

# Intel® ISP1100 Internet Server Product Guide

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**A Guide for Technically Qualified Assemblers of Intel® Identified Subassemblies/Products**

Order Number: A10528-001

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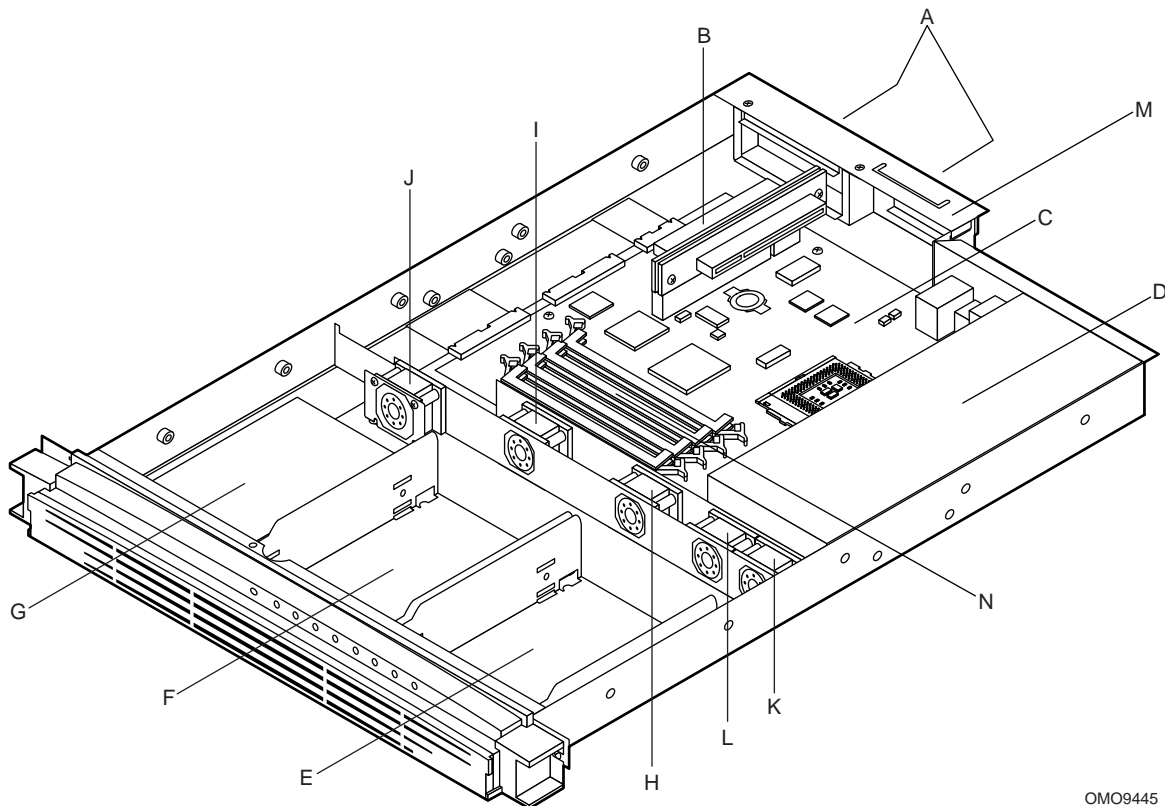
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# 1 Description

## System Components

Figure 1 shows the location of the major system components in the Intel® ISP1100 Internet Server.



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- |                              |                                  |
|------------------------------|----------------------------------|
| A. PCI Add-in Card Slots     | H. Fan 1                         |
| B. PCI Riser Card            | I. Fan 2                         |
| C. Server Board              | J. Fan 3                         |
| D. Power Supply              | K. Fan 4                         |
| E. 1-Inch Hard Drive Bracket | L. Fan 5                         |
| F. 1-Inch Hard Drive Bracket | M. Add-In Card Retention Bracket |
| G. 3.5-Inch Diskette Drive   | N. DIMM Sockets                  |

**Figure 1. System Components**

# Server Board Features

Table 1 summarizes the TR440BX server board features.

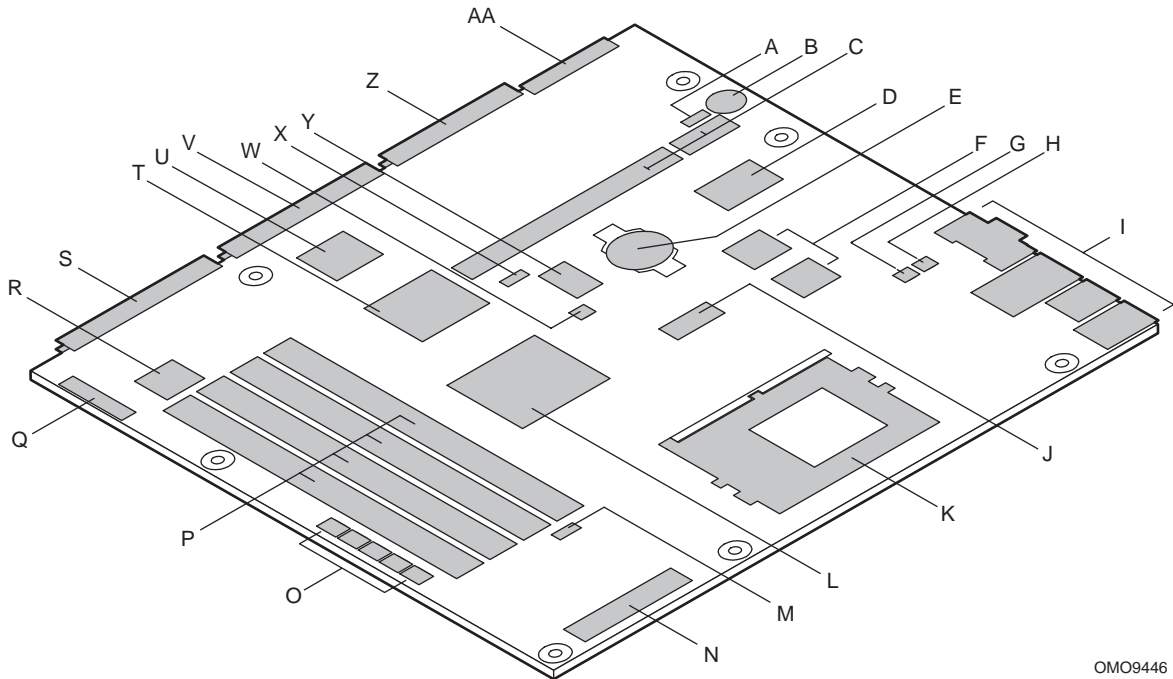
**Table 1. Server Board Features**

Feature	Description
Form Factor	MicroATX (9.6 inches by 9.6 inches)
Processor	Supports an Intel® Pentium® III processor or Intel Celeron™ processor in a PGA370 socket.
Memory	Four 168-pin dual in-line memory module (DIMM) sockets Support unbuffered and registered SDRAM DIMMs Supports up to 1 GB of ECC, SPD SDRAM with registered or unbuffered DIMMs
Chipset	Intel® 82440BX AGPset, consists of: Intel® 82443BX PCI/AGP controller (PAC) Intel® 82371EB PCI ISA IDE Xcelerator (PIIX4E)
I/O Control	SMSC FDC37B807 I/O controller
Peripheral Interfaces	Two integrated Intel® Pro/100+ Server (82559) Ethernet controllers One standard diskette drive interface One high-density diskette drive interface for slim-line diskette drive Two IDE interfaces with Ultra DMA/33 support Two serial ports (1 rear, 1 front) Two USB ports Two PS/2† interfaces for keyboard and mouse LED panel interface
Expansion	One PCI bus in combination with a 2x11 riser sideband connector supports a passive dual-slot PCI riser card (32 bit/33 MHz)
BIOS	Intel®/AMI BIOS Intel® E28F008S585 8-Mbit boot block flash memory Supports SMBIOS, Advanced Power Management (APM), Advanced Configuration and Power Interface (ACPI), and Plug and Play
Other Features	Speaker Hardware monitor Wake on Ring Wake on LAN† SCSI LED connector



# Server Board Connectors and Components

Figure 2 shows the locations of the server board connectors and components.



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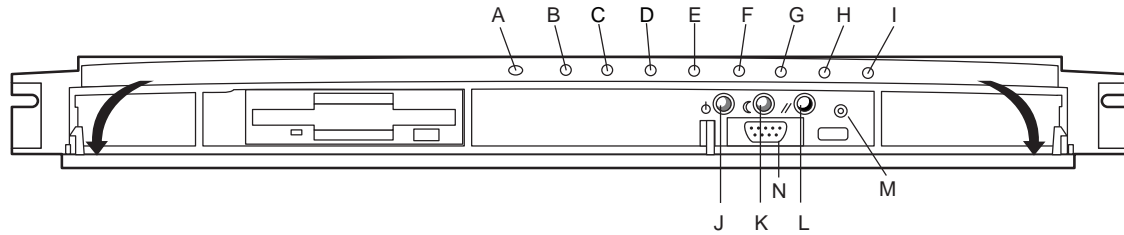
- |   |   |
|---|---|
| A. Wake on LAN Connector                              | O. System Fans Connectors                 |
| B. Speaker  | P. DIMM Sockets                           |
| C. PCI Riser Sideband and PCI Bus Connectors          | Q. Front Panel Connector                  |
| D. SMSC I/O Controller                                | R. Front Panel Controller                 |
| E. Battery  | S. Primary IDE Connector                  |
| F. Intel Pro/100+ Server (82559) Ethernet Controllers | T. Intel 82371EB PIIX4E                   |
| G. SCSI LED Connector                                 | U. Gluechip                               |
| H. Wake on Ring Connector                             | V. Secondary IDE Connector                |
| I. Back Panel I/O Connectors                          | W. Password Clear Jumper                  |
| J. Clock Generator                                    | X. BIOS Setup Configuration Jumper        |
| K. PGA370 Processor Socket                            | Y. Flash Memory                           |
| L. Intel 82443BX PAC                                  | Z. Diskette Drive Connector               |
| M. Heceta 2 Hardware Monitor Controller               | AA. High-Density Diskette Drive Connector |
| N. Power Supply Connector                             |   |

**Figure 2. Server Board Connectors and Components**

# Controls, Connectors, and Indicators

## Front Panel

Figure 3 shows the locations of the server front-panel controls, connectors, and indicators.



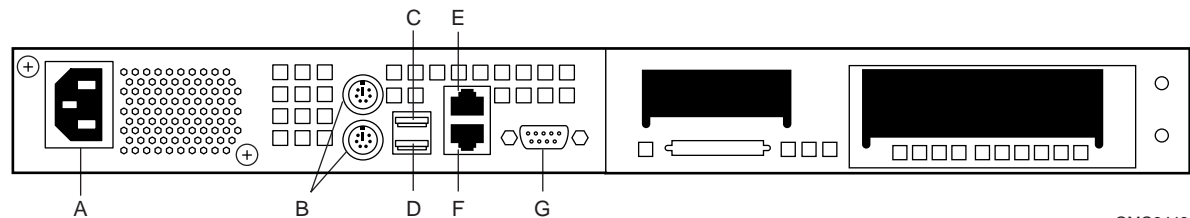
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- |  |  |
|--|--|
| A. Power LED Indicator (Green)               | H. User-Programmable LED Indicator (Green) |
| B. System Fault LED Indicator (Amber)        | I. User-Programmable LED Indicator (Green) |
| C. Hard Drive Activity LED Indicator (Green) | J. Power Switch                            |
| D. LAN 1 Activity LED Indicator (Yellow)     | K. Sleep Switch                            |
| E. LAN 1 100 Mbps LED Indicator (Green)      | L. Reset Switch                            |
| F. LAN 2 Activity LED Indicator (Yellow)     | M. NMI Switch                              |
| G. LAN 2 100 Mbps LED Indicator (Green)      | N. Serial Port B Connector                 |

**Figure 3. Front Panel Controls, Connectors, and Indicators**

## Back Panel

Figure 4 shows the locations of the server back-panel connectors.



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- |                                   |                            |
|-----------------------------------|----------------------------|
| A. AC Power Input Connector       | E. LAN 2 Connector         |
| B. PS/2 Keyboard/Mouse Connectors | F. LAN 1 Connector         |
| C. USB Port 0 Connector           | G. Serial Port A Connector |
| D. USB Port 1 Connector           |                            |

**Figure 4. Back Panel Connectors**

# Processors

The server board supports a single Intel Pentium III processor or Celeron processor that plugs into a PGA370 socket connector that secures the processor chip with a zero-insertion-force (ZIF) arm. The host bus speed (66 MHz or 100 MHz) is automatically selected. Table 2 lists the processors supported by the server board.

**Table 2. Supported Processors**

Processor Type	L2 Cache Size	FSB Speed	Speed
Celeron processor	128 KB	66 MHz	566 MHz <sup>1</sup>
			533 MHz
			500 MHz
			466 MHz
			433 MHz
			400 MHz
			366 MHz
Pentium III processor	256 KB	100 MHz	750 MHz
			700 MHz
			650 MHz
			600E MHz
			550E MHz
			500 MHz

<sup>1</sup> Coppermine 128 KB; other Intel Celeron processors are based on Mendocino core.

## NOTE

The server board supports Pentium III processors with a 100 MHz host bus and Celeron processors with a 66 MHz host bus. Processors with a 100 MHz host bus should be used only with 100 MHz SDRAM. The server board may not operate reliably if a processor with a 100 MHz host is paired with 66 MHz SDRAM. However, processors with a 66 MHz host can be used with either 66 MHz or 100 MHz SDRAM.

# Memory

The server board has four DIMM sockets. The BIOS determines the SDRAM size and speed using the serial presence detect (SPD) data structure programmed into an EEPROM on the DIMM. Memory size is 16 MB to 1 GB. DIMM board memory size can be mixed but must be either all unbuffered or registered. Slot vacancies are allowed.

The server board supports the following memory features:

- 168-pin SPD DIMMs with gold-plated contacts.
- 66 MHz or 100 MHz unbuffered or registered SDRAM, 72-bit ECC, 3.3 V only memory.
- Single- or double-sided DIMMs in the sizes listed in Table 3.

- Unbuffered DIMMs of the following sizes: 16 MB, 32 MB, 64 MB, 128 MB and 256 MB for a total memory size of 1 GB.
- Registered DIMMs of the following sizes: 64MB, 128Mb and 256MB for a maximum memory size of 1 GB. Only non-stacked DIMMs are supported because of a server board space constraint.

**Table 3. Supported Memory Characteristics**

DIMM Size	Configuration	DRAM Technology	DRAM Depth	DRAM Width	Single-sided DIMM (Size x 64 Bit)	Double-sided DIMM (Size x 64 Bit)
16 MB	2 Mbit x 72	16 Mbit	2 Mbit	8 bit	2 MB x 8 B = 16 MB	
32 MB	4 Mbit x 72	16 Mbit	2 Mbit	8 bit		4 MB x 8 B = 32 MB
32 MB	4 Mbit x 72	16 Mbit	4 Mbit	4 bit	4 MB x 8 B = 32 MB	
64 MB	8 Mbit x 72	16 Mbit	4 Mbit	4 bit		8 MB x 8 B = 64 MB
32 MB	4 Mbit x 72	64 Mbit	4 Mbit	16 bit	4 MB x 8 B = 32 MB	
64 MB	8 Mbit x 72	64 Mbit	4 Mbit	16 bit		8 MB x 8 B = 64 MB
64 MB	8 Mbit x 72	64 Mbit	8 Mbit	8 bit	8 MB x 8 B = 64 MB	
128 MB	16 Mbit x 72	64 Mbit	8 Mbit	8 bit		16 MB x 8 B = 128 MB
128 MB	16 Mbit x 72	64 Mbit	16 Mbit	4 bit	16 MB x 8 B = 128 MB	
64 MB	8 Mbit x 72	128 Mbit	8 Mbit	16 bit	8 MB x 8 B = 64MB	
128 MB	16 Mbit x 72	128 Mbit	8 Mbit	16 bit		16 MB x 8 B = 128 MB
128 MB	16 Mbit x 72	128 Mbit	16 Mbit	8 bit	16 MB x 8 B = 128 MB	
256 MB	32 Mbit x 72	128 Mbit	16 Mbit	8 bit		32 MB x 8 B = 256 MB

When ECC memory is installed, the BIOS supports both ECC and non-ECC mode. ECC mode is enabled in the BIOS Setup program. The BIOS automatically detects if ECC memory is installed and provides the Setup option for selecting the ECC mode. If any non-ECC memory is installed, the Setup option for ECC mode does not appear and ECC operation is not available.

Table 4 describes the effect of using Setup to put each memory type in each supported mode.

**Table 4. Memory Error Detection Mode**

DIMM Type	ECC Disabled	ECC Enabled
ECC	No error detection	Single-bit error correction, multiple-bit error detection
Non-ECC	No error detection	N/A

## NOTE

All memory components used with the server board should comply with the following PC SDRAM specifications (see Chapter 13 in the *Intel® ISP1100 Internet Server Technical Product Specification* for information about how to obtain these specifications):

- *PC SDRAM Specification* (memory component specific)
- *PC Unbuffered SDRAM Specifications*
- *PC Serial Presence Detection Specification*

Processors with 100 MHz host bus speed must be paired only with 100 MHz SDRAM. Processors with 66 MHz host bus speed can be paired with either 66 MHz or 100 MHz SDRAM.

## Chipset

The Intel 82440BX AGPset consists of the Intel 82443BX PAC and the Intel 82371EB PIIX4E bridge chip. The PAC provides an optimized DRAM controller. The PAC's accelerated graphics port (AGP) interface is not used. The I/O subsystem of the 82440BX is based on the PIIX4E, which is a highly integrated PCI ISA IDE Xcelerator Bridge.

## Universal Serial Bus

The server board has two universal serial bus (USB) ports that accommodate one USB peripheral connected to each port. For more than two USB devices, an external hub can be connected to either port. The two USB ports are implemented with stacked back panel I/O connectors. The server board fully supports UHCI and uses UHCI-compatible software drivers. See Chapter 13 in the *Intel ISP1100 Internet Server Technical Product Specification* for information about the USB and UHCI specifications.

The USB includes the following capabilities:

- Self-identifying peripherals that can be plugged in while the computer is running.
- Automatic mapping of function to driver and configuration.
- Support for synchronous and asynchronous transfer types over the same set of wires.
- Guaranteed bandwidth and low latencies appropriate for telephony, audio, and other applications.
- Error-handling and fault-recovery mechanisms built into the protocol.

