side covers as described in Chapter 11.
16. If you installed a SCSI boot hard disk drive, run the SCSI*Select* utility to enable BIOS support for a bootable drive. Run the SSU or Setup to specify that the SCSI drive is the boot device. For information about running these utilities, see Chapter 5, “System Setup Utility: When to Run,” and Chapter 4, “Setup Utility: When to Run.”

Removing the Boot Hard Disk Drive

See Figure 13-1.

1. Observe the precautions on page 125, “Safety Guidelines.”

2. Remove the top and side covers as described in Chapter 11, "Server Covers: Removing/Reinstalling."
3. Disconnect the power and signal cables from the 3.5-inch boot hard disk drive.
4. Remove and save the screw that attaches the drive and carrier assembly to the 3.5-inch boot drive bay.
5. Slide the assembly toward the fans to disengage the carrier tabs from the bay.
6. Place the assembly carrier-side up on a nonconductive, static-free surface.
7. Remove and save the screws that attach the carrier to the drive.
8. Remove the carrier from the drive, and set the carrier aside.
9. Place the drive board-side up on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.
10. Reinstall the top and side covers as described in Chapter 11.

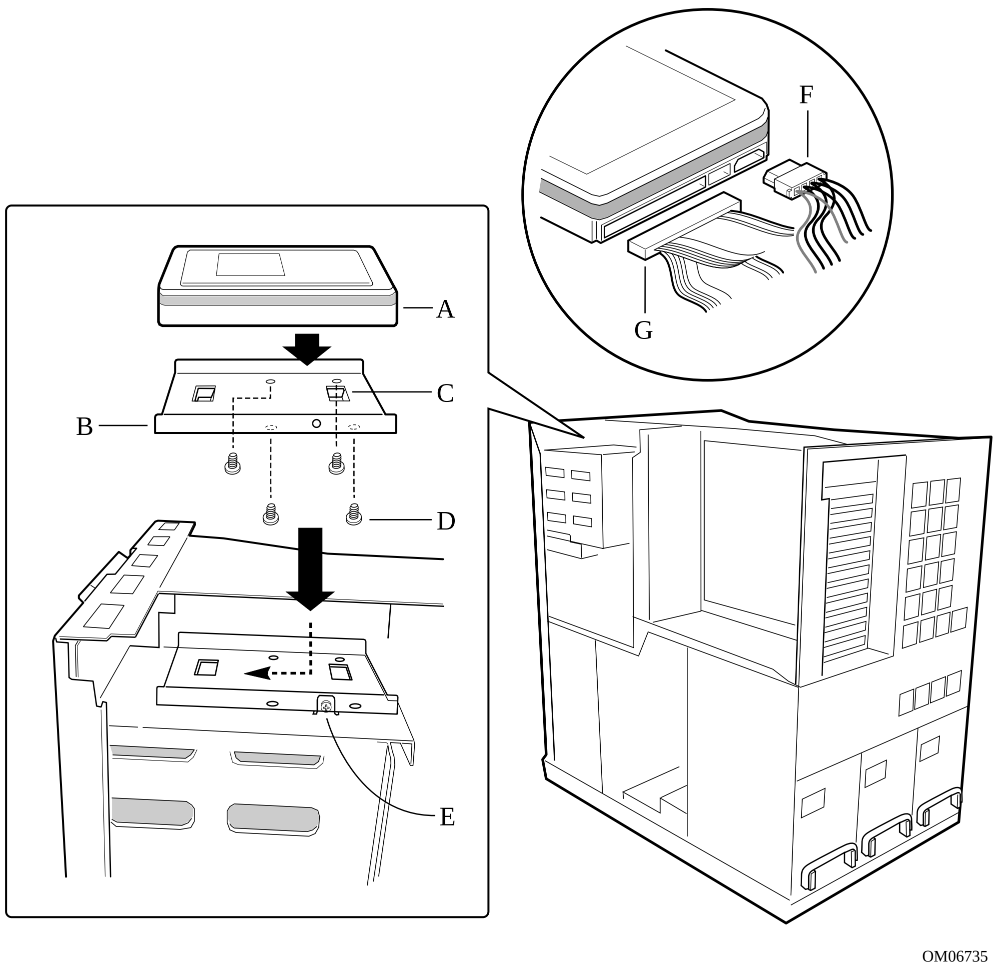


Figure 13-1. Boot Hard Disk Drive

A	Boot hard disk drive	E	Carrier screw
B	Drive carrier	F	Power cable
C	Carrier tabs	G	Signal cable
D	Drive screws (four)		

Mass Storage Devices

Four 5.25-inch half-height bays provide space for removable media devices such as tape, DVD, and CD-ROM drives. Because the top bay contains an IDE CD-ROM drive, only one other IDE device can be installed on the IDE cable attached to the primary IDE port. If needed, you can install two more IDE devices in the remaining bays and connect them to the secondary IDE port through a second IDE cable. If you do not install more IDE devices in these bays, then you can install up to three *ultra compliant* SCSI devices instead. They do not need to operate at the ultra transfer rate. If needed, you can convert any two adjacent bays to a single full-height bay.

NOTE

We do not recommend mounting a hard disk drive in a 5.25-inch bay because the drive generates EMI, is more susceptible to ESD, and may not be adequately cooled.

Contact your sales representative or dealer for a list of approved add-in devices.

Installing a Mass Storage Device

To install devices in the 5.25-inch bays, you must remove the plastic filler panels and stainless steel EMI shields that cover the bays. See Figures 13-2, 13-3, 13-4, 13-5, and 13-6.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the snap-on drive bay cover as described in Chapter 11.
4. Grasp the frame of the snap-on cover with one hand, and grasp the twist-out filler panel with your other hand.
5. Using a twisting motion, break the tabs that secure the filler panel to the cover. Set the cover and filler panel aside.
6. Insert the blade of a small screwdriver through one of the access holes in the EMI shield, and pry the shield out of the bay. As an alternate method, reach through the back of the 5.25-inch bay, and push the shield out. Save the shield.
7. Remove the device from the protective packaging, and place it on an antistatic surface.
8. Record in your equipment log the model and serial numbers of the device.
9. Set any jumpers and switches according to the device manufacturer’s instructions. If you are installing a SCSI CD-ROM drive or other SCSI device, each SCSI device must have a unique SCSI ID. For example, the default address for a SCSI CD-ROM drive is ID 5. If necessary, use the configuration jumpers on the back of the device to change the ID. For reference, record the SCSI ID of the drive in your equipment log.

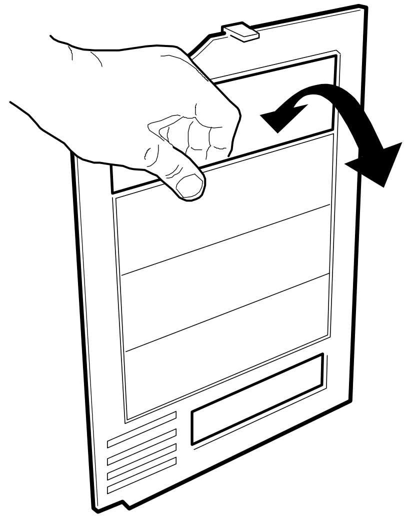


Figure 13-2. Drive Bay Filler Panels

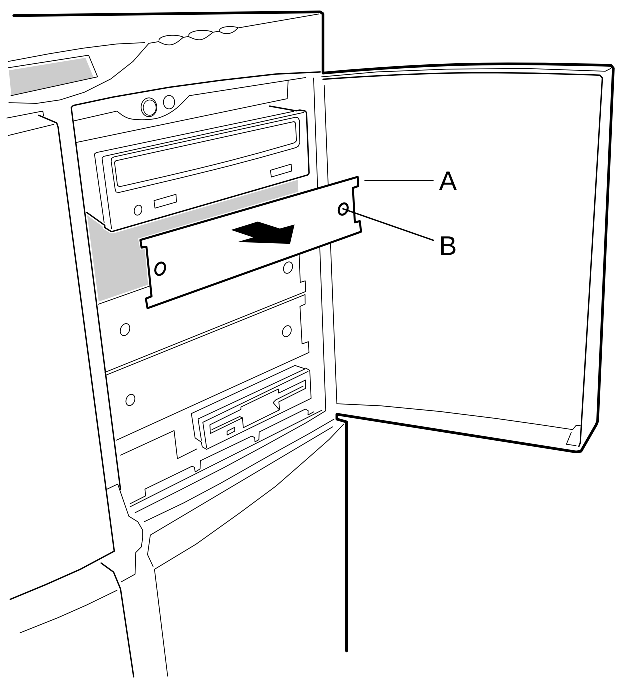


Figure 13-3. Drive Bay EMI Shield

A EMI shield
B Access holes

10. Using two screws of the appropriate size and length (not supplied), attach each plastic slide rail to the device.
11. Get one of the EMI gaskets provided, and peel the protective cover off the adhesive side of the gasket.
12. Orient the gasket .5 inches back from the center front edge of the device, and affix the gasket to the metal top of the device.

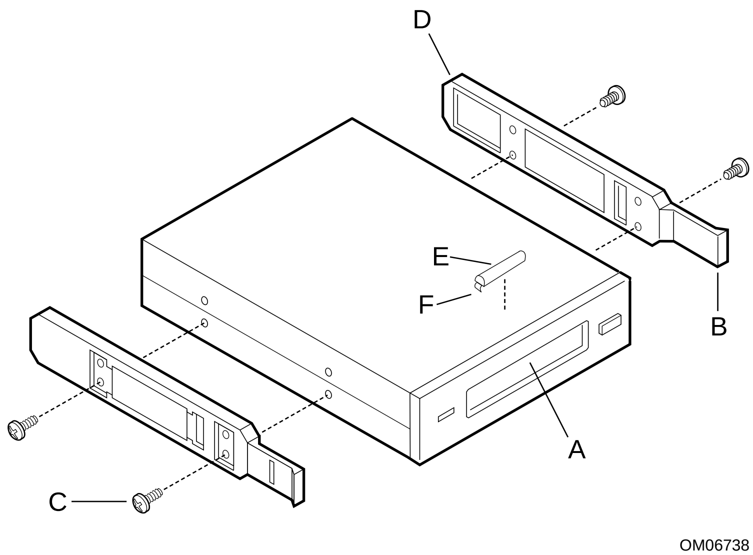


Figure 13-4. Snap-in Plastic Slide Rails

A Tape drive or other device
B Tab
C Four screws (two each side)
D Slide rail
E Protective cover
F EMI gasket

13. Orient the device so that the plastic slide rails on each side of it engage with the guide rails in the bay. Push the device into the bay until the slide rails lock in place.
14. Connect the power cable to the device.
15. For an IDE drive, connect the IDE signal cable to the drive. For a SCSI device, connect the SCSI signal cable to the drive.

⚠ CAUTION

To prevent restricting airflow or blocking the fans, route the signal cables through the strain relief clip attached to the back of the top 5.25-inch bay.

16. Reinstall the snap-on drive bay cover as described in Chapter 11.
17. Reinstall the top and side covers as described in Chapter 11.
18. This step is optional. If you installed a SCSI CD-ROM drive, run the SCSI*Select* utility to enable BIOS support for a bootable CD-ROM. Run the SSU or Setup to specify that the CD-ROM is the boot device. For information about running these utilities, see Chapter 5, “System Setup Utility: When to Run,” and Chapter 4, “Setup Utility: When to Run.”

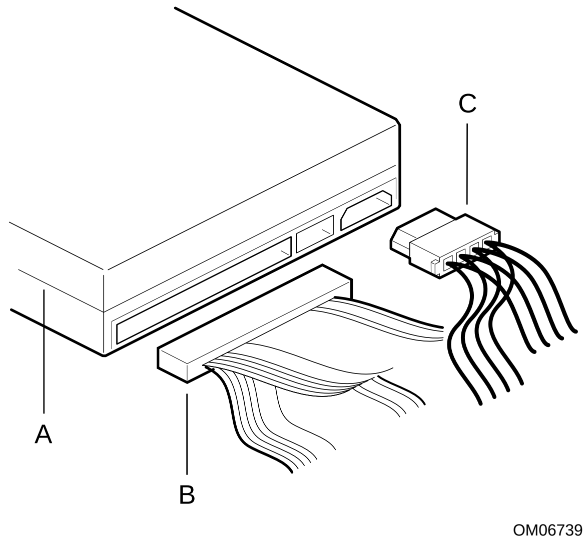


Figure 13-5. Mass Storage Device

A Tape drive or other device
B IDE or SCSI signal cable
C Power cable

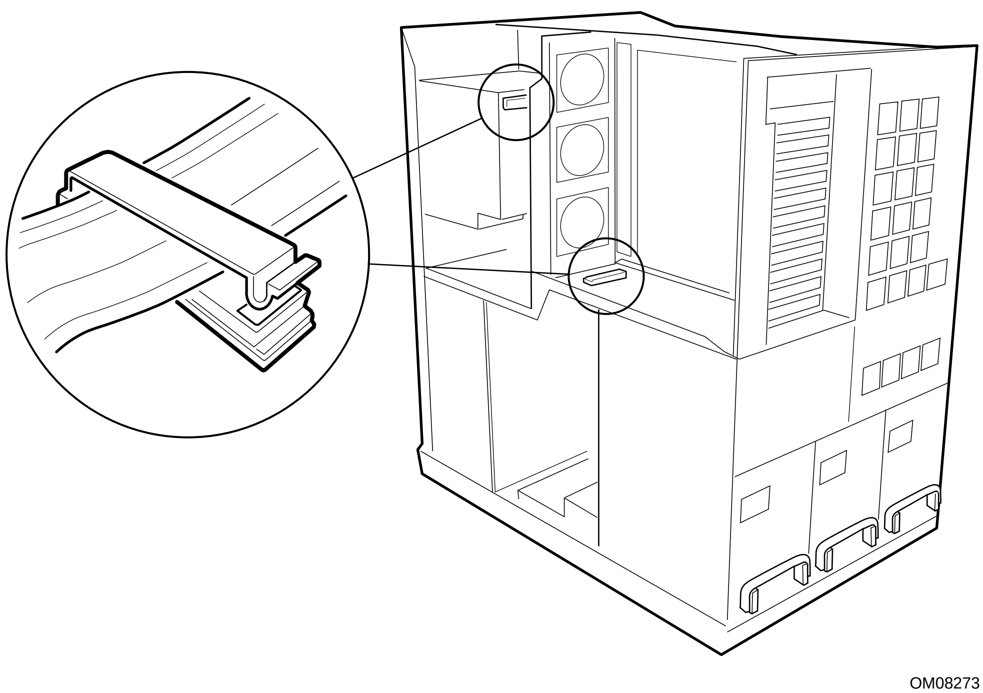


Figure 13-6. Strain Relief Clips

Removing a Mass Storage Device

See Figures 13-2, 13-3, 13-4, 13-5, and 13-6.

1. Observe the precautions on page 125, "Safety Guidelines."
2. Remove the top and side covers as described in Chapter 11, "Server Covers: Removing/Reinstalling."
3. Remove the snap-on plastic drive bay cover as described in Chapter 11.
4. Disconnect the power and the signal cables from the device.
5. Squeeze the tabs on the plastic snap-in slide rails toward the device to release it. Pull the device out of the bay, and place it component-side up on an antistatic surface.
6. Remove and save the four screws and the two slide rails from the device.
7. If you leave the bay empty, for proper cooling and airflow you must install a stainless steel EMI shield on the bay and a filler panel on the snap-on plastic drive bay cover.
8. Reinstall the snap-on plastic drive bay cover as described in Chapter 11.
9. Reinstall the top and side covers as described in Chapter 11.
10. If you leave the bay empty, run the SSU to reconfigure the system. For information about running this utility, see Chapter 5, "System Setup Utility: When to Run."

Diskette Drive

The 3.5-inch diskette drive in the 3.5-inch user-accessible drive bay supports 720 KB, 1.25 MB, 1.44 MB, and 2.88 MB media. Contact your sales representative or dealer for a list of approved add-in devices.

Removing the Diskette Drive

See Figure 13-7.

1. Observe the precautions on page 125, "Safety Guidelines."
2. Remove the top and side covers as described in Chapter 11, "Server Covers: Removing/Reinstalling."
3. Remove the snap-on plastic drive bay cover as described in Chapter 11.
4. Disconnect the power and signal cables from the 3.5-inch diskette drive.
5. Remove and save the screws that secure the drive to the 3.5-inch drive bay in the chassis.
6. Slide the drive out of the bay, and place it component-side up on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.

Replacing the Diskette Drive

See Figure 13-7.

1. Remove the 3.5-inch diskette drive from the protective packaging, and place it component-side up on a nonconductive, static-free surface.
2. Record the model and serial numbers of the drive in your equipment log.
3. Set any jumpers or switches according to the drive manufacturer's instructions.
4. Slide the drive into the 3.5-inch diskette drive bay until it stops.

5. Secure the drive to the bay with the screws you removed earlier; tighten them firmly (between 4.0 and 6.0 inch-pounds).
6. Connect the keyed signal and power cables to the drive. The red stripe on the signal cable faces toward the center of the drive; it indicates pin 1.
7. Reinstall the snap-on plastic drive bay cover as described in Chapter 11.
8. Reinstall the top and side covers as described in Chapter 11.
9. Run the SSU to specify that the diskette drive is installed in the server. For information about running this utility, see Chapter 5, “System Setup Utility: When to Run.”

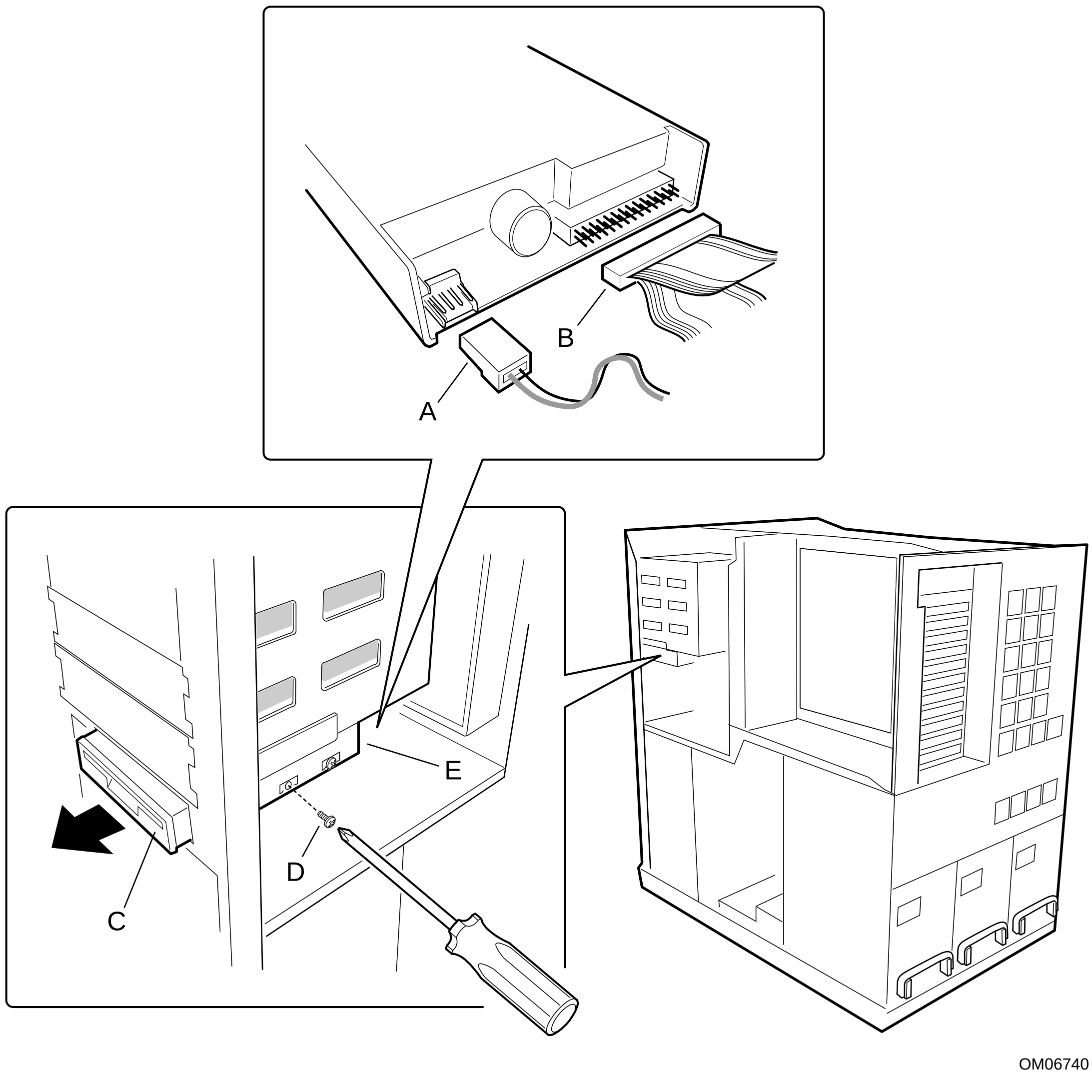


Figure 13-7. Diskette Drive

A Power cable
B Signal cable
C Diskette drive
D Two screws
E Drive bay

IDE CD-ROM Drive

The server comes with an IDE CD-ROM drive installed in the top 5.25-inch drive bay. Contact your sales representative or dealer for a list of approved add-in devices.

Removing the IDE CD-ROM Drive

See Figures 13-2, 13-3, 13-8, and 13-9.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the snap-on plastic drive bay cover as described in Chapter 11.
4. Disconnect the power and the signal cables from the IDE CD-ROM drive.
5. Squeeze the tabs on the plastic snap-in slide rails toward the drive to release it. Pull the drive out of the bay, and place it component-side up on an antistatic surface.

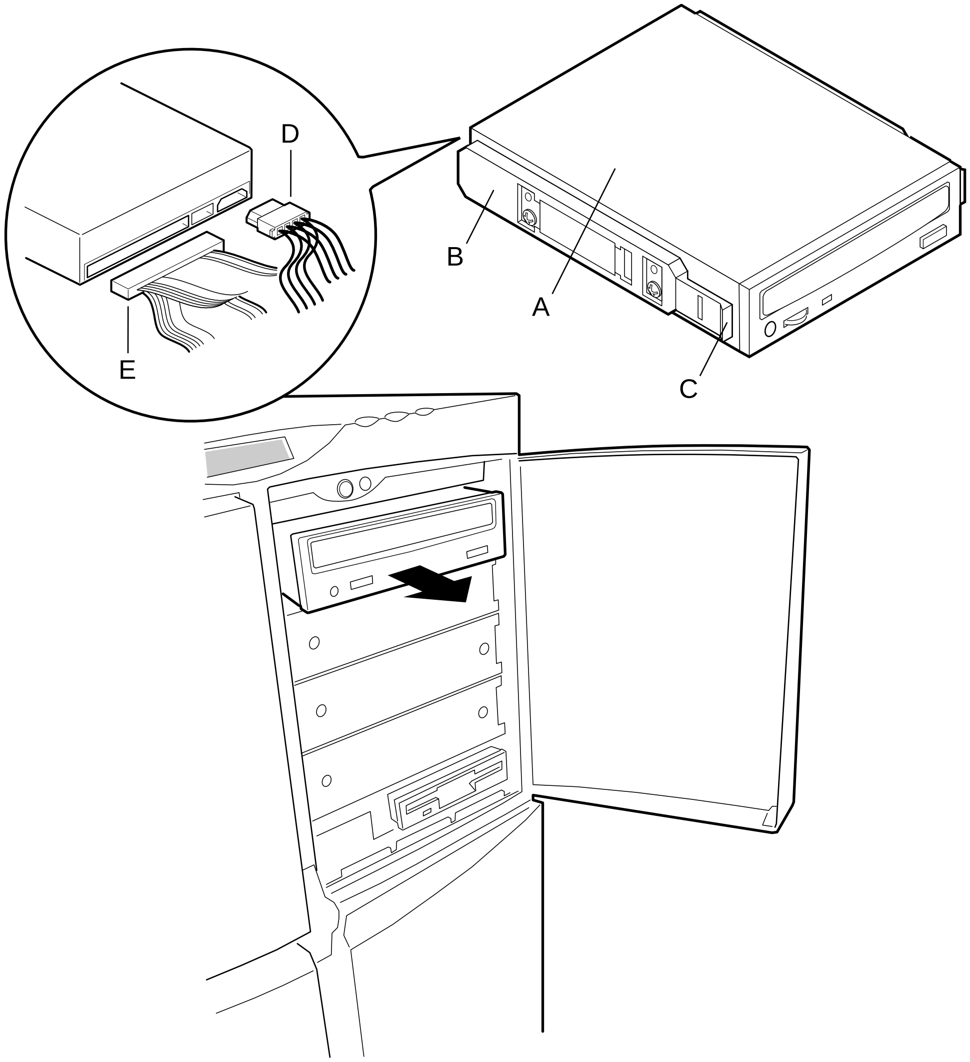


Figure 13-8. IDE CD-ROM Drive

A	IDE CD-ROM Drive
B	Plastic snap-in slide rail
C	Tab
D	Power cable
E	IDE signal cable

6. Remove and save the four screws and the two snap-in slide rails from the drive.
7. If you leave the bay empty, for proper cooling and airflow you must install a filler panel on the snap-on plastic drive bay cover and a stainless steel EMI shield on the bay.

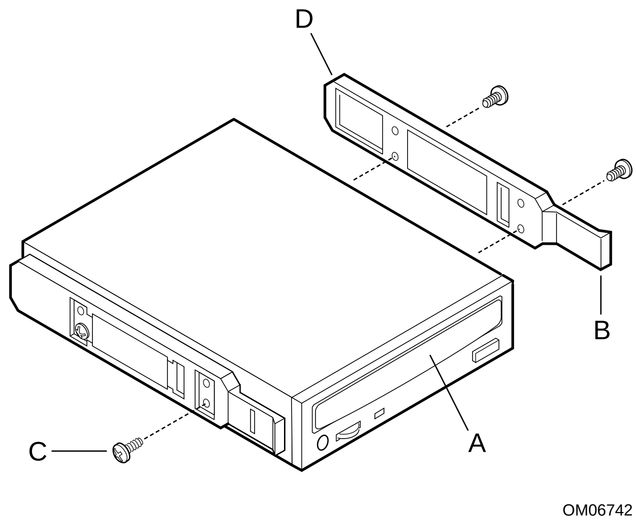


Figure 13-9. Snap-in Plastic Slide Rails

A IDE CD-ROM drive
B Tab
C Screw
D Slide rail

Replacing the IDE CD-ROM Drive

See Figures 13-2, 13-8, and 13-9.

1. Remove the IDE CD-ROM drive from the protective packaging, and place it on an antistatic surface.
2. Record the model and serial numbers of the drive in your equipment log.
3. Set any jumpers and switches on the drive according to the manufacturer's instructions.
4. Using two screws of the appropriate size and length (not supplied), attach each plastic slide rail to the drive.
5. Orient the drive so that the slide rails engage in the bay guide rails, and push the drive into the bay until the slide rails lock in place.
6. Connect the power signal cables to the drive.
7. Reinstall the snap-on plastic drive bay cover as described in Chapter 11.
8. Reinstall the top and side covers as described in Chapter 11.
9. This step is optional. Run the SSU or Setup to specify that the IDE CD-ROM drive is the boot device. For information about running these utilities, see Chapter 5, "System Setup Utility: When to Run," and Chapter 4, "Setup Utility: When to Run."

14 Power Distribution Backplane: Description/Voltages

This chapter describes the power distribution backplane.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see “Safety Guidelines” on page 125.

Power Distribution Backplane

The power backplane distributes the power load of the server among three or four 420 watt autoranging power supplies. It serves as an interface between the individual power supplies, the interconnect backplane, and the WideUltra SCSI hot-docking backplane.

The power backplane distributes the following voltages and maximum currents. These are the backplane limits, not the power supply.

Voltage	Destination	Maximum Current
+12 V	Interconnect backplane	33 A
+5 V	Interconnect backplane	60 A
+3.3 V	Interconnect backplane	42 A
5 V standby	Interconnect backplane	360 mA
-12 V	Interconnect backplane	2 A
+12 V	SCSI hot-docking backplane	5 A
+12 V, 240 VA	SCSI hot-docking backplane	34.5 A Total
+5 V, 240 VA	SCSI hot-docking backplane	22 A

240 VA Protection

For safety reasons, the exposed power circuits are limited to 240 VA. Because power for the hard disk drive is exposed on the hot-docking backplane, 240 VA limited 5 V and 12 V sources are required. If the set point of 240 VA is exceeded, the current sensing feature will shut down the entire power system. In case of a 240 VA shutdown, all DC voltages are shut down except 5 V standby and VBIAS. They remain down until AC power to the server is cycled. (To remove AC power from the server, you must unplug each power cord from each power supply or wall outlet.)

Two-speed Fan Voltage

The low voltage setting allows the fans to run at a slower speed to minimize acoustic noise under normal conditions. When the hot-docking backplane senses a fan failure, the voltage is set to high to increase the speed of the fans. For example, when the fan speed drops below 2300 RPMs on the CPU baseboard side of the chassis or 2200 RPMs on the I/O baseboard side of the chassis, the voltage for the fans goes high. Fan speed monitoring and high/low voltage control is done by the hot-docking backplane microcontroller. The power distribution backplane responds to the hot-docking backplane microcontroller by providing the appropriate voltage to the fans.

I^2C Bus

The private I^2C bus monitors failures and voltage margining in the server. The 5 V standby voltage provides power for the bus, and it is available even when the server power is off.

Power Supply Present and Fault Detection

A port on the I^2C bus monitors the presence and fault lines of each power supply. When the presence detect line is low, the power supply is present. When the fault detect line is high, a fault condition has occurred in the power supply. To clear the fault, you must remove and reapply AC power to the power supply.

Power Supply Revision Detection

When the revision detect signal is asserted HIGH, it indicates that all present supplies are 420 watt autoranging supplies. Desertion of the signal does not imply insufficient power capability but indicates that some configurations could overload the supplies. The signal is monitored via a port on the private I^2C bus.

Interconnect Cable Detect

To prevent the server from being operated when the interconnect power cables are disconnected, a cable detect circuit senses the -12 V on two of the three cables. The third cable supplies -12 V to the interconnect backplane. If the sense line of one cable is high, that cable is missing. If the sense lines of both cables are high, at least two of the three interconnect power cables are missing. If the sense lines of both cables are low, all three cables are installed. The cables can only be sensed after power is applied. Server management firmware monitors the cable detect sense lines via the private I^2C bus.

Fourth Power Supply Cable Good Detection

The fourth power supply connects to the power distribution backplane through two power cables and one signal cable. If the server is powered up while missing one of these three cables, the other cables, backplane, or power supply could be damaged. The cable good-detect circuit prevents the fourth power supply from powering up if all three of its cables are not correctly connected. The cable-detect signal is daisy-chained through the cables of the fourth power supply; any cable missing breaks the chain and prevents the fourth power supply from powering up.