## NOTE

Computer systems that have an unshielded cable attached to a USB port may not meet FCC Class B requirements; even if no device or a low-speed USB device is attached to the cable. Use shielded cable that meets the requirements for full-speed devices.

## IDE Support

The server board has two independent bus-mastering IDE interfaces that support:

1. ATAPI devices (such as CD-ROM drives).
2. ATA devices using the transfer modes listed in the *Intel ISP1100 Internet Server Technical Product Specification*.

The BIOS supports logical block addressing (LBA) and extended cylinder head sector (ECHS) translation modes. The drive reports the transfer rate and translation mode to the BIOS.

The server board supports PCMCIA ATA Type II flash card technology through its IDE interfaces. No special driver is needed for a PCMCIA ATA Type II flash drive since most operating systems see it as standard IDE drive.

## Real-Time Clock, CMOS SRAM, and Battery

The real-time clock is compatible with DS1287 and MC146818 components. The clock provides a time-of-day clock and a multi-century calendar with alarm features and century rollover. The real-time clock supports 256 bytes of battery-backed CMOS SRAM in two banks that are reserved for BIOS use.

A coin-cell Lithium battery powers the real-time clock and CMOS memory. When the computer is **not** plugged into an AC power source, the battery has an estimated life of three years. When the computer is plugged into an AC power source, the 3.3 V standby current from the power supply extends the life of the battery. The clock is accurate to  $\pm 13$  minutes/year at 25°C with 3.3 V standby applied.

The time, date, and CMOS values can be specified and the CMOS values can be returned to their defaults in the BIOS Setup program.

### NOTE

The recommended method for accessing the date in systems with Intel server boards is indirectly from the real-time clock (RTC) via the BIOS. The BIOS on the server board contains a century checking and maintenance feature that checks the two least significant digits of the year stored in the RTC during each BIOS request (INT 1Ah) to read the date. If the year is less than 80 (when 1980 is the first year supported by the PC), the BIOS updates the century byte to 20 which enables operating systems and applications that use the BIOS date/time services to reliably manipulate the year as a four-digit value.

For more information on a proper date access in systems with Intel server boards, please see: <http://support.intel.com/support/year2000/>

## I/O Controller

The FDC37B807 I/O controller from SMC is an ISA Plug and Play-compatible, multifunctional I/O device that provides the following features (see Chapter 13 in the *Intel ISP1100 Internet Server Technical Product Specification* for Plug and Play specification information):

- Two serial ports.
- Interface for one 1.2 MB, 1.44 MB, or 2.88 MB diskette drive.
- Three-mode diskette drive support (driver required).
- FIFO support on both serial and diskette drive interfaces.
- One parallel port with extended capabilities port (ECP) and enhanced parallel port (EPP) support.
- PS/2-style mouse and keyboard interfaces.
- Support for serial IRQ packet protocol.
- Intelligent power management, including:
  - Shadowed write-only registers for ACPI compliance.
  - Programmable wake up event interface.

The BIOS Setup program provides configuration options for the I/O controller.

## Serial Ports

The server board has two 9-pin D-Sub serial port connectors; one on the back panel and one on the front panel under the bezel. The front-panel serial port is connected in parallel with the serial port B D-Sub connector located on the back panel. The serial port NS16C550-compatible UARTs support data transfers at speeds up to 115.2 Kbits/sec with BIOS support. The serial ports can be assigned as COM1 (3F8h), COM2 (2F8h), and COM3 (3E8h).

## Diskette Drive Controller

The I/O controller supports a single diskette drive that is compatible with the 82077-diskette drive controller and supports both PC-AT<sup>†</sup> and PS/2 modes. In the Setup program, the diskette driver interface can be configured for the following capacities and sizes:

- 360 KB, 5.25-inch
- 1.2 MB, 5.25-inch
- 720 KB, 3.5-inch
- 1.2 MB, 3.5-inch (driver required)
- 1.25/1.44 MB, 3.5-inch
- 2.88 MB, 3.5-inch

### NOTE

The I/O controller supports 1.2 MB, 3.5-inch diskette drives, but a special driver is required (three-mode).

## Keyboard and Mouse Interface

The PS/2 keyboard and mouse connectors are located on the server back panel. The +5 V lines to these connectors are protected with a PolySwitch<sup>†</sup> circuit that, like a self-healing fuse, reestablishes the connection after an overcurrent condition is removed.

The keyboard controller contains the AMI keyboard and mouse controller code, provides the keyboard and mouse control functions, and supports password protection for power on/reset. A power on/reset password can be specified in the BIOS Setup.

The keyboard controller also supports the hot-key sequence <Ctrl><Alt><Del> for a software reset. This key sequence resets the computer software by jumping to the beginning of the BIOS code and running the Power-On Self-Test (POST).

### NOTE

The mouse and keyboard can be plugged into either of the PS/2 connectors. Turn off AC power to the computer before a keyboard or mouse is connected or disconnected.

## Hardware Monitor

A Heceta 2 system monitor controller is provided on the server board to monitor temperature, voltage, fan speed and a temperature sensor located on the front panel. Temperature is monitored through a sensor internal to the Heceta 2 that indicates the ambient temperature of the area of the board in which the Heceta 2 IC is located. The Heceta 2 monitors +5V, +3.3V, +12V, -12V, +1.5V, and the processor core voltage. The Heceta 2 may be used to monitor the speed of a fan that has a tachometer output connected to any of the five auxiliary fan connectors. The five system fan tachometer outputs are multiplexed to the Heceta 2 device to allow individual monitoring. The software through the PIIX4 chip controls the multiplexing of the fan tachometer outputs to the Heceta 2 chip. The multiplexer control bits (FAN\_MUXCTL0 and FAN\_MUXCTL1) are connected to the PIIX4 are connected to the outputs GPO0 and GPO13, respectively. Table 5 shows the fan tachometer mapping.

**Table 5. Fan Tachometer MUX Control Mapping**

Fan_MUXCTL0	Fan_MUXCTL1	Heceta FAN1_TACH Input	Heceta FAN2_TACH Input
0	0	Fan 1 (J35)	Fan 4 (J38)
0	1	Fan 2 (J34)	Fan 5 (J37)
1	0	Fan 3 (J33)	NONE
1	1	NONE	NONE

The Heceta 2 is set up and interfaced through the PIIX4 SMBUS interface. Out of band or absolute thresholds may be set for many of the monitored functions using the SMBUS interface. Threshold faults are available by polling the Heceta 2 via the SMBUS interface. The Heceta 2 updates its information approximately every 1 second.



For more details on programming and reading the Heceta 2 chip please refer to the *Heceta 2 Device Specification* version 1.2 or later (see Chapter 13 in the *Intel ISP1100 Internet Server Technical Product Specification* for how to obtain this specification).

## SCSI Hard Drive LED Connector

The optional SCSI hard drive LED connector is a 1 x 2-pin connector that allows add-in SCSI controller applications to use the same LED as the IDE controller. This connector can be connected to the LED output of the add-in controller card (see Chapter 13 in the *Intel ISP1100 Internet Server Technical Product Specification* for the location and pinouts of the SCSI hard drive LED connector).

## Intel® Pro/100+ Server (82559) Ethernet Controllers

Two Intel Pro/100+ Server (82559) Ethernet controllers provide two 10/100 Base-T interfaces accessible from the back panel (see Chapter 13 in the *Intel ISP1100 Internet Server Technical Product Specification* for the location and pinouts of the LAN connectors).

The LAN connectors on the back panel do not provide LEDs to indicate transmit/receive activity and speed. Instead, these indicators are routed to four LEDs on the front panel. See “Controls, Connectors, and Indicators” for LED locations and definitions.

Alert on LAN and Wake on LAN features are supported by the TR440BX server board software and the SMBUS interface of the Intel 82559s. See the BIOS specification for information regarding Alert on LAN and Wake on LAN. Also see “Wake on LAN” for more information.



### CAUTION

For Wake on LAN, the 5V standby line for the power supply must be capable of delivering +5V  $\pm$ 5% at 720 mA. Failure to provide adequate standby current, when implementing Wake on LAN can damage the power supply.

## Wake on LAN

Wake on LAN enables remote wakeup of the computer through a network. If a PCI add-in network interface card (NIC) with remote wakeup capabilities is desired, the remote wakeup connector on the NIC must be connected to the onboard Wake on LAN connector.

The integrated LAN controllers or the add-in NIC monitors network traffic at the MII interface. Upon detecting a Magic Packet, the LAN controllers or NIC assert a wakeup signal that powers up the computer.

To access this feature, use the optional Wake on LAN connector on the server board. See “Server Board Connectors and Components” for the location and definition of the Wake on LAN connector.

# Wake on Ring/Resume on Ring

Wake on Ring enables the computer to wake from sleep or soft-off mode when a call is received on a telephony device, such as a faxmodem. The server board provides three methods for implementing Wake on Ring:

1. An external modem connected to Serial Port A (rear) can toggle the super I/O controller's Ring Indicator pin which should be enabled to cause a wakeup event.
2. The 2-pin Wake on Ring header may be shorted to cause a wakeup event.
3. A PCI modem may implement a Wake on Ring circuit that uses PCI PME# to cause a wakeup event.

This section describes two technologies that enable telephony devices to access the computer when it is in a power-managed state. The method used depends on the type of telephony device (external or internal) and the power management mode used (APM or ACPI).

## NOTE

Wake on Ring and Resume on Ring technologies require the support of an operating system that provides full ACPI functionality.

## Wake on Ring

The operation of Wake on Ring can be summarized as follows:

1. Powers up the computer from either the APM soft-off mode or the ACPI S5 state.
2. Requires two calls to access the computer:
  - First call powers up the computer.
  - Second call enables access (when the appropriate software is loaded).
3. Detects incoming call differently for external as opposed to internal modems:
  - For external modems, server-board hardware monitors the ring indicate (RI) input of serial port A and B.
  - For internal modems, a cable must be routed from the modem to the Wake on Ring connector.

See "Server Board Connectors and Components" for the location and definition of the Wake on Ring connector.

## Resume on Ring

The operation of Resume on Ring can be summarized as follows:

1. Resumes operation from either the APM sleep mode or the ACPI S1 state.
2. Requires only one call to access the computer.
3. Detects incoming calls similarly for external and internal modems. Does not use the Wake on Ring connector.
4. Requires modem interrupt be unmasked for correct operation.

# SMI and NMI Routing

There are numerous SMI sources and all are routed to the PIIX4. Software must configure the PIIX4 SMI source pins to control whether SMI is propagated through to the processor via its H\_SMI input or not. For details on the fault conditions that cause SMI to occur, consult the data sheets of the SMI source ICs. The SMI routing on the server board is described in Table 6. Note that some PIIX4 inputs have several sources. Schematic signal names are in parenthesis.

**Table 6. SMI and NMI Routing**

<b>SMI Source</b>	<b>PIIX4 Input Pin</b>
BX Chipset PCI SERR# - used for ECC Errors (P_SERR#)	EXT_SMI#
LAN PCI SERR# (P_SERR#)	EXT_SMI#
All three PCI Slot's SERR# (P_SERR#)	EXT_SMI#
Gluechips EXTSMI# output – used for +5 VSB errors	GPI13
Gluechips EXTSMI# output – Through buffer to (P_SERR#)	EXT_SMI#
LAN1 PCI PME# (P_PME#)	GPI1
LAN2 PCI PME# (P_PME#)	GPI1
All three PCI slot's PME# (P_PME#)	GPI1
Super I/O Serial Interrupt SMI – used for watchdog timer (SER_IRQ)	SER_IRQ
Super I/O PME# (SIO_RIA#) – originally from WOR header or ext. modem	RIAB
Wake on LAN header – used for Wake on LAN (WOL#)	LID

The Gluechips EXT\_SMI# output is also connected to the PIIX4 GPI13 pin to provide a status of the Gluechips EXT\_SMI# signal.

All NMI generation on the server board is under software control. Writes to PIIX4 GPO17 are routed to the PIIX4 IOCHK# input which may be configured to cause a NMI to occur. Thus, software may cause a NMI to occur by pulsing GPO17 active.

The TR440BX server board BIOS SMI handler detects SMI events, logs the events, and elevates selected events to NMI level.

## Power Connector

When used with an ATX-compliant power supply that supports remote power on/off, the server board can turn off the system power through software control.

## Speaker

A 47-ohm inductive speaker is mounted on the server board. The speaker provides audible error code (beep code) information during the Power-On Self-Test (POST).

# Fan Support

The server board has five fan connectors. The functions of the fan connectors are described in Table 7.

**Table 7. Fan Connector Descriptions**

Connector	Function
Fan 1 (J35)	Supports fan speed sensing for fans with tachometer outputs. Connector supports variable fan speed.
Fan 2 (J34)	Supports fan speed sensing for fans with tachometer outputs. Connector supports variable fan speed.
Fan 3 (J33)	Supports fan speed sensing for fans with tachometer outputs. Connector supports variable fan speed.
Fan 4 (J38)	Supports fan speed sensing for fans with tachometer outputs. Connector supports on/off fan control or variable fan speed via a fuse-stuffing option.
Fan 5 (J37)	Supports fan speed sensing for fans with tachometer outputs. Connector supports on/off fan control or variable fan speed via a fuse-stuffing option.

## 2 Removing/Installing Server Components

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This chapter provides procedures for removing and installing replaceable and/or upgradable components in the Intel ISP1100 Internet Server. Before performing the procedures, be sure to familiarize yourself with the following “Before You Begin” information.

### Before You Begin

#### FCC/Emissions Disclaimer

This equipment has been tested and verified to comply with Class B limits when configured into a compatible host computer, pursuant to Part 15 of the FCC Rules, CISPR 22, and EN55022. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To ensure EMC compliance with your local regional rules and regulations, the final configuration of your end system product may require additional EMC compliance testing. For more information please contact your supplier.

#### Warnings and Cautions

Read and adhere to all warnings, cautions, and notes in this guide and the documentation referenced and supplied with the server. If the additional instructions supplied with the server are inconsistent with these instructions, contact the supplier to find out how you can ensure that your server meets safety and regulatory requirements.



## WARNINGS

This chapter is intended for qualified technical personnel with experience installing and configuring servers.

**SYSTEM POWER ON/OFF:** The Power button on the server front panel **DOES NOT** remove AC power to the server system. Some circuitry in the server may continue to operate even though the front panel Power button is off. Always disconnect the power cord from the AC power source or wall outlet before performing any of the procedures in this guide. Failure to do so can result in personal injury or equipment damage.

**HAZARDOUS CONDITIONS, POWER SUPPLY:** Hazardous voltage, current, and energy levels are present inside the power supply. There are no user-serviceable parts inside the power supply; servicing should be done by technically qualified personnel.

**HAZARDOUS CONDITIONS, DEVICES, AND CABLES:** Hazardous electrical conditions may be present on power, telephone, and communication cables. Press the Power button to turn off the server and disconnect the power cord from the AC power source, telecommunications systems, networks, and modems attached to the server before removing the cover. Otherwise, personal injury or equipment damage can result.



## CAUTIONS

### **ELECTROSTATIC DISCHARGE (ESD) AND ESD PROTECTION:**

Perform the procedures in this chapter only at an electrostatic discharge (ESD) workstation since the server components can be extremely sensitive to ESD. If no such station is available, you can reduce the risk of electrostatic discharge ESD damage by doing the following:

- Wear an antistatic wrist strap and attach it to a metal part of the server.
- Touch the metal on the server chassis before touching the server components.
- Keep part of your body in contact with the metal server chassis to dissipate the static charge while handling the components.
- Avoid moving around unnecessarily.
- Hold the server components (especially boards) only by the edges.
- Place the server components on a grounded, static-free surface. Use a conductive foam pad if available but **not** the component wrapper.
- Do not slide the components over any surface.

**COOLING AND AIRFLOW:** For proper cooling and airflow, always install the chassis access cover before turning on the system. Operating the system without the cover in place can cause overheating and damage to system parts.

## Rackmount Precautions

Familiarize yourself with the following precautions before rackmounting the server.



### WARNINGS

**ANCHOR THE EQUIPMENT RACK:** The equipment rack must be anchored to an unmovable support to prevent it from falling over when one or more devices are extended in front of it on slide assemblies. The anchors must be able to withstand a force of up to 113 kg (250 lbs.). You must also consider the weight of any other device installed in the rack.

**MAIN AC POWER DISCONNECT:** You are responsible for installing an AC power disconnect for the entire rack unit. This main disconnect must be readily accessible, and it must be labeled as controlling power to the entire unit, not just to the server(s).

**GROUNDING THE RACK INSTALLATION:** To avoid the potential for electrical shock, you must include a third wire safety grounding conductor with the rack installation. If server power cords are plugged into AC outlets that are part of the rack, then you must provide proper grounding for the rack itself. If server power cords are plugged into wall AC outlets, the safety grounding conductor in each power cord provides proper grounding only for the server. You must provide additional, grounding for the rack and other devices installed in it.

**OVERCURRENT PROTECTION:** The server is designed for an AC line voltage source with up to 20 amperes of overcurrent protection. If the power system for the equipment rack is installed on a branch circuit with more than 20 amperes of protection, you must provide supplemental protection for the server. If more than one server is installed in the rack, the power source for each server must be from a separate branch circuit.



### CAUTIONS

**TEMPERATURE:** The operating temperature of the server, when installed in an equipment rack, must not go below 5 °C (41°F) or rise above 35 °C (95 °F). Extreme fluctuations in temperature can cause a variety of server problems.

**VENTILATION:** The equipment rack must provide sufficient airflow to the front of the server to maintain proper cooling. There must be sufficient ventilation to exhaust at least 1,500 BTU per hour for each server. The rack selected and the ventilation provided must be suitable to the environment in which the server will be used.

## Safety and Regulatory Requirements

This product was evaluated for use in computer racks within computer rooms and similar locations. Other uses require further evaluation.

### Safety Compliance

<b>USA/Canada</b>	UL 1950, 3 <sup>rd</sup> Edition/CSA 22.2, No. 950M93, 3 <sup>rd</sup> Edition
<b>Europe</b>	Low Voltage Directive, 73/23/EEC TUV/GS to EN60950 2nd Edition with Amendments, A1 = A2 + A3 + A4
<b>International</b>	CB Certificate and Report to IEC 60950, 3rd Edition including EMKO-TSE (74-SEC) 207/94 and other national deviations

### Electromagnetic Compatibility (EMC)

<b>USA</b>	FCC 47 CFR Parts 2 and 15, Verified Class A Limit
<b>Canada</b>	IC ICES-003 Class A Limit
<b>Europe</b>	EMC Directive, 89/336/EEC EN55022, Class A Limit, Radiated & Conducted Emissions EN55024, Immunity Standard for Information Technology Equipment EN61000-3-2 Harmonic Currents EN61000-3-3 Voltage Flicker
<b>Australia/New Zealand</b>	AS/NZS 3548, Class A Limit
<b>Japan</b>	VCCI Class A ITE (CISPR 22, Class A Limit). IEC 1000-3-2; Harmonic Currents
<b>Taiwan</b>	BSMI, Class A (CISPR 22)
<b>Russia</b>	Gost Approval
<b>International</b>	CISPR 22, Class A Limit

## Tools and Supplies Needed

1. Phillips (cross-head) screwdriver (number 1 and 2 bit)
2. Flat-head screwdriver (3/16-inch)
3. Jumper removal tool or needle nosed pliers
4. Pen or pencil
5. Antistatic wrist strap and conductive foam pad (recommended)

## Removing the Server From the Rack

This procedure describes how to remove the server from the rack. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter. Refer to Figure 5 while performing this procedure.

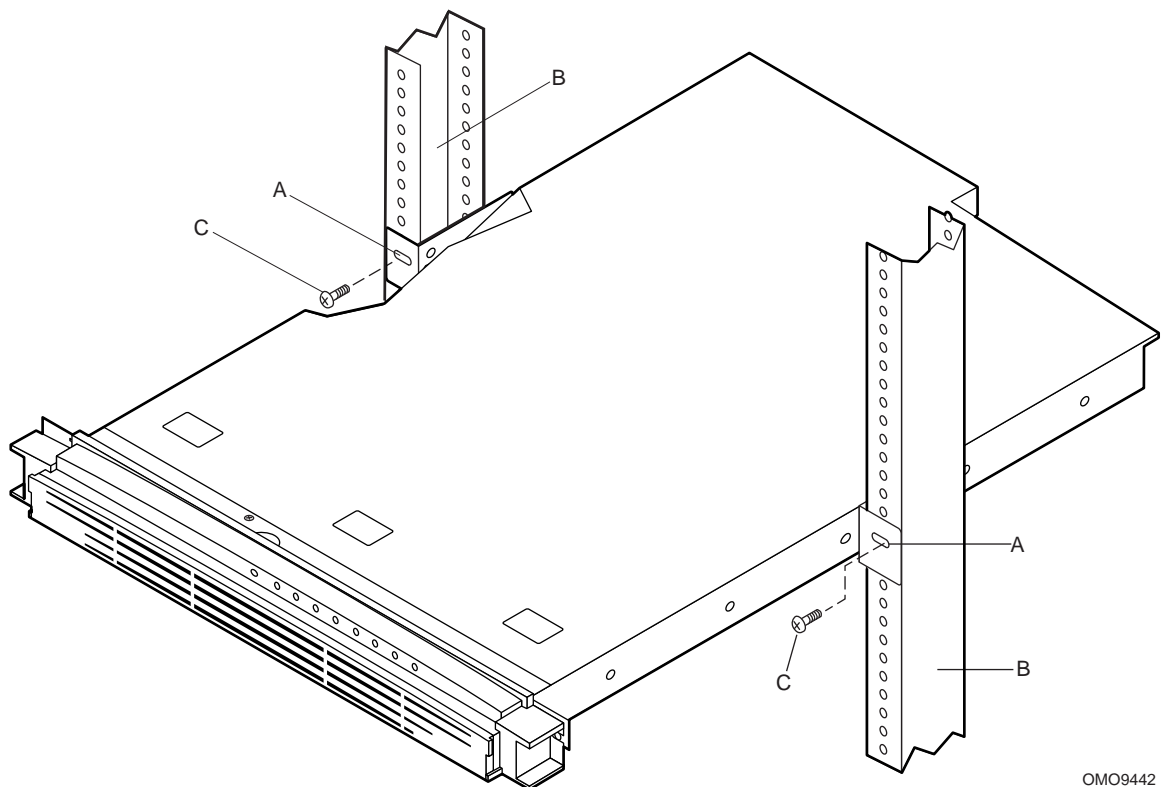
1. Use a Phillips screwdriver to remove the two screws (C) that secure the server mounting brackets to the rack posts (B).
2. Carefully remove the server from the front of the rack.



# Installing the Server in the Rack

This procedure describes how to install the server in the rack. Before proceeding, be sure and familiarize yourself with the “Rackmount Precautions” information in the “Before You Begin” section at the front of this chapter. Refer to Figure 5 while performing this procedure.

1. Orient the server with the rackmount brackets aligned with the desired mounting holes (A) in the rack posts (B).
2. Use a Phillips screwdriver and start the two screws removed in the previous “Removing the Server From the Rack” procedure and loosely attach the mounting brackets (one on each side of the server) to the rack posts. Do not tighten.
3. Properly align the server in the rack.
4. Use a Phillips screwdriver and tighten the two screws (C) to securely attach the mounting brackets to the rack posts.



OMO9442

**Figure 5. Removing/Installing the Server in the Rack**

## Removing the Cover

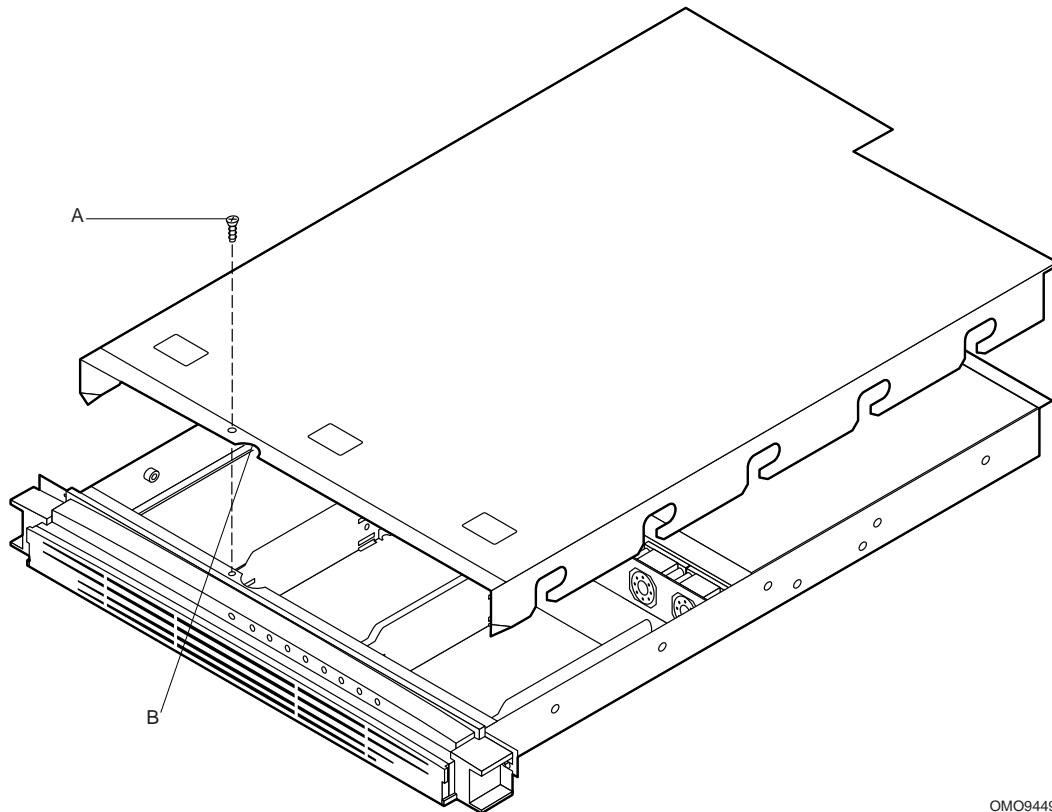
This procedure describes how to remove the cover from the server. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter. Refer to Figure 6 while performing this procedure.

1. Use a Phillips screwdriver and remove the screw (A) from the front edge of the cover.
2. Grasp the back edge of the cover and simultaneously pull from the back edge and push near the front until the cover slides out from under the edge of the server front panel.
3. Grasp the notch (B) in the front center of the cover and lift to remove the cover.

## Replacing the Cover

This procedure describes how to replace the cover on the server. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter. Refer to Figure 6 while performing this procedure.

1. Position the cover on the chassis with the notched edge (B) facing the front and the slotted sides of the cover **inside** the chassis frame.
2. Grasp the back edge of the cover and simultaneously push from the back and top until the front edge of the cover slides all the way under the edge of the server front panel.
3. Use a Phillips screwdriver and the screw (A) removed in the previous “Removing the Cover” procedure to securely attach the cover to the chassis.



OMO9449

Figure 6. Removing/Replacing the Cover

## Removing the Processor

This procedure describes how to remove the processor on the server board. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter.

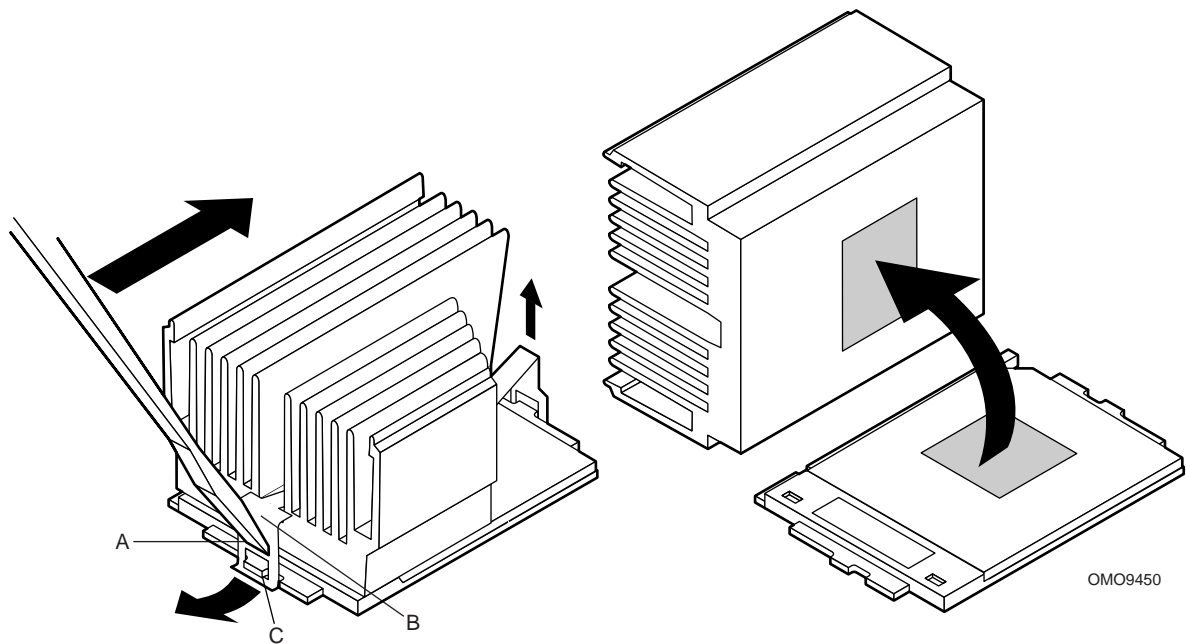
### WARNING

**If the server has been running recently, the processor chip, heat sink, and adjacent components will be hot. To avoid burns, allow time for the processor chip, heat sink, and adjacent components to cool before you proceed with these procedures.**

## Removing the Processor Heat Sink

Perform this procedure to remove the heat sink from the processor. Refer to Figure 7 while performing this procedure.

1. Use a slotted screwdriver and insert the tip into the top slot in the end of the heat sink clamp (A) that has two slots.
2. Press down on the top of the clamp (B) while gently prying back on the screwdriver until the front of the clamp is loose from the tab (C) on the processor socket.
3. Grasp the front and back of the clamp and gently lift the front of the heat sink until the rear of the clamp releases from the tab on the processor socket.
4. Remove the clamp.
5. Lift the heat sink from the processor chip.

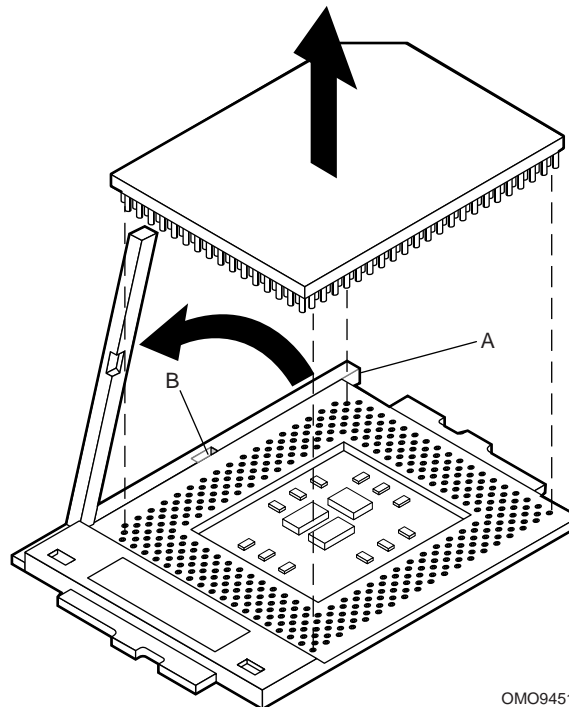


**Figure 7. Removing the Processor Heat Sink**

## Removing the Processor Chip

Perform this procedure to remove the processor chip from the socket. Refer to Figure 8 while performing this procedure.

1. Face the front of the server and grasp the end of the zero-insertion-force (ZIF) arm (A) on the left side of the processor socket.
2. Bend the ZIF arm slightly to the left until it disengages from the socket tab (B).
3. Swing the arm up until it stops in the straight up position. The processor chip is now loose in the socket.
4. Grasp the processor chip on the outside edges and lift it from the socket.



OMO9451

Figure 8. Removing the Processor Chip

## Installing the Processor

This procedure describes how to install the processor on the server board. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter.



### CAUTION

**Processor must be appropriate:** You can cause damage to the server if you install an incompatible processor. See Chapter 1 for the supported processor characteristics (note the thermal and power considerations).

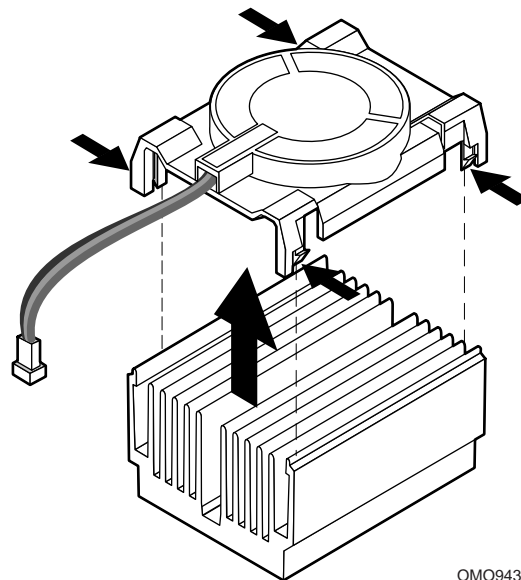
For exact information about processor interchangeability, contact the supplier.

## Removing the Processor Fan (If Applicable)

This procedure describes how to remove the processor fan from a replacement processor. Due to space constraints, the server will not accommodate a processor with a fan mounted on the heat sink. Sufficient cooling is provided in the server without the processor fan.

If the processor you wish to install has a fan mounted on top of the heat sink, remove the fan as described in the following procedure. Otherwise, proceed to “Installing the Processor Chip.” Refer to Figure 9 while performing this procedure.

1. Grasp the fan housing at each corner.
2. Gently press and lift on the corners until the fan releases from the heat sink.



OM09430

**Figure 9. Removing the Processor Fan**

## Installing the Processor Chip

Perform this procedure to install the processor chip in the socket. Refer to Figure 10 while performing this procedure.

1. Grasp the end of the zero-insertion-force (ZIF) arm (A) and bend it out slightly until it disengages from the socket tab (B).
2. Swing the ZIF arm up until it stops in the straight up position. The processor socket is now unlocked.
3. Face the front of the server and orient the processor chip (C) with the notch (D) in the upper left corner of the processor socket (E).
4. Gently place the processor chip on the socket so that the processor pins (F) mate exactly with the corresponding socket pins (G). Do not force the processor into the socket since it takes only a slight pressure to bend the pins.
5. With the processor in place, swing the arm (A) down until it snaps into the socket tab (B). The processor is now properly socketed.

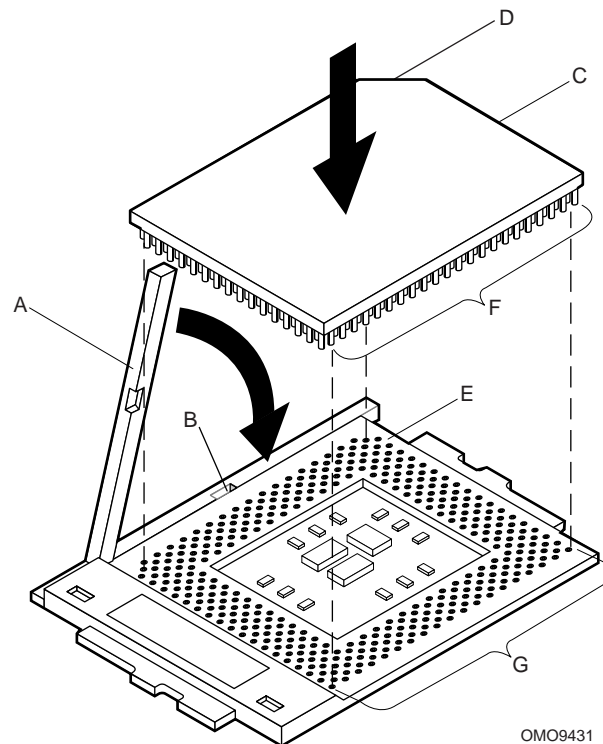
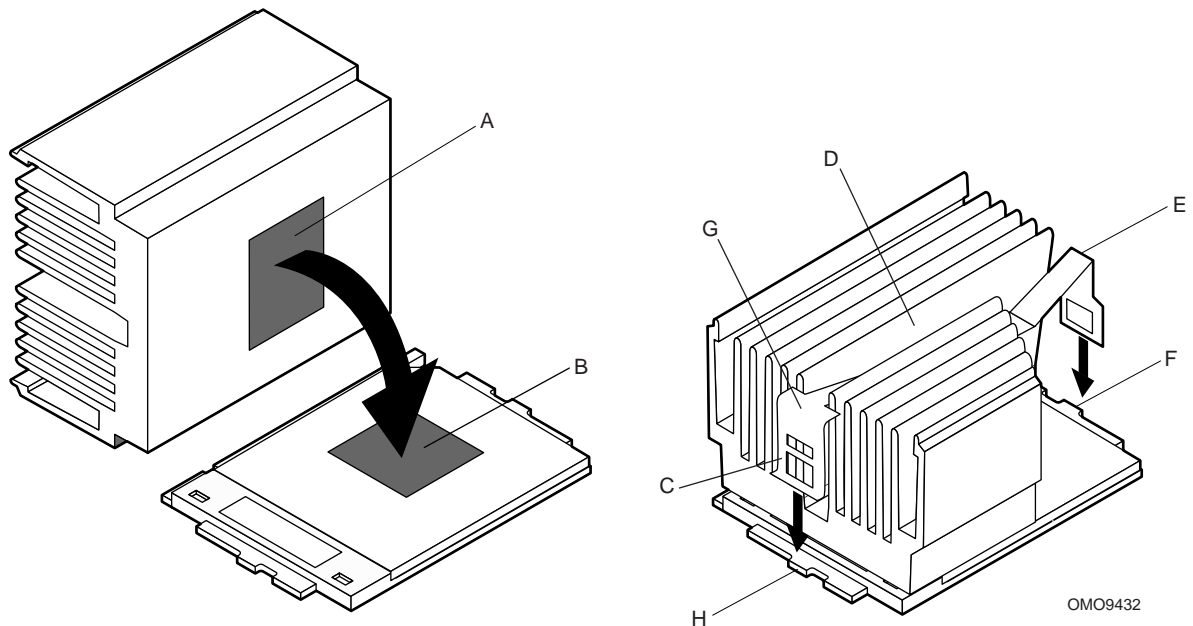


Figure 10. Installing the Processor Chip

## Installing the Processor Heat Sink

Perform this procedure to install the heat sink on the processor chip. Refer to Figure 11 while performing this procedure.