Power Good

If the power-good signal for a power supply is asserted high, it signifies that all voltages are available and stable. The power-good signals from all supplies are Ored to create system power good.

Power On

When the power-on signal is asserted from the front panel, the power supplies power up if there is no 240 VA shutdown condition. The fourth supply powers up only if all three cables are detected.

5 V Quick Discharge

The quick discharge circuit fully discharges the 5 V bus after power down. The circuit starts discharging the bus until the voltage droops to around 1 V.

15 SCSI Hot-docking Backplane: Description/SCSI IDs

This chapter describes the SCSI hot-docking backplane and lists the SCSI IDs.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see "Safety Guidelines" on page 125.

SCSI Hot-docking Backplane

The WideUltra SCSI hot-docking backplane supports hot-swapping of SCA-type SCSI drives, managing the enclosure (chassis), and monitoring server functions conforming to the *SCSI-Accessed Fault-Tolerant Enclosures* (SAF-TE) specification. The backplane provides

- two independent SCSI channels (six drives per channel)
- 12 SCA-2 connectors for SCA-type SCSI hard disk drives
- active terminators that terminate the backplane end of the SCSI bus (SCSI-3 compliant)
- power control for each drive that automatically powers down a slot when a drive failure is detected and reported or a drive is removed (when a new drive is inserted, the power control waits a few moments and then applies power to the new drive)
- three light-emitting diodes (LEDs) for each drive
  - power LEDs indicate the drives are receiving power
  - activity LEDs indicate the drives are being accessed
  - drive fault LEDs indicate the failure status of each drive (during server initialization, they flash for one second)
- intrachassis I^2C bus
- I^2C bus temperature sensor for each microcontroller
- three +12 V connectors for fans with tachometers
- interchassis I^2C bus support, per SAF-TE specification
- serial EEPROM for nonvolatile information storage

The SCA-2 connectors on the hot-docking backplane provide control signals and power for up to 12 wide/fast 3.5-inch SCA-type SCSI hard disk drives. The backplane receives control signals from an Adaptec 3940AUWD host adapter installed in a PCI slot on the I/O baseboard. It gets power through two multiple-conductor cables connected to the power distribution backplane.

The temperature sensor on the hot-docking backplane provides temperature information to other devices in the server through enclosure service messages.

The hot-docking backplane power control provides powering down of a drive when a failure is detected and reported to the SCSI bus through enclosure service messages. When a new drive is inserted in an SCA connector, the power control waits a short time for the drive to become fully seated and then applies power to the drive. Power control also lets you insert and store a spare drive in an SCA connector. When a drive fails, the spare drive can be put into service.

SCSI ID Configurations

The SCSI chip on the hot-docking backplane uses the SAF-TE protocol to communicate with the I/O baseboard. Because this chip uses SCSI ID 6, other SCSI devices cannot use this ID address. For reference, record in your equipment log the SCSI IDs of the devices.

SCSI Bus A		SCSI Bus B	
SCSI ID	**SCA Connector**	**SCSI ID**	**SCA Connector**
IDO	J10	IDO	J20
ID1	J11	ID1	J21
ID2	J12	ID2	J22
ID3	J13	ID3	J23
ID4	J14	ID4	J24
ID5	J15	ID5	J25

SCSI Hot-docking Backplane Connectors

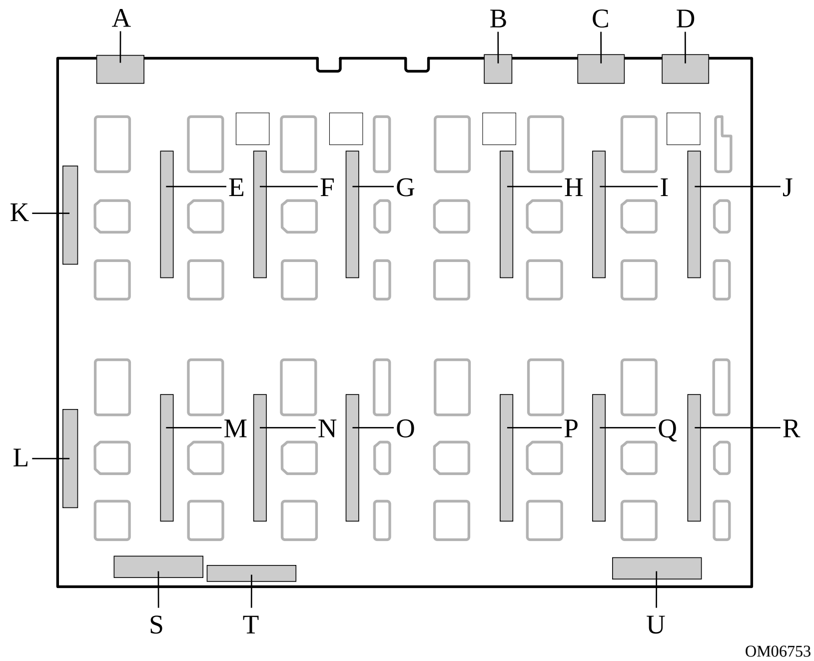


Figure 15-1. SCSI Backplane

A	Three-fan connector for I/O baseboard fans
B	Intrusion switch connector
C	Three-fan connector for CPU baseboard fans
D	Three-fan connector for CPU baseboard fans
E	J15, SCSI bus A, drive ID 5
F	J14, SCSI bus A, drive ID 4
G	J13, SCSI bus A, drive ID 3
H	J12, SCSI bus A, drive ID 2
I	J11, SCSI bus A, drive ID 1
J	J10, SCSI bus A, drive ID 0
K	J1, SCSI bus A input
L	J2, SCSI bus B input
M	J25, SCSI bus B, drive ID 5
N	J24, SCSI bus B, drive ID 4
O	J23, SCSI bus B, drive ID 3
P	J22, SCSI bus B, drive ID 2
Q	J21, SCSI bus B, drive ID 1
R	J20, SCSI bus B, drive ID 0
S	+12 V power connector
T	Hot-swap control connector
U	+5 V power connector

Wide/Fast SCSI Input16-Bit Connectors, J1 & J2

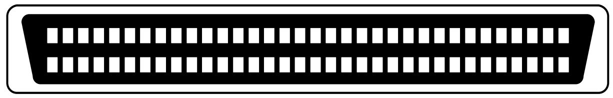


Figure 15-2. SCSI 68-pin Connector

Signal	Connector Input Pin	SCSI Bus Pin	SCSI Bus Pin	Connector Input Pin	Signal
Ground	1	1	2	35	DB 12_L
Ground	2	3	4	36	DB 13_L
Ground	3	5	6	37	DB 14_L
Ground	4	7	8	38	DB 15_L
Ground	5	9	10	39	DB P1_L
Ground	6	11	12	40	DB 0_L
Ground	7	13	14	41	DB 1_L
Ground	8	15	16	42	DB 2_L
Ground	9	17	18	43	DB 3_L
Ground	10	19	20	44	DB 4_L
Ground	11	21	22	45	DB 5_L
Ground	12	23	24	46	DB 6_L
Ground	13	25	26	47	DB 7_L
Ground	14	27	28	48	DB P_L
Ground	15	29	30	49	Ground
Ground	16	31	32	50	Ground
Reserved	17	33	34	51	Reserved
Reserved	18	35	36	52	Reserved
Reserved	19	37	38	53	Reserved
Ground	20	39	40	54	Ground
Ground	21	41	42	55	ATN_L
Ground	22	43	44	56	Ground
Ground	23	45	46	57	BSY_L
Ground	24	47	48	58	ACK_L
Ground	25	49	50	59	RST_L

continued

Wide/Fast SCSI Input16-Bit Connectors, J1 & J2 (continued)

Signal	Connector Input Pin	SCSI Bus Pin	SCSI Bus Pin	Connector Input Pin	Signal
Ground	26	51	52	60	MSG_L
Ground	27	53	54	61	SEL_L
Ground	28	55	56	62	C/D_L
Ground	29	57	58	63	REQ_L
Ground	30	59	60	64	I/O_L
Ground	31	61	62	65	DB 8_L
Ground	32	63	64	66	DB 9_L
Ground	33	65	66	67	DB 10_L
Ground	34	67	68	68	DB 11_L

Wide/Fast SCSI 16-Bit SCA Type Connectors, J10-J15 & J20-J25

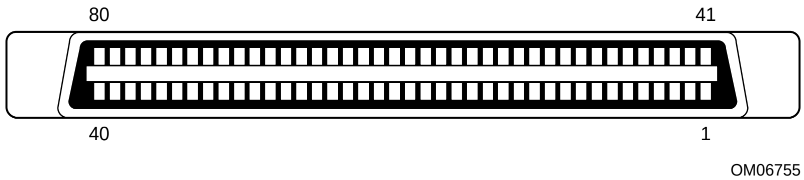


Figure 15-3. SCSI SCA 80-pin Connector

Pin	Signal	Pin	Signal
1	+12 V Charge	41	12 V Ground
2	+12 V	42	12 V Ground
3	+12 V	43	12 V Ground
4	+12 V	44	Mated 1
5	Reserved/ESI-1	45	EFW_L
6	Reserved/ESI-2	46	DIFFSNS
7	DB 11_L	47	Ground
8	DB 10_L	48	Ground
9	DB 9_L	49	Ground
10	DB 8_L	50	Ground
11	I/O_L	51	Ground
12	REQ_L	52	Ground
13	C/D_L	53	Ground
14	SEL_L	54	Ground
15	MSG_L	55	Ground
16	RST_L	56	Ground
17	ACK_L	57	Ground
18	BSY_L	58	Ground
19	ATN_L	59	Ground
20	DB P_L	60	Ground
21	DB 7_L	61	Ground
22	DB 6_L	62	Ground
23	DB 5_L	63	Ground
24	DB 4_L	64	Ground
25	DB 3_L	65	Ground
26	DB 2_L	66	Ground
27	DB 1_L	67	Ground
28	DB 0_L	68	Ground
29	DB P1_L	69	Ground

continued

Wide/Fast SCSI 16-Bit SCA Type Connectors, J10-J15 & J20-J25 (continued)

Pin	Signal	Pin	Signal
30	DB 15_L	70	Ground
31	DB 14_L	71	Ground
32	DB 13_L	72	Ground
33	DB 12_L	73	Ground
34	+5 V	74	Mated 2
35	+5 V	75	5V Ground
36	+5 V Charge	76	5V Ground
37	Spindle Sync	77	Active LED Out
38	MTRON	78	DLYD_START
39	SCSI ID (0)	79	SCSI ID (1)
40	SCSI ID (2)	80	SCSI ID (3)

Hot-swap Control Connector

Pin	Signal	Pin	Signal
1	Ground	18	Ground
2	Ground	19	Intrusion_L
3	SCL	20	Ground
4	Ground	21	Fan_12V_10V_L
5	Key	22	Ground
6	Ground	23	Intrusion_IN
7	SDA	24	Ground
8	Ground	25	HSBP_PGM_MODE
9	Not used	26	Ground
10	Ground	27	HSBP_PGM_ENABLE
11	PWR_GOOD	28	Ground
12	Ground	29	HSBP_PGM_SCLK
13	Interlock	30	Ground
14	Ground	31	HSBP_PGM_SDI
15	RST_I2C_L	32	Ground
16	Ground	33	HSBP_PGM_SDO
17	Interlock_IN	34	Ground

+12 V Power Connector

Pin	Signal	Pin	Signal
1	+12 V_R	11	+12 V_R
2	Ground	12	Ground
3	+12 V_R	13	+12 V_R
4	Ground	14	Ground
5	+12 V_L	15	+12 V_L
6	Ground	16	Ground
7	+12 V_L	17	+12 V_L
8	Ground	18	Ground
9	Not used	19	+12 V FAN_PWR
10	Ground	20	Ground

+5 V Power Connector

Pin	Signal	Pin	Signal
1	+5 V	11	+5 V
2	Ground	12	Ground
3	+5 V	13	+5 V
4	Ground	14	Ground
5	+5 V	15	+5 V
6	Ground	16	Ground
7	+5 V	17	+5 V
8	Ground	18	Ground
9	+5 V	19	+5 V
10	Ground	20	Ground

Fan Connector

Pin	Signal
1	Ground
2	signal
3	12 V FAN_PWR
4	Ground
5	signal
6	12 V FAN_PWR
7	Ground
8	signal
9	12 V FAN_PWR

Intrusion Switch Connector

Pin	Signal
1	intrusion
2	Intrusion2 (common)
3	Intrusion2 (common)
4	Intrusion_in

16 I/O Baseboard: Description/Setting Configuration Jumpers

This chapter describes the I/O baseboard and tells how to configure the jumpers.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see “Safety Guidelines” on page 125.

Input/Output (I/O) Baseboard Features

The I/O baseboard provides the primary I/O interface of the server. The board also interfaces with the CPU baseboard through the interconnect backplane. The I/O baseboard provides

- three functionally independent PCI buses
  - 32-bit primary PCI bus
  - 32-bit secondary PCI bus
  - 64-bit PCI bus
- integrated Adaptec AIC-7880 SCSI controller (user-accessible devices only; for example, DVD, tape, and CD-ROM drives)
- integrated IDE controller that supports two IDE buses
- onboard video, serial, parallel, and universal serial bus (USB) ports
- user-accessible expansion slots
  - two 32-bit primary PCI bus slots (one of them is shared with the ISA slot)
  - four 32-bit secondary PCI bus slots
  - five 64-bit PCI bus slots
  - one 16-bit ISA bus slot (shared with one of the 32-bit primary PCI bus slots)
- I^2C server management interface
- Expander bus interface connector

32-bit PCI Expansion Slots

Six 32-bit PCI bus master slots (two primary and four secondary) on the I/O baseboard provide expansion enhancement. One 32-bit primary slot shares a common chassis expansion slot with the ISA slot; you can use the shared slot for either PCI or ISA but not both. The PCI bus operates at 33 MHz and provides

- 32-bit memory addressing
- +3.3 V and +5 V power environments
- burst transfers of up to 133 MB/sec
- 8-, 16-, or 32-bit data transfers
- plug and play configuration
- hierarchical bus to maximize connectivity

➡ **NOTE**

Add-in video boards must be installed in the 32-bit primary PCI slots.

64-bit PCI Expansion Slots

Five 64-bit PCI bus master slots on a dedicated high performance bus on the I/O baseboard provide maximum performance at the wider bus width.

➡ **NOTE**

Both 32-bit and 64-bit PCI boards may be installed in the 64-bit slots. However, the 32-bit boards will not take advantage of the extra bandwidth provided by the 64-bit bus.

Add-in video boards must be installed in the 32-bit primary PCI slots.

ISA Expansion Slot

The ISA bus master slot on the I/O baseboard provides for legacy expansion. The ISA slot shares a common chassis I/O expansion slot with a 32-bit PCI slot; you can use the shared slot for either ISA or PCI but not both. The ISA bus operates at up to 8.33 MHz and provides

- 24-bit memory addressing
- type A transfers at 5.33 MB per second
- type B transfers at 8 MB per second
- 8- or 16-bit data transfers
- interrupt sharing

PCI Video Controller

The onboard Cirrus Logic GD5446 PCI VisualMedia accelerator is a 64-bit DRAM-based SVGA controller with hardware-accelerated BitBLT transfers of data, video playback, and video capture to the frame buffer. The frame buffer is addressable through a 16-Mbyte window consisting of three, 4-Mbyte byte-swapping apertures, and a special video aperture. The SVGA controller also features a 64-bit GUI BitBLT engine with double-buffered, memory-mapped control registers. The control registers are relocatable anywhere in the 64-Kbyte space; this allows multiple devices in a single server.

The SVGA controller is fully compatible with these video standards: CGA†, EGA†, Hercules graphics, MDA†, and VGA. The server comes with 2 MB of onboard video DRAM allowing the controller to support 132-column text modes and high resolution graphics with 1280 x 1024 x 16 colors. Depending on the environment, the controller displays up to 16.7 M colors in some video resolutions.

The SVGA controller supports analog VGA monitors (single and multiple frequency, interlaced and noninterlaced) with a maximum vertical retrace interlaced frequency of 87 Hz.

Video Modes

The CL-GD5446 provides all the standard IBM VGA modes. The following tables show all the supported video modes.

Standard VGA Modes

Modes in Hex	Colors (number/ palette size)	Char. x Row	Char. Cell	Resolution	Display Mode	Pixel Freq. (MHz)	Horiz. Freq. (KHz)	Vert. Freq. (Hz)
0, 1	16/256K	40 x 25	9 x 16	360 X 400	Text	14	31.5	70
2, 3	16/256K	80 x 25	9 x 16	720 X 400	Text	28	31.5	70
4, 5	4/256K	40 x 25	8 x 8	320 X 200	Graphics	12.5	31.5	70
6	2/256K	80 x 25	8 x 8	640 X 200	Graphics	25	31.5	70
7	Mono	80 x 25	9 x 16	720 X 400	Text	28	31.5	70
D	16/256K	40 x 25	8 x 8	320 X 200	Graphics	12.5	31.5	70
E	16/256K	80 x 25	8 x 14	640 X 200	Graphics	25	31.5	70
F	Mono	80 x 25	8 x 14	640 X 350	Graphics	25	31.5	70
10	16/256K	80 x 25	8 x 14	640 X 350	Graphics	25	31.5	70
11	2/256K	80 x 30	8 x 16	640 X 480	Graphics	25	31.5	60
11+	2/256K	80 x 30	8 x 16	640 X 480	Graphics	31.5	37.9	72
11+	2/256K	80 x 30	8 x 16	640 X 480	Graphics	31.5	37.5	75
12	16/256K	80 x 30	8 x 16	640 X 480	Graphics	25	31.5	60
12+	16/256K	80 x 30	8 x 16	640 X 480	Graphics	31.5	37.9	72
12+	16/256K	80 x 30	8 x 16	640 X 480	Graphics	31.5	37.5	75
12+	16/256K	80 x 30	8 x 16	640 X 480	Graphics	35.8	43.3	85
13	256/256K	40 x 25	8 x 8	320 X 200	Graphics	12.5	31.5	70

Extended VGA Modes

Mode(s) in Hex	Colors (number/ palette size)	Char. x Row	Char. Cell	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (KHz)	Vert. Freq. (Hz)
58, 6A	16/256K	100 x 37		800 X 600	36	35.2	56
58, 6A	16/256K	100 x 37		800 X 600	40	37.8	60
58, 6A	16/256K	100 x 37		800 X 600	50	48.1	72
58, 6A	16/256K	100 x 37		800 X 600	49.5	46.9	75
5C	256/256K	100 x 37		800 X 600	36	35.2	56
5C	256/256K	100 x 37		800 X 600	40	37.9	60
5C	256/256K	100 x 37		800 X 600	50	48.1	72
5C	256/256K	100 x 37		800 X 600	49.5	46.9	75
5C	256/256K	100 x 37		800 X 600	56.25	53.7	85
5D*	16/256K	128 x 48		1024 X 768	44.9	35.5	43
5D	16/256K	128 x 48		1024 X 768	65	48.3	60
5D	16/256K	128 x 48		1024 X 768	75	56	70
5D*	16/256K	128 x 48		1024 X 768	77	58	72
5D	16/256K	128 x 48		1024 X 768	78.5	60	75
5E	256/256K	80 x 25		640 x 400	25	31.5	70
5F	256/256K	80 x 30		640 X 480	25	31.5	60
5F	256/256K	80 x 30		640 X 480	31.5	37.9	72
5F	256/256K	80 x 30		640 X 480	31.5	37.5	75
5F	256/256K	80 x 30		640 X 480	36	43.3	85
60*	256/256K	128 x 48		1024 X 768	44.9	35.5	43
60	256/256K	128 x 48		1024 X 768	65	48.3	60
60	256/256K	128 x 48		1024 X 768	75	56	70
60	256/256K	128 x 48		1024 X 768	77	58	72
60	256/256K	128 x 48		1024 X 768	78.7	60	75
60	256/256K	128 x 48		1024 X 768	94.5	68.3	85
64	64K	-	-	640 X 480	25	31.5	60
64	64K	-	-	640 X 480	31.5	37.9	72
64	64K	-	-	640 X 480	31.5	37.5	75
64	64K	-	-	640 X 480	36	43.3	85
65	64K	-	-	800 X 600	36	35.2	56
65	64K	-	-	800 X 600	40	37.8	60
65	64K	-	-	800 X 600	50	48.1	72
65	64K	-	-	800 X 600	49.5	46.9	75
65	64K	-	-	800 X 600	56.25	53.7	85
66	32K‡	-	-	640 X 480	25	31.5	60
66	32K‡	-	-	640 X 480	31.5	37.9	72

* Interlaced Mode. ‡ 32K Direct-Color/256-Color Mixed Mode.

continued

Extended VGA Modes (continued)

Mode(s) in Hex	Colors (number/ palette size)	Char. x Row	Char. Cell	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (KHz)	Vert. Freq. (Hz)
66	32K[‡]	-	-	640 X 480	31.5	37.5	75
66	32K[‡]	-	-	640 X 480	36	43.3	85
67	32K[‡]	-	-	800 X 600	36	35.2	56
67	32K[‡]	-	-	800 X 600	40	37.8	60
67	32K[‡]	-	-	800 X 600	50	48.1	72
67	32K[‡]	-	-	800 X 600	49.5	46.9	75
67	32K[‡]	-	-	800 X 600	56.25	53.7	85
68	32K[‡]	-	-	1024 x 768	44.9	35.5	43
68	32K[‡]	-	-	1024 x 768	65	48.3	60
68	32K[‡]	-	-	1024 x 768	75	56	70
68	32K[‡]	-	-	1024 x 768	78.7	60	75
68	32K[‡]	-	-	1024 x 768	94.5	68.3	85
69*	32K[‡]	-	-	1280 x 1024	75	48	43
69*	32K[‡]	-	-	1280 x 1024	108	65	60
6C*	16/256K	160 x 64	8 x 16	1280 X 1024	75	48	43
6D*	256/256K	160 x 64	8 x 16	1280 X 1024	75	48	43
6D	256/256K	160 x 64	8 x 16	1280 X 1024	108	65	60
6D	256/256K	160 x 64	8 x 16	1280 X 1024	126	76	71.2
6D	256/256K	160 x 64	8 x 16	1280 X 1024	135	80	75
71	16M	-	-	640 X 480	25	31.5	60
71	16M	-	-	640 X 480	31.5	37.9	72
71	16M	-	-	640 X 480	31.5	37.5	75
71	16M	-	-	640 X 480	36	43.3	85
74*	64K[†]	-	-	1024 X 768	44.9	35.5	43
74	64K	-	-	1024 X 768	65	48.3	60
74	64K	-	-	1024 X 768	75	56	70
74	64K	-	-	1024 X 768	78.7	60	75
74	64K	-	-	1024 X 768	94.5	68.3	85
75*	64K[†]	-	-	1280 X 1024	75	48	43
78	16M	-	-	800 x 600	36	35.2	56
78	16M	-	-	800 x 600	40	37.8	60
78	16M	-	-	800 x 600	50	48.1	72
78	16M	-	-	800 x 600	49.5	46.9	75
78	16M	-	-	800 x 600	56.25	53.7	85
79	16M	-	-	800 x 600	44.9	35.5	43
79	16M	-	-	1024 x 768	65	483	60

* Interlaced Mode. ‡ 32K Direct-Color/256-Color Mixed Mode.

continued

Extended VGA Modes (continued)

Mode(s) in Hex	Colors (number/ palette size)	Char. x Row	Char. Cell	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (KHz)	Vert. Freq. (Hz)
79	16M	-	-	1024 x 768	75	56	70
79	16M	-	-	1024 x 768	78.7	60	75
79	16M	-	-	1024 x 768	94.5	68.3	85
7C	256/256K	144 x 54	8 x 16	1152 x 864	94.5	63.9	70
7C	256/256K	144 x 54	8 x 16	1152 x 864	108	67.5	75
7D	64K	-	-	1152 x 864	94.5	63.9	70
7D	64K	-	-	1152 x 864	94.5	67.5	75

* Interlaced Mode. ‡ 32K Direct-Color/256-Color Mixed Mode.

SCSI Controllers

Adaptec AIC-7880

The I/O baseboard includes an Adaptec AIC-7880 wide/fast-20 SCSI III Ultra-SCSI single-chip controller integrated as a PCI bus master. The controller supports data path widths of 8-bit (narrow SCSI) at a data transfer rate of 20 MB/sec and 16-bit (wide SCSI) at a data transfer rate of 40 MB/sec. As a 32-bit PCI bus master, the controller maximizes data transfer on the PCI local bus at 133 MB/sec data bursts.

The AIC-7880 is intended for user-accessible devices such as tape drives, CD-ROM drives, and DVD drives installed in the 5.25-inch drive bays. The controller can be configured for either wide/fast or ultra SCSI modes. The AIC-7880 is not intended for mass storage devices. However, it may be used to control a single boot hard disk drive that can be installed on top of the 5.25-inch drive bays.

Adaptec AHA-3940AUW

The AHA-3940AUW MultiChannel PCI-to-UltraSCSI controller is installed in one of the 32-bit PCI expansion slots on the I/O baseboard. The AHA-3940AUW provides a 16-bit interface between the PCI bus and the dual channel SCSI hot-docking backplane. Up to 12 SCSI hard disk drives can be installed in the 3.5-inch hot-docking bays.

IDE Controller

The PIIX4E multifunction device on the I/O baseboard acts as a PCI-based Fast IDE controller that supports

- PIO and IDE DMA/bus master operations
- Mode 4 timings
- transfer rates up to 33 MB/sec
- buffering for PCI/IDE burst transfers
- master/slave IDE mode

Server Management (SM)

During normal operation, SM receives information about the status of the server. SM also monitors the power supply voltages and operating temperature of the server. If SM determines that the server is not operating within specified limits, it attempts to notify a supervisor or an administrator about the condition of the server. The microcontrollers on the I/O baseboard, hot-docking backplane, power distribution backplane, and front panel board implement the server management features.

Front Panel Controller (FPC)

Where located: on the front panel board

What it manages:

- server power control consolidation from several sources
  - push-button power signal from the front panel connector
  - real-time clock (RTC)
  - server monitor module (SMM), if installed
  - commands from the Intelligent Platform Management Bus (IPMB)
- power and reset switch interfaces
- fault LEDs
- chassis intrusion switch
- chassis intrusion detection and reporting
- chassis and I/O baseboard ID Field Replacement Unit (FRU) inventory interface
- server hard reset generation
- server power fault indication
- Intelligent Chassis Management Bus (ICMB) bridge device
- RS-232 connection
- LCD interface

Board Management Controller (BMC)

Where located: on the I/O baseboard

What it provides:

- temperature and voltage monitoring of the I/O and CPU baseboards
- threshold comparison functions
- SMI (systems management interrupt) generation
- watchdog timer and certain GPIO (general purpose input/output) functions
- fault-resilient booting
- processor presence, Voltage ID (VID), IERR, and thermal trip monitoring
- server event log, event time stamping, sensor data record information, and DIMM ID information interface
- current event status and sensor readings when polled by System Management Software

Hot-swap Controller (HSC)

Where located: on the SCSI hot-docking backplane

What it does:

- implements the SAF-TE command set
- controls the fault lights and drive power-on
- provides a path for management information via SCSI
- retrieves drive fault status, backplane temperature, and fan failure information via the IPMB
- queries the status of the power distribution backplane by sending messages to the power share controller (PSC) via the IPMB
- controls drive power-on and power-down, facilitating hot-swapping
- monitors and communicates system fan failures
- controls fan voltage delivered from the power distribution backplane

I/O Riser Card

The I/O riser card contains all the legacy I/O connections such as video, keyboard, mouse, etc. The card plugs into the legacy connector on the I/O baseboard and provides the following external connectors:

- PS/2-compatible keyboard (interchangeable with the mouse)
- PS/2-compatible mouse (interchangeable with the keyboard)
- parallel port
- two serial ports
- VGA video port
- ICMB connector interface

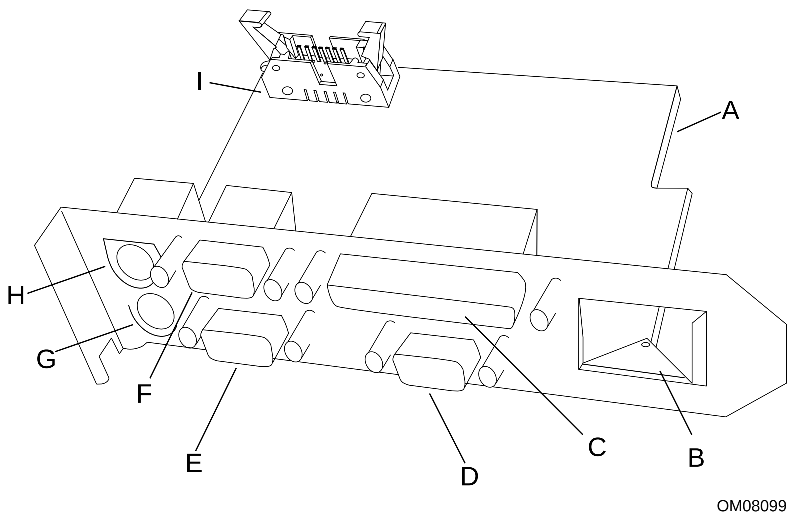


Figure 16-1. I/O Riser Card

A I/O riser card
B USB (connectors mounted on I/O baseboard)
C Parallel port
D Video port
E Serial port 2
F Serial port 1
G Keyboard port
H Mouse port
I ICMB connector

I/O Baseboard Configuration Jumpers

You can use the configuration jumpers on the I/O baseboard to recover a BIOS, clear a CMOS password, or clear all CMOS settings. Figure 16-2 shows the jumper positions for the default system configuration. The reserved pins may not be populated in shipping configurations. Table 16-1 shows the minimum default configurations in bold face type.