1. Orient the heat sink so the thermal grease pad (A) on the heat sink is exactly aligned with the corresponding thermal grease pad (B) on top of the processor chip.
2. With the end of the clamp that has the two slots (C) facing the front of the socket, drop the clamp in the bottom of the heat sink center groove (D).
3. Make sure the end of the clamp with the two slots (C) is positioned just below the top edge of the heat sink and press down on the back of the clamp (E) until it snaps onto the socket tab (F).
4. With the front of the clamp below the top edge of the heat sink, press down on the front of the clamp (G) until it snaps onto the socket tab (H).



**Figure 11. Installing the Processor Heat Sink**

# Removing the DIMM Boards

This procedure describes how to remove DIMM boards from the server board sockets. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter. Refer to Figure 12 while performing this procedure.

1. Grasp the ejector lever (A) on one end of the DIMM board and push down on the lever until the end of the board edge connector (B) just lifts out of the server board socket (C).



## CAUTION

Hold the tips of your fingers lightly on the back edge (D) of the DIMM board to prevent the board from suddenly ejecting from the socket (C) when you perform step 2 of this procedure. The DIMM board or other components on the server board could be damaged if the DIMM board is allowed to suddenly eject from the socket.

2. Grasp the ejector lever (E) on the other end of the DIMM board and carefully push down on the lever until the DIMM board is loose from the socket.

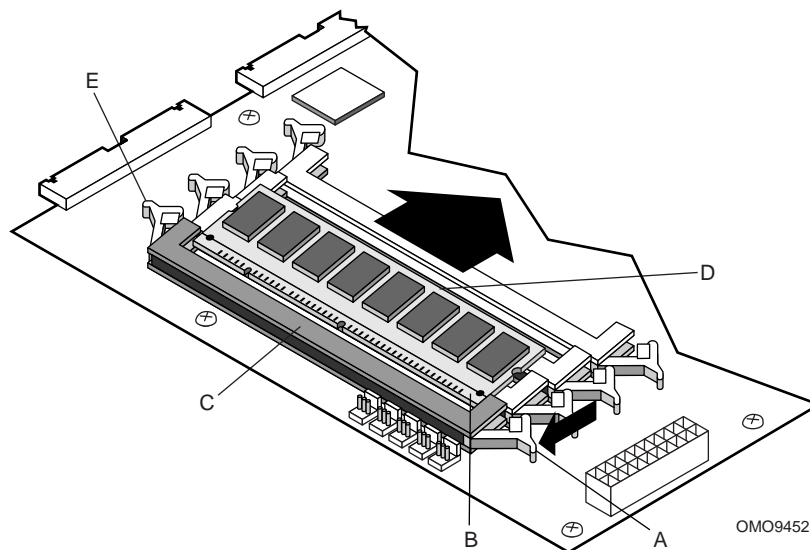


Figure 12. Removing the DIMM Boards



# Installing the DIMM Boards

This procedure describes how to install DIMM boards on the server board. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter. Refer to Figure 13 while performing this procedure.



## CAUTIONS

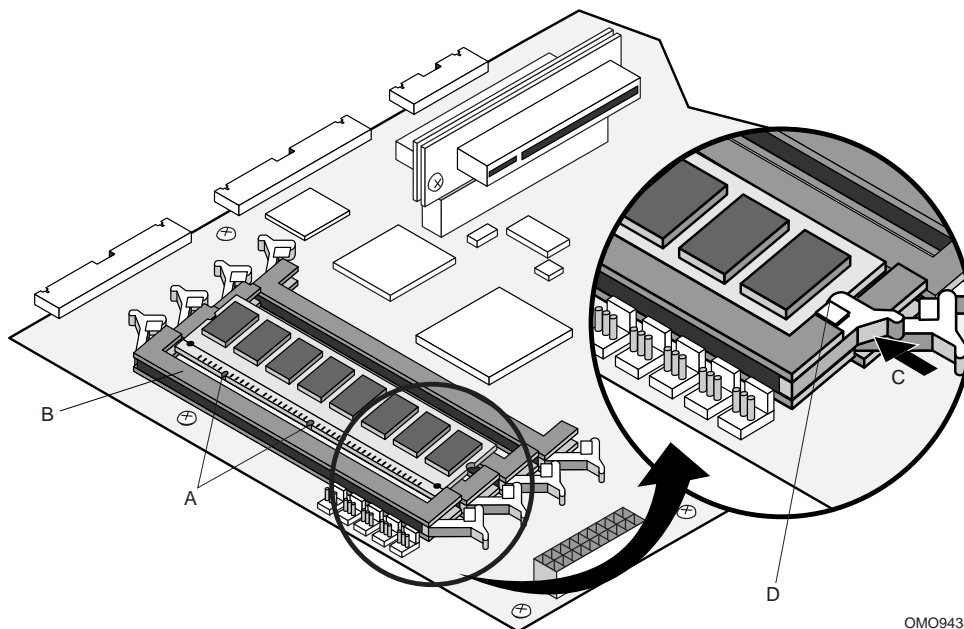
Make sure that the DIMM board(s) you wish to install has the appropriate characteristics. See Chapter 1 for the required characteristics of the supported memory.

Use extreme care when installing a DIMM board. Applying too much pressure or misaligning the board in the socket can damage the sockets or DIMM board edge connectors. DIMM board edge connectors are keyed and can be inserted only one way.

You can reduce the risk of damaging a connector by installing the DIMM boards starting with the back socket on the server board and move toward the front of the server.

Mixing dissimilar metals can cause memory failures that result in data corruption. The DIMM board sockets on the server board are gold plated. Thus, only install DIMM boards with gold-plated edge connectors.

1. Orient the DIMM board so the key slots (A) in the DIMM board edge connector are properly aligned with the corresponding slots in the mating server board socket (B). (The connectors are keyed to mate in only one direction.)
2. Firmly press the DIMM board straight down and all the way into the server board socket.
3. Make sure the DIMM board is locked in by pressing the levers (C) on each end of the server board socket into the mating notches (D) on each edge of the DIMM board.



OMO9433

**Figure 13. Installing the DIMM Boards**

## Removing the Hard Drive(s)

This procedure describes how to remove the hard drives from the server drive bays. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter. Refer to Figure 14 while performing this procedure.

1. Disconnect the power and data cables (A) from the back of the drive.
2. Grasp the back of the drive and lift until the drive mounting bracket (B) releases from the two snaptop standoffs (C).
3. Slide the mounting bracket back to release the tabs from the slots (D) in the server front panel.
4. Remove the mounting bracket and drive from the drive bay.
5. Use a Phillips screwdriver and remove the four screws (E) that attach the mounting bracket to the drive (two on each side).
6. Lift the drive from the mounting bracket.

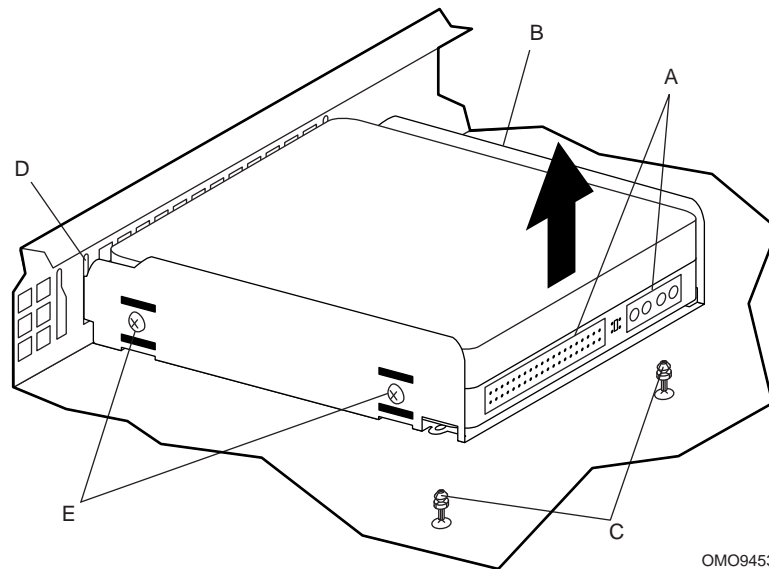


Figure 14. Removing the Hard Drive(s)

## Installing the Hard Drive(s)

This procedure describes how to install hard drives in the server drive bays. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter.

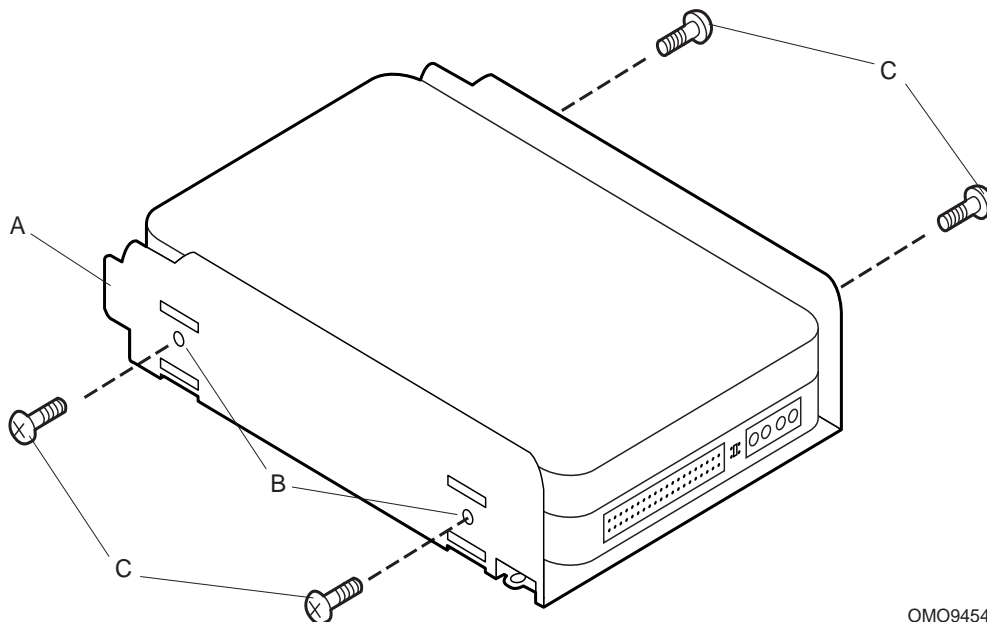
### Installing the Hard Drive in the Mounting Bracket

Perform this procedure to install the hard drive in the mounting bracket. Refer to Figure 15 while performing this procedure.

#### NOTE

This procedure assumes that the mounting bracket has been removed from the drives as described in the previous “Removing the Hard Drives” procedure.

1. Place the drive in the mounting bracket with the component side down and the front of the drive facing the front (tabbed) end (A) of the mounting bracket.
2. Align the four mounting bracket screw holes (B) with the mating holes (two on each side) in the drive housing.
3. Use a Phillips screwdriver and four screws (C) to securely attach the mounting bracket to the drive. Do not overtighten the screws because the bracket sides can bend inward which affects the alignment of the tabs with the slots in the front panel.



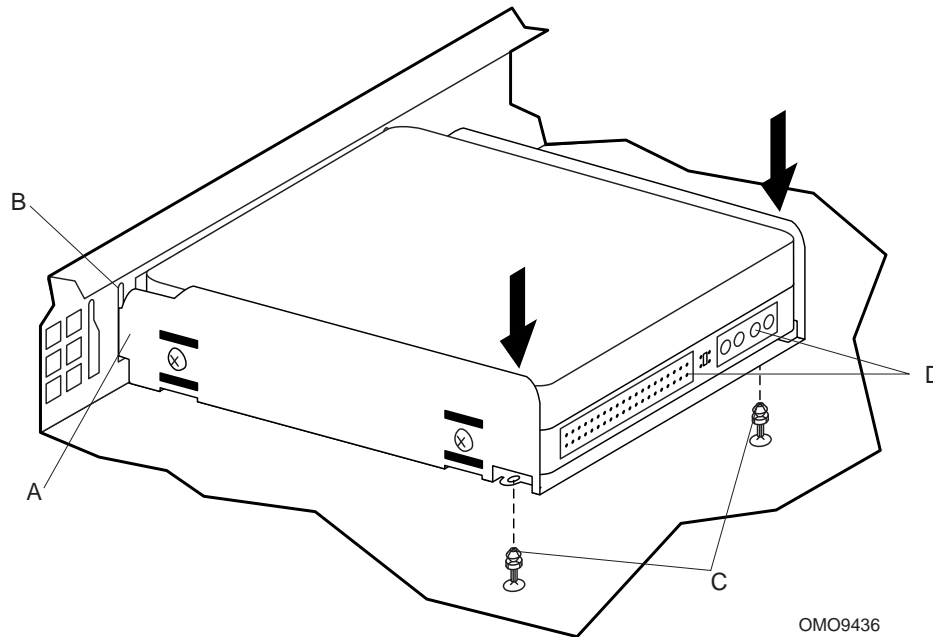
OMO9454

Figure 15. Installing the Hard Drive in the Mounting Bracket

## Installing the Hard Drive in the Drive Bay

Perform this procedure to install the mounting bracket with the hard drive in the drive bay. Refer to Figure 16 while performing this procedure.

1. Connect the power and data cables to the back of the drive (D).
2. Position the drive in the server drive bay so that the end of the bracket with the tabs (A) is facing the server front panel.
3. Gently guide the bracket tabs into the mating slots (B) in the server front panel.
4. Align the two holes in the back of the bracket with the two chassis snaptop standoffs (C).
5. Press down on the back of the mounting bracket until the two snaptop standoffs snap into the mating holes in the bracket.



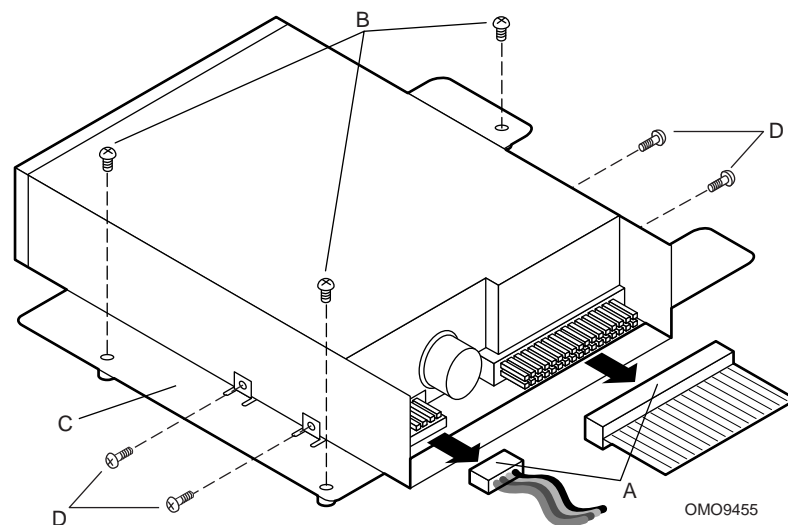
OMO9436

**Figure 16. Installing the Hard Drive in the Drive Bay**

## Removing the 3.5-inch Diskette Drive

This procedure describes how to remove the 3.5-inch diskette drive from the server drive bay. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter. Refer to Figure 17 while performing this procedure.

1. Disconnect the power and data cables (A) from the back of the drive.
2. Use a Phillips screwdriver and remove the three screws (B) that secure the mounting bracket (C) and drive to the server chassis (two on one side and one on the other).
3. Remove the drive mounting bracket and drive.
4. Use a Phillips screwdriver and remove the four screws (D) that secure the mounting bracket to the drive (two on each side).
5. Lift the drive from the mounting bracket.



**Figure 17. Removing the 3.5-inch Diskette Drive**

# Installing the 3.5-inch Diskette Drive

This procedure describes how to install the 3.5-inch diskette drive in the server drive bay. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter.

## Installing the Drive in the Mounting Bracket

Perform this procedure to install the 3.5-inch diskette drive in the mounting bracket. Refer to Figure 18 while performing this procedure.

### NOTE

This procedure assumes that the mounting bracket has been removed from the server chassis and the drive removed from the bracket as described in the previous “Removing the 3.5-inch Diskette Drive” procedure.

1. Place the diskette drive in the mounting bracket with the component side **down** and the front panel facing the front of the mounting bracket.
2. Use a Phillips screwdriver and the four screws (A) removed in the preceding “Removing the 3.5-inch Diskette Drive” procedure (two on each side) to securely attach the mounting bracket to the drive.

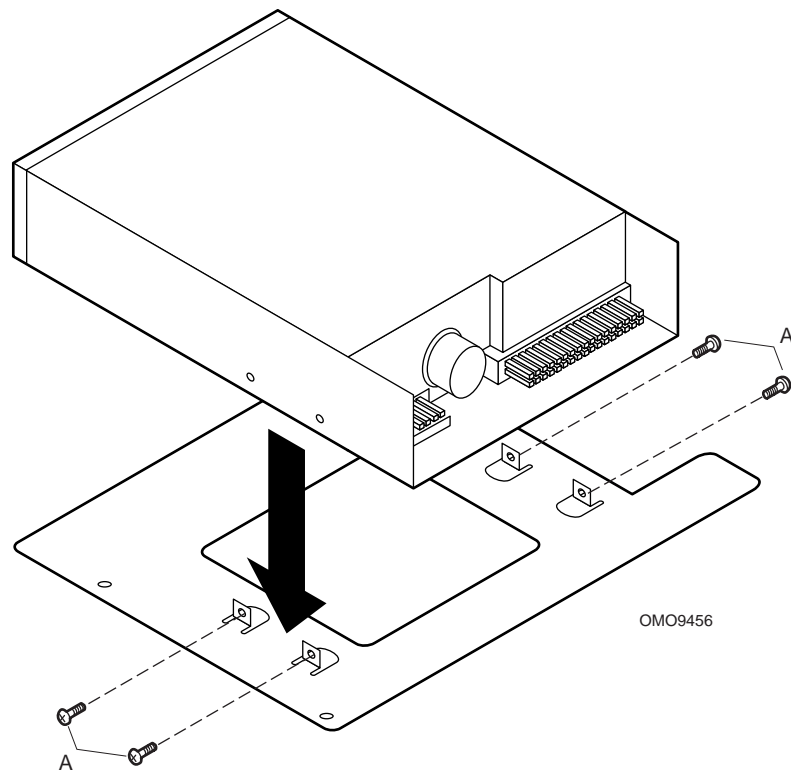
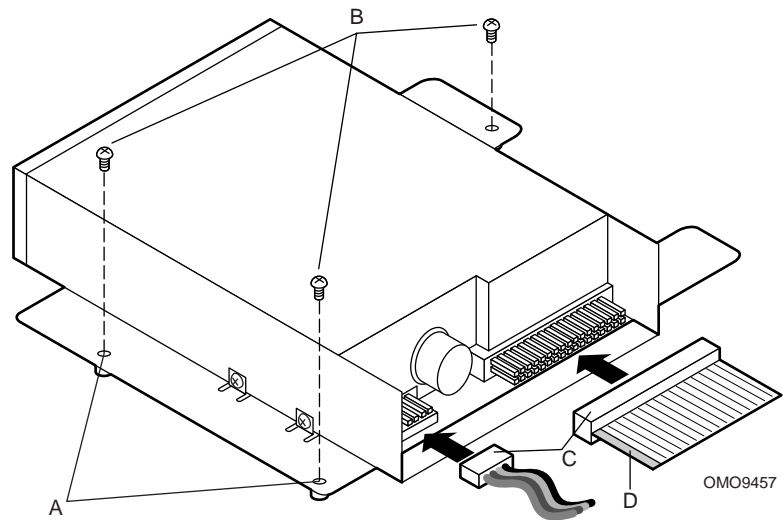


Figure 18. Installing the 3.5-inch Diskette Drive in the Mounting Bracket

## Installing the 3.5-inch Diskette Drive in the Drive Bay

Perform this procedure to install the mounting bracket and drive in the server drive bay. Refer to Figure 19 while performing this procedure.

1. Connect the power and data cables (C) to the drive. **The red stripe (D) on the data cable faces toward the center of the drive.**
2. Place the mounting bracket and drive in the server chassis and align the three screw holes (A) in the mounting bracket (two on one side and one on the other) with the mating holes in the server chassis.
3. Use a Phillips screwdriver and the three screws (B) removed from the mounting bracket in the preceding "Removing the 3.5-inch Diskette Drive" procedure to securely attach the mounting bracket and drive to the server chassis.



**Figure 19. Installing the 3.5-inch Diskette Drive in the Drive Bay**

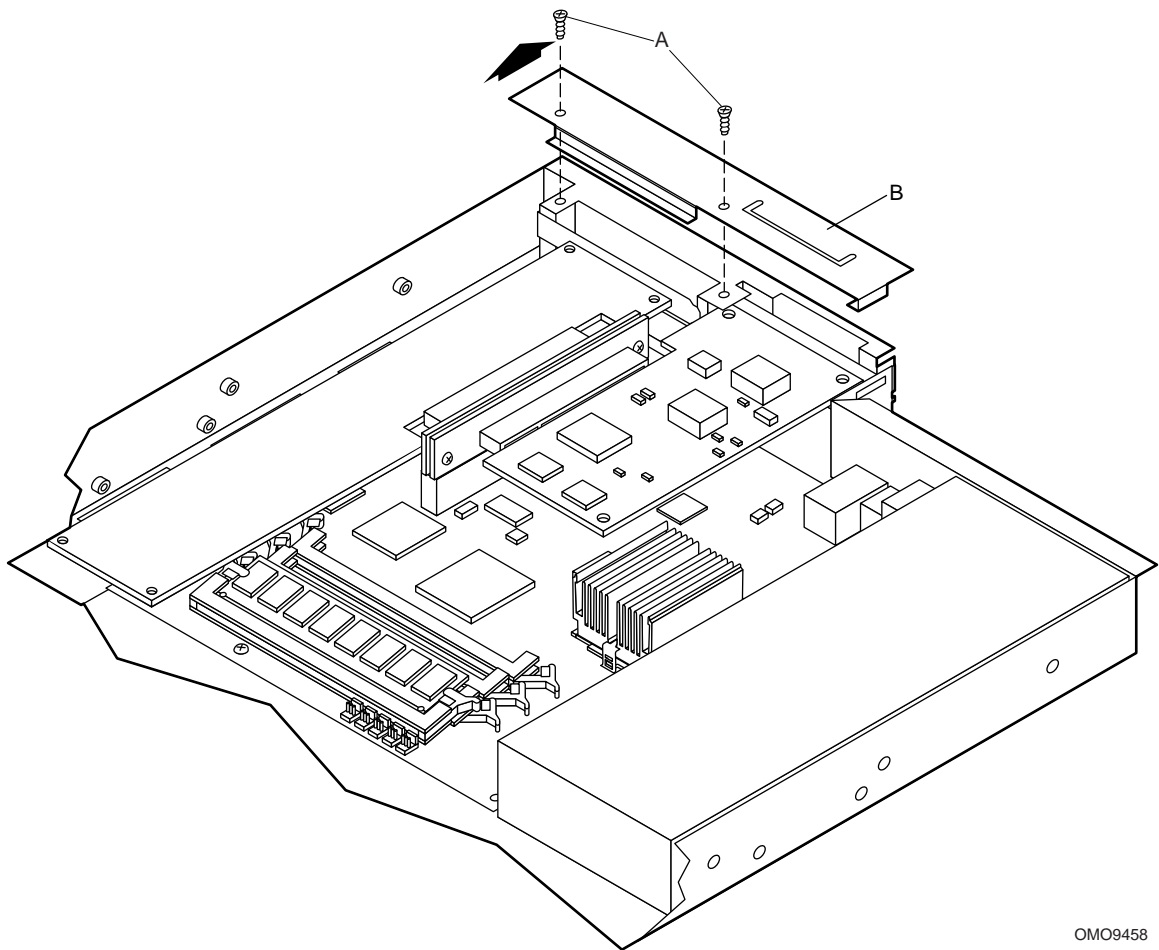
## Removing the PCI Add-in Card(s)

This procedure describes how to remove the PCI add-in card(s) from the server board. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter.

## Removing the Filler Panel Retention Bracket

Perform this procedure to remove the filler panel retention bracket from the server back panel. Refer to Figure 20 while performing this procedure.

1. Use a Phillips screwdriver and remove the two screws (A) securing the filler panel retention bracket (B) to the top edge of the server back panel.
2. Remove the retention bracket.



OMO9458

**Figure 20. Removing the Filler Panel Retention Bracket**



## Removing the Riser and Add-in Card(s)

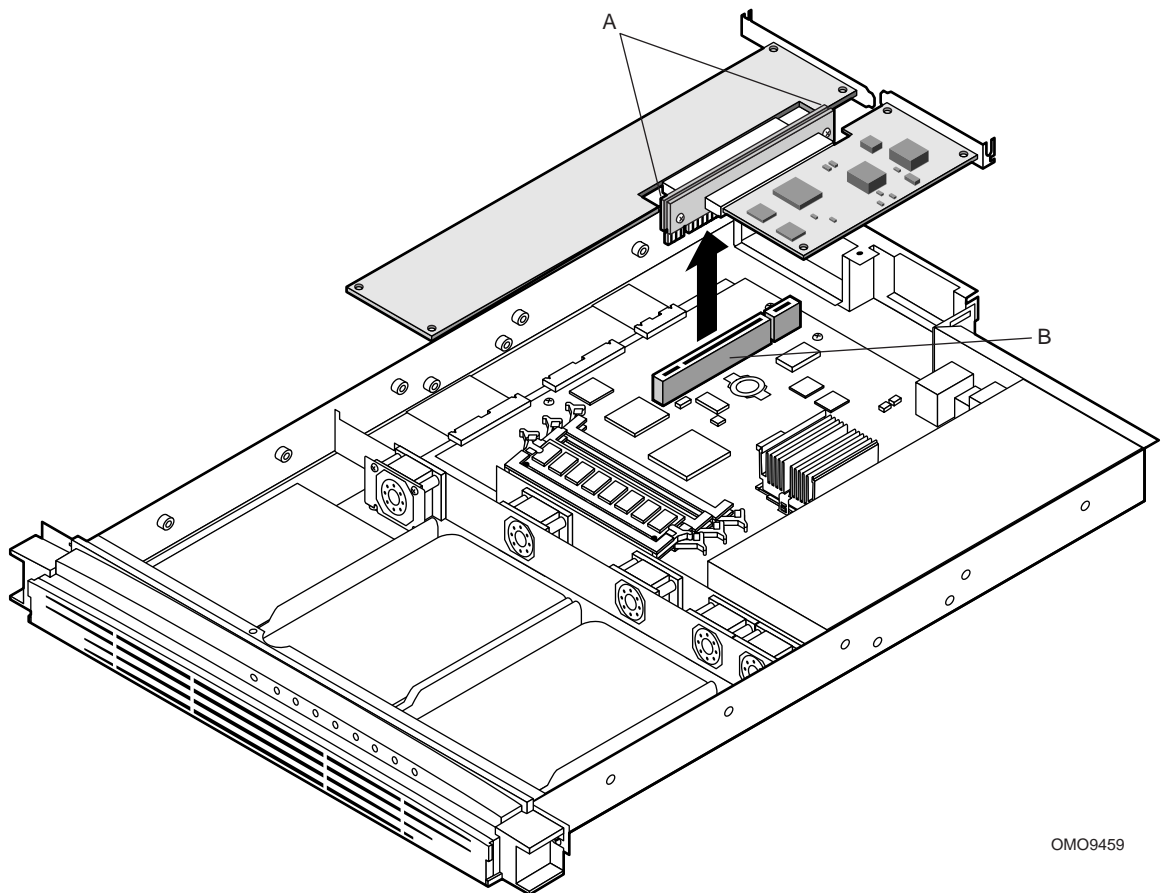
Perform this procedure to remove the riser and add-in card(s) from the server board. Refer to Figure 21 while performing this procedure.



### CAUTION

Do not attempt to remove an add-in card without first removing the riser card from the server board. If you do, you can damage the board(s) or connectors due to clearance limitations. If there are any add-in cards already installed, remove the riser and the attached add-in card(s) together as described in the following procedure.

1. Grasp the riser card, with add-in card(s) attached, at each end (A) and gently rock and lift until the riser releases from the server board connector (B).
2. Remove the riser and add-in cards from the server board.



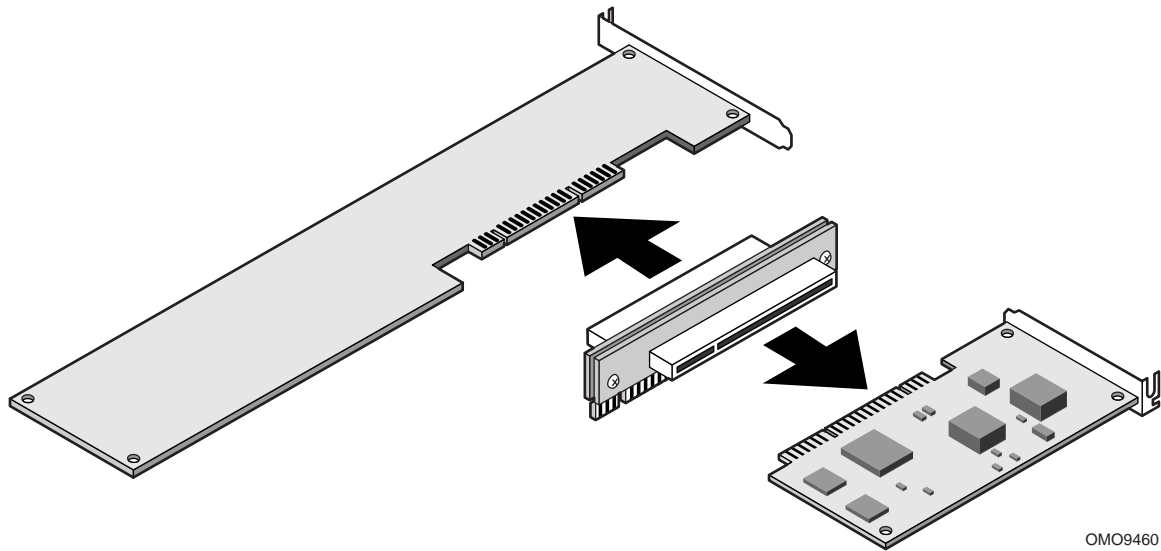
OMO9459

Figure 21. Removing the Riser and Add-in Card(s)

## Removing the Add-in Card(s) From the Riser

Perform this procedure to remove the add-in card(s) from the riser card. Refer to Figure 22 while performing this procedure.

1. Grasp the edges of the riser card and the add-in card you wish to remove.
2. Firmly hold the riser card while gently rocking and pulling the add-in card until the add-in card releases from the riser connector.
3. Remove the add-in card from the riser connector.



OMO9460

**Figure 22. Removing the Add-in Card(s) from the Riser**

## Installing the Rear I/O Filler Panel(s)



### CAUTION

Be sure any empty expansion slot(s) have a filler panel installed as described in the following “Installing the Rear I/O Filler Panel(s)” procedure. An open expansion slot reduces the cooling and EMI integrity of the server and can effect performance and/or cause damage due to overheating.

### NOTE

Perform this procedure only if you are **not** immediately reinstalling another add-in card in the same expansion slot from which an add-in card was removed.

Perform this procedure to install rear I/O filler panels in any unused expansion slots. Refer to Figure 23 while performing this procedure.

1. Align the filler panel retention bracket (A) with the two mating screw holes on top of the server back panel.
2. Use a Phillips screwdriver and the two screws (B) removed in the previous “Removing the Filler Panel Retention Bracket” procedure to securely attach the filler panel retention bracket to the top edge of the server back panel.

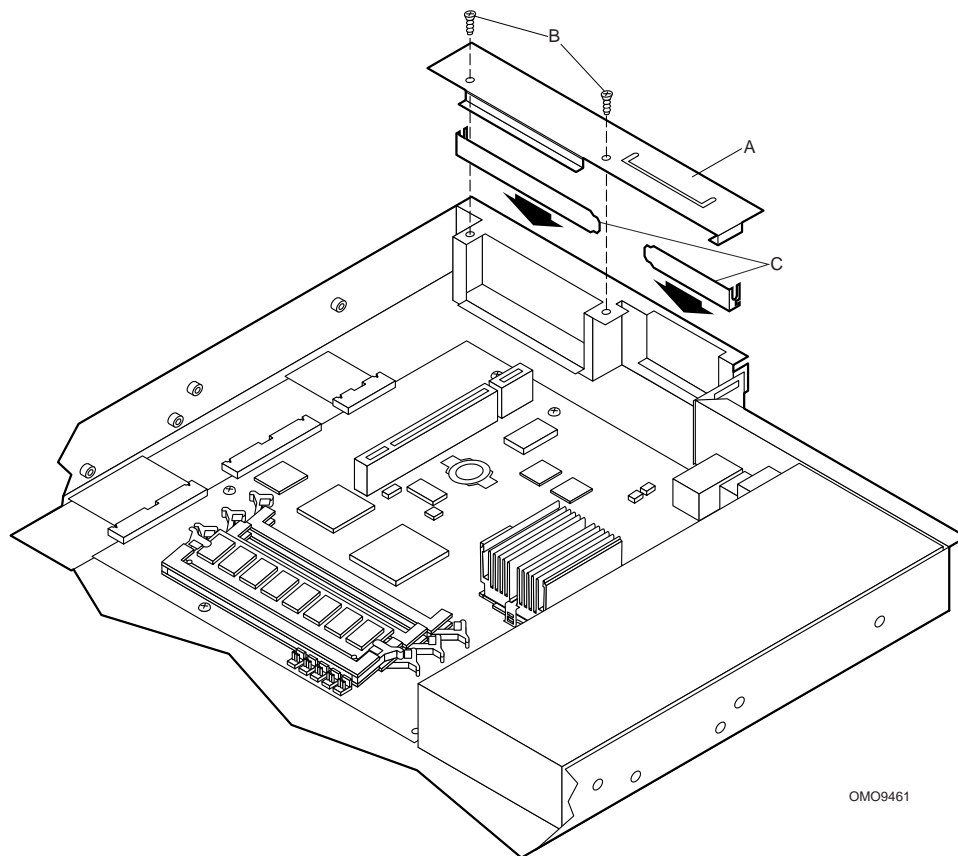


Figure 23. Installing the Rear I/O Filler Panel(s)

## Installing PCI Add-in Card(s)

This procedure describes how to install the PCI add-in card(s) in the server expansion slots. The vertically mounted riser card accommodates one standard (left side) and one low-profile (right side) PCI add-in card. Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter.

### NOTE

If applicable, check that the add-in card jumpers or switches are set according to the manufacturer’s instructions before proceeding.