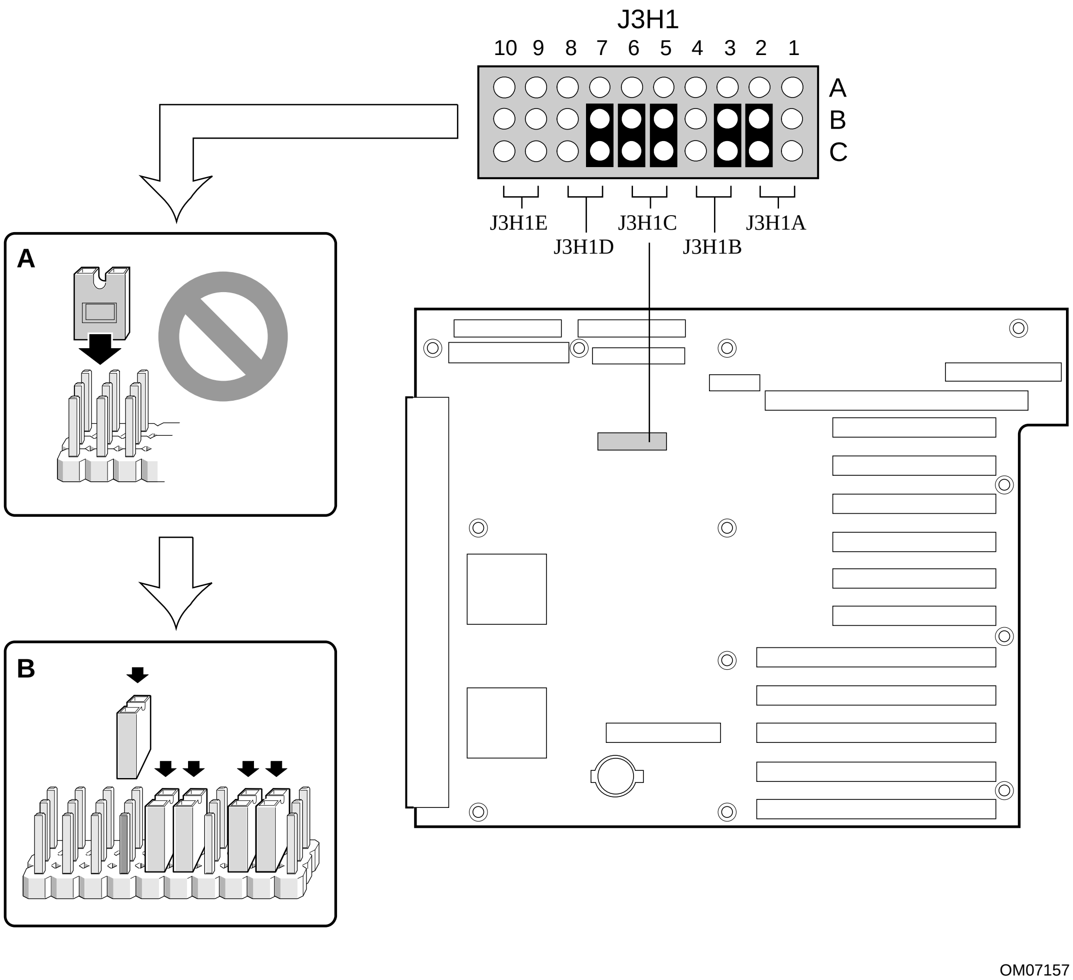


Figure 16-2. J3H1 Configuration Jumper Block

Table 16-1. Configuration Jumpers

Jumper	Pins (default in bold)	Function
J3H1A	1(B-C)	Reserved. No jumper installed.
J3H1A	1(A-B)	Reserved. No jumper installed.
J3H1A	**2(B-C)**	**Permits Server Management to program onboard programmable devices.**
J3H1A	2(A-B)	Do not allow server management to program onboard programmable devices.
J3H1B	**3(B-C)**	**Apply 12 V power to programming pins; flash memory can be updated (written to).**
J3H1B	3(A-B)	Apply ground to programming pins; write protects flash memory.
J3H1B	4(B-C)	Reserved. No jumper installed.
J3H1B	4(A-B)	Reserved. No jumper installed.
J3H1C	**5(B-C)**	**Do not clear CMOS password.**
J3H1C	5(A-B)	Clear CMOS password.
J3H1C	**6(B-C)**	**Do not clear CMOS.**
J3H1C	6(A-B)	Clear CMOS.
J3H1D	**7(B-C)**	**Normal Boot.**
J3H1D	7(A-B)	Boot recovery BIOS.
J3H1D	8(B-C)	Reserved. No jumper installed.
J3H1D	8(A-B)	Reserved. No jumper installed.
J3H1E	9(B-C)	Disable programming of onboard In System Program (ISP) parts. Reserved
J3H1E	9(A-B)	Enable programming of onboard ISP parts. Reserved.
J3H1E	10(B-C)	Reserved. No jumper installed.
J3H1E	10(A-B)	Reserved. No jumper installed.

Restoring CMOS to Default Values

The jumper on J3H1C pins 6(B-C) preserves the settings stored in CMOS nonvolatile memory (NVRAM) during server reset. Moving the jumper to pins 6(A-B) clears CMOS and sets it and the real-time clock (RTC) to the Setup default values during server reset.

To clear CMOS and restore the Setup default values:

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Turn off the server, and unplug the AC power cords from the power supplies or wall outlets.
3. Remove the top and right side covers. See Chapter 11, “Server Covers: Removing/Reinstalling.”
4. Move the jumper on J3H1C from pins 6(B-C) to pins 6(A-B).
5. Reinstall the covers, and plug in the power cords.
6. Turn on the server, and wait for POST to complete. This automatically restores CMOS and RTC to Setup default values. See Chapter 3, “Power-on Self Test: Description/Running.”
7. Turn off the server, unplug the power cords, and remove the top and right side covers.
8. Move the jumper from J3H1C pins 6(A-B) to pins 6(B-C).
9. Reinstall the covers, and plug in the power cords.
10. Run the SSU to configure your server. See Chapter 5, “System Setup Utility: When to Run.”

Clearing the Password

The jumper on J3H1C pins 5(B-C) protects the CMOS password during server reset. Moving the jumper to pins 5(A-B) clears the password during server reset.

To clear the CMOS password:

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Turn off the server, and unplug the AC power cords from the power supplies or wall outlets.
3. Remove the top and right side covers. See Chapter 11, “Server Covers: Removing/Reinstalling.”
4. Move the jumper from J3H1C pins 5(B-C) to pins 5(A-B).
5. Reinstall the covers, and plug in the power cords.
6. Turn on the server, and wait for POST to complete. This automatically clears the password. See Chapter 3, “Power-on Self Test: Description/Running.”
7. Turn off the server, unplug the power cords, and remove the top and right side covers.
8. Move the jumper from J3H1C pins 5(A-B) to pins 5(B-C).
9. Reinstall the covers, and plug in the power cords.
10. Run the SSU to configure your server. See Chapter 5, “System Setup Utility: When to Run.”

Updating the BIOS

The jumper on J3H1B pins 3(B-C) applies +12 V power to the VPP pin on the flash memory device. This allows you to update the BIOS in flash memory with the Flash Update Utility. Moving the jumper to pins 3(A-B) protects the contents of flash memory.

For a copy of the latest system BIOS release, contact your dealer or sales representative.

Before you can update the system BIOS from the Flash Update Utility diskette, you must make the diskette MS-DOS bootable. You must have either MS-DOS version 5.00 or 6.00 (or greater) installed on C:\DOS. To prevent accidentally installing a BIOS for a different type of system, the update utility insures that the BIOS matches the target system.

⇒ **NOTE**

Please review the update utility instructions and the release notes distributed with the update utility and BIOS code before attempting to update the BIOS.

The BIOS update utility allows you to update the

- BIOS in flash memory
- user and logo area of the BIOS
- language section of the BIOS

Recording the Current BIOS Settings

Before updating the BIOS, record your current BIOS settings. You will need them to configure your server at the end of the update procedure.

1. Turn on your video monitor and your server. Each time you turn on or reboot your server POST begins and, after a few seconds, displays this message:

   `Press <F2> to enter Setup`

2. After pressing F2, a few seconds may pass before entering Setup while POST completes tests and initialization functions. When Setup is entered, write down the current settings.

Creating the BIOS Update Diskette

The BIOS update file is a compressed self-extracting archive that contains the files you need to update the BIOS.

1. Copy the BIOS update file to a temporary directory on your hard disk.
2. From the C:\ prompt, change to the temporary directory.
3. To extract the file, type the name of the BIOS update file; for example, type **`10006BI1.EXE`** and press <Enter>. The extracted files include
   - `LICENSE.TXT`—software license agreement
   - `README.TXT`—instructions for the BIOS update
   - `BIOINSTR.TXT`—instructions for creating a bootable diskette
   - `BIOS.EXE`—BIOS update software
4. Insert the bootable diskette into drive A.
5. Change to the temporary directory that holds the `BIOS.EXE` file.
6. Type **`BIOS A:`** and press <Enter> to extract the `BIOS.EXE` file to the diskette.

⇒ **NOTE**

If the extracted files do not include the `BIOS.EXE` file, you must extract the BIOS update file directly to the bootable diskette in drive A.

Example: type **`10006BI1 A:`** and press <Enter>.

Running the BIOS Update Utility

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Insert the update diskette into drive A, and turn on the monitor and server. When the server boots from the diskette, follow the screen prompts.

   If you choose option 1, the server will automatically reboot after the update process completes so that the changes will take effect. Remove the diskette when the server starts to boot.

   If you choose option 2, you must reboot the server by pressing reset or <Enter> after the update process completes for the changes to take effect. Remove the diskette when the server starts to boot.
3. As the server boots, check the BIOS identifier—version number—to make sure the update was successful.
4. When the following message appears, press <F2>.

   ```
   Press <F2> to enter SETUP
   ```
5. After entering Setup, press <F9> to load Setup defaults; then press <Enter> to confirm.
6. Set the Setup options to the settings you wrote down before updating the BIOS.
7. Press <F10> to exit and save the settings; then press <Enter> to confirm and to reboot the server.
8. To protect the contents of flash memory, turn off the server, unplug the power cords from the power supplies or wall outlets, and remove the top and right side covers. See Chapter 11, “Server Covers: Removing/Reinstalling.”
9. Move the jumper from J3H1B pins 3(B-C) to pins 3(A-B) to write-protect the flash memory device.
10. Reinstall the covers, plug in the power cords, and turn on the server.

NOTE

If the system BIOS becomes corrupted during the update process—for example, a power outage occurs—follow the “Recovering the BIOS” procedure on page 218.

Recovering the BIOS

Moving the boot option jumper on J3H1D from pins 7(B-C) to pins 7(A-B) enables the BIOS flash memory boot recovery mode. The BIOS can be corrupted—for example, when the update procedure is aborted due to a power outage. However, flash memory contains a protected area that cannot be corrupted. Code in this area is used to boot the server from drive A when the BIOS has been corrupted. After booting, the Flash Update Utility (IFLASH) is used to automatically recover the BIOS from the BIOS recovery files on the diskette.

To recover the BIOS:

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Turn off the server, and unplug the AC power cords from the power supplies or wall outlets.
3. Remove the top and right side covers. See Chapter 11, “Server Covers: Removing/Reinstalling.”
4. Move the jumper from J3H1D pins 7(B-C) to pins 7(A-B) to allow the server to boot from the recovery BIOS.
5. Reinstall the top and side covers, plug in the power cords, and insert the Flash Update Utility diskette in drive A.
6. Turn on the monitor and server. After the server boots, the speaker emits a single beep and the recovery process starts—it takes about three minutes. When the recovery process completes, the speaker emits two beeps.

   While in the recovery mode, there is no screen display on the monitor. The keyboard is disabled as the server automatically recovers the BIOS. The following beep codes describe the recovery status.

Beep Code	Message
1	Recovery process starting.
2	Successful completion, no errors.
4	The server could not boot from the diskette; it may not be bootable.
Continuous series of low beeps	The wrong BIOS recovery files are being used and/or the flash memory jumper is in the wrong position.

7. Remove the diskette, turn off the server and monitor, unplug the power cords, and remove the top and right side covers.
8. Move the jumper from J3H1D pins 7(A-B) to pins 7(B-C)—the normal boot mode.
9. Reinstall the covers, and plug in the power cords.
10. After running the special recovery mode, run the SSU to specify a new password. See Chapter 5, “System Setup Utility: When to Run.”

Updating BMC, FPC, and HSC Firmware

For a copy of the latest BMC, FPC, and HSC firmware releases, contact your dealer or sales representative.

Before you can update the firmware from the firmware update diskettes, you must make them MS-DOS bootable. You must have MS-DOS version 6.00 (or greater) installed on C:\DOS.

NOTE

Please review the firmware release notes distributed with the firmware update package before attempting to update the firmware of any microcontroller.

Boot Sequence

The I/O baseboard provides the server with a variety of methods for detecting and booting an operating system. The BIOS scans devices and user configurable option slots in a specific sequence. Knowing the precise sequence the BIOS detects, sets up, and boots assists in defining the server configuration.

Location	Bus	IDSEL	Comment
J1F2	ISA	None	Diskette Drive
J2A1	ISA	None	Compatibility (Legacy) Boot Slot 1[1]
J1F1	IDE	None	Primary IDE
J2H1	IDE	None	Secondary IDE
P1	Primary PCI	25	Expansion Slot[1]
J1H2	Primary PCI	26	On board SCSI
P2	Primary PCI	27	Expansion Slot[1]
U3D1	Primary PCI	28	On board Video
U3G2	Primary PCI	31	PIIX4 Component
P3	Secondary PCI	20	Expansion Slot
P4	Secondary PCI	21	Expansion Slot
P5	Secondary PCI	22	Expansion Slot
P6	Secondary PCI	23	Expansion Slot
U4D1	Secondary PCI	25	PID Component
P7	64 Bit PCI	20	Expansion Slot
P8	64 Bit PCI	21	Expansion Slot
P9	64 Bit PCI	22	Expansion Slot
P10	64 Bit PCI	23	Expansion Slot
P11	64 Bit PCI	24	Expansion Slot

1. Install user supplied video adapters only in slots P1 or P2.

I/O Baseboard Layout

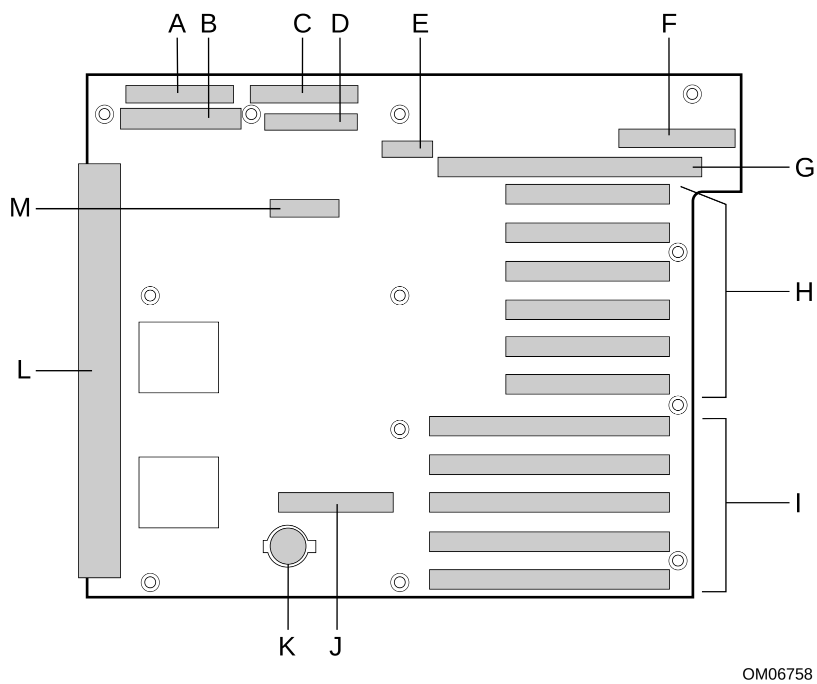


Figure 16-3. I/O Baseboard Layout

A	Primary IDE port
B	Wide SCSI port
C	Secondary IDE port
D	Diskette drive port
E	Front panel connector
F	I/O riser card
G	16-bit ISA expansion slot
H	32-bit PCI expansion slots
I	64-bit PCI expansion slots
J	Reserved
K	Battery
L	Interconnect backplane connector (expander bus)
M	J3H1 jumper block

I/O Baseboard Connectors

Expander Bus Connector: Signal Section

Signal	Pin	Signal	Pin	Signal	Pin
	A1	GND (Ground)	B1	GND	C1
IO_TCK	A2		B2		C2
IO_TDO	A3	GND	B3	IO_TMS	C3
BMC_SPI_BUS(1)	A4	IO_TDI	B4	PWRGDB	C4
BMC_SPI_BUS(6)	A5	GND	B5	A20M_L	C5
BMC_SPI_BUS(0)	A6	CPU_SPI_RESET_L	B6	PROC_RESET_L	C6
I2C_BMC_SCL	A7	GND	B7	GND	C7
I2C_BMC_SDA	A8	BMC_SPI_BUS(3)	B8	BMC_SPI_BUS(5)	C8
NMI_5V	A9	GND	B9	SMI_L	C9
GND	A10	IGNNE_L	B10	I2C_GLOBAL_SDA	C10
X0D_L(0)	A11	GND	B11	GND	C11
X0D_L(1)	A12	X0XRTS_L	B12	X0HRTS_L	C12
X0D_L(3)	A13	GND	B13	GND	C13
X0D_L(4)	A14	X0D_L(2)	B14	X0BE_L(0)	C14
GND	A15	GND	B15	GND	C15
X0D_L(6)	A16	X0D_L(5)	B16	X0PAR_L	C16
X0D_L(8)	A17	GND	B17	GND	C17
X0D_L(9)	A18	X0D_L(7)	B18	X0ADS_L	C18
GND	A19	GND	B19	X0D_L(11)	C19
X0D_L(12)	A20	X0D_L(10)	B20	X0BE_L(1)	C20
X0D_L(14)	A21	GND	B21	X0XSTBN_L	C21
X0D_L(15)	A22	X0D_L(13)	B22	GND	C22
GND	A23	GND	B23	ISP_HSBP_SDO	C23
X0CLK	A24		B24	GND	C24
GND	A25	GND	B25		C25
	A26	ISP_SCLK	B26	GND	C26
	A27	GND	B27		C27
ISP_SDO	A28		B28	GND	C28
INTRUSION_L	A29	GND	B29		C29
ISP_SDI	A30		B30		C30
VCC_STDBY	A31	GND	B31	GND	C31
I2C_FPC_SCL	A32	VCC_STDBY	B32		C32
I2C_FPC_SDA	A33	GND	B33	GND	C33
GND	A34	I2C_DS2P_SDA	B34	I2C_DS2P_SDA	C34
X1D_L(0)	A35	GND	B35	GND	C35

continued

Expander Bus Connector: Signal Section A, B, & C (continued)

Signal	Pin	Signal	Pin	Signal	Pin
X1D_L(1)	A36	X1XRTS_L	B36	X1HRTS_L	C36
X1D_L(3)	A37	GND	B37	GND	C37
X1D_L(4)	A38	X1D_L(2)	B38	X1BE_L(0)	C38
GND	A39	GND	B39	GND	C39
X1D_L(6)	A40	X1D_L(5)	B40	X1PAR_L	C40
X1D_L(8)	A41	GND	B41	GND	C41
X1D_L(9)	A42	X1D_L(7)	B42	X1ADS_L	C42
GND	A43	GND	B43	X1D_L(11)	C43
X1D_L(12)	A44	X1D_L(10)	B44	X1BE_L(1)	C44
X1D_L(14)	A45	GND	B45	X1XSTBN_L	C45
X1D_L(15)	A46	X1D_L(13)	B46	GND	C46
GND	A47	GND	B47		C47
X1CLK	A48		B48	GND	C48

Expander Bus Connector: Signal Section D & E

Signal	Pin	Signal	Pin
	D1	PIC_CLK	E1
STP_CLK_L	D2	GND	E2
IO_TRST_L	D3	PICD(1)	E3
PICD(0)	D4	GND	E4
INIT_L	D5	RESET_PWR_DIST_L	E5
GND	D6	GND	E6
BMC_SPI_BUS(2)	D7	BMC_SPI_BUS(4)	E7
GND	D8	GND	E8
X0IB_L	D9	CIB_INT0	E9
IO_PWRGD	D10	GND	E10
I2C_GLOBAL_SCL	D11	INTR	E11
GND	D12	GND	E12
RESET_HSBP_L	D13	FERR_L	E13
GND	D14	GND	E14
	D15	X0BLK_L	E15
GND	D16	GND	E16
	D17	X0RST_L	E17
GND	D18	GND	E18
	D19		E19
GND	D20	GND	E20
X0XSTBP_L	D21		E21
GND	D22	GND	E22

continued

Expander Bus Connector: Signal Section D & E (continued)

Signal	Pin	Signal	Pin
X0HSTBP_L	D23	GND	E23
X0HSTBN_L	D24	GND	E24
ISP_MODE	D25	ISP_EN_L	E25
	D26	GND	E26
	D27	(-12V)	E27
(-12V)	D28	GND	E28
ISP_EN2_L	D29	CPU_SLP_L	E29
GND	D30	GND	E30
	D31		E31
	D32	GND	E32
X1IB_L	D33	PWR_GOOD	E33
PS_PWR_ON	D34	GND	E34
	D35		E35
GND	D36	GND	E36
	D37		E37
GND	D38	GND	E38
	D39	X1BLK_L	E39
GND	D40	GND	E40
	D41	X1RST_L	E41
GND	D42	GND	E42
	D43	MIOC_INTREQ_L	E43
GND	D44	GND	E44
X1XSTBP_L	D45		E45
GND	D46	GND	E46
X1HSTBP_L	D47	GND	E47
X1HSTBN_L	D48	GND	E48

Expander Bus Connector: Power Section

Connectors J2J1B and J2J1C, 3.3 V

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+3.3V	P1B1	GND	P1C1	+3.3V	P1D1	GND	P1E1	+3.3V
P1A2	+3.3V	P1B2	GND	P1C2	+3.3V	P1D2	GND	P1E2	+3.3V
P1A3	+3.3V	P1B3	GND	P1C3	+3.3V	P1D3	GND	P1E3	+3.3V
P2A1	+3.3V	P2B1	GND	P2C1	+3.3V	P2D1	GND	P2E1	GND
P2A2	+3.3V	P2B2	GND	P2C2	+3.3V	P2D2	GND	P2E2	GND
P2A3	+3.3V	P2B3	GND	P2C3	+3.3V	P2D3	GND	P2E3	GND

Connector J2J1D, 5 V and 12 V

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+12V	P1B1	GND	P1C1	+12V	P1D1	GND	P1E1	+12V
P1A2	+12V	P1B2	GND	P1C2	+12V	P1D2	GND	P1E2	+12V
P1A3	+12V	P1B3	GND	P1C3	+12V	P1D3	GND	P1E3	+12V
P2A1	+5V	P2B1	GND	P2C1	+5V	P2D1	GND	P2E1	GND
P2A2	+5V	P2B2	GND	P2C2	+5V	P2D2	GND	P2E2	GND
P2A3	+5V	P2B3	GND	P2C3	+5V	P2D3	GND	P2E3	GND

Connectors J2J1E, J2J1F, J2J1G and J2J1H, 5 V

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+5V	P1B1	GND	P1C1	+5V	P1D1	GND	P1E1	+5V
P1A2	+5V	P1B2	GND	P1C2	+5V	P1D2	GND	P1E2	+5V
P1A3	+5V	P1B3	GND	P1C3	+5V	P1D3	GND	P1E3	+5V
P2A1	+5V	P2B1	GND	P2C1	+5V	P2D1	GND	P2E1	GND
P2A2	+5V	P2B2	GND	P2C2	+5V	P2D2	GND	P2E2	GND
P2A3	+5V	P2B3	GND	P2C3	+5V	P2D3	GND	P2E3	GND

Connector J2J1J, 3.3 V and 5 V

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+5V	P1B1	GND	P1C1	+3.3V	P1D1	GND	P1E1	+3.3V
P1A2	+5V	P1B2	GND	P1C2	+3.3V	P1D2	GND	P1E2	+3.3V
P1A3	+5V	P1B3	GND	P1C3	+3.3V	P1D3	GND	P1E3	+3.3V
P2A1	+3.3V	P2B1	GND	P2C1	+3.3V	P2D1	GND	P2E1	GND
P2A2	+3.3V	P2B2	GND	P2C2	+3.3V	P2D2	GND	P2E2	GND
P2A3	+3.3V	P2B3	GND	P2C3	+3.3V	P2D3	GND	P2E3	GND

32-bit PCI Connector

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	TRST_L	A32	AD16	B1	-12 V	B32	AD17
A2	+12 V	A33	+3.3 V	B2	TCK	B33	C/BE2_L
A3	TMS	A34	FRAME_L	B3	GND (Ground)	B34	GND
A4	TDI	A35	GND	B4	TDO	B35	IRDY_L
A5	+5 V	A36	TRDY_L	B5	+5 V	B36	+3.3 V
A6	INTA_L	A37	GND	B6	+5 V	B37	DEVSEL_L
A7	INTC_L	A38	STOP_L	B7	INTB_L	B38	GND
A8	+5 V	A39	+3.3 V	B8	INTD_L	B39	LOCK_L
A9	RESERVED	A40	SDONE	B9	PRSNT1_L	B40	PERR_L
A10	+5 V	A41	SB0_L	B10	RESERVED	B41	+3.3 V
A11	RESERVED	A42	GND	B11	PRSNT2_L	B42	SERR_L
A12	GND[‡]	A43	PAR	B12	GND[‡]	B43	+3.3 V
A13	GND[‡†]	A44	AD15	B13	GND[‡]	B44	C/BE1_L
A14	RESERVED	A45	+3.3 V	B14	RESERVED	B45	AD14
A15	RESET_L	A46	AD13	B15	GND	B46	GND
A16	+5 V	A47	AD11	B16	CLK	B47	AD12
A17	GRANT_L	A48	GND	B17	GND	B48	AD10
A18	GND	A49	AD9	B18	REQ_L	B49	GND
A19	RESERVED	A50	KEY	B19	+5 V	B50	KEY
A20	AD30	A51	KEY	B20	AD31	B51	KEY
A21	+3.3 V	A52	C/BE0_L	B21	AD29	B52	AD8
A22	AD28	A53	+3.3 V	B22	GND	B53	AD7
A23	AD26	A54	AD6	B23	AD27	B54	+3.3 V
A24	GND	A55	AD4	B24	AD25	B55	AD5
A25	AD24	A56	GND	B25	+3.3 V	B56	AD3
A26	IDSEL	A57	AD2	B26	C/BE3_L	B57	GND
A27	+3.3 V	A58	AD0	B27	AD23	B58	AD1
A28	AD22	A59	+5 V	B28	GND	B59	+5 V
A29	AD20	A60	REQ64_L	B29	AD21	B60	ACK64_L
A30	GND	A61	+5 V	B30	AD19	B61	+5 V
A31	AD18	A62	+5 V	B31	+3.3 V	B62	+5 V

* The cross (‡) symbol after the signal indicates that the slot serves +5 V compliant devices only.

64-bit PCI Connector

For pins A1–A62 and B1–B62, the 64-bit PCI connector is identical to the 32-bit PCI connector. The table below shows the additional extension pins for the 64-bit PCI connector.

Pin	Signal	Pin	Signal
A63	GND (Ground)	B63	RESERVED
A64	C/BE7_L	B64	GND
A65	C/BE5_L	B65	C/BE6_L
A66	+5 V	B66	C/BE4_L
A67	PAR64	B67	GND
A68	AD62	B68	AD63
A69	GND	B69	AD61
A70	AD60	B70	+5 V
A71	AD58	B71	AD59
A72	GND	B72	AD57
A73	AD56	B73	GND
A74	AD54	B74	AD55
A75	+5 V	B75	AD53
A76	AD52	B76	GND
A77	AD50	B77	AD51
A78	GND	B78	AD49
A79	AD48	B79	+5 V
A80	AD46	B80	AD47
A81	GND	B81	AD45
A82	AD44	B82	GND
A83	AD42	B83	AD43
A84	+5 V	B84	AD41
A85	AD40	B85	+5 V
A86	AD38	B86	AD39
A87	GND	B87	AD37
A88	AD36	B88	+5 V
A89	AD34	B89	AD35
A90	GND	B90	AD33
A91	AD32	B91	GND
A92	RESERVED	B92	RESERVED
A93	GND	B93	RESERVED
A94	RESERVED	B94	GND

ISA Connector

The ISA connector on the I/O baseboard follows the standard pinout given in the ISA Specification.

Pin	Signal	Pin	Signal
B1	GND (Ground)	A1	IOCHK_L
B2	RESET	A2	SD7
B3	+5 V	A3	SD6
B4	IRQ9	A4	SD5
B5	-5 V	A5	SD4
B6	DRQ2	A6	SD3
B7	-12 V	A7	SD2
B8	SRDY_L	A8	SD1
B9	+12 V	A9	SD0
B10	GND	A10	IOCHRDY
B11	SMEMW_L	A11	AEN
B12	SMEMR_L	A12	SA19
B13	IOW_L	A13	SA18
B14	IOR_L	A14	SA17
B15	DACK3_L	A15	SA16
B16	DRQ3	A16	SA15
B17	DACK1_L	A17	SA14
B18	DRQ1	A18	SA13
B19	REFRESH_L	A19	SA12
B20	BCLK	A20	SA11
B21	IRQ7	A21	SA10
B22	IRQ6	A22	SA9
B23	IRQ5	A23	SA8
B24	IRQ4	A24	SA7
B25	IRQ3	A25	SA6
B26	DACK2_L	A26	SA5
B27	TC	A27	SA4
B28	BALE	A28	SA3
B29	+5 V	A29	SA2
B30	OSC 14 MHz	A30	SA1
B31	GND	A31	SA0
Key		Key	
D1	MEMCS16_L	C1	SBHE_L
D2	IOCS16_L	C2	LA23
D3	IRQ10	C3	LA22

continued

ISA Connector (continued)

Pin	Signal	Pin	Signal
D4	IRQ11	C4	LA21
D5	IRQ12	C5	LA20
D6	IRQ15	C6	LA19
D7	IRQ14D	C7	LA18
D8	DACK0_L	C8	LA17
D9	DRQ0	C9	MEMR_L
D10	DACK5_L	C10	MEMW_L
D11	DRQ5	C11	SD8
D12	DACK6_L	C12	SD9
D13	DRQ6	C13	SD10
D14	DACK7_L	C14	SD11
D15	DRQ7	C15	SD12
D16	+5 V	C16	SD13
D17	MASTER16_L	C17	SD14
D18	GND	C18	SD15

Diskette Drive Port

Pin	Name	Pin	Name
1	GND (Ground)	2	FD_DENSEL
3	GND	4	No Connection
5	Key	6	FD_DRATE0
7	GND	8	FD_INDEX_L
9	GND	10	FD_MTR0_L
11	GND	12	FD_DR1_L
13	GND	14	FD_DR0_L
15	GND	16	FD_MTR1_L
17	FD_MSEN1	18	FD_DIR_L
*19	GND	20	FD_STEP_L
21	GND	22	FD_WDATA_L
23	GND	24	FD_WGATE_L
25	GND	26	FD_TRK0_L
27	FD_MSEN0	28	FD_WPROT_L
29	GND	30	FD_RDATA_L
31	GND	32	FD_HDSEL_L
33	GND	34	FD_DSKCHG_L

Wide/Fast 16-bit SCSI Port

Signal Name	Conn. Pin	Cable Pin	Cable Pin	Conn. Pin	Signal Name
GND (Ground)	1	1	2	35	DB12_L
GND	2	3	4	36	DB13_L
GND	3	5	6	37	DB14_L
GND	4	7	8	38	DB15_L
GND	5	9	10	39	DBP1_L
GND	6	11	12	40	DB0_L
GND	7	13	14	41	DB1_L
GND	8	15	16	42	DB2_L
GND	9	17	18	43	DB3_L
GND	10	19	20	44	DB4_L
GND	11	21	22	45	DB5_L
GND	12	23	24	46	DB6_L
GND	13	25	26	47	DB7_L
GND	14	27	28	48	DBP_L
GND	15	29	30	49	GND
GND	16	31	32	50	GND
TERMPWR	17	33	34	51	TERMPWR
TERMPWR	18	35	36	52	TERMPWR
RESERVED	19	37	38	53	RESERVED
GND	20	39	40	54	GND
GND	21	41	42	55	ATN_L
GND	22	43	44	56	GND
GND	23	45	46	57	BSY_L
GND	24	47	48	58	ACK_L
GND	25	49	50	59	RST_L
GND	26	51	52	60	MSG_L
GND	27	53	54	61	SEL_L
GND	28	55	56	62	C/D_L
GND	29	57	58	63	REQ_L
GND	30	59	60	64	I/O_L
GND	31	61	62	65	DB8_L
GND	32	63	64	66	DB9_L
GND	33	65	66	67	DB10_L
GND	34	67	68	68	DB11_L

IDE Port

Pin	Signal	Pin	Signal
1	RSTDRV	2	GND (Ground)
3	DD7	4	DD8
5	DD6	6	DD9
7	DD5	8	DD10
9	DD4	10	DD11
11	DD3	12	DD12
13	DD2	14	DD13
15	DD1	16	DD14
17	DD0	18	DD15
19	GND	20	KEY PIN
21	DRQ	22	GND
23	DIOW	24	GND
25	DIOR	26	GND
27	IORDY	28	CSEL
29	DACK	30	GND
31	IRQ	32	No connection
33	DA1	34	No connection
35	DA0	36	DA2
37	CS1P_L	38	DS3P_L
39	DHACT_L	40	GND

I2C Connector

Pin	Signal
1	CLK
2	GND
3	DATA

Front Panel Connector

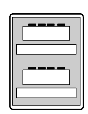
Pin	Signal	Pin	Signal
1	GND (Ground)	2	+5V
3	VCC_STDBY	4	GND
5	ISP_SCLK	6	FAN_FAILED_L
7	ISP_SDI	8	SPEAKER_DATA
9	ISP_FPC_EN_L	10	INTRUSION_L
11	ISP_MODE	12	RESERVED
13	ISP_FPC_SDO	14	GND
15	VCC_STDBY	16	BMC_TO_FPC_RST_CMD
17	GND	18	PROC_RESET_L
19	COM2_TO_FP_EN	20	SYS_RESET_STATE
21	COM2_TO_SIO_EN_A	22	RST_SFC_L
23	XIMB_SOUT_EN	24	SECURE_MODE_BMC
25	VCC_STDBY	26	HARD_RESET
27	RESERVED	28	FP_NMI_SWT_L
29	SIN_TTL_COM2	30	RESERVED
31	SIN_TTL_XIMB	32	GND
33	SOUT_TTL_COM2	34	PWR_CNTRL_SFC_L
35	SOUT_TTL_XIMB	36	PWR_CNTRL_RTC_L
37	RESERVED	38	PWR_GOOD
39	GND	40	PS_PWR_ON
41	DCD_TTL_FP	42	GND
43	DSR_TTL_FP	44	I2C_CEL_CONNECT_FPC
45	CTS_TTL_FP	46	I2C_CEL_CONNECT_BMC_A
47	RI_TTL_FP	48	I2C_FPC_SCL
49	GND	50	I2C_FPC_SDA
51	VCC_STDBY	52	GND
53	RTS_TTL_FP	54	RESERVED
55	DTR_TTL_FP	56	I2C_BACKUP_SCL
57	GND	58	I2C_BACKUP_SDA
59	(key position)	60	GND

Legacy Connector

The legacy connector on the I/O baseboard provides the signals for the external legacy VGA, serial, parallel, mouse, and keyboard peripheral ports.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	VCC_STDBY	A21	PP_STB_L	B1	+5V	B21	SP0_RTS_L
A2	KB_DATA	A22	PP_SLIN_L	B2	MS_DATA	B22	GND
A3	KB_CLK	A23	PP_INIT_L	B3	MS_CLK	B23	SP1_RTS_L
A4	+5V	A24	PP_ERR_L	B4	SIN_TTL_XIMB	B24	SP0_CTS_L
A5	SOUT_TTL_XIMB	A25	PP_AFD_L	B5	SIN_TTL_COM2	B25	SP1_CTS_L
A6	PP_SLCT	A26	I2C_BMC_SCL	B6	SP0_DCD_L	B26	RTL_TTL_FP_L
A7	PP_PE	A27	DSR_TTL_FP	B7	SP1_DCD_L	B27	DTR_TTL_FP_L
A8	PP_BUSY	A28	CTS_TTL_FP	B8	SP0_SIN	B28	DCD_TTL_FP_L
A9	PP_ACK_L	A29	RT_TTL_FP	B9	GND	B29	I2C_BMC_SDA
A10	GND	A30	COM2_TO_STD_EN	B10	SP1_SIN	B30	XIMB_SOUT_EN
A11	PP_DR7	A31	COM2_TO_FP_EN	B11	SP0_RI_L	B31	SOUT_TTL_COM2
A12	PP_DR6	A32	GND	B12	SP1_RI_L	B32	PWR_GOOD
A13	PP_DR5	A33	GND	B13	GND	B33	GND
A14	PP_DR4	A34	GND	B14	SP0_DTR_L	B34	GND
A15	GND	A35	V_BLUE	B15	SP1_DTR_L	B35	V_VSYNC
A16	PP_DR3	A36	GND	B16	SP0_SOUT	B36	GND
A17	PP_DR2	A37	V_GREEN	B17	SP1_SOUT	B37	V_HSYNC
A18	PP_DR1	A38	GND	B18	No connection	B38	GND
A19	PP_DR0	A39	V_RED	B19	SP0_DSR_L	B39	VR_DDCDAT
A20	GND	A40	GND	B20	SP1_DSR_L	B40	VR_DDCCLK

USB Port

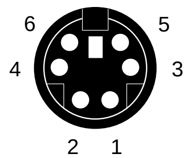


OM06248

Pin	Signal	Description
A1	VCC	Overcurrent monitor line port 0
A2	DATAL0	Differential data line paired with DATAH0
A3	DATAH0	Differential data line paired with DATAL0
A4	GND	Ground potential
B1	VCC	Overcurrent monitor line port 1
B2	DATAL1	Differential data line paired with DATAH1
B3	DATAH1	Differential data line paired with DATAL1
B4	GND	Ground potential

Keyboard and Mouse Ports

These identical PS/2 compatible ports share a common housing. The top one is the mouse, and the bottom one is the keyboard.

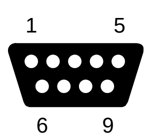


OM00951A

Mouse		Keyboard	
Pin	**Signal**	**Pin**	**Signal**
1	MSEDAT (mouse data)	1	KEYDAT (keyboard data)
2	No connection	2	No connection
3	GND (Ground)	3	GND (Ground)
4	FUSED_VCC (+5 V)	4	FUSED_VCC (+5 V)
5	MSECLK (mouse clock)	5	KEYCLK (keyboard clock)
6	No connection	6	No connection

Serial Ports

These ports support external devices such as modems and scanners that require serial data transmission.

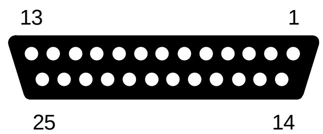


OM00932A

Pin	Signal
1	DCD (data carrier detect)
2	RXD (receive data)
3	TXD (transmit data)
4	DTR (data terminal ready)
5	GND (Ground)
6	DSR (data set ready)
7	RTS (request to send)
8	CTS (clear to send)
9	RIA (ring indicator)

Parallel Port

The IEEE 1284-compatible parallel port—used primarily for a printer—sends data in parallel format.

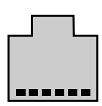


OM00933A

Pin	Signal	Pin	Signal
1	STROBE_L	14	AUFDXT_L (auto feed)
2	Data bit 0	15	ERROR_L
3	Data bit 1	16	INIT_L (initialize printer)
4	Data bit 2	17	SLCTIN_L (select input)
5	Data bit 3	18	GND (Ground)
6	Data bit 4	19	GND
7	Data bit 5	20	GND
8	Data bit 6	21	GND
9	Data bit 7	22	GND
10	ACK_L (acknowledge)	23	GND
11	BUSY	24	GND
12	PE (paper end)	25	GND
13	SLCT (select)		

XICMB Connectors

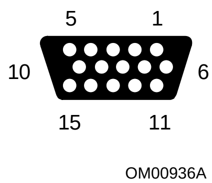
The XICMB device provides external access to the ICMB devices that are within the chassis. This makes it possible to externally access chassis management functions, alert logs, post-mortem data, etc. The device also provides a mechanism for chassis power control. The server provides two SEMCONN 6-pin connectors to allow daisy-chained cabling.



OM06193A

Pin	Signal
1	No connection
2	No connection
3	+ (positive)
4	- (negative)
5	No connection
6	No connection

VGA Video Port



Pin	Signal
1	Red (analog color signal R)
2	Green (analog color signal G)
3	Blue (analog color signal B)
4	No connection
5	GND (video ground, shield)
6–8	GND (video ground, shield)
9	No connection
10	GND (video ground)
11–12	No connection
13	HSYNC (horizontal sync)
14	VSYNC (vertical sync)
15	No connection

17 CPU Baseboard: Description/Setting Configuration Jumpers

This chapter describes the CPU baseboard and tells how to use the jumpers.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see “Safety Guidelines” on page 125.

CPU Baseboard Features

The CPU baseboard interfaces with the I/O baseboard through the interconnect backplane. The CPU baseboard provides

- four slot 2 type connectors for installing up to four processors packaged in Single Edge Contact (S.E.C.) cartridges
- two memory connectors for installing two 16-DIMM memory modules or one 16-DIMM memory module and one memory terminator module
- an onboard DC-to-DC switching converter that supplies voltage for the CPU baseboard and memory modules
- an onboard DC-to-DC linear converter that supplies voltage for the logic on the CPU baseboard
- four sockets for VRM8.3 converters that supply core voltage for the processors
- two sockets for VRM8.3 converters that supply L2 cache voltage for the processors
- I^2C, serial peripheral interface (SPI), and in-system programming (ISP) server management interfaces
- expander bus interface connector

In a symmetric multiprocessor (SMP) environment, all processors are equal and have no preassigned tasks. Distributing the processing loads among processors increases server performance. This is particularly useful when application demand is low and the I/O request load is high. In an SMP environment, the processors share a common bus, the same interrupt structure, and access to common memory and I/O channels. The SMP implementation conforms to the Multiprocessor Specification Version 1.4.

The onboard PCI and memory controller (PMC) supports from 128 MB to 8 GB of ECC memory, either fast page mode (FPM) or extended data out (EDO) 3.3 V 50 or 60 ns DRAMs, mounted on JEDEC DIMMs.

Processors

The processor core and L2 cache components are mounted inside the S.E.C. cartridge. It plugs into one of the four slot 2 connectors on the CPU baseboard.

Memory Interface

The memory subsystem consists of two memory modules—or one memory module and one memory terminator module—installed in the two memory connectors on the CPU baseboard. Each memory module contains sixteen 72-bit wide DIMM sockets that can provide up to 4 GB of EDO memory per board. The memory bus uses assisted gunning transceiver logic (AGTL)+ signaling technology. Because the bus must be terminated on each end, both memory connectors must contain memory modules or a memory module in one and a memory terminator module in the other to properly terminate the bus.

The orientation of the second memory connector is reversed with respect to the first one to shorten the length of the address/control bus to the memory module. As a result, the component side of the first memory module faces toward the bottom processor. The component side of the second memory module faces toward the bottom of the chassis.

DC-to-DC Voltage Converters

The plug-in VRM8.3 DC to DC converters, on the CPU baseboard, supply voltage for the processors and the L2 caches. All the converters convert off the +12 V supply rail.

- Four converters supply voltage for the four processor cores.
- Two converters supply voltage for the four processor L2 caches (two L2 caches share one converter).

An onboard switching converter provides the 1.5 V AGTL+ termination voltage required by the CPU baseboard, memory modules, and processors. A second onboard linear converter provides +2.5 V for the logic on the CPU baseboard (clock buffers and voltage shifters). Both converters use the +5 V supply rail as source voltage.

DS1624 SEEPROM

When the DS1624 on the CPU baseboard is accessed via the I^2C bus, it provides a temperature reading of the ambient temperature of the CPU baseboard. The DS1624 also provides

- time and date the CPU baseboard was manufactured
- name of the board manufacturer
- name and description of the board
- serial number of the board
- part number of the board

Interconnect Interface

The CPU baseboard interfaces with the I/O baseboard through the interconnect backplane. The backplane provides the primary and secondary expander buses, system management signals, system clock and reset signals, and legacy signals. The buses provide source-synchronous, high-speed bidirectional point-to-point links between the CPU baseboard and the I/O baseboard. Each expander bus has enough bandwidth for two 32-bit, 33 MHz PCI buses or one 64-bit, 33 MHz PCI bus. The expander buses use AGTL+ signaling technology.

Front Side Bus

The front side bus (FSB) is an ECC protected 64-bit bus that uses AGTL+ signaling technology and runs at 100 MHz. The FSB requires termination modules in each unused slot 2 connector. When installing processors, always install them in sequence by starting with processor connector 1, then connector 2, and so on—bottom connector to top connector. For example, in a dual processor server, connectors 1 and 2 contain processors while connectors 3 and 4 contain terminator modules.

Front Side Bus Terminator Module

The FSB terminator module provides

- the necessary termination for the AGTL+ signals on the FSB
- correct handling of JTAG scan signals

CPU Baseboard Configuration Jumpers

The J31 jumper block

- controls the VRMs and server management outputs
- determines core to bus ratio
- provides parking spaces for unused jumpers

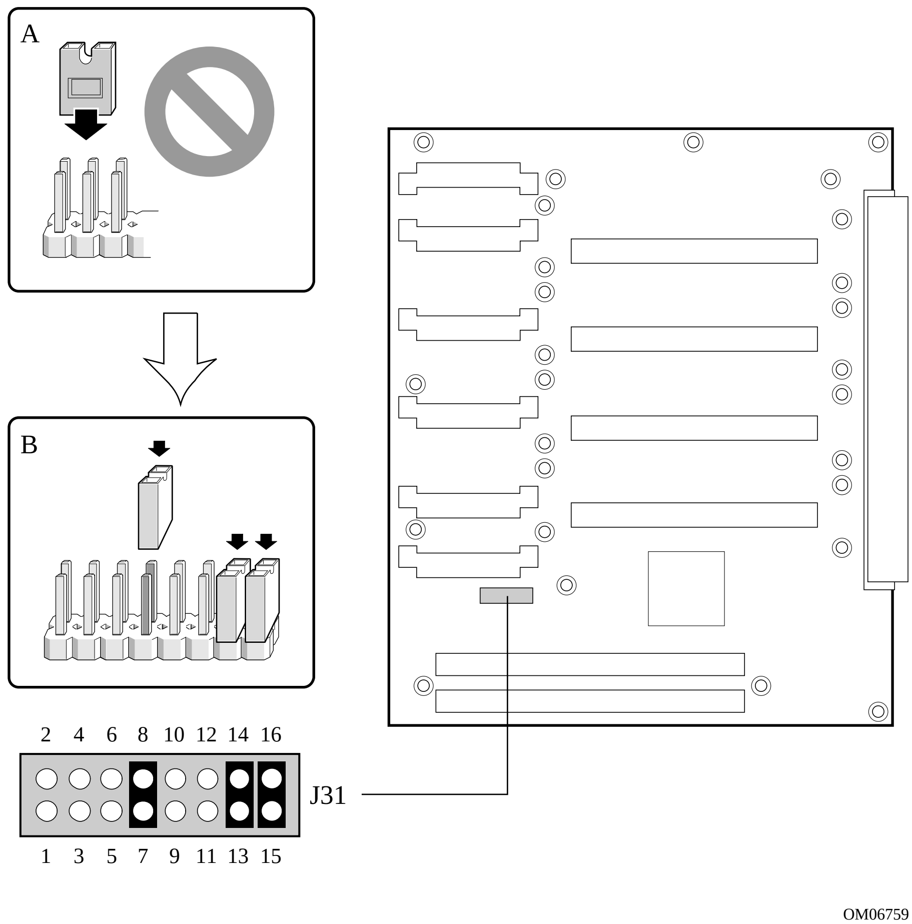


Figure 17-1. J31 Jumper Block

Table 17-1. J31 Jumpers for VRMs and Server Management

Pins 1 and 2	Pins 3 and 4	Status
1	1	Disable VRMs
1	0	Reserved
0	1	Disable Server Management
0	0	Default/Normal Operation

Key: 0 = open; 1 = closed

Installing jumpers across pins 5 and 6, 7 and 8, and 9 and 10 determines the processor core-to-FSB frequency ratios. The bus frequency is 100 MHz. The core frequencies are based on the 100 MHz bus frequency.

Table 17-2. J31 Jumpers for Bus Ratios

Pins 5 and 6	Pins 7 and 8	Pins 9 and 10	Bus Ratio	Core Frequency (MHz)
1	1	1	Reserved	
1	1	0	9:2	450
1	0	1	7:2	350
1	0	0	Reserved	
0	1	1	5:1	500
0	1	0	4:1	400
0	0	1	3:1	300
0	0	0	Reserved	

Key: 0 = open; 1 = closed

The jumper block provides three parking positions for storing the jumpers. They can be parked across pins 11 and 12, 13 and 14, and 15 and 16.

Changing a Jumper Setting

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Turn off the server, and unplug the AC power cords from the power supplies or wall outlets.
3. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
4. Remove the VRM from connector J1 on the CPU baseboard. See Chapter 12.
5. From the tables above, determine which jumper you need to move. Then move it to the new location.
6. Reinstall the VRM in connector J1.
7. Reinstall the top and right side covers.
8. Turn on the server, and wait for POST to complete. See Chapter 3, “Power-on Self Test: Description/Running.”
9. Run the SSU to reconfigure your server. See Chapter 5, “System Setup Utility: When to Run.”

CPU Baseboard Layout

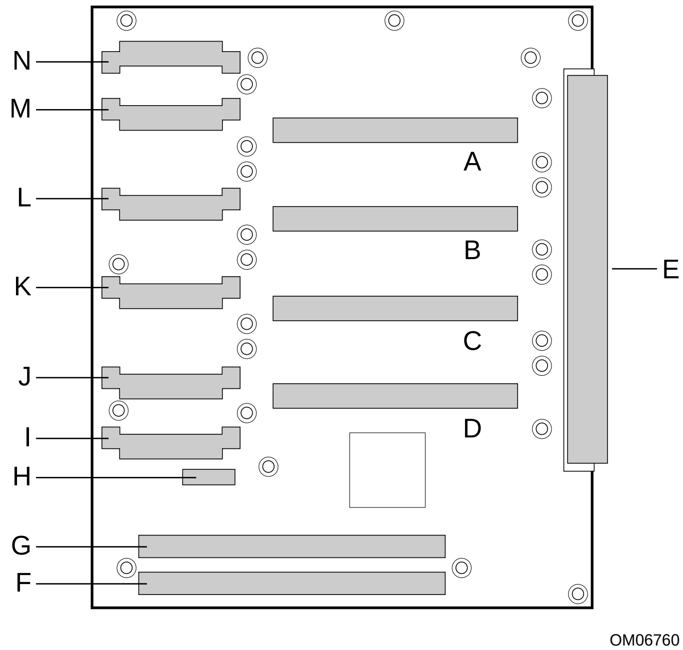


Figure 17-2. CPU Baseboard Layout

A	Processor slot #4
B	Processor slot #3
C	Processor slot #2
D	Processor slot #1
E	Expander bus connector
F	J19, Memory module #2 connector (primary)
G	J18, Memory module #1 connector (secondary or memory terminator module)
H	J31, Jumper block
I	J1, VRM connector provides power for processor slot #1 (processor core power only)
J	J2, VRM connector provides power for processor slots #1 and #2 (L2 cache power only)
K	J3, VRM connector provides power for processor slot #2 (processor core power only)
L	J4, VRM connector provides power for processor slot #3 (processor core power only)
M	J5, VRM connector provides power for processor slots #3 and #4 (L2 cache power only)
N	J6, VRM connector provides power for processor slot #4 (processor core power only)

CPU Baseboard Connectors

Memory Connectors, J18 and J19: Signal, Power, and Ground

Signal	Pin	Signal	Pin	Signal	Pin
GND	A01	MD_L(36)	B01	GND	C01
+1.5V	A02	+3.3V	B02	DSTBN_L(2)	C02
GND	A03	MD_L(39)	B03	GND	C03
MD_L(41)	A04	+3.3V	B04	DSTBP_L(2)	C04
GND	A05	MD_L(43)	B05	GND	C05
MD_L(45)	A06	+3.3V	B06	MD_L(46)	C06
GND	A07	MD_L(48)	B07	GND	C07
MD_L(50)	A08	+3.3V	B08	MD_L(51)	C08
GND	A09	MD_L(53)	B09	GND	C09
DCMPLT(A,B)_L	A10	+3.3V	B10	MD_L(54)	C10
GND	A11	GND	B11	+1.5V	C11
MUXCLK1(A,B)	A12	GND	B12	MD_L(56)	C12
GND	A13	GND	B13	+1.5V	C13
MD_L(59)	A14	+3.3V	B14	DSTBP_L(3)	C14
GND	A15	MD_L(61)	B15	GND	C15
MD_L(63)	A16	+3.3V	B16	DSTBN_L(3)	C16
GND	A17	MD_L(65)	B17	GND	C17
+1.5V	A18	+3.3V	B18	MD_L(67)	C18
GND	A19	MD_L(69)	B19	GND	C19
MD_L(71)	A20	+3.3V	B20	+3.3V	C20
GND	A21	NC	B21	GND	C21
+3.3V	A22	+3.3V	B22	CARD_NUM(,2)	C22
GND	A23	GND	B23	+1.5V	C23
SDRAM(A,B)_CLK	A24	GND	B24	PHIT(A,B)L	C24
GND	A25	GND	B25	+1.5V	C25
+1.5V	A26	+3.3V	B26	RCMPLT(A,B)_L	C26
GND	A27	CARD(0,1)_L	B27	GND	C27
CMND0_L	A28	+3.3V	B28	BANK0_L	C28
GND	A29	BANK2_L	B29	GND	C29
GDCMPLT_L	A30	+3.3V	B30	ROW_L	C30
GND	A31	GND	B31	+1.5V	C31
RCGCLK0(A,B)	A32	GND	B32	MA_L(1)	C32
GND	A33	GND	B33	+1.5V	C33
MA_L(4)	A34	+3.3V	B34	MA_L(5)	C34
GND	A35	MA_L(7)	B35	GND	C35

continued

Memory Connectors, J18 and J19: Signal, Power, and Ground A, B, & C (continued)

Signal	Pin	Signal	Pin	Signal	Pin
MA_L(9)	A36	+3.3V	B36	MA_L(10)	C36
GND	A37	MA_L(12)	B37	GND	C37
+1.5V	A38	+3.3V	B38	MEM(A,B)_TMS	C38
GND	A39	GND	B39	+1.5V	C39
RCGCLK1(A,B)	A40	GND	B40	MEM(A,B)_TDI	C40
GND	A41	GND	B41	+1.5V	C41
MD_L(0)	A42	+3.3V	B42	MD_L(1)	C42
GND	A43	MD_L(3)	B43	GND	C43
MD_L(5)	A44	+3.3V	B44	DSTBN_L(0)	C44
GND	A45	MD_L(7)	B45	GND	C45
MD_L(9)	A46	+3.3V	B46	DSTBP_L(0)	C46
GND	A47	MD_L(11)	B47	GND	C47
MD_L(13)	A48	+3.3V	B48	MD_L(14)	C48
GND	A49	D0FF1_L	B49	GND	C49
MD_L(16)	A50	+3.3V	B50	DSEL(0,1)_L	C50
GND	A51	GND	B51	+1.5V	C51
MUXCLK0(A,B)	A52	GND	B52	MD_L(18)	C52
GND	A53	GND	B53	+1.5V	C53
MD_L(21)	A54	+3.3V	B54	MD_L(22)	C54
GND	A55	MD_L(24)	B55	GND	C55
MD_L(26)	A56	+3.3V	B56	DSTBP_L(1)	C56
GND	A57	MD_L(28)	B57	GND	C57
+1.5V	A58	+3.3V	B58	DSTBN_L(1)	C58
GND	A59	MD_L(31)	B59	GND	C59
MD_L(33)	A60	+3.3V	B60	MD_L(34)	C60

Memory Connectors, J18 and J19: Signal, Power, and Ground D & E

Signal	Pin	Signal	Pin
MD_L(37)	D01	+3.3V	E01
GND	D02	MD_L(38)	E02
MD_L(40)	D03	+3.3V	E03
GND	D04	MD_L(42)	E04
MD_L(44)	D05	+3.3V	E05
GND	D06	MD_L(47)	E06
MD_L(49)	D07	+3.3V	E07
GND	D08	MD_L(52)	E08
WDEVT_L	D09	+3.3V	E09
GND	D10	DVALID(A,B)_L	E10
MD_L(55)	D11	+3.3V	E11

continued

Memory Connectors, J18 and J19: Signal, Power, and Ground D & E (continued)

Signal	Pin	Signal	Pin
GND	D12	MD_L(57)	E12
MD_L(58)	D13	+3.3V	E13
GND	D14	MD_L(60)	E14
MD_L(62)	D15	+3.3V	E15
GND	D16	MD_L(64)	E16
MD_L(66)	D17	+3.3V	E17
GND	D18	MD_L(68)	E18
MD_L(70)	D19	+3.3V	E19
GND	D20	+3.3V	E20
NC	D21	+3.3V	E21
GND	D22	I2C_BMC_SCL	E22
PWRGDB	D23	+3.3V	E23
GND	D24	I2C_BMC_SDA	E24
RHIT(A,B)_L	D25	+3.3V	E25
GND	D26	+3.3V	E26
GRCMPLT_L	D27	+3.3V	E27
GND	D28	BANK1_L	E28
CMND1_L	D29	+3.3V	E29
GND	D30	CSTB_L	E30
MA_L(0)	D31	+3.3V	E31
GND	D32	MA_L(2)	E32
MA_L(3)	D33	+3.3V	E33
GND	D34	MA_L(6)	E34
MA_L(8)	D35	+3.3V	E35
GND	D36	MA_L(11)	E36
MA_L(13)	D37	+3.3V	E37
GND	D38	+3.3V	E38
MEM(A,B)_TRST_L	D39	+3.3V	E39
GND	D40	(MEMB_TDI,IO_TDI)	E40
MEM(A,B)_TCK	D41	+3.3V	E41
GND	D42	MD_L(2)	E42
MD_L(4)	D43	+3.3V	E43
GND	D44	MD_L(6)	E44
MD_L(8)	D45	+3.3V	E45
GND	D46	MD_L(10)	E46
MD_L(12)	D47	+3.3V	E47
GND	D48	MD_L(15)	E48
DOFF0_L	D49	+3.3V	E49
GND	D50	MRESET_L	E50

continued

Memory Connectors, J18 and J19: Signal, Power, and Ground D & E (continued)

Signal	Pin	Signal	Pin
MD_L(17)	D51	+3.3V	E51
GND	D52	MD_L(19)	E52
MD_L(20)	D53	+3.3V	E53
GND	D54	MD_L(23)	E54
MD_L(25)	D55	+3.3V	E55
GND	D56	MD_L(27)	E56
MD_L(29)	D57	+3.3V	E57
GND	D58	MD_L(30)	E58
MD_L(32)	D59	+3.3V	E59
GND	D60	MD_L(35)	E60

Expander Bus Connector: Signal Section

Signal	Pin	Signal	Pin	Signal	Pin
X1CLK	A1	GND	B1	GND	C1
GND	A2	X1CLKB	B2	RSVD	C2
X1D_L(15)	A3	GND	B3	GND	C3
X1D_L(14)	A4	X1D_L(13)	B4	X1XSTBN_L	C4
X1D_L(12)	A5	GND	B5	X1BE_L(1)	C5
GND	A6	X1D_L(10)	B6	X1D_L(11)	C6
X1D_L(9)	A7	GND	B7	X1ADS_L	C7
X1D_L(8)	A8	X1D_L(7)	B8	GND	C8
X1D_L(6)	A9	GND	B9	X1PAR_L	C9
GND	A10	X1D_L(5)	B10	GND	C10
X1D_L(4)	A11	GND	B11	X1BE_L(0)	C11
X1D_L(3)	A12	X1D_L(2)	B12	GND	C12
X1D_L(1)	A13	GND	B13	X1HRTS_L	C13
X1D_L(0)	A14	X1XRTS_L	B14	GND	C14
GND	A15	GND	B15	I2C_DS2P_SCL	C15
RSVD	A16	I2C_DS2P_SDA	B16	GND	C16
RSVD	A17	GND	B17	RSVD	C17
RSVD	A18	RSVD	B18	GND	C18
ISP_SDI	A19	GND	B19	RSVD	C19
RSVD	A20	RSVD	B20	RSVD	C20
ISP_SDO	A21	GND	B21	GND	C21
RSVD	A22	RSVD	B22	RSVD	C22
RSVD	A23	GND	B23	GND	C23
GND	A24	ISP_SCLK	B24	RSVD	C24
X0CLK	A25	GND	B25	GND	C25
GND	A26	X0CLKB	B26	RSVD	C26
X0D_L(15)	A27	GND	B27	GND	C27
X0D_L(14)	A28	X0D_L(13)	B28	X0XSTBN_L	C28
X0D_L(12)	A29	GND	B29	X0BE_L(1)	C29
GND	A30	X0D_L(10)	B30	X0D_L(11)	C30
X0D_L(9)	A31	GND	B31	X0ADS_L	C31
X0D_L(8)	A32	X0D_L(7)	B32	GND	C32
X0D_L(6)	A33	GND	B33	X0PAR_L	C33
GND	A34	X0D_L(5)	B34	GND	C34
X0D_L(4)	A35	GND	B35	X0BE_L(0)	C35
X0D_L(3)	A36	X0D_L(2)	B36	GND	C36
X0D_L(1)	A37	GND	B37	X0HRTS_L	C37
X0D_L(0)	A38	X0XRTS_L	B38	GND	C38

continued

Expander Bus Connector: Signal Section A, B, & C (continued)