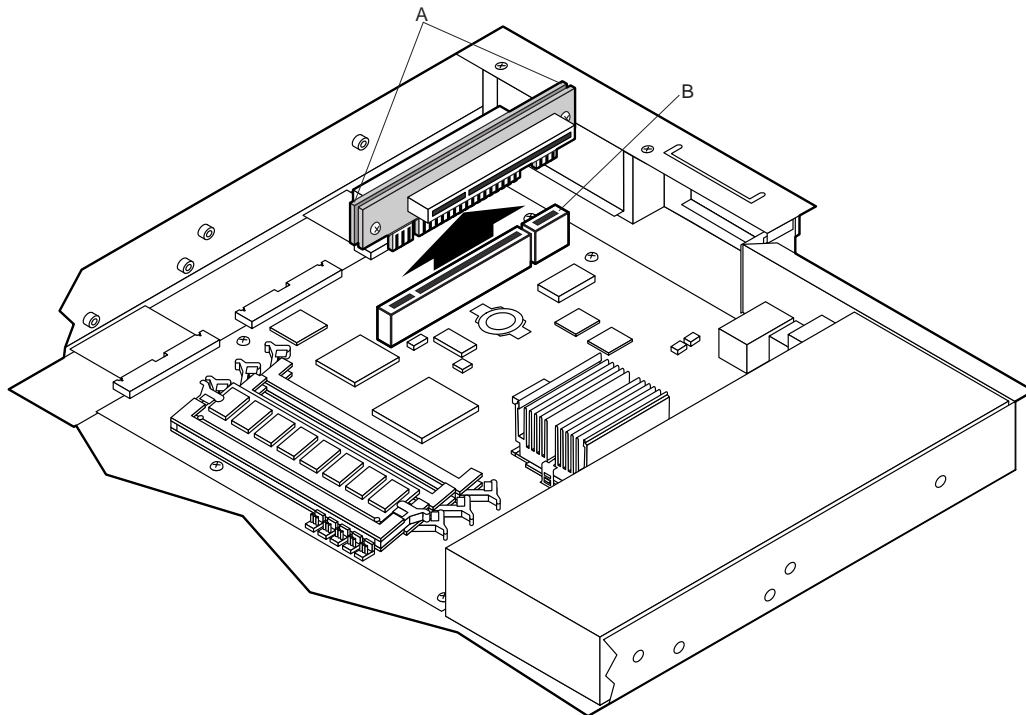
## Removing the Riser Card

Perform this procedure to remove the riser card from the server board. Refer to Figure 24 while performing this procedure.

### NOTE

This procedure assumes that the PCI add-in cards have been removed from the server chassis as described in the previous “Removing the PCI Add-in Card(s)” procedure.

1. Grasp the riser card at each end (A) and gently rock and lift the riser card until it releases from the server board connector (B).
2. Remove the riser card from the server board.



OM09437

Figure 24. Removing the Riser Card



## Installing the Add-in Card(s) on the Riser

Perform this procedure to install the standard or low-profile add-in cards on the riser card. Refer to Figure 25 while performing this procedure.

Before you begin, examine the length of the bracket at the end of the add-in card you wish to install to determine whether it is a standard or a low-profile type. The low-profile card bracket is shorter than the standard card; approximately 3.11 in. (7.9 cm) compared to approximately 4.75 in. (12.06 cm) long. The low-profile card fits into the right expansion slot (when facing the front of the server) and the standard card fits in the left slot.

1. Align the add-in card edge connector (A) with the proper riser connector (B). For example:
2. If the add-in card is a standard type (C), the component side faces **down** and the add-in card edge connector mates with the connector on the **left** side of the riser card when the riser is pointing toward the back of the server.
3. If the add-in card is a low-profile type (D), the component side faces **up** and the add-in card edge connector mates with the connector on the **right** side of the riser card.
4. The connectors are keyed to mate in only one direction.
5. Firmly press the add-in card(s) all the way into the mating connector on the riser card.

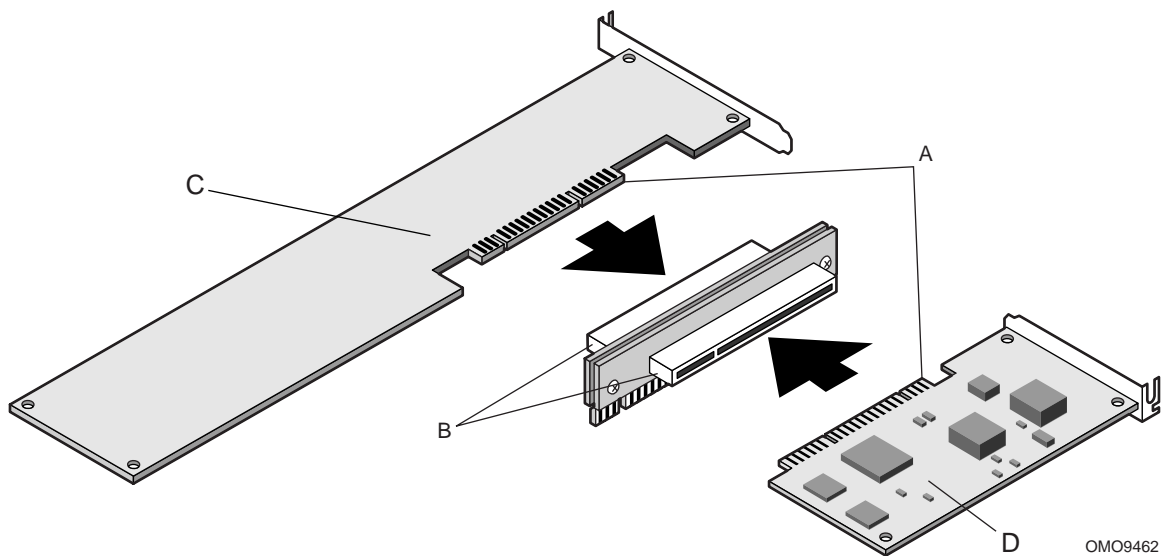


Figure 25. Installing the Add-in Card(s) on the Riser

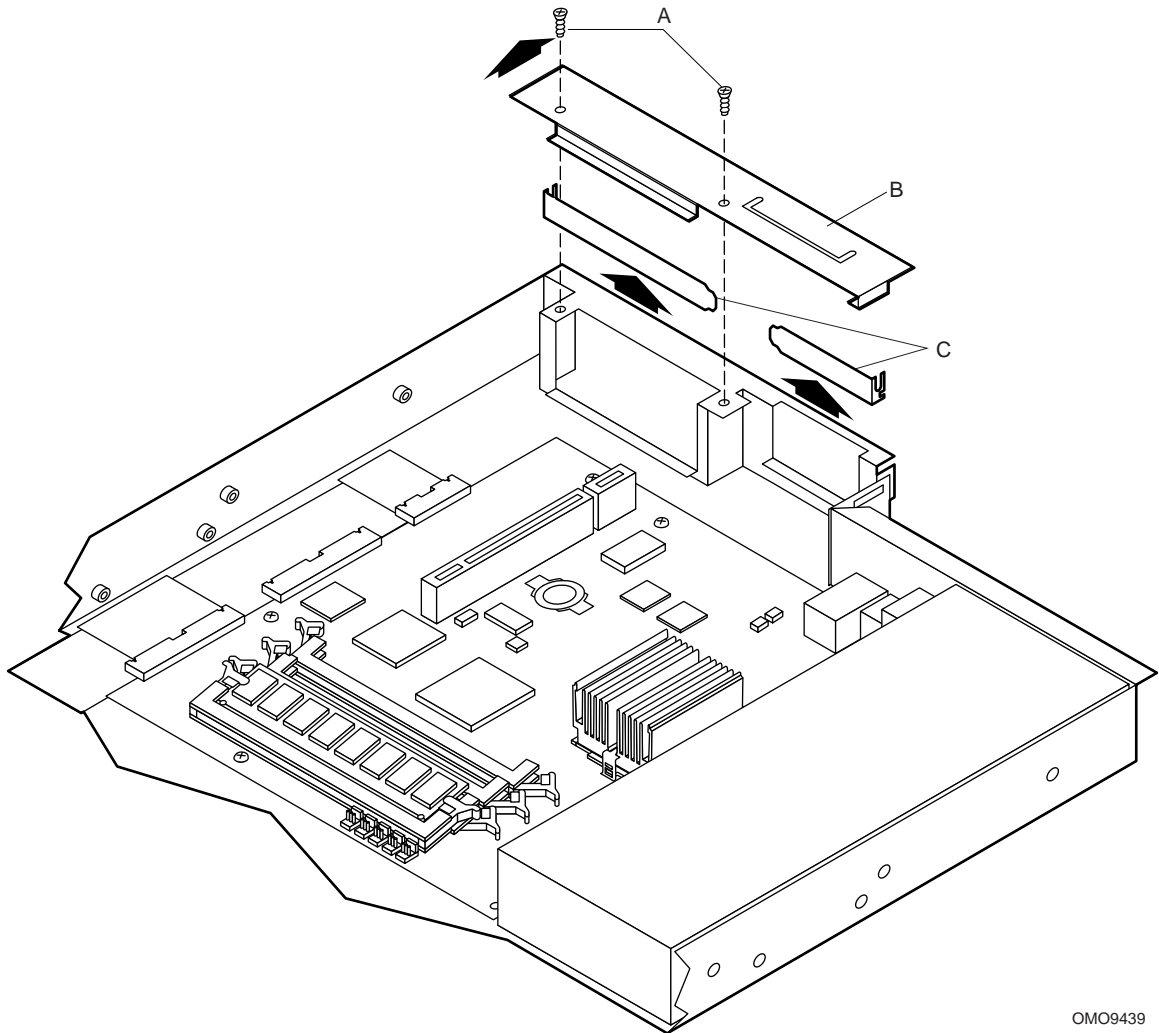
## Removing the Rear I/O Filler Panel(s)

### NOTE

Perform this procedure only if you are installing PCI add-in card(s) in unused expansion slots that still have an I/O filler panel installed.

Perform this procedure to remove the rear I/O filler panel(s). Refer to Figure 26 while performing this procedure.

1. Use a Phillips screwdriver and remove the two screws (A) securing the filler panel retention bracket (B) to the top edge of the server back panel.
2. Remove the retention bracket.
3. Remove the filler panel (C) from the expansion slot for the add-in card(s) you are installing.



OMO9439

**Figure 26. Removing the Rear I/O Filler Panel(s)**

## Installing the Riser and Add-in Card(s)

Perform this procedure to install the riser and add-in card(s) in the server PCI expansion slots. Refer to Figure 27 while performing this procedure.

1. Align the riser card edge connector (A) with the mating riser connector on the server board. (The connectors are keyed to mate in only one direction.)

### NOTE

If you installed a low-profile card on the riser, make sure the right side of the low-profile card bracket (B) fits into the narrow slot (C) on the right side of the add-in card expansion slot.

2. Firmly press the riser/add-in card(s) straight down and all the way into the mating connector on the server board.



### CAUTION

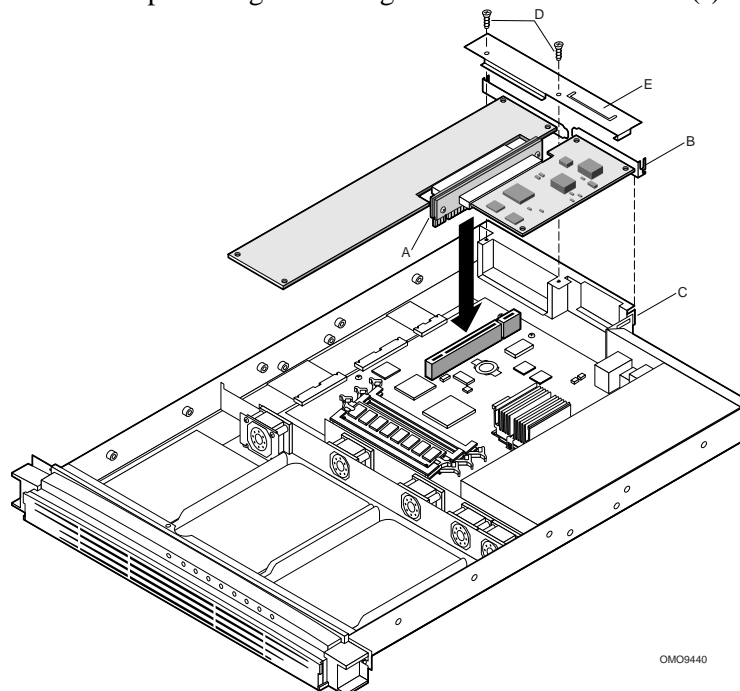
If you installed only one add-in card, make sure the empty expansion slot has a filler panel installed before you attach the filler panel retention bracket as described in the following step. An open expansion slot will reduce the cooling and EMI integrity of the server.

3. Use the Phillips screwdriver and the two screws (D) removed in the “Removing the Rear I/O Filler Panel(s)” procedure to securely attach the filler panel retention bracket (E) to the top of the server back panel.



### CAUTION

If you installed only one add-in card, make sure the empty expansion slot has a filler panel installed. An open expansion slot will reduce the cooling and EMI integrity of the server. Refer to the preceding “Installing the Rear I/O Filler Panel(s)” procedure.



OM09440

Figure 27. Installing the Riser and Add-in Card(s)



# Replacing the Back-up Battery

This procedure describes how to remove and replace the lithium battery on the server board. The lithium battery powers the real-time clock (RTC) in the absence of AC power. The lithium battery lasts for up to 10 years; but when it starts to lose voltage the server settings stored in the CMOS RAM in the RTC (for example, the date and time) may be incorrect. Contact your supplier or dealer for a list of approved devices.

Before proceeding, be sure you are thoroughly familiar with the information in “Before You Begin” at the front of this chapter. Refer to Figure 28 while performing this procedure.



## WARNING

**Replace the lithium battery only with the same or equivalent type recommended by the dealer. The battery can explode and cause harm to personnel or equipment if it is not the proper type or incorrectly installed. Discard used batteries 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.**

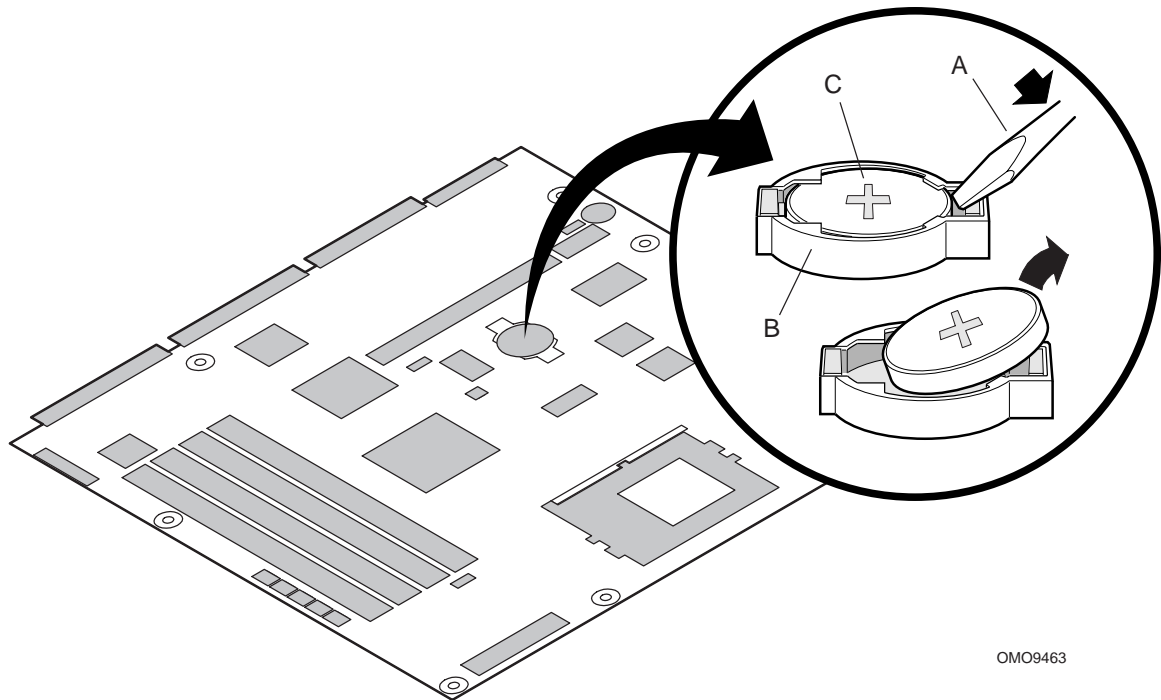
1. Remove the server cover as described in the “Removing the Server Cover” procedure.
2. Insert the tip of a flat bladed screwdriver (A), or equivalent, under the tab in the plastic battery retainer (B).
3. Gently push down on the screwdriver to lift the battery (C).
4. Remove the battery from the socket.



## WARNING

**Replace the lithium battery only with the same or equivalent type recommended by the dealer. The battery can explode and cause harm to personnel or equipment if it is not the proper type or incorrectly installed. Discard used batteries according to manufacturer’s instructions.**

5. Remove the new lithium battery from its package.
6. Insert the battery in the battery socket with the + side up.
7. Reinstall the plastic retainer (B) on the socket.
8. Replace the server cover as described in the “Replacing the Server Cover” procedure.
9. Run the system setup utility (SSU) as described in Chapter 3 to restore the configuration settings to the real-time clock (RTC).



OMO9463

**Figure 28. Replacing the Lithium Back-up Battery**

# Power Up the Server

This procedure describes how to apply AC power and power up the server (refer to Figure 29). Before proceeding, be sure you are thoroughly familiar with the “Before You Begin” information at the front of this guide.



## WARNING

**Carefully check the AC power cord. If it is not the exact type required in the region where the server will be installed and used, replace the cord with the correct type. Refer to the following “Power Cord Requirements” for a detailed power cord description.**

## Power Cord Requirements

**Rating:** Power cords must be rated for available AC voltage and have a current rating at least 125% of the server current rating. (Refer to the *Intel ISP1100 Internet Server Technical Product Specification* included on the CD-ROM shipped with the server for power requirement information.)

**Connector, wall outlet end:** Power cords must be terminated in a grounding-type male plug designed for use in your region. Cords must have certification marks showing certification by an agency that is acceptable in your region.

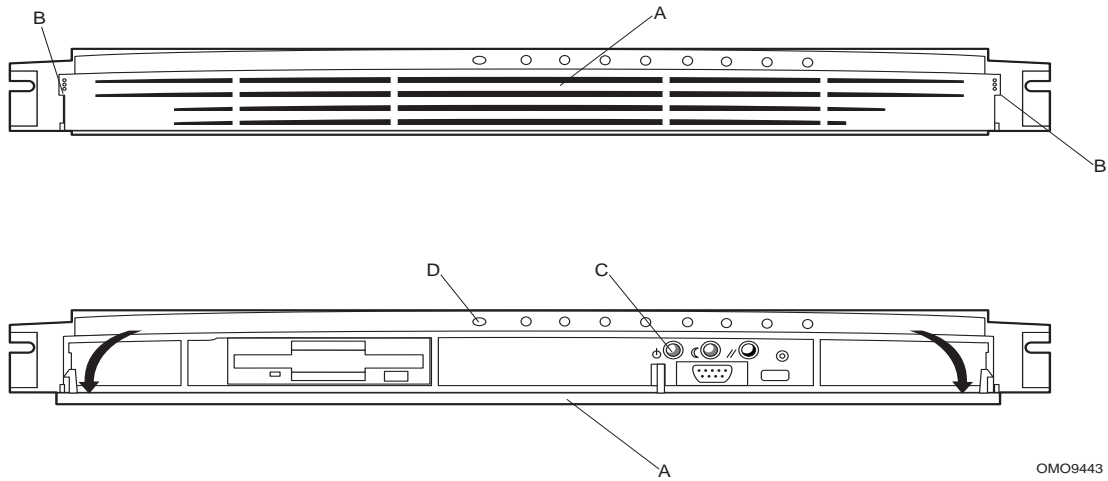
**Connector, power supply end:** The connector that plugs into the AC receptacle on the server power supply must be an IEC 320, sheet C13, type female connector.