Signal	Pin	Signal	Pin	Signal	Pin
GND	A39	GND	B39	I2C_GLOBAL_SDA	C39
NMI_5V	A40	IGNNE_5V_L	B40	SMI_3V_L	C40
I2C_BMC_SDA	A41	GND	B41	BMC_SPI_BUS(5)	C41
I2C_BMC_SCL	A42	BMC_SPI_BUS(3)	B42	GND	C42
BMC_SPI_BUS(0)	A43	GND	B43	PROC_RESET_L	C43
BMC_SPI_BUS(6)	A44	CPU_SPI_RESET_L	B44	A20M_3V_L	C44
BMC_SPI_BUS(1)	A45	GND	B45	PWRGDB	C45
IO_TDO	A46	IO_TDI	B46	IO_TMS	C46
IO_TCK	A47	GND	B47	RSVD	C47
RSVD	A48	RSVD	B48	GND	C48

Expander Bus Connector: Signal Section D & E

Signal	Pin	Signal	Pin
X1HSTBN_L	D1	GND	E1
X1HSTBP_L	D2	GND	E2
GND	D3	X1CLKFB	E3
X1XSTBP_L	D4	GND	E4
GND	D5	MIOC_INTREQ_L	E5
X1RSTFB_L	D6	GND	E6
GND	D7	X1RST_L	E7
X1RSTB_L	D8	GND	E8
GND	D9	X1BLK_L	E9
RSVD	D10	GND	E10
GND	D11	RSVD	E11
RSVD	D12	GND	E12
GND	D13	RSVD	E13
RSVD	D14	GND	E14
RSVD	D15	RSVD	E15
X1IB_L	D16	GND	E16
RSVD	D17	RSVD	E17
RSVD	D18	GND	E18
GND	D19	CPU_SLP_L	E19
RSVD	D20	GND	E20
RSVD	D21	RSVD	E21
RSVD	D22	GND	E22
RSVD	D23	ISP_EN_L	E23
ISP_MODE	D24	GND	E24
X0HSTBN_L	D25	GND	E25

continued

Expander Bus Connector: Signal Section D & E (continued)

Signal	Pin	Signal	Pin
X0HSTBP_L	D26	GND	E26
GND	D27	X0CLKFB	E27
X0XSTB_L	D28	GND	E28
GND	D29	RSVD	E29
X0RSTB_L	D30	GND	E30
GND	D31	X0RST_L	E31
X0RSTFB_L	D32	GND	E32
GND	D33	X0BLK_L	E33
RSVD	D34	GND	E34
GND	D35	FERR_L	E35
RSVD	D36	GND	E36
GND	D37	INTR_3V	E37
I2C_GLOBAL_SCL	D38	GND	E38
IO_PWRGD	D39	CIB_INT0	E39
X0IB_L	D40	GND	E40
GND	D41	BMC_SPI_BUS(4)	E41
BMC_SPI_BUS(2)	D42	GND	E42
GND	D43	RSVD	E43
INIT_3V_L	D44	GND	E44
PICD(0)	D45	PICD(1)	E45
IO_TRST_L	D46	GND	E46
STOP_CLK_L	D47	PIC_CLK	E47
RSVD	D48	GND	E48

Expander Bus Connector: Power Section

3.3 V Connectors J21A, B, C, & D

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+3.3V	P1B1	GND	P1C1	+3.3V	P1D1	GND	P1E1	GND
P1A2	+3.3V	P1B2	GND	P1C2	+3.3V	P1D2	GND	P1E2	GND
P1A3	+3.3V	P1B3	GND	P1C3	+3.3V	P1D3	GND	P1E3	GND
P2A1	+3.3V	P2B1	GND	P2C1	+3.3V	P2D1	GND	P2E1	+3.3V
P2A2	+3.3V	P2B2	GND	P2C2	+3.3V	P2D2	GND	P2E2	+3.3V
P2A3	+3.3V	P2B3	GND	P2C3	+3.3V	P2D3	GND	P2E3	+3.3V

5 V Connectors J21E & F

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+5V	P1B1	GND	P1C1	+5V	P1D1	GND	P1E1	GND
P1A2	+5V	P1B2	GND	P1C2	+5V	P1D2	GND	P1E2	GND
P1A3	+5V	P1B3	GND	P1C3	+5V	P1D3	GND	P1E3	GND
P2A1	+5V	P2B1	GND	P2C1	+5V	P2D1	GND	P2E1	+5V
P2A2	+5V	P2B2	GND	P2C2	+5V	P2D2	GND	P2E2	+5V
P2A3	+5V	P2B3	GND	P2C3	+5V	P2D3	GND	P2E3	+5V

12 V Connector J21G

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+12V	P1B1	GND	P1C1	+12V	P1D1	GND	P1E1	GND
P1A2	+12V	P1B2	GND	P1C2	+12V	P1D2	GND	P1E2	GND
P1A3	+12V	P1B3	GND	P1C3	+12V	P1D3	GND	P1E3	GND
P2A1	+12V	P2B1	GND	P2C1	+12V	P2D1	GND	P2E1	+12V
P2A2	+12V	P2B2	GND	P2C2	+12V	P2D2	GND	P2E2	+12V
P2A3	+12V	P2B3	GND	P2C3	+12V	P2D3	GND	P2E3	+12V

12 V Connectors J21H & J

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+12V	P1B1	GND	P1C1	+12V	P1D1	GND	P1E1	+12V
P1A2	+12V	P1B2	GND	P1C2	+12V	P1D2	GND	P1E2	+12V
P1A3	+12V	P1B3	GND	P1C3	+12V	P1D3	GND	P1E3	+12V
P2A1	+12V	P2B1	GND	P2C1	+12V	P2D1	GND	P2E1	+12V
P2A2	+12V	P2B2	GND	P2C2	+12V	P2D2	GND	P2E2	+12V
P2A3	+12V	P2B3	GND	P2C3	+12V	P2D3	GND	P2E3	+12V

18 Memory and Memory Terminator Modules: Description/Adding Memory

This chapter describes the memory and memory terminator modules and tells how to populate the DIMM sockets on the module.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see “Safety Guidelines” on page 125.

Module Features

Memory module:

- Up to 4 GB of ECC memory using sixteen 72-bit dual inline memory modules (DIMMs)
- 60 ns and 50 ns, 3.3 V, buffered EDO DRAM
- Four-way interleaving
- A minimum configuration of 128 MB using four 32 MB DIMMs
- Supports buffered DIMMs with capacities of 32, 64, and 256 MB
- Provides server management data with an onboard EEPROM, including thermal monitoring, FRU information, and presence-detect bit access
- Can act as a memory terminator module when not populated with DIMMs

Memory terminator module:

- Used as an alternate means to properly terminate the memory bus other than with an empty memory module
- Installs into the secondary memory connector on the CPU baseboard when only one memory module is installed
- Provides server management data with an onboard EEPROM, including thermal monitoring, FRU information, and presence-detect bit access

You must install two high-capacity DRAM memory modules in the memory connectors on the CPU baseboard or one memory module and one memory terminator module to properly terminate the memory bus. The memory terminator module provides electrical termination for the memory bus when only one memory module is in installed. However, if you install two memory modules, only one of them must be populated with DIMMs.

ECC memory detects and corrects single-bit errors from DRAM in real time, allowing your server to function normally despite data transmission errors. ECC detects all double-bit errors but does not correct them; it also detects, but does not correct, three-bit and four-bit adjacent errors in a DRAM nibble. Single-bit errors are reported down to the exact bit within DIMM. Multiple-bit errors are reported down to an interleave which corresponds to a single DIMM.

EDO DRAM Array

The extended data out (EDO) DRAM array on the memory module consists of sixteen 72-bit (64-bit data plus 8 ECC bits) DIMM sockets. They are divided into four memory banks, A–D, of four sockets each. These banks support only 4:1 interleaving (DIMMs in all four sockets). For example, in bank A socket

- J1 contains interleave 0
- J2 contains interleave 1
- J3 contains interleave 2
- J4 contains interleave 3

Because each interleave provides access to 72 bits of data, 4:1 interleaving yields 288 bits (32 bytes) per DRAM transaction—one cache line for the processor. If the CPU baseboard contains two 4:1 interleaving memory modules, successive DRAM transactions occurring in the different memory modules complete at a maximum rate of one transaction every 30 ns. This yields a maximum data rate of 1.067 GB per second.

Although several DIMM population options are available, the following table lists the populations that should be used to add memory to the system.

Table 18-1. Memory Module DIMM Support

Category	Supported DIMM Variety
Speed	50 ns, 60 ns
Capacity/Organization/Refresh	32 MB: 16 Mbit, 4Mx4 DRAM; 2 K or 4 K refresh* 64 MB: 64 Mbit, 8Mx8 DRAM; 4 K refresh* 256 MB: Double-high; 64 Mbit, 16Mx4 DRAM; 4K or 8K refresh*
Voltage	3.3 V
Data Width	x72 (ECC)
Page Mode	EDO
Buffered/Non	Buffered
Maximum Height	2.4 inches
DRAM Package	TSSOP

* The memory module supports only CAS-before-RAS refresh. When selecting a module, make sure that the target refresh number corresponds to CBR refresh.

All DIMMs within a given bank must be identical. From bank to bank, the 450NX PCI chipset supports different varieties of DIMM sizes, manufacturers, and speeds.

Only configuration adhering to the following rules are validated, and they are the only configuration that are fully supported:

- All DIMMs within a given back must be identical.
- Install 32, 64, and 256 MB DIMMs in the memory banks.
- The total number of DIMMs on both memory modules: 4, 8, 16, 24, or 32 (two memory module configuration).
- The total number of DIMMs using only one memory module must be: 4, 8, 12, or 16 (one memory module and one memory terminator configuration).

- Install an equal number of DIMMs on each memory module, in the two memory module configuration, except when only four DIMMs are used. In that case, all four DIMMs are on the primary memory module installed in connector J18 on the CPU baseboard.
- All DIMMs on a memory module are identical in size and speed.
- DIMMs may differ in size and speed between memory modules. However, the maximum data transfer rate can only be provided when the banks of each module are configured identically (through module-to-module interleaving as indicated in the rules below).

To take advantage of address bit permuting (ABP), which increases memory access performance across sequential cache line accesses, the following rules must be followed:

- All banks that are used must be populated with four DIMMs.
- There must be a power of two banks populated (2, 4, 8, or 16).
- All banks in an ABP group (two banks in 2-bank permuting or four banks in 4-bank permuting) must be the same size.
- All populated banks must be adjacent and start at bank 0.
- If two memory modules are in the server, both must be configured to allow equivalent ABP settings. For example, the chip set cannot support 2-bank permuting on one module and 4-bank permuting on the other.

To take advantage of module-to-module interleaving, which provides maximum performance across sequential cache line accesses, the following rules must be followed:

- All ABP rules above must be followed.
- Two memory modules must used, and corresponding banks must be identically populated with DIMMs of the same size and type.

Before allowing the processors to come out of reset, server management firmware scans the presence-detect bits of all DIMMs installed on the memory modules. If they are 50-ns DIMMs, then server management changes the value of the chipset’s DRAM speed-mode bit. The default value on this bit is a high voltage level, which corresponds to 60-ns timings; changing the value to a low voltage level places this bit in the 50-ns mode. Changing the value of the bit can only be effected by software, and it must be before the processors come out of reset. If the bit changes while a memory access is in process, the results are unpredictable. After deciding the value of the bit and making any necessary changes, server management may proceed with processor reset. While changing this bit will not increase the theoretical maximum bandwidth, it will decrease initial latency of DRAM reads by one clock and increase bandwidth of consecutive page misses.

When installing less than 16 DIMMs on a memory module, there is a preferred order for populating the DIMM sockets to maintain optimal signal integrity. When installing two memory modules on the CPU baseboard, you should always alternate DIMM installation between memory modules. For instance, when installing 16 DIMMs in the system, the quantities should be divided such that eight fill the first two banks of one module and eight more fill the same two banks in the second module. See the DIMM interleave configurations in Figures 18-1 through 18-4.

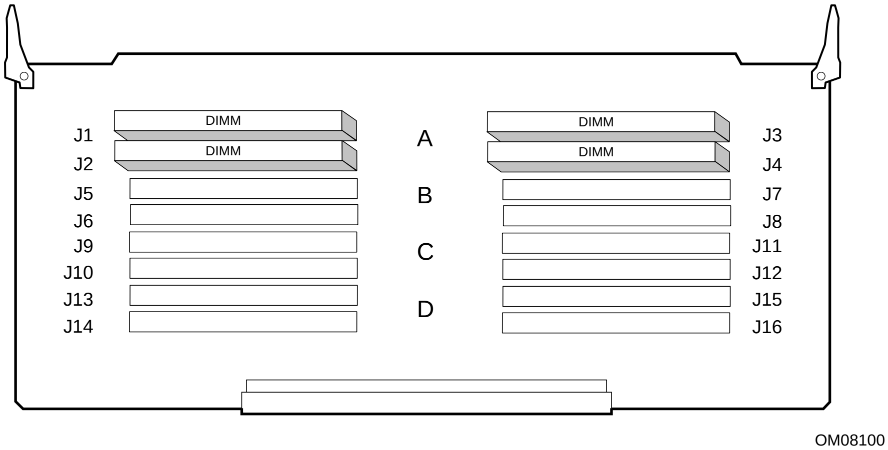


Figure 18-1. 4:1 Interleave With Four DIMMs

A	Bank A, J1-J4 (populated)	C	Bank C, J9-J12 (empty)
B	Bank B, J5-J8 (empty)	D	Bank D, J13-J16 (empty)

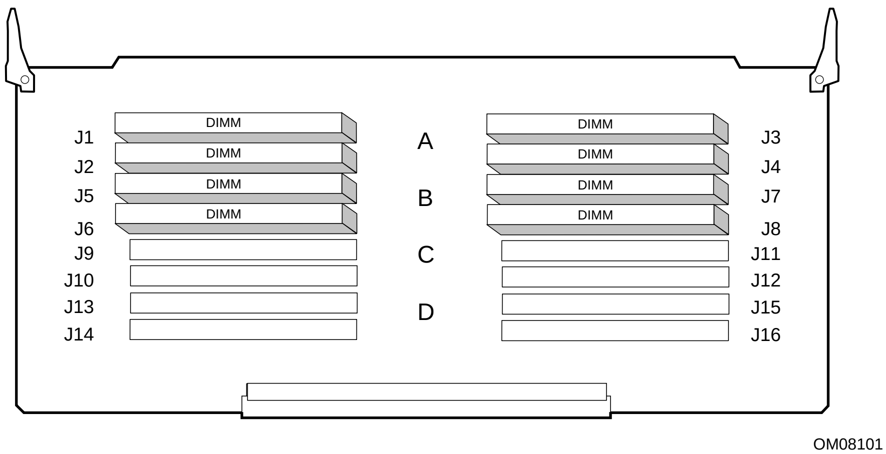


Figure 18-2. 4:1 Interleave With Eight DIMMs

A	Bank A, J1-J4 (populated)	C	Bank C, J9-J12 (empty)
B	Bank B, J5-J8 (populated)	D	Bank D, J13-J16 (empty)

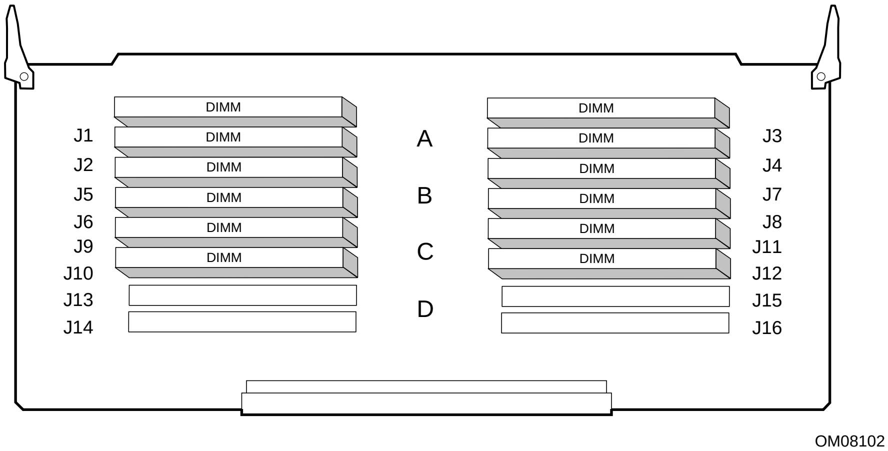


Figure 18-3. 4:1 Interleave With 12 DIMMs

A	Bank A, J1-J4 (populated)	C	Bank C, J9-J12 (populated)
B	Bank B, J5-J8 (populated)	D	Bank D, J13-J16 (empty)

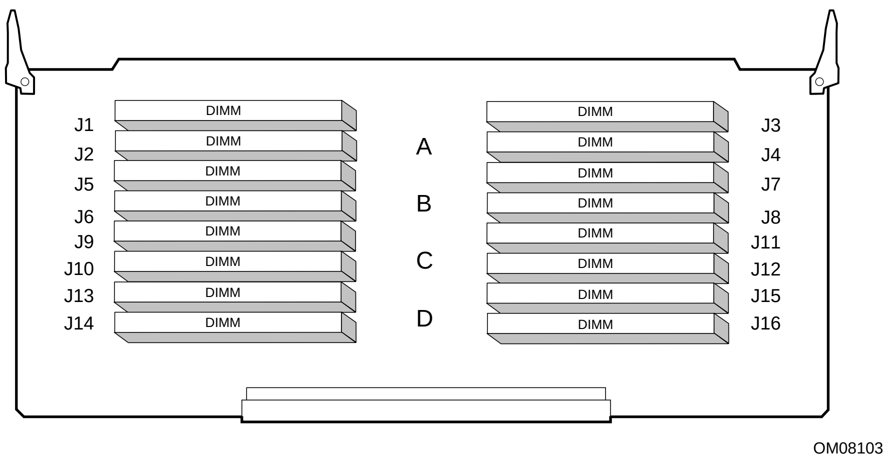


Figure 18-4. 4:1 Interleave With 16 DIMMs

A	Bank A, J1-J4 (populated)	C	Bank C, J9-J12 (populated)
B	Bank B, J5-J8 (populated)	D	Bank D, J13-J16 (populated)

Memory Module Layout

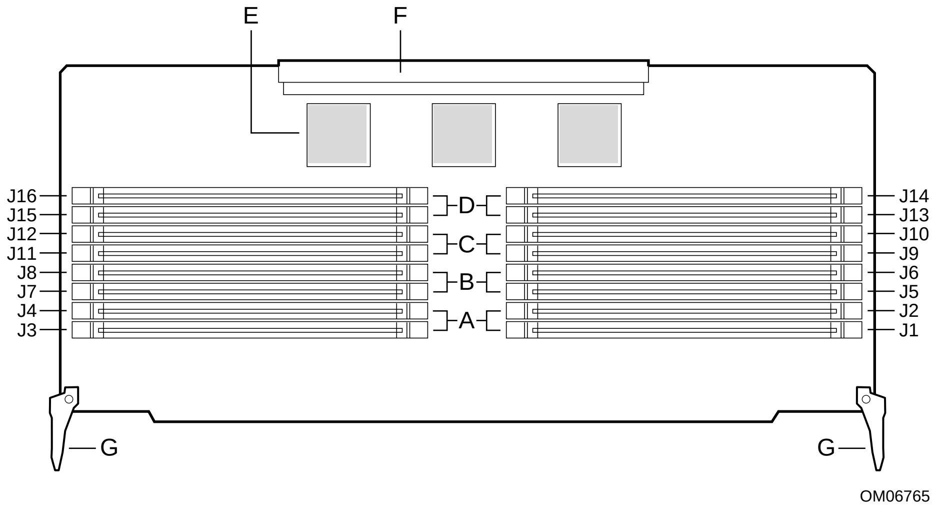


Figure 18-5. Memory Module Layout

A	J1-J4, 168-pin DIMM sockets, Bank A
B	J5-J8, 168-pin DIMM sockets, Bank B
C	J9-J12, 168-pin DIMM sockets, Bank C
D	J13-J16, 168-pin DIMM sockets, Bank D
E	U9D1, DS1624, I^2C EEPROM and temperature sensor (package)
F	J21 memory interface connector
G	Eject/insert levers

Installing DIMMs

⚠ **CAUTION**

DIMM devices with gold contacts should not be installed in DIMM sockets with tin-lead contacts or vice versa. Mixing dissimilar metal contacts types has been shown to result in unreliable memory operation.

To avoid potential memory problems, use only DIMMs from JEDEC-compatible manufacturers that have been tested for compatibility with the memory module. Contact your sales representative or dealer for a list of approved DIMMs.

See Figures 18-6 and 18-7.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the memory module as described in Chapter 12, "Server Components: Removing/Reinstalling."
4. Being careful not to touch the components on the memory module, place the module DIMM-side up on a nonconductive, static-free surface.

5. Hold the DIMM only by the edges as you remove the DIMM from the antistatic package.
6. Beginning with bank A (Figure 18-6), socket J1, orient the DIMM so that the two notches in the bottom edge align with the keyed socket.

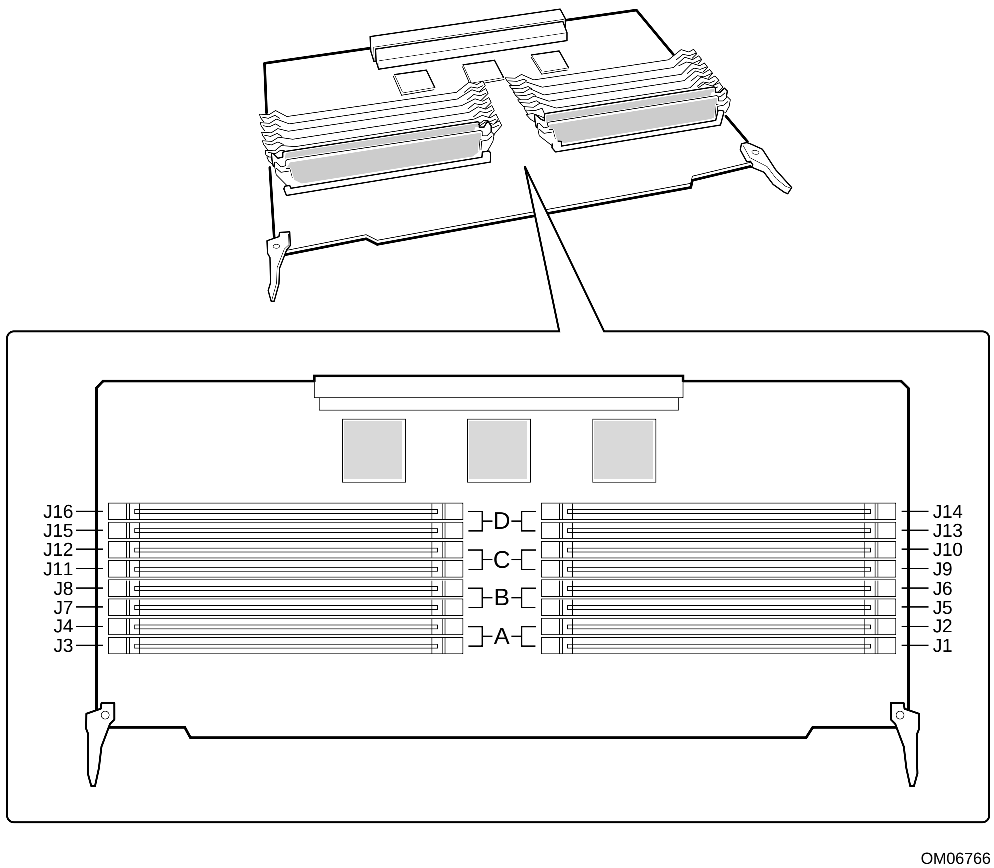


Figure 18-6. DIMM Orientation

A	Bank A, J1-J4
B	Bank B, J5-J8
C	Bank C, J9-J12
D	Bank D, J13-J16

CAUTION

Use extreme care when installing a DIMM. Applying too much pressure can damage the socket slot. DIMMs are keyed such that they can be inserted in only one way.

7. Insert the bottom edge of the DIMM into socket J1, and press down firmly on the DIMM until it seats correctly (Figure 18-7).

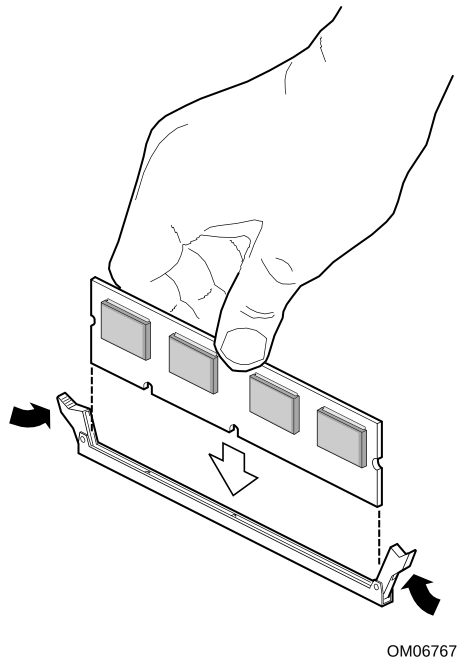


Figure 18-7. Properly Seated DIMM

8. Repeat the above steps to install more DIMMs. Always install them in sequence by installing the next DIMM in bank A, socket J2 and so on, with the last one in bank D, socket J16.
9. Reinstall the memory module as described in Chapter 12.
10. Reinstall the top and side covers as described in Chapter 11.
11. Reconnect all external cables and the power cords to the server.
12. Turn on your monitor and then your server.
13. Run the SSU to configure the server and to properly attribute ECC memory. Failure to do so may degrade the performance of your server. For information about running the SSU, see Chapter 5, "System Setup Utility: When to Run."

Removing DIMMs

See Figure 18-8.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Remove the memory module as described in Chapter 12, "Server Components: Removing/Reinstalling."
4. Starting with the first DIMM-filled socket closest to the top edge of the module, remove the DIMMs one at a time.

⚠ **CAUTION**

Use extreme care when removing a DIMM. Too much pressure can damage the socket slot. Apply only enough pressure on the plastic ejector levers to release the DIMM.

5. Gently push the plastic ejector levers out and down to eject the DIMM from the socket (Figure 18-8).
6. Carefully lift the DIMM away from the socket, and store it in an antistatic package.
7. Repeat the above steps to remove other DIMMs.

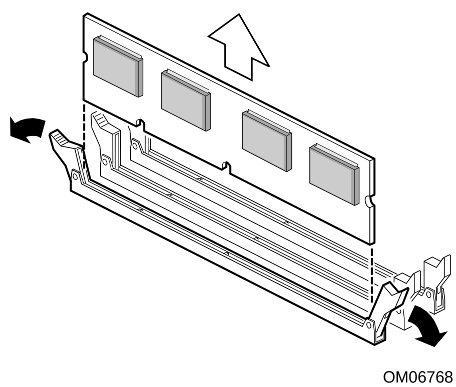


Figure 18-8. Removing DIMMs

8. Reinstall the memory module as described in Chapter 12.
9. Reinstall the top and side covers as described in Chapter 11.
10. Reconnect all external cables and the power cords to the server.
11. Turn on your monitor and then your server.
12. Run the SSU to configure the server and to properly attribute ECC memory. Failure to do so may degrade the performance of your server. For information about running the SSU, see Chapter 5, "System Setup Utility: When to Run."

System Management Interface

The devices on I²C bus of the memory module provide system management software with module operating temperature, DIMM configuration, and field replacement unit (FRU) data. The devices also provide

- time and date the module was manufactured
- name of the module manufacturer
- name and description of the module
- serial number of the module
- part number of the module

Memory Module Connector

Signal	Pin	Signal	Pin	Signal	Pin
GND	A1	MD36_L	B1	GND	C1
VTT	A2	VCC	B2	DSTBN2_L	C2
GND	A3	MD39_L	B3	GND	C3
MD41_L	A4	VCC	B4	DSTBP2_L	C4
GND	A5	MD43_L	B5	GND	C5
MD45_L	A6	VCC	B6	MD46_L	C6
GND	A7	MD48_L	B7	GND	C7
MD50_L	A8	VCC	B8	MD51_L	C8
GND	A9	MD53_L	B9	GND	C9
DCMPLT_L	A10	VCC	B10	MD54_L	C10
GND	A11	GND	B11	GND	C11
MUXCLK1	A12	GND	B12	MD56_L	C12
GND	A13	GND	B13	VTT	C13
MD59_L	A14	VCC	B14	DSTBP3_L	C14
GND	A15	MD61_L	B15	GND	C15
MD63_L	A16	VCC	B16	DSTBN3_L	C16
GND	A17	MD65_L	B17	GND	C17
VTT	A18	VCC	B18	MD67_L	C18
GND	A19	MD69_L	B19	GND	C19
MD71_L	A20	VCC	B20	VCC	C20
GND	A21	NC	B21	GND	C21
VCC	A22	VCC	B22	CARD_NUM	C22
GND	A23	GND	B23	VTT	C23
SPARECLK1	A24	GND	B24	PHIT_L	C24
GND	A25	GND	B25	VTT	C25
VTT	A26	VCC	B26	RCMPLT_L	C26
GND	A27	CARD_L	B27	GND	C27
CMND0_L	A28	VCC	B28	BANK0_L	C28
GND	A29	BANK2_L	B29	GND	C29
GDCMPLT_L	A30	VCC	B30	ROW_L	C30
GND	A31	GND	B31	VTT	C31
RCGCLK	A32	GND	B32	MA1_L	C32
GND	A33	GND	B33	VTT	C33
MA4_L	A34	VCC	B34	MA5_L	C34
GND	A35	MA7_L	B35	GND	C35
MA9_L	A36	VCC	B36	MA10_L	C36
GND	A37	MA12_L	B37	GND	C37

continued

Memory Module Connector: A, B, & C (continued)

Signal	Pin	Signal	Pin	Signal	Pin
VTT	A38	VCC	B38	TMS	C38
GND	A39	GND	B39	VTT	C39
SPARECLK0	A40	GND	B40	TDI	C40
GND	A41	GND	B41	VTT	C41
MD0_L	A42	VCC	B42	MD1_L	C42
GND	A43	MD3_L	B43	GND	C43
MD5_L	A44	VCC	B44	DSTBN0_L	C44
GND	A45	MD7_L	B45	GND	C45
MD9_L	A46	VCC	B46	DSTBP0_L	C46
GND	A47	MD11_L	B47	GND	C47
MD13_L	A48	VCC	B48	MD14_L	C48
GND	A49	DOFF1_L	B49	GND	C49
MD16_L	A50	VCC	B50	DSEL_L	C50
GND	A51	GND	B51	VTT	C51
MUXCLK0	A52	GND	B52	MD18_L	C52
GND	A53	GND	B53	VTT	C53
MD21_L	A54	VCC	B54	MD22_L	C54
GND	A55	MD24_L	B55	GND	C55
MD26_L	A56	VCC	B56	DSTBP1_L	C56
GND	A57	MD28_L	B57	GND	C57
VTT	A58	VCC	B58	DSTBN1_L	C58
GND	A59	MD31_L	B59	GND	C59
MD33_L	A60	VCC	B60	MD34_L	C60

Memory Module Connector: D & E

Signal	Pin	Signal	Pin
MD37_L	D1	VCC	E1
GND	D2	MD38_L	E2
MD40_L	D3	VCC	E3
GND	D4	MD42_L	E4
MD44_L	D5	VCC	E5
GND	D6	MD47_L	E6
MD49_L	D7	VCC	E7
GND	D8	MD52_L	E8
WDEVT_L	D9	VCC	E9
GND	D10	DVALID_L	E10
MD55_L	D11	VCC	E11
GND	D12	MD57_L	E12

continued

Memory Module Connector: D & E (continued)

Signal	Pin	Signal	Pin
MD58_L	D13	VCC	E13
GND	D14	MD60_L	E14
MD62_L	D15	VCC	E15
GND	D16	MD64_L	E16
MD66_L	D17	VCC	E17
GND	D18	MD68_L	E18
MD70_L	D19	VCC	E19
GND	D20	VCC	E20
NC	D21	VCC	E21
GND	D22	I2C_BMC_SCL	E22
PWRGD	D23	VCC	E23
GND	D24	I2C_BMC_SDA	E24
RHIT_L	D25	VCC	E25
GND	D26	VCC	E26
GRCMPLT_L	D27	VCC	E27
GND	D28	BANK1_L	E28
CMND1_L	D29	VCC	E29
GND	D30	CSTB_L	E30
MA0_L	D31	VCC	E31
GND	D32	MA2_L	E32
MA3_L	D33	VCC	E33
GND	D34	MA6_L	E34
MA8_L	D35	VCC	E35
GND	D36	MA11_L	E36
MA13_L	D37	VCC	E37
GND	D38	VCC	E38
TRST_L	D39	VCC	E39
GND	D40	TDO	E40
TCK	D41	VCC	E41
GND	D42	MD2_L	E42
MD4_L	D43	VCC	E43
GND	D44	MD6_L	E44
MD8_L	D45	VCC	E45
GND	D46	MD10_L	E46
MD12_L	D47	VCC	E47
GND	D48	MD15_L	E48
DOFF0_L	D49	VCC	E49
GND	D50	MRESET_L	E50

continued

Memory Module Connector: D & E (continued)

Signal	Pin	Signal	Pin
MD17_L	D51	VCC	E51
GND	D52	MD19_L	E52
MD20_L	D53	VCC	E53
GND	D54	MD23_L	E54
MD25_L	D55	VCC	E55
GND	D56	MD27_L	E56
MD29_L	D57	VCC	E57
GND	D58	MD30_L	E58
MD32_L	D59	VCC	E59
GND	D60	MD35_L	E60

19 Interconnect Backplane: Description/Connectors

This chapter describes the interconnect backplane.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see “Safety Guidelines” on page 125.

Interconnect Backplane

The interconnect backplane connects the CPU and I/O baseboards together via the expander buses. The backplane provides power to the baseboards from the power distribution system. Operating at 100 MHz, the primary and secondary expander buses can provide peak transfers at a data rate of 400 MB per second. The bidirectional and synchronous expander bus uses a full split transaction protocol. Each transaction consists of a request and completion phase. The “No Wait State” protocol of the bus guarantees high bus efficiency. The interconnect backplane provides

- 400 MB/second bandwidth per expander bus at 100 MHz bus frequency
- cableless interface between CPU and I/O baseboards
- power distribution to the CPU and I/O baseboards
- interface between I/O baseboard and power distribution backplane
- passive power transient filtering via bulk decoupling capacitors for +5 V and +12 V
- power cable fault detect

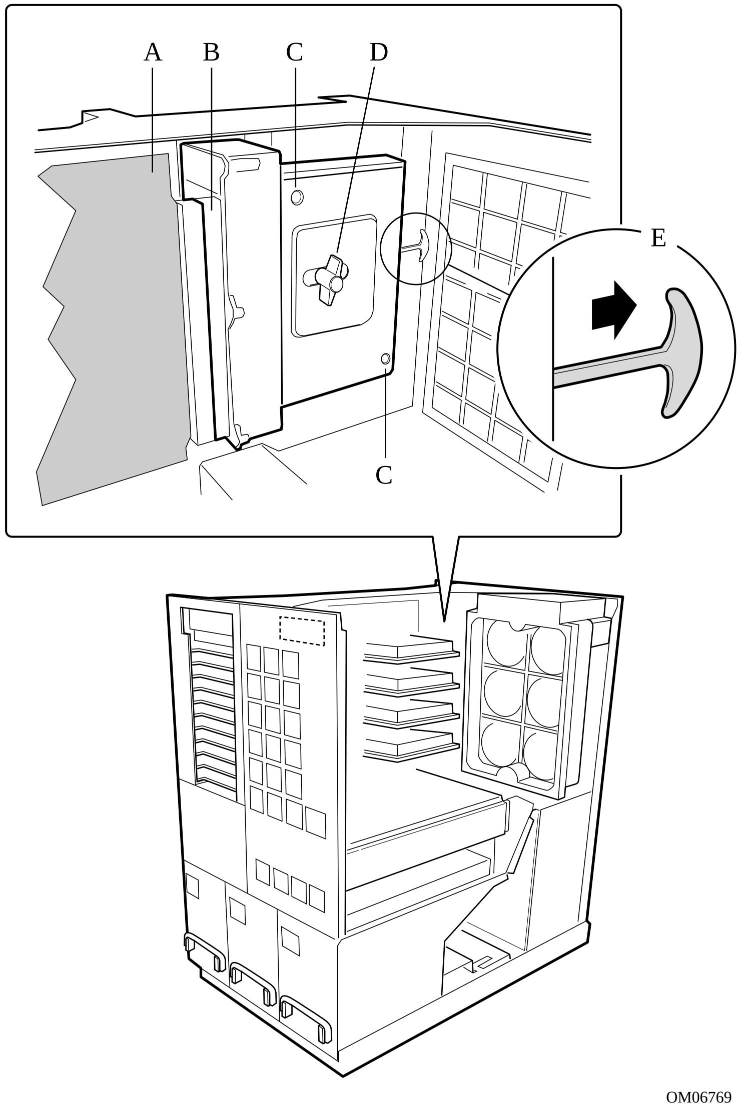


Figure 19-1. Interconnect Backplane

A CPU baseboard
B Expander bus connector to the CPU baseboard
C Captive screws
D Mechanical unit crank
E Mechanical unit lock/unlock lever

Server Management Connector

The 34-conductor signal cable from the power distribution backplane plugs into the 34-pin connector on the interconnect backplane. This cable links the CPU and I/O baseboards to the power distribution backplane and the SCSI hot-docking backplane. It is used mostly for server management, but the power supplies also use this connector to remotely sense the voltages being delivered to the baseboards.

Pin	Signals	Description
1	ISP_SDI	CPU baseboard PLD ISP serial data in
2	ISP_HSBP_SDO	HSBP PLD ISP serial data out
3	ISP_EN2_L	Enables ISP chain on HSBP
4	ISP_SCLK	ISP serial clock
5	INTRUSION_L	Drive door intrusion detect
6	I2C_GLOBAL_SDA	IPMB I^2C data
7	PWR_GOOD	Power good—indicates when power is stable
8	GND	Ground
9	VCC_STDBY	+5 V standby power
10	RESET_PWR_DIST_L	Reset to power distribution backplane
11	VCC_STDBY	+5 V standby power
12	GND	Ground
13	I2C_FPC_SCL	Front panel I^2C clock
14	I2C_GLOBAL_SCL	IPMB I^2C clock
15	I2C_FPC_SDA	Front panel I^2C data
16	GND	Ground
17		Not connected
18	GND	Ground
19	RESET_HSBP_L	Resets microcontroller on HSBP
20	GND	Ground
21	VBIAS	Not used/reserved
22	INTERLOCK_L	Not used/reserved
23	PS_PWR_ON	Tells power supplies to turn on
24	ISP_MODE	ISP mode signal
25	GND	Ground
26	GND	Ground
27	+12V_SENSE	Power supply feedback sense line
28	+5V_SENSE	Power supply feedback sense line
29	GND	Ground
30	+3.3V_SENSE	Power supply feedback sense line
31	GND	Ground
32	GND	Ground
33	SPARE_1	Not connected
34	SPARE_2	Not connected

Interconnect Backplane Power Connectors

The three power connectors on the interconnect backplane receive power from the power distribution backplane. These connectors provide +5 V, +3.3 V, +12 V, -12 V, and ground to the interconnect backplane. It distributes this power to the I/O and CPU baseboards.

The following table describes the pinouts for the three power connectors and the wire colors of the cables that plug into them from the power distribution backplane.

Pin	Signal	Color	Pin	Signal	Color
1	+5 V	RED	13	+12 V	YELLOW
2	GROUND	BLACK	14	GROUND	BLACK
3	+5 V	RED	15	+12 V	YELLOW
4	GROUND	BLACK	16	GROUND	BLACK
5	+5 V	RED	17	+3.3 V	ORANGE
6	GROUND	BLACK	18	GROUND	BLACK
7	+5 V	RED	19	+3.3 V	ORANGE
8	GROUND	BLACK	20	GROUND	BLACK
9	+5 V	RED	21	+3.3 V	ORANGE
10	GROUND	BLACK	22	GROUND	BLACK
11	+12 V	YELLOW	23	+3.3 V	ORANGE
12	GROUND	BLACK	24	-12 V	BLACK

Interconnect to CPU Baseboard: Signal Section

Signal	Pin	Signal	Pin	Signal	Pin
X1CLK	A1	GND	B1	GND	C1
GND	A2	X1CLKB	B2	RSVD	C2
X1D_L(15)	A3	GND	B3	GND	C3
X1D_L(14)	A4	X1D_L(13)	B4	X1XSTBN_L	C4
X1D_L(12)	A5	GND	B5	X1BE_L(1)	C5
GND	A6	X1D_L(10)	B6	X1D_L(11)	C6
X1D_L(9)	A7	GND	B7	X1ADS_L	C7
X1D_L(8)	A8	X1D_L(7)	B8	GND	C8
X1D_L(6)	A9	GND	B9	X1PAR_L	C9
GND	A10	X1D_L(5)	B10	GND	C10
X1D_L(4)	A11	GND	B11	X1BE_L(0)	C11
X1D_L(3)	A12	X1D_L(2)	B12	GND	C12
X1D_L(1)	A13	GND	B13	X1HRTS_L	C13
X1D_L(0)	A14	X1XRTS_L	B14	GND	C14
GND	A15	GND	B15	RSVD	C15
RSVD	A16	RSVD	B16	GND	C16

continued

Interconnect to CPU Baseboard: Signal Section A, B, & C (continued)

Signal	Pin	Signal	Pin	Signal	Pin
RSVD	A17	GND	B17	RSVD	C17
RSVD	A18	RSVD	B18	GND	C18
ISP_SDI	A19	GND	B19	RSVD	C19
RSVD	A20	RSVD	B20	RSVD	C20
ISP_SDO	A21	GND	B21	GND	C21
RSVD	A22	RSVD	B22	RSVD	C22
RSVD	A23	GND	B23	GND	C23
GND	A24	ISP_SCLK	B24	RSVD	C24
X0CLK	A25	GND	B25	GND	C25
GND	A26	X0CLKB	B26	RSVD	C26
X0D_L(15)	A27	GND	B27	GND	C27
X0D_L(14)	A28	X0D_L(13)	B28	X0XSTBN_L	C28
X0D_L(12)	A29	GND	B29	X0BE_L(1)	C29
GND	A30	X0D_L(10)	B30	X0D_L(11)	C30
X0D_L(9)	A31	GND	B31	X0ADS_L	C31
X0D_L(8)	A32	X0D_L(7)	B32	GND	C32
X0D_L(6)	A33	GND	B33	X0PAR_L	C33
GND	A34	X0D_L(5)	B34	GND	C34
X0D_L(4)	A35	GND	B35	X0BE_L(0)	C35
X0D_L(3)	A36	X0D_L(2)	B36	GND	C36
X0D_L(1)	A37	GND	B37	X0HRTS_L	C37
X0D_L(0)	A38	X0XRTS_L	B38	GND	C38
GND	A39	GND	B39	I2C_GLOBAL_SDA	C39
NMI_5V	A40	IGNNE_5V_L	B40	SMI_3V_L	C40
I2C_BMC_SDA	A41	GND	B41	BMC_SPI_BUS(5)	C41
I2C_BMC_SCL	A42	BMC_SPI_BUS(3)	B42	GND	C42
BMC_SPI_BUS(0)	A43	GND	B43	PROC_RESET_L	C43
BMC_SPI_BUS(6)	A44	CPU_SPI_RESET_L	B44	A20M_3V_L	C44
BMC_SPI_BUS(1)	A45	GND	B45	PWRGDB	C45
IO_TDO	A46	IO_TDI	B46	IO_TMS	C46
IO_TCK	A47	GND	B47	RSVD	C47
RSVD	A48	RSVD	B48	GND	C48

Interconnect to CPU Baseboard: Signal Section D & E

Signal	Pin	Signal	Pin
X1HSTBN_L	D1	GND	E1
X1HSTBP_L	D2	GND	E2
GND	D3	X1CLKFB	E3
X1XSTBP_L	D4	GND	E4
GND	D5	MIOC_INTREQ_L	E5
X1RSTFB_L	D6	GND	E6
GND	D7	X1RST_L	E7
X1RSTB_L	D8	GND	E8
GND	D9	X1BLK_L	E9
RSVD	D10	GND	E10
GND	D11	RSVD	E11
RSVD	D12	GND	E12
GND	D13	RSVD	E13
RSVD	D14	GND	E14
RSVD	D15	RSVD	E15
X1IB_L	D16	GND	E16
RSVD	D17	RSVD	E17
RSVD	D18	GND	E18
GND	D19	RSVD	E19
RSVD	D20	GND	E20
RSVD	D21	RSVD	E21
RSVD	D22	GND	E22
RSVD	D23	ISP_EN_L	E23
ISP_MODE	D24	GND	E24
X0HSTBN_L	D25	GND	E25
X0HSTBP_L	D26	GND	E26
GND	D27	X0CLKFB	E27
X0XSTB_L	D28	GND	E28
GND	D29	RSVD	E29
X0RSTB_L	D30	GND	E30
GND	D31	X0RST_L	E31
X0RSTFB_L	D32	GND	E32
GND	D33	X0BLK_L	E33
RSVD	D34	GND	E34
GND	D35	FERR_L	E35
RSVD	D36	GND	E36
GND	D37	INTR_3V	E37
I2C_GLOBAL_SCL	D38	GND	E38

continued

Interconnect to CPU Baseboard: Signal Section D & E (continued)

Signal	Pin	Signal	Pin
IO_PWRGD	D39	CIB_INT0	E39
X0IB_L	D40	GND	E40
GND	D41	BMC_SPI_BUS(4)	E41
BMC_SPI_BUS(2)	D42	GND	E42
GND	D43	RSVD	E43
INIT_3V_L	D44	GND	E44
PICD(0)	D45	PICD(1)	E45
IO_TRST_L	D46	GND	E46
RSVD	D47	PIC_CLK	E47
RSVD	D48	GND	E48

Interconnect to CPU Baseboard: Power Section

3.3 V Connectors J21, J22, J23, and J24

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+3.3V	P1B1	GND	P1C1	+3.3V	P1D1	GND	P1E1	GND
P1A2	+3.3V	P1B2	GND	P1C2	+3.3V	P1D2	GND	P1E2	GND
P1A3	+3.3V	P1B3	GND	P1C3	+3.3V	P1D3	GND	P1E3	GND
P2A1	+3.3V	P2B1	GND	P2C1	+3.3V	P2D1	GND	P2E1	+3.3V
P2A2	+3.3V	P2B2	GND	P2C2	+3.3V	P2D2	GND	P2E2	+3.3V
P2A3	+3.3V	P2B3	GND	P2C3	+3.3V	P2D3	GND	P2E3	+3.3V

5 V Connectors J25 and J26

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+5V	P1B1	GND	P1C1	+5V	P1D1	GND	P1E1	GND
P1A2	+5V	P1B2	GND	P1C2	+5V	P1D2	GND	P1E2	GND
P1A3	+5V	P1B3	GND	P1C3	+5V	P1D3	GND	P1E3	GND
P2A1	+5V	P2B1	GND	P2C1	+5V	P2D1	GND	P2E1	+5V
P2A2	+5V	P2B2	GND	P2C2	+5V	P2D2	GND	P2E2	+5V
P2A3	+5V	P2B3	GND	P2C3	+5V	P2D3	GND	P2E3	+5V

12 V Connector J27

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+12V	P1B1	GND	P1C1	+12V	P1D1	GND	P1E1	GND
P1A2	+12V	P1B2	GND	P1C2	+12V	P1D2	GND	P1E2	GND
P1A3	+12V	P1B3	GND	P1C3	+12V	P1D3	GND	P1E3	GND
P2A1	+12V	P2B1	GND	P2C1	+12V	P2D1	GND	P2E1	+12V
P2A2	+12V	P2B2	GND	P2C2	+12V	P2D2	GND	P2E2	+12V
P2A3	+12V	P2B3	GND	P2C3	+12V	P2D3	GND	P2E3	+12V

12 V Connectors J28 and J29

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+12V	P1B1	GND	P1C1	+12V	P1D1	GND	P1E1	+12V
P1A2	+12V	P1B2	GND	P1C2	+12V	P1D2	GND	P1E2	+12V
P1A3	+12V	P1B3	GND	P1C3	+12V	P1D3	GND	P1E3	+12V
P2A1	+12V	P2B1	GND	P2C1	+12V	P2D1	GND	P2E1	+12V
P2A2	+12V	P2B2	GND	P2C2	+12V	P2D2	GND	P2E2	+12V
P2A3	+12V	P2B3	GND	P2C3	+12V	P2D3	GND	P2E3	+12V

Interconnect to I/O Baseboard: Signal Section

Signal	Pin	Signal	Pin	Signal	Pin
RSVD	A1	GND	B1	GND	C1
IO_TCK	A2	RSVD	B2	RSVD	C2
IO_TDO	A3	GND	B3	IO_TMS	C3
BMC_SPI_BUS(1)	A4	IO_TDI	B4	PWRGDB	C4
BMC_SPI_BUS(6)	A5	GND	B5	A20M_3V_L	C5
BMC_SPI_BUS(0)	A6	CPU_SPI_RESET_L	B6	PROC_RESET_L	C6
I2C_BMC_SCL	A7	GND	B7	GND	C7
I2C_BMC_SDA	A8	BMC_SPI_BUS(3)	B8	BMC_SPI_BUS(5)	C8
NMI_5V	A9	GND	B9	SMI_3V_L	C9
GND	A10	IGNNE_3V_L	B10	I2C_GLOBAL_SDA	C10
X0D_L(0)	A11	GND	B11	GND	C11
X0D_L(1)	A12	X0XRTS_L	B12	X0HRTS_L	C12
X0D_L(3)	A13	GND	B13	GND	C13
X0D_L(4)	A14	X0D_L(2)	B14	X0BE_L(0)	C14
GND	A15	GND	B15	GND	C15
X0D_L(6)	A16	X0D_L(5)	B16	X0PAR_L	C16
X0D_L(8)	A17	GND	B17	GND	C17
X0D_L(9)	A18	X0D_L(7)	B18	X0ADS_L	C18

continued

Interconnect to I/O Baseboard: Signal Section A, B, & C (continued)

Signal	Pin	Signal	Pin	Signal	Pin
GND	A19	GND	B19	X0D_L(11)	C19
X0D_L(12)	A20	X0D_L(10)	B20	X0BE_L(1)	C20
X0D_L(14)	A21	GND	B21	X0XSTBN_L	C21
X0D_L(15)	A22	X0D_L(13)	B22	GND	C22
GND	A23	GND	B23	ISP_HSBP_SDO	C23
X0CLK	A24	RSVD	B24	GND	C24
GND	A25	GND	B25	RSVD	C25
RSVD	A26	ISP_SCLK	B26	GND	C26
RSVD	A27	GND	B27	RSVD	C27
ISP_SDO	A28	RSVD	B28	GND	C28
INTRUSION_L	A29	GND	B29	INTERLOCK_L	C29
ISP_SDI	A30	RSVD	B30	RSVD	C30
VCC_STDBY	A31	GND	B31	GND	C31
I2C_FPC_SCL	A32	VCC_STDBY	B32	RSVD	C32
I2C_FPC_SDA	A33	GND	B33	GND	C33
GND	A34	RSVD	B34	RSVD	C34
X1D_L(0)	A35	GND	B35	GND	C35
X1D_L(1)	A36	X1XRTS_L	B36	X1HRTS_L	C36
X1D_L(3)	A37	GND	B37	GND	C37
X1D_L(4)	A38	X1D_L(2)	B38	X1BE_L(0)	C38
GND	A39	GND	B39	GND	C39
X1D_L(6)	A40	X1D_L(5)	B40	X1PAR_L	C40
X1D_L(8)	A41	GND	B41	GND	C41
X1D_L(9)	A42	X1D_L(7)	B42	X1ADS_L	C42
GND	A43	GND	B43	X1D_L(11)	C43
X1D_L(12)	A44	X1D_L(10)	B44	X1BE_L(1)	C44
X1D_L(14)	A45	GND	B45	X1XSTBN_L	C45
X1D_L(15)	A46	X1D_L(13)	B46	GND	C46
GND	A47	GND	B47	RSVD	C47
X1CLK	A48	RSVD	B48	GND	C48

Interconnect to I/O Baseboard: Signal Section D & E

Signal	Pin	Signal	Pin
RSVD	D1	PIC_CLK	E1
RSVD	D2	GND	E2
IO_TRST_L	D3	PICD(1)	E3
PICD(0)	D4	GND	E4
INIT_3V_L	D5	RESET_PWR_DIST_L	E5
GND	D6	GND	E6
BMC_SPI_BUS(2)	D7	BMC_SPI_BUS(4)	E7
GND	D8	GND	E8
X0IB_L	D9	CIB_INT(0)	E9
IO_PWRGD	D10	GND	E10
I2C_GLOBAL_SCL	D11	INTR_3V	E11
GND	D12	GND	E12
RESET_HSBP_L	D13	FERR_L	E13
GND	D14	GND	E14
RSVD	D15	X0BLK_L	E15
GND	D16	GND	E16
RSVD	D17	X0RST_L	E17
GND	D18	GND	E18
RSVD	D19	RSVD	E19
GND	D20	GND	E20
X0XSTBP_L	D21	RSVD	E21
GND	D22	GND	E22
X0HSTBP_L	D23	GND	E23
X0HSTBN_L	D24	GND	E24
ISP_MODE	D25	ISP_EN_L	E25
RSVD	D26	GND	E26
RSVD	D27	-12V	E27
-12V	D28	GND	E28
ISP_EN2_L	D29	CPU_SLP_L	E29
GND	D30	GND	E30
RSVD	D31	RSVD	E31
RSVD	D32	GND	E32
X1IB_L	D33	PWR_GOOD	E33
PS_PWR_ON	D34	GND	E34
RSVD	D35	RSVD	E35
GND	D36	GND	E36
RSVD	D37	VREF	E37
GND	D38	GND	E38

continued

Interconnect to I/O Baseboard: Signal Section D & E (continued)

Signal	Pin	Signal	Pin
RSVD	D39	X1BLK_L	E39
GND	D40	GND	E40
RSVD	D41	X1RST_L	E41
GND	D42	GND	E42
RSVD	D43	MIOC_INTREQ_L	E43
GND	D44	GND	E44
X1XSTBP_L	D45	RSVD	E45
GND	D46	GND	E46
X1HSTBP_L	D47	GND	E47
X1HSTBN_L	D48	GND	E48

Interconnect to I/O Baseboard: Power Section

3.3 V Connectors J38 and J39

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+3.3V	P1B1	GND	P1C1	+3.3V	P1D1	GND	P1E1	+3.3V
P1A2	+3.3V	P1B2	GND	P1C2	+3.3V	P1D2	GND	P1E2	+3.3V
P1A3	+3.3V	P1B3	GND	P1C3	+3.3V	P1D3	GND	P1E3	+3.3V
P2A1	+3.3V	P2B1	GND	P2C1	+3.3V	P2D1	GND	P2E1	GND
P2A2	+3.3V	P2B2	GND	P2C2	+3.3V	P2D2	GND	P2E2	GND
P2A3	+3.3V	P2B3	GND	P2C3	+3.3V	P2D3	GND	P2E3	GND

5 V and 12 V Connector J40

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+12V	P1B1	GND	P1C1	+12V	P1D1	GND	P1E1	+12V
P1A2	+12V	P1B2	GND	P1C2	+12V	P1D2	GND	P1E2	+12V
P1A3	+12V	P1B3	GND	P1C3	+12V	P1D3	GND	P1E3	+12V
P2A1	+5V	P2B1	GND	P2C1	+5V	P2D1	GND	P2E1	GND
P2A2	+5V	P2B2	GND	P2C2	+5V	P2D2	GND	P2E2	GND
P2A3	+5V	P2B3	GND	P2C3	+5V	P2D3	GND	P2E3	GND

5 V Connectors J41, J42, J43, and J44

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+5V	P1B1	GND	P1C1	+5V	P1D1	GND	P1E1	+5V
P1A2	+5V	P1B2	GND	P1C2	+5V	P1D2	GND	P1E2	+5V
P1A3	+5V	P1B3	GND	P1C3	+5V	P1D3	GND	P1E3	+5V
P2A1	+5V	P2B1	GND	P2C1	+5V	P2D1	GND	P2E1	GND
P2A2	+5V	P2B2	GND	P2C2	+5V	P2D2	GND	P2E2	GND
P2A3	+5V	P2B3	GND	P2C3	+5V	P2D3	GND	P2E3	GND

3.3 V and 5 V Connector J45

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
P1A1	+5V	P1B1	GND	P1C1	+3.3V	P1D1	GND	P1E1	+3.3V
P1A2	+5V	P1B2	GND	P1C2	+3.3V	P1D2	GND	P1E2	+3.3V
P1A3	+5V	P1B3	GND	P1C3	+3.3V	P1D3	GND	P1E3	+3.3V
P2A1	+3.3V	P2B1	GND	P2C1	+3.3V	P2D1	GND	P2E1	GND
P2A2	+3.3V	P2B2	GND	P2C2	+3.3V	P2D2	GND	P2E2	GND
P2A3	+3.3V	P2B3	GND	P2C3	+3.3V	P2D3	GND	P2E3	GND

20 Power System: Description/Calculating Power Usage

This chapter describes the modular power system and explains how to calculate power usage for your server.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see “Safety Guidelines” on page 125.

Power System

The modular power system for the server is provided by up to four 420 watt autoranging power supplies and a power distribution backplane. The power system may be configured with three power supplies (standard, nonredundant) or four power supplies (3 + 1, redundant). The power supplies are mounted in a 3 + 1 pattern in the bottom of the chassis. Each power supply has an integrated fan for cooling and a detachable power cord that plugs into the AC inlet receptacle on the power supply.

The power distribution backplane provides the connectors for the hot-swap power supplies. It also provides the interface logic for power supply related management functions such as

- power supply presence detection
- power supply fault signal reporting
- 240VA overload detection and shutdown

Current sensing limits the energy supplied by the power distribution backplane to levels generally accepted as operator-accessible areas—less than 240 VA for the CSA Level 3 category—without the use of interlocks. This means that while the server is energized, the current sensing feature will shut down the entire power system if any *single output* from the backplane to operator-accessible areas (SCSI hot-docking backplane only) exceeds 240 VA.

Care must be taken not to overload a branch circuit of the AC mains by plugging too many power cords into a single AC circuit. We recommend plugging the power cord of each power supply into a separate circuit.

If a power supply fails in the redundant power system, the yellow power supply failure LED on the front panel starts flashing. The supply can be hot-swapped—removed and replaced—without turning off the power or impacting server operations. The power cord must be unplugged from the failed supply before it can be hot-swapped.

Power Supply Input Voltages

Table 20-1. Power Supply AC Input Ratings

Parameter	Minimum	Nominal	Maximum	Units
V in (115)	90	100-120	132	V RMS
V in (230)	180	200-240	264	V RMS
V in Frequency	47	50/60	63	Hz
AC Input Current		7.0 A @110 VAC 3.4 A @ 210 VAC		Ampere

The 420 watt autoranging power supplies are capable of handling up to 12 hard drives at 24 watts per drive (typical 3.5-inch by 1.6-inch, 7200 RPM drive) and four processors at a maximum of 50 watts per processor. However, the power distribution systems (cables, boards, and connectors) are sized to handle up to 12 hard drives at 28 watts per drive and four processors at a maximum of 65 watts per processor.

The CPU baseboard provides headers for six VRM 8.3 compatible voltage converters. The converter input is +12 V from the power supply. Each processor core has its own converter. One converter is provided for a pair of processor caches. The maximum processor power of 65 watts is based on a ratio of 2:1 core to cache power. The converters can handle a maximum of 50 watts per processor.

The total power requirement for the board set exceeds the 240 VA energy hazard limit that defines an operator-accessible area. The 240 VA protection circuits for the hot-docking bay area protect the user from a 240 VA energy hazard while installing or removing—hot-swapping—a hard disk drive.

Power Supply Output Voltages

Table 20-2. Power Supply Output Ratings

Power Supply Outputs	Individual Supply	Three Supplies* Nonredundant	Four Supplies* Redundant
5 V	32 A	90 A	90 A
12 V	16 A	45 A	45 A
3.3 V	15 A	42 A	42 A
-12 V	1 A	1 A	1 A
5 V Standby	100 mA	360 mA	360 mA

* Forced load sharing is for 5, 3.3, and 12 V only. The +5 V standby load sharing is the technique for passive load sharing.

Server Current Usage

Table 20-3 shows the current usage for both minimally and fully configured servers. You can easily calculate power usage in the server from the numbers provided. The table is for reference only. It is not meant to provide the exact current usage in the server.

NOTE

The current usage will vary depending on the number of processors, the size and number of DIMMs, and any other PCI and peripheral devices installed in your server.