**Cord length and flexibility:** Power cord length must be 4.5 meters (14.76 feet) or less and composed of flexible (harmonized <HAR>) cord or VDE-certified cordage to comply with server safety certifications.

## NOTE

In geographic regions that are susceptible to electrical storms, it is recommended that you plug the server into an AC surge suppressor.

1. Attach the female end of the appropriate AC power cord to the mating AC power receptacle on the server back panel.
2. Plug the male end of the AC power cord into the AC power source (wall outlet).
3. Open the bezel door (A) to access the Power switch (C) as follows:
  - a. Grasp the tab (B) at each end of the hinged bezel door.
  - b. Gently pull the tabs out and down to swing open the hinged bezel door.
4. Press the Power switch (C) to apply power to the server and notice that the green LED power indicator (D) is lit.



OMO9443

**Figure 29. Powering Up the Server**



## 3 Configuration Software and Utilities

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This chapter describes the Power-On Self-Test (POST) and server configuration utilities. The table below briefly describes the utilities.

**Table 8. Configuration Utilities**

Utility	Description and brief procedure	Page
BIOS Setup	The BIOS Setup program is for viewing and changing BIOS settings for the server.	55
BIOS Update Utility	Use to update the BIOS or recover from a corrupted BIOS update.	64

### Hot Keys

Use the keyboard's numeric pad to enter numbers and symbols.

**Table 9. Hot Keys**

To do this:	Press these keys
Clear memory and reload the operating system—this is a system reset.	<Ctrl+Alt+Del>

### Power-On Self-Test (POST)

Each time you turn on the system, POST starts running. POST checks the server board, processor, memory, keyboard, and most installed peripheral devices. During the memory test, POST displays the amount of memory that it is able to access and test. The length of time needed to test memory depends on the amount of memory installed. POST is stored in flash memory.

1. Turn on your video monitor and server. After a few seconds, POST begins to run.
2. After the memory test, these screen prompts and messages appear:

```
Legacy Keyboard.....Detected
```

```
Legacy Mouse.....Detected
```

```
Press <F2> key if you want to run SETUP
```

3. If you do not press <F2> and do NOT have a device with an operating system loaded, the above message remains for a few seconds while the boot process continues, and the system beeps once. Then this message appears:

```
Missing Operating System
```

What appears on the screen after this depends on whether you have an operating system loaded and if so, which one.

If the system 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 display screen, 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 the “Solving Problems” chapter in this manual.

## Using BIOS Setup

The Setup program is used for viewing and changing the BIOS settings of this system. The user accesses Setup by pressing <F2> key after the POST memory test begins and before the operating system boot begins. The menu bar and brief description of each is shown in Table 10.

**Table 10. BIOS Setup Menu Bar**

Main	Advanced	Security	Boot	System Management	Exit
Allocates resources for hardware components	Configures advanced features available through the chipset	Set passwords and security features	Selects boot options and power supply control	Configures server management features such as console redirection	Saves or discards changes to Setup program options

If “Quiet Boot” is enabled, an OEM logo will display instead of the “Press <F2> to enter Setup” message. The user can still enter Setup by pressing <F2> during the time an OEM logo is displayed.

### NOTE

Note that a few seconds might pass before Setup is entered. This is the result of POST completing test and initialization functions that must be completed before Setup can be entered. When Setup is entered, the Main Menu options page is displayed.

Table 11 shows the function keys available for menu screens.

**Table 11. BIOS Setup Function Keys**

Setup Key	Description
<Enter>	Select Submenu: The <Enter> key activates sub-menus when the selected feature is a sub-menu, displays a pick list if a selected feature has a value field, or selects a sub-field for multi-valued features like time and date. If a pick list is displayed, the <Enter> key undoes the pick list, and allows another selection in the parent menu.
<ESC>	Exit: The <ESC> key provides a mechanism for backing out of any field. This key undoes the pressing of the <Enter> key. When the <ESC> key is pressed while editing any field or selecting features of a menu, the parent menu is re-entered. When the <ESC> key is pressed in any sub-menu, the parent menu is re-entered. When the <ESC> key is pressed in any major menu, the exit confirmation window displays and the user is asked whether changes can be discarded.
<Tab>	Select Field: The <Tab> key selects a field within a configurable field. For example, when configuring the system time, use the <Tab> key to move between the hour, minute, and second fields.

continued

**Table 11. BIOS Setup Function Keys (continued)**

Setup Key	Description
<↑> or <↓>	Select Item: The up or down arrow selects the previous or next value in a pick list, or the previous or next feature in a menu item's option list. The selected item must then be activated by pressing the <Enter> key.
<→> or <←>	Select Menu: The left and right arrow keys move between the major menu pages. The keys have no effect if a sub-menu or pick list is displayed.
<F9>	Setup Defaults: Load the default configuration values for all fields. A menu will appear asking user to confirm. Press <Yes> to load defaults. Press <No> to cancel loading defaults.
<F10>	Save and Exit: Save the current values and exit Setup. A menu will appear asking user to confirm. Press <Yes> to save and exit. Press <No> to remain in Setup.

## Main Menu

The menu bar is shown below.

Main	Advanced	Security	Boot	System Management	Exit
------	----------	----------	------	-------------------	------

Table 12 shows the Main menu. This menu reports processor and memory information and is for configuring the system date and time.

**Table 12. Main Menu**

Feature	Options	Description
BIOS Version	No options	Displays the version of the BIOS.
Processor Type	No options	Displays processor type.
Processor Speed	No options	Displays processor speed (MHz).
Processor Serial Number	Disabled <b>Enabled (default)</b>	Enables or disables PSN. PSN is only available for a Pentium III processor.
Cache RAM	No options	Displays cache size (KB).
Total Memory	No options	Displays total memory (MB).
Bank 0 Bank 1 Bank 2 Bank 3	No options	Displays memory type for each bank or "Not Installed."
Language	<b>English (US) (default)</b> French Deutsch Japanese Italian Spanish	Selects which language the BIOS displays.
Memory Configuration	Non-ECC <b>ECC (default)</b>	Allows the user to turn error reporting on or off if the system and all memory installed support ECC (Error Correction Code).
System Time	HH:MM:SS	Sets the system time.
System Date	MM/DD/YYYY	Sets the system date.



## Advanced Menu

The menu bar is shown below.

Main	<b>Advanced</b>	Security	Boot	System Management	Exit
------	-----------------	----------	------	-------------------	------

Table 13 shows the Advanced menu. This menu configures advanced features that are available through the chipset.

**Table 13. Advanced Menu**

Feature	Options	Description
Boot Configuration	See Table 14	Configures Plug and Play, Numlock key, and reset Configuration Data on next boot.
Peripheral Configuration	See Table 15	Configures peripheral ports and devices.
IDE Configuration	See Table 16	Configures IDE devices.
Diskette Configuration	See Table 18	Configure diskette drive settings.
Event Log Configuration	See Table 19	Configures system event log options.

**Table 14. Boot Configuration Submenu**

Feature	Options	Description
Plug & Play O/S	Yes <b>No (default)</b>	Specifies if a Plug and Play operating system is being used. “No” lets the BIOS configure all the devices in the system. “Yes” lets the operating system configure Plug & Play (PnP) devices not required for boot if yours system has a Plug and Play operating system.
Reset Config Data	Yes <b>No (default)</b>	Clears the BIOS PCI/PnP configuration data stored in Flash on next boot.
Numlock	Off <b>On (default)</b>	Selects the power on state of the Numlock key.

**Table 15. Peripheral Configuration Submenu**

Feature	Options	Description
Serial Port A	<b>Auto (default)</b> Disabled Enabled	Disables or enables serial port A.
Serial Port B	<b>Auto (default)</b> Disabled Enabled	Disables or enables serial port B.
Legacy USB Support	Auto <b>Disabled (default)</b> Enabled	Disables or enables support for legacy USB.

**Table 16. IDE Configuration Menu**

Feature	Options	Description
IDE Controller	<b>Boot (default)</b> Disabled Primary Secondary	“Disabled” disables the integrated IDE Controller. “Primary” enables only the primary IDE Controller. “Secondary” enables the secondary IDE Controller. “Both” enables both IDE Controllers.
Hard Disk Pre-Delay	<b>Disabled (default)</b> 3 seconds 6 seconds 9 seconds 12 seconds 15 seconds 21 seconds 30 seconds	Selects the hard disk drive pre-delay. Causes the BIOS to insert a delay before attempting to detect IDE drives in the system.  Configures primary and secondary IDE devices as the name of the drive found or Not Installed.
Primary IDE Master	If device detected, see Table 17 for IDE configuration options.	Reports name of device installed, otherwise displays “Not Installed.”
Primary IDE Slave	If device detected, see Table 17 for IDE configuration options.	Reports name of device installed, otherwise displays “Not Installed.”
Secondary IDE Master	If device detected, see Table 17 for IDE configuration options.	Reports name of device installed, otherwise displays “Not Installed.”
Secondary IDE Slave	If device detected, see Table 17 for IDE configuration options.	Reports name of device installed, otherwise displays “Not Installed.”

**Table 17. IDE Configuration Submenu**

Feature	Options	Description
Type	None User <b>Auto (default)</b> CD-ROM ATAPI Removable Other ATAPI IDE Removable	Specifies the IDE configuration mode for IDE devices.  “User” allows the cylinders, heads, and sectors fields to be changed.  “Auto” automatically fills in the values of the cylinders, heads, and sectors fields.
LBA Mode Control	Disabled <b>Enabled (default)</b>	Enables or disables the LBA mode control.
Multi-Sector Transfers	Disabled 2 sectors 4 sectors 8 sectors <b>16 sectors (default)</b>	Specifies the number of sectors per block for transfers in a single interrupt from the hard drive to memory.  Check the hard drive’s specification for optimum setting.

continued

**Table 17. IDE Configuration Submenu (continued)**

Feature	Options	Description
PIO Mode	<b>Auto (default)</b>	Configures the PIO mode.
	0	
	1	
	2	
	3	
Ultra DMA	<b>Disabled (default)</b>	Configures the Ultra DMA mode.
	Mode 0	
	Mode 1	
	Mode 2	
	Mode 3	
	Mode 4	

**Table 18. Diskette Configuration Submenu**

Feature	Options	Description
Diskette Controller	Disabled	Disables or enables the integrated diskette controller.
	<b>Enabled (default)</b>	
Floppy A	Not Installed	Disables or enables serial port B.
	360KB 5.25"	
	1.2MB 5.25"	
	720KB 3.5"	
	<b>1.44/1.25MB 3.5" (default)</b>	
	2.88MB 3.5"	
Diskette Write Protect	<b>Disabled (default)</b>	Disables or enables write protect for the diskette drive.
	Enabled	

**Table 19. Event Log Configuration Submenu**

Feature	Options	Description
Event Log	No options	Displays whether or not there is space available in the event log.
Event Log Validity	No options	Displays whether or not the contents of the event log are valid.
View Event Log	Press <ENTER> to view log.	Displays event log or "No Unread Events."
Clear All Event Logs	Yes	Clears the event log after rebooting.
	<b>No (default)</b>	
Event Logging	Disabled	Disables or enables logging of events.
	<b>Enabled (default)</b>	
ECC Event Logging	Disabled	Disables or enables logging of ECC events.
	<b>Enabled (default)</b>	
Mark Events As Read	Press <ENTER> to mark all events read.	Marks all DMI events in the log as read.

## Security Menu

The menu bar is shown below.

Main	Advanced	<b>Security</b>	Boot	System Management	Exit
------	----------	-----------------	------	-------------------	------

Table 20 shows the Security menu. This menu sets passwords and security features.

**Table 20. Security Menu**

Feature	Options	Description
User Password Is	No options	Displays whether or not there is a supervisor password installed. Default is no user password installed.
Supervisor Password Is	No options	Displays whether or not there is a user password installed. Default is no supervisor password installed.
Set Supervisor Password	Press <Enter> to input a supervisor password.	Password can be up to seven alphanumeric characters. Default is no supervisor password.
Set User Password	Press <Enter> to input a user password.	Password can be up to seven alphanumeric characters. Default is no user password.
Clear User Password	No options	Clears the user password.
User Access Level	Limited No Access View Only <b>Full (default)</b>	“Limited” allows only limited fields to be changed such as Date and Time. “No Access” prevents user access to the Setup Utility. “View Only” allows access to the Setup Utility but the fields can not be changed. “Full” allows any field to be changed.
Unattended Start	<b>Disabled (default)</b> Enabled	Disables or enables an unattended start.

## Boot Menu

The menu bar is shown below.

Main	Advanced	Security	<b>Boot</b>	System Management	Exit
------	----------	----------	-------------	-------------------	------

Table 21 shows the Boot menu. This menu sets boot features and the boot sequence.

**Table 21. Boot Menu**

Feature	Options	Description
Quiet Boot	<b>Disabled (default)</b> Enabled	“Disabled” displays normal POST messages. “Enabled” displays OEM logo instead of POST messages.
Quick Boot	Disabled <b>Enabled (default)</b>	Allows the BIOS to skip certain tests while booting. This decreases the time needed to boot the system.
Scan User Flash Area	<b>Disabled (default)</b> Enabled	Allows the BIOS to scan the Flash ROM for user binaries.

continued

**Table 21. Boot Menu** (continued)

Feature	Options	Description
After Power Failure	Stays Off <b>Last State (default)</b> Power On	Determines the mode of operation if a power loss occurs. "Stays Off" keeps system off once power is restored. "Power On" boots the system after power is restored. "Last State" restores the system to the same state it was in before the power failed.
On Modem Ring	<b>Stay Off (default)</b> Power On	APM Mode only: Determines the action of the system when the system power is off and the modem is ringing.
On LAN	Stay Off <b>Power On (default)</b>	APM Mode only: Determines the action of the system when a LAN wake up event occurs.
On PME	<b>Stay Off (default)</b> Power On	APM Mode only: Determines the action of the system when a PCI Power Management Enabled wake up event occurs.
IDE Drive Configuration	Primary Master IDE <b>1<sup>st</sup> IDE (default)</b> 2 <sup>nd</sup> IDE 3 <sup>rd</sup> IDE 4 <sup>th</sup> IDE Primary Slave IDE <b>2<sup>nd</sup> IDE (default)</b> Secondary Master IDE <b>3<sup>rd</sup> IDE (default)</b> Secondary Slave IDE <b>4<sup>th</sup> IDE (default)</b>	Configures the peripheral devices. Configurable options for other IDE devices are similar to Primary Master IDE.
1 <sup>st</sup> to 8-th Boot Devices	<b>ATAPI CD-ROM (default)</b> <b>Floppy</b> <b>IDE-HDD</b> <b>Intel UNDI, PXE-2.0 (LAN 1)</b> Intel UNDI, PXE-2.0 (LAN 2) ARMD-FDD SCSI <b>Disabled</b>	Configures the boot sequence from the available devices.  IDE-HDD = Hard disk drive. Intel UNDI, PXE-2.0 = Network boot using PXE. ARMD-FDD = ATAPI removable device-floppy disk drive. SCSI = If a SCSI device is installed, it will appear as one of the possible boot devices with the name of device.

## System Management Menu

The menu bar is shown below.

Main	Advanced	Security	Boot	<b>System Management</b>	Exit
------	----------	----------	------	--------------------------	------

Table 22 shows the System Management menu. This menu sets server management features.

**Table 22. System Management Menu**

Feature	Options	Description
Serial Port	Disabled <b>COM1 3F8 IRQ4 (default)</b> COM2 2F8 IRQ3 COM3 3E8 IRQ4	Configures which COM port to use for serial console redirection.
Serial Console Redirection	Disabled <b>Enabled (default)</b>	Disables or enables serial console redirection.
Baud Rate	9600 <b>19.2K (default)</b> 38.4K 115.2K	Sets the baud rate.
Flow Control	No Flow Control <b>CTS/RTS (default)</b> XON/XOFF CTS/RTS+CD	If enabled, it will use the flow control selected. CTS/RTS = Hardware. XON/XOFF = Software. CTS/RTS + CD = Hardware + Carrier Detect for modem use.
LAN Device	<b>Disabled (default)</b> LAN Device 1 LAN Device 2	Configures which LAN device to use for LAN console redirection.
LAN Console Redirection	<b>Disabled (default)</b> Enabled	Disables or enables LAN console redirection.

## Exit Menu

The menu bar is shown below.

Main	Advanced	Security	Boot	System Management	Exit
------	----------	----------	------	-------------------	------

Table 23 shows the Exit menu. This menu exits the Setup program – saving, discarding, and loading default settings.

**Table 23. Exit Menu**

Feature	Options	Description
Exit Saving Changes	No options	Exits system Setup and saves your changes in CMOS.
Exit Discarding Changes	No options	Exits system setup without saving your changes in CMOS.
Load Setup Defaults	No options	Loads setup defaults.
Load Custom Defaults	No options	Loads custom defaults.
Save Custom Defaults	No options	Save custom defaults.
Discard Changes	No options	Discards changes.

## Upgrading the BIOS

### Preparing for the Upgrade

Before you upgrade the BIOS, prepare for the upgrade by recording the current BIOS settings, obtaining the upgrade utility, and making a copy of the current BIOS.

### Recording the Current BIOS Settings

1. Boot the computer and press <F2> when you see the message:  
Press <F2> Key if you want to run SETUP
2. Write down the current settings in the BIOS Setup program.

#### NOTE

Do not skip step 2. You will need these settings to configure your computer at the end of the procedure.

## Obtaining the Upgrade Utility

You can upgrade to a new version of the BIOS using the new BIOS files and the BIOS upgrade utility, iFLASH.EXE. You can obtain the BIOS upgrade file and the iFLASH.EXE utility through your computer supplier or from the Intel Customer Support website:

<http://www.intel.com/isp>

### NOTE

Please review the instructions distributed with the upgrade utility before attempting a BIOS upgrade.