Table 20-3. Server Board Set Voltages and Currents

	+3.3 V		+5 V		+12 V		+5 V Standby		-12 V	
	Min.[1] Current	Max.[2] Current	Min. Current	Max. Current	Min. Current	Max. Current	Min. Current	Max. Current	Min. Current	Max. Current
CPU baseboard with processors	4.6A	4.6A	0.8A	6.2A	0.2A	28.5A	0 A	0 A	0 A	0 A
DRAM (8 GB)	2.4 A	27.2 A	0 A	0 A	0 A	0 A	0 A	0 A	0 A	0 A
Total (CPU baseboard)	7.0 A	31.8 A	0.8 A	6.2 A	0.2 A	28.5 A	0 A	0 A	0 A	0 A
I/O baseboard	0.2 A	5 A	0.7 A	4.25 A	0 A	0 A	5 mA	5 mA	0 A	0 A
PCI/ISA[3, 4, 5, 6, 7]	0 A	23 A	0 A	41 A	0 A	12 A	0 A	0 mA	0 A	1.2 A
I/O riser card	0 A	0 A	0 A	70 mA	0 A	25 mA	5 mA	150 mA	0 A	0 A
Front panel[8]	0 A	0 A	0 A	250 mA	0 A	0 A	0 A	170 mA	0 A	0 A
Total (I/O baseboard)	0.2 A	28 A	0.7 A	45.32 A	0 A	6.03 A	10 mA	155 mA	0 A	1.2 A
Total Current (CPU and I/O baseboards)	**7.2 A**	**59.8 A**	**1.5 A**	**51.5 A**	**0.2 A**	**34.5 A**	**10 mA**	**155 mA**	**0 A**	**1.2 A**
Total Power (CPU and I/O baseboards)	**23.76 W**	**197.3 W**	**7.5 W**	**257.6 W**	**2.4 W**	**414.4 W**	**0.05 W**	**0.78 W**	**0 W**	**14.4 W**

1 Minimum server configuration: one idle processor, two VRMs, four processor termination modules, two memory modules with 128 MB DRAM, no I/O adapter cards, no front panel, no I/O riser card, no keyboard, no mouse, no video, no parallel-port connections, and no bus activity.

2 Maximum server configuration: four 65 W processors and their associated VRMs operating at 80% efficiency, keyboard, mouse, video, parallel port connected, two memory modules with 8 GB DRAM, and all I/O adapter slots filled. See notes 3-8.

3 Current must not exceed 7.58 A (25 W) per PCI slot or 23 A total for all PCI expansion slots on +3.3 V.

4 Current must not exceed 5 A (25 W) per PCI slot or 41 A total for all expansion slots on +5 V.

5 Current must not exceed 2 A per ISA slot or 41 A total for all expansion slots on +5 V.

6 Current must not exceed 500 mA per PCI or ISA slot or 6 A total for all expansion slots on +12 V.

7 Current must not exceed 100 mA per slot or 1.2 A total for all expansion slots on -12 V.

8 These values are included for reference only. They are not included in the maximum configuration requirements.

Calculating Power Usage

Use the worksheets in Tables 20-4 and 20-5 to calculate the total DC power used by your server configuration.

The documentation that comes with each add-in device should specify its current and voltage requirements.

To calculate the total combined wattage for your server, do this:

1. List the current for each board and device in the appropriate voltage level column in Table 20-4.
2. Add the currents in each column of Table 20-4, and enter the total current for each column in Table 20-5.
3. Multiply the voltage by the total current to get the total wattage for each voltage level.
4. Add the total wattage for each voltage level to arrive at a total combined power usage on the power supply.

Table 20-4. Worksheet for Calculating DC Power Usage

	Current (maximum) at voltage levels:			
Device	**+3.3 V**	**+5 V**	**+12 V**	**-12 V**
I/O baseboard	5 A	4.25 A	2 A	1 A
16-bit ISA slot				
32-bit primary PCI slot 1, J4				
32-bit primary PCI slot 2, J5				
32-bit secondary PCI slot 3, J6				
32-bit secondary PCI slot 4, J7				
32-bit secondary PCI slot 5, J8				
32-bit secondary PCI slot 6, J9				
64-bit PCI slot 7, J10				
64-bit PCI slot 8, J11				
64-bit PCI slot 9, J12				
64-bit PCI slot 10, J13				
64-bit PCI slot 11, J14				
CPU baseboard with four 65 W processors	4.6 A	6.2 A	28.5 A	
Primary memory module				
Secondary memory module				
3.5-inch diskette drive		0.3 A		
CD-ROM drive		0.4 A	1.0 A	
SCSI tape drive				
1st 3.5-inch SCA SCSI hard disk drive				
2nd 3.5-inch SCA SCSI hard disk drive				

continued

Table 20-4. Worksheet for Calculating DC Power Usage (continued)

	Current (maximum) at voltage levels:			
Device	**+3.3 V**	**+5 V**	**+12 V**	**-12 V**
3rd 3.5-inch SCA SCSI hard disk drive				
4th 3.5-inch SCA SCSI hard disk drive				
5th 3.5-inch SCA SCSI hard disk drive				
6th 3.5-inch SCA SCSI hard disk drive				
7th 3.5-inch SCA SCSI hard disk drive				
8th 3.5-inch SCA SCSI hard disk drive				
9th 3.5-inch SCA SCSI hard disk drive				
10th 3.5-inch SCA SCSI hard disk drive				
11th 3.5-inch SCA SCSI hard disk drive				
12th 3.5-inch SCA SCSI hard disk drive				
Nine 92 mm cooling fans (.31 A/fan @ 12 V) (.595 A/fan @ 5V)		5.36 A		
Total Current				

NOTE

The total combined wattage for your server configuration must be less than 1260 watts. The power must be less than

- 139 watts for +3.3 V
- 450 watts for +5 V
- 540 watts for +12 V
- 12 watts for -12 V
- 1.8 watts for +5 V standby

Table 20-5. Total Combined Power Used by Your Server

Voltage Level and Total Current (V x A = W)	Total Watts for Each Voltage Level
(+3.3 V) x (A)	W
(+5 V) x (A)	W
(-5 V) x (A)	W
(+12 V) x (A)	W
(-12 V) x (A)	W
Total Combined Wattage =	**W**

21 Back-up Battery: Replacing/Disposing

This chapter tells how to replace the lithium back-up battery on the I/O baseboard.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see “Safety Guidelines” on page 125.

Tools and Supplies You Need

- Phillips (cross-head) screwdriver (#1 bit and #2 bit)
- Antistatic wrist strap (recommended)
- Pen or pencil

Equipment Log

Use the equipment log form provided in Appendix B, “Equipment Log,” to record the model and serial numbers of the server, all installed options, and any other pertinent information about the server. You will need this information when running the SSU.

Back-up Battery

The lithium battery on the I/O baseboard powers the real-time clock (RTC) for up to ten years in the absence of power. The RTC contains 256 bytes of general purpose RAM that stores the system BIOS configuration information, clock registers, and general purpose control registers.

Contact your sales representative or dealer for a list of approved replacement devices and available service.

⚠ **CAUTION**

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used battery according to manufacturer's instructions.

⚠ **ADVARSEL!**

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

⚠ **ADVARSEL!**

Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

⚠ **VARNING**

Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

⚠ **VAROITUS**

Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

Replacing the Back-up Battery

See Figure 21-1.

1. Observe the precautions on page 125, “Safety Guidelines.”
2. Remove the top and side covers as described in Chapter 11, “Server Covers: Removing/Reinstalling.”
3. Using the tip of your finger, press down lightly on the lithium battery, and slide it toward the right side of the socket.
4. Gently lift the battery out of the socket, and dispose of it according to local ordinance.
5. Remove the new battery from its package, and, being careful to observe correct polarity (positive-side up), gently insert it into the battery socket.
6. Reinstall the top and side covers as described in Chapter 11.
7. Run the SSU to restore the configuration settings to the RTC. For information about running this utility, see Chapter 5, “System Setup Utility: When to Run.”

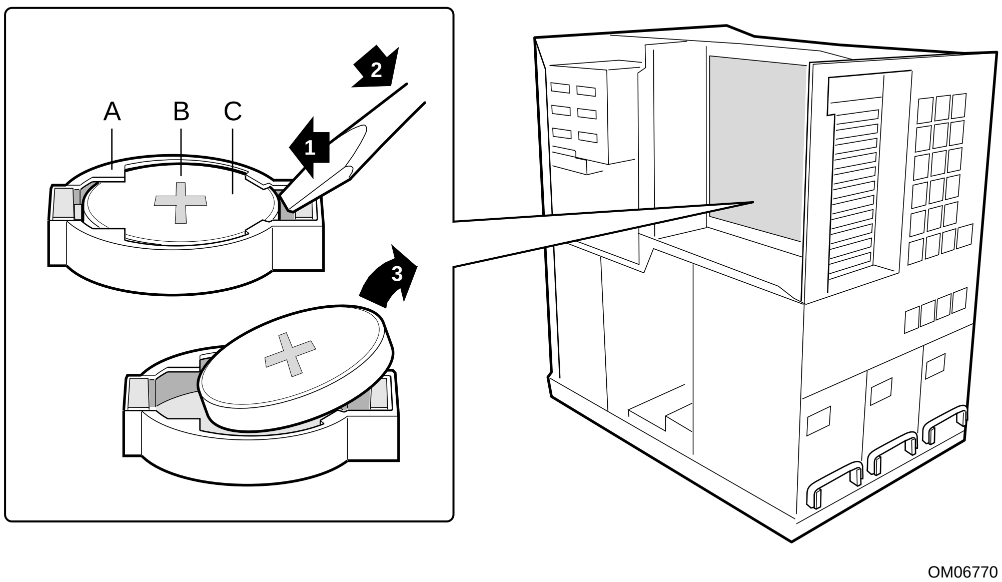


Figure 21-1. Lithium Back-up Battery

A	Socket
B	Positive-side up
C	Battery

22 Solving Problems: Troubleshooting/Error Messages

This chapter helps you identify and solve problems that might occur while you are using the server.

For detailed instructions about removing or installing a component or checking jumpers, see the chapter whose number appears in parentheses after a given checklist item. Also check the Contents and Index for specific page locations.

Warnings and Cautions

Only a ***qualified service technician*** is authorized to remove the server covers and to access any of the components inside the server. Before removing the covers, see “Safety Guidelines” on page 125.

Resetting the Server

You can reset the server in several ways.

Manually

Press	To
<Ctrl+Alt+Del>	Clear server memory and reload the operating system. This is a "soft boot" reset.
Reset button	Clear server memory, restart POST, and reload the operating system.
Power off/on	Turn the server power off and then on. This is a "cold boot" reset; it has the same effect as pushing the reset button except that power is halted to all peripherals.

Programmed

You can reset the server with software.

Initial Startup of the Server

Problems that occur at initial startup are usually caused by incorrect installation or configuration of the server. Hardware failure is a less frequent cause.

Checklist

- ❑ Are all cables correctly connected and secured?
- ❑ Are the processors packaged in S.E.C. cartridges fully seated in the slot 2 connectors on the CPU baseboard?

- ❑ Are front side bus terminator modules installed in all unused slot 2 connectors on the CPU baseboard?
- ❑ Are the memory modules fully seated in the connectors on the CPU baseboard?
- ❑ Are all DIMMs on the memory module installed correctly? (Chapter 18)
- ❑ Are all add-in ISA and PCI boards fully seated in their slots on the I/O baseboard?
- ❑ Are all jumper settings on the I/O and CPU baseboards correct? (Chapters 16 and 17)
- ❑ Are all jumper and switch settings on add-in boards and peripheral devices correct? To check settings, refer to the manufacturer's documentation. Ensure there are no conflicts—for example, two add-in boards sharing the same interrupt.
- ❑ Are all add-in boards installed correctly? (Chapter 12)
- ❑ If the server has a hard disk drive, is it properly formatted or defined?
- ❑ Is the SCSI hot-docking backplane configured correctly? (Chapter 15)
- ❑ Are all device drivers properly installed? (Chapter 2)
- ❑ Are the configuration settings made with the SSU correct? (Chapter 5)
- ❑ Is the operating system properly loaded? Refer to the operating system documentation.
- ❑ Did you press the on/off power switch on the front panel to turn the server on (power-on LED should be lit)?
- ❑ Is the power cord plugged into the AC inlet on the power supply and into a NEMA 5-15R outlet for 100-120 V~ or a NEMA 6-15R outlet for 200-240 V~? (Chapter 2)
- ❑ Is AC power available at the wall outlet?

If these items are correct but the problem recurs, refer to "More Troubleshooting Procedures" on page 290.

Running New Application Software

Problems that occur when you run new application software are usually related to the new software. Faulty equipment is much less likely, especially if other software runs correctly.

Checklist

- ❑ Does the server meet the minimum hardware requirements for the software? Refer to the software documentation.
- ❑ Is the software an authorized copy? If not, get one; unauthorized copies often do not work.
- ❑ If you are running the software from a diskette, is it a good copy?
- ❑ If you are running the software from a CD, is it scratched or dirty?
- ❑ If you are running the software from a hard disk drive, is the software correctly installed? Were all necessary procedures followed and files installed?
- ❑ Are the correct device drivers installed?
- ❑ Is the software correctly configured for the server?
- ❑ Are you using the software correctly?

If the problems persist, contact the software vendor's customer service representative.

After the Server Has Been Running Correctly

Problems that occur after the server hardware and software have been running correctly often indicate equipment failure. Many situations that are easy to correct, however, can also cause such problems.

Checklist

- ❑ If you are running the software from a diskette, try a new copy of the software.
- ❑ If you are running the software from a CD, try a different CD to see if the problem occurs on all CDs.
- ❑ If you are running the software from a hard disk drive, try running it from a diskette. If the software runs correctly, there may be a problem with the copy on the hard disk drive. Reinstall the software on the hard disk drive, and try running it again. Make sure all the necessary files are installed.
- ❑ If the problems are intermittent, there may be a loose cable, dirt in the keyboard (if keyboard input is incorrect), a marginal power supply, or other random component failures.
- ❑ If you suspect that a transient voltage spike, power outage, or brownout might have occurred, reload the software and try running it again. (For example, symptoms of voltage spikes include a flickering video monitor, unexpected server reboots, and the server does not respond to user commands.)

NOTE

If you are getting random errors in your data files, they may be getting corrupted by voltage spikes on your power line. If you are experiencing any of the above symptoms that might indicate voltage spikes on the power line, you may want to install a surge suppressor between the power outlet and the server power cord.

- ❑ If the problem recurs after you have checked and corrected all the above items, refer to "More Troubleshooting Procedures" on page 290.
- ❑ If you receive any error messages, refer to "Error Codes and Messages" on page 295 for an explanation and suggestions.

More Troubleshooting Procedures

This section provides a more detailed approach to identifying a problem and locating its source.

Preparing the Server for Diagnostic Testing

⚠ **CAUTION**

Before disconnecting any peripheral cables from the server, turn off the server and any external peripheral devices. Failure to do so can cause permanent damage to the server and/or the peripheral devices.

1. Turn off the server and all external peripheral devices. Disconnect all devices from the server, except the keyboard and video monitor.
2. Make sure the server power cords are plugged into properly grounded AC outlets. (Chapter 2)
3. Make sure your video monitor and keyboard are correctly connected to the server. Turn on the monitor. Set its brightness and contrast controls to at least two-thirds of their maximum ranges (refer to the documentation supplied with your monitor).
4. If the operating system normally loads from the hard disk drive, make sure there is no diskette in drive A. If the OS normally loads from a diskette, place the diskette containing the OS files in drive A.
5. Turn on the server. If the power LED does not light, refer to "Power Light Does Not Light" on page 291.

Monitoring POST

See Chapter 3.

Verifying Proper Operation of the Server Lights

As POST determines the server configuration, it tests for the presence of each mass storage device installed in the server. As each device is checked, its activity light should turn on briefly. Check for the following:

- ❑ Does the diskette drive activity light turn on briefly? If not, refer to "Diskette Drive Activity Light Does Not Light" on page 294.
- ❑ If there is a hard disk drive or a SCSI device installed in the server, does the drive activity light on the front panel turn on briefly? If not, refer to "Hard Disk Drive Activity Light Does Not Light" on page 294.

NOTE

For information about the controls and indicators, see Chapter 1.

Confirming Loading of the Operating System

Once the server boots up, the operating system prompt appears on the screen. The prompt varies according to the operating system. If the operating system prompt does not appear, refer to "Initial Startup of the Server" on page 287.

Specific Problems and Corrective Actions

This section provides possible solutions for the following specific problems:

- Power light does not light.
- Server cooling fans do not rotate or rotate slowly.
- No characters appear on screen.
- Characters on the screen appear distorted or incorrect.
- No beep or incorrect beep pattern emitted.
- Activity light on the diskette drive does not light.
- Activity light on the hard disk drive does not light.
- Activity light on the CD-ROM drive does not light.
- Application software problems are unresolved.
- Server powers up, and it immediately powers down.

Try the solutions in the order given. If you cannot correct the problem, contact your service representative or authorized dealer for assistance.

Power Light Does Not Light

Check the following:

❑ Is the server operating normally? If so, the power LED is probably defective or the cable from the front panel to the baseboard is loose.

❑ Are there other problems with the server? If so, check the items listed under "Server Cooling Fans Do Not Rotate Properly."

❑ Is the yellow power supply failure LED flashing? If so, a power supply has failed.

If all items are correct and problems persist, contact your service representative or authorized dealer for assistance.

Server Cooling Fans Do Not Rotate Properly

If the server cooling fans are not operating properly, server components will be damaged.

NOTE

The server contains nine fans, arranged in arrays of three and six fans, that provide cooling for the server components. The integrated fan on each power supply provides more cooling for the SCSI hard disk drives in the hot-docking bays. In case of cooling problems, you cannot access or replace the fans integrated in the power supplies. There are no serviceable components in the power supply. If the power supply is opened, the warranty is voided.

Check the following:

- ❑ Is AC power available at the wall outlets?
- ❑ Are the server power cords properly connected to the power supplies and the wall outlets?
- ❑ If present, are the fuses in the server power cord plugs okay?
- ❑ Did you press the power on/off push-button switch?
- ❑ Is the power-on light lit?
- ❑ Have any of the fan motors stopped (use the server management subsystem to check the fan status)?
- ❑ Are the fan power cables properly connected to the SCSI hot-docking backplane?
- ❑ Is the cable from the front panel board connected to the I/O baseboard?
- ❑ Are all power and signal cables properly connected to the power distribution backplane?
- ❑ Are the power distribution backplane power and signal cables properly connected to the SCSI hot-docking backplane?
- ❑ Are there any shorted wires caused by pinched cables or power connector plugs forced into power connector sockets the wrong way?

If switches and connections are correct and AC power is available at the wall outlets, contact your service representative or authorized dealer for assistance.

No Characters Appear on Screen

Check the following:

- ❑ Is the keyboard working?
- ❑ Is the video monitor plugged in and turned on?
- ❑ Are the brightness and contrast controls on the video monitor properly adjusted?
- ❑ Are the switch settings on the video monitor correct?
- ❑ Is the video monitor signal cable properly installed?

If you are using an add-in video controller board, do the following:

1. Verify that the video controller board is fully seated in the I/O baseboard connector.
2. Run the SSU to specify that an add-in VGA/EGA controller board is installed.
3. Reboot the server for changes to take effect.
4. If there are still no characters on the screen after you reboot the server and POST emits a beep code, write down the beep code you hear. This information is useful for your service representative. See "Error Codes and Messages" on page 295.
5. If you do not receive a beep code and characters do not appear, the video monitor or video controller may have failed. Contact your service representative or authorized dealer for assistance.

Characters Are Distorted or Incorrect

Check the following:

- ❑ Are the brightness and contrast controls properly adjusted on the video monitor? Refer to the manufacturer’s documentation.
- ❑ Are the video monitor signal and power cables properly installed?

If the problem persists, the monitor may be faulty or it may be the incorrect type. Contact your service representative or authorized dealer for assistance.

Incorrect or no Beep Codes

If the server operates normally but there was no beep, the speaker may be defective. Run the SSU to verify that the speaker is enabled (Chapter 5). If the speaker is enabled but not functioning, contact your service representative or authorized dealer for assistance.

Record the beep code emitted by POST, and refer to "Error Codes and Messages" on page 295 for information about beep codes and error messages.

Diskette Drive Activity Light Does Not Light

Check the following:

- ❑ Are the power and signal cables to the diskette drive properly installed?
- ❑ Are all relevant switches and jumpers on the diskette drive set correctly?
- ❑ Is the diskette drive properly configured?
- ❑ Is the diskette drive activity light always on? If so, the signal cable may be plugged in incorrectly.

If you are using the onboard diskette controller, use the SSU to make sure that controller is enabled. If you are using an add-in diskette controller, make sure that the onboard controller is disabled. (Chapter 5)

If the problem persists, there may be a problem with the diskette drive, I/O baseboard, or drive signal cable. Contact your service representative or authorized dealer for assistance.

Hard Disk Drive Activity Light Does Not Light

If you have installed one or more hard disk drives in your server, check the following:

- ❑ Are the power and signal cables to the IDE hard disk drive properly installed?
- ❑ Is the SCSI controller board fully seated in the I/O baseboard connector?
- ❑ Are all relevant switches and jumpers on the hard disk drive and controller board set correctly?
- ❑ Is the onboard IDE controller enabled?

NOTE

The hard disk drive activity light on the front panel lights when either an IDE hard disk drive or SCSI device is in use.

- ❑ Is the hard disk drive properly configured?
- ❑ Are the SCSI controller board signal cables properly connected to the SCSI hot-docking backplane?

If you received error messages, refer to "Error Codes and Messages" on page 295 for information about error messages.

If you did not receive error messages, run the SSU and make sure the hard disk drive is configured with the correct parameters. (Chapter 5)

If the problem persists, there may be a problem with the hard disk drive, the add-in controller board, I/O baseboard, drive signal cable, or LED connector. Contact your service representative or authorized dealer for assistance.

Problems With Application Software

If you have problems with application software, do the following:

1. Verify that the software is properly configured for the server. Refer to the software installation and operation documentation to set up and use the software.
2. Try a different copy of the software to see if the problem is with the copy you are using.
3. Make sure all cables are installed correctly.
4. Verify that the baseboard jumpers are set correctly.
5. If other software runs correctly on the server, contact your vendor about the failing software.

If the problem persists, contact the software vendor's customer service representative for assistance.

Server Powers Up and Immediately Powers Down

If the server powers up after a DC power failure and then immediately powers down, check the power supply failure LED. If it is lit, wait until it goes out before turning the server back on. If the LED does not go out, you may have to unplug the power cord of each power supply from the AC wall outlets. When the LED goes out, plug the power cords back into the outlets.

If the problem persists, the power distribution backplane may be defective. Contact your service representative or authorized dealer for assistance.

Error Codes and Messages

The server BIOS displays POST error codes and messages on the video monitor. When you turn on the server, POST displays messages that provide information about the server. If a failure occurs, POST emits beep codes that indicate errors in hardware, software, or firmware. Before the video adapter is initialized, audible beep codes inform you of errors. The errors are logged in the event log and the Extended BIOS Data Area (EBDA). If POST can display a message on the monitor, it causes the speaker to beep twice as the message appears.

Port 80h Codes

After the video adapter has been successfully initialized after the server is turned on, the BIOS indicates the current testing phase during POST by writing a 2-digit hex code to I/O location 80h. If a port-80h card is installed, it displays this 2-digit code on a pair of hex display LEDs.

The following table contains the port-80h codes displayed during the boot process. The table also describes the error conditions associated with each beep code and the corresponding POST checkpoint (CP) code as seen by a port-80h card. A beep code is a series of individual beeps emitted by the server speaker, each equal in length. For example, if an error occurs at checkpoint 20h, a beep code of 1-3-1-1 is generated (1 = a single beep, 3 = burst of three beeps).

CP	Beeps	Reason
02		Verify real mode
04		Get processor type
06		Initialize system hardware
08		Initialize chip set registers with initial POST values
09		Set in-POST flag
0A		Initialize processor registers
0B		Enable processor cache
0C		Initialize caches to initial POST values
0E		Initialize I/O
0F		Initialize the local bus IDE
10		Initialize Power Management
11		Load alternate registers with initial new POST values
12		Restore processor control word during warm boot
14		Initialize keyboard controller
16	1-2-2-3	BIOS ROM checksum
18		Initialize 8254 timer
1A		Initialize 8237 DMA controller
1C		Reset Programmable Interrupt Controller
20	1-3-1-1	Test DRAM refresh
22	1-3-1-3	Test 8742 Keyboard Controller
24		Set ES segment register to 4 GB
28	1-3-3-1	Autosize DRAM
2A		Clear 512K base RAM
2C	1-3-4-1	RAM failure on address line xxxx*
2E	1-3-4-3	RAM failure on data bits xxxx* of low byte of memory bus
30	1-4-1-1	RAM failure on data bits xxxx* of high byte of memory bus
32		Test processor bus-clock frequency
34		Test CMOS
35		RAM initialize alternate chip set registers
36		Warm start shutdown

continued

Port 80h Codes (continued)

CP	Beeps	Reason
37		Reinitialize the chip set (MB only)
38		Shadow system BIOS ROM
39		Reinitialize the cache (MB only)
3A		Autosize cache
3C		Configure advanced chip set registers
3D		Load alternate registers with new CMOS values
40		Set initial new processor speed
42		Initialize interrupt vectors
44		Initialize BIOS interrupts
46	2-1-2-3	Check ROM copyright notice
47		Initialize manager for PCI Option ROMs
48		Check video configuration against CMOS
49		Initialize PCI bus and devices
4A		Initialize all video adapters in system
4B		Display QuietBoot screen
4C		Shadow video BIOS ROM
4E		Display copyright notice
50		Display processor type and speed
52		Test keyboard
54		Set key click if enabled
56		Enable keyboard
58	2-2-3-1	Test for unexpected interrupts
5A		Display prompt "Press F2 to enter SETUP"
5C		Test RAM between 512 and 640k
60		Test extended memory
62		Test extended memory address lines
64		Jump to UserPatch1
66		Configure advanced cache registers
68		Enable external and processor caches
6A		Display external cache size
6C		Display shadow message
6E		Display nondisposable segments
70		Display error messages
72		Check for configuration errors
74		Test real-time clock
76		Check for keyboard errors
7A		Test for key lock on
7C		Set up hardware interrupt vectors
7E		Test coprocessor if present

continued

Port 80h Codes (continued)

CP	Beeps	Reason
80		Detect and install external RS232 ports
82		Detect and install external parallel ports
85		Initialize PC-compatible PnP ISA devices
86		Reinitialize onboard I/O ports
88		Initialize BIOS Data Area
8A		Initialize Extended BIOS Data Area
8C		Initialize floppy controller
90		Initialize hard disk controller
91		Initialize local bus hard disk controller
92		Jump to UserPatch2
93		Build MPTABLE for multiprocessor boards
94		Disable A20 address line
95		Install CD ROM for boot
96		Clear huge ES segment register
98	1-2	Search for option ROMs; one long beep and two short beeps on checksum failure
9A		Shadow option ROMs
9C		Set up Power Management
9E		Enable hardware interrupts
A0		Set time of day
A2		Check key lock
A4		Initialize typematic rate
A8		Erase F2 prompt
AA		Scan for F2 key stroke
AC		Enter SETUP
AE		Clear in-POST flag
B0		Check for errors
B2		POST done—prepare to boot operating system
B4	1	One short beep before boot
B5		Display MultiBoot menu
B6		Check password (optional)
B8		Clear global descriptor table
BC		Clear parity checkers
BE		Clear screen (optional)
BF		Check virus and backup reminders
C0		Try to boot with INT 19
D0		Interrupt handler error
D2		Unknown interrupt error
D4		Pending interrupt error

continued

Port 80h Codes (continued)

CP	Beeps	Reason
D6		Initialize option ROM error
D8		Shutdown error
DA		Extended Block Move
DC		Shutdown 10 error
FB		FRB in progress
FC		Five second wait for BMC to initialize
FD		FRB 2 watchdog timer failed, reset will occur in five seconds

POST Error Codes and Messages

The table below contains POST error codes and their associated messages.

Code	Error message
0002	Primary boot device not found
0010	Cache memory failure, do not enable cache
0015	Primary output device not found
0016	Primary input device not found
0042	ISA Config contains invalid info
0050	PnP memory conflict
0051	PnP 32-bit memory conflict
0052	PnP IRQ conflict
0053	PnP DMA conflict
0054	PnP error log is full
0055	Bad PnP serial id checksum
0056	Bad PnP resource data checksum
0060	Keyboard is locked ... Please unlock it
0070	CMOS time & date not set
0080	Option ROM has bad checksum
0083	Shadow of PCI ROM failed
0085	Shadow of ISA ROM failed
0131	Floppy drive A:
0132	Floppy drive B:
0135	Floppy disk controller failure
0140	Shadow of System BIOS Failed
0170	Disabled CPU slot #
0171	CPU Failure—CPU # 1
0172	CPU Failure—CPU # 2
0173	CPU Failure—CPU # 3
0174	CPU Failure—CPU # 4
0175	CPU modules are incompatible or one is not present.

continued

POST Error Codes and Messages (continued)

Code	Error message
0176	Previous CPU Failure—CPU # 1
0177	Previous CPU Failure—CPU # 2
0178	Previous CPU Failure—CPU # 3
0179	Previous CPU Failure—CPU # 4
0180	Attempting to boot with failed CPU
0181	BSP switched, system may be in uniprocessor mode
0191	CMOS battery failed
0195	CMOS system options not set
0198	CMOS checksum invalid
0289	System memory size mismatch
0295	Address line short detected
0297	Memory size decreased
0299	ECC Error Correction failure
0370	Keyboard controller error
0373	Keyboard stuck key detected
0375	Keyboard and mouse swapped
0430	Timer Channel 2 failure
0440	Gate-A20 failure
0441	Unexpected interrupt in protected mode
0445	Master interrupt controller error
0446	Slave interrupt controller error
0450	Master DMA controller error
0451	Slave DMA controller error
0452	DMA controller error
0460	Fail-safe timer NMI failure
0461	Software port NMI failure
0465	Bus time-out NMI in slot
0467	Expansion board NMI in slot
0510	PCI parity error
0710	Baseboard device resource conflict
0711	Static device resource conflict
0780	PCI Segment 1 memory request exceeds 998 MB
0781	PCI Segment 1 I/O requests exceeds 12K
0782	PCI I/O request exceeds amount available
0783	PCI memory request exceeds amount available
0784	Illegal bus for memory request below 1 MB
0785	Memory request below 1 MB exceeds 1 MB
0800	PCI I/O port conflict
0801	PCI memory conflict

continued

POST Error Codes and Messages (continued)

Code	Error message
0802	PCI IRQ conflict
0804	PCI ROM not found, may be OK for this card
0805	Insufficient memory to shadow PCI ROM
0806	Memory allocation failure for second PCI segment
0810	Floppy disk controller resource conflict
0811	Primary IDE controller resource conflict
0812	Secondary IDE controller resource conflict
0815	Parallel port resource conflict
0816	Serial port 1 resource conflict
0817	Serial port 2 resource conflict
0820	Expansion board disabled in slot
0900	NVRAM checksum error, NVRAM cleared
0903	NVRAM data invalid, NVRAM cleared
0982	I/O expansion board NMI in slot
0984	Expansion board disabled in slot
0985	Fail-safe timer NMI
0986	System reset caused by watchdog timer
0987	Bus time-out NMI in slot
8100	Processor 0 failed BIST
8101	Processor 1 failed BIST
8102	Processor 2 failed BIST
8103	Processor 3 failed BIST
8104	Processor 0 internal error (IERR)
8105	Processor 1 internal error (IERR)
8106	Processor 0 thermal trip error
8107	Processor 1 thermal trip error
8108	Watchdog timer failed on last boot
810B	Processor 0 failed initialization
810C	Processor 0 disabled
810D	Processor 1 disabled
810E	Processor 0 failed FRB-3 timer
810F	Processor 1 failed FRB-3 timer
8110	Server management interface failed to function
8128	Processor 2 internal error (IERR)
8129	Processor 3 internal error (IERR)
8130	Processor 2 thermal trip error
8131	Processor 3 thermal trip error
8138	Processor 2 failed FRB-3 timer
8139	Processor 3 failed FRB-3 timer

continued

POST Error Codes and Messages (continued)

Code	Error message
8140	Processor 2 disabled
8141	Processor 3 disabled
8148	Processor 1 failed initialization
8149	Processor 2 failed initialization
814A	Processor 3 failed initialization
8150	NVRAM cleared by jumper
8152	ESCD data cleared
8153	Password cleared by jumper
8160	Unable to apply BIOS update for processor 1
8161	Unable to apply BIOS update for processor 2
8162	Unable to apply BIOS update for processor 3
8163	Unable to apply BIOS update for processor 4
8168	Processor 1 L2 cache failed
8169	Processor 2 L2 cache failed
816A	Processor 3 L2 cache failed
816B	Processor 4 L2 cache failed
8170	BIOS does not support current stepping for processor 1
8171	BIOS does not support current stepping for processor 2
8172	BIOS does not support current stepping for processor 3
8173	BIOS does not support current stepping for processor 4
8180	PXB1 failed to respond
8181	Mismatch among processors detected
8182	L2 cache size mismatch
8200	Baseboard management controller failed to function
8201	Front panel controller failed to function
8203	Primary hot-swap controller failed to function
8204	Secondary hot-swap controller failed to function

A Regulatory Specifications

The AD450NX server meets specifications and regulations for safety and EMC.