This upgrade utility allows you to:

- Upgrade the BIOS in flash memory.
- Update the language section of the BIOS.

The following steps explain how to upgrade the BIOS.

## Creating a Bootable Floppy Diskette

1. Use a DOS or Windows 95 system to create the floppy disk.
2. Insert a floppy disk in floppy drive A.
3. At the C:\ prompt, for an unformatted floppy disk, type:

```
format a:/s
```

or, for a formatted floppy disk, type:

```
sys a:
```

4. Press <Enter>.

## Creating the BIOS Upgrade Floppy Diskette

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

1. Copy the BIOS upgrade 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 upgrade file, for example:

```
CB01BI.EXE
```

4. Press <Enter>. The extracted file contains the following files:

```
LICENSE.TXT
```

```
README.TXT
```

```
BIOS.EXE
```

5. Read the LICENSE.TXT file, which contains the software license agreement and the README.TXT file, which contains the instructions for the BIOS upgrade.
6. Insert the bootable floppy disk into drive A.



7. To extract the BIOS.EXE file to the floppy disk, change to the temporary directory that holds the BIOS.EXE file and type:  
BIOS A:
8. Press <Enter>.
9. The floppy disk now holds the BIOS upgrade and recovery files.

## Performing the Upgrade

1. Boot the computer with the floppy disk in drive A. The BIOS upgrade utility screen appears.
2. Select Update Flash Memory From a File.
3. Select Update System BIOS. Press <Enter>.
4. Use the arrow keys to select the correct .bio file. Press <Enter>.
5. When the utility asks for confirmation that you want to flash the new BIOS into memory, select Continue with Programming. Press <Enter>.
6. When the utility displays the message upgrade is complete, remove the floppy disk. Press <Enter>.
7. As the computer boots, check the BIOS identifier (version number) to make sure the upgrade was successful.
8. To enter the Setup program, press <F2> when you see the message:  
Press <F2> Key if you want to run SETUP
9. For proper operation, load the Setup program defaults. To load the defaults, press <F9>.
10. To accept the defaults, press <Enter>.
11. Set the options in the Setup program to the settings you wrote down before the BIOS upgrade.
12. To save the settings, press <F10>.
13. To accept the settings, press <Enter>.
14. Turn off the computer and reboot.

## Recovering the BIOS

It is unlikely that anything will interrupt the BIOS upgrade; however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an upgrade fails. The following procedure use recovery mode for the Setup program.

### NOTE

Because of the small amount of code available in the non-erasable boot block area, there is no video support. You will not see anything on the screen during the procedure. Monitor the procedure by listening to the speaker and looking at the floppy drive LED.

1. Turn off all peripheral devices connected to the computer. Turn off the computer.
2. Remove the computer cover.
3. Locate jumper block J22.
4. Remove the BIOS configuration jumper (see Page 9).
5. Insert the bootable BIOS upgrade floppy disk into floppy drive A.
6. Replace the cover, turn on the computer, and allow it to boot. The recovery process will take a few minutes.
7. Listen to the speaker.

8. Two beeps and the end of activity in drive A indicate successful BIOS recovery.
9. A series of continuous beeps indicates failed BIOS recovery.
10. If recovery fails, return to step 1 and repeat the recovery process.
11. If recovery is successful, turn off the computer. Remove the computer cover and continue with the following steps.
12. Set the BIOS configuration jumper to pins 1-2.
13. Replace the computer cover. Leave the upgrade disk in drive A and turn on the computer.
14. Continue with the BIOS upgrade (see “Upgrading the BIOS” on page 54).



## 4 Solving Problems

---

This chapter helps you identify and solve problems that might occur while you are using the system.

### Resetting the System

To do this:	Press:
Soft boot reset, which clears system memory and reloads the operating system.	<Ctrl+Alt+Del>
Clear system memory, restart POST, and reload the operating system.	Reset button
Cold boot reset. Turn the system power off and then on. This clears system memory, restarts POST, reloads the operating system, and halts power to all peripherals.	Power off/on

### Initial System Startup

Problems that occur at initial system startup are usually caused by incorrect installation or configuration. Hardware failure is a less frequent cause.

#### Checklist

- Are all cables correctly connected and secured?
- Are the processors or processor termination board fully seated in their slots on the server board?
- Are all add-in PCI boards fully seated in their slots on the server board?
- Are all switch and jumper settings on the server board correct?
- Are all jumper and switch settings on add-in boards and peripheral devices correct? To check these settings, refer to the manufacturer's documentation that comes with them. If applicable, ensure that there are no conflicts—for example, two add-in boards sharing the same interrupt.
- Are all SDRAM DIMMs installed correctly?
- Are all peripheral devices installed correctly?
- If the system has a hard disk drive, is it properly formatted or configured?
- Are all device drivers properly installed?
- Are the configuration settings made with the SSU correct?
- Is the operating system properly loaded? Refer to the operating system documentation.
- Did you press the system power on/off switch on the front panel to turn the server on (power on light should be lit)?
- Is the system power cord properly connected to the system and plugged into a NEMA 5-15R outlet for 100-120 V~ or a NEMA 6-15R outlet for 200-240 V~?
- Is AC power available at the wall outlet?
- Are all integrated components from the tested components lists? Check the tested memory, and chassis lists, as well as the supported hardware and operating system list on the Intel Customer Support website: <http://www.intel.com/isp>

# Running New Application Software

Problems that occur when you run new application software are usually related to the software. Faulty equipment is much less likely, especially if other software runs correctly.

## Checklist

- Does the system meet the minimum hardware requirements for the software? See 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-ROM disk, is the disk 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 system?
- Are you using the software correctly?

If the problems persist, contact the software vendor's customer service representative.

## After the System Has Been Running Correctly

Problems that occur after the system 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-ROM disk, try a different disk to see if the problem occurs on all disks.
- 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, and try running it again. Make sure all 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. (Symptoms of voltage spikes include a flickering video display, unexpected system reboots, and the system not responding to user commands.)

## NOTE

**Random errors in data files:** 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 system power cord.

# More Problem Solving Procedures

This section provides a more detailed approach to identifying a problem and locating its source.

## Preparing the System for Diagnostic Testing



### CAUTION

**Turn off devices before disconnecting cables:** Before disconnecting any peripheral cables from the system, turn off the system and any external peripheral devices. Failure to do so can cause permanent damage to the system and/or the peripheral devices.

1. Turn off the system and all external peripheral devices. Disconnect all of them from the system, except the keyboard and video monitor.
2. Make sure the system power cord is plugged into a properly grounded AC outlet.
3. Make sure your video display monitor and keyboard are correctly connected to the system. Turn on the video monitor. Set its brightness and contrast controls to at least two thirds of their maximum ranges (see the documentation supplied with your video display monitor).
4. If the operating system normally loads from the hard disk drive, make sure there is no diskette in drive A. Otherwise, place a diskette containing the operating system files in drive A.
5. Turn on the system. If the power LED does not light, see “Power Light Does Not Light” on page 71.

## Monitoring POST

See Chapter 3.

## Verifying Proper Operation of Key System Lights

As POST determines the system configuration, it tests for the presence of each mass storage device installed in the system. 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, see “Diskette Drive Activity Light Does Not Light” on page 72.
- If a second diskette drive is installed, does its activity light turn on briefly? If not, see “Diskette Drive Activity Light Does Not Light” on page 72.
- If there is a hard disk drive or SCSI devices installed in the system, does the hard disk drive activity light on the control panel turn on briefly? If not, see “Hard Disk Drive Activity Light Does Not Light” on page 73.

## Confirming Loading of the Operating System

Once the system 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, see “No Characters Appear on Screen” on page 71.

## Specific Problems and Corrective Actions

This section provides possible solutions for these specific problems:

- Power light does not light.
- There is no beep or an incorrect beep pattern.
- No characters appear on screen.
- Characters on the screen appear distorted or incorrect.
- System cooling fans do not rotate.
- Diskette drive activity light does not light.
- Hard disk drive activity light does not light.
- CD-ROM drive activity light does not light.
- There are problems with application software.
- The bootable CD-ROM is not detected.

Try the solutions in the order given. If you cannot correct the problem, contact your service representative or authorized dealer for help.

### Power Light Does Not Light

Check the following:

- Is the system operating normally? If so, the power LED is probably defective or the cable from the front panel to the server board is loose.
- Are there other problems with the system? If so, check the items listed under “System Cooling Fans Do Not Rotate Properly.”

If all items are correct and problems persist, contact your service representative or authorized dealer for help.

### No Characters Appear on Screen

Check the following:

- Is the keyboard functioning? Check to see that the “Num Lock” light is functioning.
- Is the video monitor plugged in and turned on?
- Are the brightness and contrast controls on the video monitor properly adjusted?
- Are the video monitor switch settings correct?
- Is the video monitor signal cable properly installed?
- Is the onboard video controller enabled?

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 server board connector.
2. Reboot the system for changes to take effect.
3. If there are still no characters on the screen after you reboot the system 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 Error Messages” on page 75.

4. If you do not receive a beep code and characters do not appear, the video display monitor or video controller may have failed. Contact your service representative or authorized dealer for help.

## Characters Are Distorted or Incorrect

Check the following:

- Are the brightness and contrast controls properly adjusted on the video monitor? See the manufacturer's documentation.
- Are the video monitor signal and power cables properly installed?

If the problem persists, the video monitor may be faulty or it may be the incorrect type. Contact your service representative or authorized dealer for help.

## System Cooling Fans Do Not Rotate Properly

If the system cooling fans are not operating properly, system components could be damaged.

Check the following:

- Is AC power available at the wall outlet?
- Is the system power cord properly connected to the system and the wall outlet?
- Did you press the power button?
- 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 connectors properly connected to the server board?
- Is the cable from the front panel board connected to the server board?
- Are the power supply cables properly connected to the server board?
- Are there any shorted wires caused by pinched cables or power connector plugs forced into power connector sockets the wrong way?

If the switches and connections are correct and AC power is available at the wall outlet, contact your service representative or authorized dealer for help.

## Diskette Drive Activity Light Does Not Light

Check the following:

- Are the diskette drive power and signal cables 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 the problem persists, there may be a problem with the diskette drive, server board, or drive signal cable. Contact your service representative or authorized dealer for help.



## Hard Disk Drive Activity Light Does Not Light

If you have installed one or more hard disk drives in your system, check the following:

- Are the power and signal cables to the drive properly installed?
- Are all relevant switches and jumpers on the hard drive and adapter board set correctly?
- Is the onboard IDE controller enabled? (IDE hard drives only)
- Is the hard disk drive properly configured?

### NOTE

**Front panel hard disk LED indicates IDE and SCSI devices:** The hard disk drive activity light on the front panel lights when either an IDE hard disk drive, or a SCSI device, is in use. This LED does not display CD-ROM activity.

## CD-ROM Drive Activity Light Does Not Light

Check the following:

- Are the power and signal cables to the CD-ROM drive properly installed?
- Are all relevant switches and jumpers on the drive set correctly?
- Is the drive properly configured?
- Is the onboard IDE controller enabled?

### NOTE

**Front panel hard disk LED indicates IDE and SCSI devices:** The hard disk drive activity light on the front panel lights when either an IDE hard disk drive, or a SCSI device, is in use. This LED does not display CD-ROM activity.

## Cannot Connect to a Server

- Make sure you are using the drivers that are shipped on the system Configuration Software CD for the onboard network controller.
- Make sure the driver is loaded and the protocols are bound.
- Make sure the network cable is securely attached to the connector at the system back panel and that the network controller Link LED is on (visible at back panel). If the cable is attached but the problem persists, try a different cable.
- Make sure the hub port is configured for the same duplex mode as the network controller.
- Check with your LAN administrator about the correct networking software that needs to be installed.
- If you are directly connecting two servers (no hub), you will need a crossover cable (see your hub documentation for more information on crossover cables).

- Check the network controller LEDs that are visible through an opening at the system back panel.

## Problems with Network

### **The server hangs when the drivers are loaded.**

- Change the PCI BIOS interrupt settings. Try the “PCI Installation Tips” below.

### **Diagnostics pass, but the connection fails.**

- Make sure the network cable is securely attached.
- Make sure you specify the correct frame type in your NET.CFG file.

### **The Link LED doesn't light.**

- Make sure you have loaded the network drivers.
- Check all cable connections.
- Try another port on the hub.
- Make sure you have the correct type of cable between the adapter and the hub. Some hubs require a crossover cable while others require a straight through cable (for more information on crossover cabling, see your hub documentation).

### **The Activity LED doesn't light.**

- Make sure you've loaded the correct network drivers.
- Network may be idle. Try accessing a server.

### **The controller stopped working when an add-in adapter was installed.**

- Make sure the cable is connected to the port from the onboard network controller.
- Make sure your PCI BIOS is current. Try the “PCI Installation Tips” below.
- Make sure the other adapter supports shared interrupts. Also, make sure your operating system supports shared interrupts; OS/2<sup>†</sup> does not.
- Try reseating the add in adapter.

### **The add-in adapter stopped working without apparent cause.**

- Try reseating the adapter first; then try a different slot if necessary.
- The network driver files may be corrupt or deleted. Delete and then reinstall the drivers.
- Run the diagnostics.

## Problems with Application Software

If you have problems with application software, do the following:

- Verify that the software is properly configured for the system. See the software installation and operation documentation for instructions on setting up and using the software.
- Try a different copy of the software to see if the problem is with the copy you are using.
- Make sure all cables are installed correctly.
- Verify that the server board jumpers are set correctly. See Chapter 1.

- ❑ If other software runs correctly on the system, contact your vendor about the failing software. If the problem persists, contact the software vendor's customer service representative for help.

## Bootable CD-ROM Is Not Detected

Check the following:

- ❑ Is the BIOS set to allow the CD-ROM to be the first bootable device?

## Error and Informational Messages

When you turn on the system, POST displays messages that provide information about the system. If a failure occurs, POST emits beep codes that indicate errors in hardware, software, or firmware. If POST can display a message on the video display screen, it causes the speaker to beep twice as the message appears.

## Error Codes and Error Messages

The following tables show the beep codes and error messages for AMIBIOS.

**Table 24. Beep Codes**

Beeps	Error message	Description
1	Refresh Failure	The memory refresh circuitry is faulty.
2	Parity Error	Parity error in the base memory (the first 64 KB block) of memory.
3	Base 64 KB Memory Failure	Memory failure in first 64 KB.
4	Timer Not Operational	A memory failure in the first 64 KB of memory, or Timer 1 is not functioning.
5	Processor Error	The CPU generated an error.
6	8042 - Gate A20 Failure	Cannot switch to protected mode.
7	Processor Exception Interrupt Error	The CPU on the CPU Card generated an exception interrupt.
8	Display Memory Read/Write Error	The system video adapter is either missing or its memory is faulty. This is not a fatal error.
9	ROM Checksum Error	The ROM checksum value does not match the value encoded in AMIBIOS.
10	CMOS Shutdown Register Read/Write Error	The shutdown register for CMOS RAM has failed.
11	Cache Memory Bad – Do Not Enable Cache	The cache memory test failed. Cache memory is disabled. Do not press <Ctrl> <Alt> <Shift> <+> to enable cache memory.

**Table 25. Error Messages Description**

<b>Error Message</b>	<b>Description</b>
8042 Gate-A20 Error	Gate A20 on the keyboard controller (8042) is not working. Replace the 8042.
Address Line Short!	Error in the address decoding circuitry.
C: Drive Error	No response from drive C:. Run the AMIDdiag Hard Disk Utility. Check the C: hard disk type in Standard Setup.
C: Drive Failure	No response from hard disk drive C:. Replace the drive.
Cache Memory Bad, Do Not Enable Cache!	Cache memory is defective. Run AMIDdiag.
CH-2 Timer Error	An AT system has two timers. There is an error in timer 2.
CMOS Battery State Low	CMOS RAM is powered by a battery. The battery power is low. Replace the battery.
CMOS Checksum Failure	CMOS RAM checksum is different than the previous value. Run WINBIOS Setup.
CMOS System Options Not Set	The values stored in CMOS RAM have been destroyed. Run WINBIOS Setup.
CMOS Display Type Mismatch	The video type in CMOS RAM does not match the type detected. Run WINBIOS Setup.
CMOS Memory Size Mismatch	The amount of memory found by AMIBIOS is different than the amount in CMOS RAM. Run WINBIOS Setup.
CMOS Time and Date Not Set	Run Standard Setup to set the date and time.
D: Drive Error	No response from drive D:. Run the AMIDdiag Hard Disk Utility. Check the hard disk type in Standard Setup.
D: Drive failure	No response from hard disk drive D:. Replace the drive.
Diskette Boot Failure	The boot diskette in drive A: cannot be used to boot the system. Use another boot diskette and follow the screen instructions.
Display Switch Not Proper	Some systems require a video switch be set to either color or monochrome. Turn the system off, set the switch properly, then power on.
DMA Error	Error in the DMA controller.
DMA 1 Error	Error in the first DMA channel.
DMA 2 Error	Error in the second DMA channel.
FDD Controller Failure	AMIBIOS cannot communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered down.
HDD Controller Failure	AMIBIOS cannot communicate with the hard disk drive controller. Check all appropriate connections after the system is powered down.
INTR1 Error	Interrupt channel 1 failed POST.
INTR2 Error	Interrupt channel 2 failed POST.
Invalid Boot Diskette	AMIBIOS can read the diskette in floppy drive A:, but it cannot boot the system with it. Use another boot diskette and follow the screen instructions.
Keyboard Is Locked...Unlock It	The keyboard lock on the system is engaged. The system must be unlocked to continue to boot.
Keyboard Error	The keyboard has a timing problem. Make sure a Keyboard Controller AMIBIOS is installed. Set Keyboard in Advanced Setup to Not Installed to skip the keyboard POST routines.
KB/Interface Error	There is an error in the keyboard connector.

continued

**Table 25. Error Messages Description (continued)**

<b>Error Message</b>	<b>Description</b>
No ROM BASIC	Cannot find a proper bootable sector on drive A:, C:, or CD-ROM drive. AMIBIOS cannot find ROM Basic.
Off Board Parity Error	Parity error in memory installed on an adapter card in an expansion slot. The format is: OFF BOARD PARITY ERROR ADDR = (XXXX) XXXX is the hex address where the error occurred. Run AMIDiag to find and correct memory problems.
On Board Parity Error	Parity error in serverboard memory. The format is: ON BOARD PARITY ERROR ADDR = (XXXX) XXXX is the hex address where the error occurred. Run AMIDiag to find and correct memory problems.
Parity Error ????	Parity error in system memory at an unknown address. Run AMIDiag to find and correct memory problems.

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