Declaration of Compliance

We—*the manufacturer or importer*—hereby certify that the CE marking on this product indicates that it is in compliance with the European community's EMC Directive (89/336/EEC) and Low Voltage Directive (73/23/EEC).

Safety Compliance

USA/Canada:	UL 1950-CSA 950-95, 3rd Edition
Europe:	TUVGS Mark to - EN60950 (Amendments 1 to 3) EU Low Voltage Directive (73/23/EEC) (CE Mark)
International:	NEMKO to IEC950 (Amendments 1 to 4) NEMKO to EN60950 (A1 + A2 + A3Amendments 1 to 3)) NEMKO to EMKO-TSE(74-SEC) 207/94

Electromagnetic Compatibility (EMC)

USA:	FCC 47 CFR Part 15 Subpart B, Class A
Canada:	Canadian DOC CRC c.1374, Class A
Europe:	VDE 0871 Level B EU EMC Directive 89/336/EEC (CE Mark)
International:	CISPR 22, Class A
Australia/New Zealand:	AS/NZS 3548, Class A Limits (using CISPR 22, Class A)
Japan:	VCCI Class A ITE (using CISPR 22, Class A)

Electromagnetic Compatibility Notice (USA)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference with his own expense.

FCC Compliance Statement

Product Type: DRAASP

This Device Complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Intel Corporation
5200 N.E. Elam Young Parkway
Hillsboro, OR 97124-6497

Phone: 1 (800)-INTEL4U

Electromagnetic Compatibility Notices (International)

　この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

English translation of the notice above:

This is a Class A product based on the standard of the Voluntary Control Council For Interference (VCCI) by Information Technology Equipment. If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Cet appareil numérique respecte les limites bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouilleur: “Appareils Numériques”, NMB-003 édictée par le Ministre Canadian des Communications.

English translation of the notice above:

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the interference-causing equipment standard entitled “Digital Apparatus,” ICES-003 of the Canadian Department of Communications.

B Equipment Log

Use this equipment log to record pertinent information about your server. You will need some of this information when you run the System Setup Utility (SSU).

Record the model and serial numbers of the server components, dates of component removal or replacement, and the vendor's name. Be sure to record the same information for any components added to the server, such as hard disk drives, add-in boards, or printers.

The location of serial numbers on add-in boards, hard disk drives, and external equipment, such as video monitors or printers, varies from one manufacturer to another.

Equipment Log

Component	Manufacturer and Model Number	Serial Number	Date Installed
Server			
I/O Baseboard			
I/O Riser Card			
CPU Baseboard			
Processor 1			
Processor 2			
Processor 3			
Processor 4			
VRM 1			
VRM 2			
VRM 3			
VRM 4			
VRM 5			
VRM 6			
Memory Module 1			
Memory Module 2			
Power Distribution Backplane			
SCSI Hot-docking Backplane			
Interconnect Backplane			
Hot-swappable Power Supply			
Hot-swappable Power Supply			
Hot-swappable Power Supply			
Hot-swappable Power Supply			
Video Monitor			
Keyboard			
Mouse			

continued

Equipment Log (continued)

Component	Manufacturer and Model Number	Serial Number	Date Installed
IDE Hard Disk (Boot) Drive			
SCSI Hard Disk (Boot) Drive			
Diskette Drive			
Tape Drive			
IDE CD-ROM Drive			
SCSI CD-ROM Drive			
SCSI SCA Hard Disk Drive 1			
SCSI SCA Hard Disk Drive 2			
SCSI SCA Hard Disk Drive 3			
SCSI SCA Hard Disk Drive 4			
SCSI SCA Hard Disk Drive 5			
SCSI SCA Hard Disk Drive 6			
SCSI SCA Hard Disk Drive 7			
SCSI SCA Hard Disk Drive 8			
SCSI SCA Hard Disk Drive 9			
SCSI SCA Hard Disk Drive 10			
SCSI SCA Hard Disk Drive 11			
SCSI SCA Hard Disk Drive 12			
VGA/EGA Adapter Board			
SCSI Host Adapter Board			
PCI RAID Controller Board			

continued

Equipment Log (continued)

Component	Manufacturer and Model Number	Serial Number	Date Installed

C Warnings

WARNING: English (US)

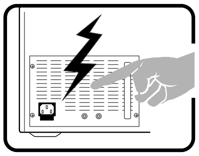
AVERTISSEMENT: Français

WARNUNG: Deutsch

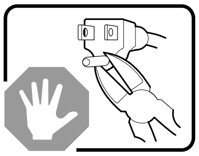
AVVERTENZA: Italiano

ADVERTENCIAS: Español

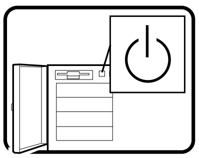
WARNING: English (US)



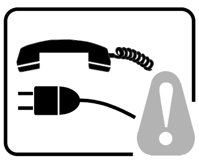
The power supply in this product contains no user-serviceable parts. There may be more than one supply in this product. Refer servicing only to qualified personnel.



Do not attempt to modify or use the supplied AC power cord if it is not the exact type required. A product with more than one power supply will have a separate AC power cord for each supply.

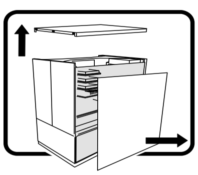


The DC push-button on/off switch on the system does not turn off system AC power. To remove AC power from the system, you must unplug each AC power cord from the wall outlet or power supply.



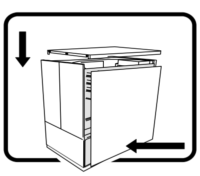
SAFETY STEPS: Whenever you remove the chassis covers to access the inside of the system, follow these steps:

1. Turn off all peripheral devices connected to the system.
2. Turn off the system by using the push-button on/off power switch on the system.
3. Unplug all AC power cords from the system or from wall outlets.
4. Label and disconnect all cables connected to I/O connectors or ports on the back of the system.
5. Provide some electrostatic discharge (ESD) protection by wearing an antistatic wrist strap attached to chassis ground of the system—any unpainted metal surface—when handling components.
6. Do not operate the system with the chassis covers removed.



After you have completed the six SAFETY steps above, you can remove the system covers. To do this:

1. Unlock and remove the padlock from the back of the system if a padlock has been installed.
2. Remove and save all screws from the covers.
3. Remove the covers.

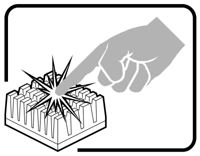


For proper cooling and airflow, always reinstall the chassis covers before turning on the system. Operating the system without the covers in place can damage system parts. To install the covers:

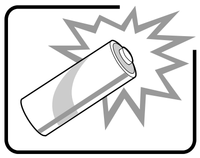
1. Check first to make sure you have not left loose tools or parts inside the system.
2. Check that cables, add-in boards, and other components are properly installed.
3. Attach the covers to the chassis with the screws removed earlier, and tighten them firmly.
4. Insert and lock the padlock to the system to prevent unauthorized access inside the system.
5. Connect all external cables and the AC power cord(s) to the system.

continued

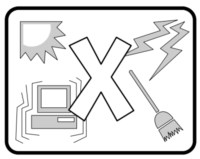
WARNING: English (continued)



A microprocessor and heat sink may be hot if the system has been running. Also, there may be sharp pins and edges on some board and chassis parts. Contact should be made with care. Consider wearing protective gloves.



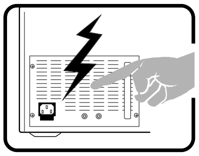
Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.



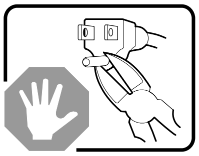
The system is designed to operate in a typical office environment. Choose a site that is:

- Clean and free of airborne particles (other than normal room dust).
- Well ventilated and away from sources of heat including direct sunlight.
- Away from sources of vibration or physical shock.
- Isolated from strong electromagnetic fields produced by electrical devices.
- In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppresser and disconnect telecommunication lines to your modem during an electrical storm.
- Provided with a properly grounded wall outlet.
- Provided with sufficient space to access the power supply cords, because they serve as the product's main power disconnect.

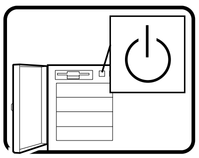
AVERTISSEMENT: Français



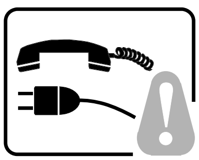
Le bloc d'alimentation de ce produit ne contient aucune pièce pouvant être réparée par l'utilisateur. Ce produit peut contenir plus d'un bloc d'alimentation. Veuillez contacter un technicien qualifié en cas de problème.



Ne pas essayer d'utiliser ni modifier le câble d'alimentation CA fourni, s'il ne correspond pas exactement au type requis. Le nombre de câbles d'alimentation CA fournis correspond au nombre de blocs d'alimentation du produit.

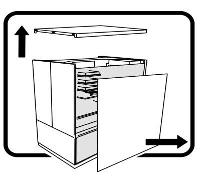


Notez que le commutateur CC de mise sous tension /hors tension du panneau avant n'éteint pas l'alimentation CA du système. Pour mettre le système hors tension, vous devez débrancher chaque câble d'alimentation de sa prise.



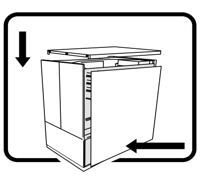
CONSIGNES DE SÉCURITÉ - Lorsque vous ouvrez le boîtier pour accéder à l'intérieur du système, suivez les consignes suivantes :

1. Mettez hors tension tous les périphériques connectés au système.
2. Mettez le système hors tension en mettant l'interrupteur général en position OFF (bouton-poussoir).
3. Débranchez tous les cordons d'alimentation c.a. du système et des prises murales.
4. Identifiez et débranchez tous les câbles reliés aux connecteurs d'E-S ou aux accès derrière le système.
5. Pour prévenir les décharges électrostatiques lorsque vous touchez aux composants, portez une bande antistatique pour poignet et reliez-la à la masse du système (toute surface métallique non peinte du boîtier).
6. Ne faites pas fonctionner le système tandis que le boîtier est ouvert.



Une fois TOUTES les étapes précédentes accomplies, vous pouvez retirer les panneaux du système. Procédez comme suit :

1. Si un cadenas a été installé sur à l'arrière du système, déverrouillez-le et retirez-le.
2. Retirez toutes les vis des panneaux et mettez-les dans un endroit sûr.
3. Retirez les panneaux.

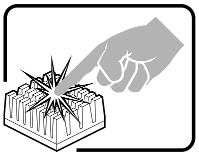


Afin de permettre le refroidissement et l'aération du système, réinstallez toujours les panneaux du boîtier avant de mettre le système sous tension. Le fonctionnement du système en l'absence des panneaux risque d'endommager ses pièces. Pour installer les panneaux, procédez comme suit :

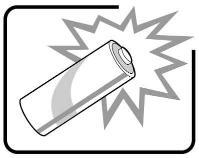
1. Assurez-vous de ne pas avoir oublié d'outils ou de pièces démontées dans le système.
2. Assurez-vous que les câbles, les cartes d'extension et les autres composants sont bien installés.
3. Revissez solidement les panneaux du boîtier avec les vis retirées plus tôt.
4. Remettez le cadenas en place et verrouillez-le afin de prévenir tout accès non autorisé à l'intérieur du système.
5. Rebranchez tous les cordons d'alimentation c. a. et câbles externes au système.

suite

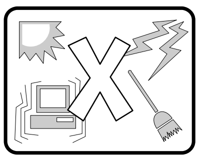
AVERTISSEMENT: Français (suite)



Le microprocesseur et le dissipateur de chaleur peuvent être chauds si le système a été sous tension. Faites également attention aux broches aiguës des cartes et aux bords tranchants du capot. Nous vous recommandons l'usage de gants de protection.



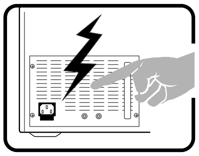
Danger d'explosion si la batterie n'est pas remontée correctement. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le fabricant. Disposez des piles usées selon les instructions du fabricant.



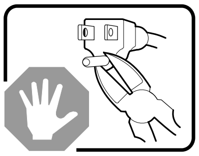
Le système a été conçu pour fonctionner dans un cadre de travail normal. L'emplacement choisi doit être :

- Propre et dépourvu de poussière en suspension (sauf la poussière normale).
- Bien aéré et loin des sources de chaleur, y compris du soleil direct.
- A l'abri des chocs et des sources de vibrations.
- Isolé de forts champs électromagnétiques géenérés par des appareils électriques.
- Dans les régions sujettes aux orages magnétiques il est recomandé de brancher votre système à un supresseur de surtension, et de débrancher toutes les lignes de télécommunications de votre modem durant un orage.
- Muni d'une prise murale correctement mise à la terre.
- Suffisamment spacieux pour vous permettre d'accéder aux câbles d'alimentation (ceux-ci étant le seul moyen de mettre le système hors tension).

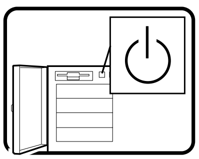
WARNUNG: Deutsch



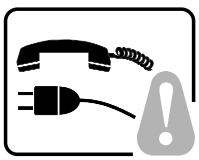
Benutzer können am Netzgerät dieses Produkts keine Reparaturen vornehmen. Das Produkt enthält möglicherweise mehrere Netzgeräte. Wartungsarbeiten müssen von qualifizierten Technikern ausgeführt werden.



Versuchen Sie nicht, das mitgelieferte Netzkabel zu ändern oder zu verwenden, wenn es sich nicht genau um den erforderlichen Typ handelt. Ein Produkt mit mehreren Netzgeräten hat für jedes Netzgerät ein eigenes Netzkabel.

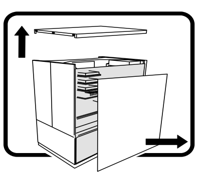


Der Wechselstrom des Systems wird durch den Ein-/Aus-Schalter für Gleichstrom nicht ausgeschaltet. Ziehen Sie jedes Wechselstrom-Netzkabel aus der Steckdose bzw. dem Netzgerät, um den Stromanschluß des Systems zu unterbrechen.



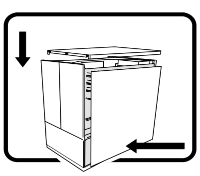
SICHERHEISMASSNAHMEN: Immer wenn Sie die Gehäuseabdeckung abnehmen um an das Systeminnere zu gelangen, sollten Sie folgende Schritte beachten:

1. Schalten Sie alle an Ihr System angeschlossenen Peripheriegeräte aus.
2. Schalten Sie das System mit dem Hauptschalter aus.
3. Ziehen Sie den Stromanschlußstecker Ihres Systems aus der Steckdose.
4. Auf der Rückseite des Systems beschriften und ziehen Sie alle Anschlußkabel von den I/O Anschlüssen oder Ports ab.
5. Tragen Sie ein geerdetes Antistatik Gelenkband, um elektrostatische Ladungen (ESD) über blanke Metallstellen bei der Handhabung der Komponenten zu vermeiden.
6. Schalten Sie das System niemals ohne ordnungsgemäß montiertes Gehäuse ein.



Nachdem Sie die oben erwähnten ersten sechs SICHERHEITSSCHRITTE durchgeführt haben, können Sie die Abdeckung abnehmen, indem Sie:

1. Öffnen und entfernen Sie die Verschlußeinrichtung (Padlock) auf der Rückseite des Systems, falls eine Verschlußeinrichtung installiert ist.
2. Entfernen Sie alle Schrauben der Gehäuseabdeckung.
3. Nehmen Sie die Abdeckung ab.

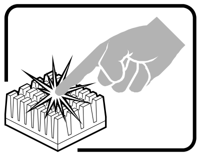


Zur ordnungsgemäßen Kühlung und Lüftung muß die Gehäuseabdeckung immer wieder vor dem Einschalten installiert werden. Ein Betrieb des Systems ohne angebrachte Abdeckung kann Ihrem System oder Teile darin beschädigen. Um die Abdeckung wieder anzubringen:

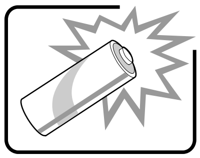
1. Vergewissern Sie sich, daß Sie keine Werkzeuge oder Teile im Innern des Systems zurückgelassen haben.
2. Überprüfen Sie alle Kabel, Zusatzkarten und andere Komponenten auf ordnungsgemäßen Sitz und Installation.
3. Bringen Sie die Abdeckungen wieder am Gehäuse an, indem Sie die zuvor gelösten Schrauben wieder anbringen. Ziehen Sie diese gut an.
4. Bringen Sie die Verschlußeinrichtung (Padlock) wieder an und schließen Sie diese, um ein unerlaubtes Öffnen des Systems zu verhindern.
5. Schließen Sie alle externen Kabel und den AC Stromanschlußstecker Ihres Systems wieder an.

Fortsetzung

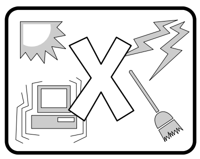
WARNUNG: Deutsch (Fortsetzung)



Der Mikroprozessor und der Kühler sind möglicherweise erhitzt, wenn das System in Betrieb ist. Außerdem können einige Platinen und Gehäuseteile scharfe Spitzen und Kanten aufweisen. Arbeiten an Platinen und Gehäuse sollten vorsichtig ausgeführt werden. Sie sollten Schutzhandschuhe tragen.



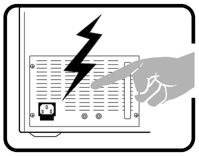
Bei falschem Einsetzen einer neuen Batterie besteht Explosionsgefahr. Die Batterie darf nur durch denselben oder einen entsprechenden, vom Hersteller empfohlenen Batterietyp ersetzt werden. Entsorgen Sie verbrauchte Batterien den Anweisungen des Herstellers entsprechend.



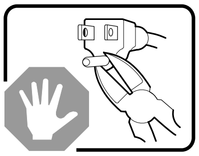
Das System wurde für den Betrieb in einer normalen Büroumgebung entwickelt. Der Standort sollte:

- sauber und staubfrei sein (Hausstaub ausgenommen);
- gut gelüftet und keinen Heizquellen ausgesetzt sein (einschließlich direkter Sonneneinstrahlung);
- keinen Erschütterungen ausgesetzt sein;
- keine starken, von elektrischen Geräten erzeugten elektromagnetischen Felder aufweisen;
- in Regionen, in denen elektrische Stürme auftreten, mit einem Überspannungsschutzgerät verbunden sein; während eines elektrischen Sturms sollte keine Verbindung der Telekommunikationsleitungen mit dem Modem bestehen;
- mit einer geerdeten Wechselstromsteckdose ausgerüstet sein;
- über ausreichend Platz verfügen, um Zugang zu den Netzkabeln zu gewährleisten, da der Stromanschluß des Produkts hauptsächlich über die Kabel unterbrochen wird.

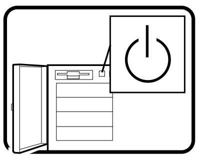
AVVERTENZA: Italiano



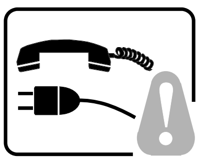
Rivolgersi ad un tecnico specializzato per la riparazione dei componenti dell'alimentazione di questo prodotto. È possibile che il prodotto disponga di più fonti di alimentazione.



Non modificare o utilizzare il cavo di alimentazione in c.a. fornito dal produttore, se non corrisponde esattamente al tipo richiesto. Ad ogni fonte di alimentazione corrisponde un cavo di alimentazione in c.a. separato.

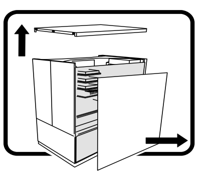


L'interruttore attivato/disattivato nel pannello anteriore non interrompe l'alimentazione in c.a. del sistema. Per interromperla, è necessario scollegare tutti i cavi di alimentazione in c.a. dalle prese a muro o dall'alimentazione di corrente.



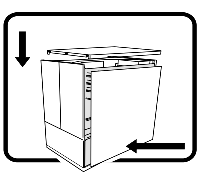
PASSI DI SICUREZZA: Qualora si rimuovano le coperture del telaio per accedere all'interno del sistema, seguire i seguenti passi:

1. Spegnere tutti i dispositivi periferici collegati al sistema.
2. Spegnere il sistema, usando il pulsante spento/acceso dell'interruttore del sistema.
3. Togliere tutte le spine dei cavi del sistema dalle prese elettriche.
4. Identificare e sconnettere tutti i cavi attaccati ai collegamenti I/O od alle prese installate sul retro del sistema.
5. Qualora si tocchino i componenti, proteggersi dallo scarico elettrostatico (SES), portando un cinghia anti-statica da polso che è attaccata alla presa a terra del telaio del sistema – qualsiasi superficie non dipinta – .
6. Non far operare il sistema quando il telaio è senza le coperture.



Dopo aver seguito i sei passi di SICUREZZA sopracitati, togliere le coperture del telaio del sistema come seque:

1. Aprire e rimuovere il lucchetto dal retro del sistema qualora ve ne fosse uno installato.
2. Togliere e mettere in un posto sicuro tutte le viti delle coperture.
3. Togliere le coperture.

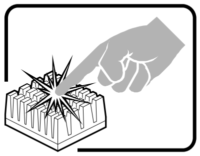


Per il giusto flusso dell'aria e raffreddamento del sistema, rimettere sempre le coperture del telaio prima di riaccendere il sistema. Operare il sistema senza le coperture al loro proprio posto potrebbe danneggiare i componenti del sistema. Per rimettere le coperture del telaio:

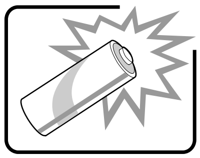
1. Controllare prima che non si siano lasciati degli attrezzi o dei componenti dentro il sistema.
2. Controllare che i cavi, dei supporti aggiuntivi ed altri componenti siano stati installati appropriatamente.
3. Attaccare le coperture al telaio con le viti tolte in precedenza e avvitarle strettamente.
4. Inserire e chiudere a chiave il lucchetto sul retro del sistema per impedire l'accesso non autorizzato al sistema.
5. Ricollegare tutti i cavi esterni e le prolunghe AC del sistema.

continua

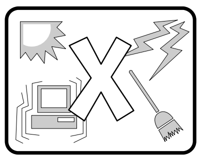
AVVERTENZA: Italiano (continua)



Se il sistema è stato a lungo in funzione, il microprocessore e il dissipatore di calore potrebbero essere surriscaldati. Fare attenzione alla presenza di piedini appuntiti e parti taglienti sulle schede e sul telaio. È consigliabile l'uso di guanti di protezione.



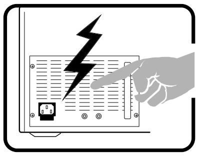
Esiste il pericolo di un esplosione se la pila non viene sostituita in modo corretto. Utilizzare solo pile uguali o di tipo equivalente a quelle consigliate dal produttore. Per disfarsi delle pile usate, seguire le istruzioni del produttore.



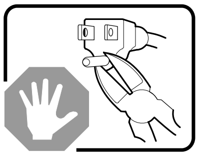
Il sistema è progettato per funzionare in un ambiente di lavoro tipo. Scegliere una postazione che sia:

- Pulita e libera da particelle in sospensione (a parte la normale polvere presente nell'ambiente).
- Ben ventilata e lontana da fonti di calore, compresa la luce solare diretta.
- Al riparo da urti e lontana da fonti di vibrazione.
- Isolata dai forti campi magnetici prodotti da dispositivi elettrici.
- In aree soggette a temporali, è consigliabile collegare il sistema ad un limitatore di corrente. In caso di temporali, scollegare le linee di comunicazione dal modem.
- Dotata di una presa a muro correttamente installata.
- Dotata di spazio sufficiente ad accedere ai cavi di alimentazione, i quali rappresentano il mezzo principale di scollegamento del sistema.

ADVERTENCIAS: Español

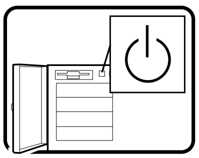


El usuario debe abstenerse de manipular los componentes de la fuente de alimentación de este producto, cuya reparación debe dejarse exclusivamente en manos de personal técnico especializado. Puede que este producto disponga de más de una fuente de alimentación.

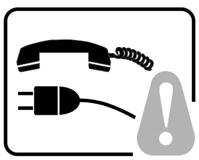


No intente modificar ni usar el cable de alimentación de corriente alterna, si no corresponde exactamente con el tipo requerido.

El número de cables suministrados se corresponden con el número de fuentes de alimentación de corriente alterna que tenga el producto.

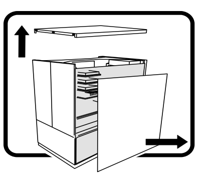


Nótese que el interruptor activado/desactivado en el panel frontal no desconecta la corriente alterna del sistema. Para desconectarla, deberá desenchufar todos los cables de corriente alterna de la pared o desconectar la fuente de alimentación.



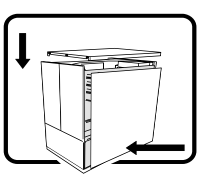
INSTRUCCIONES DE SEGURIDAD: Cuando extraiga la tapa del chasis para acceder al interior del sistema, siga las siguientes instrucciones:

1. Apague todos los dispositivos periféricos conectados al sistema.
2. Apague el sistema presionando el interruptor encendido/apagado.
3. Desconecte todos los cables de alimentación CA del sistema o de las tomas de corriente alterna.
4. Identifique y desconecte todos los cables enchufados a los conectores E/S o a los puertos situados en la parte posterior del sistema.
5. Cuando manipule los componentes, es importante protegerse contra la descarga electrostática (ESD). Puede hacerlo si utiliza una muñequera antiestática sujetada a la toma de tierra del chasis — o a cualquier tipo de superficie de metal sin pintar.
6. No ponga en marcha el sistema si se han extraído las tapas del chasis.



Después de completar las seis instrucciones de SEGURIDAD mencionadas, ya puede extraer las tapas del sistema. Para ello:

1. Desbloquee y extraiga el bloqueo de seguridad de la parte posterior del sistema, si se ha instalado uno.
2. Extraiga y guarde todos los tornillos de las tapas.
3. Extraiga las tapas.

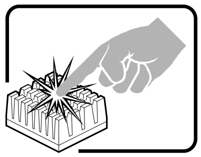


Para obtener un enfriamiento y un flujo de aire adecuados, reinstale siempre las tapas del chasis antes de poner en marcha el sistema. Si pone en funcionamiento el sistema sin las tapas bien colocadas puede dañar los componentes del sistema. Para instalar las tapas:

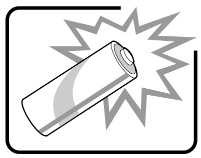
1. Asegúrese primero de no haber dejado herramientas o componentes sueltos dentro del sistema.
2. Compruebe que los cables, las placas adicionales y otros componentes se hayan instalado correctamente.
3. Incorpore las tapas al chasis mediante los tornillos extraídos anteriormente, tensándolos firmemente.
4. Inserte el bloqueo de seguridad en el sistema y bloquéelo para impedir que pueda accederse al mismo sin autorización.
5. Conecte todos los cables externos y los cables de alimentación CA al sistema.

continúa

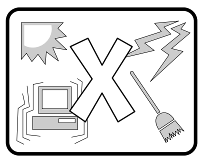
ADVERTENCIAS: Español (continúa)



Si el sistema ha estado en funcionamiento, el microprocesador y el disipador de calor pueden estar aún calientes. También conviene tener en cuenta que en el chasis o en el tablero puede haber piezas cortantes o punzantes. Por ello, se recomienda precaución y el uso de guantes protectores.



Existe peligro de explosión si la pila no se cambia de forma adecuada. Utilice solamente pilas iguales o del mismo tipo que las recomendadas por el fabricante del equipo. Para deshacerse de las pilas usadas, siga igualmente las instrucciones del fabricante.



El sistema está diseñado para funcionar en un entorno de trabajo normal. Escoja un lugar:

- Limpio y libre de partículas en suspensión (salvo el polvo normal).
- Bien ventilado y alejado de fuentes de calor, incluida la luz solar directa.
- Alejado de fuentes de vibración.
- Aislado de campos electromagnéticos fuertes producidos por dispositivos eléctricos.
- En regiones con frecuentes tormentas eléctricas, se recomienda conectar su sistema a un eliminador de sobrevoltage y desconectar el módem de las líneas de telecomunicación durante las tormentas.
- Provisto de una toma de tierra correctamente instalada.
- Provisto de espacio suficiente como para acceder a los cables de alimentación, ya que éstos hacen de medio principal de desconexión del sistema.

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